| DESIGN DATA | | | | |
|---|---|---|---|---|
| Traffic | Average Daily | | | |
| Current 2019 | Pass: <750 | Trucks: <750 | Total: <750 | |
| Clear Zone Distance: 18 ft | | Design Speed: 55 mph | | |
| Minimum Sight Dist. for Stopping: 520 ft | | Bridges: N/A | | |
| Sight Dist. for No Passing Zone: N/A | | | | |
| | | | | |
| | | | | |
| | | | | |

| | STATE | PROJECT NO. | PCN | SECTION NO. | SHEET NO. |
|---|---|---|---|---|---|
| | ND | ROM-0300(137) | 22155 | 1 | 1 |

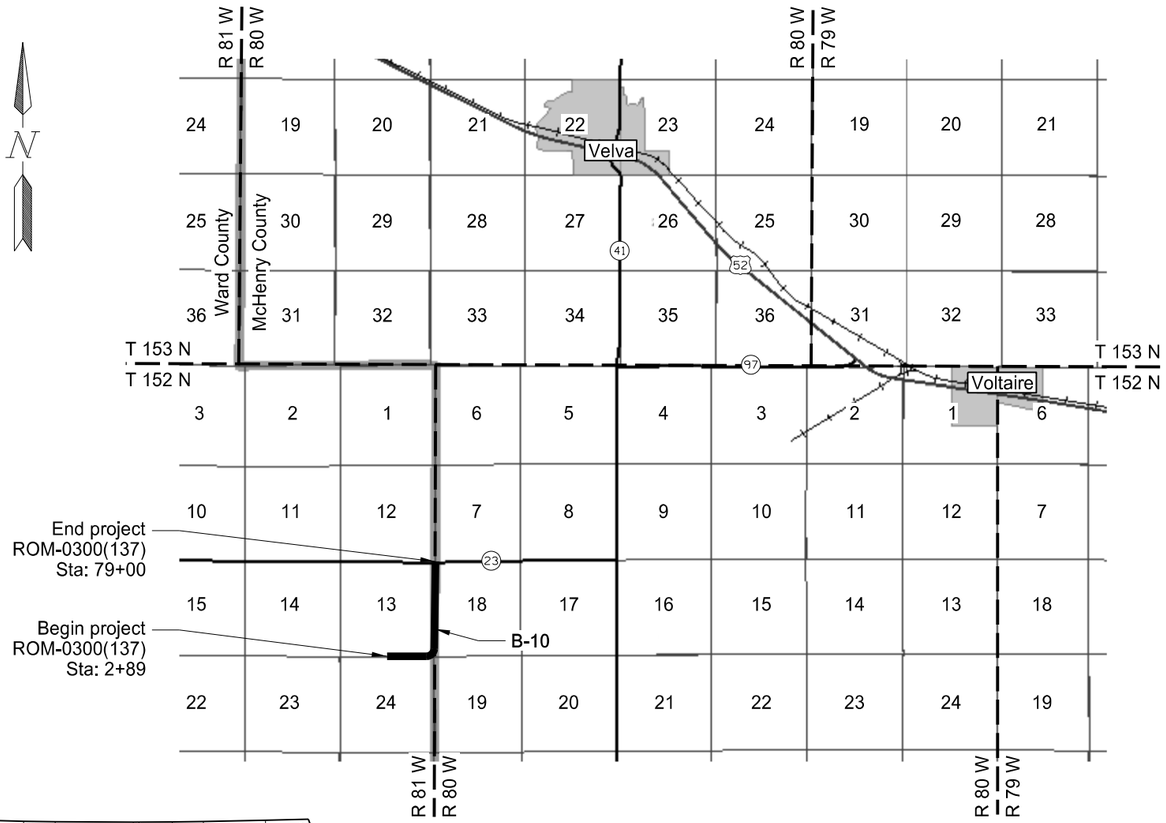
# JOB # 3
# NORTH DAKOTA
# DEPARTMENT OF TRANSPORTATION

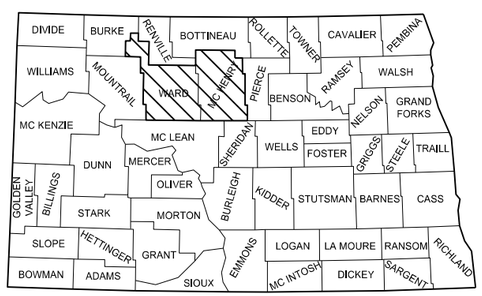
## ROM-0300(137)

Ward & McHenry Counties
Minuteman Missile Access Road B-10
Reconstruction

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 |
|---|---|---|
| ROM-0300(137) \ B-10 Missile Road | 1.441 | 1.441 |




STATE COUNTY MAP

| DESIGNER |
|---|
| Bradley Schaff |
| DESIGNER |
| DESIGNER |

SAMBATEK, INC.

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222 , on 05/06/19 and the original document is stored at the North Dakota Department of Transportation

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 2 | 1 |

# TABLE OF CONTENTS

## PLAN SECTIONS



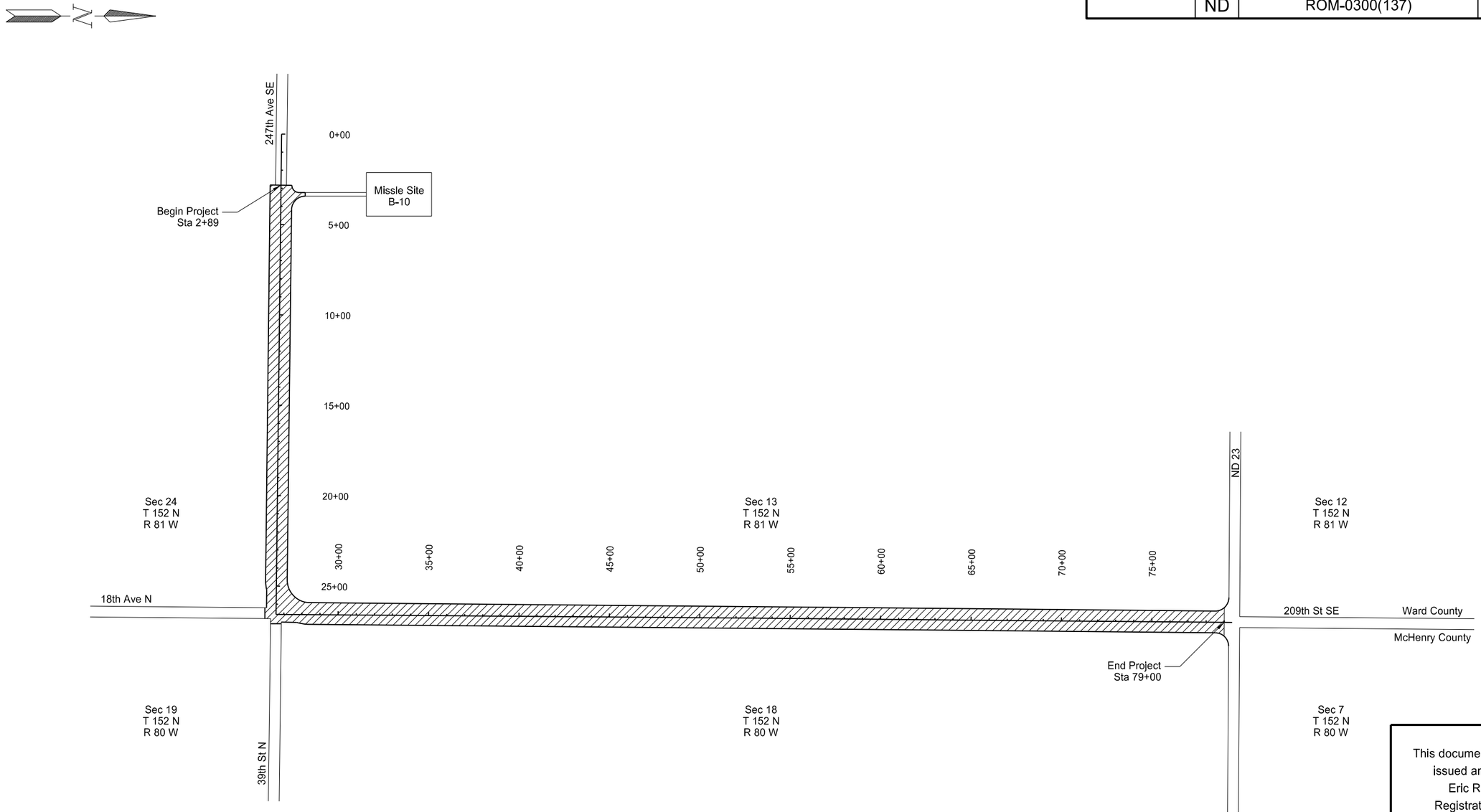
## LIST OF STANDARD DRAWINGS

| 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-260-1 | Erosion And Siltation Controls - Silt Fence |
| D-261-1 | Erosion Control - Fiber Roll Placement Details |
| D-704-9 | Construction Sign Details - Terminal And Guide 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-704-20 | Terminal And Seal Coat Sign Layouts |
| D-704-22 | Construction Truck And Temporary Detour Layouts |
| D-704-30 | Windrow Marking |
| D-714-1 | Reinforced Concrete Pipe Culverts And End Sections (Round Pipe) |
| D-714-4 | Round Corrugated Steel Pipe Culverts And End Sections |
| D-714-11 | Traversable End Sections For Corrugated Steel Pipe Culverts |
| D-714-22 | Concrete Pipe, Cattle Pass, or Precast Concrete Box Culvert Ties |
| D-714-26 | Transverse Mainline Pipe Installation Detail - Pipes 4 Feet or Less Below Top of Subgrade |
| D-714-27 | Pipe Installation Detail for Longitudinal Mainline Pipe or Pipe Not Under the Roadway |
| D-754-7 | Pipe Support And Sign Mounting Details |
| D-754-18 | Barricade And Advance Signs For Forward Roadway Termination |
| D-754-24 | Mounting Details Perforated Tube |
| D-754-26, 29, 31 | Sign Punching, Stringer, and Support Location Details Regulatory, Warning and Guide Signs |
| D-754-82 | Object Markers |
| D-754-83 | Object Markers - Culverts |
| D-754-86 | 911 Sign Support Information And Sign Details |
| D-754-87 | Sign Punching, Stringer And Support Location Details For Street Name Signs And 911 Signs |

## SPECIAL PROVISIONS

| Number | Description |
|---|---|
| SP 003(14) | Temporary Erosion and Sediment Best Management Practices |
| SP 5279(14) | Permits and Environmental Considerations |
| SP 714(14) | Gravel Surfacing |

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 4 | 1 |




Legend

Reconstruction

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Scope of Work

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 6 | 1 |

# NOTES

**100-P01** **AGENCY COORDINATION:** The contractor must invite the following representatives to the preconstruction meeting and provide the Minot Air Force Base (MAFB) personnel 48 hours of advance notice before beginning work.

Military Contact:
MAFB - Missile Engineering
Dan Lewis P.E.
445 Peacekeeper Place
Minot AFB, ND 58705
(701)723-4834

Military Contact:
MAFB - Engineering Technician
Michelle Beavers
445 Peacekeeper Place
Minot AFB, ND 58705
(701)723-3998

McHenry County Contact:
McHenry County Auditor
Darlene Carpenter
P.O. Box 275
8103 61st Street NW
Stanley, ND, 58754
(701)628-2390

Ward County Contact:
Ward County Engineer
Dana G. Larsen
P.O Box 5005
Minot, ND, 58701
(701)838-2810

Brown Township Contact:
Township Road Overseer
Dwight Holmen
(701)338-2901

Brillian Township Contact:
Township Road Overseer
Gene and Lori Flaten
(701)624-5490

**100-P02** **ROAD CLOSURES:** Daytime road closures are allowed to remove and install centerline pipe crossings. Provide notice to all MAFB and Township officials listed above three working days prior to closing the roadway to traffic. Restore the roadway to all traffic at night. Close only one phase at a time per Section 100.

**100-P03** **CONSTRUCTION EQUIPMENT:** Storage of construction equipment or other materials is not allowed within USFWS waterfowl production areas and wetland easements. The N ½ of Section 13, T152N, R81W and the NW ¼ of Section 18, T152N, R80W are under USFWS wetland easement.

**104-P01** **WETLAND MITIGATION CREDITS:** Purchase wetland mitigation credits from Ducks Unlimited to satisfy the environmental commitments shown in Section 75. No work shall begin on the project until a Credit Sales Letter from Ducks Unlimited is submitted to and accepted by US Army Corps of Engineers.

The wetland mitigation credits shall be purchased from the Souris River Watershed mitigation site. The details are:

| | | |
|---|---|---|
| Souris River | 0.72 Credits @ $68,000/credit = | $ 48,960 |
| Total | 0.72 Credits | $ 48,960 |

The contact information to purchase the wetland mitigation credits from Ducks Unlimited is provided below:

Trenton Hieb
Biologist in Ecosystem Services - Mitigation
Ducks Unlimited (Great Plains Region)
2525 River Road
Bismarck, ND 58503
Phone: (701)355-3573
Email: thieb@ducks.org

**105-P01** **UTILITIES:** The vertical and horizontal utility locations shown in the plans are approximate. Plan locations should not be interpreted as exact for bidding or construction purposes.

**105-P02** **UTILITIES:** No utility relocations or adjustments are planned. All utilities on the project need to be protected and remain in existing location.

**107-P01** **ENVIRONMENTAL COMMITMENT:** Contact the US Fish and Wildlife Service to confirm sources of water intended for use are not part of the USFWS refuge system, including wetland easements.

Wetland District Managers:

Audubon Wildlife Refuge (Ward County)
Jon Beyer
3275 11th St NW
Coleharbor, ND 58531
701.442.5474

J. Clark Salyer Wildlife Refuge (McHenry County)
John Takala
681 Salyer Road
Upham, ND 58789
701.768.2548

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE-4222, on 05/06/19 and the original document is stored at the North Dakota Department of Transportation.

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 6 | 2 |

# NOTES

**203-010** **SHRINKAGE:** 20 percent additional volume is included for shrinkage in earth embankment.

**203-P01** **COMMON EXCAVATION-TYPE A:** The Engineer will measure and pay for Common Excavation-Type A at the plan quantity. A quantity of 3,752 CY has been included in the plan quantity to excavate 6 inches of the roadway core after salvaging the existing surfacing material.

**203-P02** **COMPACTION AND DENSITY CONTROL:** Compact material as specified in Section 203.04 E.2, Compaction Control, Type A.

**230-P01** **SUBGRADE PREPARATION:** Remove sod and organic material from the existing surfacing. Remove and dispose of railroad ties and other waste from the abandoned railroad bed. Remove and salvage the existing surfacing material. Excavate and widen to proposed subgrade lines and grades. Incorporate the existing surfacing material in the top of the subgrade preparation. All material removed and not approved for use in the embankment will become property of the contractor.

**260-P01** **SILT FENCE:** Do not trench silt fence when in a wetland.

**261-P01** **PERMANENT FIBER ROLLS:** If fiber rolls are to remain on the project, use fiber rolls that are composed of plastic or natural fiber photodegradable netting that has a life expectancy of between 12 and 24 months. If the photodegradable netting is plastic, the netting color must be either clear or green.

**302-P01** **SALVAGE & RELAY AGGREGATE SURFACE COURSE:** Salvage the existing surface aggregate. Incorporate the salvaged aggregate into the top of subgrade preparation.

**704-255** **TRAFFIC CONTROL:** Maintain traffic at all times except as provided for centerline pipe removal and replacement in Plan Note 100-P02. Provide traffic control consisting of the following layouts:

1. Standard D-704-15, Layout Type A;
2. Standard D-704-20, Layout G;
3. Standard D-704-22, Layout K; and
4. Standard D-704-30
5. Centerline Pipe Work Zone Details

When installing pipe, backfill the trench up to grade, and return traffic to normal by end of day's work. If a centerline pipe replacement will not be completed in one working day, the area shall be made traversable for one lane of traffic and be flagged 24 hours per day.

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 6 | 3 |

# ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation, Ward County and McHenry County have made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1: WHOOPING CRANE: The project is located within the migration corridor of the endangered whooping crane, and suitable stopover habitat for the whooping crane is present. The migration periods of the whooping crane are April 1st to May 15th and September 10 to October 31.

Stop all construction activities and notify the Engineer immediately in the event a whooping crane is identified within one mile of the project location. The Engineer will then coordinate with the USFWS, FHWA and NDDOT. Do not resume work within the avoidance area until the Engineer has confirmed that the bird has left the area.

Above ground utility conflicts are not foreseen with this project but if any impacts are required, contact the NDDOT Utility Engineer to coordinate with the utility company. Bird diverters will be installed by the utility company on overhead utility lines that are shifted due to the proposed action.

EN-2: Unavoidable impacts to wetlands will be mitigated onsite, adjacent to the project, or at a NDDOT approved mitigation site or bank. The bank will be provided by ducks unlimited in the drainage basin for which the wetland impacts will occur.

EN-3: TEMPORARY WETLAND IMPACT: Temporary impact areas within wetlands and or other waters are incorporated into the plans for this project. Remove temporary fill placed and sedimentation in wetlands or other waters. Restore these wetlands to preconstruction contours.

EN-4: All spills must be immediately reported to the ND Department of Health, Project Engineer and appropriate remedial actions performed.

EN-5: Erosion control devices will be used as needed during construction. Care is to be taken during construction activity near any water of the state to minimize adverse effects on a water body.

EN-6: Fugitive dust emissions created during construction will be minimized.

EN-7: Contact the US Fish and Wildlife Service to confirm sources of water intended for use are not part of the USFWS refuge system, including wetland easements.

EN-8: If questions related to wetlands or USFWS property interests arise during construction, notify USFWS staff before adjustments to the engineering plans are made.

EN-9: Coordinate and ensure proposed borrow site locations used in conjunction with the projects do not impact USFWS property interests. No borrow fill will be used from USFWS Waterfowl Production Areas or USFWS grassland easement properties.

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 8 | 1 |

# Estimated Quantities

| SPEC | CODE | ITEM DESCRIPTION | UNIT | ROM-0300(137) | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 103 | 100 | CONTRACT BOND | L SUM | 1 | | | | 1 |
| 201 | 370 | REMOVAL OF TREES 10IN | EA | 2 | | | | 2 |
| 201 | 380 | REMOVAL OF TREES 18IN | EA | 1 | | | | 1 |
| 202 | 170 | REMOVAL OF CULVERTS-ALL TYPES & SIZES | LF | 162 | | | | 162 |
| 203 | 101 | COMMON EXCAVATION-TYPE A | CY | 4716 | | | | 4716 |
| 203 | 109 | TOPSOIL | CY | 4818 | | | | 4818 |
| 203 | 140 | BORROW-EXCAVATION | CY | 5272 | | | | 5272 |
| 216 | 100 | WATER | M GAL | 263 | | | | 263 |
| 230 | 165 | SUBGRADE PREPARATION-TYPE A-12IN | STA | 76 | | | | 76 |
| 251 | 200 | SEEDING CLASS II | ACRE | 8.87 | | | | 8.87 |
| 251 | 2000 | TEMPORARY COVER CROP | ACRE | 8.87 | | | | 8.87 |
| 253 | 101 | STRAW MULCH | ACRE | 17.74 | | | | 17.74 |
| 260 | 100 | SILT FENCE UNSUPPORTED | LF | 2266 | | | | 2266 |
| 260 | 101 | REMOVE SILT FENCE UNSUPPORTED | LF | 2266 | | | | 2266 |
| 261 | 112 | FIBER ROLLS 12IN | LF | 6288 | | | | 6288 |
| 261 | 113 | REMOVE FIBER ROLLS 12IN | LF | 1520 | | | | 1520 |
| 302 | 402 | SALVAGE & RELAY AGGREGATE SURFACE COURSE | MILE | 1.44 | | | | 1.44 |
| 350 | 500 | GRAVEL SURFACING | TON | 7435 | | | | 7435 |
| 702 | 100 | MOBILIZATION | L SUM | 1 | | | | 1 |
| 704 | 100 | FLAGGING | MHR | 960 | | | | 960 |
| 704 | 1000 | TRAFFIC CONTROL SIGNS | UNIT | 753 | | | | 753 |
| 704 | 1052 | TYPE III BARRICADE | EA | 8 | | | | 8 |
| 704 | 1080 | STACKABLE VERTICAL PANELS | EA | 15 | | | | 15 |
| 709 | 151 | GEOSYNTHETIC MATERIAL TYPE R1 | SY | 839 | | | | 839 |
| 714 | 4099 | PIPE CONDUIT 18IN-APPROACH | LF | 318 | | | | 318 |
| 714 | 4105 | PIPE CONDUIT 24IN | LF | 177 | | | | 177 |
| 754 | 110 | FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING | SF | 18.9 | | | | 18.9 |
| 754 | 206 | STEEL GALV POSTS-TELESCOPING PERFORATED TUBE | LF | 78 | | | | 78 |
| 754 | 592 | RESET SIGN PANEL | EA | 2 | | | | 2 |
| 754 | 805 | OBJECT MARKERS - CULVERTS | EA | 8 | | | | 8 |
| 900 | 2001 | WETLAND MITIGATION SITE 1 | ACRE | 0.72 | | | | 0.72 |

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 10 | 1 |

# BASIS OF ESTIMATE

| | | Stations | |
|---|---|---|---|
| | | Mainline | |
| | | Sta 2+89 to Sta 79+00 | |
| | | Tangent | |
| **Material** | **Unit** | Width (ft) | Quantity per Station |
| Gravel Surfacing @ 1.875 Ton/CY | Ton | 24 | 91.60 |

| **Water** | | | |
|---|---|---|---|
| Description | Basis | Units | Mgal |
| 10 Mgal/Mile for Dust Palliative | 1.44 | Miles | 14.4 |
| 20 Gal/Ton for Gravel Surfacing | 7,435 | Ton | 148.7 |
| 10 Gal/CY for Embankment | 9,988 | CY | 99.9 |
| | **Project Total** | | **263.0** |

| **Object Markers - Culverts** | |
|---|---|
| Location | Quantity (EA) |
| All Pipe Locations | 8 |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Basis of Estimate

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 10 | 2 |

**Gravel Surfacing Summary**

| Item | Begin Station | End Station | Net Length (FT) | Average Width (FT) | Average End Area (SF) | Gravel Surfacing @ 1.875 Tons/CY (Ton) |
|---|---|---|---|---|---|---|
| Mainline | 2+89 | 79+00 | 7,611 | 24 | 13.19 | 6972 |
| Approaches | | | | | | 463 |
| **Project Total** | | | | | | **7,435** |

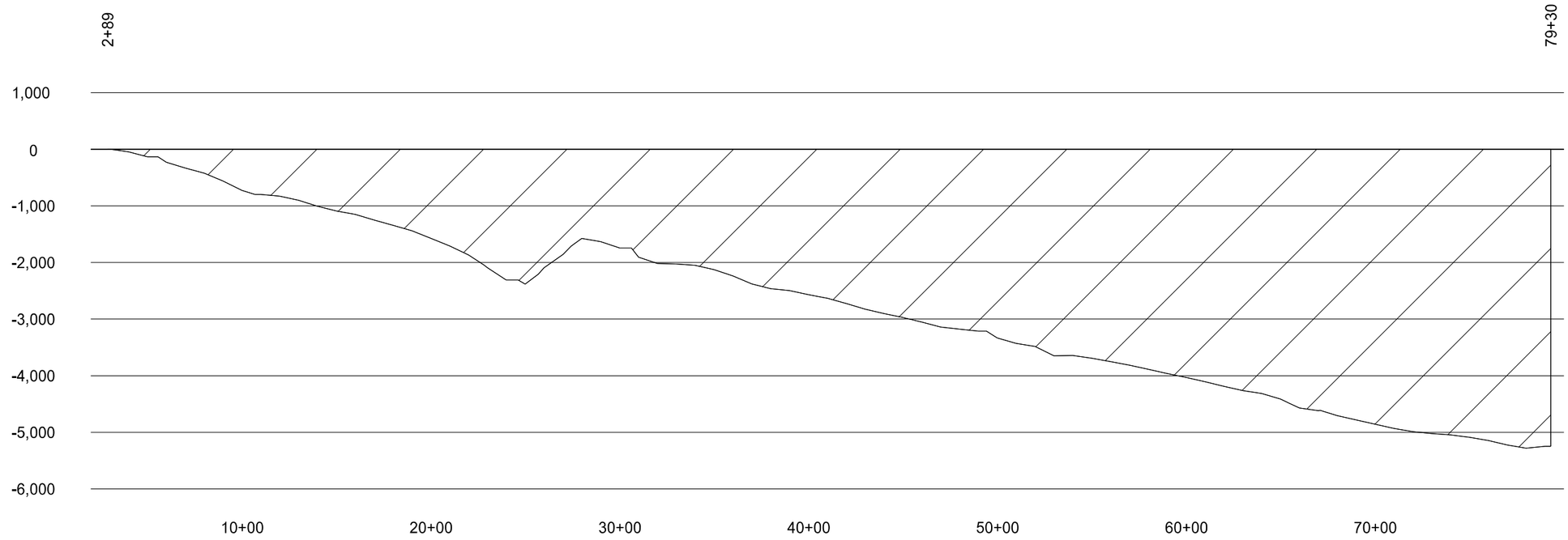
**Earthwork Summary**

| Item | Common Excavation | Embankment (CY) | Adjusted Embankment at 20% Shrinkage (CY) | Borrow (CY) | Topsoil (CY) |
|---|---|---|---|---|---|
| | A | B | C = B × (1.20) | D = C - A | E |
| Mainline | 4,707 | 8,040 | 9,648 | 4,941 | 4,818 |
| Intersection Realignment Detail | 9 | 28 | 34 | 25 | |
| Approaches | 0 | 255 | 306 | 306 | |
| **Project Total** | **4,716** | **8,323** | **9,988** | **5,272** | **4,818** |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Gravel Surfacing & Earthwork Summary

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 11 | 1 |




PROJECT TOTAL

| | | |
|---|---|---|
| EXC | = 4,716 | CY |
| BORROW EXC | = 9,988 | CY |
| EMB | = 5,272 | CY |
| AVG HAUL | = 9,988 | CY |
| | = 39.97 | STA |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Mass Balance Diagram

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 11 | 2 |

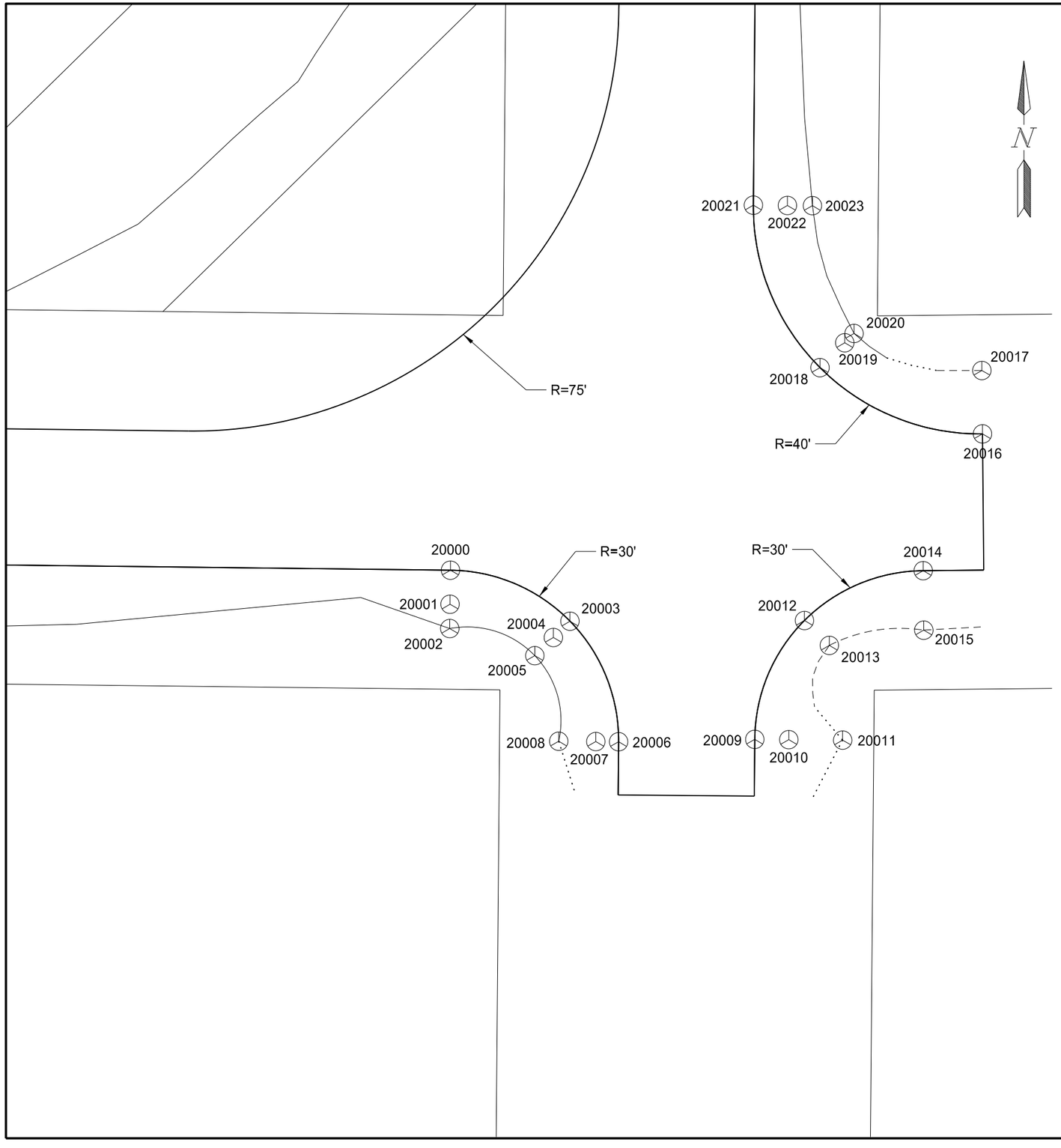
| Station | Common Excavation & Borrow | | | Embankment | | | Added Vol. (CY) | Adj. Accum. Vol. (CY) | Mass Ordinate |
|---|---|---|---|---|---|---|---|---|---|
| | End Area (SF) | Vol. (CY) | Accum. Vol. (CY) | End Area (SF) | Vol. (CY) | Adj. Vol. (CY) | | | |
| 2+89.31 R1 | 0.0 | 0 | 0 | 0.0 | 0 | 0 | 0 | 0.0 | 0 |
| 3+00.00 R1 | 17.4 | 3 | 3 | 22.4 | 4 | 5 | 0 | 5 | -2 |
| 3+31.31 R1 | 18.4 | 21 | 24 | 21.1 | 25 | 30 | 0 | 35 | -11 |
| 4+00.00 R1 | 9.4 | 35 | 59 | 24.8 | 58 | 70 | 0 | 105 | -46 |
| 5+00.00 R1 | 13.8 | 43 | 102 | 34.1 | 109 | 131 | 0 | 236 | -134 |
| 5+55.36 R1 | 11.1 | 0 | 102 | 41.2 | 0 | 0 | 0 | 236 | -134 |
| 6+00.00 R1 | 12.3 | 48 | 150 | 30.0 | 119 | 143 | 0 | 379 | -229 |
| 7+00.00 R1 | 13.7 | 48 | 198 | 38.1 | 126 | 151 | 0 | 530 | -332 |
| 8+00.00 R1 | 12.2 | 48 | 246 | 23.6 | 114 | 137 | 0 | 667 | -421 |
| 9+00.00 R1 | 13.3 | 47 | 293 | 60.3 | 155 | 187 | 0 | 854 | -560 |
| 10+00.00 R1 | 13.2 | 49 | 342 | 36.6 | 180 | 215 | 0 | 1,069 | -727 |
| 10+69.52 R1 | 17.3 | 39 | 381 | 15.5 | 67 | 81 | 30 | 1,180 | -798 |
| 11+00.00 R1 | 17.0 | 19 | 400 | 14.6 | 17 | 20 | 0 | 1,200 | -799 |
| 12+00.00 R1 | 15.7 | 61 | 461 | 26.3 | 76 | 91 | 0 | 1,291 | -830 |
| 13+00.00 R1 | 13.6 | 54 | 515 | 30.0 | 104 | 125 | 0 | 1,416 | -900 |
| 14+00.00 R1 | 13.4 | 50 | 565 | 40.1 | 130 | 156 | 0 | 1,572 | -1,006 |
| 15+00.00 R1 | 15.6 | 54 | 619 | 22.5 | 116 | 139 | 0 | 1,711 | -1,092 |
| 16+00.00 R1 | 14.1 | 55 | 674 | 29.0 | 95 | 115 | 0 | 1,826 | -1,151 |
| 17+00.00 R1 | 13.3 | 51 | 725 | 38.8 | 126 | 151 | 0 | 1,977 | -1,251 |
| 18+00.00 R1 | 13.9 | 50 | 775 | 25.6 | 119 | 143 | 0 | 2,120 | -1,344 |
| 19+00.00 R1 | 13.2 | 50 | 825 | 40.3 | 122 | 147 | 0 | 2,267 | -1,440 |
| 20+00.00 R1 | 11.9 | 46 | 871 | 40.5 | 150 | 180 | 0 | 2,447 | -1,574 |
| 21+00.00 R1 | 12.5 | 45 | 916 | 39.5 | 148 | 178 | 0 | 2,625 | -1,706 |
| 22+00.00 R1 | 12.8 | 47 | 963 | 54.4 | 174 | 209 | 0 | 2,834 | -1,868 |
| 22+80.00 R1 | 11.1 | 35 | 998 | 63.0 | 174 | 209 | 0 | 3,043 | -2,042 |
| 23+00.00 R1 | 8.6 | 7 | 1,005 | 65.2 | 47 | 57 | 0 | 3,100 | -2,092 |
| 24+00.00 R1 | 11.9 | 38 | 1,043 | 50.4 | 214 | 257 | 0 | 3,357 | -2,311 |
| 24+62.79 R1 | 15.1 | 0 | 1,043 | 33.4 | 0 | 0 | 0 | 3,357 | -2,311 |
| 25+00.00 R1 | 27.0 | 72 | 1,115 | 14.5 | 120 | 144 | 0 | 3,501 | -2,383 |
| 25+69.32 R1 | 127.2 | 198 | 1,313 | 0.0 | 19 | 22 | 0 | 3,523 | -2,207 |
| 26+00.00 R1 | 72.8 | 114 | 1,427 | 0.0 | 0 | 0 | 0 | 3,523 | -2,094 |
| 27+00.00 R1 | 56.9 | 240 | 1,667 | 2.6 | 5 | 6 | 0 | 3,529 | -1,859 |
| 27+43.96 R1 | 132.3 | 154 | 1,821 | 2.0 | 4 | 4 | 0 | 3,533 | -1,710 |
| 28+00.00 R1 | 0.0 | 137 | 1,958 | 0.0 | 2 | 2 | 0 | 3,535 | -1,575 |
| 29+00.00 R1 | 15.9 | 29 | 1,987 | 38.7 | 72 | 86 | 0 | 3,621 | -1,631 |
| 30+00.00 R1 | 17.6 | 62 | 2,049 | 39.2 | 144 | 173 | 0 | 3,794 | -1,743 |
| 30+62.72 R1 | 16.6 | 0 | 2,049 | 54.6 | 0 | 0 | 0 | 3,794 | -1,743 |
| 31+00.00 R1 | 15.8 | 62 | 2,111 | 62.2 | 188 | 225 | 0 | 4,019 | -1,906 |
| 32+00.00 R1 | 21.0 | 68 | 2,179 | 18.8 | 150 | 180 | 0 | 4,199 | -2,018 |
| 33+00.00 R1 | 18.4 | 73 | 2,252 | 18.6 | 69 | 83 | 0 | 4,282 | -2,028 |
| 34+00.00 R1 | 17.8 | 67 | 2,319 | 21.5 | 74 | 89 | 0 | 4,371 | -2,050 |
| 35+00.00 R1 | 18.1 | 66 | 2,385 | 42.3 | 118 | 142 | 0 | 4,513 | -2,125 |
| 36+00.00 R1 | 16.4 | 64 | 2,449 | 37.1 | 147 | 176 | 0 | 4,689 | -2,238 |
| 37+00.00 R1 | 15.5 | 59 | 2,508 | 53.3 | 167 | 201 | 0 | 4,890 | -2,380 |
| 38+00.00 R1 | 17.3 | 61 | 2,569 | 11.9 | 121 | 145 | 0 | 5,035 | -2,464 |
| 39+00.00 R1 | 15.3 | 60 | 2,629 | 30.1 | 78 | 94 | 0 | 5,129 | -2,497 |
| 40+00.00 R1 | 14.4 | 55 | 2,684 | 26.5 | 105 | 126 | 0 | 5,255 | -2,568 |
| 40+84.75 R1 | 15.1 | 46 | 2,730 | 27.3 | 84 | 101 | 0 | 5,356 | -2,623 |
| 41+00.00 R1 | 15.5 | 9 | 2,739 | 27.7 | 16 | 19 | 0 | 5,375 | -2,633 |
| 42+00.00 R1 | 15.1 | 57 | 2,796 | 38.7 | 123 | 148 | 0 | 5,523 | -2,724 |
| 43+00.00 R1 | 17.0 | 59 | 2,855 | 33.8 | 134 | 161 | 0 | 5,684 | -2,826 |
| 44+00.00 R1 | 15.5 | 60 | 2,915 | 27.9 | 114 | 137 | 0 | 5,821 | -2,903 |
| 45+00.00 R1 | 16.5 | 59 | 2,974 | 29.6 | 107 | 128 | 0 | 5,949 | -2,971 |
| 46+00.00 R1 | 13.9 | 56 | 3,030 | 32.5 | 115 | 138 | 0 | 6,087 | -3,053 |
| 47+00.00 R1 | 13.7 | 51 | 3,081 | 29.5 | 115 | 138 | 0 | 6,225 | -3,140 |
| 48+04.27 R1 | 15.9 | 57 | 3,138 | 12.2 | 81 | 97 | 0 | 6,322 | -3,179 |
| 49+00.00 R1 | 12.4 | 50 | 3,188 | 27.1 | 70 | 84 | 0 | 6,406 | -3,213 |
| 49+43.00 R1 | 16.1 | 0 | 3,188 | 29.1 | 0 | 0 | 0 | 6,406 | -3,213 |
| 50+00.00 R1 | 14.8 | 50 | 3,238 | 38.2 | 121 | 145 | 26 | 6,577 | -3,334 |
| 51+00.00 R1 | 14.6 | 54 | 3,292 | 28.7 | 124 | 149 | 0 | 6,726 | -3,428 |
| 52+00.00 R1 | 14.8 | 54 | 3,346 | 20.7 | 91 | 110 | 0 | 6,836 | -3,484 |
| 53+00.00 R1 | 13.7 | 53 | 3,399 | 0.3 | 39 | 47 | 170 | 7,053 | -3,648 |
| 54+00.00 R1 | 14.6 | 52 | 3,451 | 20.5 | 39 | 46 | 0 | 7,099 | -3,643 |
| 55+00.00 R1 | 14.7 | 54 | 3,505 | 25.5 | 85 | 102 | 0 | 7,201 | -3,691 |
| 56+00.00 R1 | 13.7 | 52 | 3,557 | 25.3 | 94 | 113 | 0 | 7,314 | -3,751 |
| 57+00.00 R1 | 12.7 | 49 | 3,606 | 24.8 | 93 | 111 | 0 | 7,425 | -3,814 |
| 58+00.00 R1 | 11.8 | 45 | 3,651 | 28.7 | 99 | 119 | 0 | 7,544 | -3,887 |
| 59+00.00 R1 | 12.1 | 44 | 3,695 | 25.3 | 100 | 120 | 0 | 7,664 | -3,963 |
| 60+00.00 R1 | 11.0 | 43 | 3,738 | 25.1 | 93 | 112 | 0 | 7,776 | -4,032 |
| 61+00.00 R1 | 11.9 | 42 | 3,780 | 27.1 | 97 | 116 | 0 | 7,892 | -4,106 |
| 62+00.00 R1 | 12.7 | 45 | 3,825 | 30.8 | 107 | 129 | 0 | 8,021 | -4,189 |
| 63+00.00 R1 | 14.6 | 50 | 3,875 | 24.8 | 103 | 124 | 0 | 8,145 | -4,262 |
| 64+00.00 R1 | 15.5 | 56 | 3,931 | 23.0 | 89 | 106 | 0 | 8,251 | -4,313 |
| 65+00.00 R1 | 14.6 | 56 | 3,987 | 47.0 | 130 | 156 | 0 | 8,407 | -4,413 |
| 65+49.00 R1 | 14.0 | 26 | 4,013 | 48.3 | 86 | 104 | 0 | 8,511 | -4,491 |
| 66+00.00 R1 | 14.4 | 27 | 4,040 | 45.7 | 89 | 107 | 0 | 8,618 | -4,570 |
| 67+00.00 R1 | 15.7 | 56 | 4,096 | 0.9 | 86 | 104 | 0 | 8,722 | -4,618 |
| 67+09.56 R1 | 16.0 | 6 | 4,102 | 0.0 | 0 | 0 | 0 | 8,722 | -4,613 |
| 68+00.00 R1 | 12.8 | 48 | 4,150 | 30.5 | 51 | 61 | 79 | 8,862 | -4,705 |
| 69+00.00 R1 | 13.5 | 49 | 4,199 | 25.9 | 104 | 125 | 0 | 8,987 | -4,782 |
| 70+00.00 R1 | 11.2 | 46 | 4,245 | 27.5 | 99 | 119 | 0 | 9,106 | -4,855 |
| 71+00.00 R1 | 13.4 | 46 | 4,291 | 26.9 | 101 | 121 | 0 | 9,227 | -4,930 |
| 72+00.00 R1 | 13.3 | 50 | 4,341 | 22.0 | 90 | 109 | 0 | 9,336 | -4,989 |
| 73+00.00 R1 | 14.0 | 51 | 4,392 | 15.2 | 69 | 83 | 0 | 9,419 | -5,021 |
| 74+00.00 R1 | 13.1 | 50 | 4,442 | 18.5 | 62 | 75 | 0 | 9,494 | -5,046 |
| 75+00.00 R1 | 13.4 | 49 | 4,491 | 22.5 | 76 | 91 | 0 | 9,585 | -5,088 |
| 76+00.00 R1 | 12.7 | 48 | 4,539 | 24.9 | 88 | 105 | 0 | 9,690 | -5,145 |
| 77+00.00 R1 | 12.9 | 48 | 4,587 | 32.2 | 106 | 127 | 0 | 9,817 | -5,224 |
| 78+00.00 R1 | 13.4 | 49 | 4,636 | 15.1 | 88 | 105 | 0 | 9,922 | -5,280 |
| 79+00.00 R1 | 22.6 | 67 | 4,703 | 0.0 | 28 | 33 | 0 | 9,955 | -5,247 |

*An additional volume of 20% has been included to allow for shrinkage

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Earthwork Data Table

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 20 | 1 |

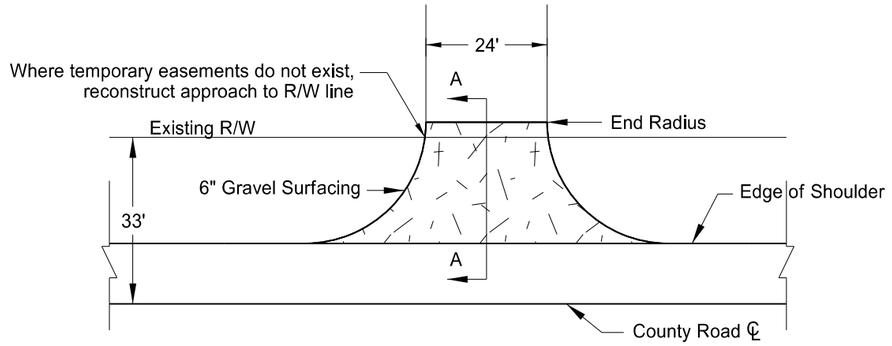



| Point # | Northing | Easting | Elevation |
|---|---|---|---|
| 20000 | 357292.293 | 1853458.212 | 1757.51 |
| 20001 | 357286.290 | 1853458.142 | 1756.76 |
| 20002 | 357281.994 | 1853458.092 | 1756.69 |
| 20003 | 357283.423 | 1853479.161 | 1756.87 |
| 20004 | 357280.425 | 1853476.316 | 1756.37 |
| 20005 | 357277.219 | 1853473.088 | 1756.94 |
| 20006 | 357262.042 | 1853487.861 | 1756.04 |
| 20007 | 357262.076 | 1853483.841 | 1755.54 |
| 20008 | 357262.131 | 1853477.350 | 1756.35 |
| 20009 | 357262.466 | 1853511.866 | 1756.07 |
| 20010 | 357262.416 | 1853517.865 | 1755.04 |
| 20011 | 357262.336 | 1853527.365 | 1756.61 |
| 20012 | 357283.448 | 1853520.677 | 1756.88 |
| 20013 | 357279.031 | 1853525.024 | 1755.88 |
| 20014 | 357292.212 | 1853541.569 | 1757.31 |
| 20015 | 357281.712 | 1853541.673 | 1755.57 |
| 20016 | 357316.316 | 1853552.027 | 1757.76 |
| 20017 | 357327.496 | 1853551.917 | 1755.90 |
| 20018 | 357328.003 | 1853523.376 | 1757.74 |
| 20019 | 357332.384 | 1853527.749 | 1756.54 |
| 20020 | 357334.012 | 1853529.373 | 1756.92 |
| 20021 | 357356.633 | 1853511.634 | 1757.45 |
| 20022 | 357356.585 | 1853517.635 | 1756.44 |
| 20023 | 357356.550 | 1853522.034 | 1757.17 |

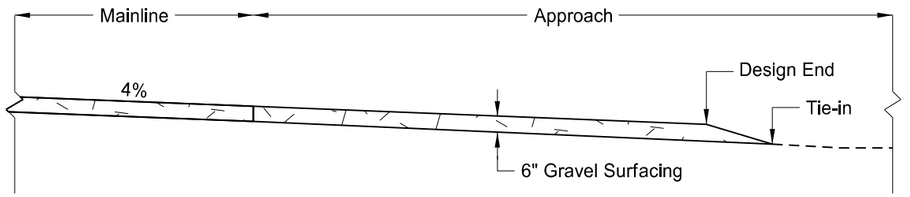
This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Intersection Realignment Detail

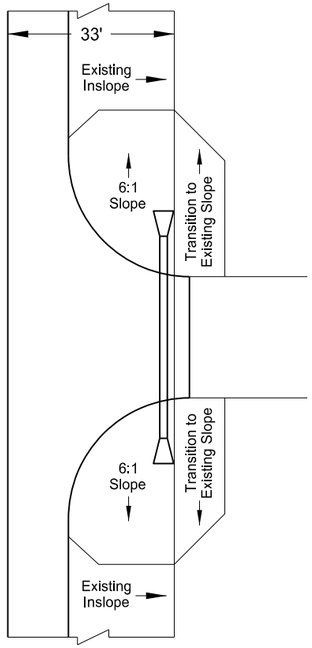
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 20 | 2 |




Approaches




Section A-A
(not to scale)

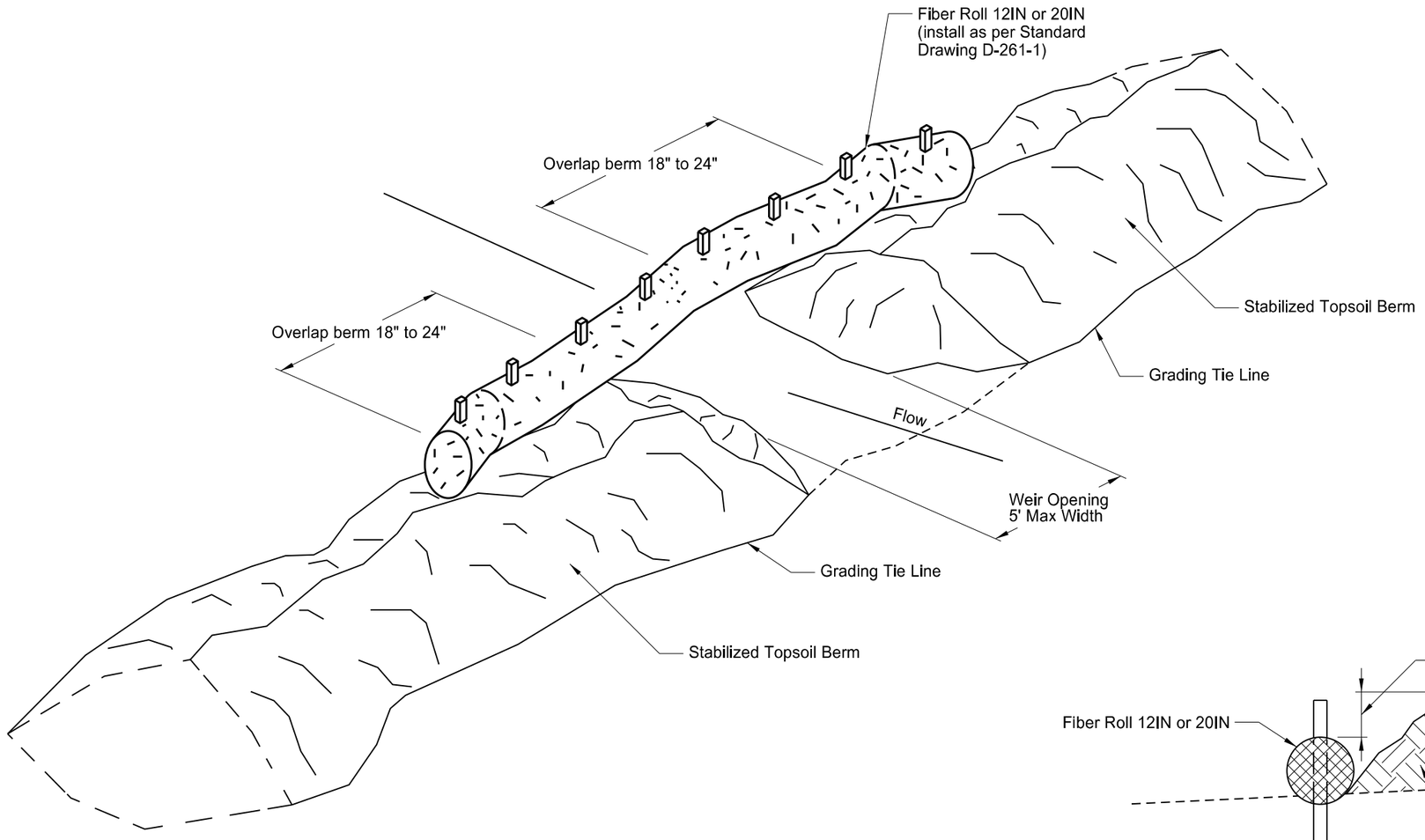


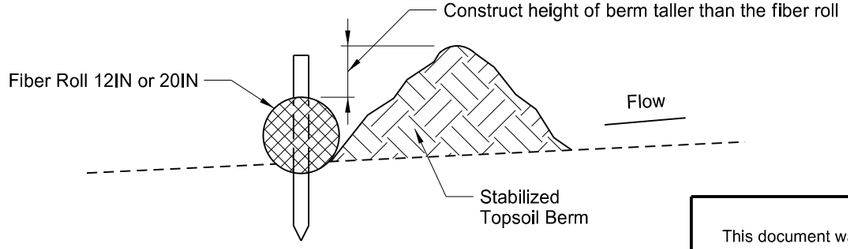

| Approach | Offset | Approach Type | Radius | Embankment (CY) | Gravel Surfacing @ 1.875 Tons/CY (Ton) |
|---|---|---|---|---|---|
| 3+31 | LT | Private Drive | 30' & 75' | | 112 |
| 10+72 | RT | Field Drive | 25' | 25 | 29 |
| 26+57 | LT & RT | Township Road | Varies | | 129 |
| 40+85 | LT | Field Drive | 25' | | 29 |
| 48+04 | LT | Private Drive | 30' | | 20 |
| 49+43 | LT | Private Drive | 30' | 22 | 28 |
| 53+09 | LT | Field Drive | 25' | 45 | 29 |
| 53+09 | RT | Field Drive | 25' | 97 | 29 |
| 67+07 | LT | Field Drive | 25' | 58 | 29 |
| 67+13 | RT | Field Drive | 25' | 8 | 29 |
| | | | **Total** | **255** | **463** |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Approach Reconstruction Detail

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 20 | 3 |




Topsoil Berm Detail

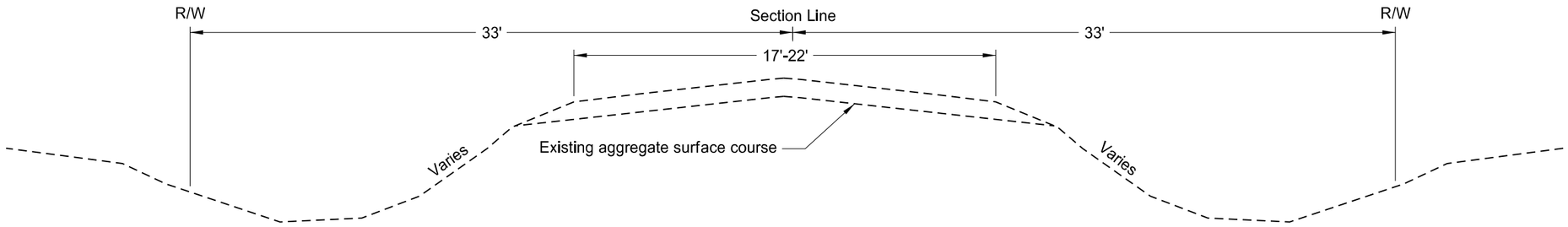
Notes:

1. Windrow the existing topsoil from the foreslope to create a berm at the grading tie line.
2. Stabilize berms in accordance with the Construction General Permit.
3. Place weirs intermittently throughout the length of the berm to allow stormwater to drain through the berm.
4. Avoid placing weirs adjacent to waterbodies.
5. Install fiber rolls as the weirs are created in the topsoil berm.
6. Include costs to create, stabilize, maintain, and dismantle the berm in the unit price bid for "Topsoil".
7. Include costs for fiber rolls in the unit price bid for "Fiber Rolls 12IN" or "Fiber Rolls 20IN".

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Temporary Topsoil Berm Weir Detail

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 30 | 1 |

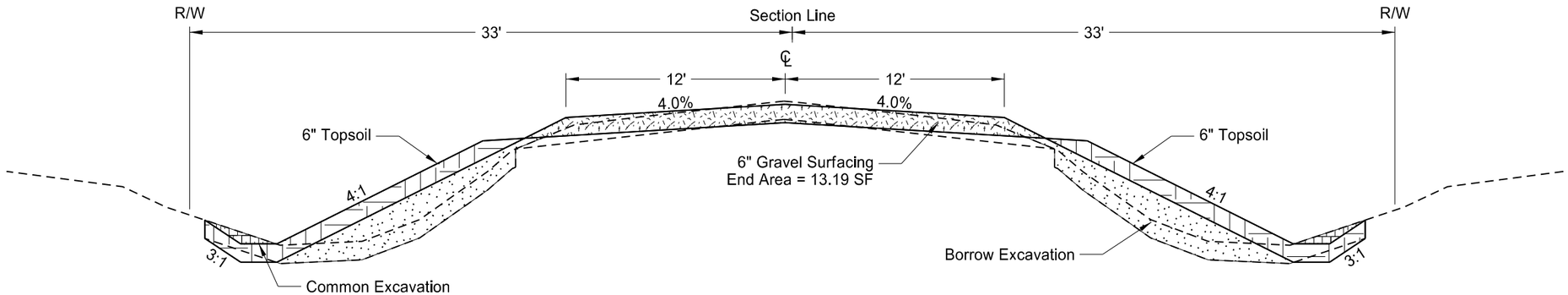



Township Road B-10
Sta 2+89 to Sta 79+00

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Existing Typical Section

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 30 | 2 |




Township Road B-10
Sta 2+89 to Sta 79+00

Scale: 1H 2V

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/06/19 and the original document is stored at the North Dakota Department of Transportation

Proposed Typical Section

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 40 | 1 |


25+00

Sec 13
T152N
R81W

Note: Quantities for removal of the existing roadway have been included in the bid items Common Excavation-Type A and Salvage & Relay Aggregate Surface Course

REMOVE

REMOVE

REMOVE

REMOVE

PI 26+56.64

Sec 18
T152N
R80W

Sec 24
T152N
R81W

Sec 19
T152N
R80W

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Removals

4/30/2019 8:14:15 AM bschaff N:\21545\ROM-0300(137)\Design\040_Removals\040RM_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 51 | 1 |

| Centerline Pipe Location | Begin Station /Location | Begin Offset | End Station /Location | End Offset | Pipe Installation Pay Item | | | Allowable Material | Required Diamater (in) | Steel Pipe Coating | Steel Pipe Corrugations | Steel Pipe Minimum Thickness (In) | R1 Fabric Pay Item (SY) | End Sections | | Applicable Backfill Detail |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Pipe Size (in) | Bid Item | LF | | | | | | | Begin (Ea) | End (Ea) | |
| 3+33 | 3+08 | 58' Lt | 3+59 | 58' Lt | 18 | PIPE CONDUIT 18IN-APPROACH | 51 | Reinforced Concrete Pipe - Class III (barrel length = 50 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |
| 5+55 | 5+56 | 22' Lt | 5+55 | 21' Rt | 24 | PIPE CONDUIT 24IN | 40 | Reinforced Concrete Pipe - Class III (barrel length = 36 LF) | 24 | | | | 178 | FES | FES | Standard D-714-26 |
| | | | | | | | | Corrugated Steel Pipe | 24 | A | 2 | 0.138 | | | |
| | | | | | | | | Corrugated Steel Pipe | 24 | P | 2 | 0.064 | | | |
| 24+63 | 24+61 | 24' Lt | 24+65 | 19' Rt | 24 | PIPE CONDUIT 24IN | 43 | Reinforced Concrete Pipe - Class III (barrel length = 38 LF) | 24 | | | | 193 | FES | FES | Standard D-714-26 |
| | | | | | | | | Corrugated Steel Pipe | 24 | A | 2 | 0.138 | | | |
| | | | | | | | | Corrugated Steel Pipe | 24 | P | 2 | 0.064 | | | |
| 30+63 | 30+64 | 23' Lt | 30+62 | 24' Rt | 24 | PIPE CONDUIT 24IN | 47 | Reinforced Concrete Pipe - Class III (barrel length = 42 LF) | 24 | | | | 248 | FES | FES | Standard D-714-26 |
| | | | | | | | | Corrugated Steel Pipe | 24 | A | 2 | 0.138 | | | |
| | | | | | | | | Corrugated Steel Pipe | 24 | P | 2 | 0.064 | | | |
| 41+85 | 40+60 | 31' Lt | 41+40 | 31' Lt | 18 | PIPE CONDUIT 18IN-APPROACH | 50 | Reinforced Concrete Pipe - Class III (barrel length = 50 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |
| 48+06 | 47+84 | 31' Lt | 48+26 | 31' Lt | 18 | PIPE CONDUIT 18IN-APPROACH | 42 | Reinforced Concrete Pipe - Class III (barrel length = 42 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |
| 49+41 | 49+18 | 30' Lt | 49+64 | 29' Lt | 18 | PIPE CONDUIT 18IN-APPROACH | 47 | Reinforced Concrete Pipe - Class III (barrel length = 46 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |
| 53+01 | 52+80 | 28' Lt | 53+22 | 27' Lt | 18 | PIPE CONDUIT 18IN-APPROACH | 41 | Reinforced Concrete Pipe - Class III (barrel length = 44 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |
| 53+02 | 52+81 | 27' Rt | 53+22 | 27' Rt | 18 | PIPE CONDUIT 18IN-APPROACH | 40 | Reinforced Concrete Pipe - Class III (barrel length = 40 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |
| 65+49 | 65+49 | 22' Lt | 65+49 | 24' Rt | 24 | PIPE CONDUIT 24IN | 47 | Reinforced Concrete Pipe - Class III (barrel length = 42 LF) | 24 | | | | 220 | FES | FES | Standard D-714-26 |
| | | | | | | | | Corrugated Steel Pipe | 24 | A | 2 | 0.138 | | | |
| | | | | | | | | Corrugated Steel Pipe | 24 | P | 2 | 0.064 | | | |
| 67+08 | 66+85 | 29' Lt | 67+32 | 30' Lt | 18 | PIPE CONDUIT 18IN-APPROACH | 47 | Reinforced Concrete Pipe - Class III (barrel length = 46 LF) | 18 | | | | 0 | TES | TES | Standard D-714-27 |
| | | | | | | | | Corrugated Steel Pipe | 18 | A, P | 2 | 0.064 | | | |

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

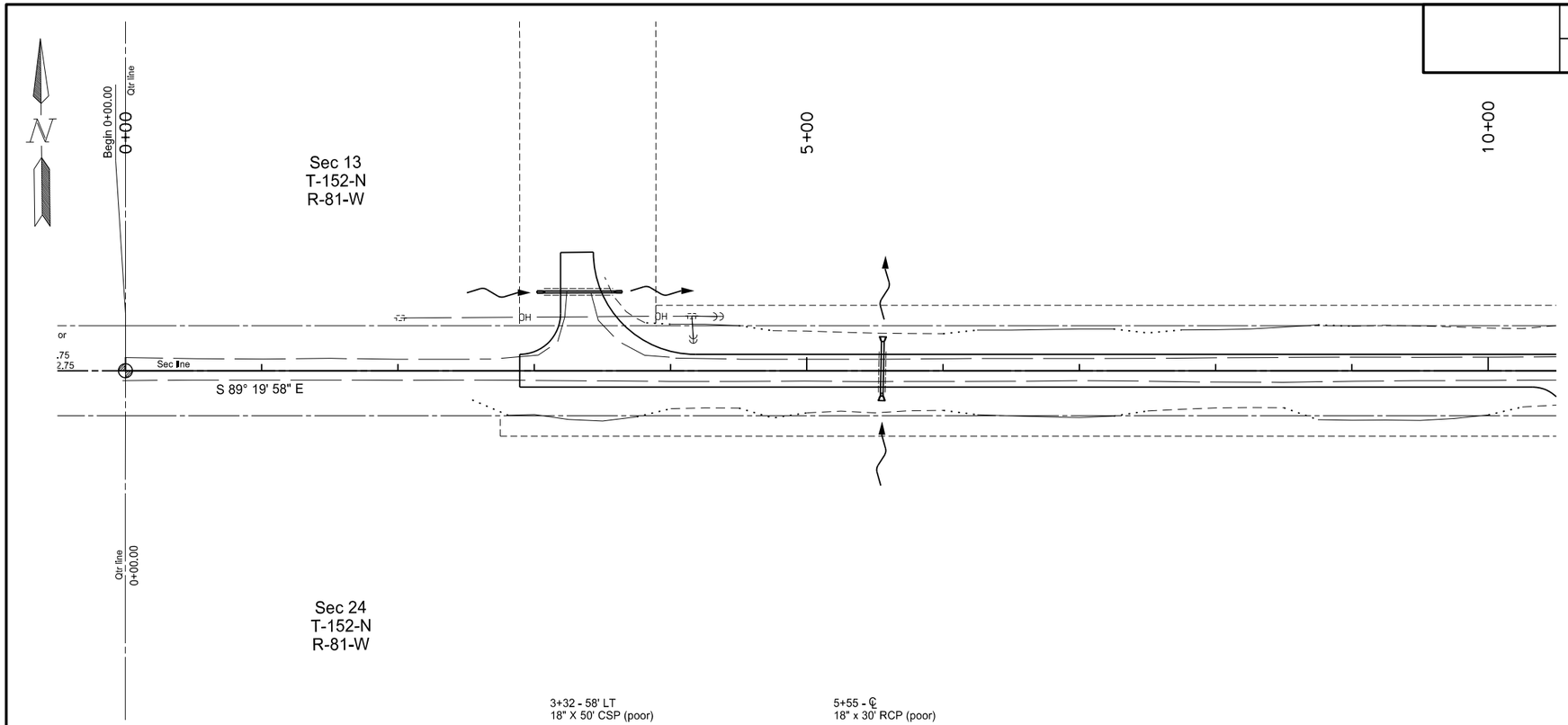
Corrugations: **2** = 2-2/3"x1/2"
**3** = 3"x1"
**5** = 5"x1"

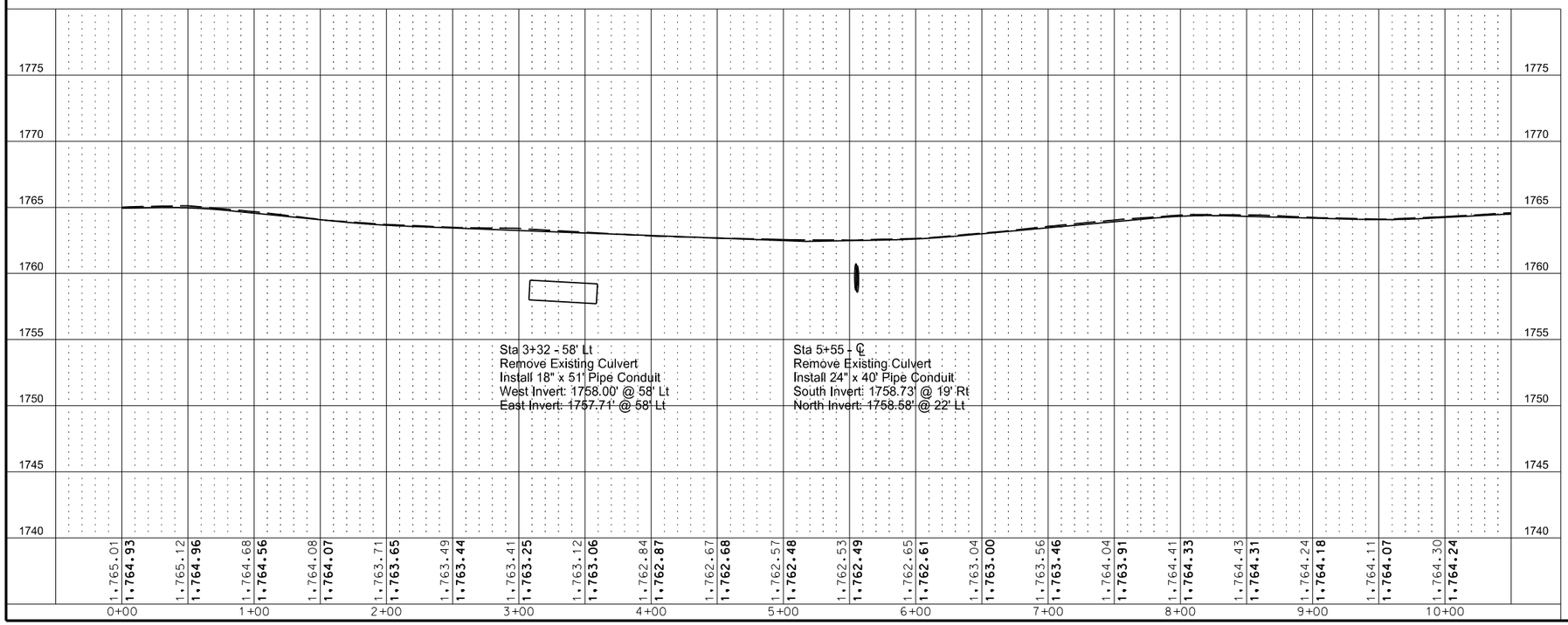
Spiral Ribs: **3/4** = 3/4"x3/4" **(*)** End sections are measured and paid for separately for pipe extensions.
**1** = 3/4"x1" **FES** = Flared End Section
**TES** = Traversable End Section

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Allowable Pipe Material List

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 1 |




REMOVAL OF CULVERTS-ALL TYPES & SIZES

| | QTY |
|---|---|
| Sta 3+32 - 58' Lt | 50 LF |
| Sta 5+55 - CL | 30 LF |
| TOTAL | 80 LF |

PIPE CONDUIT 18IN - APPROACH

| | QTY |
|---|---|
| Sta 3+32 - 58' Lt | 51 LF |
| TOTAL | 51 LF |

PIPE CONDUIT 24IN

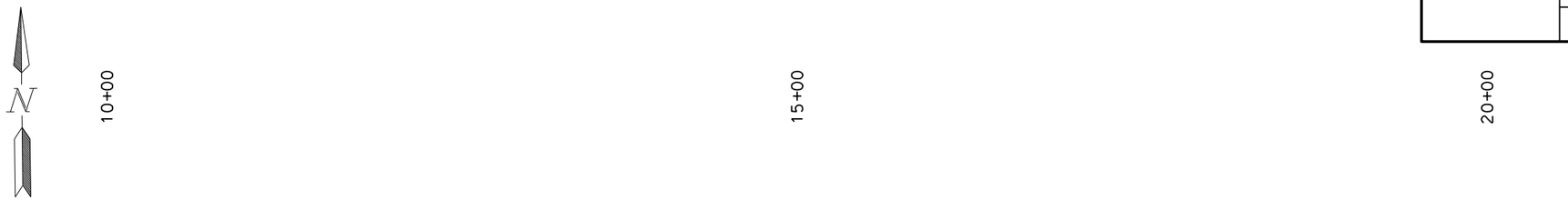
| | QTY |
|---|---|
| Sta 5+55 - CL | 40 LF |
| TOTAL | 40 LF |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222 , on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 0+00 to Sta 10+00

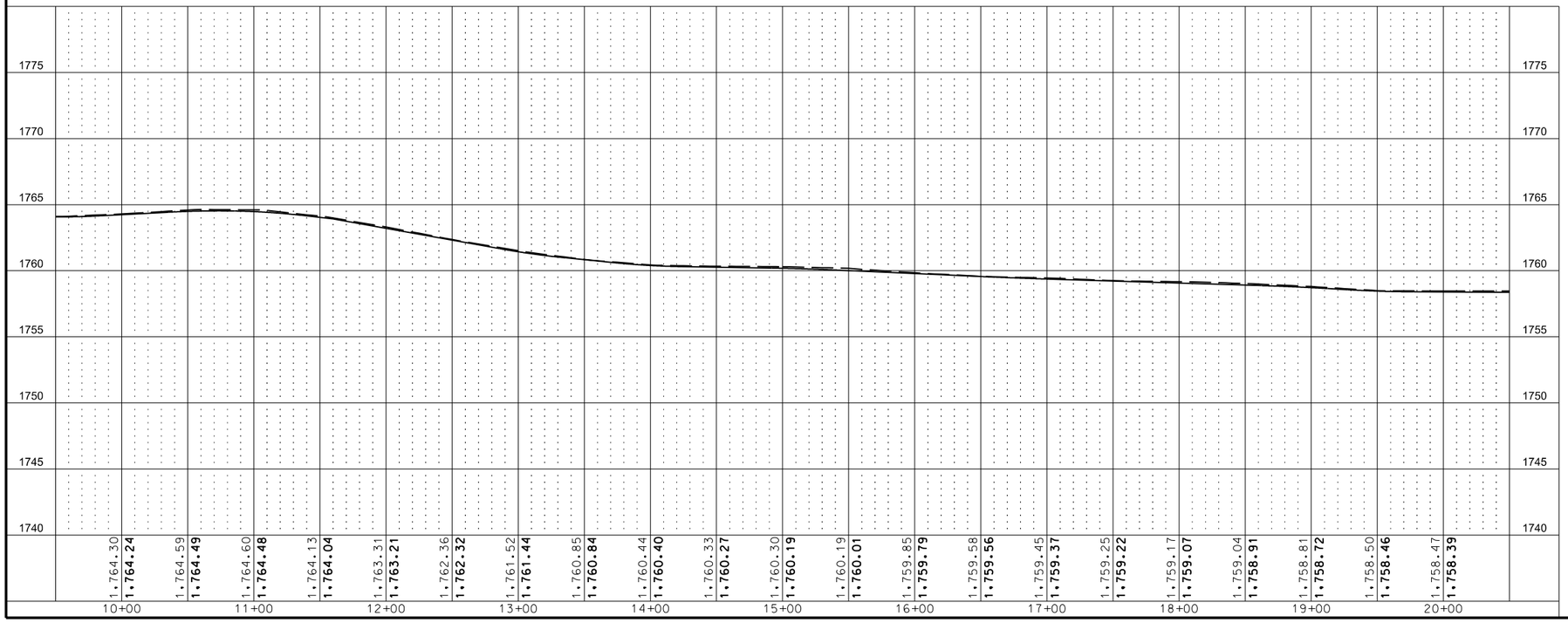
4/30/2019 8:42:55 AM bschaff N:\21545\ROM-0300(137)\Design\060_PP\060PP_001.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 2 |




REMOVAL OF TREES 18IN

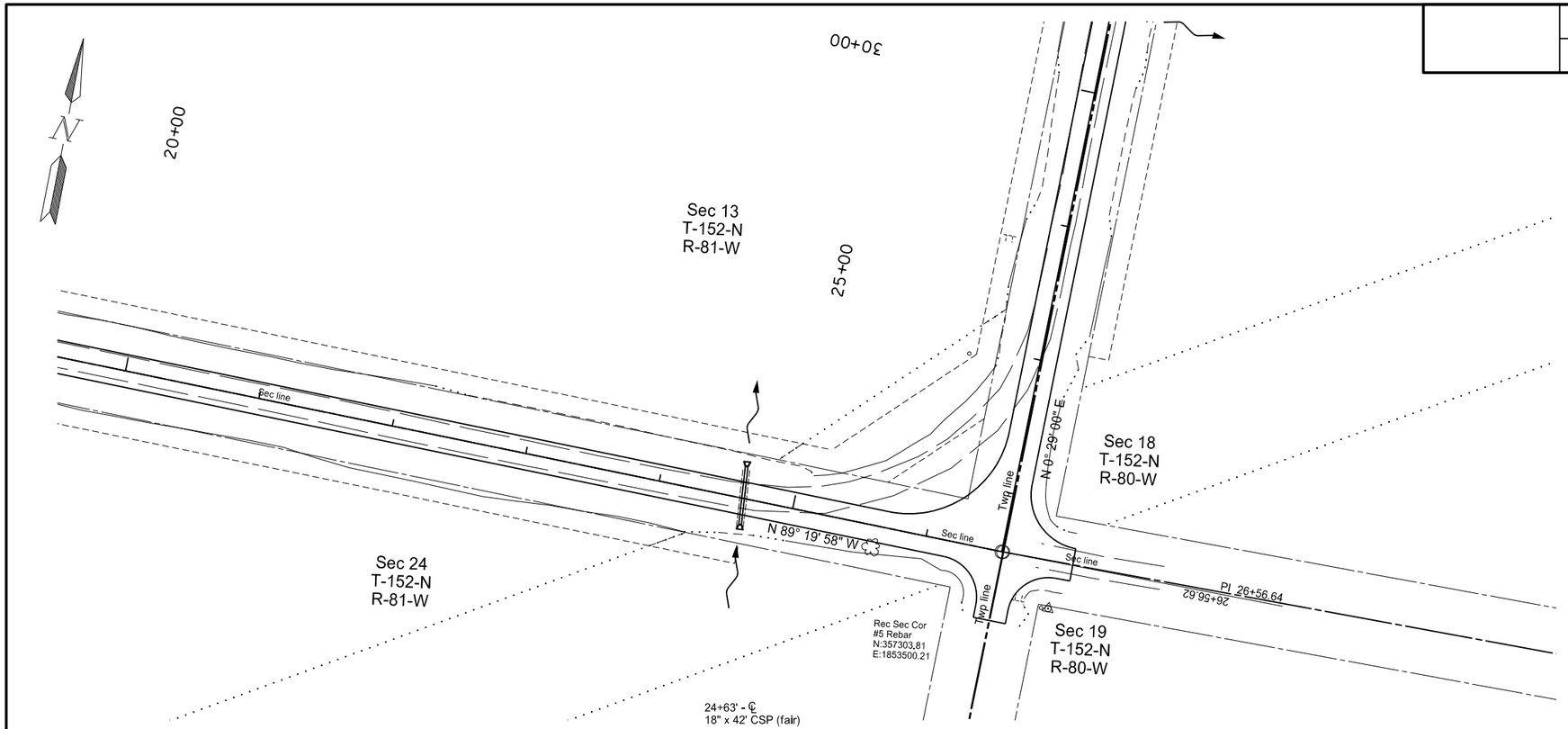
| | QTY |
|---|---|
| Sta 17+88 - 28' Rt | 1 EA |
| TOTAL | 1 EA |

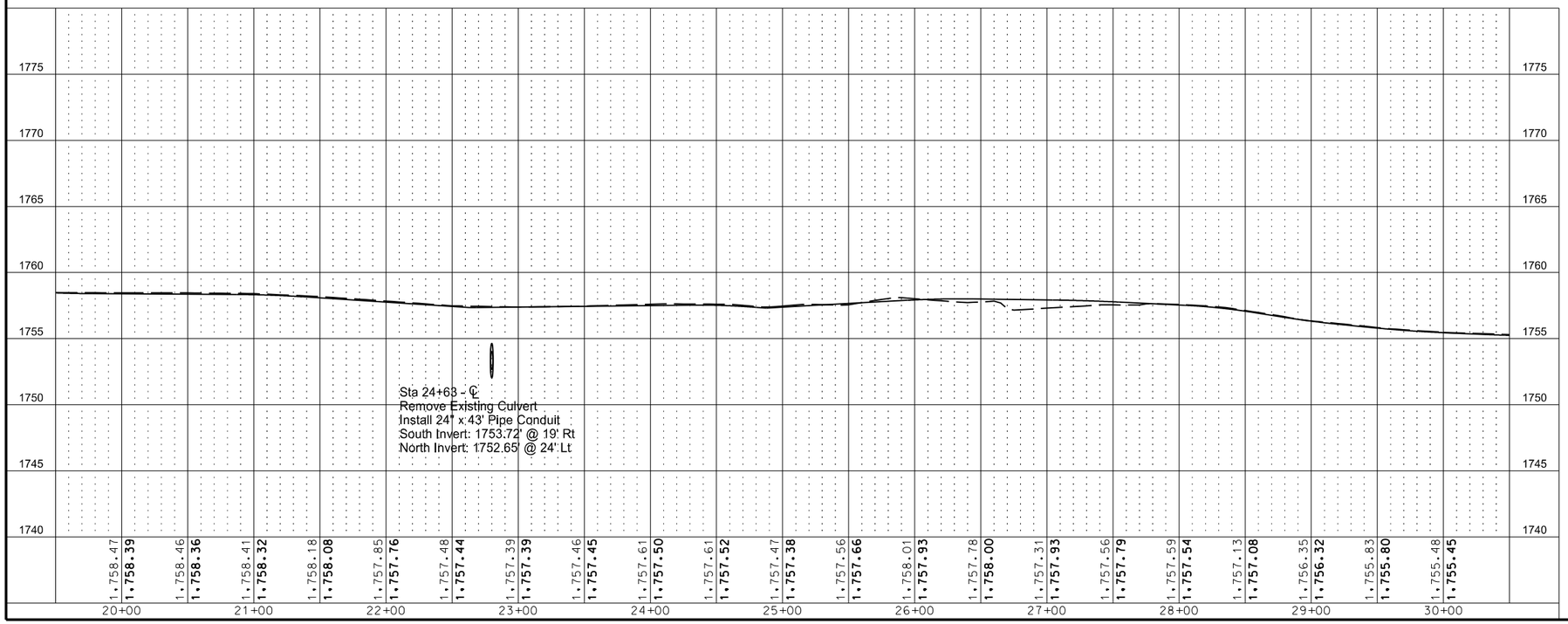



This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 10+00 to Sta 20+00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 3 |




REMOVAL OF TREES 10IN

| | QTY |
|---|---|
| Sta 25+62 - 16' Rt | 1 EA |
| TOTAL | 1 EA |

REMOVAL OF CULVERTS-ALL TYPES & SIZES

| | QTY |
|---|---|
| Sta 24+63 - CL | 42 LF |
| TOTAL | 42 LF |

PIPE CONDUIT 24IN

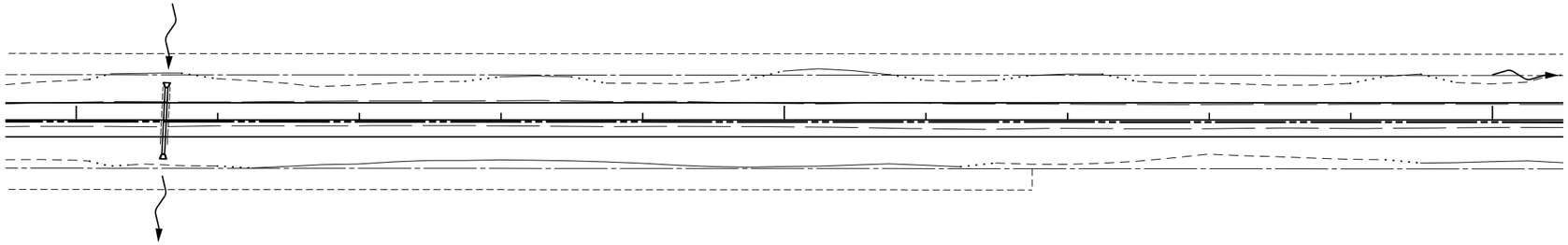
| | QTY |
|---|---|
| Sta 24+63 - CL | 43 LF |
| TOTAL | 43 LF |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 20+00 to Sta 30+00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 4 |

30+00 35+00 40+00

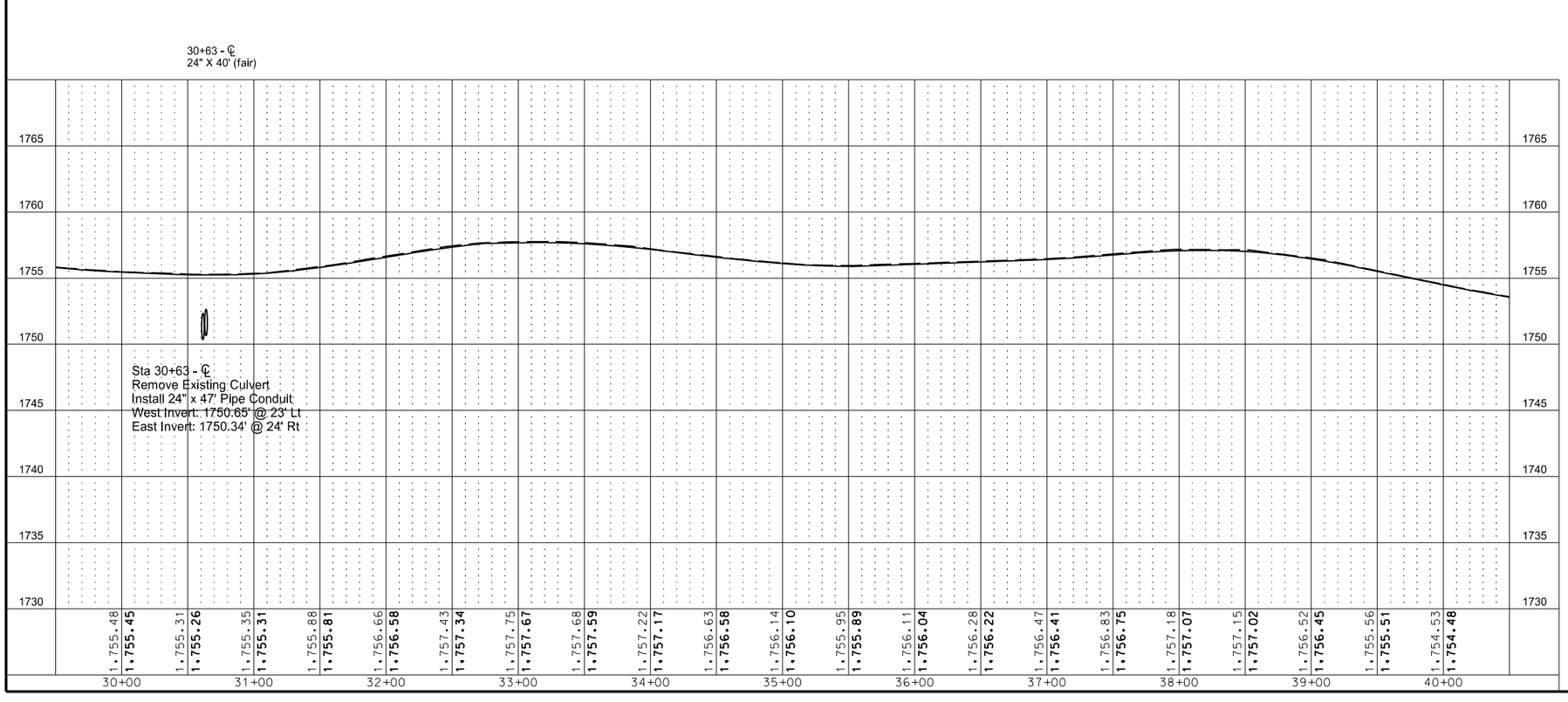


REMOVAL OF CULVERTS-ALL TYPES & SIZES

| | QTY |
|---|---|
| Sta 30+63 - CL | 40 LF |
| TOTAL | 40 LF |

PIPE CONDUIT 24IN

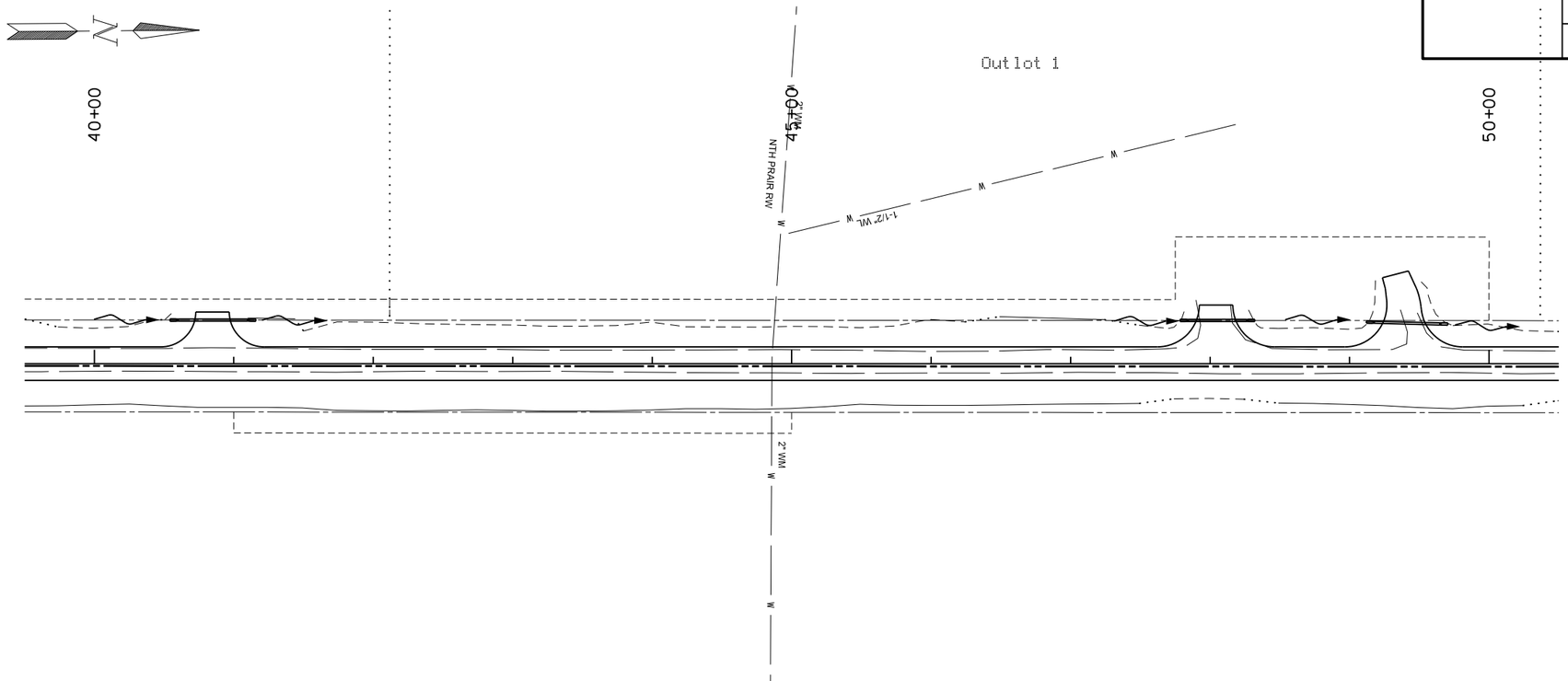
| | QTY |
|---|---|
| Sta 30+63 - CL | 47 LF |
| TOTAL | 47 LF |




This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

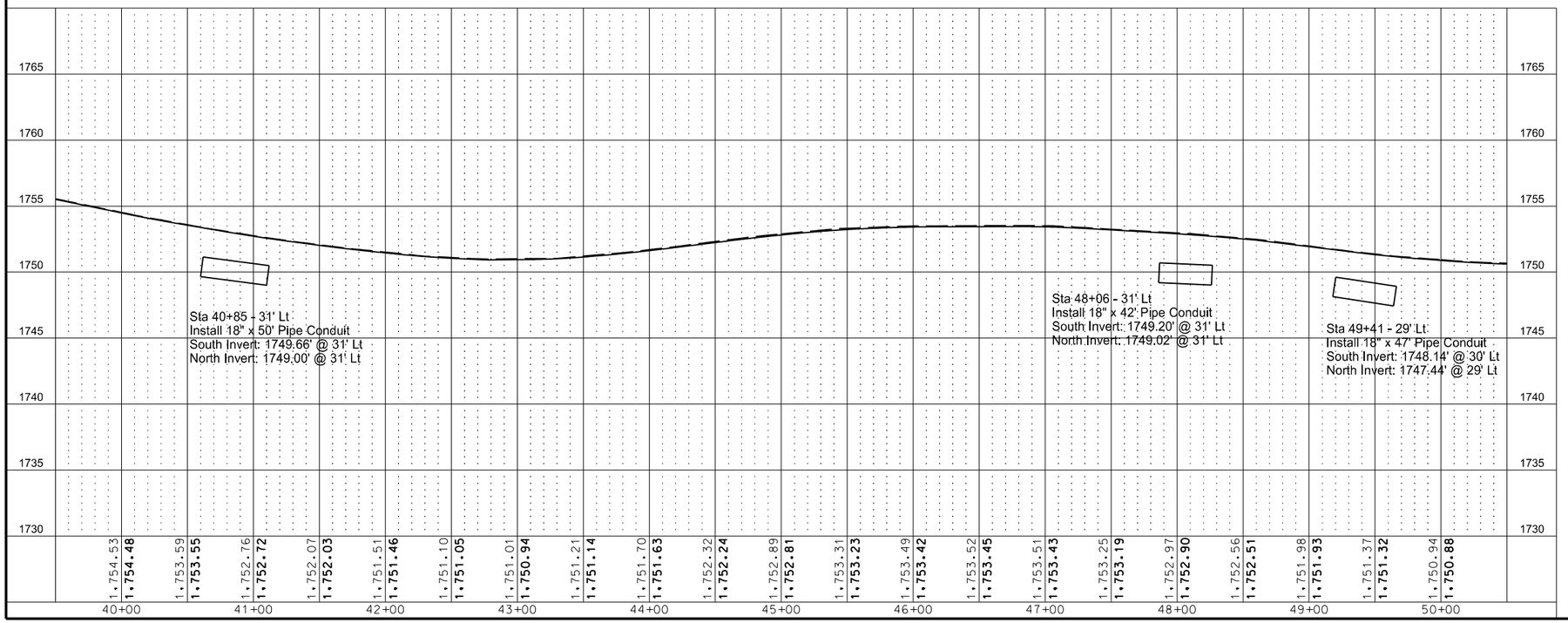
Plan & Profile
Sta 30+00 to Sta 40+00

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 60 | 5 |




PIPE CONDUIT 18IN - APPROACH

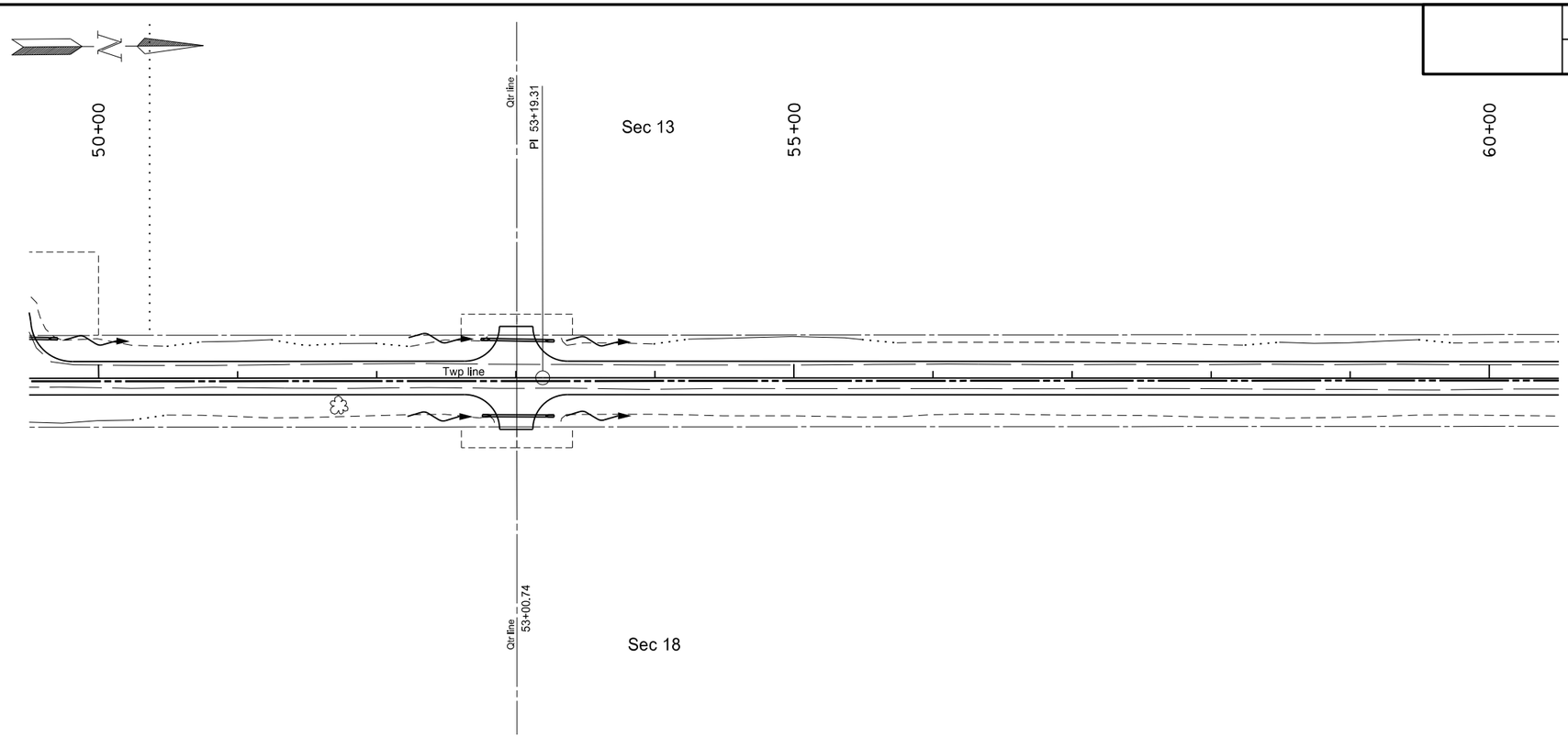
| | QTY |
|---|---|
| Sta 40+85 - 31' Lt | 50 LF |
| Sta 48+06 - 31' Lt | 42 LF |
| Sta 49+41 - 29' Lt | 47 LF |
| TOTAL | 139 LF |

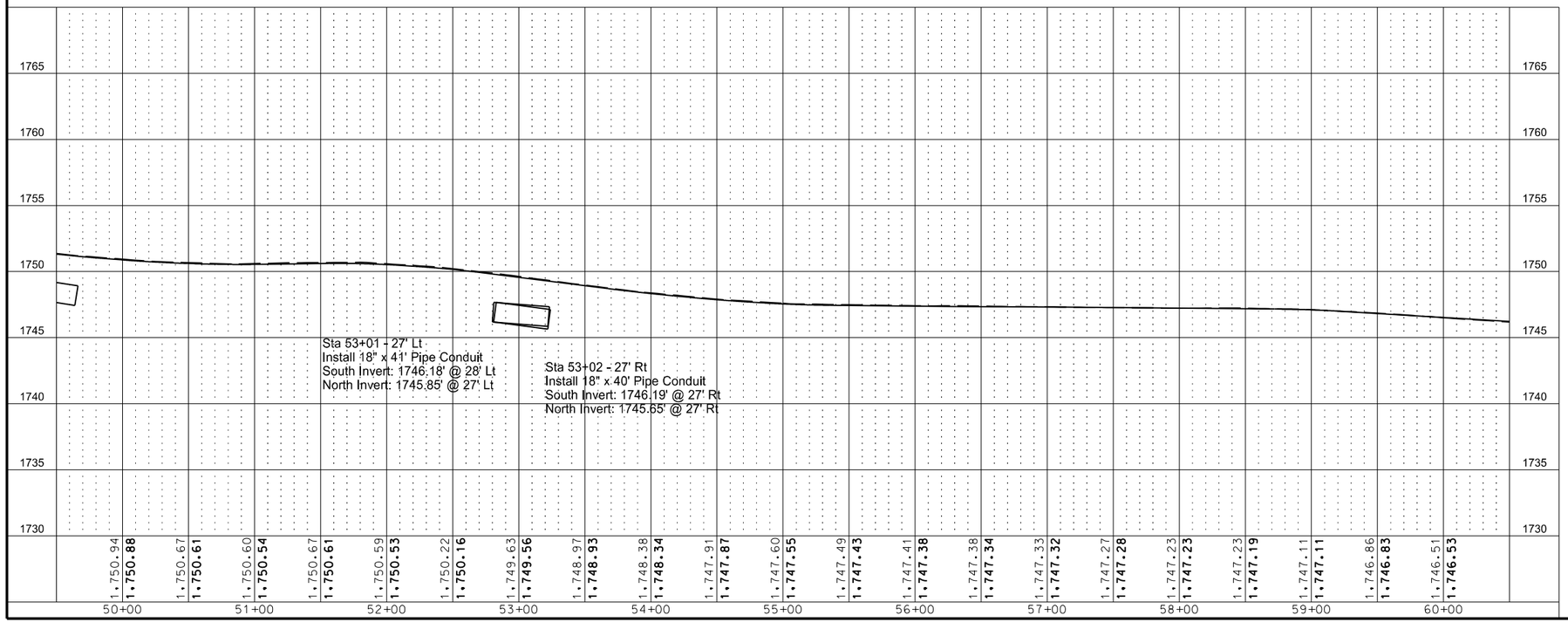



This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222 , on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 40+00 to Sta 50+00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 6 |




REMOVAL OF TREES 10IN

| | QTY |
|---|---|
| Sta 51+73 - 22' Rt | 1 EA |
| TOTAL | 1 EA |

PIPE CONDUIT 18IN - APPROACH

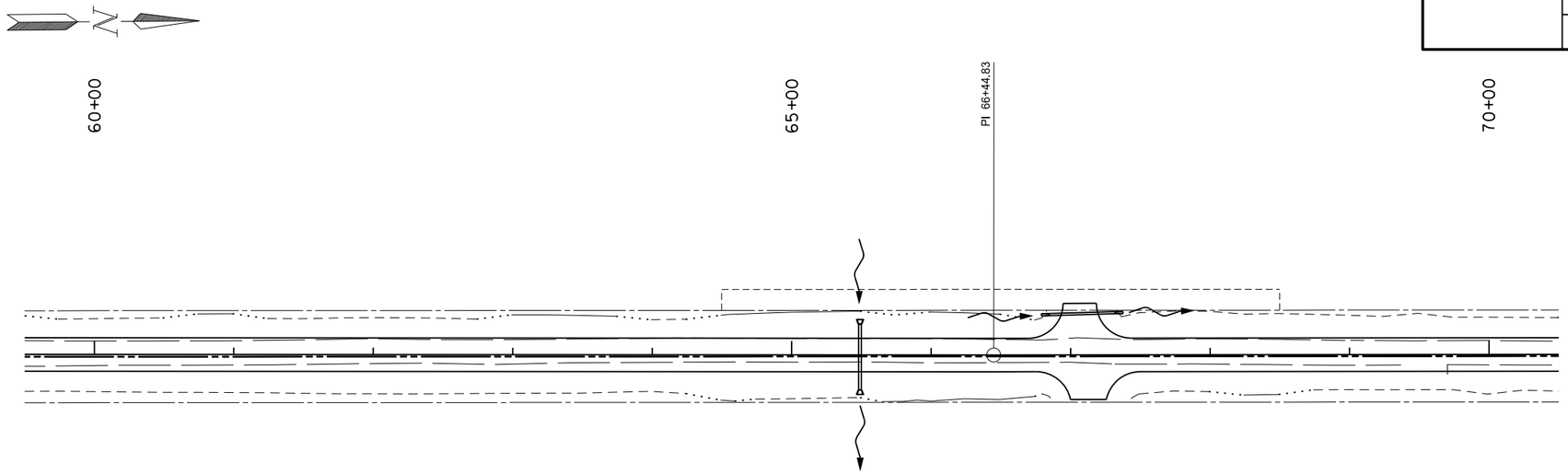
| | QTY |
|---|---|
| Sta 53+01 - 27' Lt | 41 LF |
| Sta 53+02 - 27' Rt | 40 LF |
| TOTAL | 81 LF |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 50+00 to Sta 60+00

4/30/2019 8:43:04 AM bschaff N:\21545\ROM-0300(137)\Design\060_PP\060PP_006.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 7 |

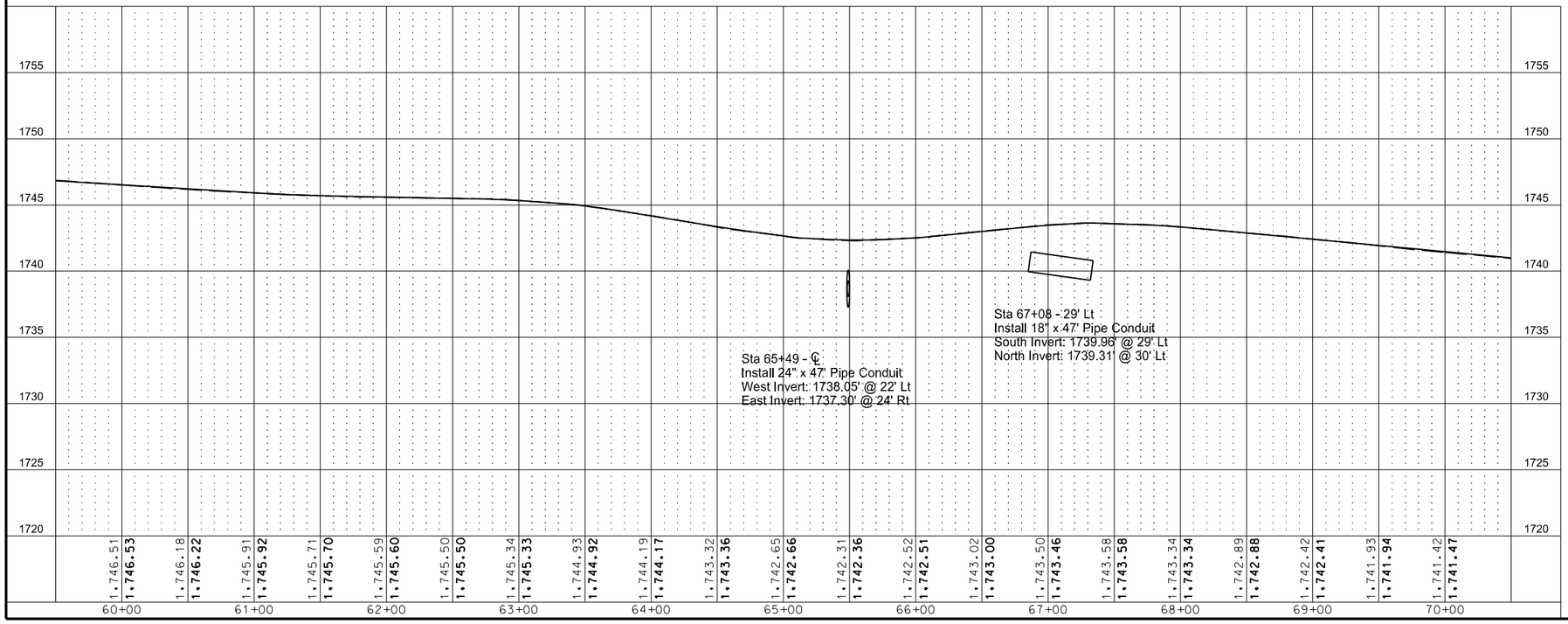



PIPE CONDUIT 18IN - APPROACH

| | QTY |
|---|---|
| Sta 67+08 - 29' Lt | 47 LF |
| TOTAL | 47 LF |

PIPE CONDUIT 24IN

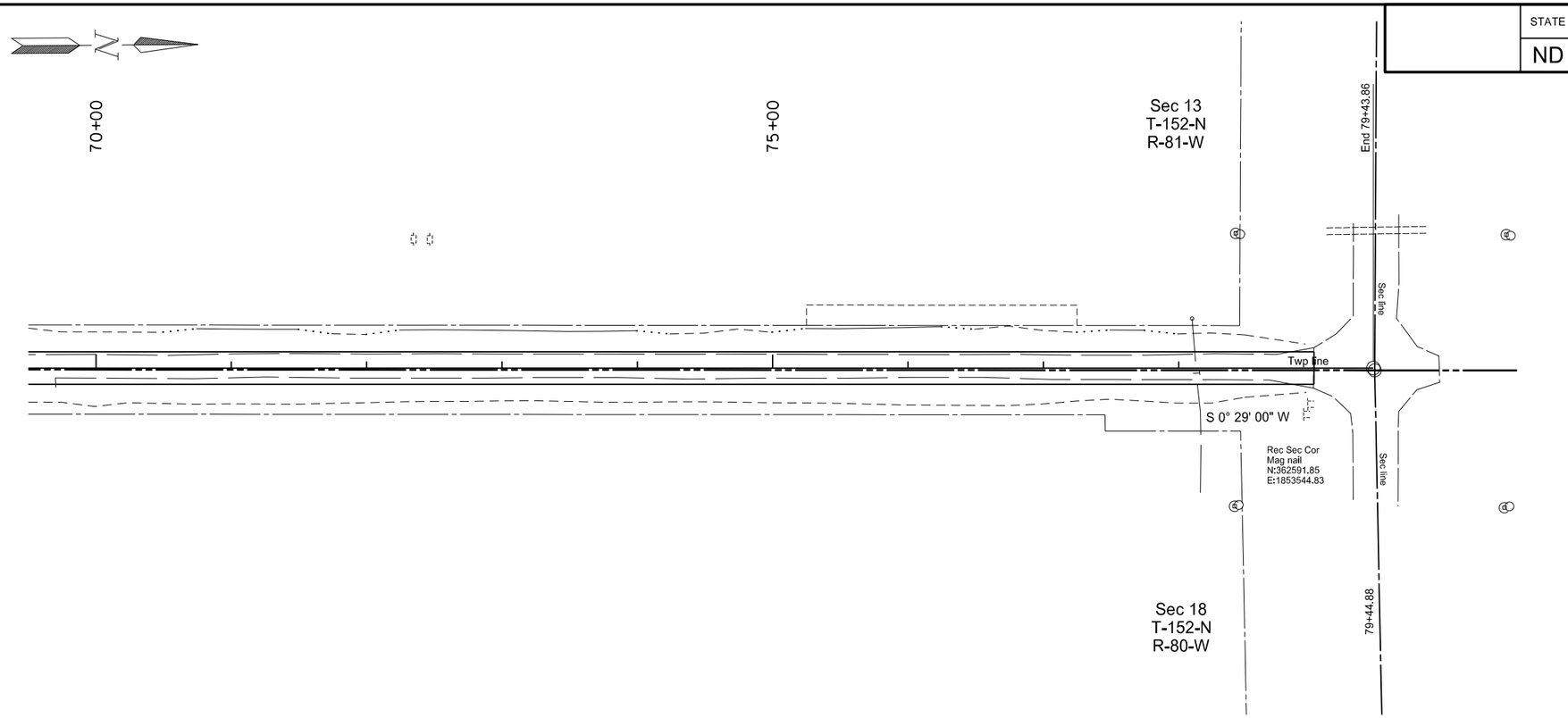
| | QTY |
|---|---|
| Sta 65+49 - CL | 47 LF |
| TOTAL | 47 LF |

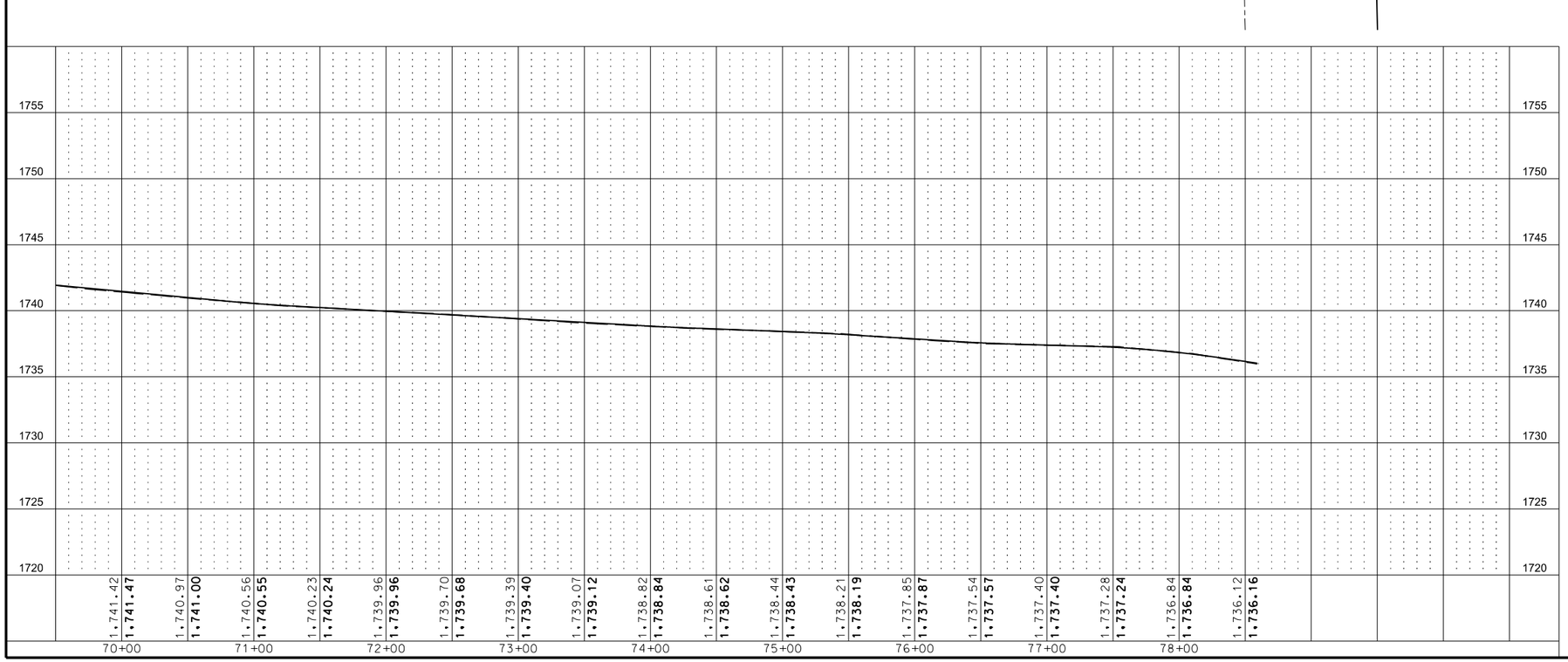



This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 60+00 to Sta 70+00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 60 | 8 |




This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Plan & Profile
Sta 70+00 to Sta 79+43.86

4/30/2019 8:43:07 AM bschaff N:\21545\ROM-0300(137)\Design\060_PP\060PP_008.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 75 | 1 |

## Wetland Impact Table

| Wetland Number | Location | Wetland Type | Wetland Feature | USACE Jurisdictional Wetlands[1] | Wetland Impacts Acre(s) | | | | USFWS Easement Impacts Acre(s) | | Wetland Mitigation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Mitigation Required | | | USACE/11990 Bank | | 11990 Bank | | Ducks Unlimited Credits | |
| | | | | | Permanent (Fill) | Permanent (Cut) | Temporary (Inslope) | Temporary (Berm) | Temp. | Perm. | EO 11990 | USACE | USFWS | Location | Acre(s) | Location | Acre(s) | Location | Acre(s) |
| 1a | Sec. 24, T152N, R81W | Basin | Natural | Yes | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 1b | Sec. 24, T152N, R81W | Ditch | Artificial | Yes | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 2a | Sec. 24, T152N, R81W | Ditch | Artificial | Yes | 0.04 | 0.01 | 0.04 | 0.03 | 0.00 | 0.00 | N | Y | N | | | | | Souris River Service Area | 0.05 |
| 2b | Sec. 24, T152N, R81W | Basin | Natural | Yes | 0.06 | 0.01 | 0.10 | 0.08 | 0.00 | 0.00 | Y | Y | N | | | | | Souris River Service Area | 0.07 |
| 2c | Sec. 13, T152N, R81W | Ditch | Artificial | Yes | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 2d | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.04 | 0.02 | 0.05 | 0.09 | 0.00 | 0.00 | Y | Y | N | | | | | Souris River Service Area | 0.06 |
| 3 | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 4 | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.03 | 0.00 | 0.01 | 0.04 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.03 |
| 5a | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.08 | 0.01 | 0.03 | 0.10 | 0.00 | 0.00 | Y | Y | N | | | | | Souris River Service Area | 0.09 |
| 5b | Sec. 24, T152N, R81W | Basin | Natural | Yes | 0.04 | 0.01 | 0.02 | 0.01 | 0.00 | 0.00 | Y | Y | N | | | | | Souris River Service Area | 0.05 |
| 6 | Sec. 24, T152N, R81W | Basin | Natural | Yes | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 7a | Sec. 18, T152N, R80W | Basin | Natural | Yes | 0.07 | 0.01 | 0.04 | 0.06 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.08 |
| 7b | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.02 | 0.00 | 0.01 | 0.03 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.02 |



Wetland Impacts & Mitigation

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 75 | 2 |

## Wetland Impact Table

| Wetland Number | Location | Wetland Type | Wetland Feature | USACE Jurisdictional Wetlands[1] | Wetland Impacts Acre(s) | | | | USFWS Easement Impacts Acre(s) | | Wetland Mitigation | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Mitigation Required | | | USACE/11990 Bank | | 11990 Bank | | Ducks Unlimited Credits | |
| | | | | | Permanent (Fill) | Permanent (Cut) | Temporary (Inslope) | Temporary (Berm) | Temp. | Perm. | EO 11990 | USACE | USFWS | Location | Acre(s) | Location | Acre(s) | Location | Acre(s) |
| 8 | Sec. 13, T152N, R81W | Ditch | Artificial | Yes | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 9 | Sec. 18, T152N, R80W | Ditch | Artificial | Yes | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | N | N | N | | | | | | |
| 10 | Sec. 18, T152N, R80W | Basin | Natural | Yes | 0.09 | 0.05 | 0.03 | 0.07 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.14 |
| 11 | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.04 | 0.00 | 0.03 | 0.07 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.04 |
| 12 | Sec. 18, T152N, R80W | Basin | Natural | Yes | 0.06 | 0.01 | 0.00 | 0.06 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.07 |
| 13 | Sec. 13, T152N, R81W | Basin | Natural | Yes | 0.01 | 0.01 | 0.11 | 0.06 | 0.00 | 0.00 | Y | N | N | | | | | Souris River Service Area | 0.02 |
| 14 | Sec. 13, T152N, R81W | Ditch | Artificial | Yes | 0.02 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | N | N | N | | | | | | |
| 15 | Sec. 18, T152N, R80W | Ditch | Artificial | Yes | 0.03 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | N | N | N | | | | | | |
| | | | | Totals | **0.65** | **0.14** | **0.48** | **0.74** | **0.00** | **0.00** | | | | | **0.00** | | **0.00** | | **0.72** |

[1] A wetland Jurisdictional Determination was issued by the USACE on 01/23/2019; NWO-2018-02098-BIS.

### Impact Summary Table

| Permanent Impact Summary | | Temporary Impacts and additional information | |
|---|---|---|---|
| Wetland Type | Total (Acres) | Wetland Type | Total (Acres/Lf) |
| Natural/JD | 0.67 | Temporary JD | 1.22 |
| Natural/Non-JD | 0.00 | Non-JD Temporary | 0.00 |
| Artificial/JD | 0.12 | Permanent JD > 0.10 | 0.26 |
| Artificial /Non-JD | 0.00 | Permanent OW | 0 Lf |
| **Total** | **0.79** | Temporary OW | 0 Lf |

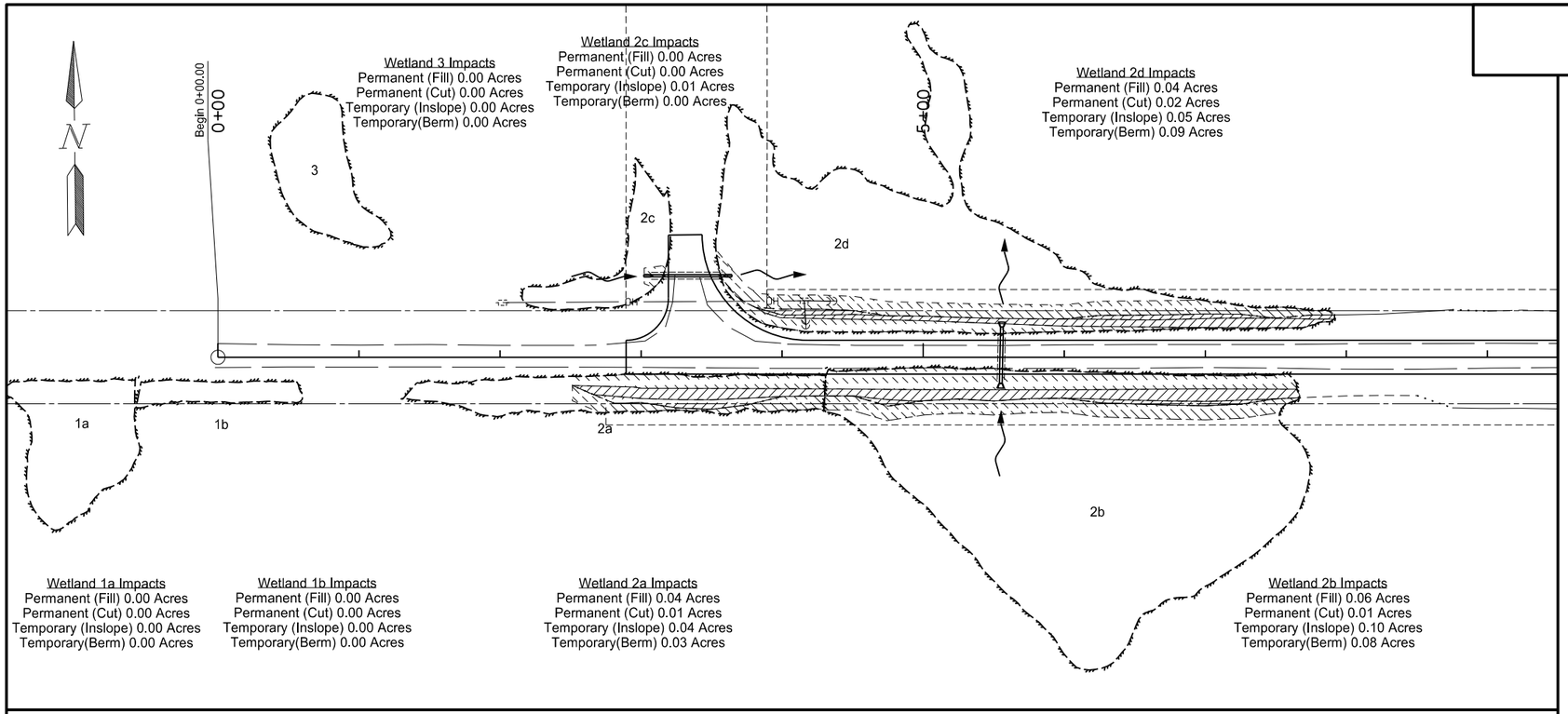
### Mitigation Summary Table

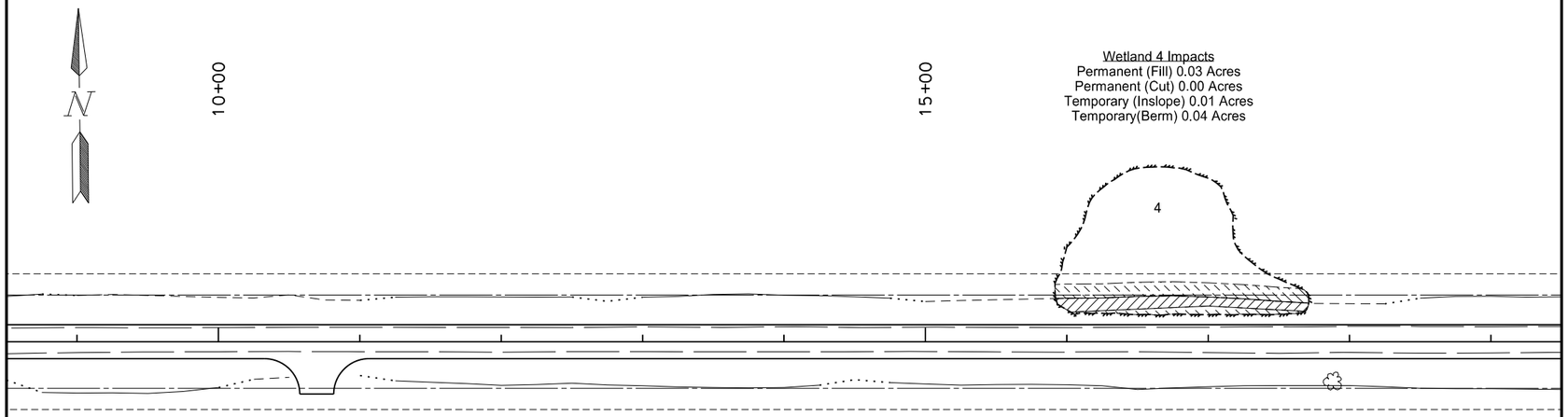
| | Location | DU Offsite | 11990 Bank Acre(s) | USACE/11990 Bank Acre(s) | USFWS Bank Acre(s) |
|---|---|---|---|---|---|
| USACE Only | | 0.05 | | 0.00 | |
| EO 11990 Only | | 0.40 | 0.00 | | |
| USACE/11990 | | 0.27 | | 0.00 | |
| USFWS | | | | | 0.00 |
| | **Total** | **0.72** | **0** | **0** | **0.00** |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Wetland Impacts & Mitigation

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 75 | 3 |




Permanent Wetland Impact (Fill)

Temporary Wetland Impact (Cut)

Temporary Wetland Impact (Inslope)

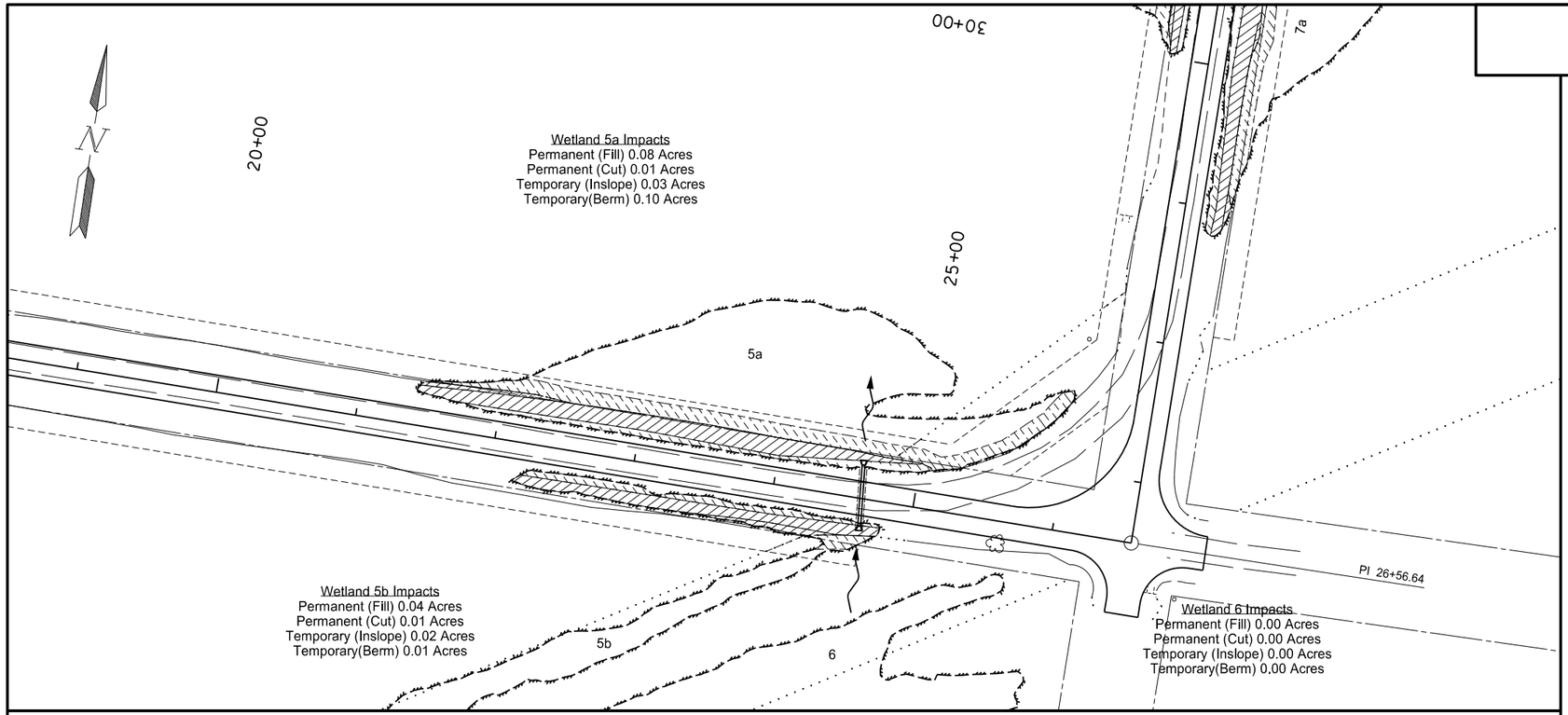
Temporary Wetland Impact (Berm)

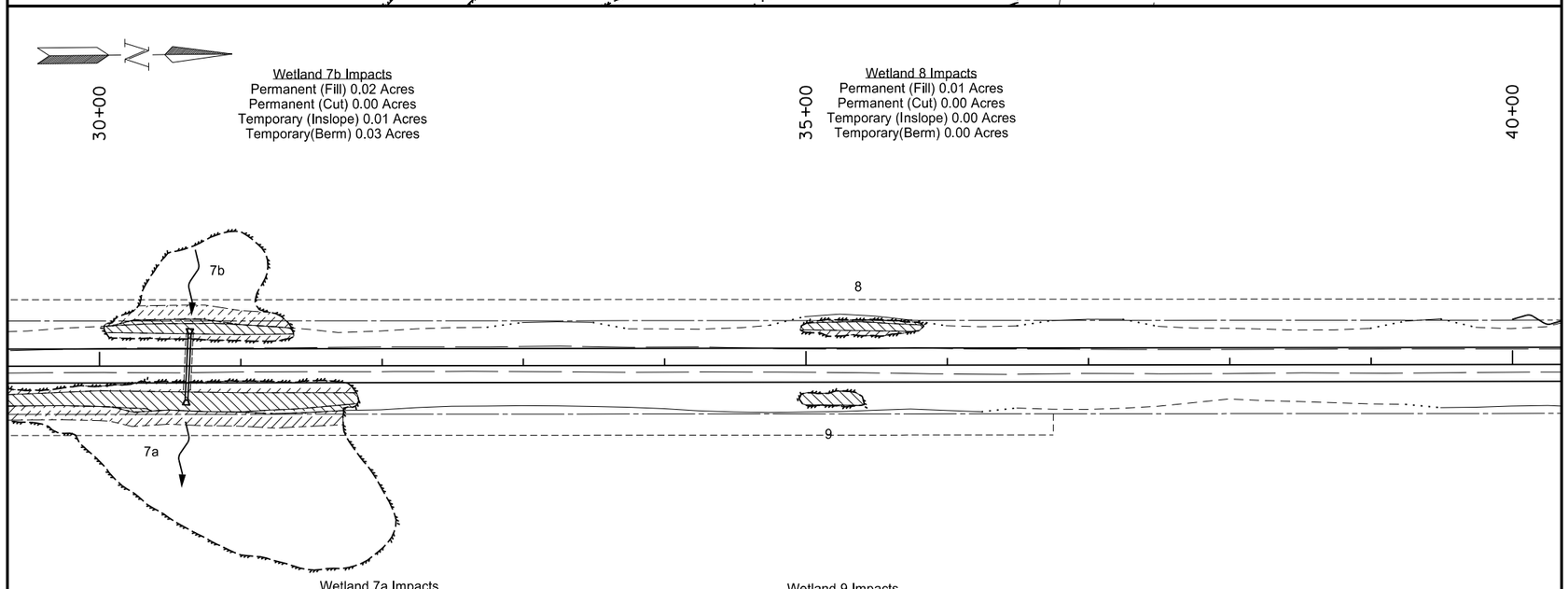
This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Wetland Impacts & Mitigation

4/30/2019 12:10:37 PM bschaff N:\21545\ROM-0300(137)\Design\075_Wetlands\075WL_003.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 75 | 4 |




Permanent Wetland Impact (Fill)

Temporary Wetland Impact (Cut)

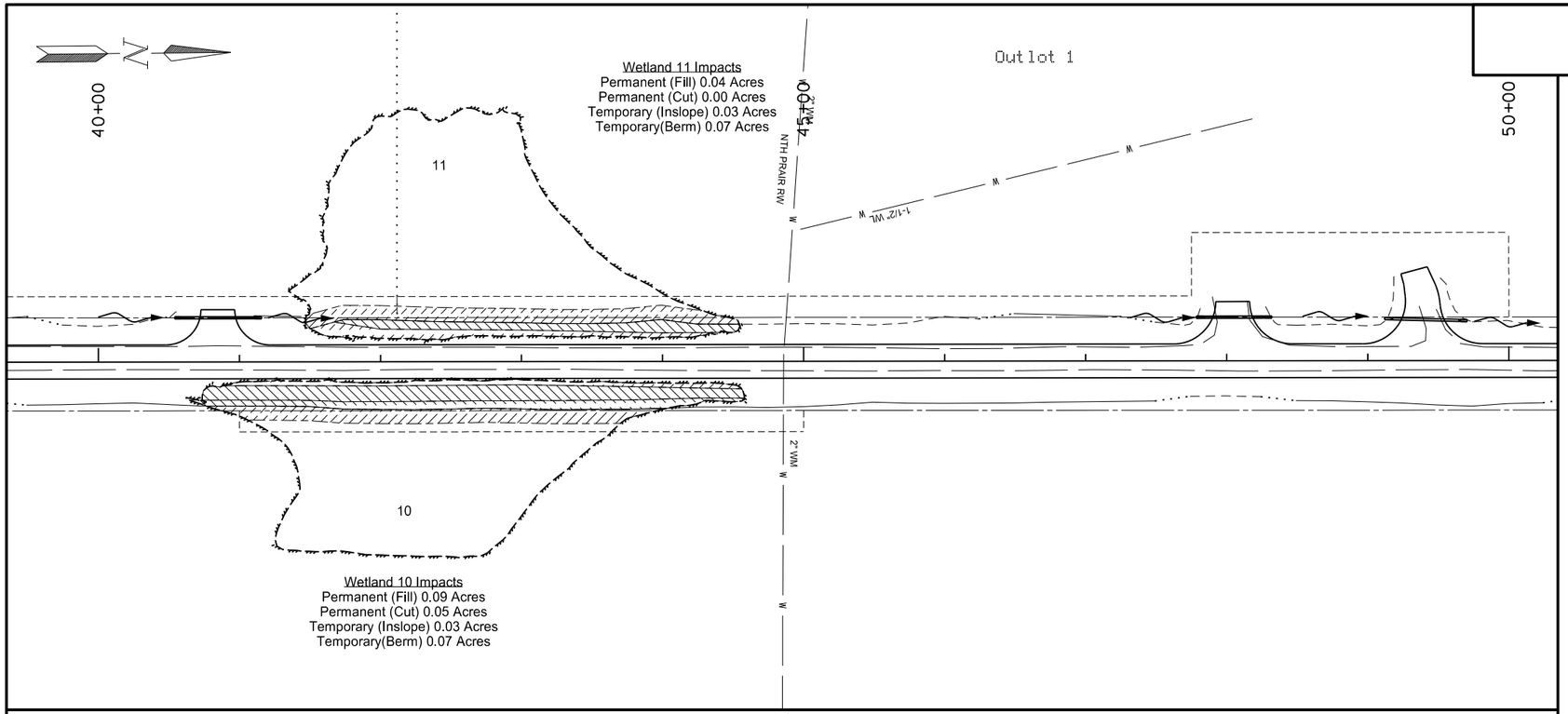
Temporary Wetland Impact (Inslope)

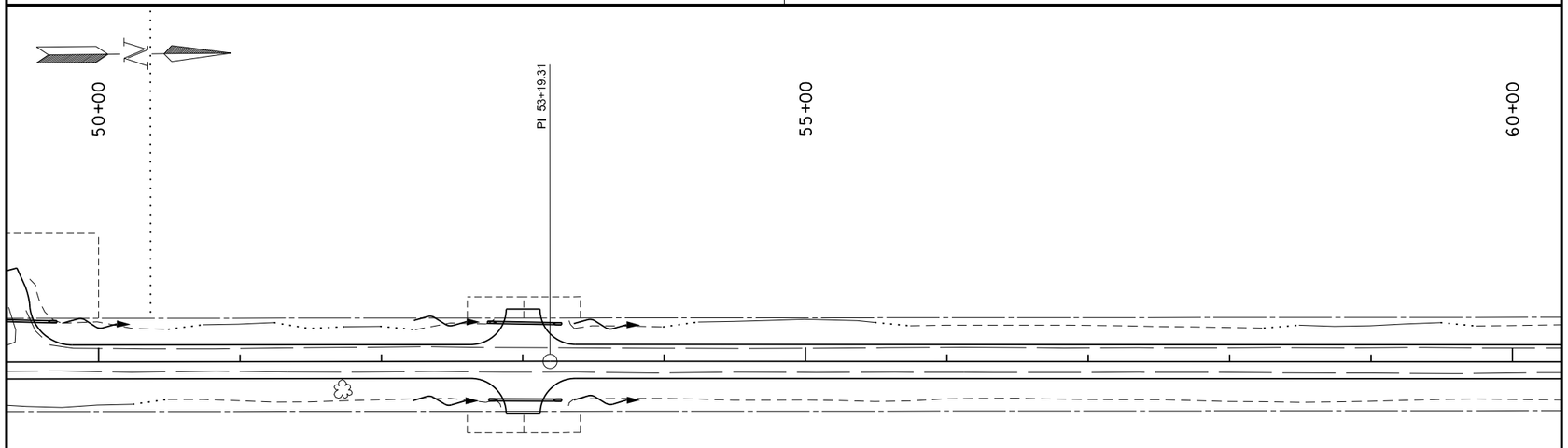
Temporary Wetland Impact (Berm)

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Wetland Impacts & Mitigation

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 75 | 5 |




Permanent Wetland Impact (Fill)

Temporary Wetland Impact (Cut)

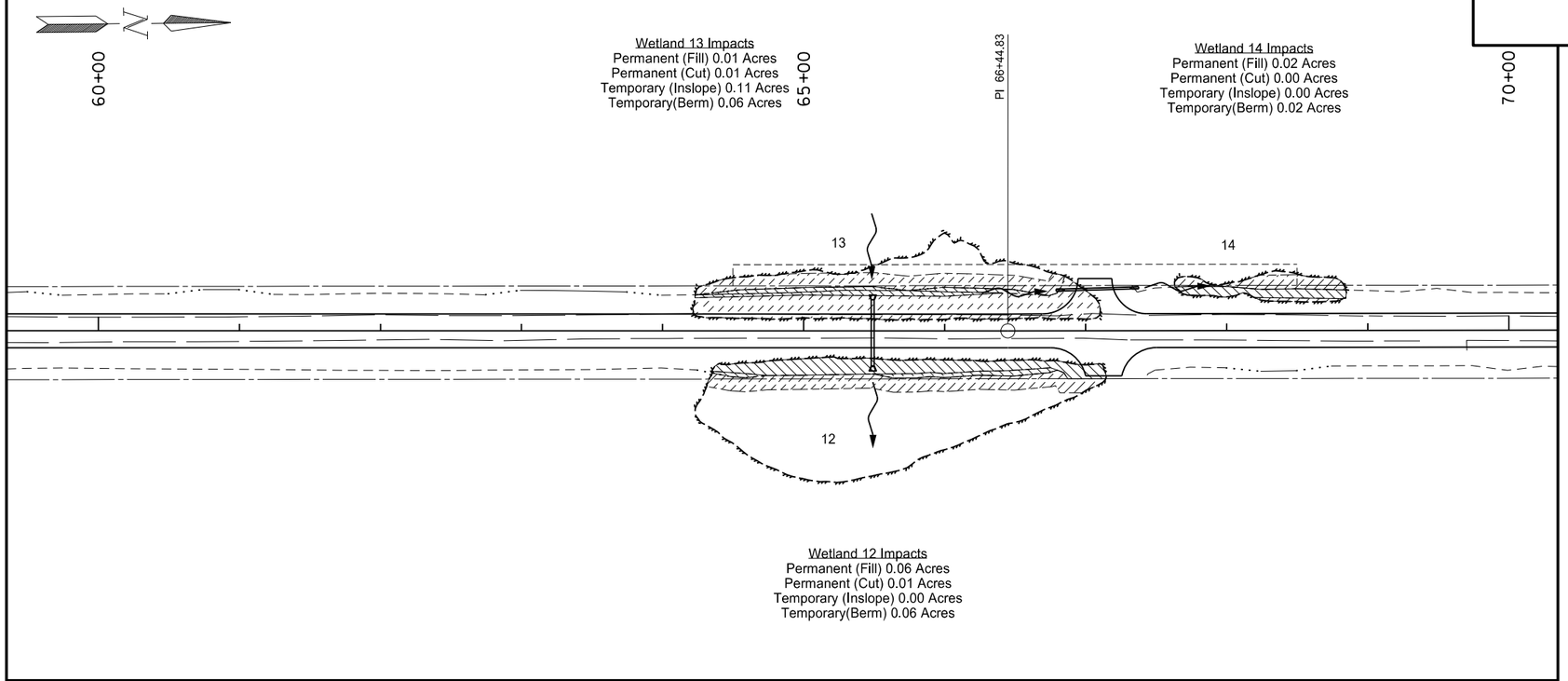
Temporary Wetland Impact (Inslope)

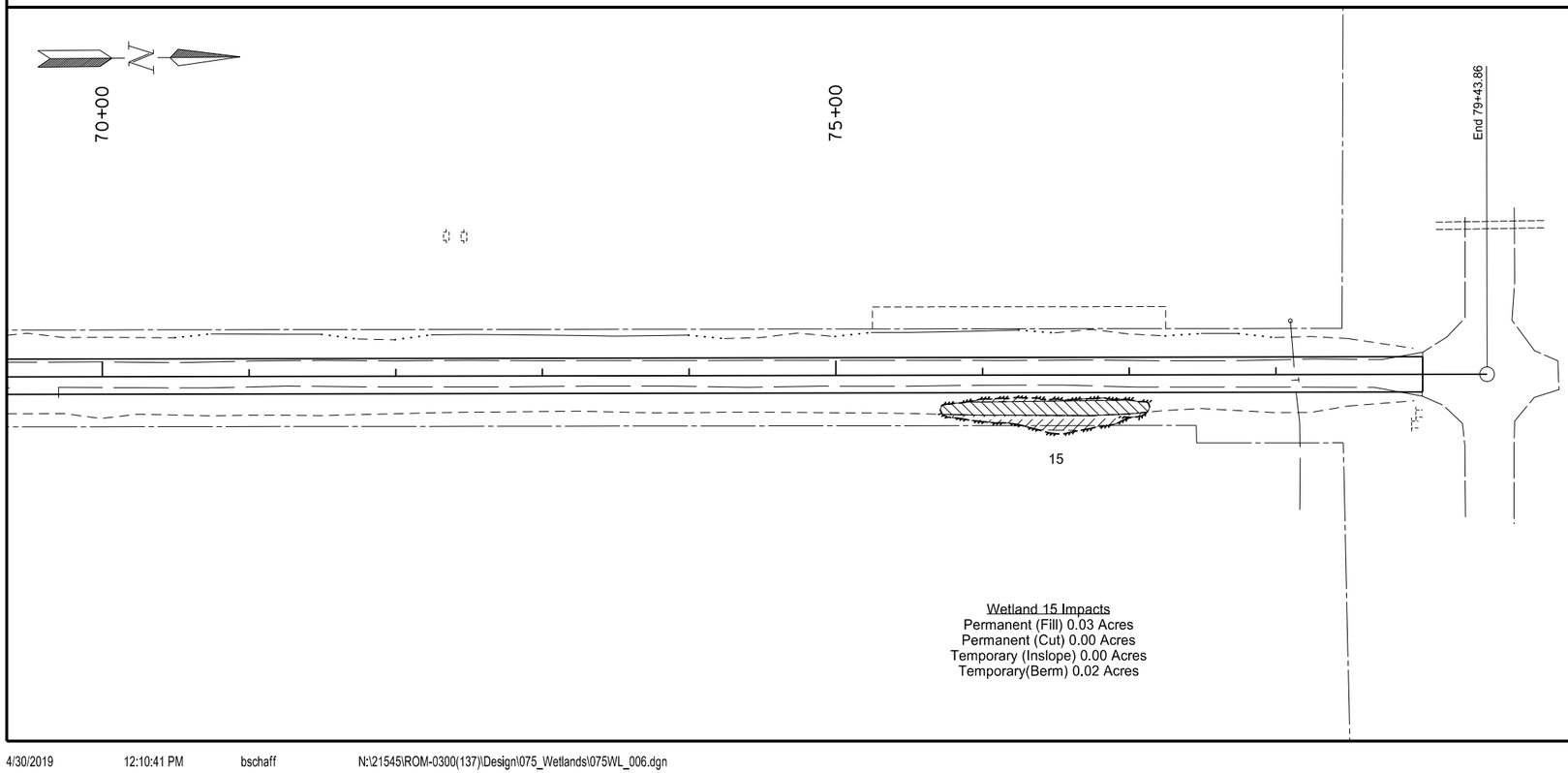
Temporary Wetland Impact (Berm)

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Wetland Impacts & Mitigation

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 75 | 6 |




Permanent Wetland Impact (Fill)

Temporary Wetland Impact (Cut)

Temporary Wetland Impact (Inslope)

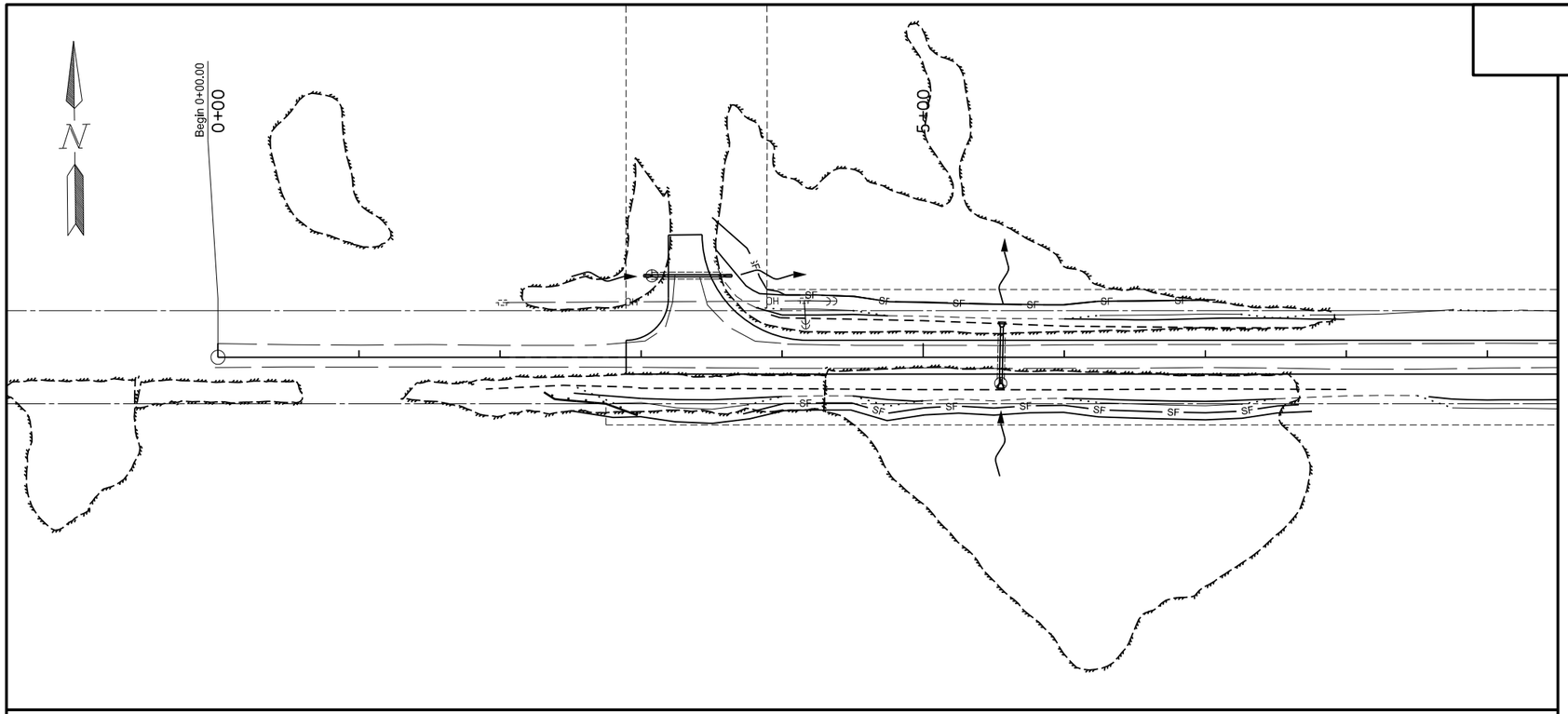
Temporary Wetland Impact (Berm)

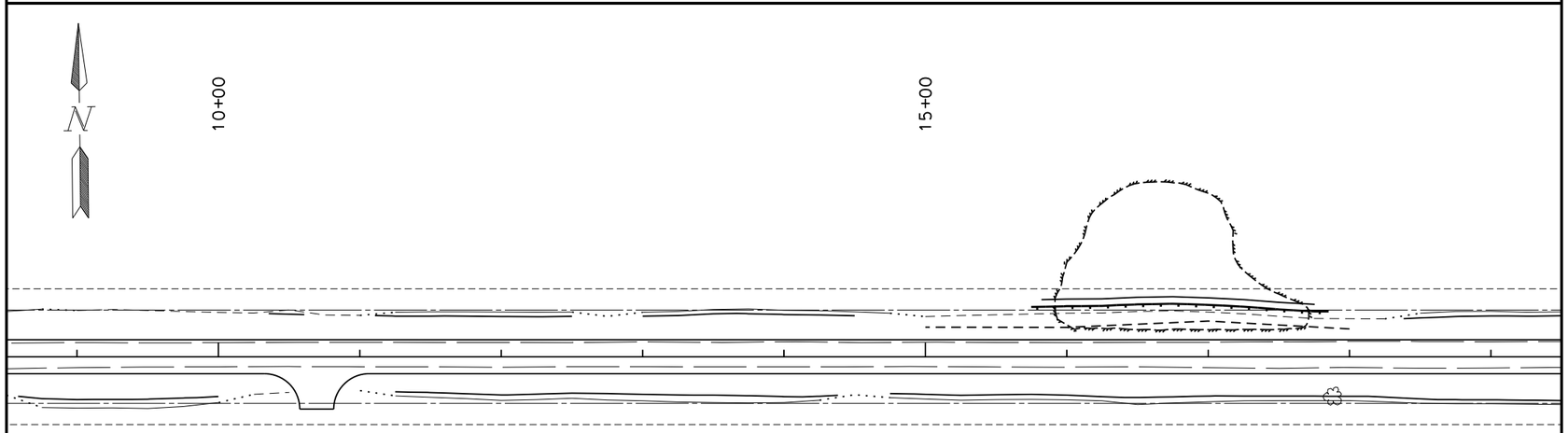
This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Wetland Impacts & Mitigation

4/30/2019 12:10:41 PM bschaff N:\21545\ROM-0300(137)\Design\075_Wetlands\075WL_006.dgn

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 76 | 1 |




See sheet 5 for quantities

SF — TEMPRARY SILT FENCE UNSUPPORTED

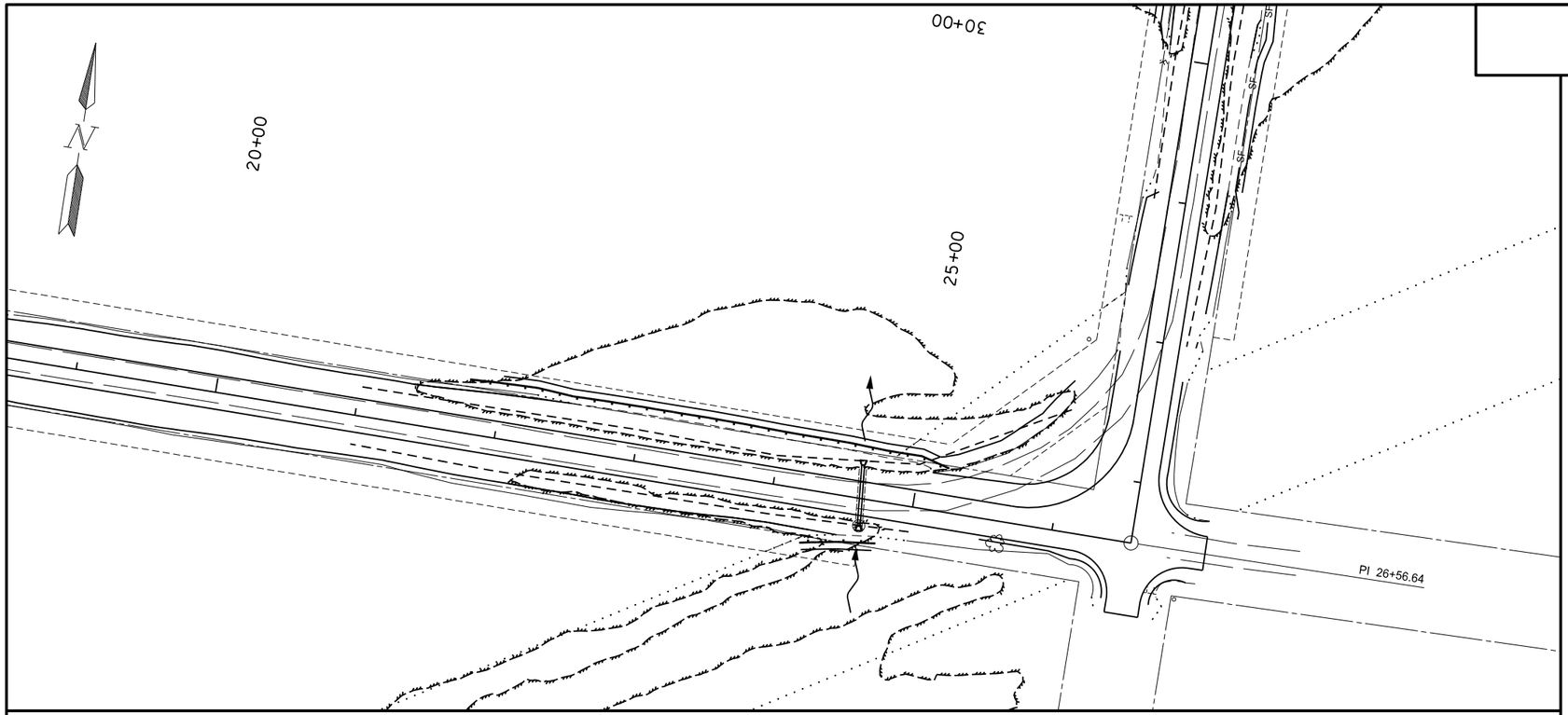
INLET PROTECTION - FIBER ROLLS

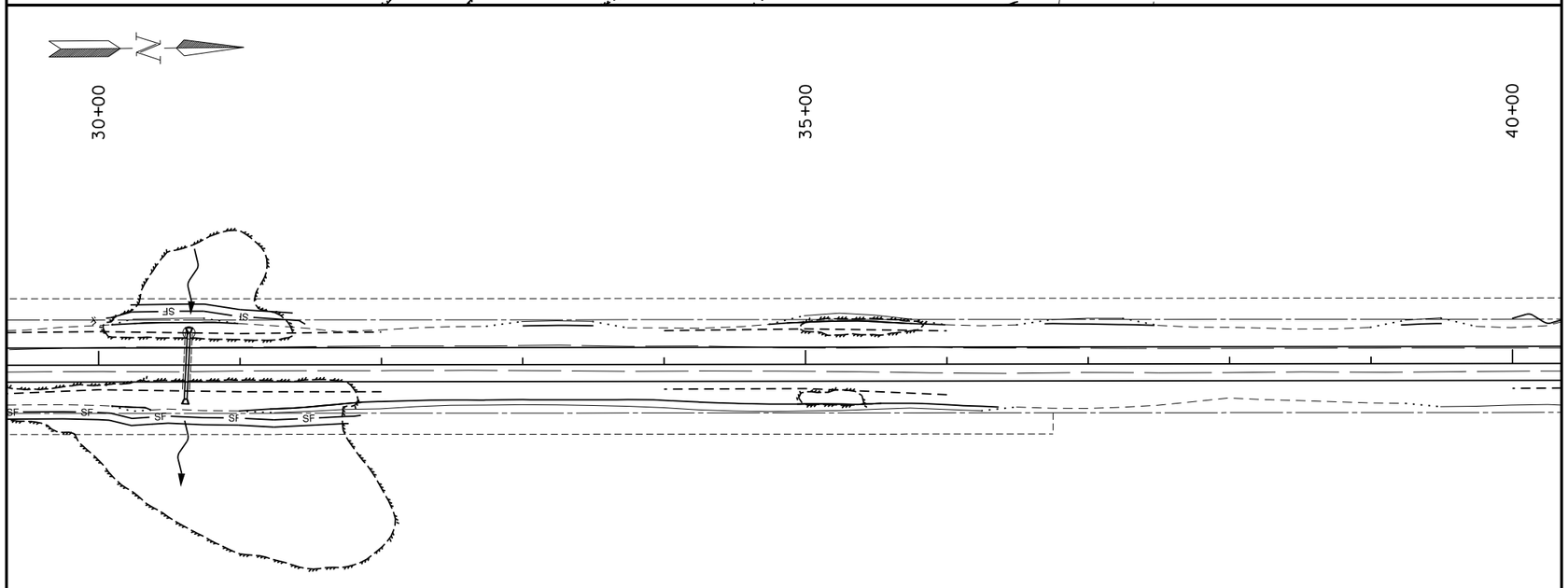
FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Temporary Erosion Control

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 76 | 2 |




See sheet 5 for quantities

SF — TEMPRARY SILT FENCE UNSUPPORTED

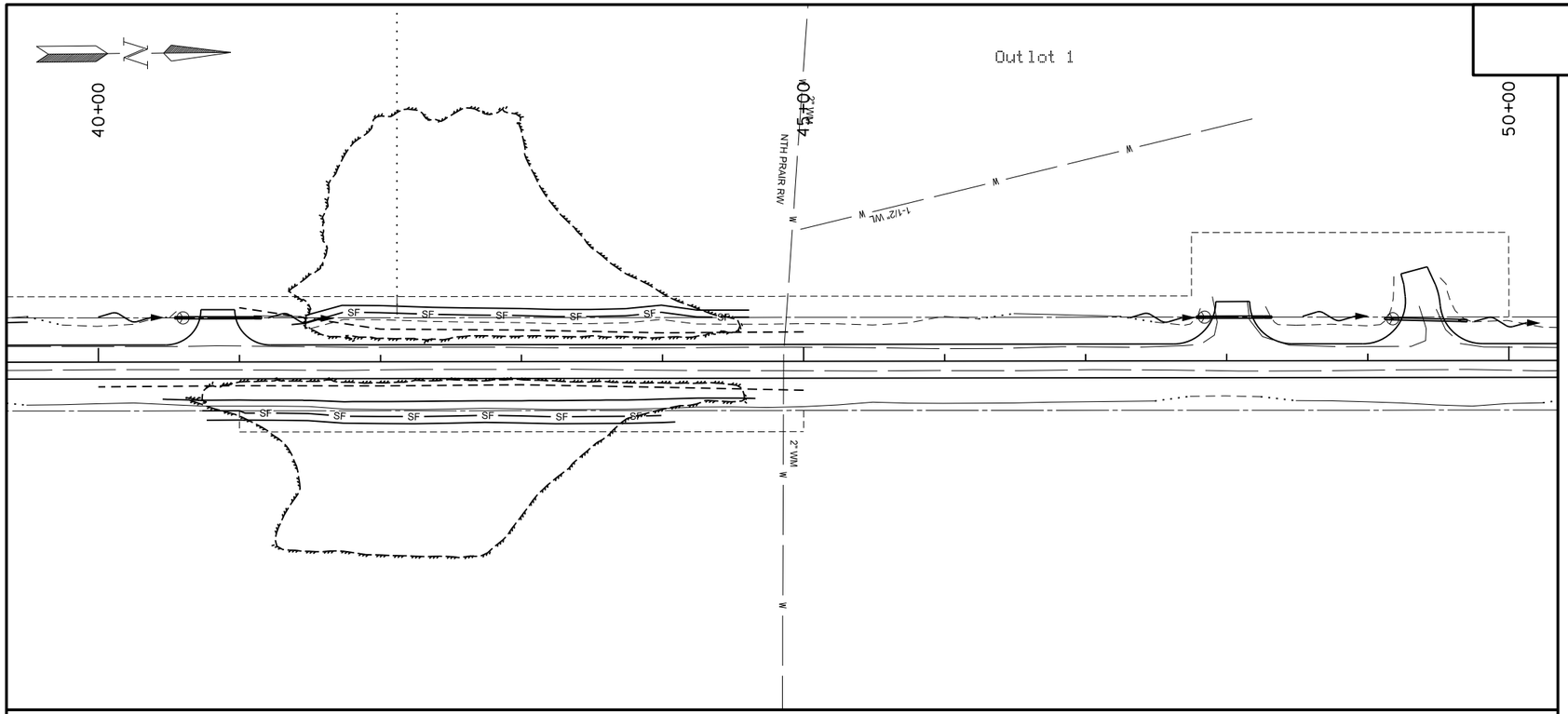
INLET PROTECTION - FIBER ROLLS

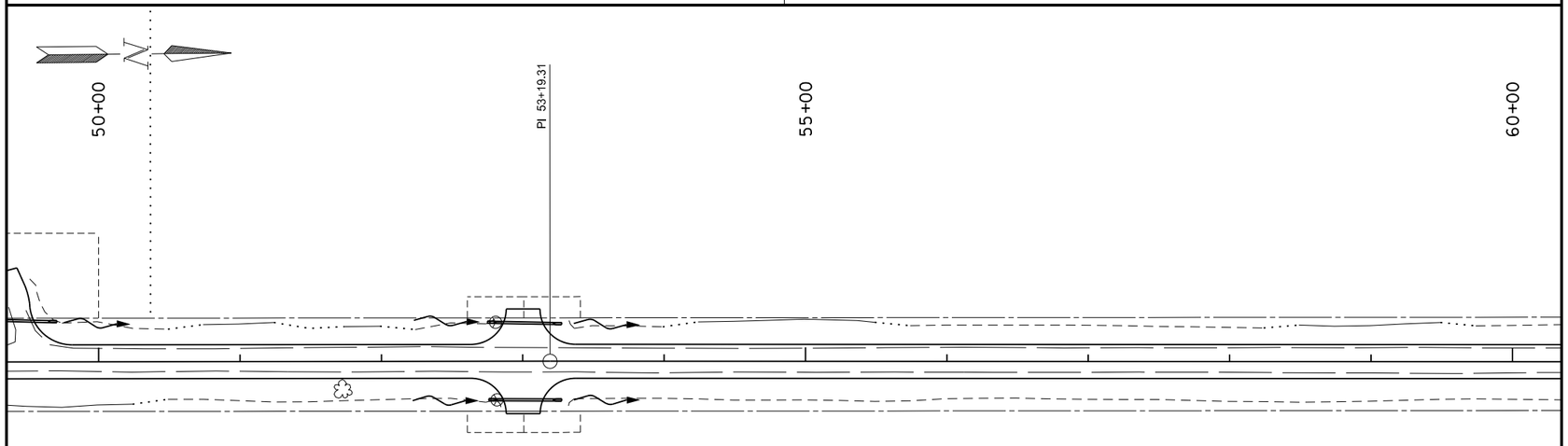
FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Temporary Erosion Control

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 76 | 3 |




See sheet 5 for quantities

SF — TEMPRARY SILT FENCE UNSUPPORTED

INLET PROTECTION - FIBER ROLLS

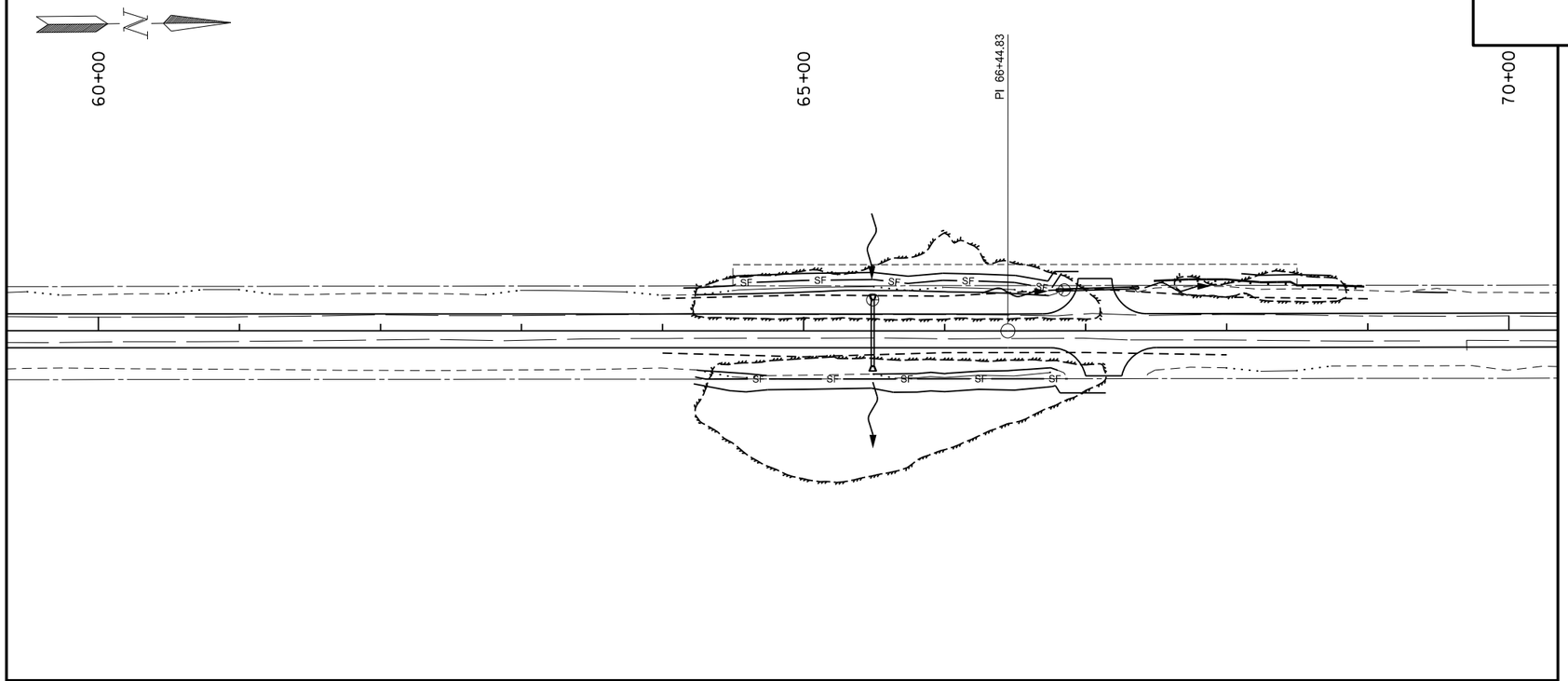
FIBER ROLLS

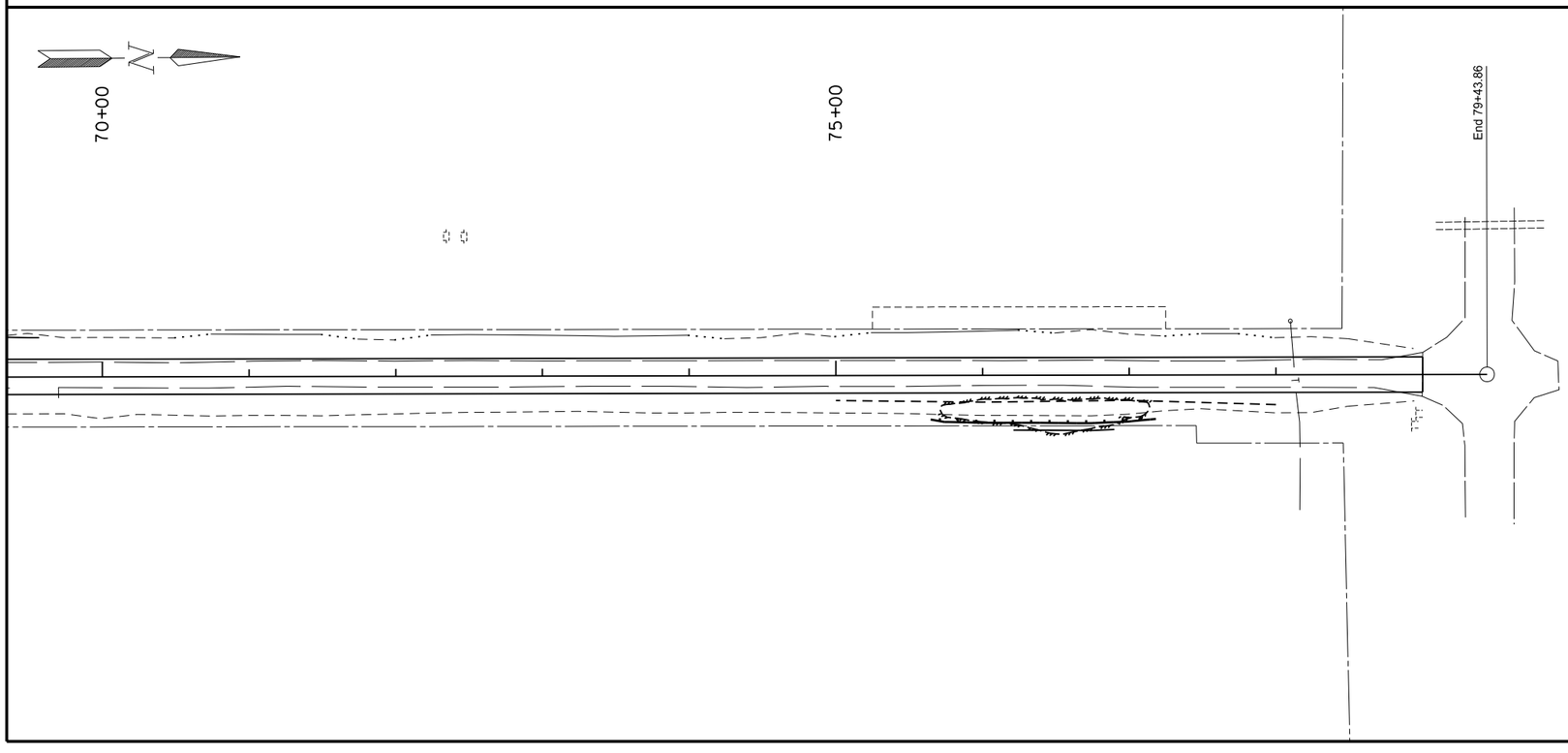
This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Temporary Erosion Control

4/30/2019 12:15:39 PM bschaff N:\21545\ROM-0300(137)\Design\076_TempEC\076TE_003.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 76 | 4 |




See sheet 5 for quantities

SF — TEMPRARY SILT FENCE UNSUPPORTED

INLET PROTECTION - FIBER ROLLS

FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Temporary Erosion Control

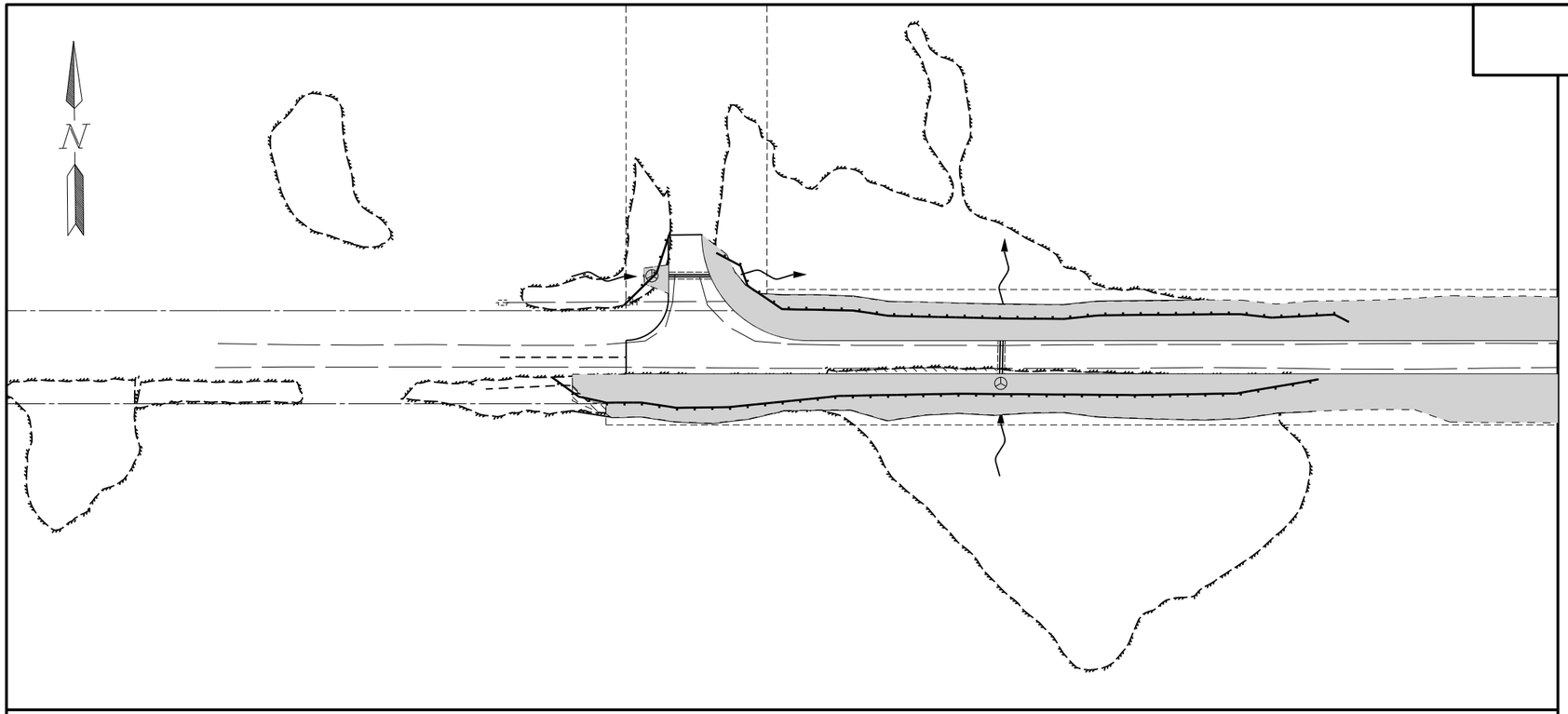
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 76 | 5 |

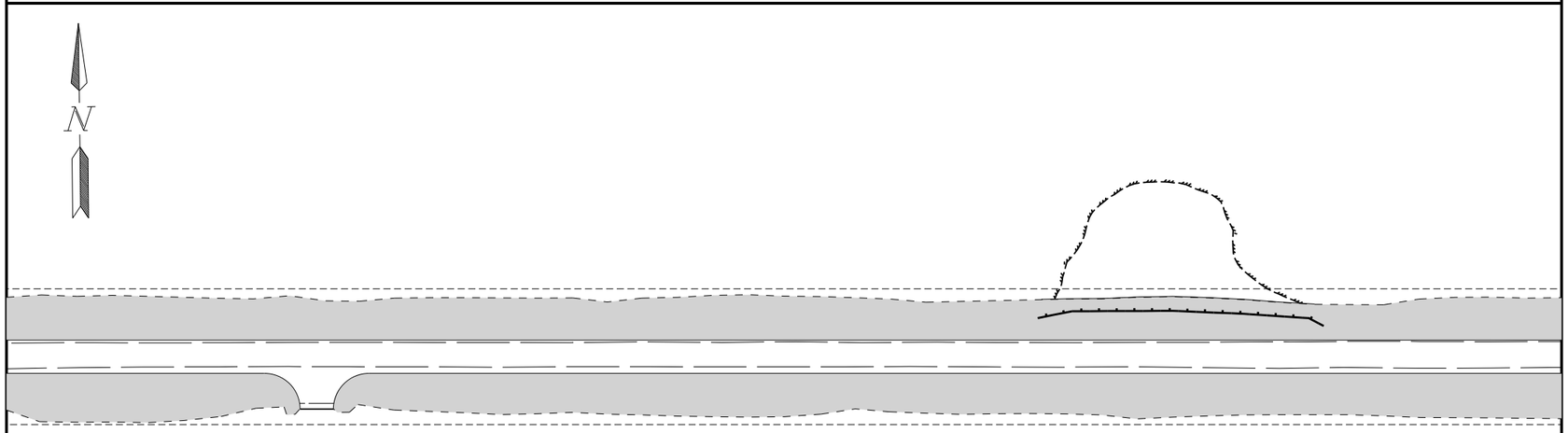
| Temporary Erosion Control | 12" Fiber Rolls (LF) | | Silt Fence (LF) | |
|---|---|---|---|---|
| Stationing | LT | RT | LT | RT |
| 2+31 to 2+97 | | 70 | | |
| 3+50 to 7+07 | | | 385 | |
| 3+72 to 7+63 | | | | 397 |
| 15+75 to 17+85 | 210 | | | |
| 21+76 to 25+21 | 346 | | | |
| 24+25 to 24+78 | | 54 | | |
| 28+95 to 31+83 | | | | 292 |
| 29+94 to 31+46 | 156 | | | |
| 40+74 to 44+00 | | | | 326 |
| 41+37 to 44+61 | | | 326 | |
| 64+15 to 66+83 | | | 275 | |
| 64+23 to 66+87 | | | | 265 |
| 67+48 to 68+98 | 150 | | | |
| 75+65 to 77+18 | 154 | | | |
| Pipe Inlet Protection | 160 | 60 | | |
| Earthen Berm Opening | 80 | 80 | | |
| **Subtotal** | **1,256** | **264** | **986** | **1,280** |
| **Total** | **1,520** | | **2,266** | |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Temporary Erosion Control

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 77 | 1 |





See sheet 5 for quantities

SEEDING CLASS II

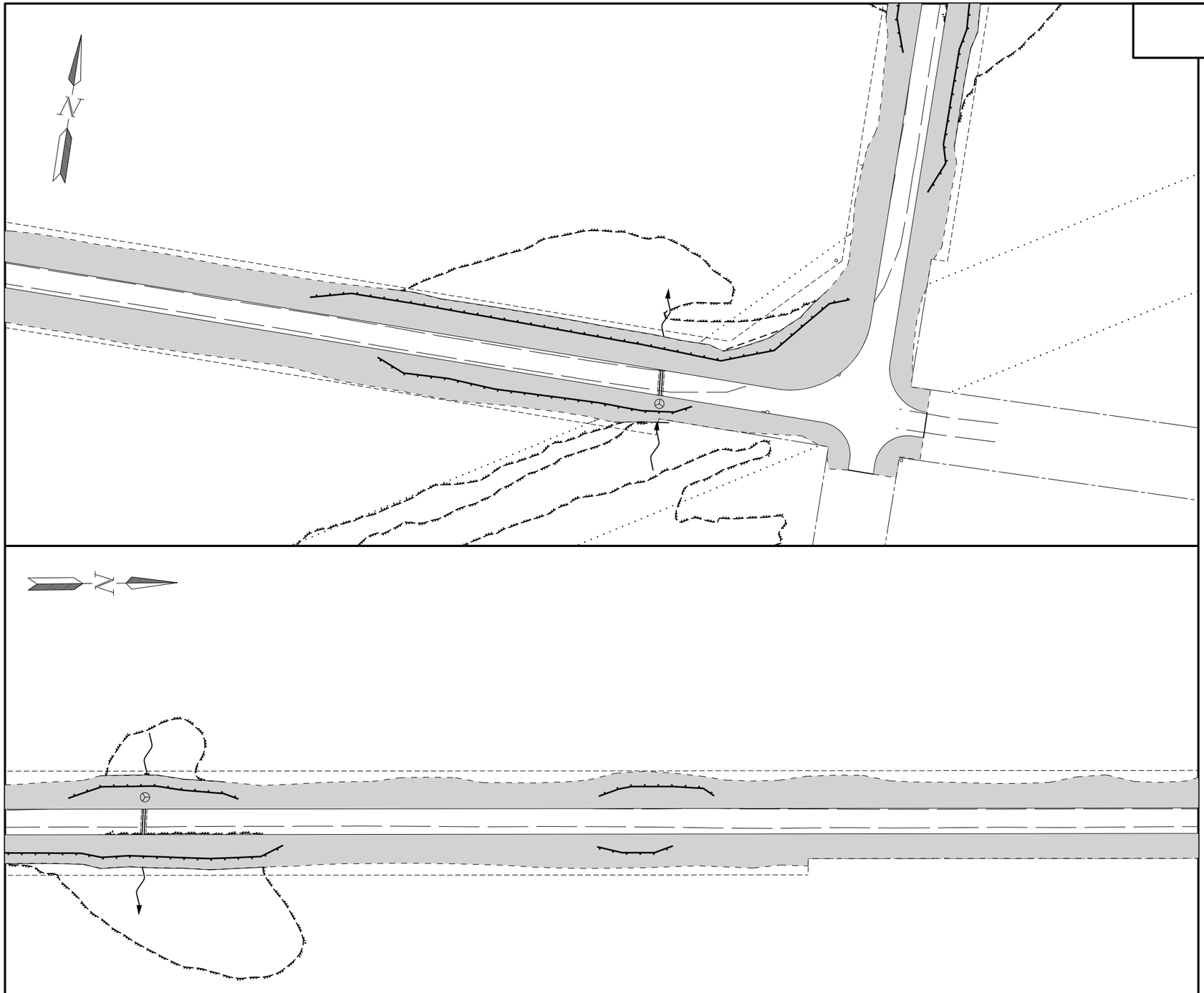
INLET PROTECTION

FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 77 | 2 |



See sheet 5 for quantities

SEEDING CLASS II

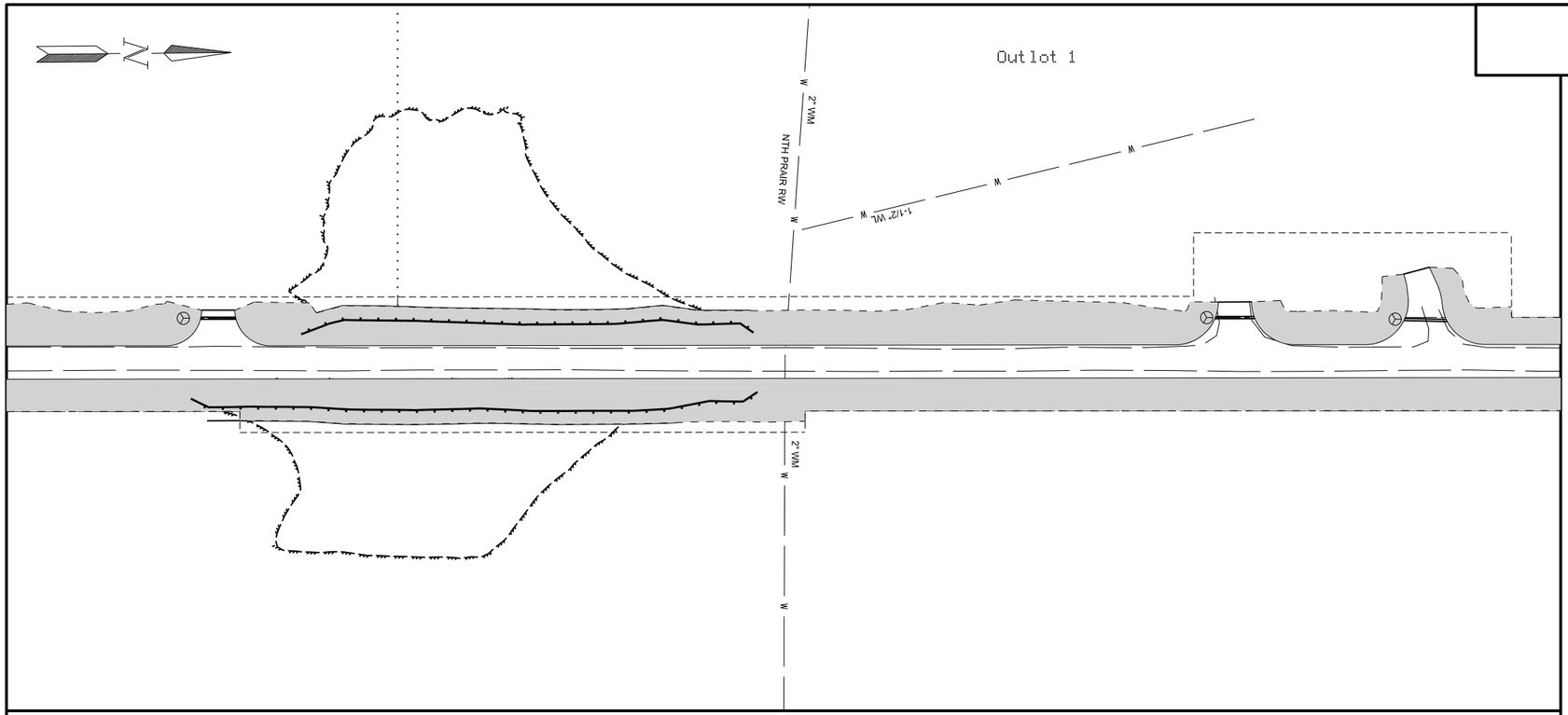
INLET PROTECTION

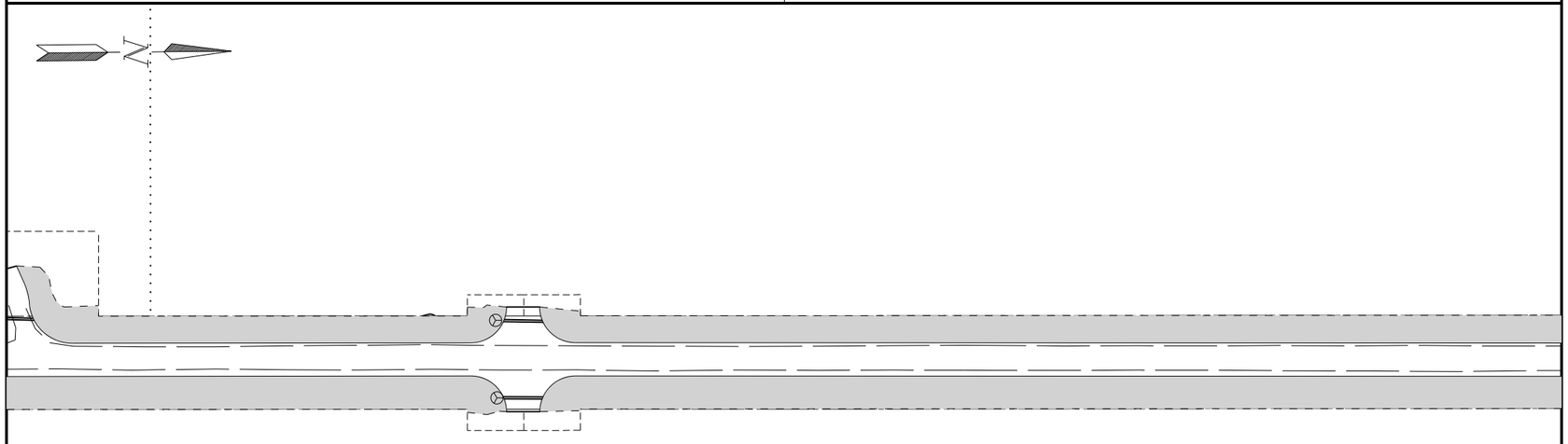
FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 77 | 3 |



See sheet 5 for quantities

SEEDING CLASS II

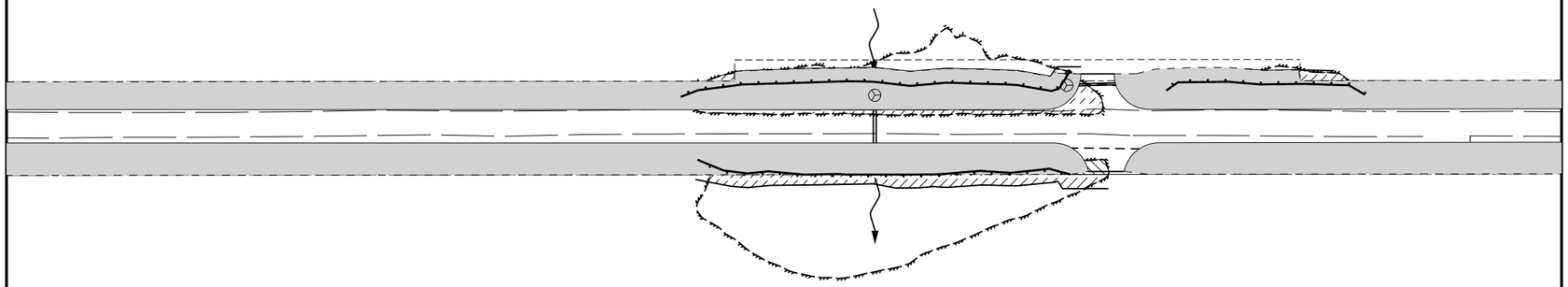
INLET PROTECTION

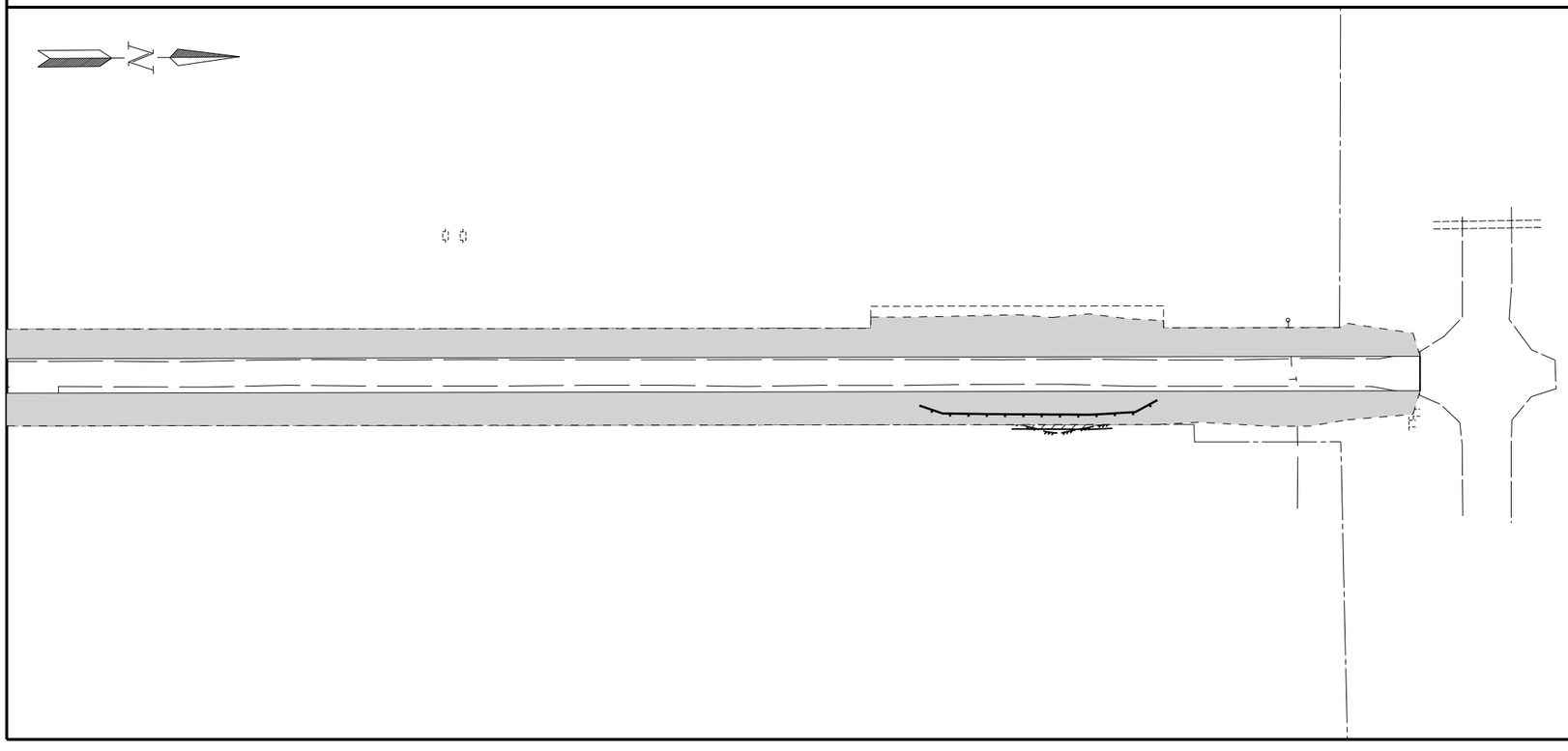
FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 77 | 4 |





See sheet 5 for quantities

SEEDING CLASS II

INLET PROTECTION

FIBER ROLLS

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 77 | 5 |

| Permanent Erosion Control | | | 12" Fiber Rolls (LF) | |
|---|---|---|---|---|
| Stationing | | | LT | RT |
| 2+37 | to | 7+80 | | 550 |
| 2+88 | to | 3+21 | 63 | |
| 3+53 | to | 8+02 | 468 | |
| 15+79 | to | 17+82 | 204 | |
| 21+31 | to | 27+61 | 521 | |
| 22+01 | to | 24+95 | | 298 |
| 28+70 | to | 31+91 | | 327 |
| 29+93 | to | 31+50 | 160 | |
| 34+81 | to | 35+50 | | 72 |
| 34+82 | to | 35+89 | 110 | |
| 40+65 | to | 44+66 | | 405 |
| 41+43 | to | 44+64 | 324 | |
| 64+12 | to | 66+88 | 285 | |
| 64+24 | to | 67+12 | | 291 |
| 67+55 | to | 68+96 | 144 | |
| 75+58 | to | 77+21 | | 166 |
| Pipe Inlet Protection | | | 160 | 60 |
| Earthen Berm Opening | | | 80 | 80 |
| **Subtotal** | | | **2,519** | **2,249** |
| **Total** | | | **4,768** | |

| Spec | Code | Material | Unit | Temporary | Permanent | Total |
|---|---|---|---|---|---|---|
| 251 | 0200 | Seeding Class II | Acre | | 8.87 | **8.87** |
| 251 | 2000 | Temporary Cover Crop | Acre | 8.87 | | **8.87** |
| 253 | 0101 | Straw Mulch | Acre | 8.87 | 8.87 | **17.74** |

This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Permanent Erosion Control

# PRELIMINARY SURVEY COORDINATE AND CURVE DATA - MINOT MINUTEMAN MISSILE ACCESS ROAD B-10

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 81 | 1 |

## HORIZONTAL ALIGNMENT

| PNT | STATION | NORTHING | EASTING |
|---|---|---|---|
| B-10 | | | |
| Begin | 0+00 | 357334.75 | 1850842.75 |
| PI | 26+56.64 | 357303.81 | 1853499.21 |
| PI | 53+19.31 | 359966.40 | 1853520.37 |
| PI | 66+44.83 | 361291.86 | 1853532.95 |
| End | 79+43.86 | 362590.85 | 1853543.16 |

## CURVE DATA

ARC DEFINITION

## US PUBLIC LAND SURVEY DATA

| CORNER | IRN | NORTHING | EASTING |
|---|---|---|---|
| SW Cor Sec | 13 T-152-N R-81-W | 357365.79 | 1848185.67 |
| S Qtr Cor | 13 T-152-N R-81-W | 357334.75 | 1850842.75 |
| NE Cor Sec | 13 T-152-N R-81-W | 362591.85 | 1853544.83 |
| SE Cor Sec | 13 T-152-N R-81-W | 357303.81 | 1853500.21 |

## SURVEY CONTROL POINTS

| PNT | NORTHING | EASTING | ELEV | STATION | OFFSET | MONUMENT DESCRIPTION |
|---|---|---|---|---|---|---|
| PRIMARY CONTROL | | | | | | |
| GPS-1 | 362505.29 | 1853834.30 | 1731.17 | 78+60.60 | 291.81' Rt | |
| SECONDARY CONTROL | | | | | | |
| RTK-2 | 357269.32 | 1853540.43 | 1756.71 | | Off of Alignment | |

NOTES: Sheet 1 of 1

Date Survey Completed 12/05/18

☐ Assumed Coordinates

☒ All coordinates on this sheet are Ward County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota North Zone Combination Factor (cf) = 0.9998530

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

INITIALIZING BENCH MARK
ND GPS Station (OPUS)

☒ NAVD-88

☐ _____

☒ GEOID12B ☐ _____

☐ GEOID18

This document was originally issued and sealed by James Alber, Registration Number LS- 4730 , on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | ROM-0300(137) | 100 | 1 |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | 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** | **2** | **34** | **68** |
| 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** | **3** | **19** | **57** |
| G20-4-36 | 36"x18" | PILOT CAR FOLLOW ME (Mounted to back of pilot car) | | 18 | |
| G20-10-108 | 108"x48" | CONTRACTOR SIGN | | 64 | |
| **G20-50a-72** | **72"x36"** | **ROAD WORK NEXT __ MILES RT & LT ARROWS** | **1** | **37** | **37** |
| **G20-52a-72** | **72"x24"** | **ROAD WORK NEXT __ MILES RT or LT ARROW** | **2** | **30** | **60** |
| G20-55-96 | 96"x48" | SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT | | 59 | |
| 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** | **2** | **32** | **64** |
| **R1-1a-18** | **18"x18"** | **STOP and SLOW PADDLE Back to Back** | **2** | **5** | **10** |
| R1-2-60 | 60"x60" | YIELD | | 29 | |
| R2-1-48 | 48"x60" | SPEED LIMIT __ | | 39 | |
| R2-1a-24 | 24"x18" | MINIMUM FEE $80 (Mounted on Speed Limit post) | | 10 | |
| 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** | **2** | **28** | **56** |
| R11-2a-48 | 48"x30" | STREET CLOSED | | 28 | |
| **R11-3a-60** | **60"x30"** | **ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY** | **2** | **31** | **62** |
| 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** | **35** | **70** |
| W3-5-48 | 48"x48" | SPEED REDUCTION AHEAD | | 35 | |
| W4-2-48 | 48"x48" | RIGHT or LEFT LANE TRANSITION SYMBOL | | 35 | |
| W5-1-48 | 48"x48" | ROAD NARROWS | | 35 | |
| W5-8-48 | 48"x48" | THRU TRAFFIC RIGHT LANE | | 35 | |
| W5-9-48 | 48"x48" | ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW | | 35 | |
| W6-3-48 | 48"x48" | TWO WAY TRAFFIC SYMBOL | | 35 | |
| W8-1-48 | 48"x48" | BUMP | | 35 | |
| W8-3-48 | 48"x48" | PAVEMENT ENDS | | 35 | |
| W8-7-48 | 48"x48" | LOOSE GRAVEL | | 35 | |
| W8-9a-48 | 48"x48" | SHOULDER DROP-OFF | | 35 | |
| 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** | **35** | **70** |
| W8-55-48 | 48"x48" | TRUCKS CROSSING AHEAD or __ FT. | | 35 | |
| W8-56-48 | 48"x48" | TRUCKS EXITING HIGHWAY | | 35 | |
| W9-3a-48 | 48"x48" | CENTER LANE CLOSED SYMBOL | | 35 | |
| W12-2-48 | 48"x48" | LOW CLEARANCE 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** | **2** | **35** | **70** |
| 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. | | 35 | |
| **W20-7a-48** | **48"x48"** | **FLAGGING SYMBOL** | **2** | **35** | **70** |
| 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** | **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 | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|
| W21-5-48 | 48"x48" | SHOULDER WORK | | 35 | |
| 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** | **1** | **35** | **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**

**SPEC & CODE**

| | | | |
|---|---|---|---|
| **704-1000** | **TRAFFIC CONTROL SIGNS** | **TOTAL UNITS** | **753** |

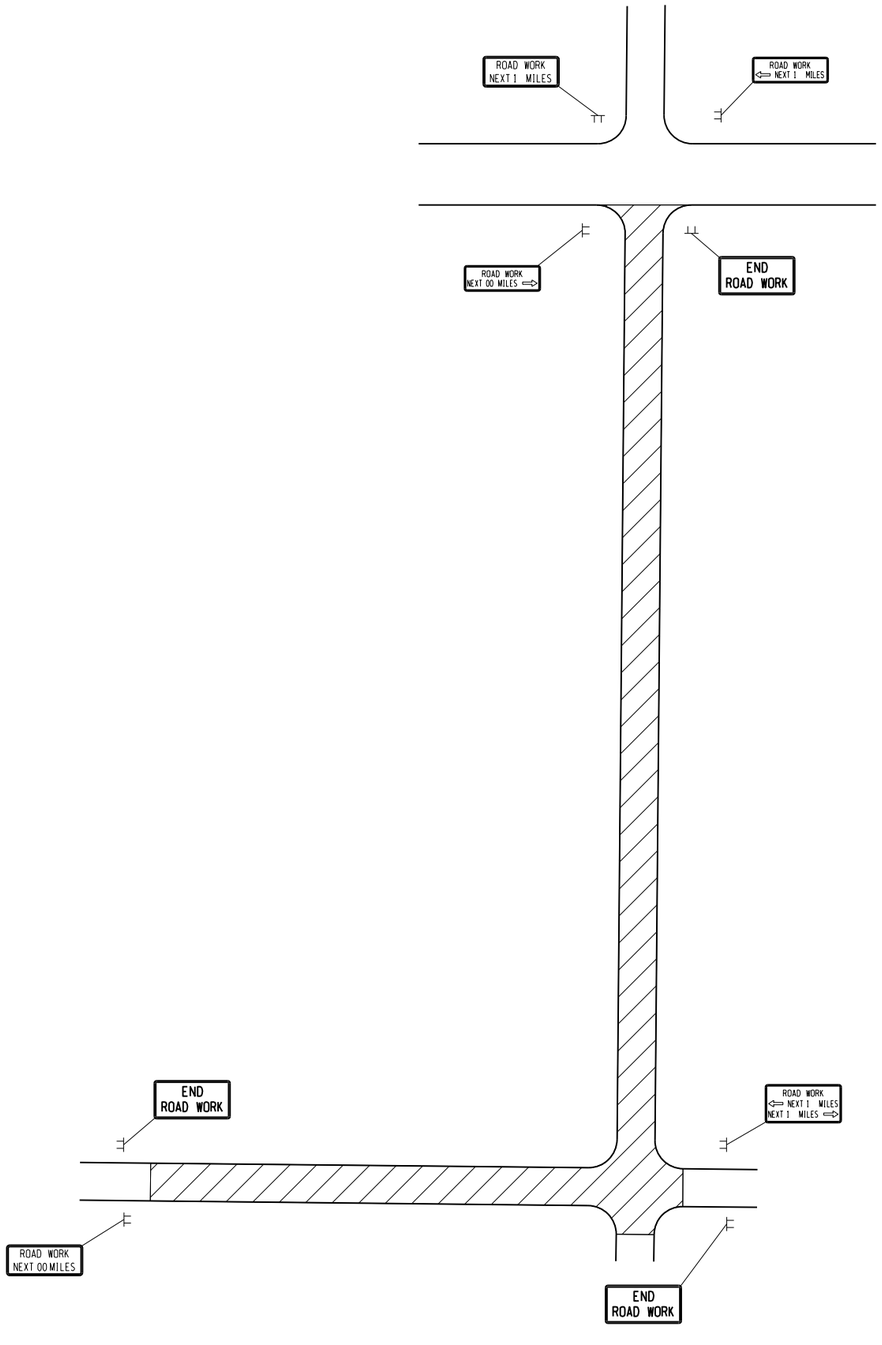
| SPEC & CODE | DESCRIPTION | UNIT | QUANTITY |
|---|---|---|---|
| **704-0100** | **FLAGGING** | **MHR** | **960** |
| 704-1041 | ATTENUATION DEVICE-TYPE B-55 | EACH | |
| 704-1043 | ATTENUATION DEVICE-TYPE B-65 | EACH | |
| 704-1044 | ATTENUATION DEVICE-TYPE B-70 | EACH | |
| 704-1050 | TYPE I BARRICADES | EACH | |
| 704-1051 | TYPE II BARRICADES | EACH | |
| **704-1052** | **TYPE III BARRICADES** | **EACH** | **8** |
| 704-1060 | DELINEATOR DRUMS | EACH | |
| 704-1065 | TRAFFIC CONES | EACH | |
| 704-1067 | TUBULAR MARKERS | EACH | |
| 704-1070 | DELINEATOR | EACH | |
| 704-1072 | FLEXIBLE DELINEATORS | EACH | |
| **704-1080** | **STACKABLE VERTICAL PANEL** | **EACH** | **15** |
| 704-1081 | VERTICAL PANELS - BACK TO BACK | EACH | |
| 704-1085 | SEQUENCING ARROW PANEL - TYPE A | EACH | |
| 704-1086 | SEQUENCING ARROW PANEL - TYPE B | EACH | |
| 704-1087 | SEQUENCING ARROW PANEL - TYPE C | EACH | |
| 704-1088 | SEQUENCING ARROW PANEL - TYPE C - CROSSOVER | EACH | |
| 704-1095 | TYPE B FLASHERS | EACH | |
| 704-1500 | OBLITERATION OF PVMT MK | SF | |
| 704-3501 | PORTABLE PRECAST CONCRETE MED BARRIER | LF | |
| 704-3510 | PRECAST CONCRETE MED BARRIER - STATE FURNISHED | EACH | |
| 762-0200 | RAISED PAVEMENT MARKERS | EACH | |
| 762-0420 | SHORT TERM 4IN LINE - TYPE R | LF | |
| 762-0430 | SHORT TERM 4IN LINE - TYPE NR | LF | |
| 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/

This document was originally issued and sealed by Eric R. Molbert,, Registration Number PE-4222, on 5/2/19 and the original document is stored at the North Dakota Department of Transportation.

Traffic Control Devices List

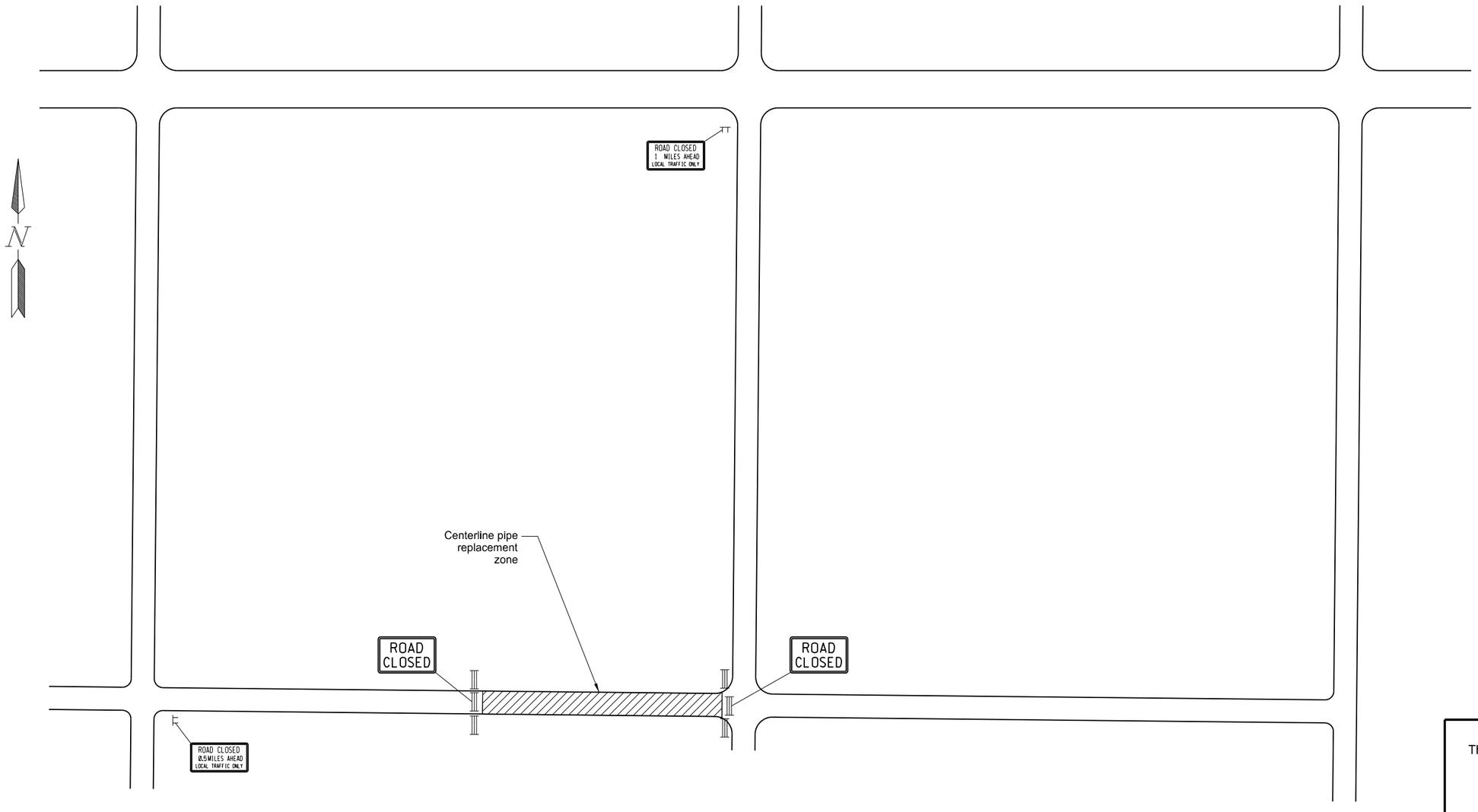
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 100 | 2 |


This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Work Zone Terminal Sign Layout

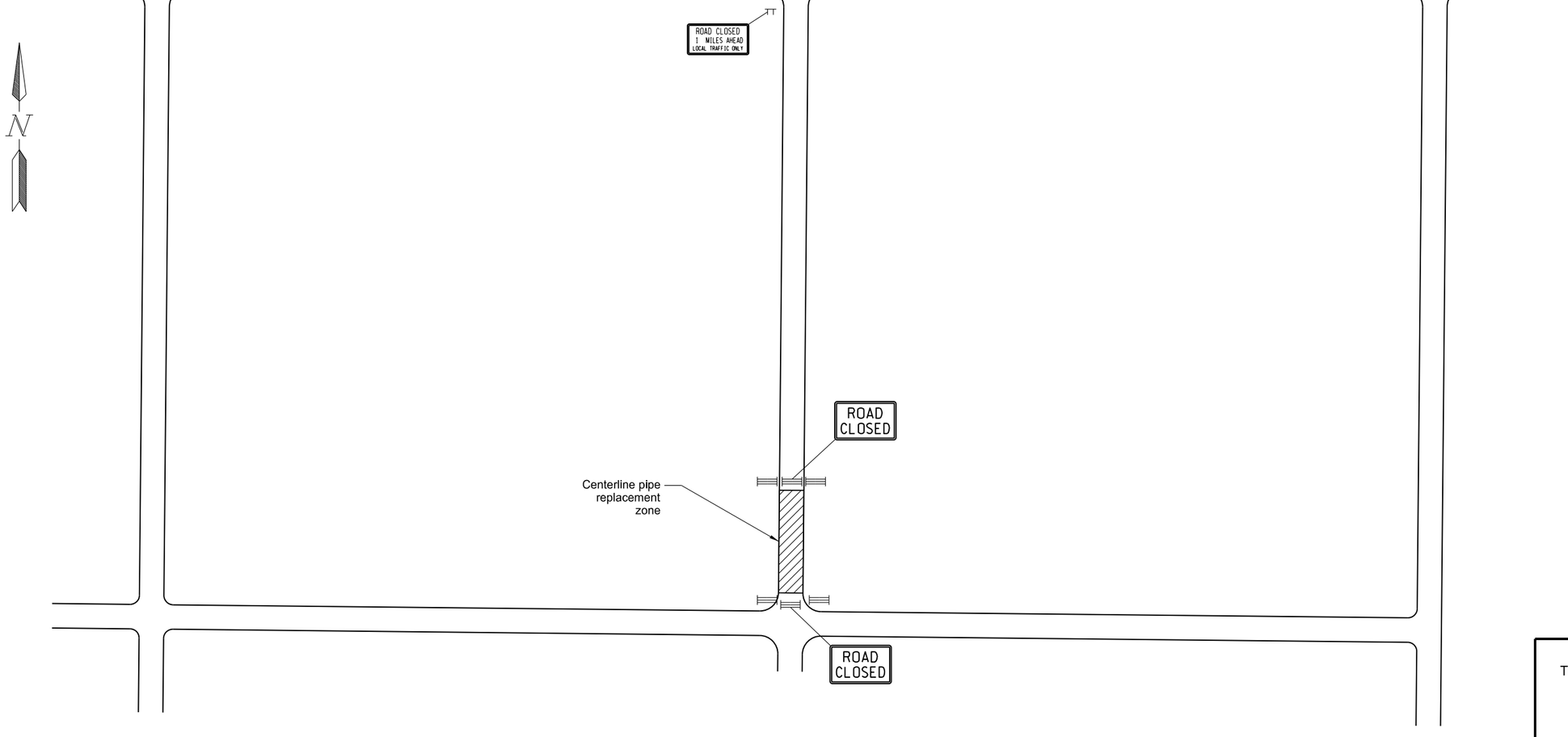
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 100 | 3 |




This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Centerline Pipe Work Zone
Phase 1

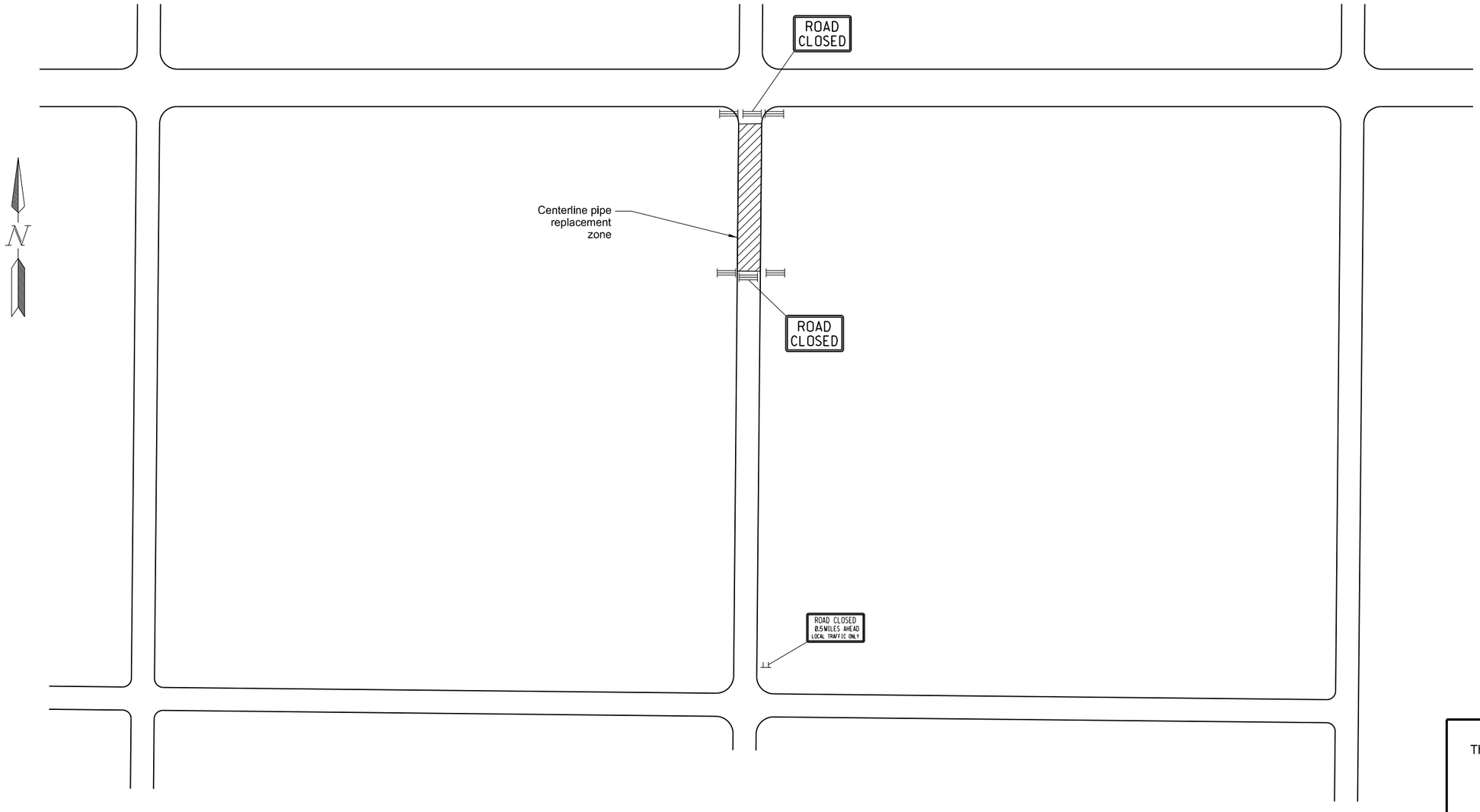
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 100 | 4 |




This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Centerline Pipe Work Zone
Phase 2

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 100 | 5 |




This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Centerline Pipe Work Zone
Phase 3

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| N.D. | ROM-0300(137), PCN 22155 | 110 | 1 |

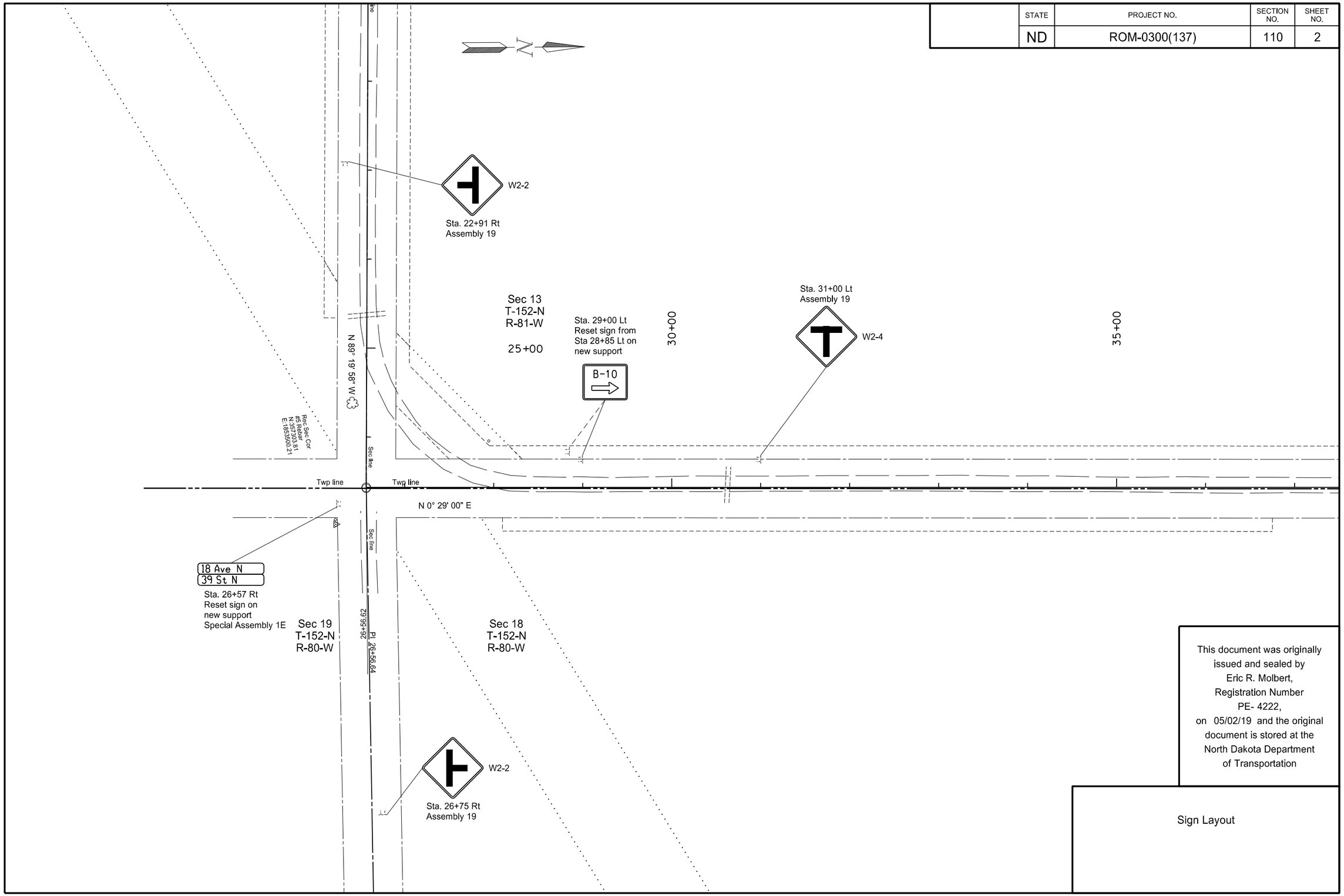
| Station / RP | Sign No. | Assembly No. | Flat Sheet For Signs IV SF | Flat Sheet For Signs XI SF | Sign Support Length 1st LF | 2nd LF | 3rd LF | 4th LF | Vert Clear-ance FT | Support Size | Max Post Len LF | Sleeve Length 1st LF | 2nd LF | 3rd LF | 4th LF | Sleeve Size | Anchor EA | Anchor LF | Anchor Size | Reset Sign Panel EA | Reset Sign Support EA | Break-Away EA | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22+91 Rt | W2-2 | 19 | | 6.3 | 12.4 | | | | 5.0 | 2.5 x 2.5 12 ga | 14.6 | | | | | | 1 | 4 | 3 x 3 7 ga | | | | |
| 26+57 Rt | SA 1E | | | | 10.5 | | | | 5.0 | 2 x 2 12 ga | 21.2 | | | | | | 1 | 4 | 2.25 x 2.25 12 ga | 1 | | | |
| 26+75 Rt | W2-2 | 19 | | 6.3 | 12.0 | | | | 5.0 | 2.5 x 2.5 12 ga | 14.6 | | | | | | 1 | 4 | 3 x 3 7 ga | | | | |
| 29+00 Lt | | 29 | | | 10.5 | | | | 5.0 | 2 x 2 12 ga | 13.6 | | | | | | 1 | 4 | 2.25 x 2.25 12 ga | 1 | | | |
| 31+00 Lt | W2-4 | 19 | | 6.3 | 12.0 | | | | 5.0 | 2.5 x 2.5 12 ga | 14.6 | | | | | | 1 | 4 | 3 x 3 7 ga | | | | |
| **Sub Total** | | | 0.0 | 18.9 | | **Total** | 57.3 | | | | | | | | | | **Total** | 20.0 | | 2 | 0 | 0 | |
| **Grand Total** | | | **0.0** | **18.9** | | **Total** | **57.3** | | | | | | | | | | **Total** | **20** | **0** | **2** | **0** | **0** | |

This document was originally issued and sealed by Eric R. Molbert, Registration Number 4222, on 5/2/19 and is stored at the North Dakota Department of Transportation.

Sign Summary
Perforated Tube

Township Road in Ward and McHenry County
Starting 2.0 Miles West of the Intersection of ND Highway 23 & ND Highway 41, Running South 1.0 Mile then West 0.5 Mile

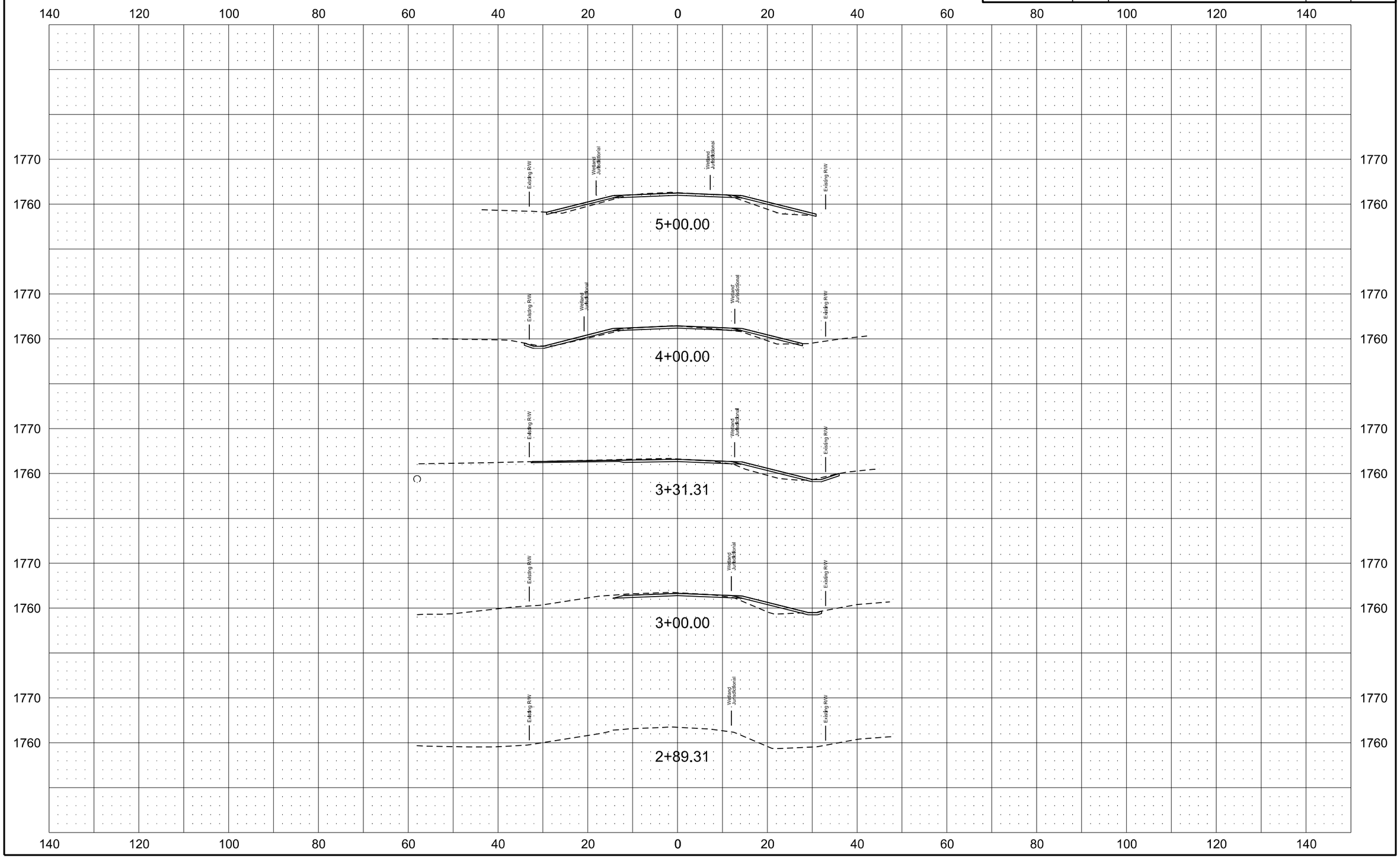
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 110 | 2 |




This document was originally issued and sealed by Eric R. Molbert, Registration Number PE- 4222, on 05/02/19 and the original document is stored at the North Dakota Department of Transportation

Sign Layout

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 1 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 2 |

140 120 100 80 60 40 20 0 20 40 60 80 100 120 140

1770
1760

Existing R/W
Existing R/W
9+00.00

1770

Existing R/W
Existing R/W
8+00.00

1770
1760

Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W
7+00.00

1770
1760

Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W
6+00.00

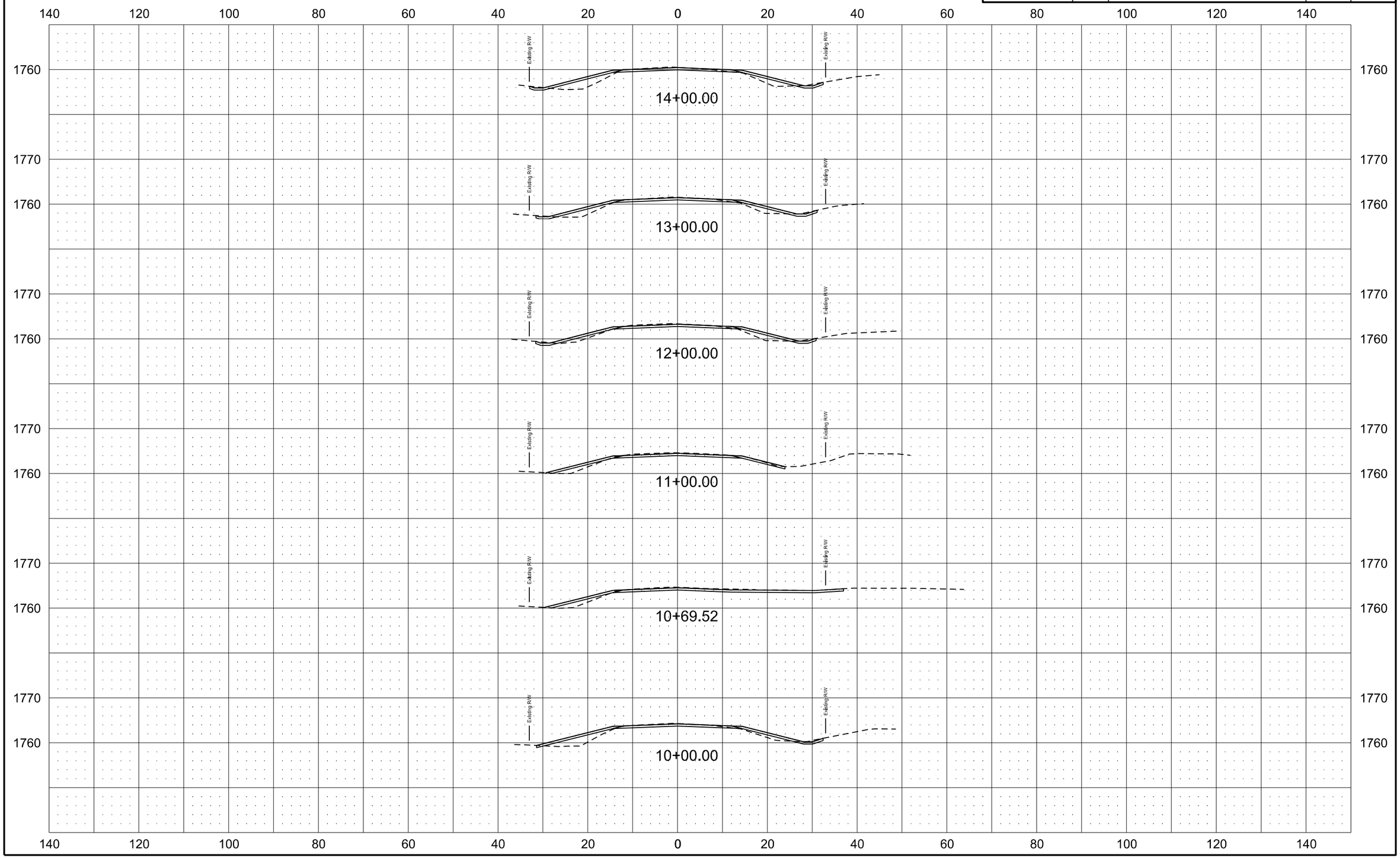
1770
1760

Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W
5+55.36

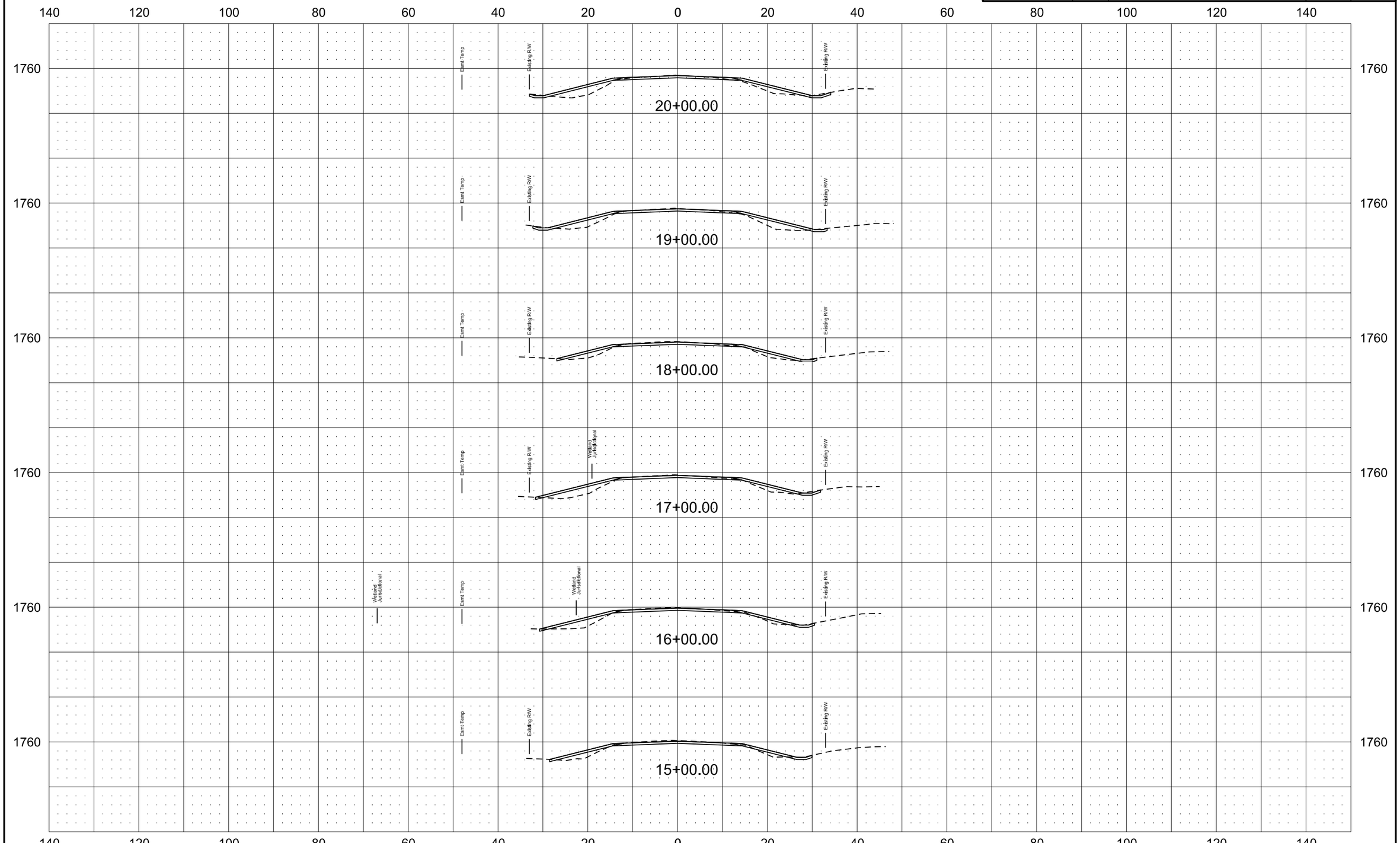
140 120 100 80 60 40 20 0 20 40 60 80 100 120 140

4/30/2019 12:55:43 PM bschaff N:\21545\ROM-0300(137)\Design\200_Xsec\200_Xsec.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 3 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 4 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 5 |

140 120 100 80 60 40 20 0 20 40 60 80 100 120 140

1760

Wetland Jurisdictional
Wetland Jurisdictional
Esmt Temp
Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W

24+62.79

Esmt Temp
Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W

24+00.00

Esmt Temp
Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W

23+00.00

Esmt Temp
Existing R/W
Wetland Jurisdictional
Wetland Jurisdictional
Wetland Jurisdictional
Existing R/W

22+80.00

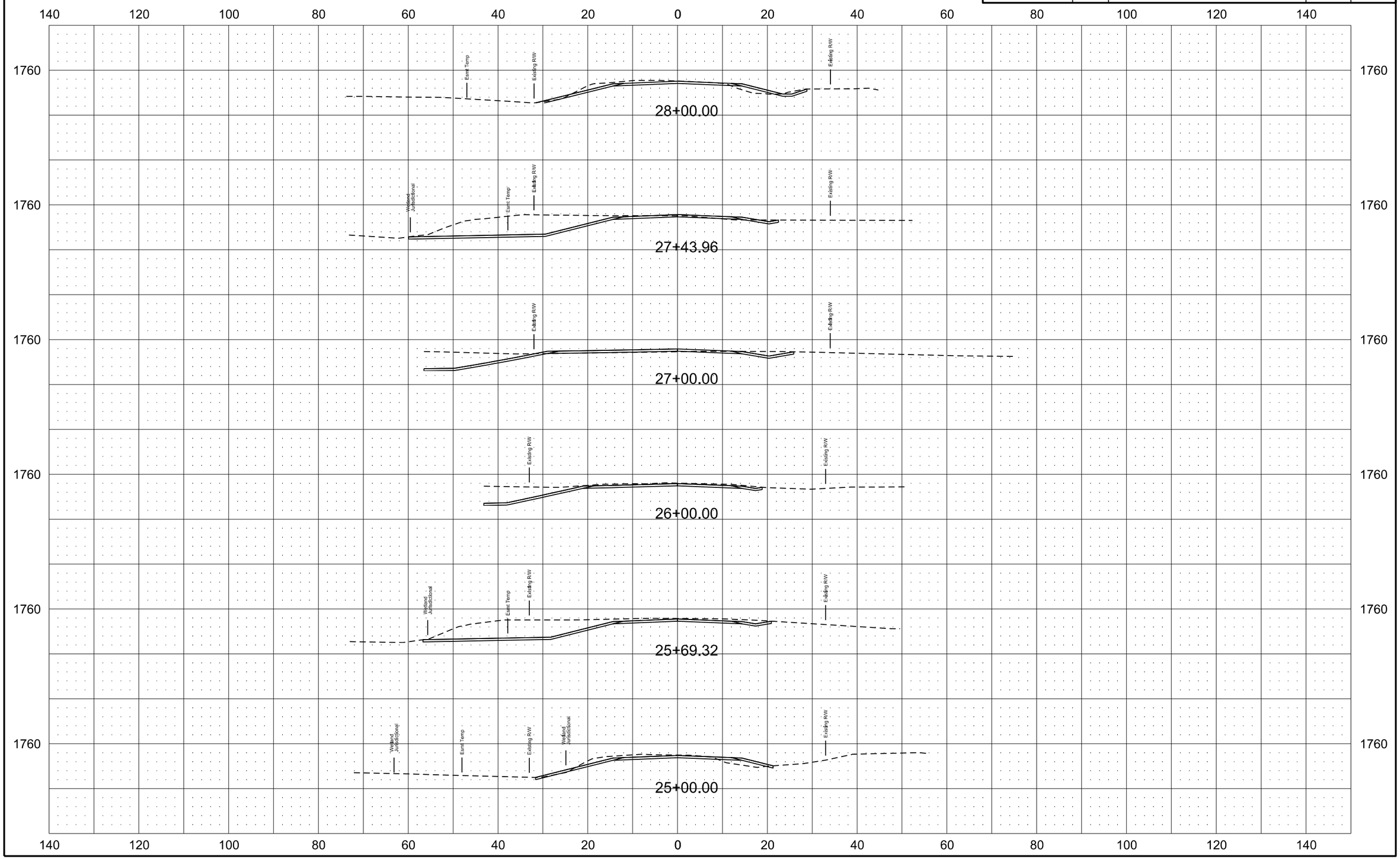
Esmt Temp
Wetland Jurisdictional
Existing R/W
Wetland Jurisdictional
Existing R/W

22+00.00

Esmt Temp
Existing R/W
Existing R/W

21+00.00

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 6 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 7 |

140 120 100 80 60 40 20 0 20 40 60 80 100 120 140

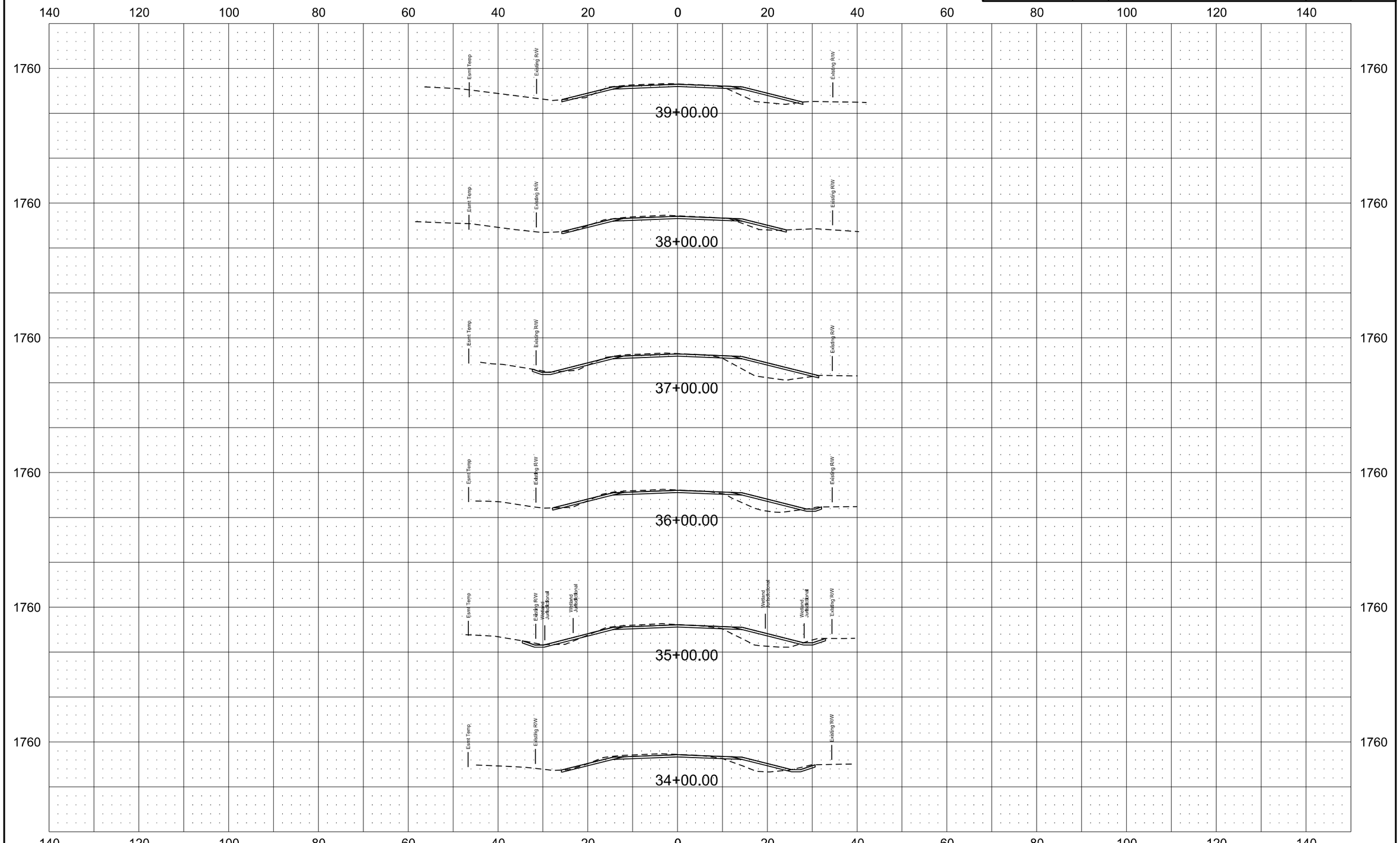
1760 1750

Esmt Temp
Existing R/W
Wetland Jurisdictional

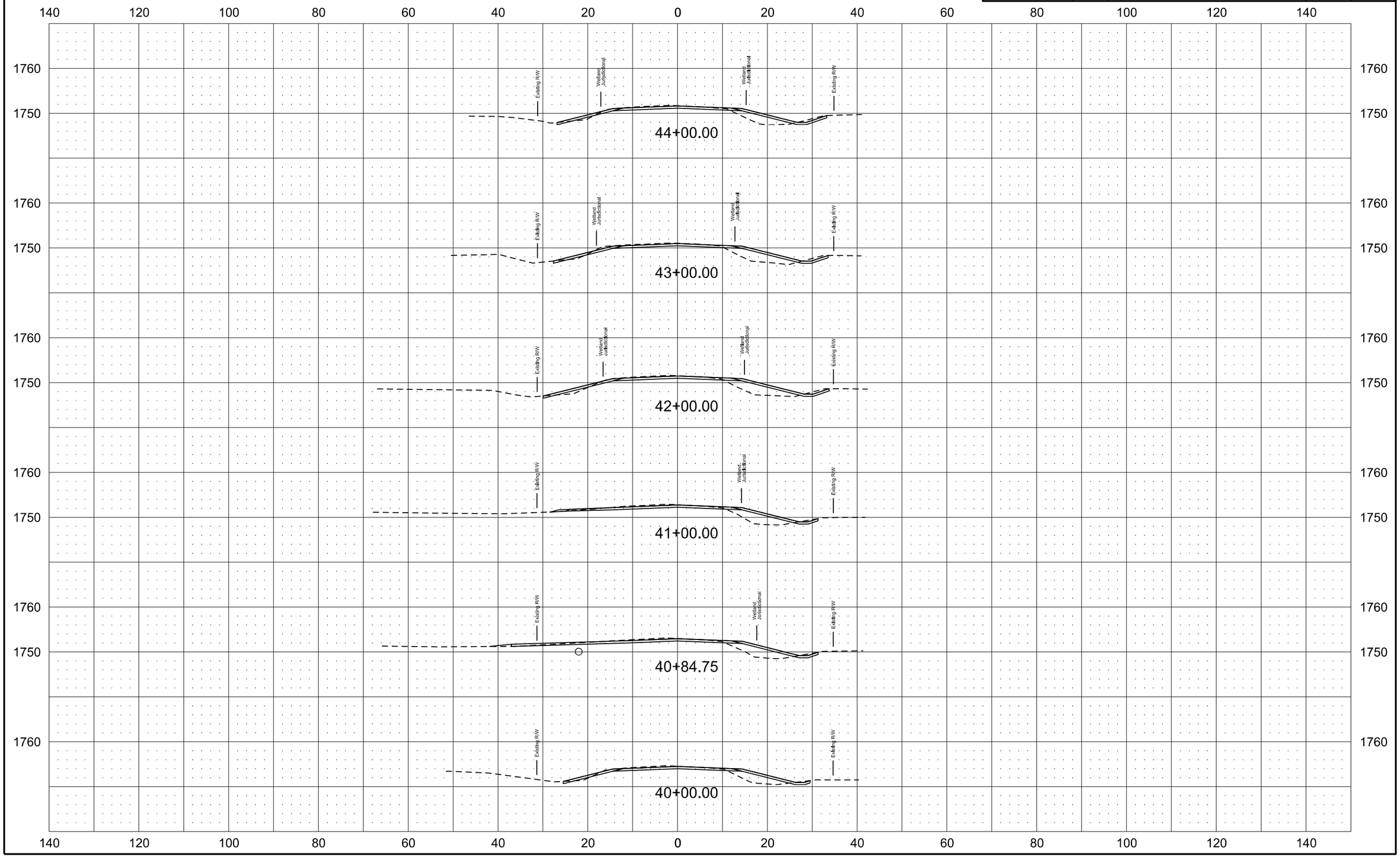
33+00.00
32+00.00
31+00.00
30+62.72
30+00.00
29+00.00

4/30/2019 12:55:48 PM bschaff N:\21545\ROM-0300(137)\Design\200_Xsec\200_Xsec.dgn

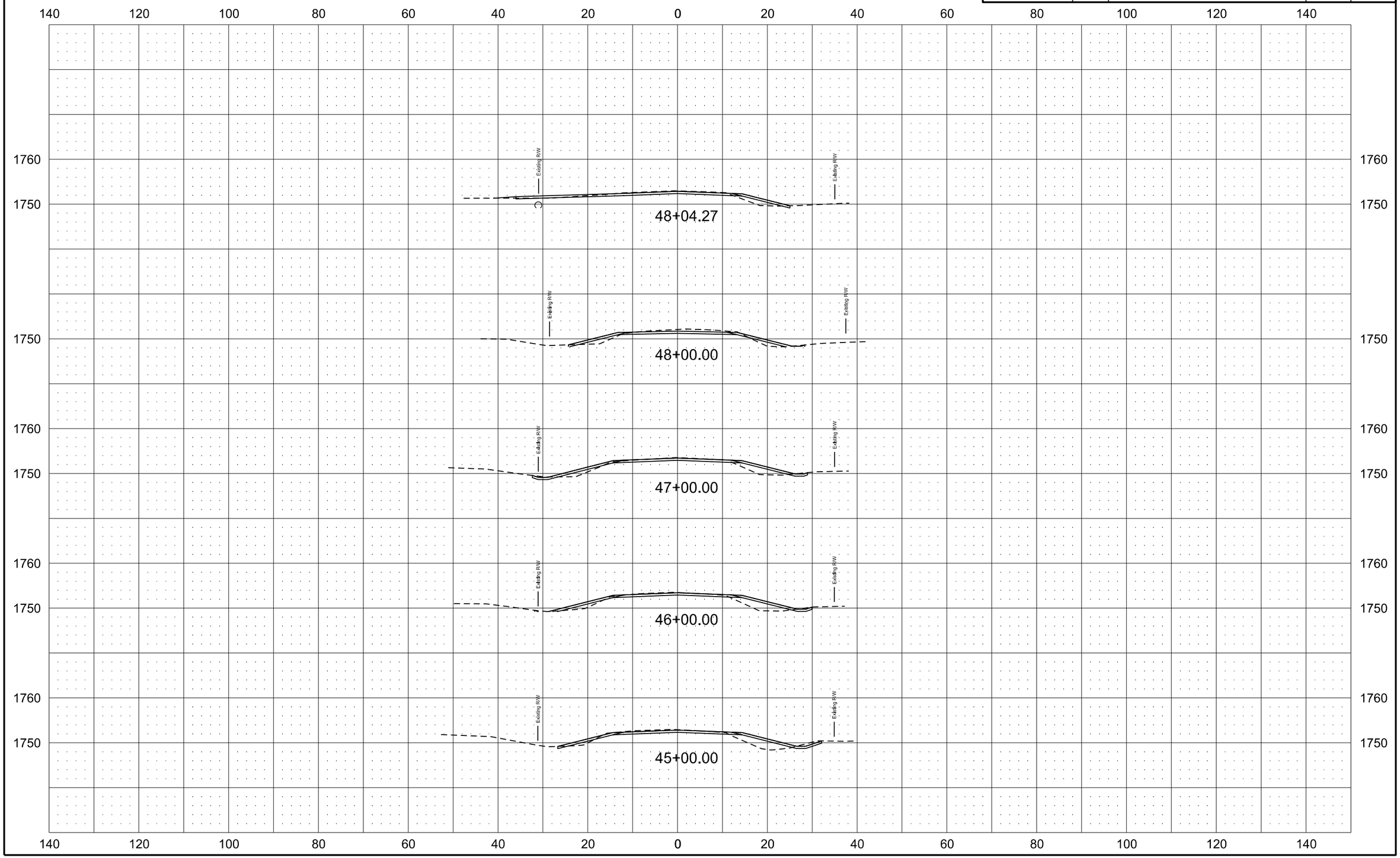
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 8 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 9 |

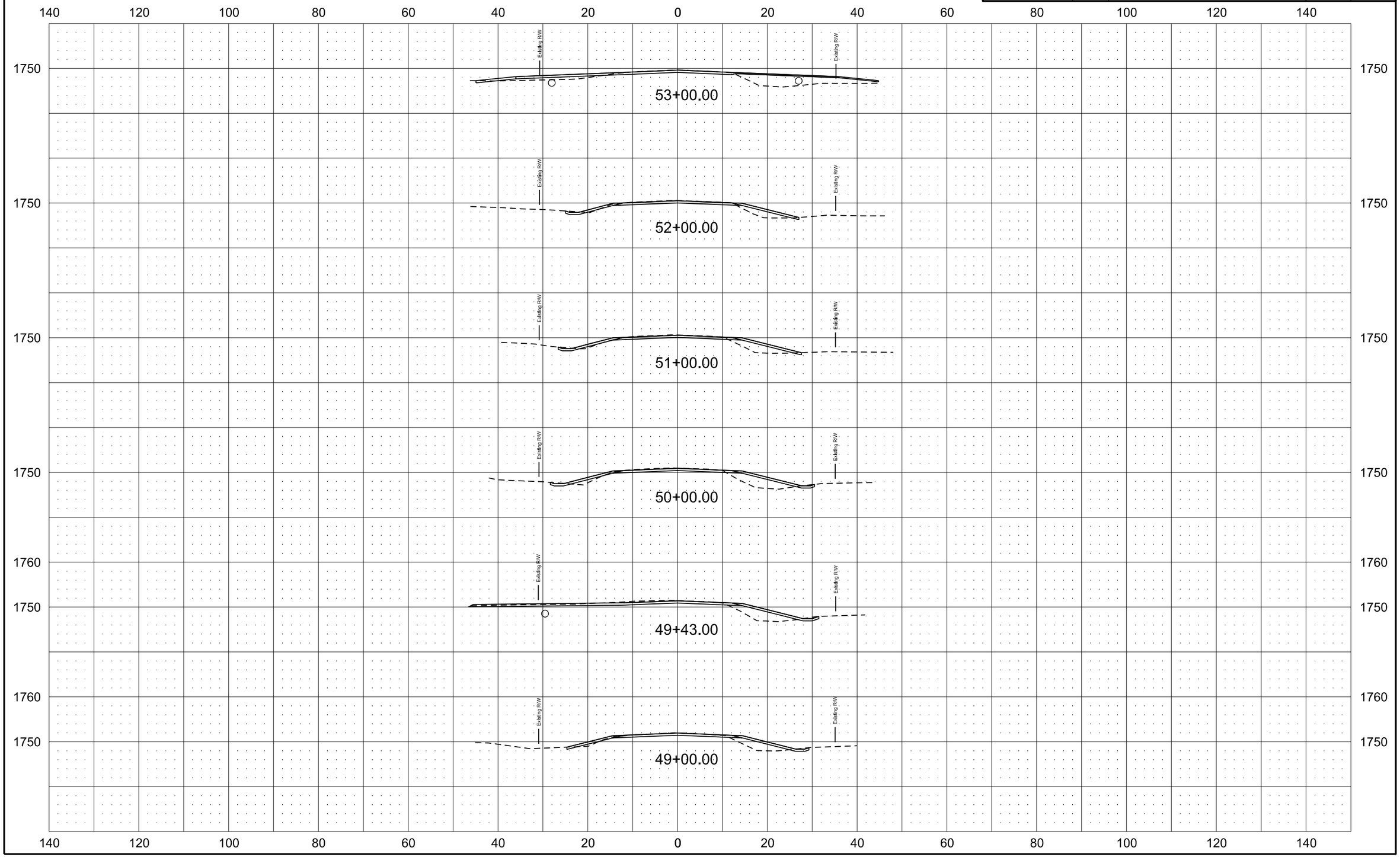


| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 10 |

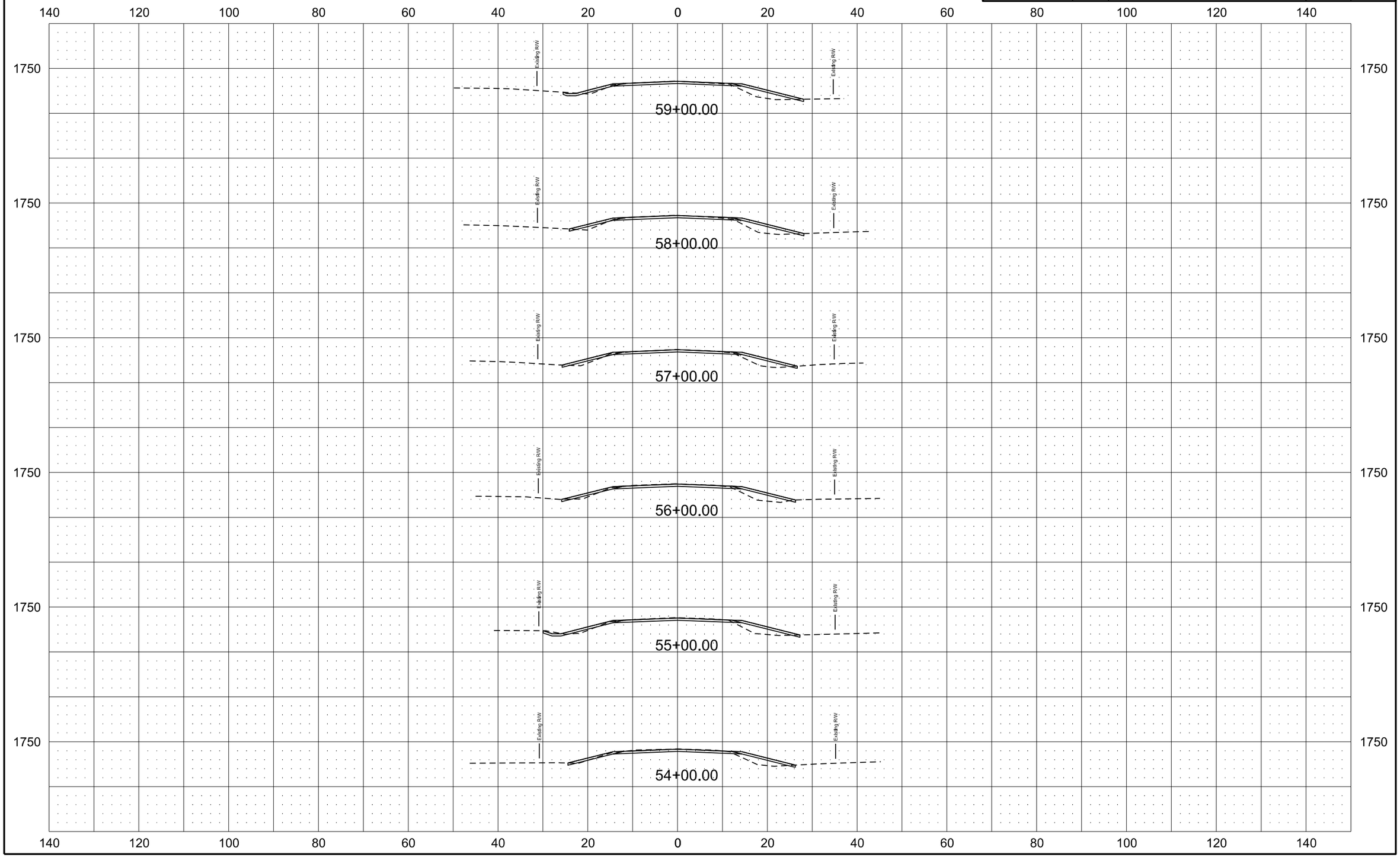



4/30/2019 12:55:52 PM bschaff N:\21545\ROM-0300(137)\Design\200_Xsec\200_Xsec.dgn

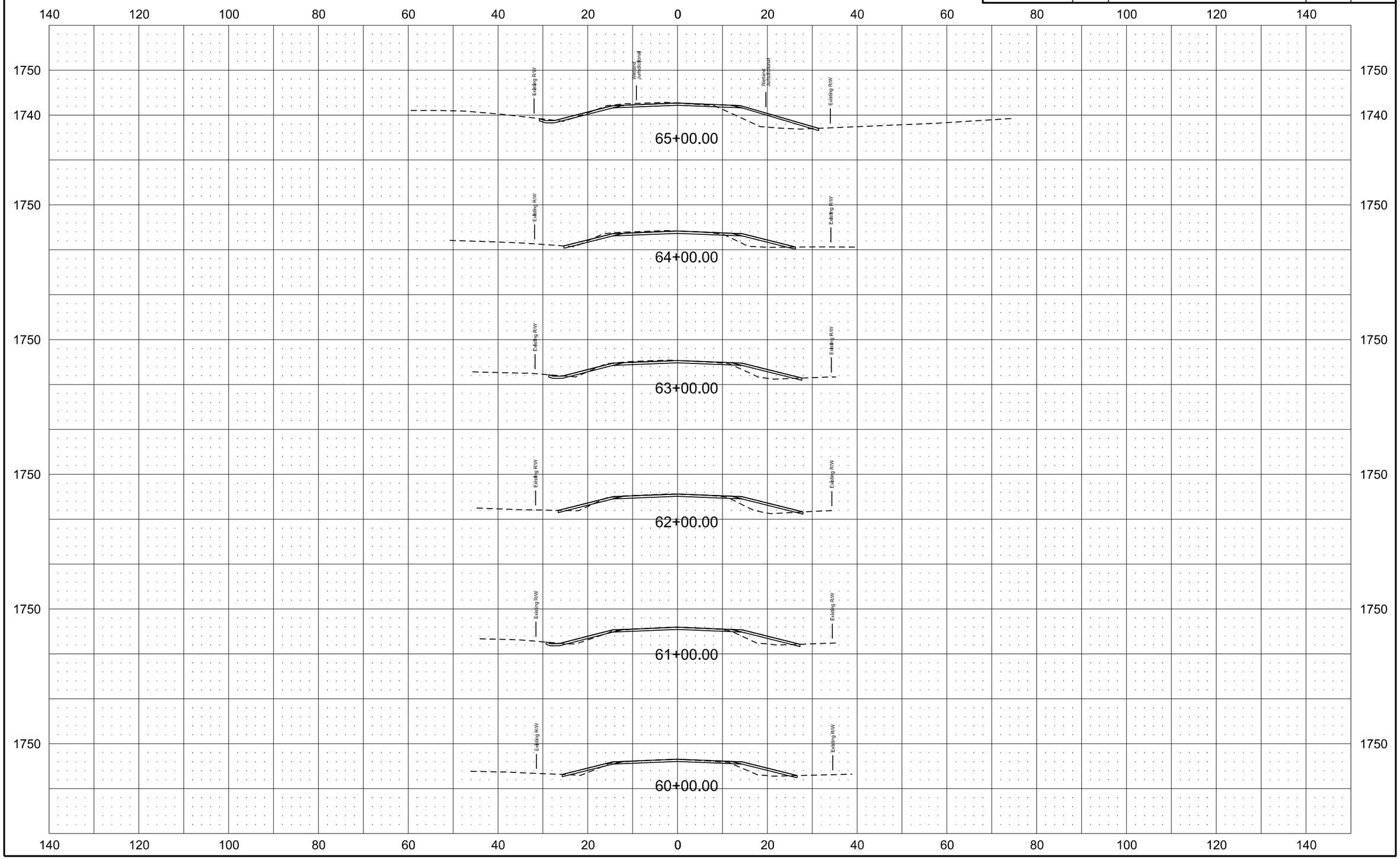
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 11 |



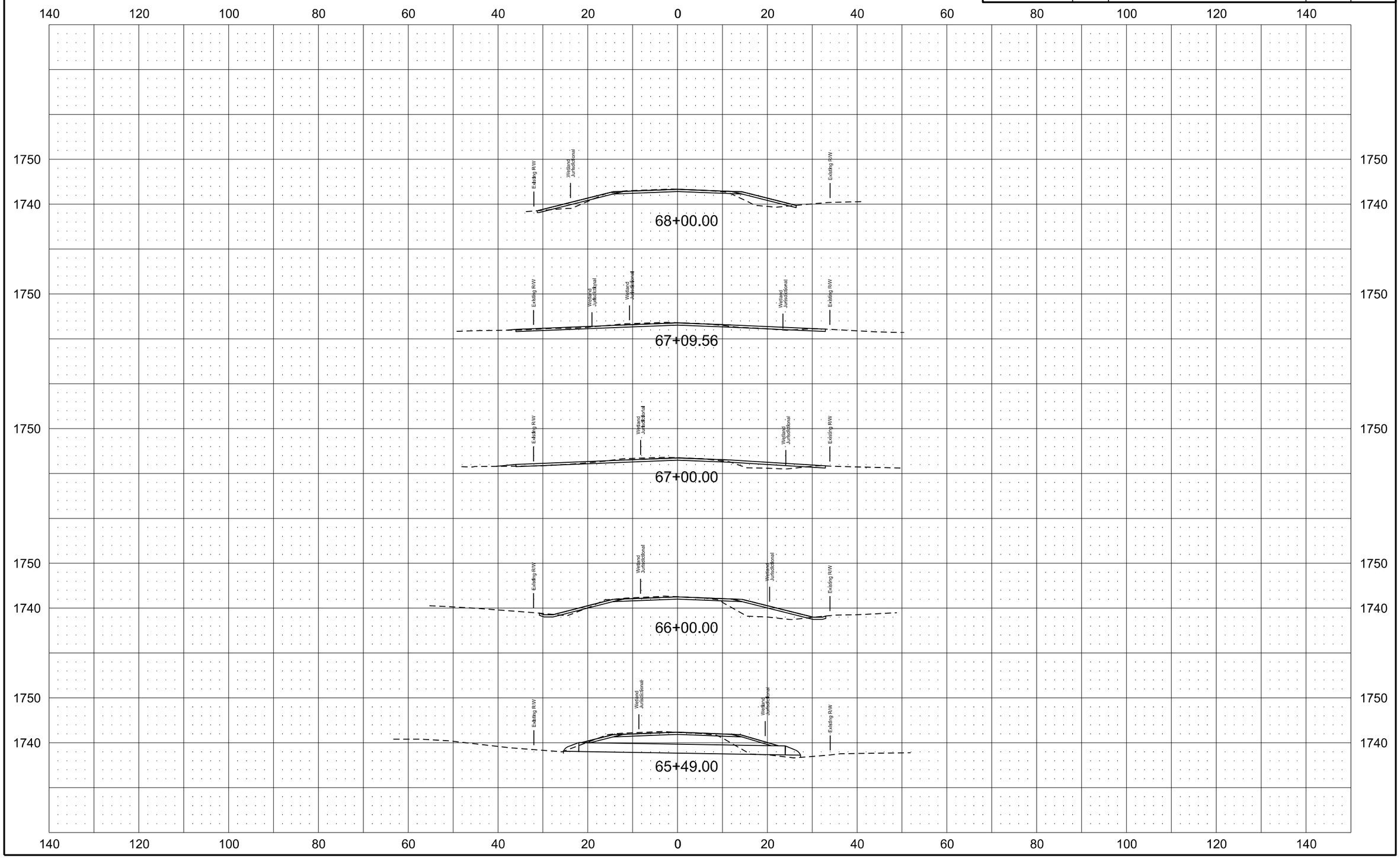
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 12 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 13 |

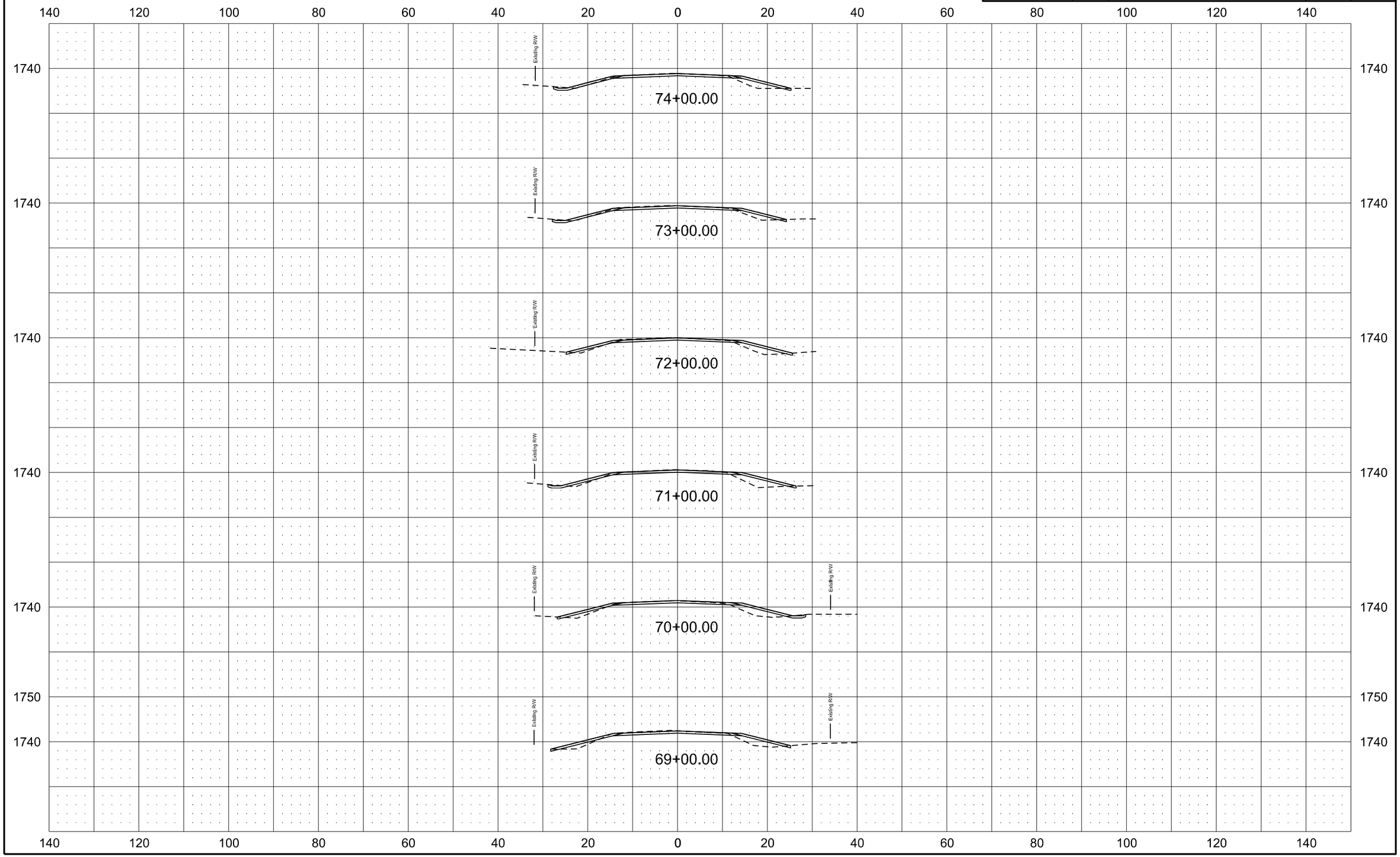


| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 14 |

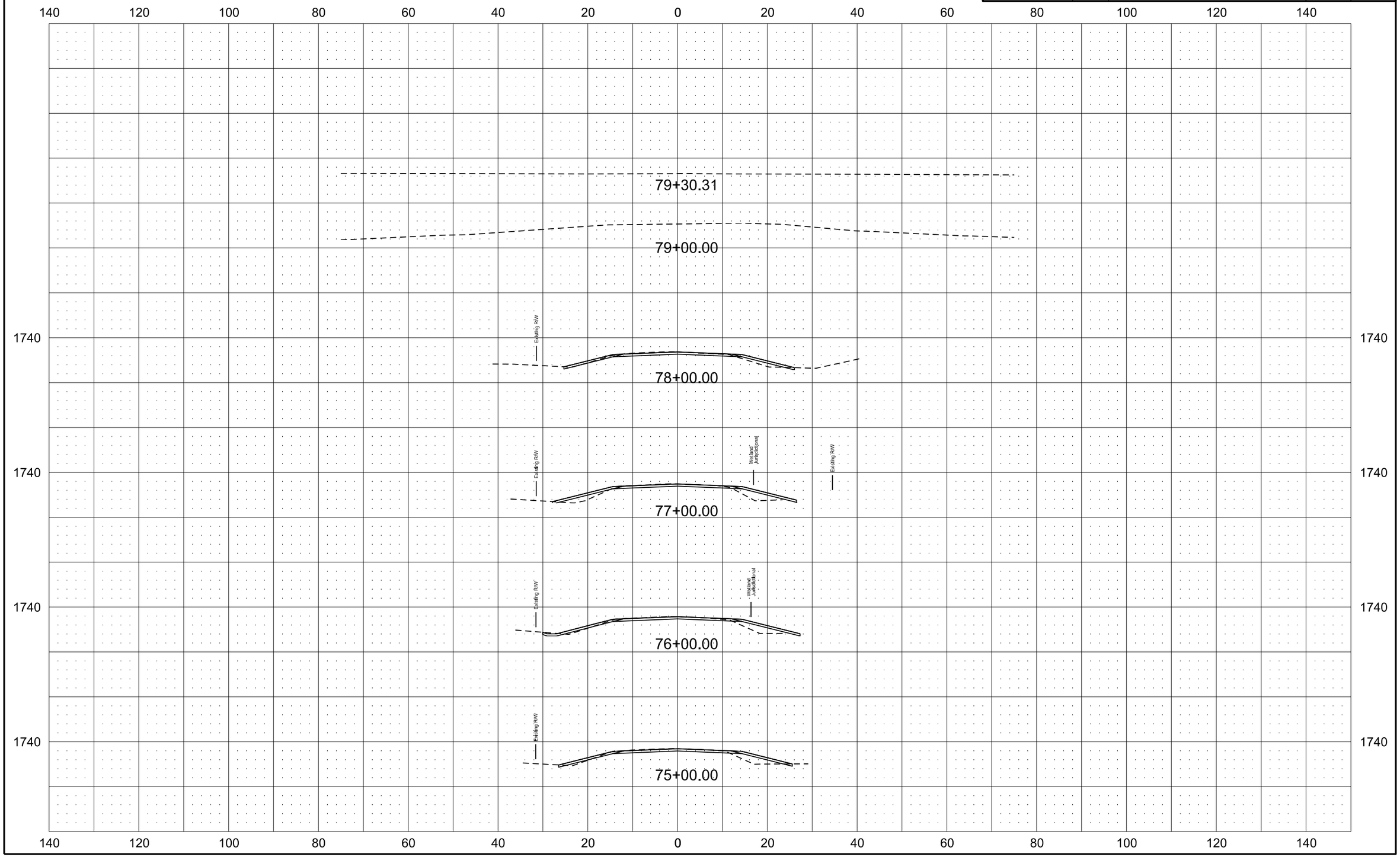



4/30/2019 12:55:56 PM bschaff N:\21545\ROM-0300(137)\Design\200_Xsec\200_Xsec.dgn

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 15 |



| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | ROM-0300(137) | 200 | 16 |



# 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 |
| BG | below grade |
| 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 |
| CI 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 |
| C Gr | coarse gravel |
| CS | coarse sand |
| Comb. | combination |
| Coml | commercial |
| Compr | compression |
| CADD | computer aided drafting & design |
| Conc | concrete |
| CECB | concrete erosion control blanket |
| 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 |
| CSFES | corrugated steel flared end section |
| CSP | corrugated steel pipe |
| CSTES | corrugated steel traversable end section |
| C | coulomb |
| Co | County |
| Crse | course |
| 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 or ø | 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 |
| DSDS | dynamic speed display sign |
| 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 |

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 09/20/18 and the original document is stored at the North Dakota Department of Transportation

# NDDOT ABBREVIATIONS

D-101-2

| | |
|---|---|
| Fnd | found |
| Fdn | foundation |
| Frac | fractional |
| Frwy | freeway |
| Frt | front |
| FF | front face |
| F Disp | fuel dispenser |
| 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 |
| Mb | mailbox |
| 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 |
| MGS | Midwest Guardrail System |
| 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 |
| P Cap | plastic cap |
| Pl or ℙ | 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 or Pref | preformed |
| Prep | preperation |
| Press. | pressure |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 07-01-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 08-03-15 | General Revisions |
| 04-23-18 | General Revisions |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 04/23/18 and the original document is stored at the North Dakota Department of Transportation

# NDDOT ABBREVIATIONS

D-101-3

| | |
|---|---|
| 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 |
| 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 |
| RP | reference point |
| Refl | reflectorized |
| RCB | reinforced concrete box |
| RCES | reinforced concrete end section |
| RCFES | reinforced concrete flared end section |
| RCTES | reinforced concrete traversable end section |
| RCP | reinforced concrete pipe |
| RCPS | reinforced concrete pipe sewer |
| Reinf | reinforcement |
| Res | reservation |
| Rs | residence |
| 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 or Sdwk | 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 |
| SRCP | slotted reinforced concrete pipe |
| 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 |
| TES | traversable end section |
| 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 |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 07-01-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 08-03-15 | General Revisions |
| 04-23-18 | General Revisions |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 04/23/18 and the original document is stored at the North Dakota Department of Transportation

# 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 |
| GTR RAMSEY WD | Greater Ramsey Water District |
| 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 VALL COMM | Missouri Valley Communications |
| 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 |
| NWRWD | Northwest Rural Water District |
| 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 |
| RED RIV TEL | Red River Rural Telephone |
| RESVTN TEL | Reservation Telephone |
| ROBRTS TEL | Roberts Company Telephone |
| R-RIDER ELEC | Roughrider Electric Cooperative |
| RRVW | Red River Valley & Western Railroad |
| S CENT REG WD | South Central Regional Water District |
| 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 |

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 09/20/18 and the original document is stored at the North Dakota Department of Transportation

# Line Styles

D-101-20

## Existing Topography

- Existing Ground Void
- Existing Cemetary Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter

- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break

## Proposed Topography

- 3-Cable w Posts
- Flow
- Fence
- Remove Line
- Wall
- Retaining Wall (Plan View)
- W-Beam w Posts

## Existing Utilities

- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Existing Culvert
- Existing Telephone Line
- Existing TV Line
- Existing Water or Steam Line
- Existing Under Drain
- Existing Slotted Drain
- Existing Conduit
- Existing Conductor
- Existing Down Guy Wire Down Guy
- Existing Underground Vault or Lift Station

## Proposed Utilities

- 24 Inch Pipe
- Reinforced Concrete Pipe
- Under Drain
- Edge Drain

## Traffic Utilities

- Conductor
- Fiber Optic
- Existing Loop Detector
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Micro Loop Detector
- Micro Loop Detector
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm

## Sign Structures

- Existing Overhead Sign Structure
- Existing Overhead Sign Structure Cantilever
- Overhead Sign Structure Cantilever

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

# Line Styles

D-101-21

## Right Of Way

- Easement
- Existing Easement
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Existing Right of Way Not State Owned
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines
- Sight Distance Triangle Line
- Dimension Leader

## Boundary Control

- Existing City Corporate Limits or Reservation Boundary
- Existing State or International Line
- Existing Township
- Existing County
- Existing Section Line
- Existing Quarter Section Line
- Existing Sixteenth Section Line
- Existing Centerline
- Tangent Line

## Cross Sections and Typicals

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

## Geotechnical

- Geotextile Fabric Type D (D — D)
- Geogrid (Geo — Geo)
- Geotextile Fabric Type R (R — R)
- Geotextile Fabric Type R1 (R — R)
- Geotextile Fabric Type RR (RR — RR)
- Geotextile Fabric Type S (S — S)
- Subgrade Reinforcement
- Failure Line

## Countours

- Depression Contours
- Supplemental Contour

## Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

## Striping

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

## Pavement Joints

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

## Bridge Details

- Hidden Object
- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Centerline Main
- Centerline
- Existing Ground (Details)
- Existing Conditions
- Sheet Piling

## Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Floating Silt Curtain (S — S)
- Silt Fence (SF — SF)
- Excavation Limits
- Fiber Rolls

## Environmental

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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 09/23/16 and the original document is stored at the North Dakota Department of Transportation

# 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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

# 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

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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

# Symbols

D-101-32

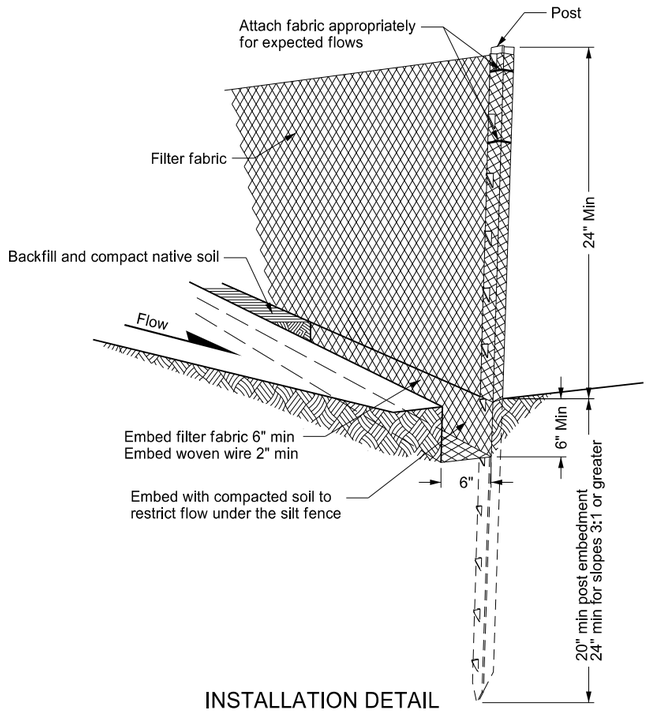
- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate Type 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 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

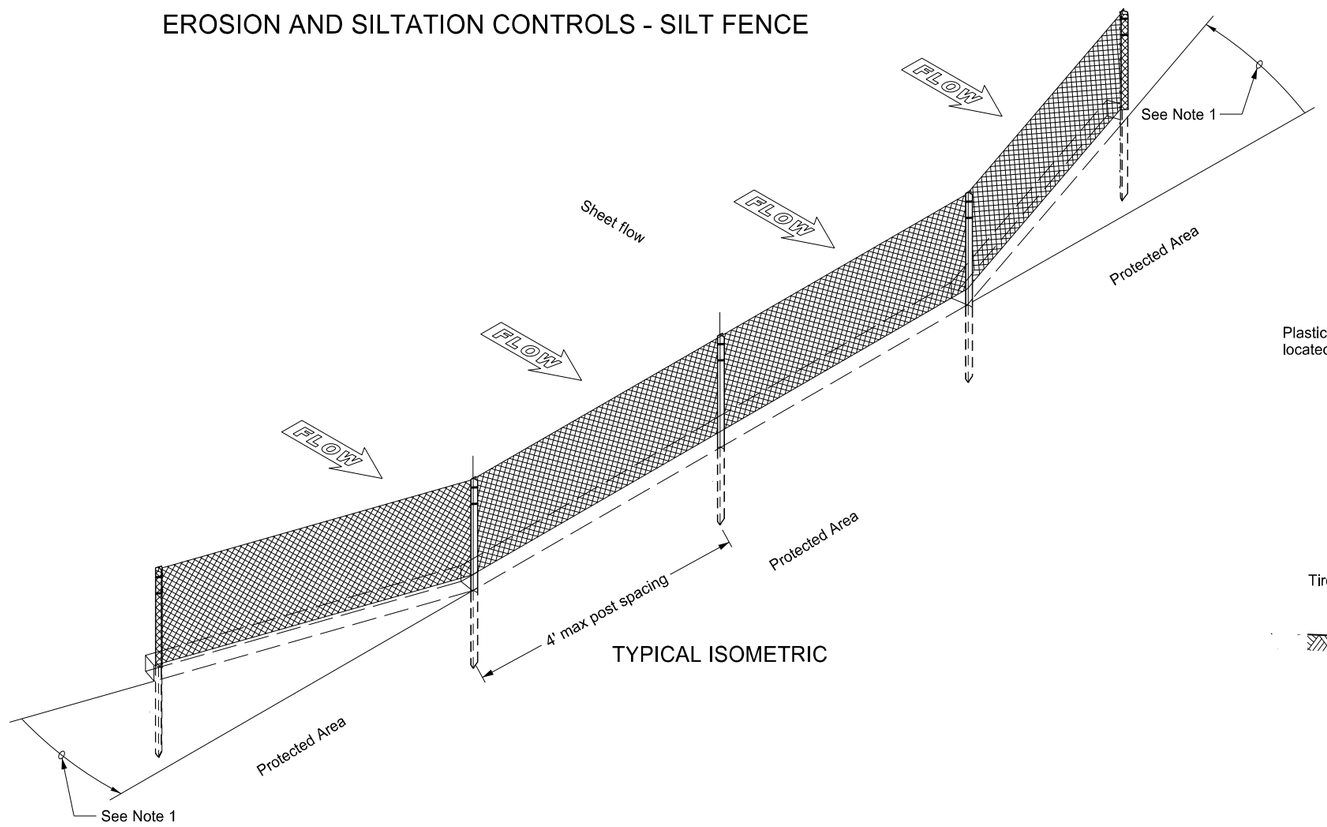
# EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1

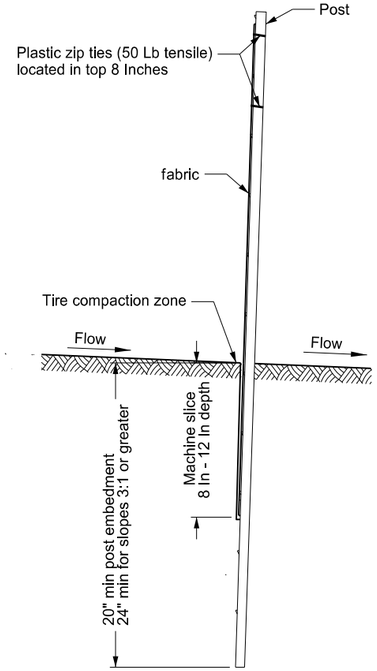



## INSTALLATION DETAIL

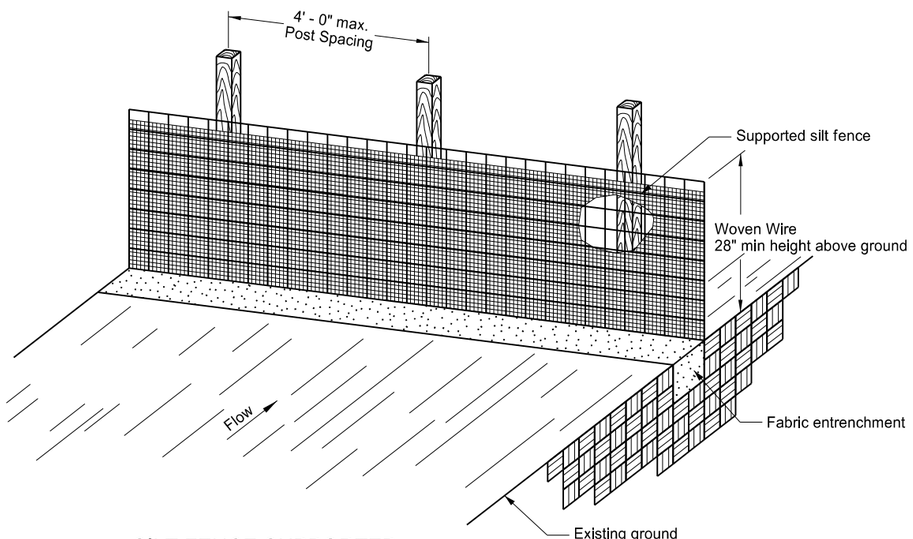
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



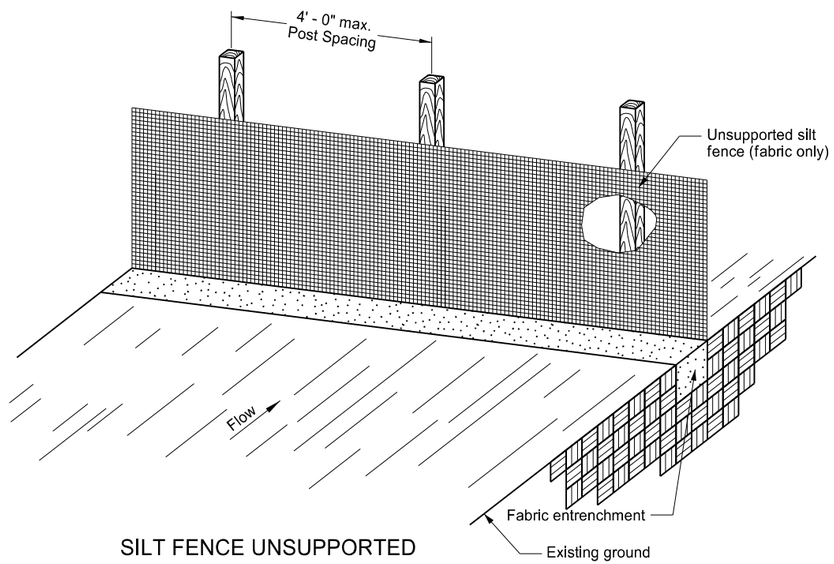

## TYPICAL ISOMETRIC




## MACHINE SLICED SILT FENCE




## SILT FENCE SUPPORTED




## SILT FENCE UNSUPPORTED

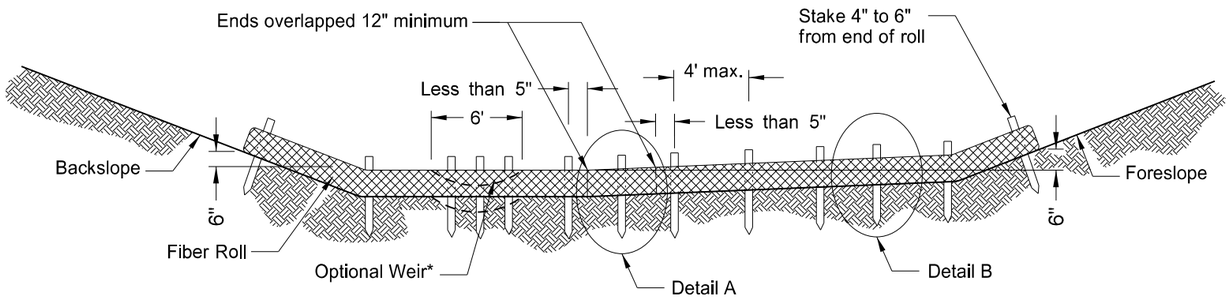
NOTES:
1. Install the ends of the silt fence to point slightly upslope to prevent sediment from flowing around the ends of the fence.
2. Place splices outside low spots.
3. Install silt fencing parallel to contour lines.
4. Do not embed silt fence when placed in standing water.
5. Silt fence material does not need to reach the top of woven wire support.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Standard drawing resulted from splitting standard D-708-2. |
| 06-27-16 | Revised details & added new ones. |

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 06/27/16 and the original document is stored at the North Dakota Department of Transportation

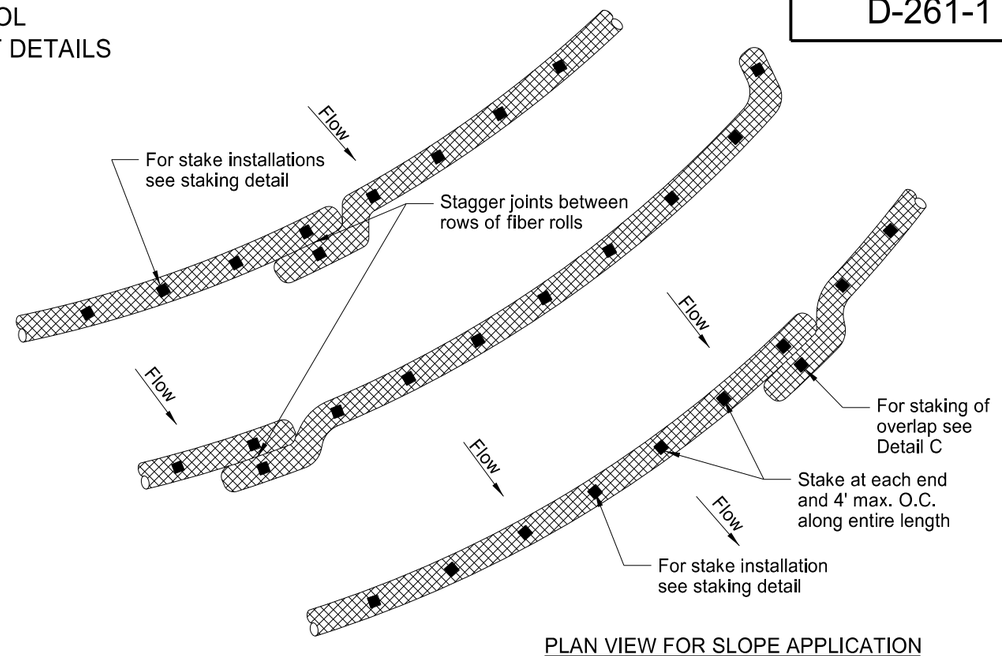
D-261-1

# EROSION CONTROL
# FIBER ROLL PLACEMENT DETAILS

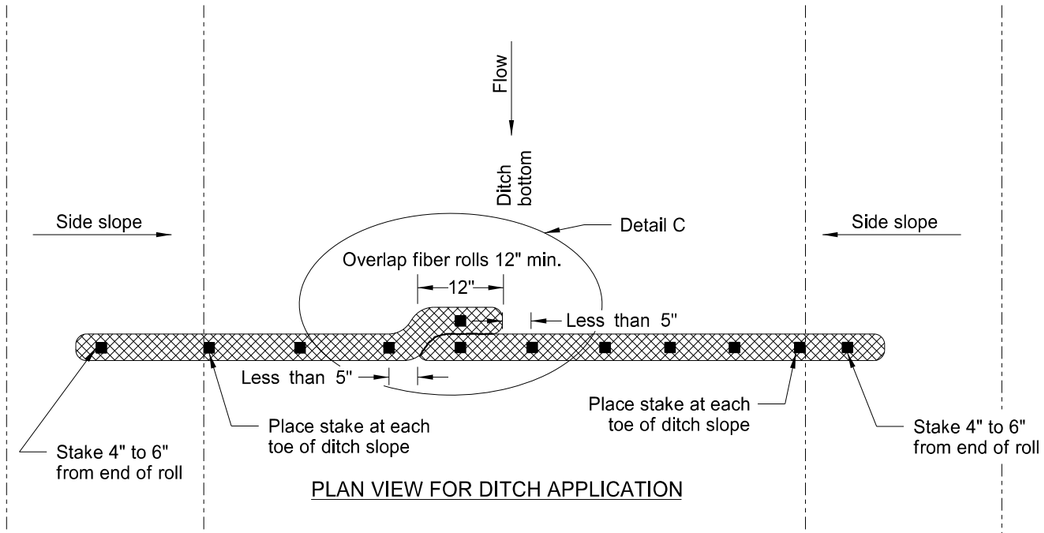



*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

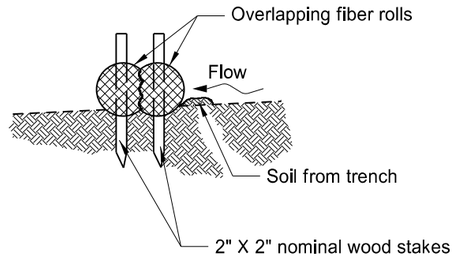
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM




PLAN VIEW FOR SLOPE APPLICATION

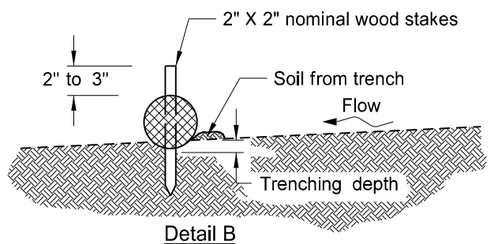



PLAN VIEW FOR DITCH APPLICATION




Detail A

Fiber Roll Overlapping Staking Detail




Detail B

Fiber Roll Staking Detail

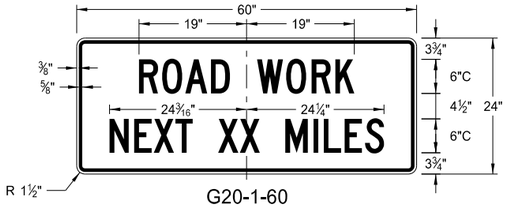
| FIBER ROLL DIAMETER | NOMINAL STAKE SIZE | MINIMUM STAKE LENGTH | MINIMUM TRENCH DEPTH | MAXIMUM TRENCH DEPTH |
|---|---|---|---|---|
| 6" | 2" x 2" | 18" | 2" | 2" |
| 12" | 2" x 2" | 24" | 2" | 3" |
| 20" | 2" x 2" | 36" | 3" | 5" |

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

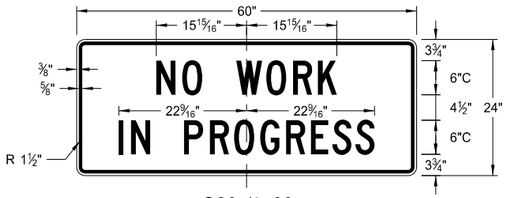
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 11-18-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-10-13 | Added plan view for ditch and slope application. Added table with values for stake and trench dimensions. |
| 10-04-13 | Revised fiber roll overlap detail. |
| 06-26-14 | Changed standard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

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 06/26/14 and the original document is stored at the North Dakota Department of Transportation

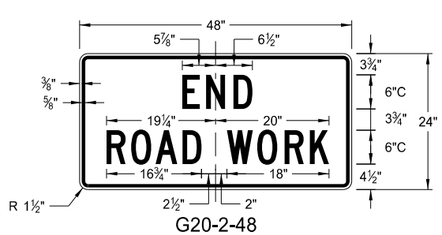
# CONSTRUCTION SIGN DETAILS
# TERMINAL AND GUIDE SIGNS



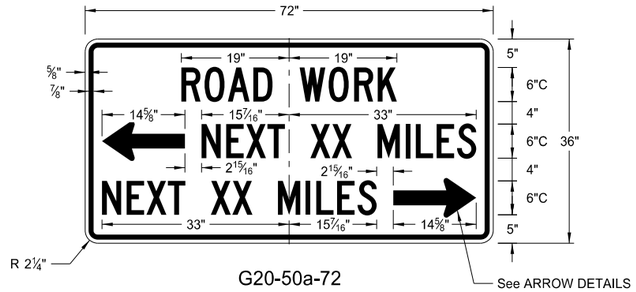

G20-1-60
Legend: black (non-refl)
Background: orange



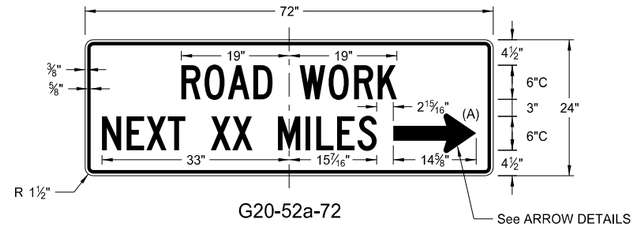

G20-1b-60
Legend: black (non-refl)
Background: orange



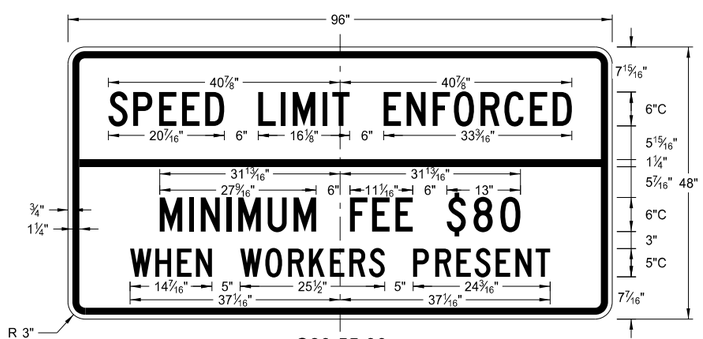

G20-2-48
Legend: black (non-refl)
Background: orange



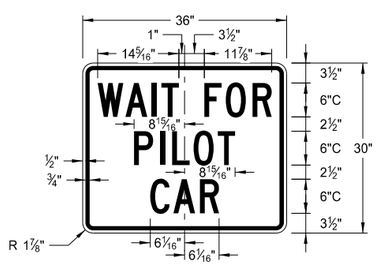

G20-50a-72
Legend: black (non-refl)
Background: orange



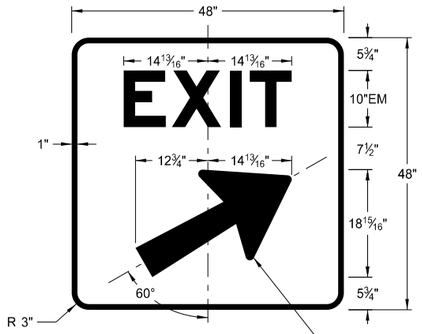

G20-52a-72
Legend: black (non-refl)
Background: orange



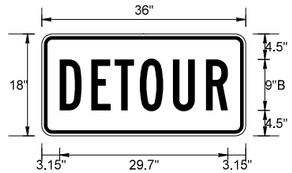

G20-55-96
Legend: black (non-refl)
Background: orange



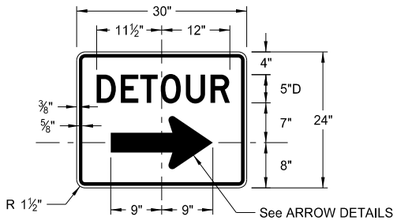

G20-4b-36
Legend: black (non-refl)
Background: orange



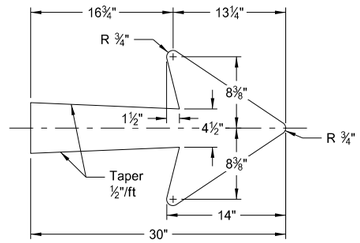

E5-1(L or R)-48
Legend: white
Background: green (orange optional)



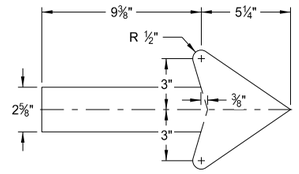

M4-8-36
Legend: black (non-refl)
Background: orange



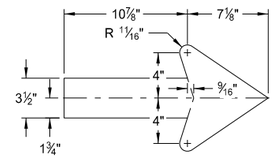

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange



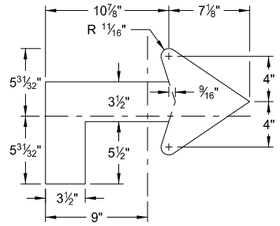

E5-1-48



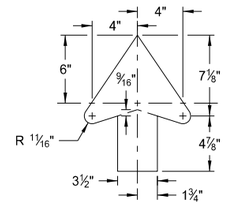
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

## ARROW DETAILS

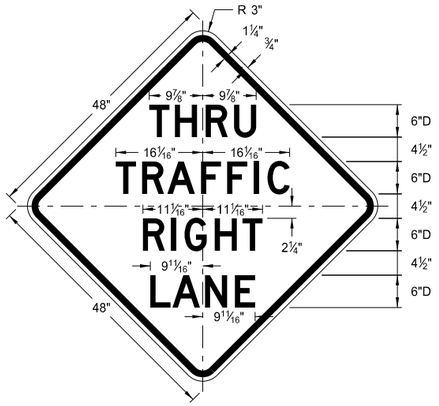
NOTES:

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

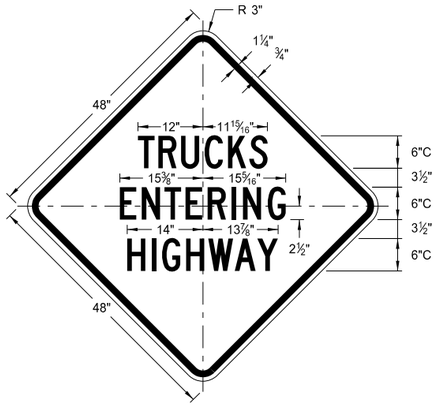
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Added sign & background color |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8/17/17 and the original document is stored at the North Dakota Department of Transportation

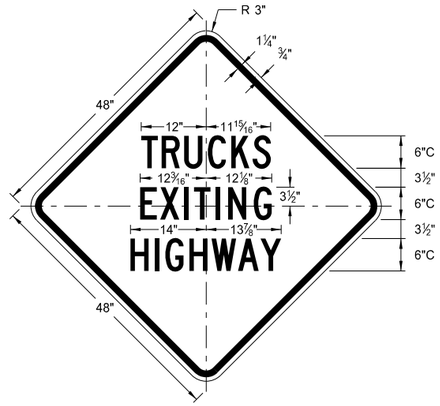
# CONSTRUCTION SIGN DETAILS
## WARNING SIGNS



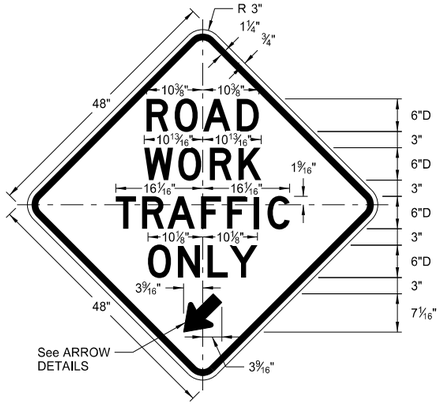

W5-8-48
Legend: black (non-refl)
Background: orange



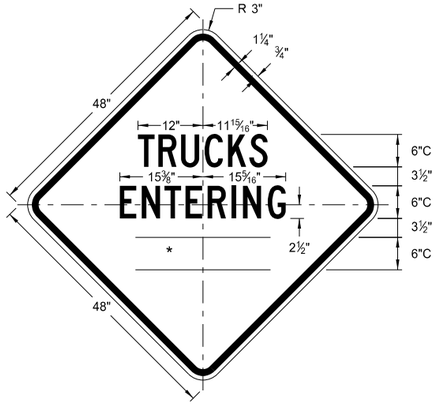

W8-53-48
Legend: black (non-refl)
Background: orange



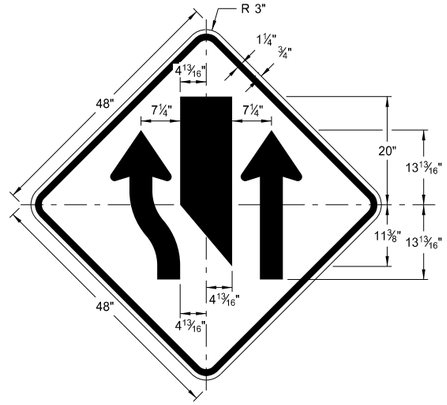

W8-56-48
Legend: black (non-refl)
Background: orange



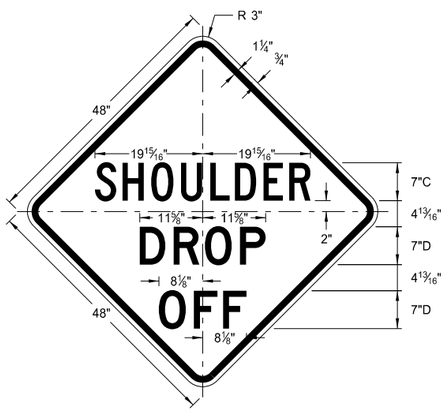

W5-9-48
Legend: black (non-refl)
Background: orange



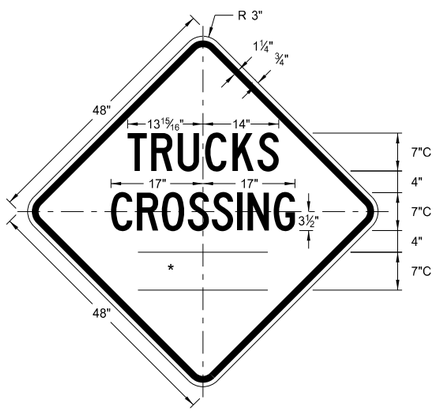

W8-54-48
Legend: black (non-refl)
Background: orange




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



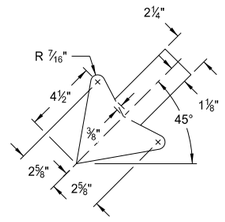

W8-9a-48
Legend: black (non-refl)
Background: orange



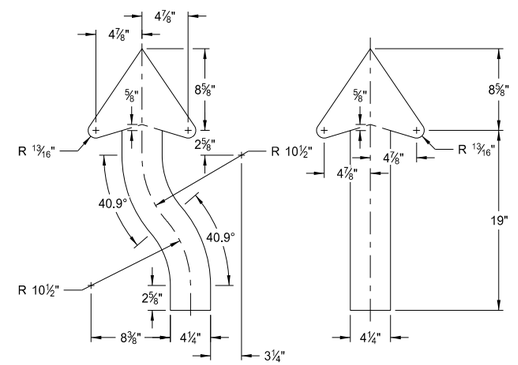

W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES




W5-9-48




W9-3a-48

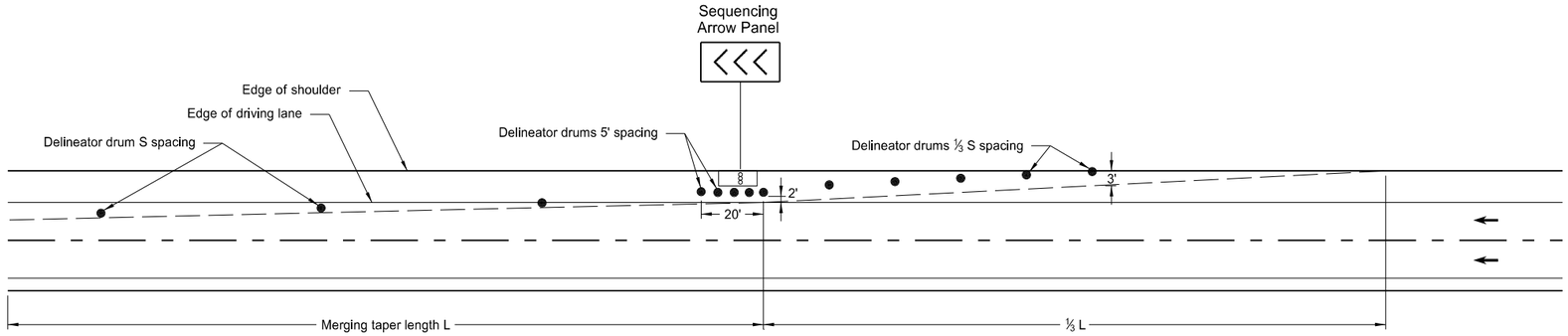
ARROW DETAILS

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Updated sign number |
| 5-31-18 | Revised sign and arrow details |

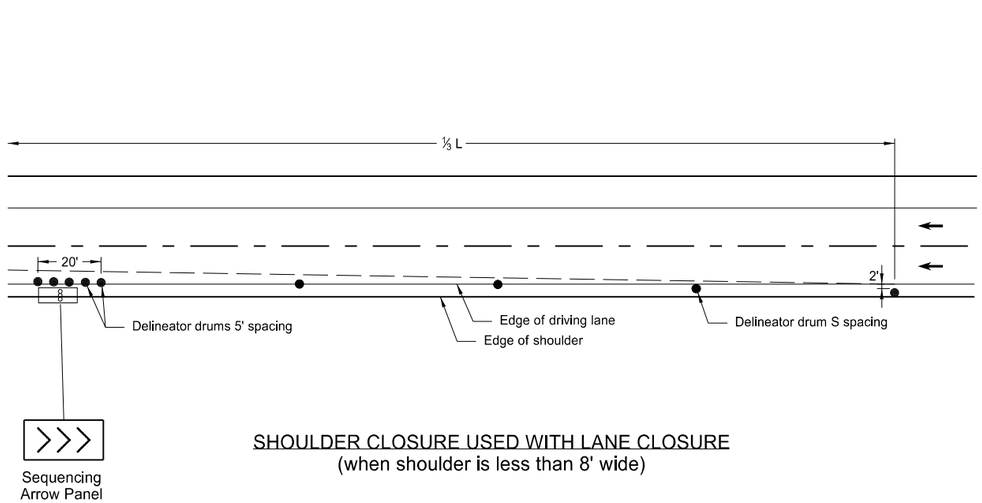
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 5/31/18 and the original document is stored at the North Dakota Department of Transportation

# SHOULDER CLOSURE TAPERS

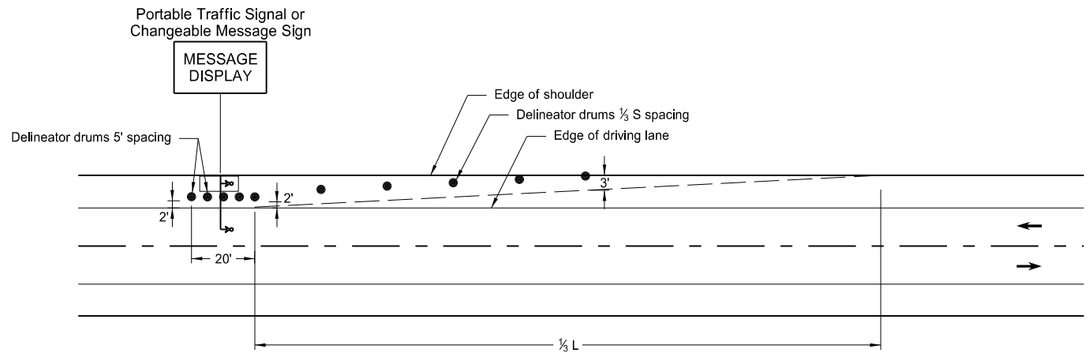
D-704-12




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:

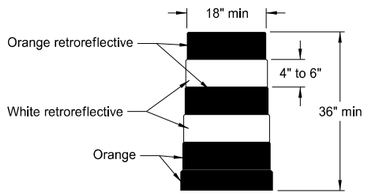
1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, use a length of approximately ⅓L. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
3. When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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17 | Updated to active voice |

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

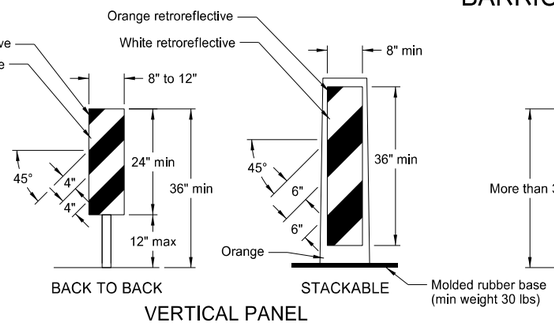
# BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



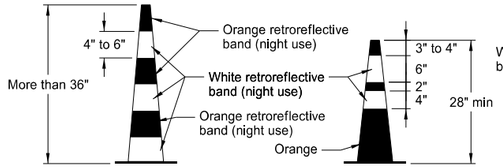

## DELINEATOR DRUM

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



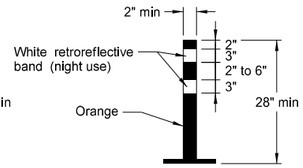

## VERTICAL PANEL

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



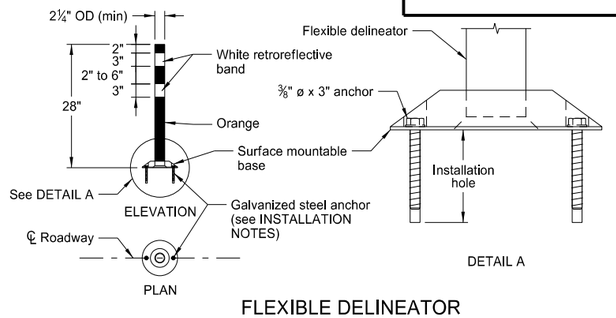

## TRAFFIC CONE

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




## TUBULAR MARKER

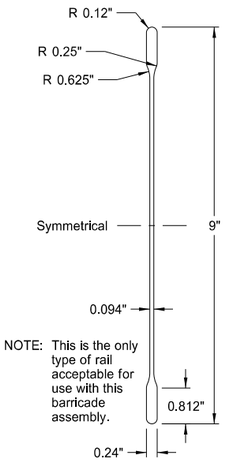
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.




## FLEXIBLE DELINEATOR

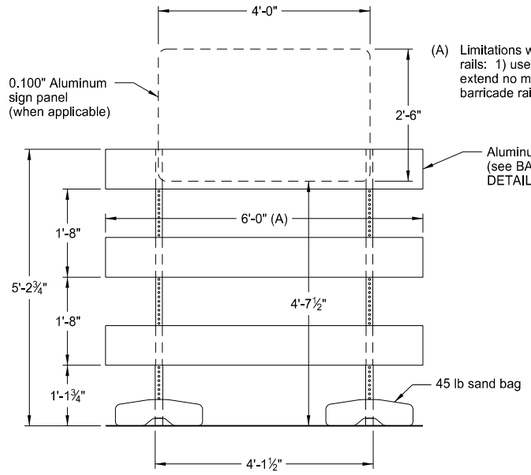
INSTALLATION NOTES:

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



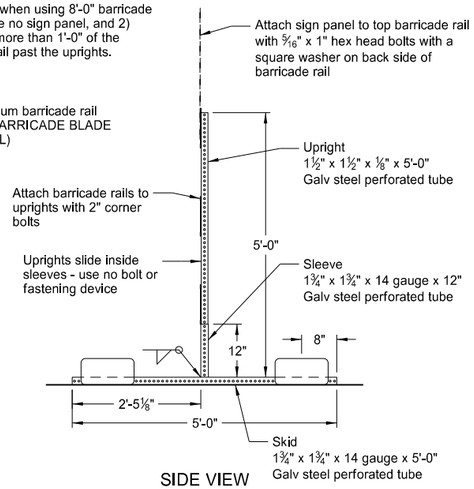

NOTE: This is the only type of rail acceptable for use with this barricade assembly.

## BARRICADE BLADE DETAIL



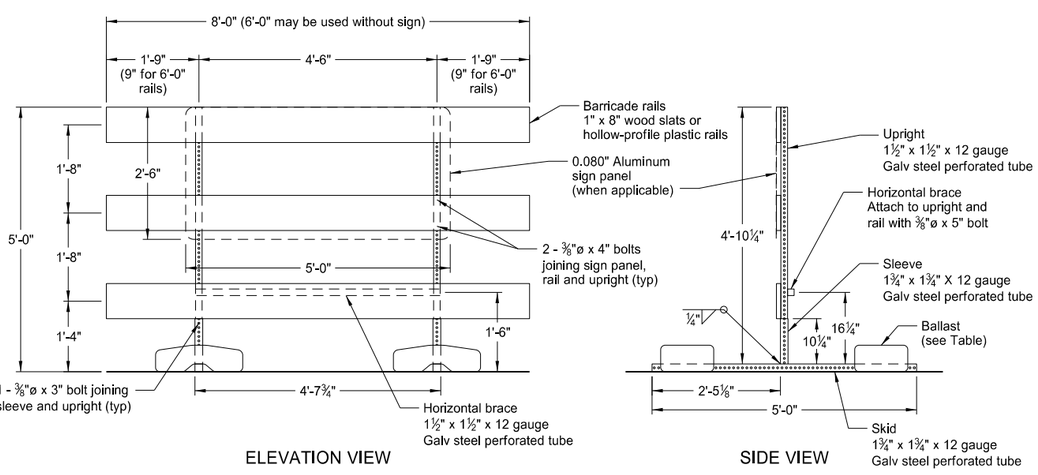

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

## ELEVATION VIEW



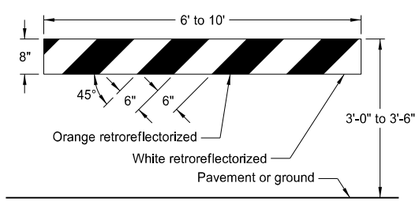

## SIDE VIEW

## BARRICADE ASSEMBLY DETAIL
## (Aluminum Barricade Rails)

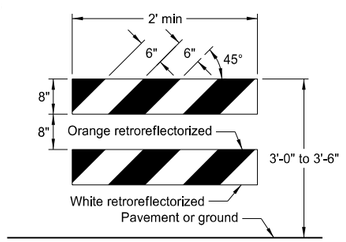



## BARRICADE ASSEMBLY DETAIL
## (Wood or Plastic Rails)

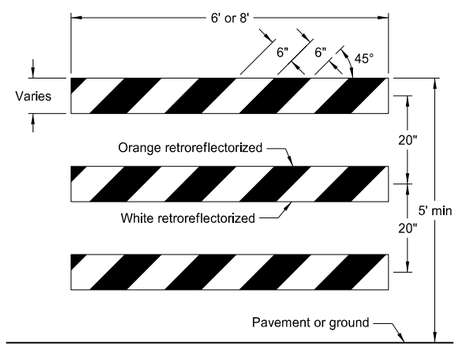
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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




## TYPE I BARRICADE

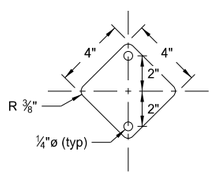


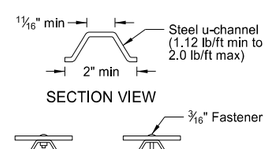

## TYPE II BARRICADE

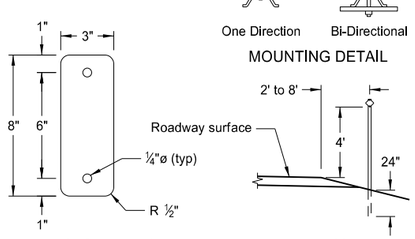



## TYPE III BARRICADE

## BARRICADE RAIL DETAILS




REFLECTOR DETAIL ELEVATION

## DELINEATORS

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

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

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

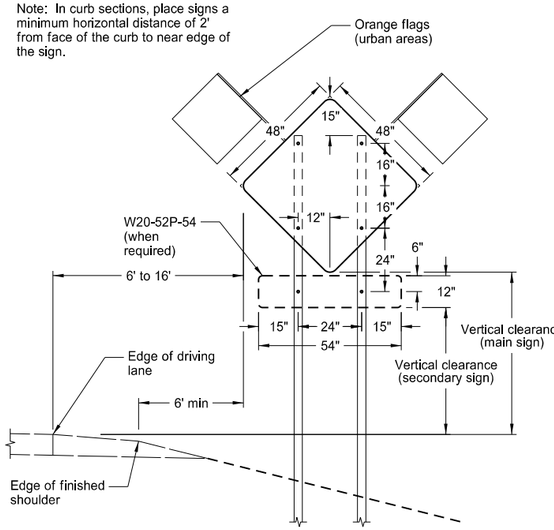
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 9-27-17 | Updated to active voice |

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

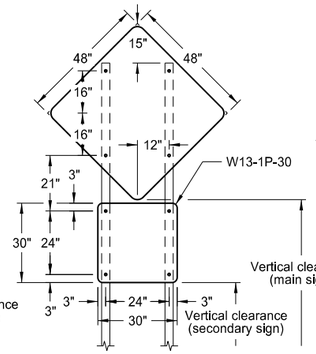
# CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

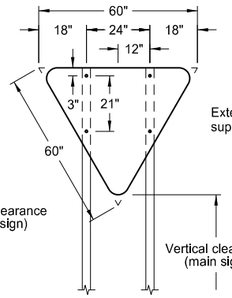
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



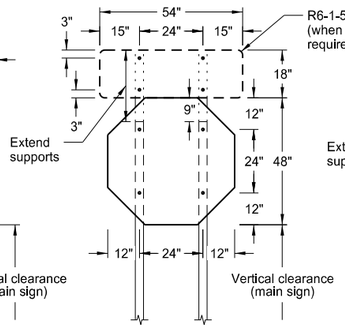

TYPICAL SECTION
(48" x 48" diamond warning sign shown)



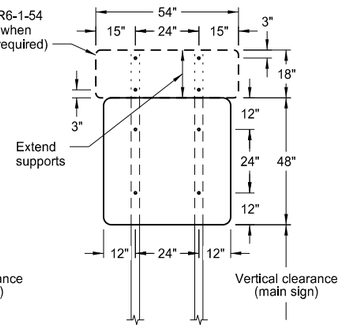

48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



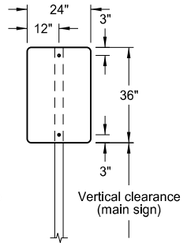

R1-2-60 - YIELD SIGN



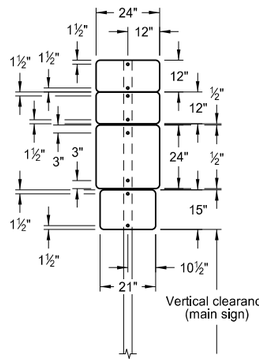

R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



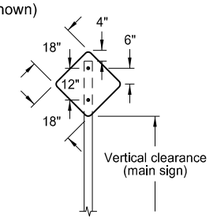

48" x 48" SIGN
(with R6-1-54 sign as required)



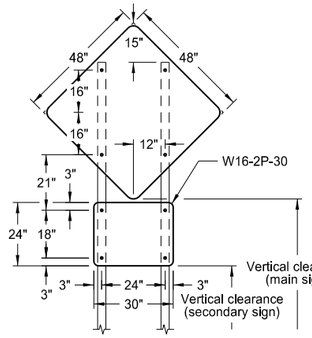

24" x 36" SIGN



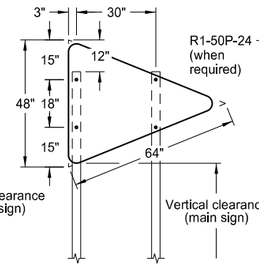

24" x 24"
ROUTE MARKER
ASSEMBLY



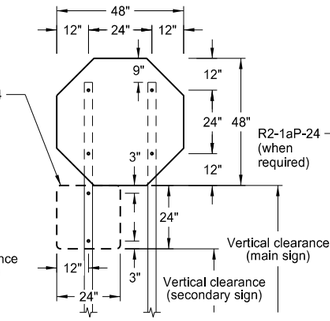

18" x 18"
DIAMOND SIGN



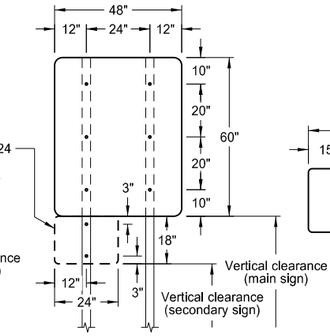

48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



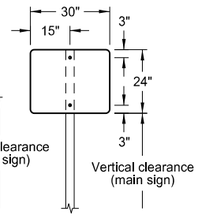

W14-3-64 - PENNANT SIGN



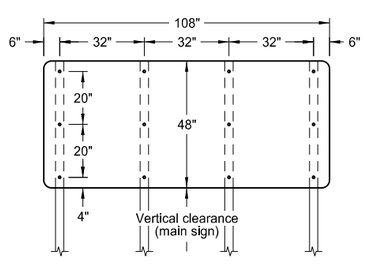

R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



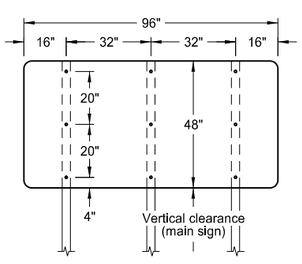

48" x 48" SIGN
(with R2-1aP-24 sign as required)



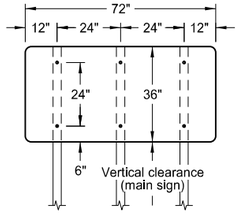

30" x 24" SIGN



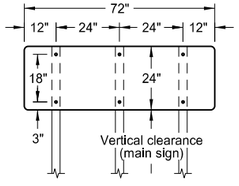

108" x 48" SIGN



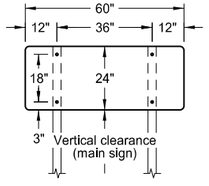

96" x 48" SIGN



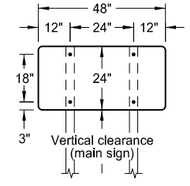

72" x 36" SIGN



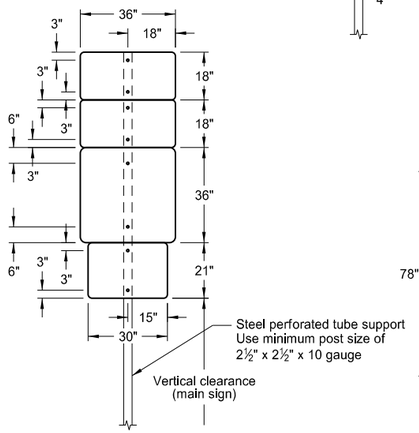

72" x 24" SIGN



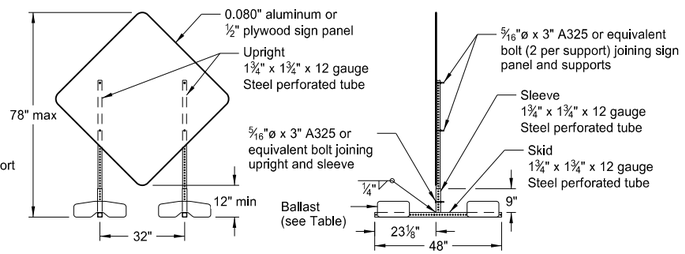

60" x 24" SIGN



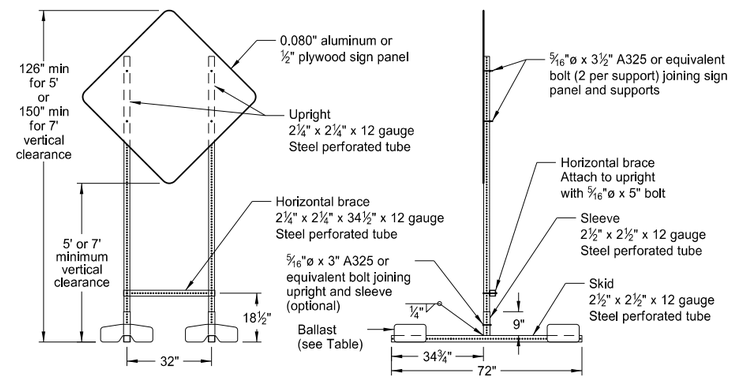

48" x 24" SIGN




36" x 36"
ROUTE MARKER
ASSEMBLY




PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT




PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

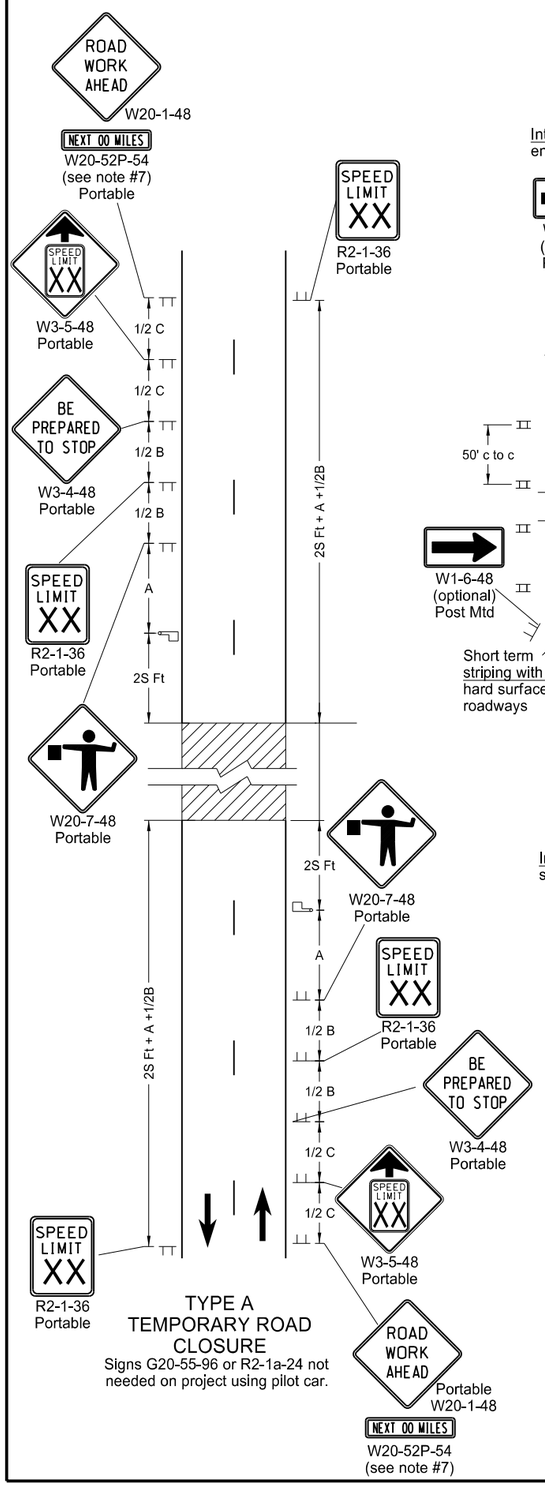
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-4-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 11-14-13<br>9-27-17 | Revised Note 6.<br>Updated to active voice |

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

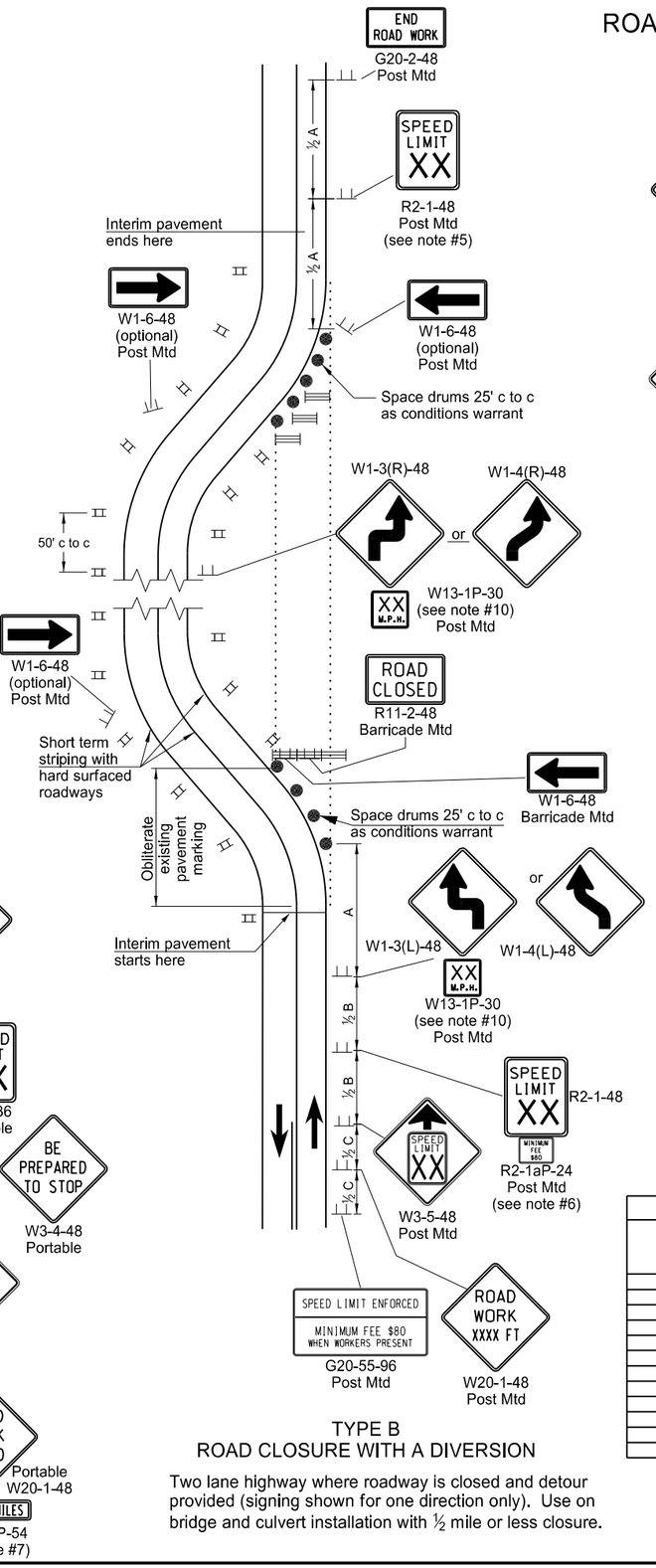
# ROAD CLOSURE LAYOUTS






## TYPE A
## TEMPORARY ROAD CLOSURE

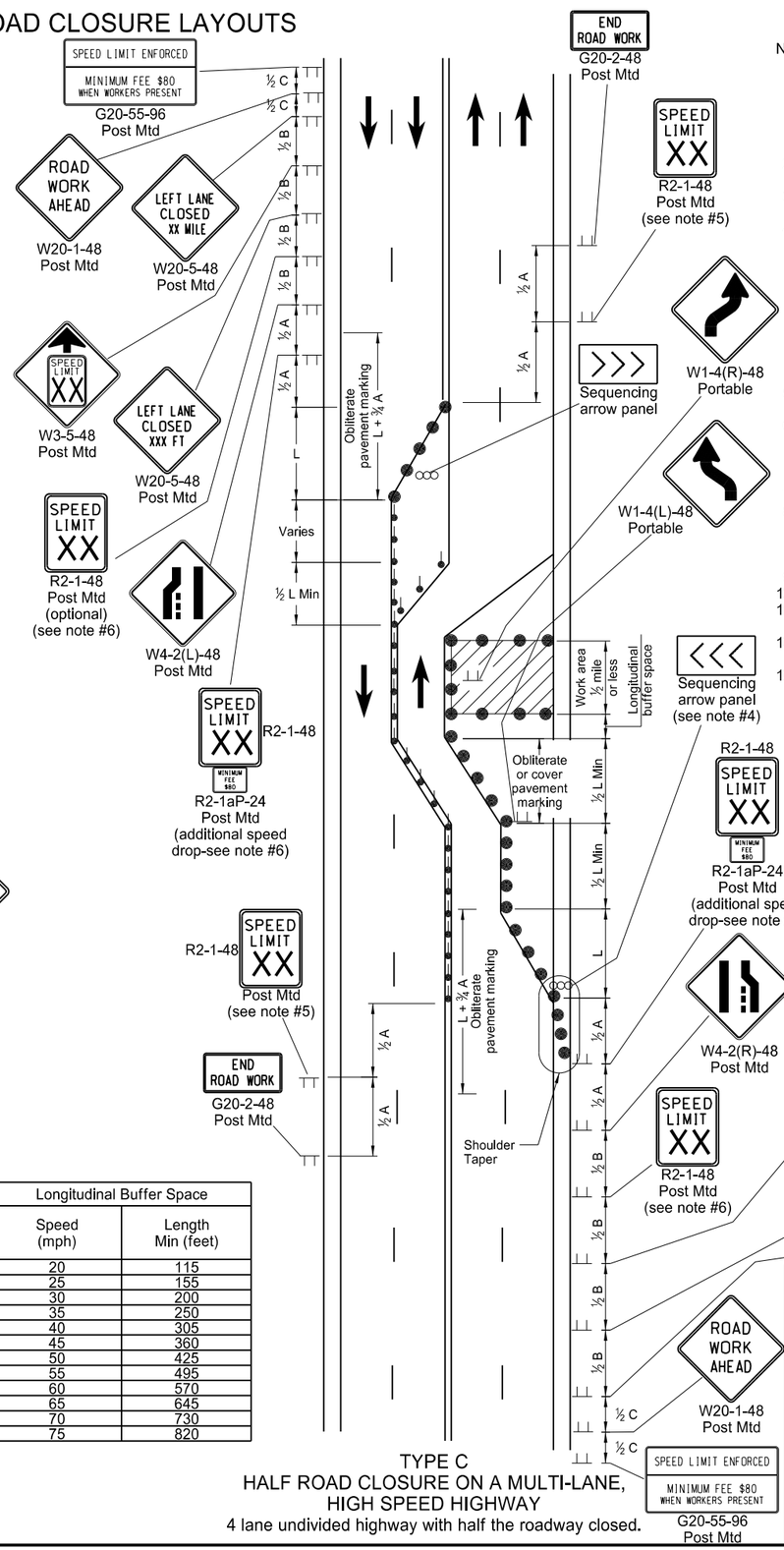
Signs G20-55-96 or R2-1a-24 not needed on project using pilot car.




## TYPE B
## ROAD CLOSURE WITH A DIVERSION

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

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




## TYPE C
## HALF ROAD CLOSURE ON A MULTI-LANE, HIGH SPEED HIGHWAY

4 lane undivided highway with half the roadway closed.

Notes

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

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

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

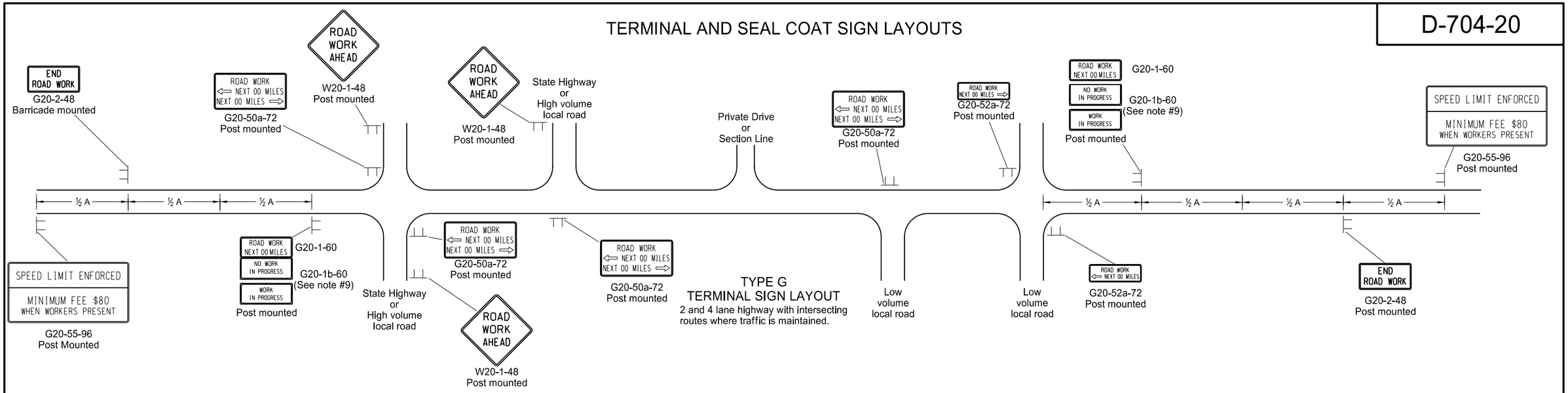
REVISIONS

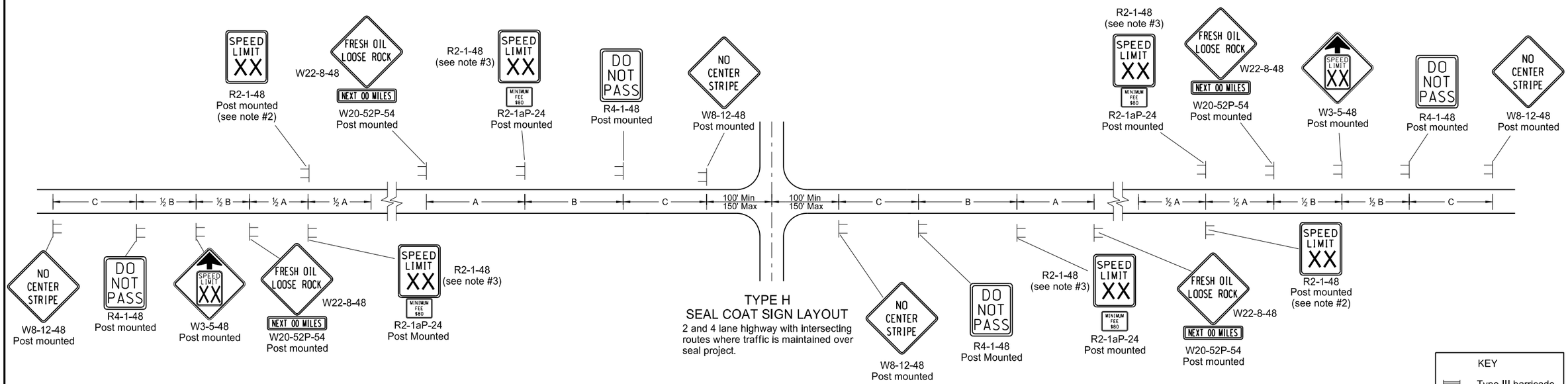
| DATE | CHANGE |
|---|---|
| 8-17-17 | Updated notes & Speed Limit signs |

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

# TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20




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

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

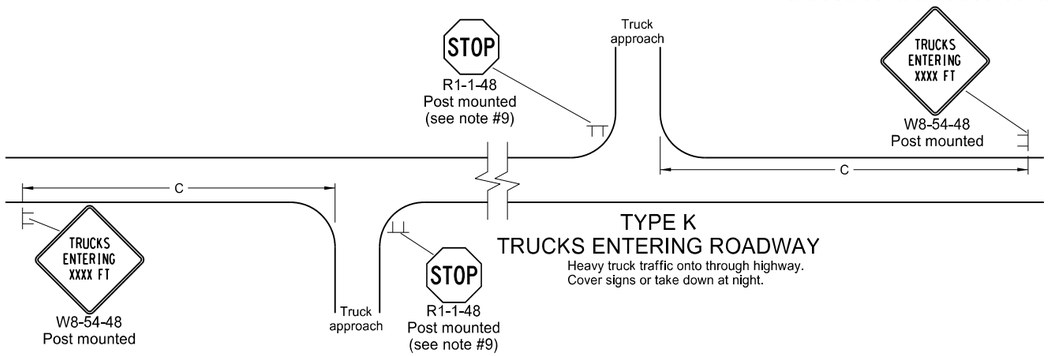
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-17-17 | Updated notes & sign numbers |

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

# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

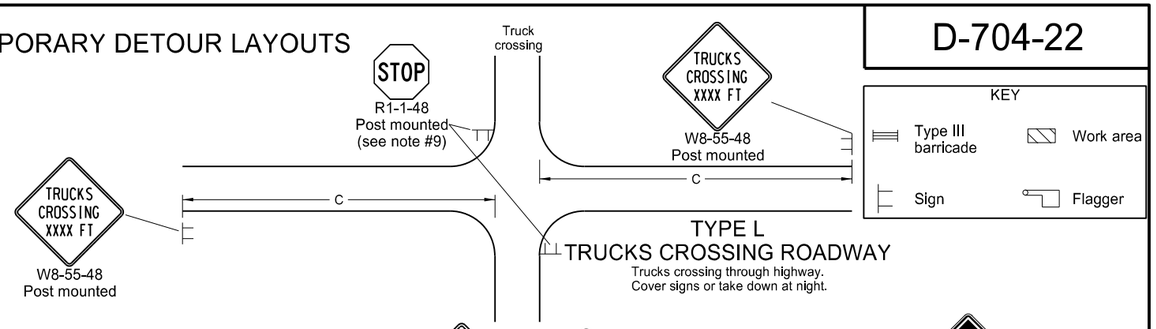
D-704-22

KEY
- Type III barricade
- Work area
- Sign
- Flagger



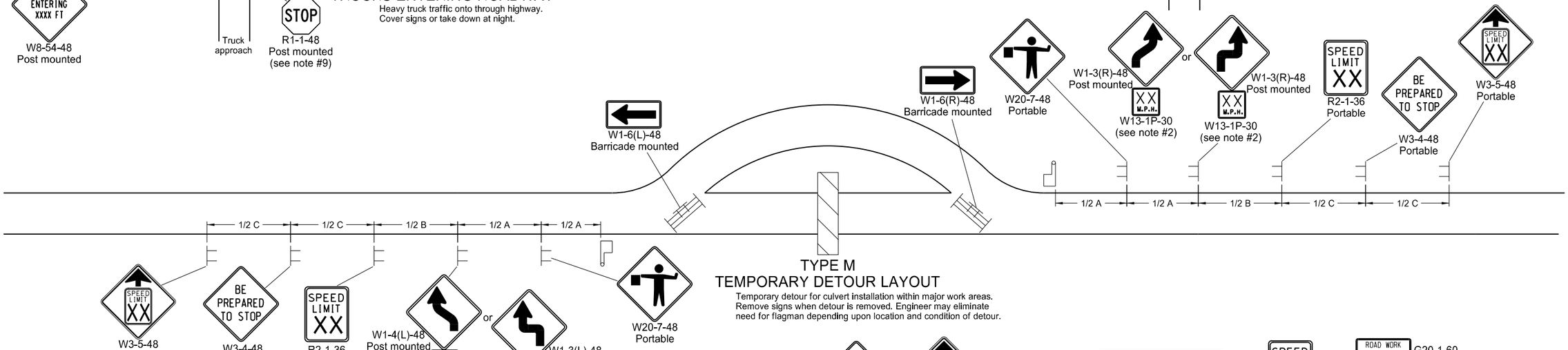

## TYPE K
## TRUCKS ENTERING ROADWAY

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



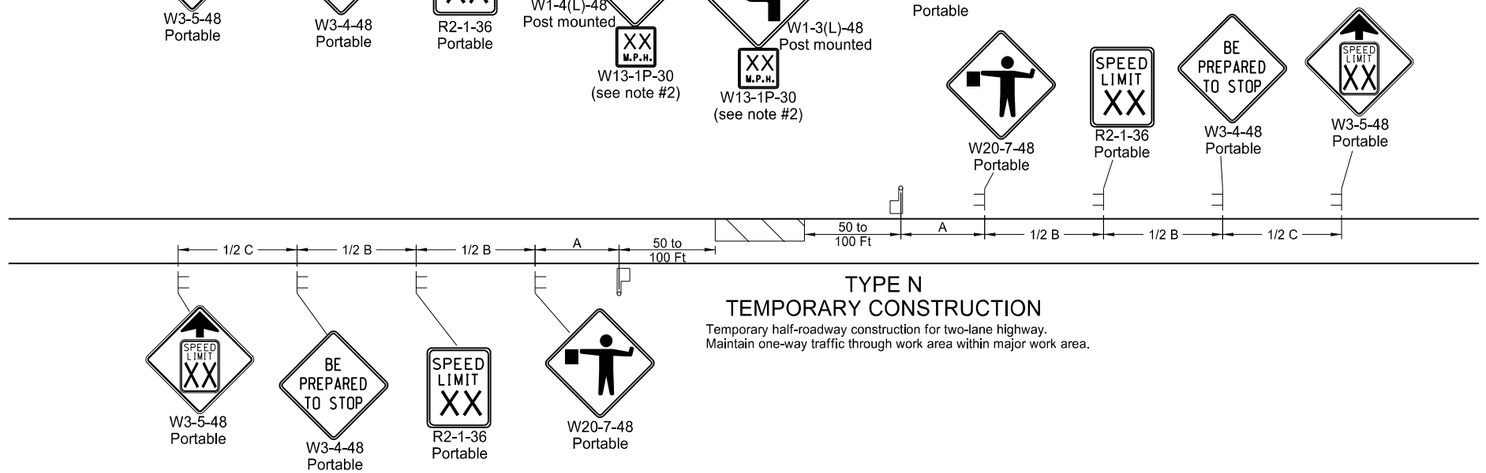

## TYPE L
## TRUCKS CROSSING ROADWAY

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



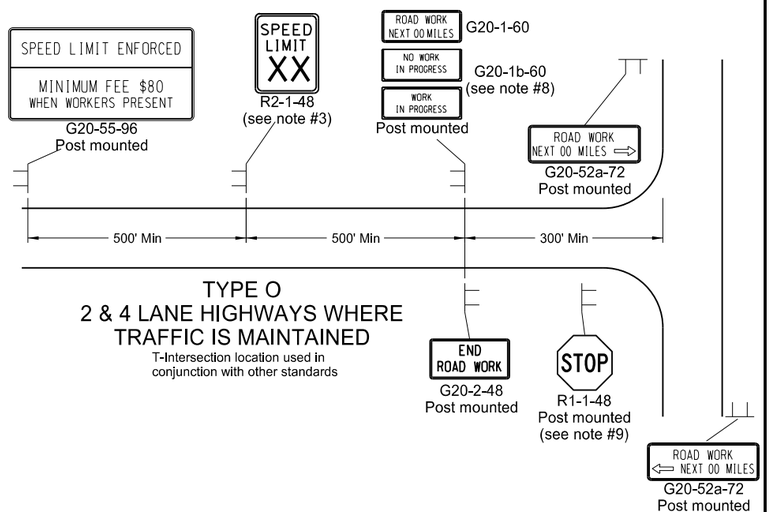

## TYPE M
## TEMPORARY DETOUR LAYOUT

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




## TYPE N
## TEMPORARY CONSTRUCTION

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




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

T-Intersection location used in conjunction with other standards

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

ADVANCE WARNING SIGN SPACING

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

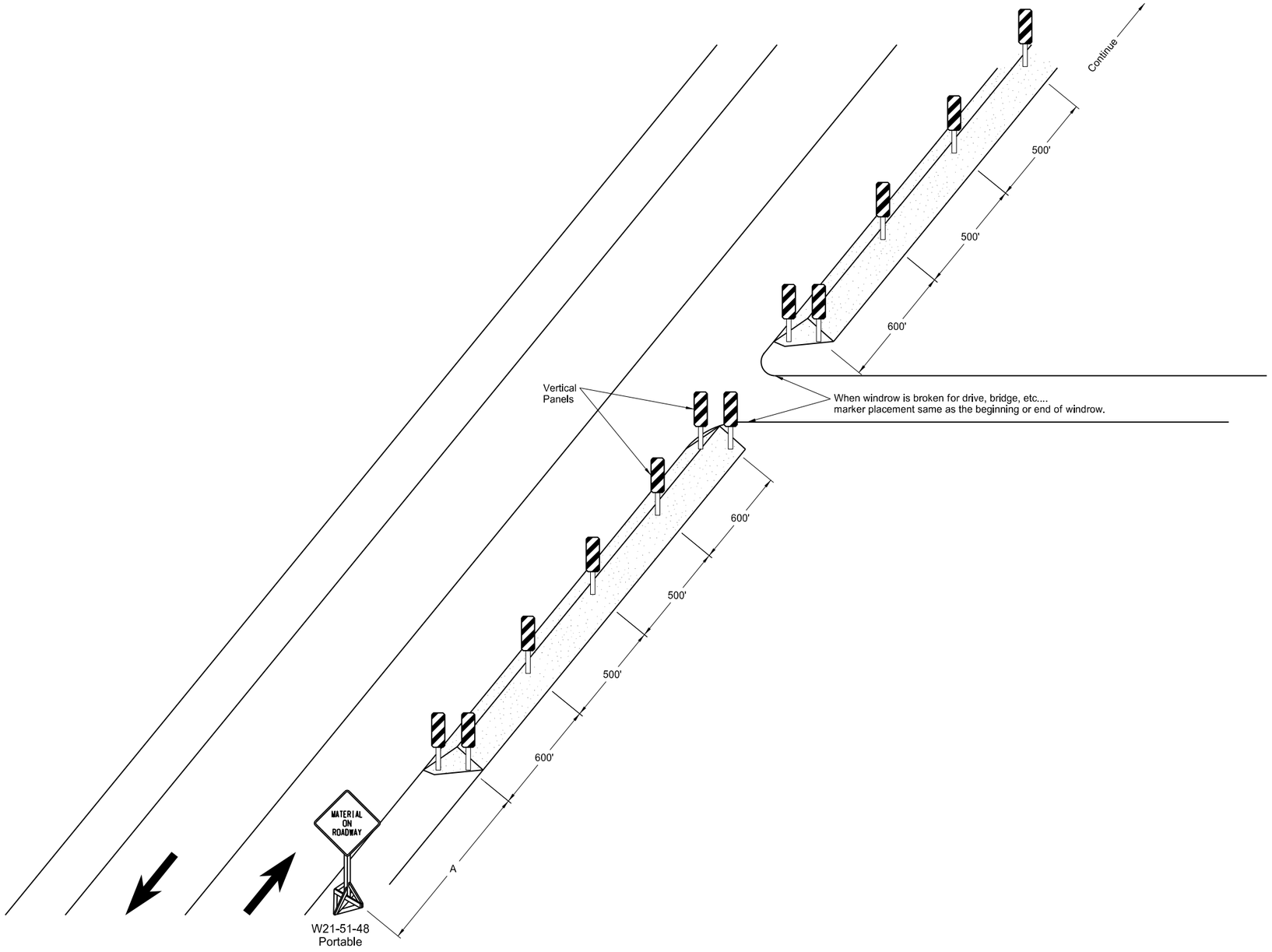
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
9-27-13
REVISIONS

| DATE | CHANGE |
|---|---|
| 8-17-17 | Update notes & sign numbers |

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

# WINDROW MARKING

D-704-30




| 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 (55 mph to 60 mph) | 1000 | 1500 | 2640 |
| Interstate/4-Lane Divided (Maintenance and Surveying) | 750 | 1000 | 1500 |

Notes:
As an option, use portable sign supports in lieu of post mounted sign in accordance with NDDOT Standard Specifications.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

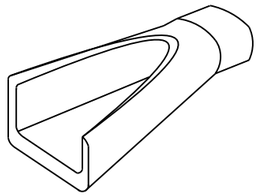
9-27-13

REVISIONS

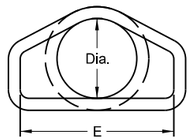
| DATE | CHANGE |
|---|---|
| 6-24-14 | Revised Note |
| 8-17-17 | Updated notes & sign support |

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

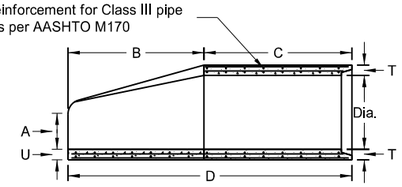
# REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
## (Round Pipe)



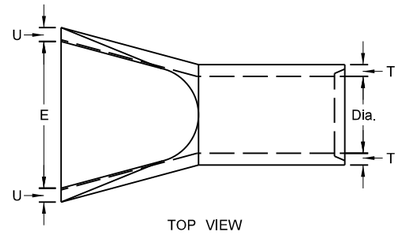
PERSPECTIVE




END VIEW




SIDE VIEW



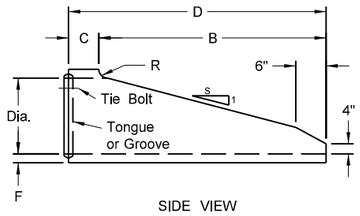

TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION

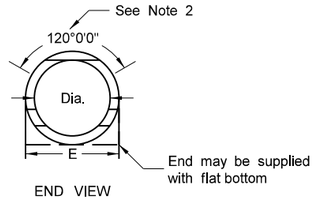
Reinforcement to be equivalent to Class III RCP

| 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

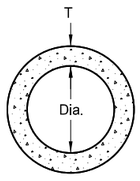
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

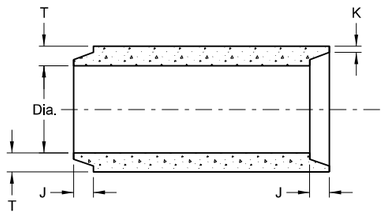
NOTES (Traversable End Section):

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.

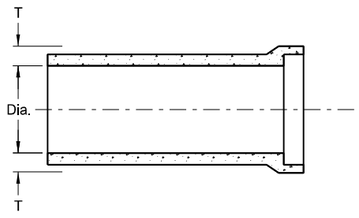
| All Classifications of Round Concrete Pipe | | | | | |
|---|---|---|---|---|---|
| Internal Dia of pipe in Inches | Cross-Sectional Water Area | Weight per lin. foot of Pipe Std. Wall | Joint J Groove End Min./Max. | Joint K Tongue End Min. | Minimum Wall Thickness (T) |
| Dia | Sq. ft. | Lbs. | In. | In. | In. |
| 12 | 0.79 | 92 | 1⅛-2⅛ | ¾ | 2 |
| 15 | 1.23 | 127 | 1¾-2¾ | ⅞ | 2¼ |
| 18 | 1.77 | 168 | 1⅞-2⅛ | 1 | 2½ |
| 21 | 2.40 | 214 | 1⅞-3⅛ | 1⅛ | 2¾ |
| 24 | 3.14 | 265 | 2⅛-3¾ | 1⅛ | 3 |
| 27 | 3.98 | 322 | 2¾-4 | 1¼ | 3¼ |
| 30 | 4.91 | 384 | 3¼-4¼ | 1¼ | 3½ |
| 33 | 5.94 | 452 | 3¼-4¼ | 1½ | 3¾ |
| 36 | 7.07 | 524 | 3½-4¼ | 1½ | 4 |
| 42 | 9.62 | 685 | 3⅝-4¾ | 1¾ | 4½ |
| 48 | 12.57 | 685 | 3⅝-4¾ | 1⅞ | 5 |
| 54 | 15.90 | 1070 | 4⅛-5¼ | 2 | 5½ |
| 60 | 19.63 | 1296 | 4½-5½ | 2¼ | 6 |
| 66 | 23.76 | 1542 | 5-6 | 2⅝ | 6½ |
| 72 | 28.27 | 1810 | 5⅝-6¾ | 2⅞ | 7 |
| 78 | 33.18 | 2098 | 6¼-7¼ | 2⅞ | 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 |




END VIEW



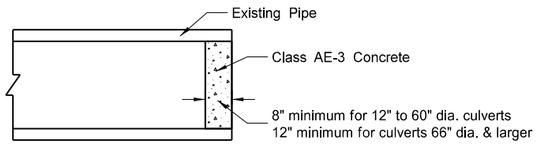

TONGUE & GROOVE JOINT




BELL & SPIGOT JOINT

CIRCULAR PIPE

JOINTS FOR REINFORCED CONCRETE PIPE




CONCRETE PIPE PLUG

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.

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

05-12-14

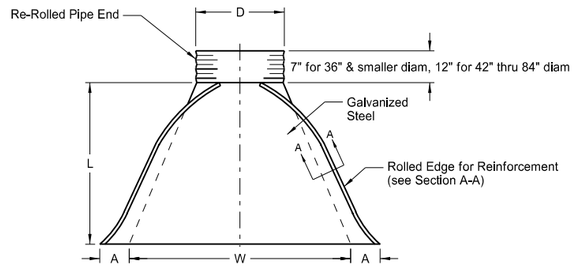
REVISIONS

| DATE | CHANGE |
|---|---|
| 01-21-15 | Revised Note 5 |
| 11-21-16 | Revised End Section Dimensions |

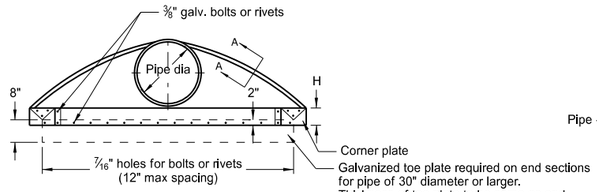
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 11/21/16 and the original document is stored at the North Dakota Department of Transportation

# ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

D-714-4

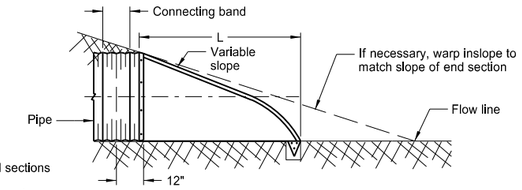



PLAN VIEW




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 |

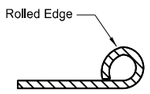
* These sizes have 0.109" sides and 0.138" center panels.

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

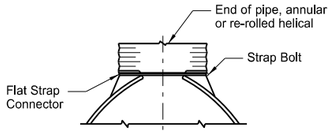
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

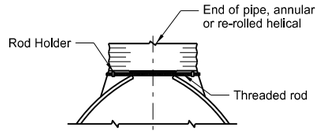
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



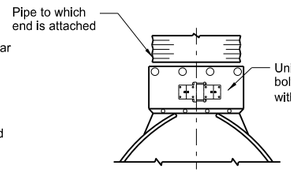

SECTION A-A




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




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

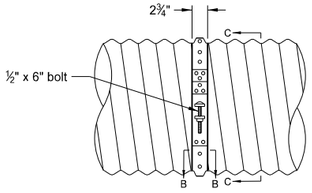



TYPE #3
For all pipe sizes

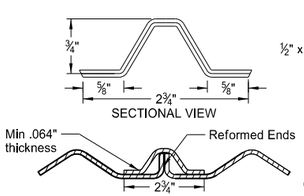
| COUPLING BAND DIMENSIONS | | | | |
|---|---|---|---|---|
| COUPLING TYPE | CORRUGATION PITCH x DEPTH | PIPE SIZE | COUPLING BAND LENGTH | MIN. BAND THICKNESS |
| Hat Band | 2⅔" x ½" | 12" - 48" | 2¾" | .064" |
| Annular Band | 2⅔" x ½" | 12" - 72" | 12" | .052" |
| | | 78" - 84" | 12" | .079" |
| | 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".

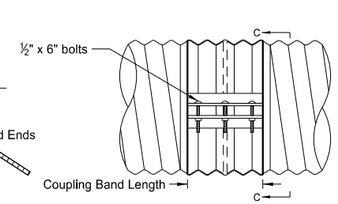



SIDE VIEW

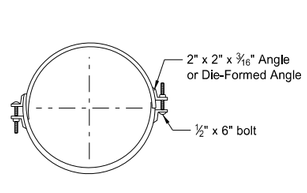



SECTION B-B

HAT BAND FOR FLANGED END PIPE

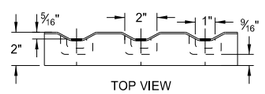



SIDE VIEW

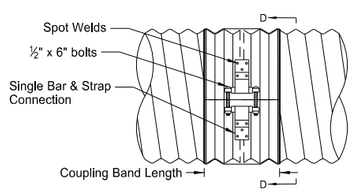



SECTION C-C
Angle Connection

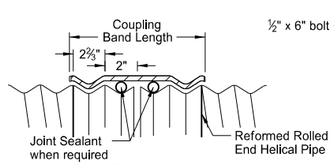
ANNULAR BAND




TOP VIEW
Die-Formed Angle Connector

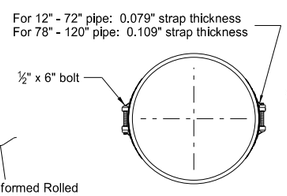



SIDE VIEW

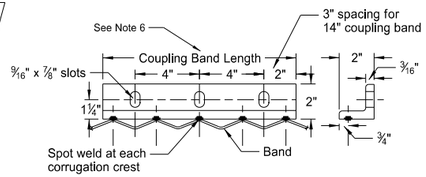



SECTIONAL VIEW

HUGGER COUPLING BAND



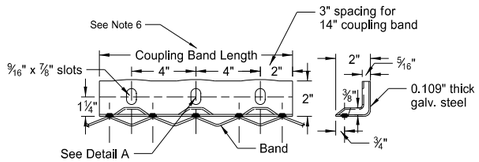

SECTION D-D
Bar & Strap Connection




SIDE VIEW

END VIEW

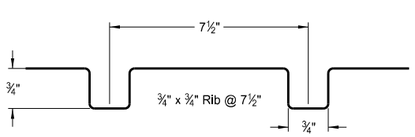
2" x 2" x 3/16" Angle Connector

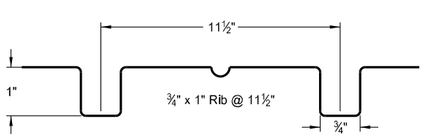



SIDE VIEW

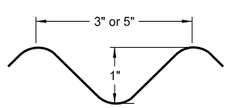
END VIEW

Die-Formed Angle Connector

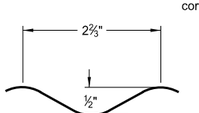


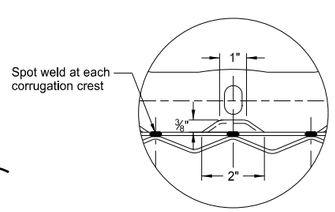

SPIRAL RIB CORRUGATIONS




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




2⅔" x ½" CORRUGATIONS

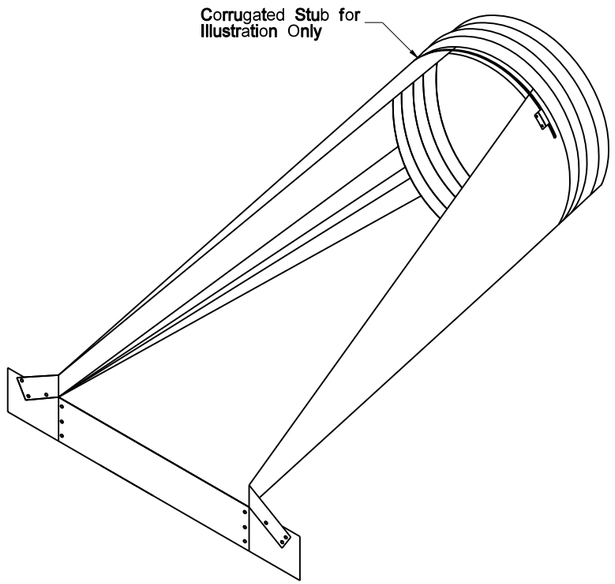



Detail A

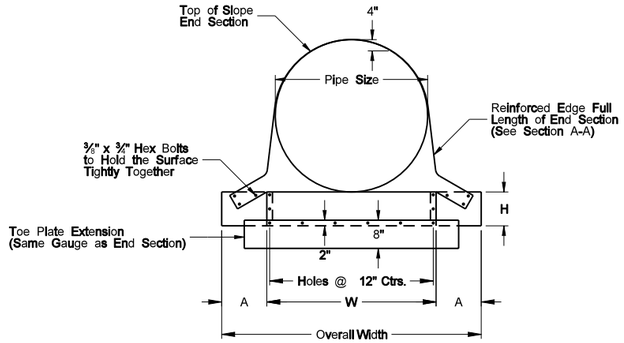
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 08-06-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 01-07-14 | End Section Plan View |
| 02-27-14 | 3" x 1" Corrugation Detail |

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

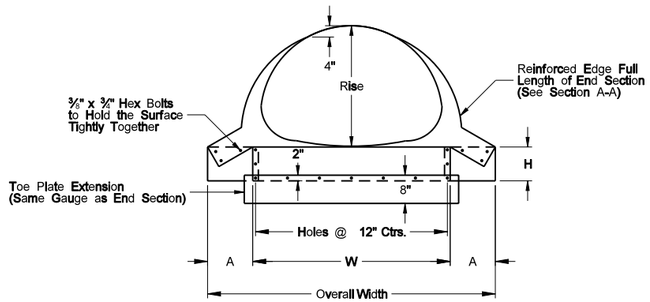
# TRAVERSABLE END SECTIONS FOR CORRUGATED STEEL PIPE CULVERTS



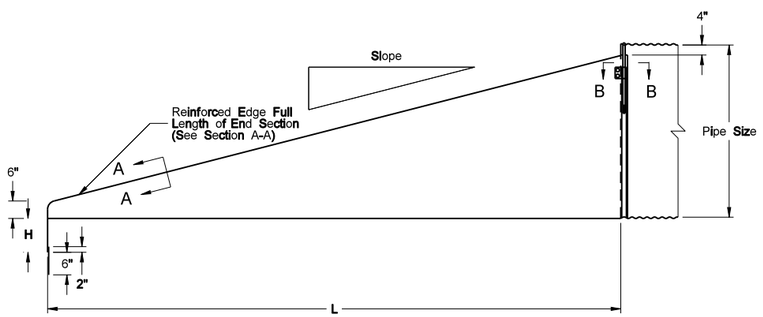

ISOMETRIC VIEW




FRONT VIEW CIRCULAR PIPE

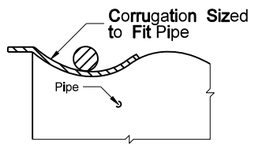



FRONT VIEW ARCHED PIPE




SIDE VIEW


SECTION A-A




SECTION B-B

**TRAVERSABLE END SECTIONS FOR CIRCULAR PIPES**

| Pipe Dia. (in.) | Min. Thick. | | Dimensions (inches) | | | | L Dimensions | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | in. | Gauge | A | H | W | Overall Width | Slope | Length (in.) | Slope | Length (in.) |
| 15 | .064 | 16 | 8 | 6 | 21 | 37 | 4:1 | 20 | 6:1 | 30 |
| 18 | .064 | 16 | 8 | 6 | 24 | 40 | 4:1 | 32 | 6:1 | 48 |
| 24 | .064 | 16 | 8 | 6 | 30 | 46 | 4:1 | 56 | 6:1 | 84 |
| 30 | .109 | 12 | 12 | 9 | 36 | 60 | 4:1 | 80 | 6:1 | 120 |

**TRAVERSABLE END SECTIONS FOR ARCHED PIPES**

| Equiv. Dia. (in.) | (inches) | | Min. Thick. | | Dimensions (inches) | | | | L Dimensions | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Span | Rise | in. | Gauge | A | H | W | Overall Width | Slope | Length (in.) | Slope | Length (in.) |
| 18 | 21 | 15 | .064 | 16 | 8 | 6 | 27 | 43 | 4:1 | 20 | 6:1 | 30 |
| 21 | 24 | 18 | .064 | 16 | 8 | 6 | 30 | 46 | 4:1 | 32 | 6:1 | 48 |
| 24 | 28 | 20 | .064 | 16 | 8 | 6 | 34 | 50 | 4:1 | 40 | 6:1 | 60 |

Note: See Standard Drawing D-714-04 for end section to pipe details.

For 15", 18" and 24" diameter end sections, 1/2" diameter rod, or strap type connection to corrugated steel pipe shall be used.

For 30" diameter round end sections, rod type connection to corrugated steel pipe, using 5/8" diameter rod shall be used.

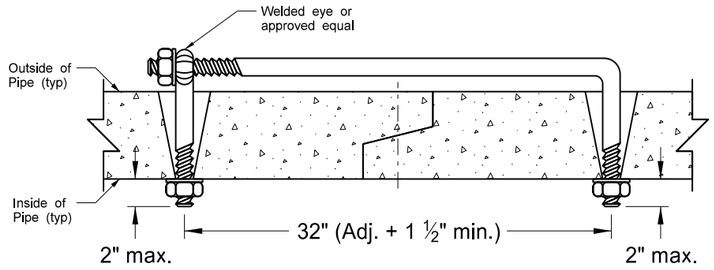
For arched pipe end sections (21" X 15" through 28" X 20"), rod type connection to corrugated steel pipe, using 1/2" diameter rod shall be used.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 07-23-09 | |
| REVISIONS | |
| DATE | CHANGE |
| | |

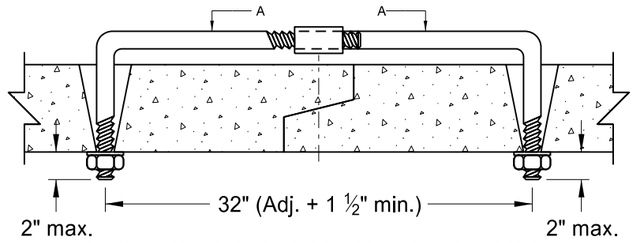
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE- 2674, on 07/23/09 and the original document is stored at the North Dakota Department of Transportation

# CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES

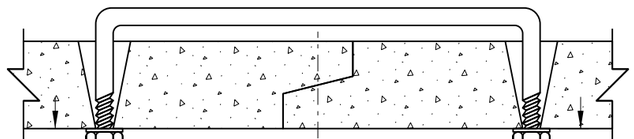
D-714-22



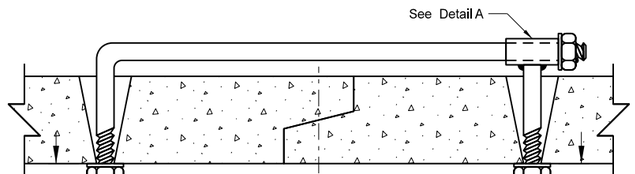

EYE BOLT TIE (PIPES ONLY)



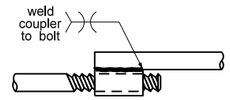

ADJUSTABLE TIE (RCB AND PIPES ONLY)



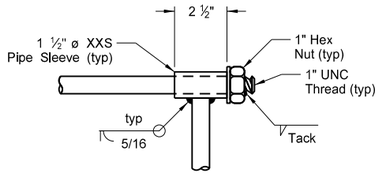

U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



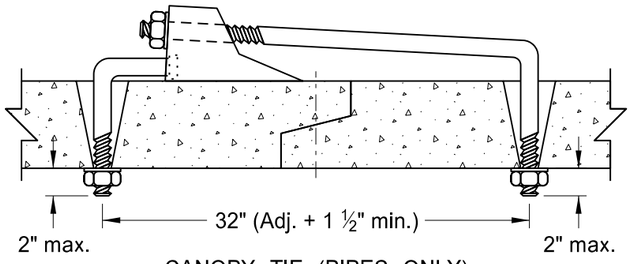

WELDED TIE (RCB AND PIPES ONLY)



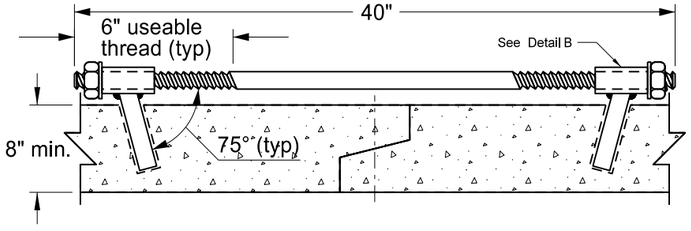

SECTION A-A



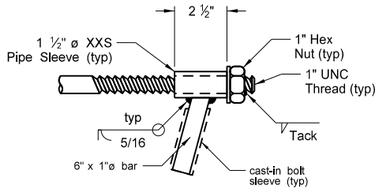

DETAIL A



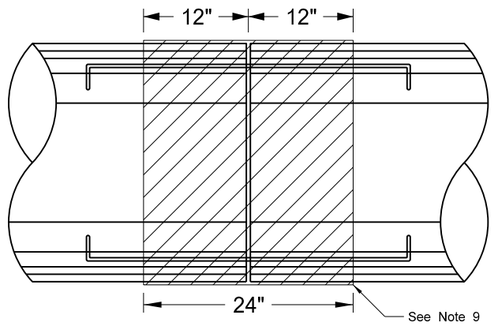

CANOPY TIE (PIPES ONLY)



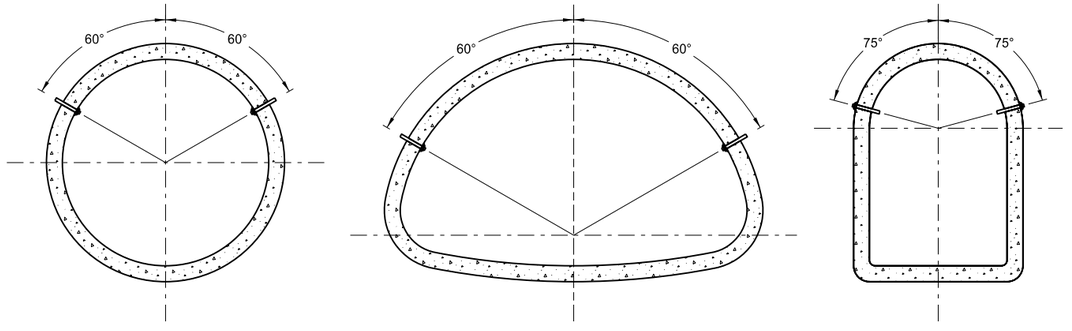

HIDDEN TIE (RCB ONLY)




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/Cattle Pass | | |

NOTES:

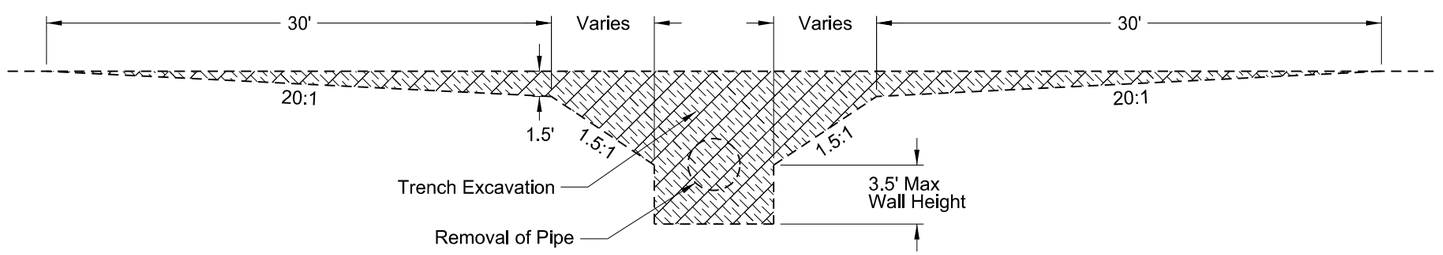
1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
3. 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.
4. Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
5. Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
6. 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".
7. The contractor has the option of selecting the type of tie bolt used from those shown.
8. 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.
9. 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.
10. Place joint wrap prior to installing ties. Overlap the joint by 12" in both directions.
11. 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.
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 |
| 6-6-17 | Notes 2-11, Table, Title, Lables |

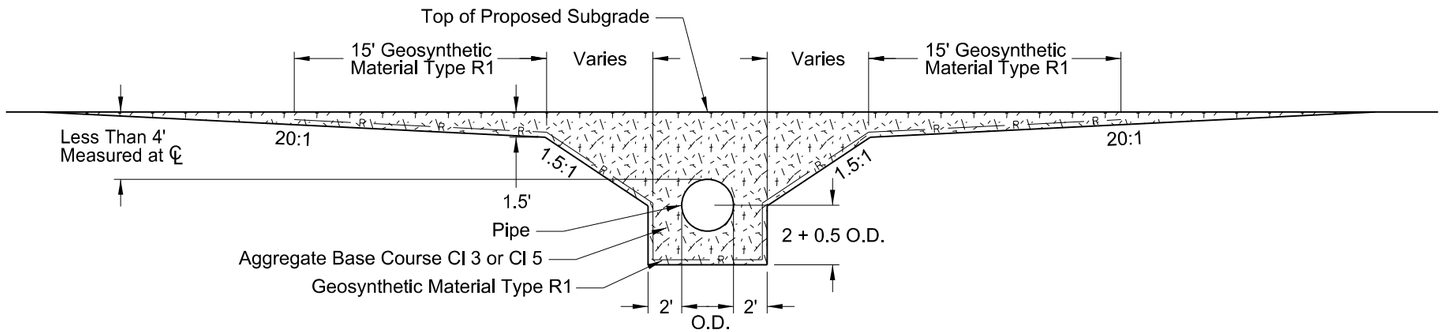
This document was originally issued and sealed by Jonathan David Ketterling, Registration Number PE-4684, on 6/6/2017 and the original document is stored at the North Dakota Department of Transportation

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

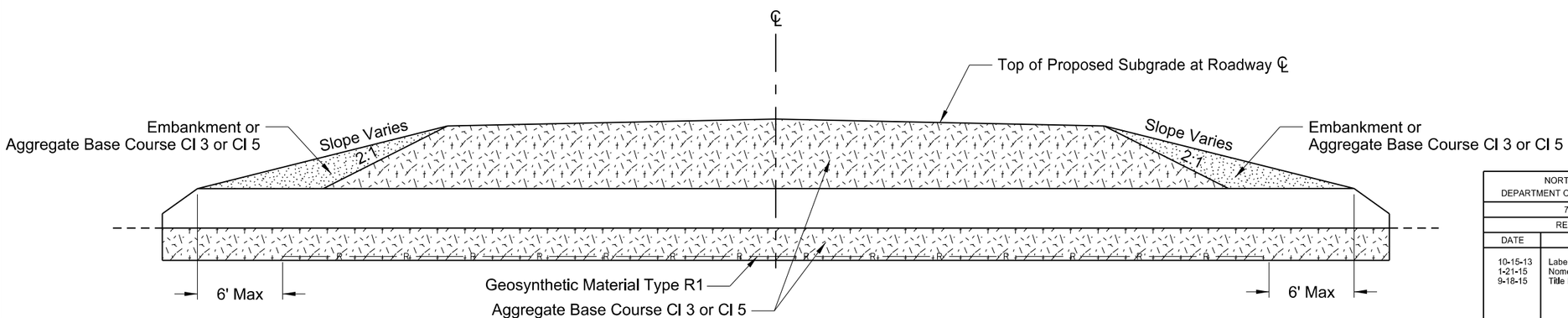
D-714-26




## 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:

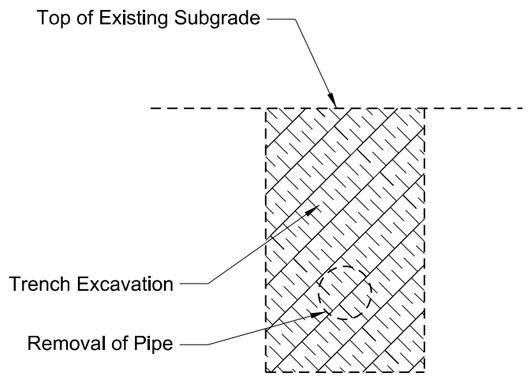
1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.
2) Embankment may be either Borrow Excavation or Common Excavation - Type A

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

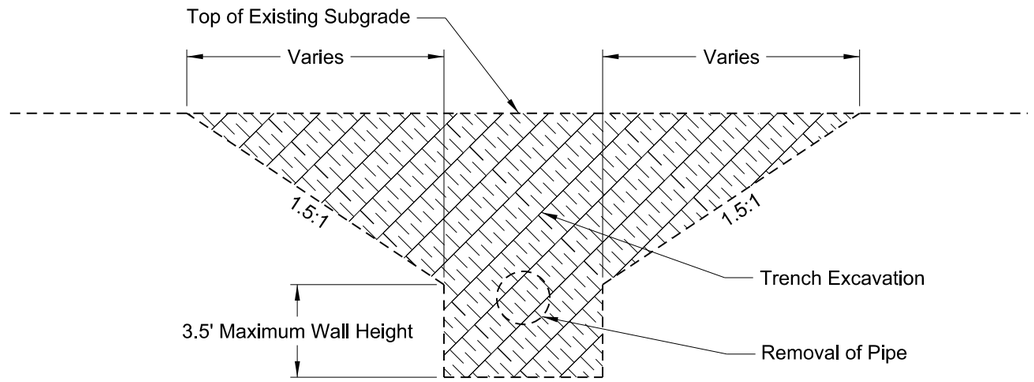
This document was originally issued and sealed by Ron Horner, Registration Number PE- 2087, on 9/18/2015 and the original document is stored at the North Dakota Department of Transportation

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

D-714-27




EXCAVATION DETAIL A



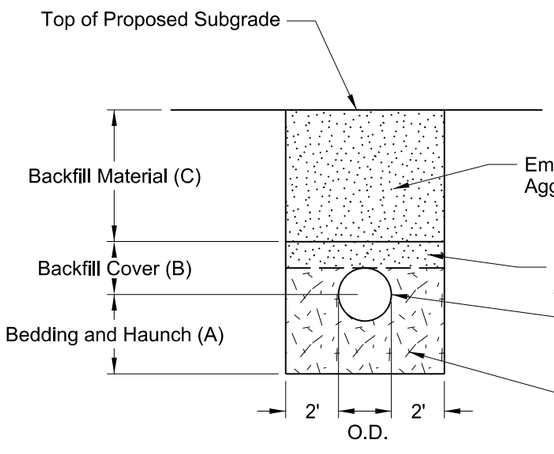

EXCAVATION DETAIL B

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

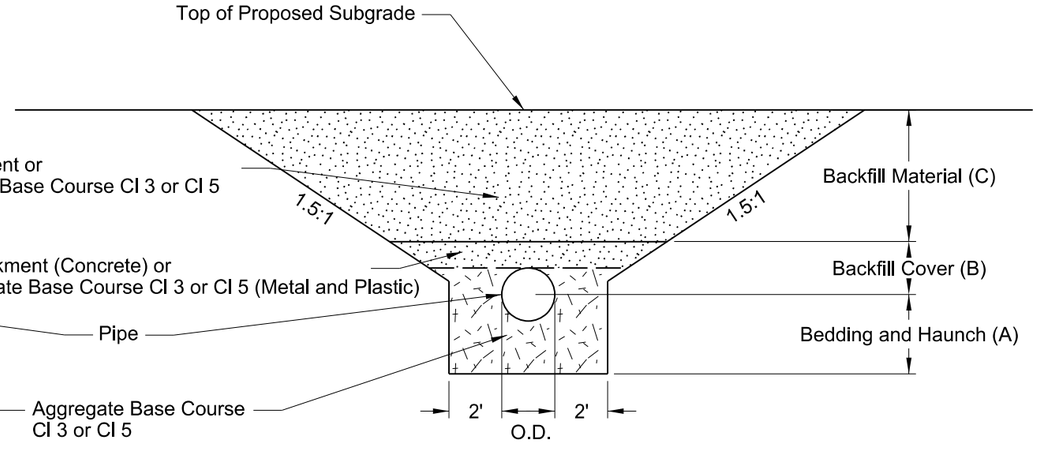
*Included in Pipe Pay Item
1) Pipe
2) Trench excavation
3) Aggregate base course Cl 3 or Cl 5
4) Embankment

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

| Bedding and Haunch (A) |
|---|
| Pipes Not Under Roadway = 0.5 O.D. + 4 Inches |
| Pipes Under the Roadway = 0.5 O.D. + 2 Feet |
| |
| Backfill Cover (B) |
| Concrete Pipe = 0.5 O.D. |
| Metal and Plastic = 0.5 O.D. + 1 Foot |
| |
| Backfill Material (C) |
| Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course Cl3 or Cl 5 |
| Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A |
| Pipe Not Under Roadway = Common Excavation - Type B |




BACKFILL DETAIL A



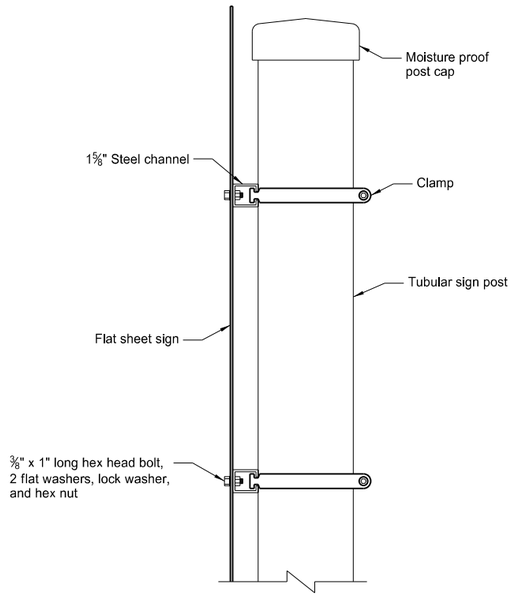

BACKFILL DETAIL B

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-26-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-15-13<br>1-21-15<br>12-10-15 | Label Formatting<br>Nomenclature<br>Added Plastic Pipe |

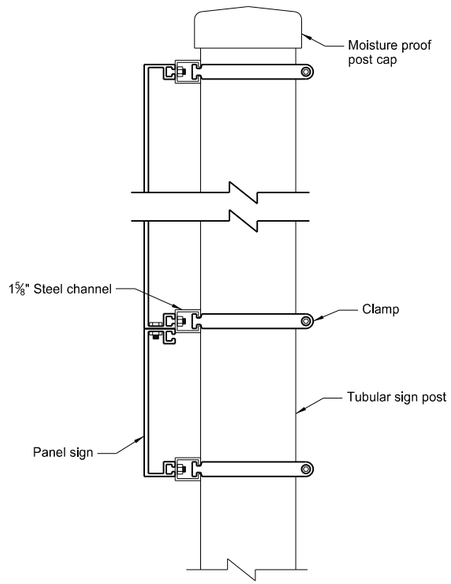
This document was originally issued and sealed by Ron Horner, Registration Number PE-2087, on 12/10/2015 and the original document is stored at the North Dakota Department of Transportation

# PIPE SUPPORT AND SIGN MOUNTING DETAILS

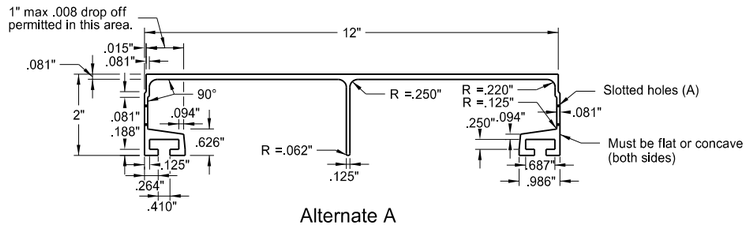
D-754-7



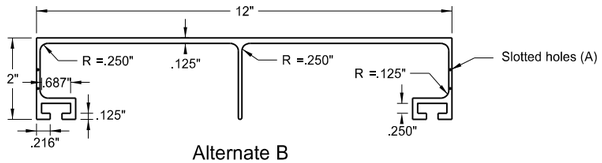

Side View



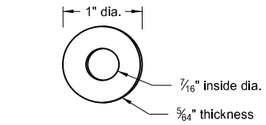

Side View




Alternate A
12" Extruded Panel




Alternate B
12" Extruded Panel




Flat Washer Detail




Slotted Hole Detail



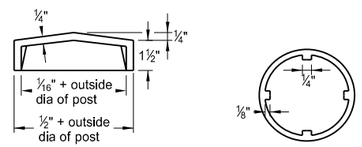

6" Extruded Panel

## Aluminum Panel Details

(A) Punch slotted holes in aluminum panels at 1'-0" on center, space from end as listed below:

| | |
|---|---|
| 12" even length panels | 4'-0" etc. |
| 9" odd + 6" length panels | 5'-6" etc. |
| 6" odd length panels | 5'-0" etc. |
| 3" even + 6" length panels | 4'-6" etc. |

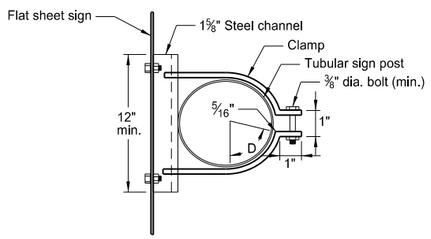
Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



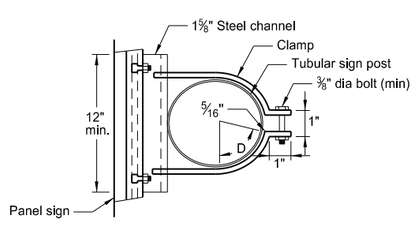

Side View Top View

## Post Cap Detail

Furnish post caps for all steel or aluminum posts or weld a ⅛" plate all around.



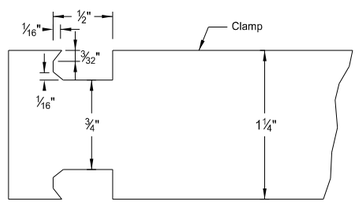

Top View



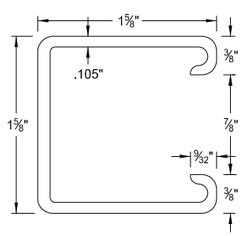

Top View

Flat Sheet Sign Clamp Mounting Details

Panel Sign Clamp Mounting Details




Clamp Detail




Steel Channel Detail

| Post Size dia | Clamp Gauge min |
|---|---|
| 3½" to 5" | 11 |
| 6" to 12" | 10 |

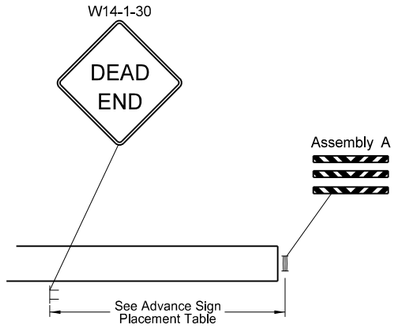
| Post Size dia (in) | D (in) |
|---|---|
| 3½ | 3 |
| 4 | 3 3/16 |
| 5 | 5⅛ |
| 6 | 7 7/16 |
| 8 | 13 1/16 |
| 10 | 20¾ |
| 12 | 29⅝ |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 2-21-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated to active voice, defined bolt & washers for fastening sign. |

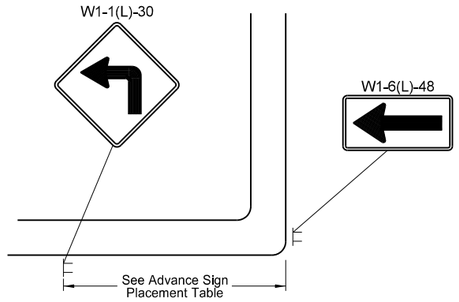
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

# BARRICADE AND ADVANCE SIGNS FOR FORWARD ROADWAY TERMINATION

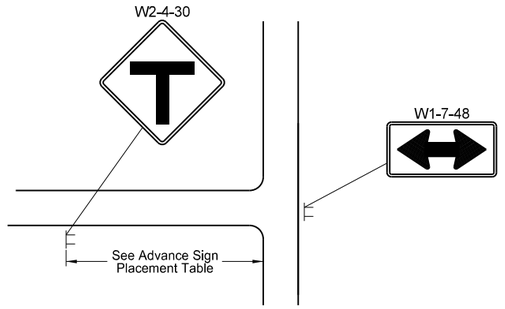
D-754-18




Roadway Termination with Dead End Type A




Roadway Termination with Right or Left Turn Type B




Roadway Termination with T-Intersection Type C

Notes:

Barricade Rails: Fabricate 8" or 9" x 120" rails from anodized aluminum and attach to perforated tube posts with two ⅜" diameter bolts per post placed between the reinforcing ribs.

Barricade Supports: Use material specified for sign supports.

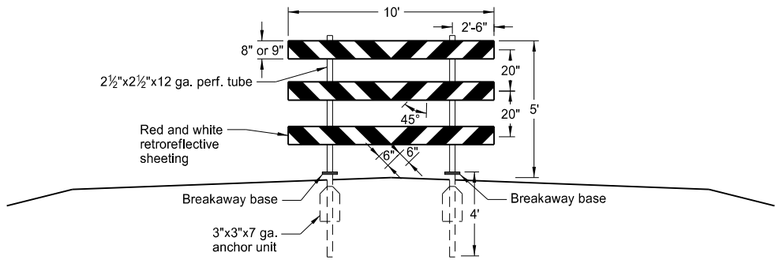
Method of Measurement: The number of each location completed, in place, and accepted by the Engineer.

Basis of Payment: Include all cost for furnishing, delivering, and installing all necessary signs and barricades at each location shown on the plans in the unit price bid for each location.

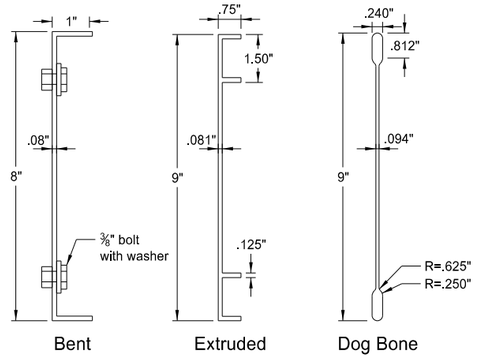
Vertical Clearance: 5' minimum, 7' residential and business districts where parking and/or pedestrian movements occur.

Place breakaway base and anchor unit as shown on D-754-24 or D-754-24A.

Use Type XI reflective sheeting.




Type III Barricade Assembly A



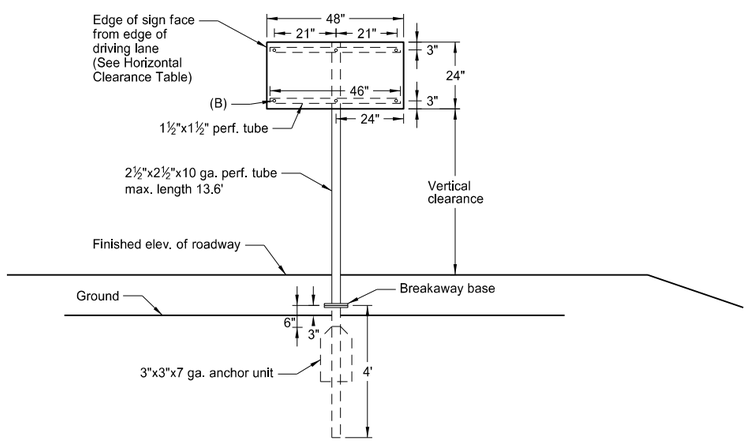

Barricade Bar Details

| 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 |

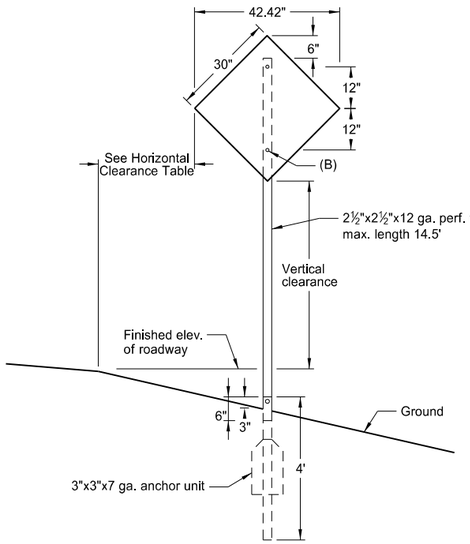
| Advance Sign Placement Table (A) | |
|---|---|
| Posted or 85th Percentile Speed | Minimum Distance |
| 0 to 40 mph | 125 ft |
| 45 mph | 175 ft |
| 50 mph | 250 ft |
| 55 mph | 325 ft |
| 60 mph | 400 ft |
| 65 mph | 475 ft |
| 70 mph | 550 ft |
| 75 mph | 650 ft |

(A) If roadway termination is ½ mile or less from a section line road, place the advanced warning sign just after the section line road.

(B) Punch round holes for ⅜" fasteners.




Assembly Detail for Directional Arrow Signs




Assembly Detail for 30" Signs

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 11-4-13 | Non bkwy base for 30" signs |
| 7-8-14 | Note added for Refl. sheeting and revised Assembly detail for directional arrow signs. |
| 8-30-18 | Updated notes to active voice. |

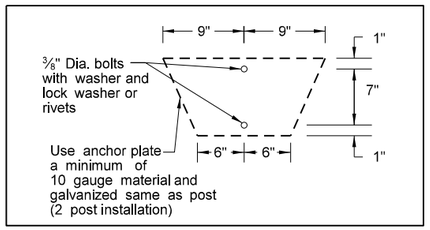
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

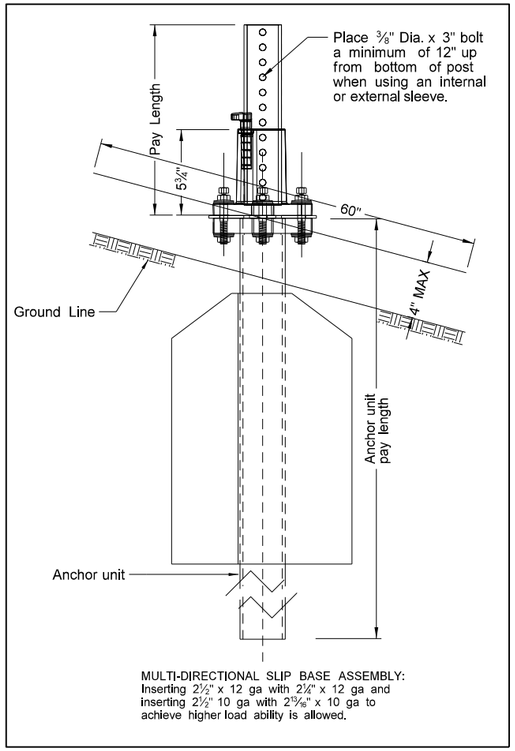
# Mounting Details Perforated Tube

D-754-24

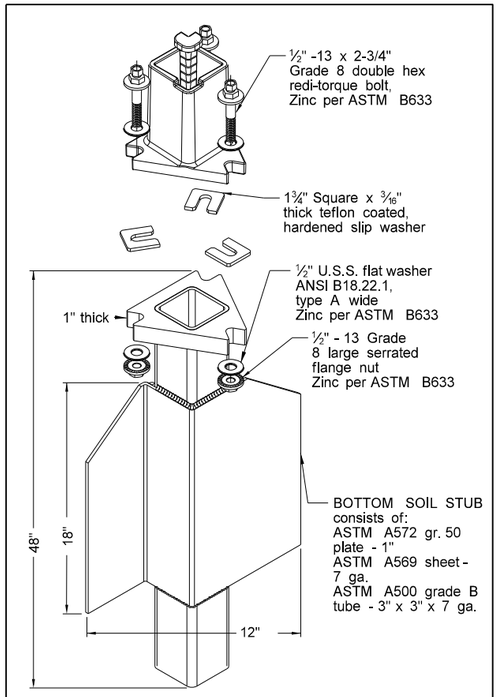
| Number of Posts | Telescoping Perforated Tube | | | | | | |
|---|---|---|---|---|---|---|---|
| | Post Size In. | Wall Thick-ness Gauge | Sleeve Size In. | Wall Thick-ness Gauge | Slip Base | Anchor Size Without Slip Base In. | Anchor Wall Thick-ness Gauge |
| 1 | 2 | 12 | | | No | 2¼ | 12 |
| 1 | 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 | 2⅜16 | 10 | Yes | | 7 |

(B) - Provide a shim as specified by the manufacturer when placing 2½", 12 gauge posts in standard soils without breakaway bases. Provide breakaway base when placing the support in weak soils. The Engineer will determine if the soils are weak. Weak soils are classified as boggy, wet, or loose soil areas.
(C) - 3" anchor unit
(D) - 2½" x 12 ga. x 18" minimum length external sleeve required.

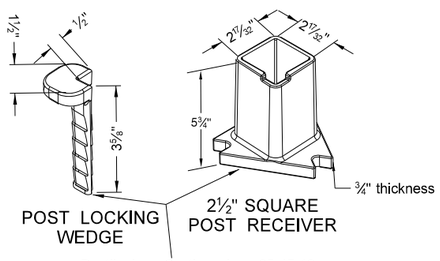


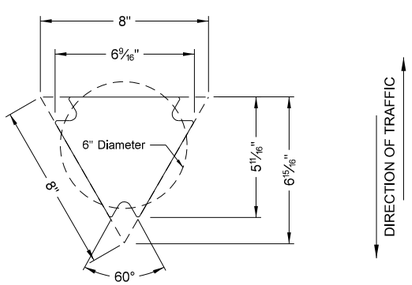

MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2⅜16" x 10 ga to achieve higher load ability is allowed.




SLIP BASE FOR 2½" POST




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



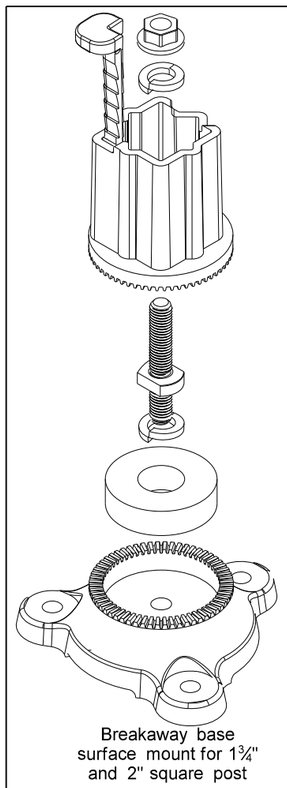

SLIP BASE DETAIL

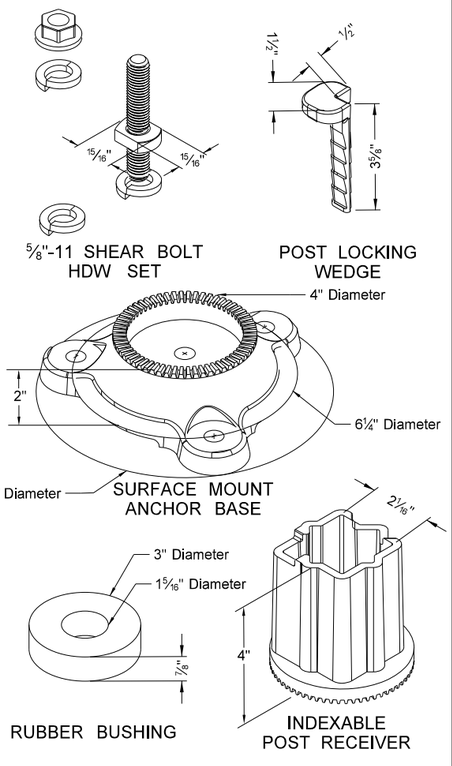
| Properties of Telescoping Perforated Tubes | | | | | | |
|---|---|---|---|---|---|---|
| Tube Size In. | Wall Thickness in. | U.S. Standard Gauge | Weight Per Foot Lbs. | Moment of Inertia In.⁴ | Cross Sect. Area In.² | Section Modulud In.³ |
| 1½ x 1½ | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 |
| 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 |
| 2⅜16 x 2⅜16 | 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 ⅜16" 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 is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.

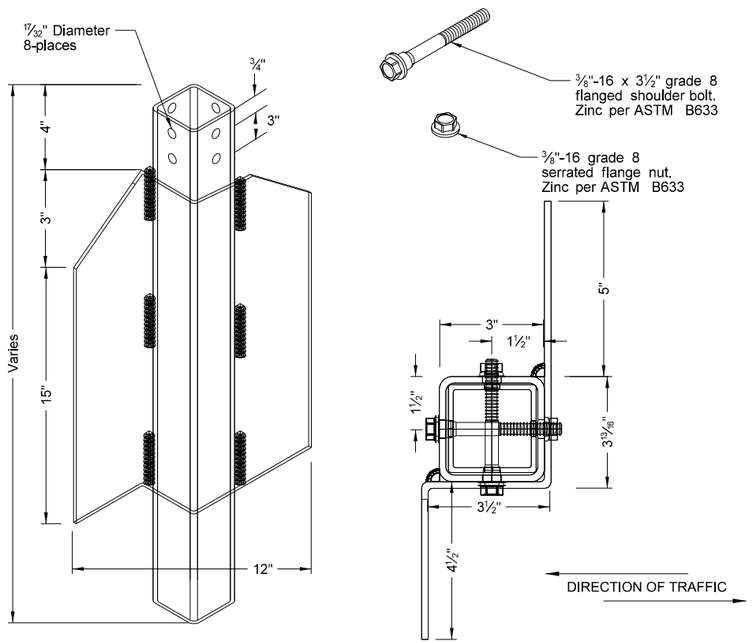



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

Shimming agent to reduce tolerance between 3" anchor unit and 2½" post.
(use standard ⅜" diameter grade 8 bolt with proper shim)



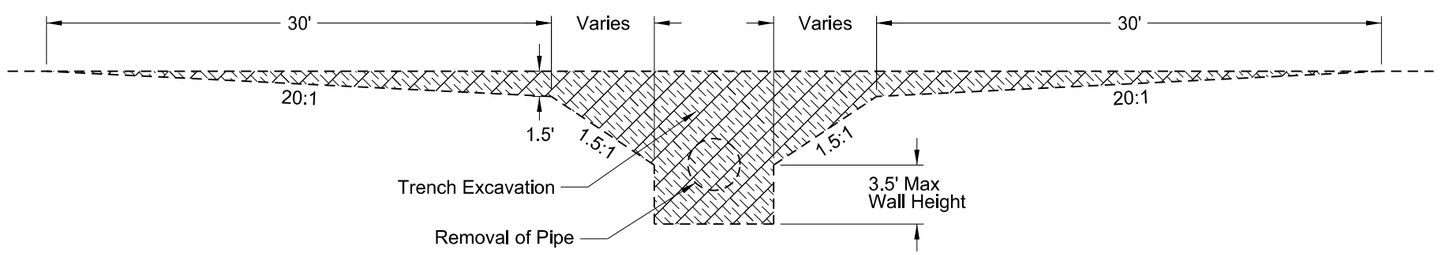

3" ANCHOR UNIT

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-6-09 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated notes to active voice & corrected max height of base. |

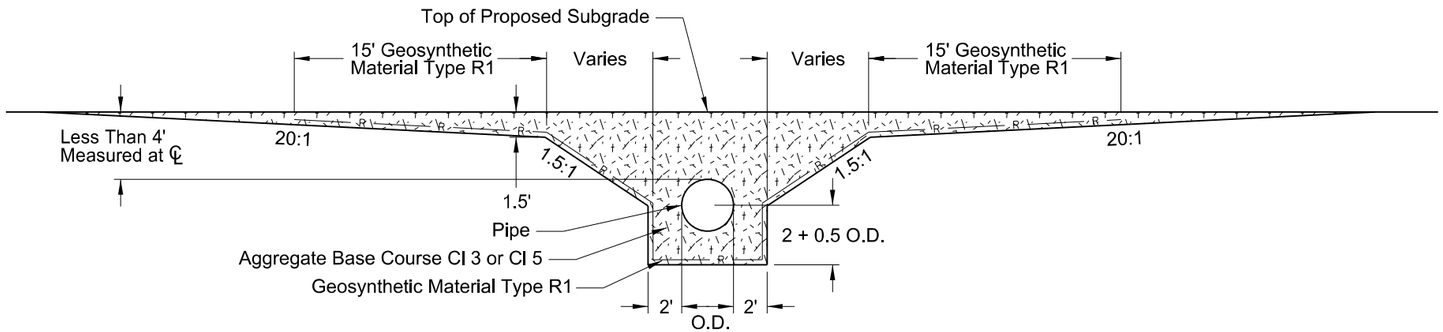
This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

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

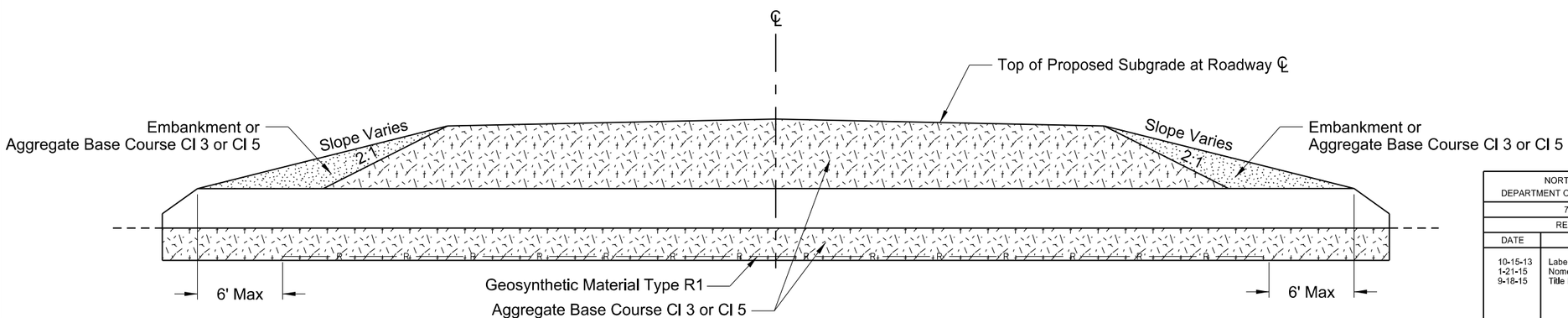
D-714-26




## 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

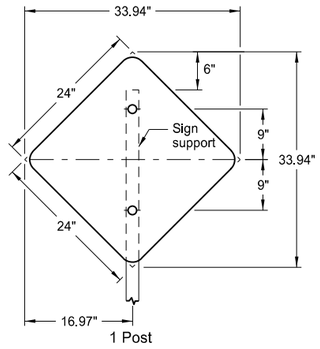
NOTES:

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

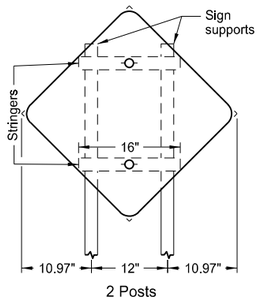
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-26-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-15-13<br>1-21-15<br>9-18-15 | Label Formatting<br>Nomenclature<br>Title Rewording |

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

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

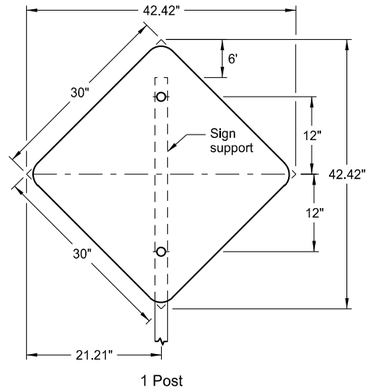



1 Post

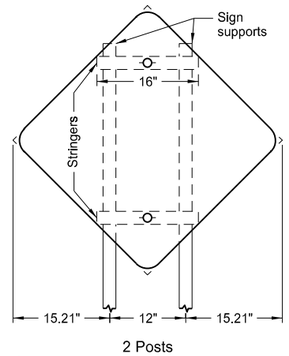



2 Posts

Assembly No. 18

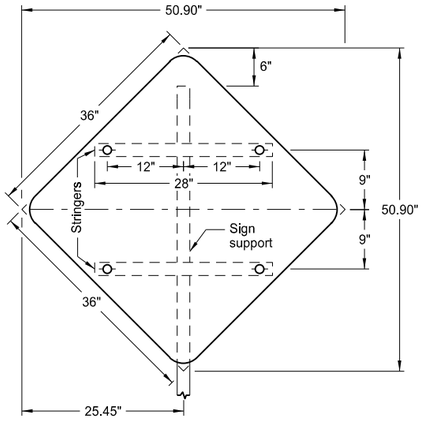



1 Post

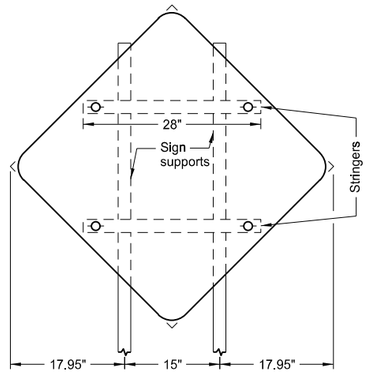



2 Posts

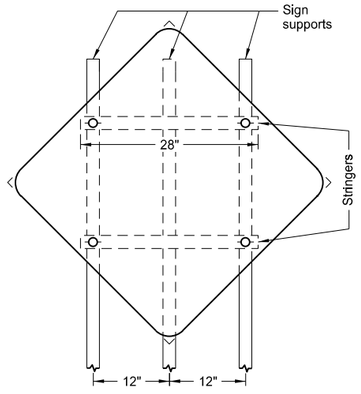
Assembly No. 19




1 Post

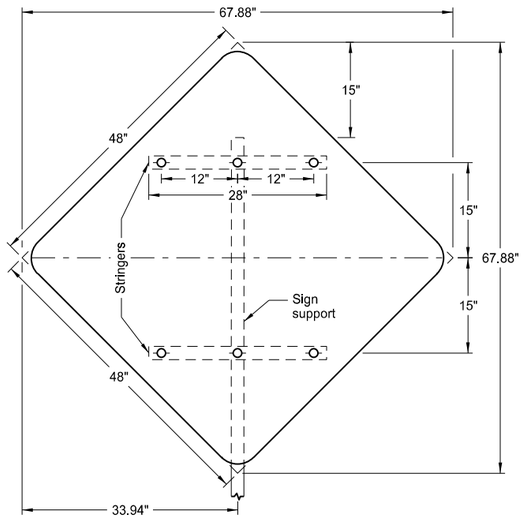



2 Posts

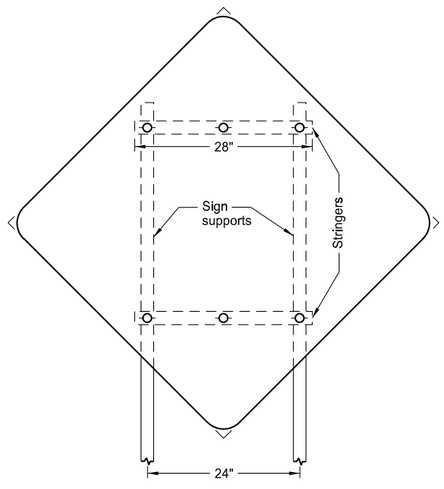



3 Posts

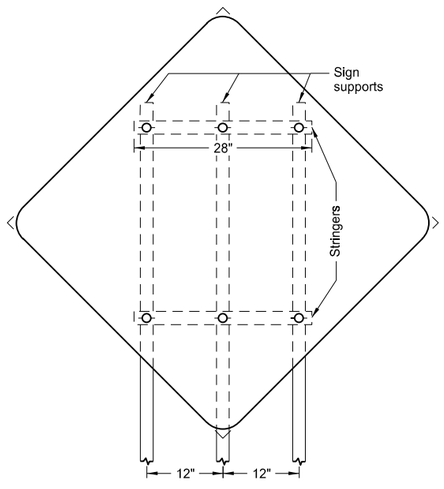
Assembly No. 20




1 Post




2 Posts




3 Posts

Assembly No. 21

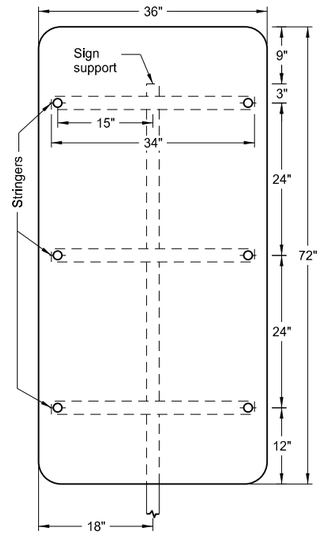
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

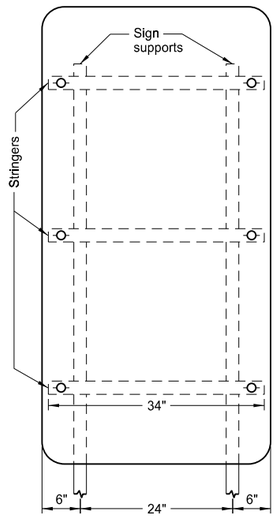
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated notes to active voice. |

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

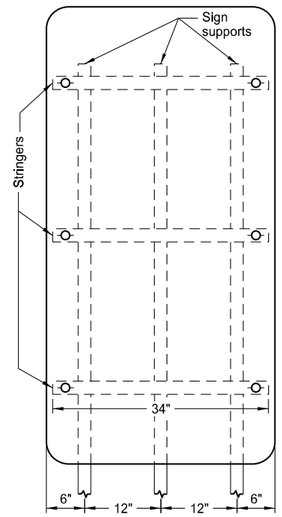
# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
# DETAILS REGULATORY, WARNING AND GUIDE SIGNS




1 Post

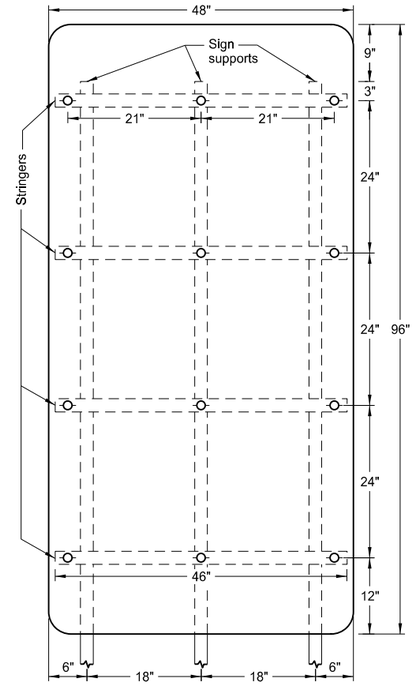



2 Posts



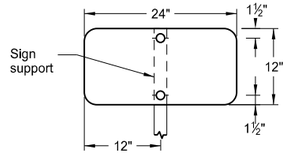

3 Posts

Assembly No. 24



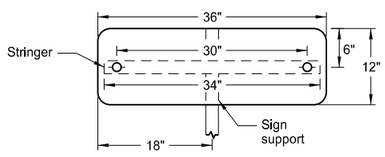

3 Posts

Assembly No. 25



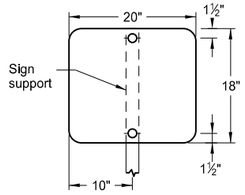

1 Post

Assembly No. 26



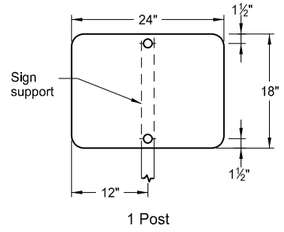

1 Post

Assembly No. 27



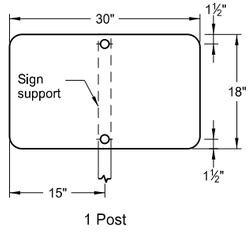

1 Post

Assembly No. 28

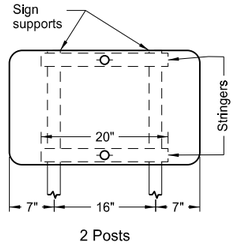



1 Post

Assembly No. 29




1 Post




2 Posts

Assembly No. 30

Notes:

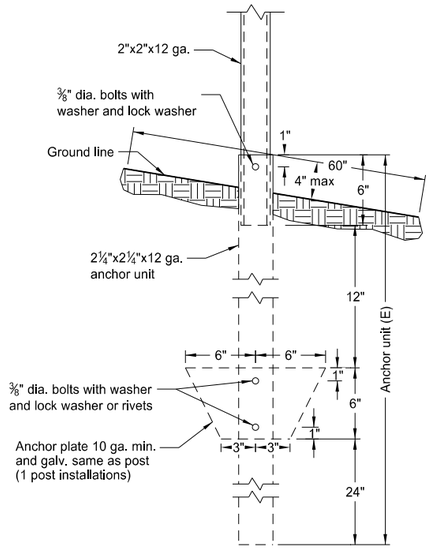
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated notes to active voice. |

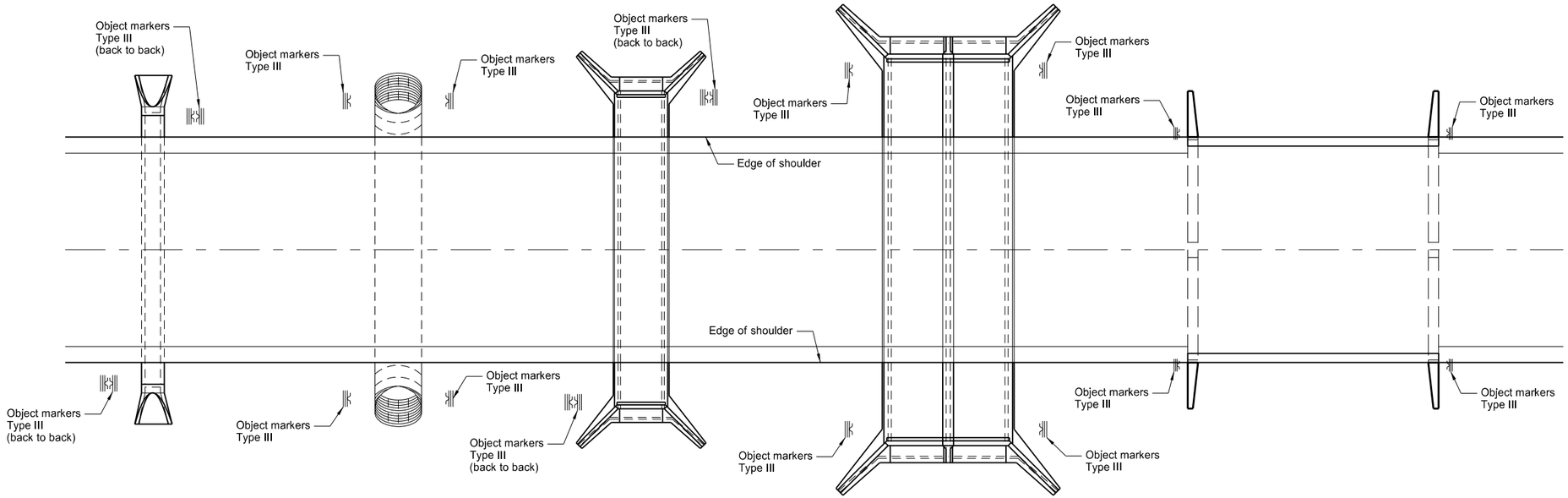
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

# OBJECT MARKERS

D-754-82




Perforated Tube Anchor Unit Assembly



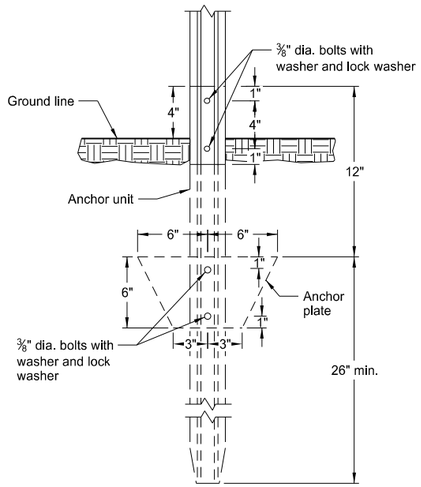

Pipe Culverts
10' max

Pipe Culverts
greater than 10'

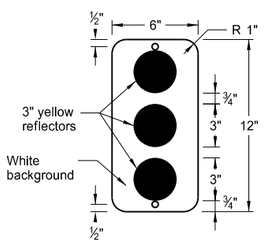
Box Culverts
10' max

Box Culverts
greater than 10'

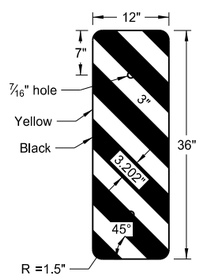
Bridges (B)



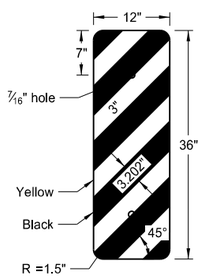

U-Channel Anchor Unit Assembly



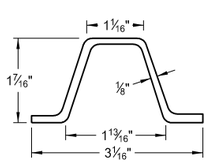

Object Marker
OM2-1V (C)
Type II



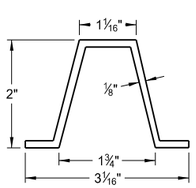

Object Marker Left
OM-3L (C)
Type III



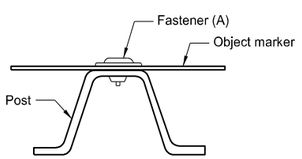

Object Marker Right
OM-3R (C)
Type III



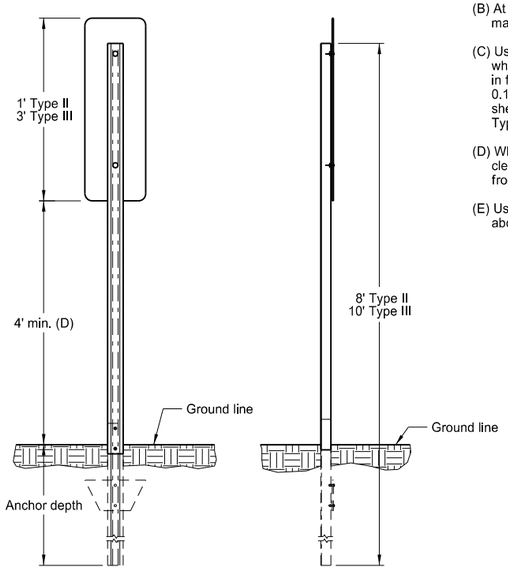

Steel Post Detail
Approx. 2 lb/ft




Aluminum Post Detail
Approx. 0.88 lb/ft




Fastener Detail




Object Marker
Installation Detail

Notes:

(A) Use ⅜" dia. tension pin type or other non-rust vandal resistant fastener with min. outside dia. 13/16" flat washer.

(B) At locations of approach guardrail with reflectors and end terminal with impact head object markers, do not install object markers.

(C) Use two object markers for back to back mountings. On bridges where the distance between wheel guards is less than the approach width, mount object markers vertically on steel posts in front of the bridge railing on each side of highway to mark the horizontal clearance. Use 0.100" minimum thickness sheet aluminum for sign backing material. Use ASTM Type XI sheeting for Type III object markers and ASTM Type IV background sheeting with ASTM Type XI reflectors for Type II object markers.

(D) When object marker is located 8' or less from shoulder or curb, provide 4' minimum vertical clearance from near edge of traveled way to bottom of sign. When located more than 8' from shoulder or curb provide 4' minimum vertical clearance from ground to bottom of sign.

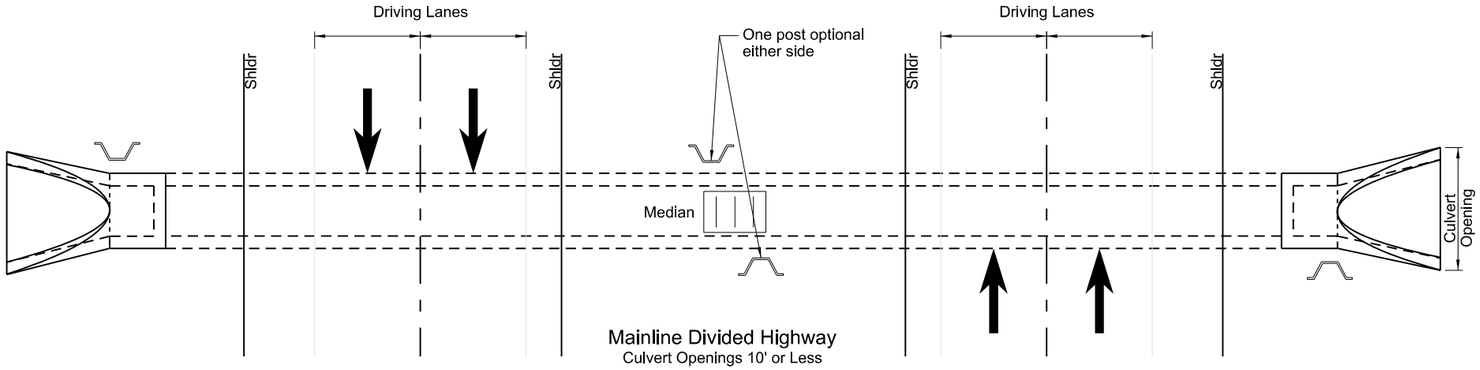
(E) Use 4" vertical clearance for anchor or breakaway base. Provide 4"x60" measurement above and below post location and back and ahead of post.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-18-14<br>8-30-18 | Revised Note C<br>Updated notes to active voice and removed note. |

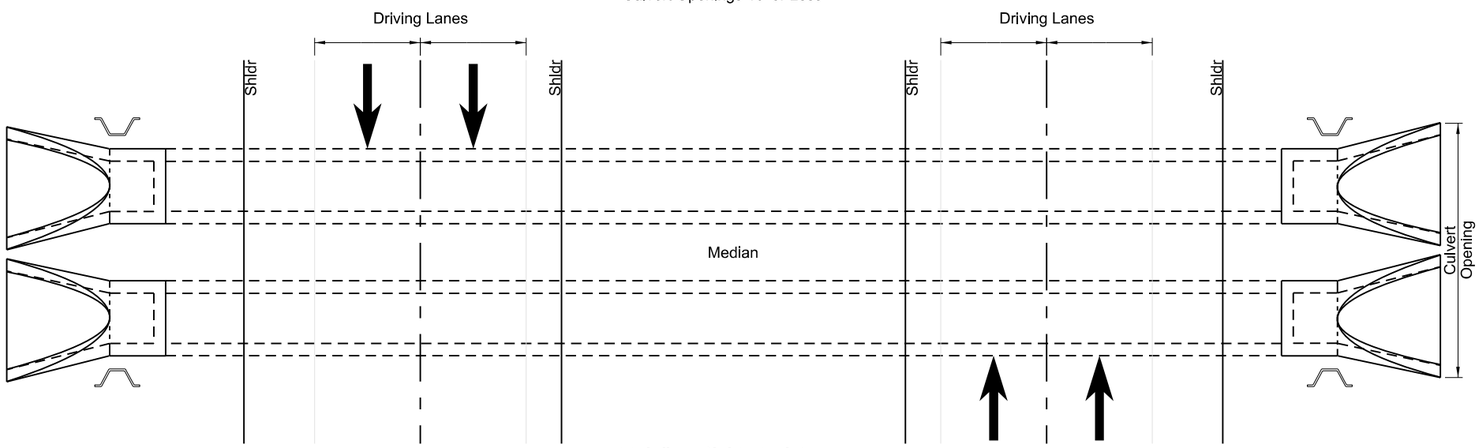
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

# OBJECT MARKERS - CULVERTS

D-754-83

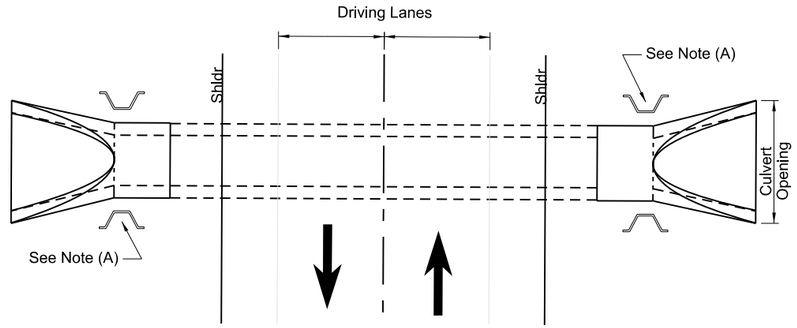



Mainline Divided Highway
Culvert Openings 10' or Less



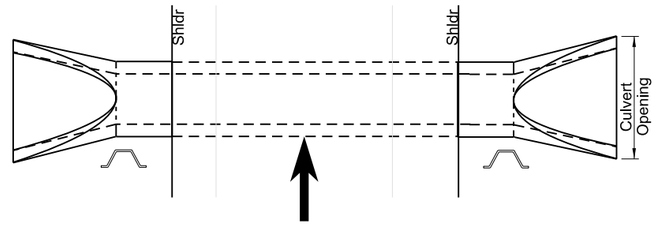

Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations

Post Location

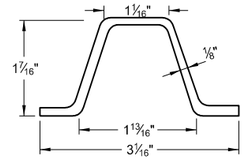



Two-Lane Highway

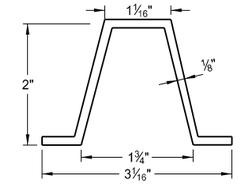
(A) Install additional marker where multiple pipe installations have a width of greater than 10'.




Ramp



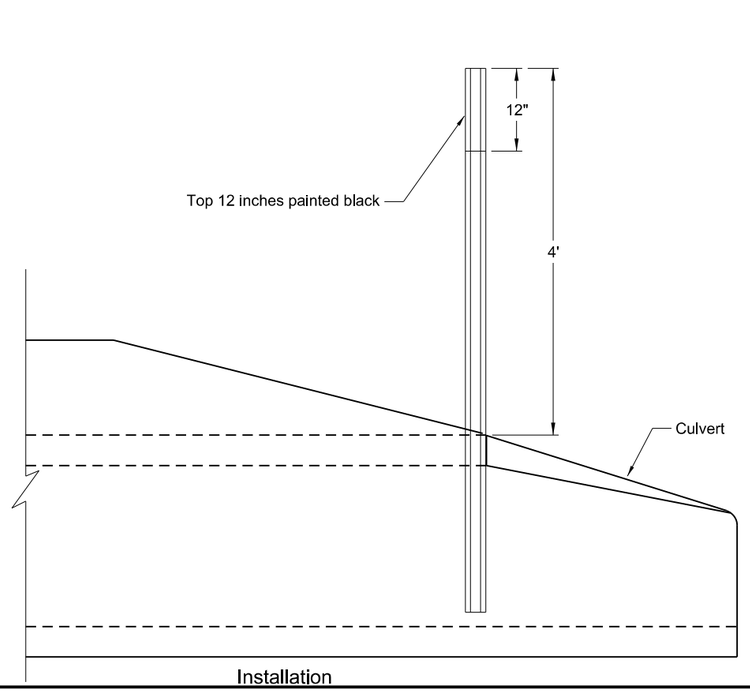

Steel Post Detail
Approx. 2.0 lbs/ft



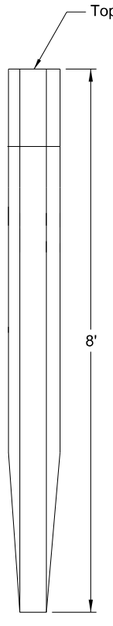

Aluminum Post Detail
Approx. 0.88 lbs/ft

## Notes:

Mark each end of culverts crossing the roadway within the right-of-way with a post. Install posts in front of culvert in direction of travel along the side of culvert and one foot from culvert opening unless shown otherwise in plans.




Installation




U-Type Post

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-05-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-7-14 | Revised Notes |
| 8-30-18 | Updated notes to active voice. |

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

# 911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

D-754-86

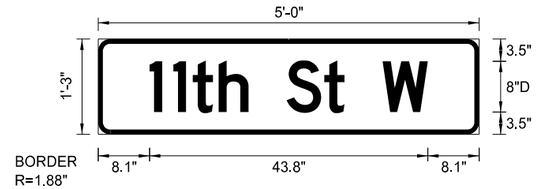
POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS

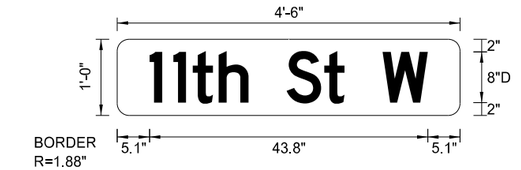
| ASSEMBLY NUMBER | STREET NAME SIGN SIZE | VERTICAL CLEARANCE | MAXIMUM POST LENGTH | NUMBER OF POSTS | SUPPORT SIZE | SLEEVE LENGTH (A) | | | SLEEVE SIZE | ANCHOR | | | BREAKAWAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1st | 2nd | 3rd | | NUMBER | LENGTH | SIZE | |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

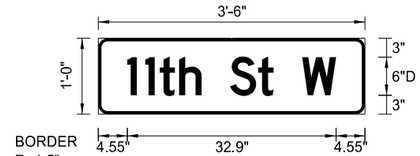
POST INFORMATION FOR VARIOUS SIGN CONFIGURATIONS

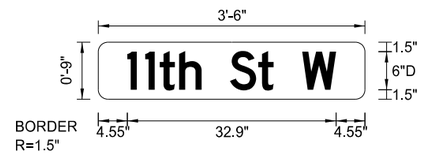
| ASSEMBLY NUMBER | STREET NAME SIGN SIZE | VERTICAL CLEARANCE | MAXIMUM POST LENGTH | NUMBER OF POSTS | SUPPORT SIZE | SLEEVE LENGTH (A) | | | SLEEVE SIZE | ANCHOR | | | BREAKAWAY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1st | 2nd | 3rd | | NUMBER | LENGTH | SIZE | |
| | Inches | LF | LF | | | LF | LF | LF | | | LF | | |
| Special Assembly 3 | 24"x12" | 5 | 16.2 | 1 | 2.5 x 2.5 10 ga | | | | | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 30"x12" | 5 | 15.3 | 1 | 2.5 x 2.5 10 ga | | | | | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 36"x12" | 5 | 15.9 | 1 | 2.25 x 2.25 12 ga | 4.3 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 42"x12" | 5 | 15.2 | 1 | 2.25 x 2.25 12 ga | 4.8 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 48"x12" | 5 | 15.2 | 1 | 2.5 x 2.5 12 ga | 5 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 54"x12" | 5 | 20.6 | 1 | 2.5 x 2.5 10 ga | 1.9 | | | 2.19 x 2.19 10 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 60"x12" | 5 | 16 | 1 | 2.5 x 2.5 12 ga | 4.7 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 24"x9" | 5 | 16.8 | 1 | 2.5 x 2.5 10 ga | | | | | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 30"x9" | 5 | 16.1 | 1 | 2.5 x 2.5 10 ga | | | | | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 36"x9" | 5 | 15.4 | 1 | 2.5 x 2.5 10 ga | | | | | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 42"x9" | 5 | 14.9 | 1 | 2.5 x 2.5 10 ga | | | | | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 48"x9" | 5 | 15.7 | 1 | 2.25 x 2.25 12 ga | 4.2 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 54"x9" | 5 | 14.9 | 1 | 2.5 x 2.5 12 ga | 4.8 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 60"x9" | 5 | 20.5 | 1 | 2.5 x 2.5 10 ga | 1.6 | | | 2.19 x 2.19 10 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| Special Assembly 4 | 24"x12" | 5 | 15.1 | 1 | 2.25 x 2.25 12 ga | 4.8 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 30"x12" | 5 | 15.1 | 1 | 2.5 x 2.5 12 ga | 5 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 36"x12" | 5 | 17.4 | 1 | 2.5 x 2.5 12 ga | 3.6 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 42"x12" | 5 | 16.8 | 1 | 2.5 x 2.5 12 ga | 4.1 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 48"x12" | 5 | 16.1 | 1 | 2.5 x 2.5 12 ga | 4.5 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 54"x12" | 5 | 15.5 | 1 | 2.5 x 2.5 12 ga | 4.9 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 60"x12" | 5 | 16.7 | 1 | 2.5 x 2.5 10 ga | 4.2 | | | 2.19 x 2.19 10 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 24"x9" | 5 | 15.5 | 1 | 2.25 x 2.25 12 ga | 4.2 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 30"x9" | 5 | 15 | 1 | 2.25 x 2.25 12 ga | 4.5 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 36"x9" | 5 | 14.5 | 1 | 2.25 x 2.25 12 ga | 4.8 | | | 2 x 2 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 42"x9" | 5 | 14.7 | 1 | 2.5 x 2.5 12 ga | 4.9 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 48"x9" | 5 | 17.2 | 1 | 2.5 x 2.5 12 ga | 3.5 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 54"x9" | 5 | 15.8 | 1 | 2.5 x 2.5 12 ga | 4.4 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| | 60"x9" | 5 | 15.3 | 1 | 2.5 x 2.5 12 ga | 4.7 | | | 2.25 x 2.25 12 ga | 1 | 4.0 | 3 x 3 7 ga | 1 |
| Special Assembly 5 | 24"x12" | 5 | 17.1 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 30"x12" | 5 | 16.7 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 36"x12" | 5 | 17.7 | 2 | 2.25 x 2.25 12 ga | 4 | 4.5 | | 2 x 2 12 ga | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 42"x12" | 5 | 17.3 | 2 | 2.25 x 2.25 12 ga | 4.3 | 4.8 | | 2 x 2 12 ga | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 48"x12" | 5 | 16.8 | 2 | 2.25 x 2.25 12 ga | 4.5 | 5 | | 2 x 2 12 ga | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 54"x12" | 5 | 16.5 | 2 | 2.25 x 2.25 12 ga | 4.8 | 5.3 | | 2 x 2 12 ga | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 60"x12" | 5 | 17.5 | 3 | 2.5 x 2.5 12 ga | | | | | 3 | 4.0 | 3 x 3 7 ga | 3 |
| | 24"x9" | 5 | 17.3 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 30"x9" | 5 | 17 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 36"x9" | 5 | 16.6 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 42"x9" | 5 | 16.3 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 48"x9" | 5 | 16 | 2 | 2.5 x 2.5 10 ga | | | | | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 54"x9" | 5 | 17.1 | 2 | 2.25 x 2.25 12 ga | 4 | 4.6 | | 2 x 2 12 ga | 2 | 4.0 | 3 x 3 7 ga | 2 |
| | 60"x9" | 5 | 16.8 | 2 | 2.25 x 2.25 12 ga | 4.2 | 4.8 | | 2 x 2 12 ga | 2 | 4.0 | 3 x 3 7 ga | 2 |

(A) The sleeve length shown is for the maximum post length. The required sleeve length is the "sleeve length" minus the difference between the "maximum post length" and the post length required in the field.




Notes:
Use 6 inch legend except on multi-lane divided roads with speeds of 45 mph or greater.
On divided multi-lane roadways, do not place 911 signs on top of stop sign.

When installing signs on existing supports, check support and sleeve size to determine if they meet table requirements. Measure maximum post length from ground to top of street name sign. If calculated support length is greater than maximum post length shown, recalculate support size.

See Standard Drawing D-754-87 for sign punching, stringer and support location details.

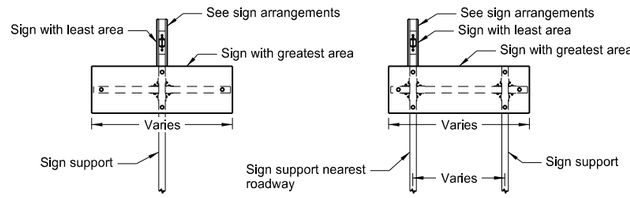
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-18-14<br>8-30-18 | Revised street name sign layouts. Revised tables, lettering, & signs and updated notes to active voice. |

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation

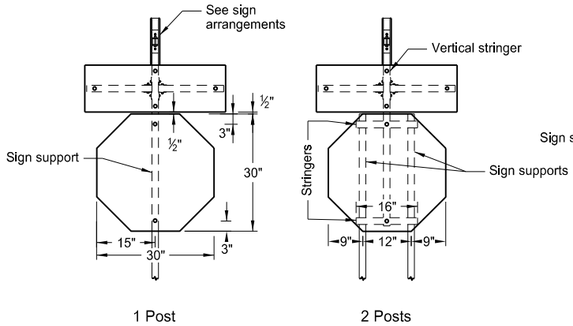
# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

D-754-87

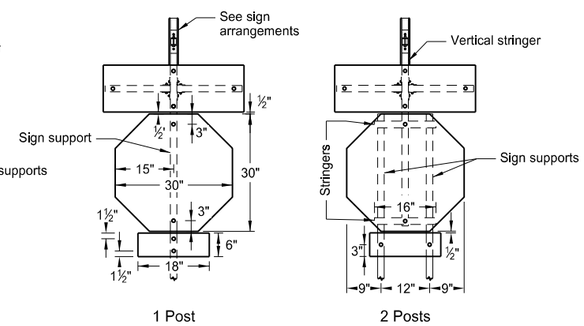
A - Single sign
B - Single sign back to back
C - Single sign each direction
D - Single sign one direction, back to back other direction
E - Back to back both directions



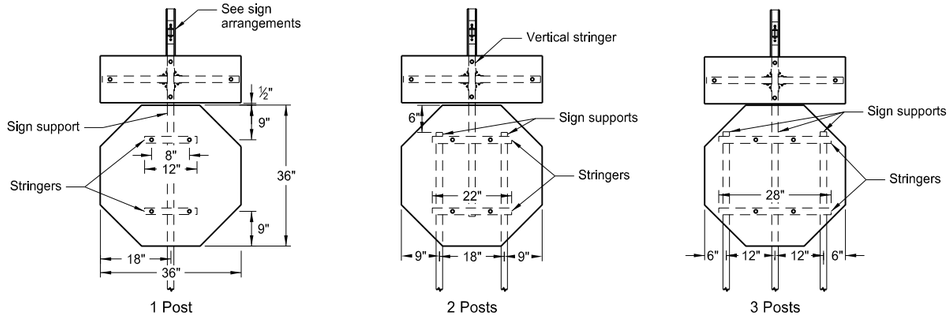

Special Assembly 1 (A, B, C, D or E)



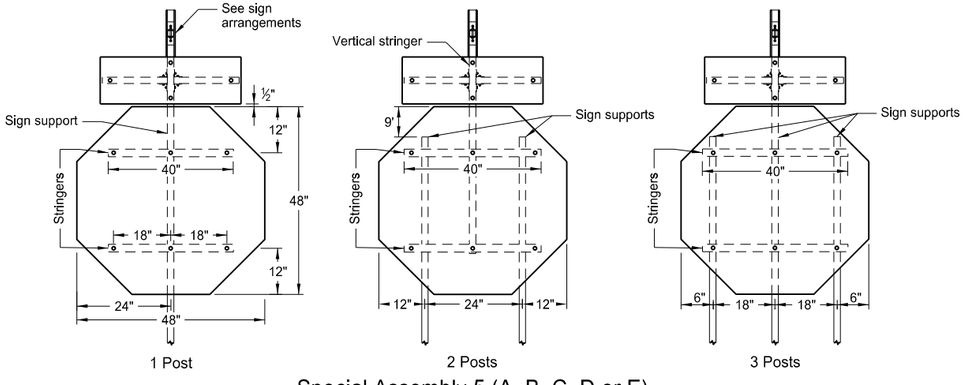

Special Assembly 2 (A, B, C, D or E)



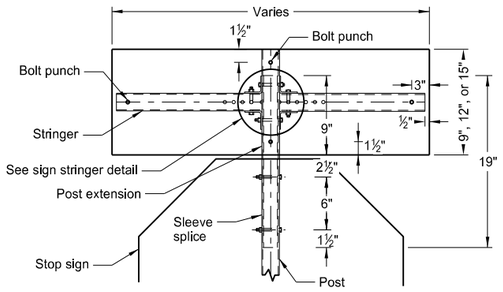

Special Assembly 3 (A, B, C, D or E)




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

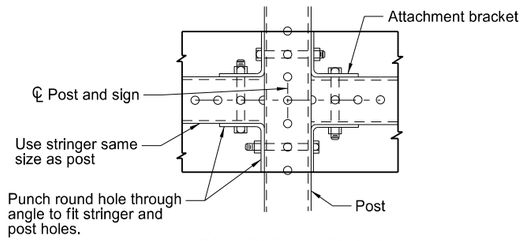



Special Assembly 5 (A, B, C, D or E)



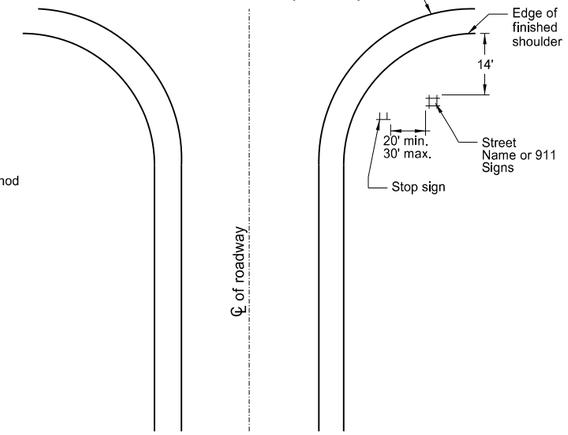

Sleeve Splice Detail

Note: Only use splice method with approval of engineer.



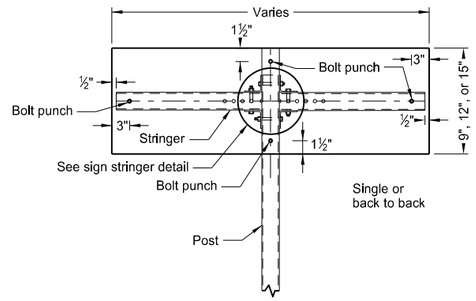

Sign Stringer Detail

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

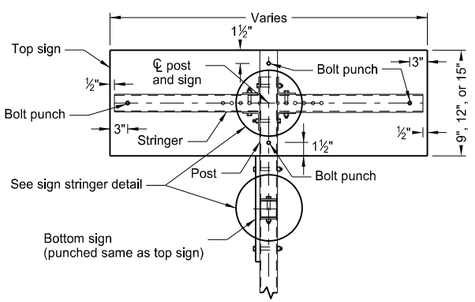



Intersection Layout

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

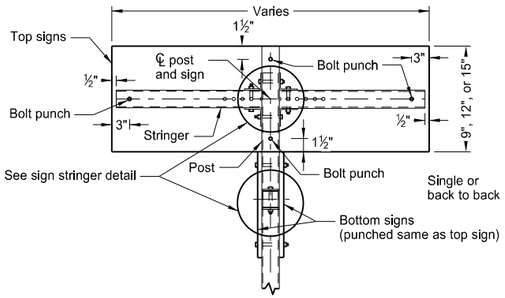



Detail A or B




Detail C

Sign Arrangements




Detail D or E

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Added 2 post layout for SA1 and Updated notes to active voice. |

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 8-30-2018 and the original document is stored at the North Dakota Department of Transportation