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| DESIGN DATA | | | | |
|---|---|---|---|---|
| Traffic | Average Daily | | | |
| Current 2022 | Pass: 160 | Trucks: 30 | Total: 190 | |
| Forecast 2042 | Pass: 210 | Trucks: 45 | Total: 255 | |
| Clear Zone Distance: 18' | | Design Speed: 40 MPH | | |
| Minimum Sight Dist. for Stopping: 333' | | Bridges: HL-93 Design Loading | | |
| Sight Dist. for No Passing Zone: N/A | | | | |
| Pavement Design Life 20 (years) | | | | |
| Design Accumulated One-way Flexible ESALs: 130,411 | | | | |

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# NORTH DAKOTA
# DEPARTMENT OF TRANSPORTATION

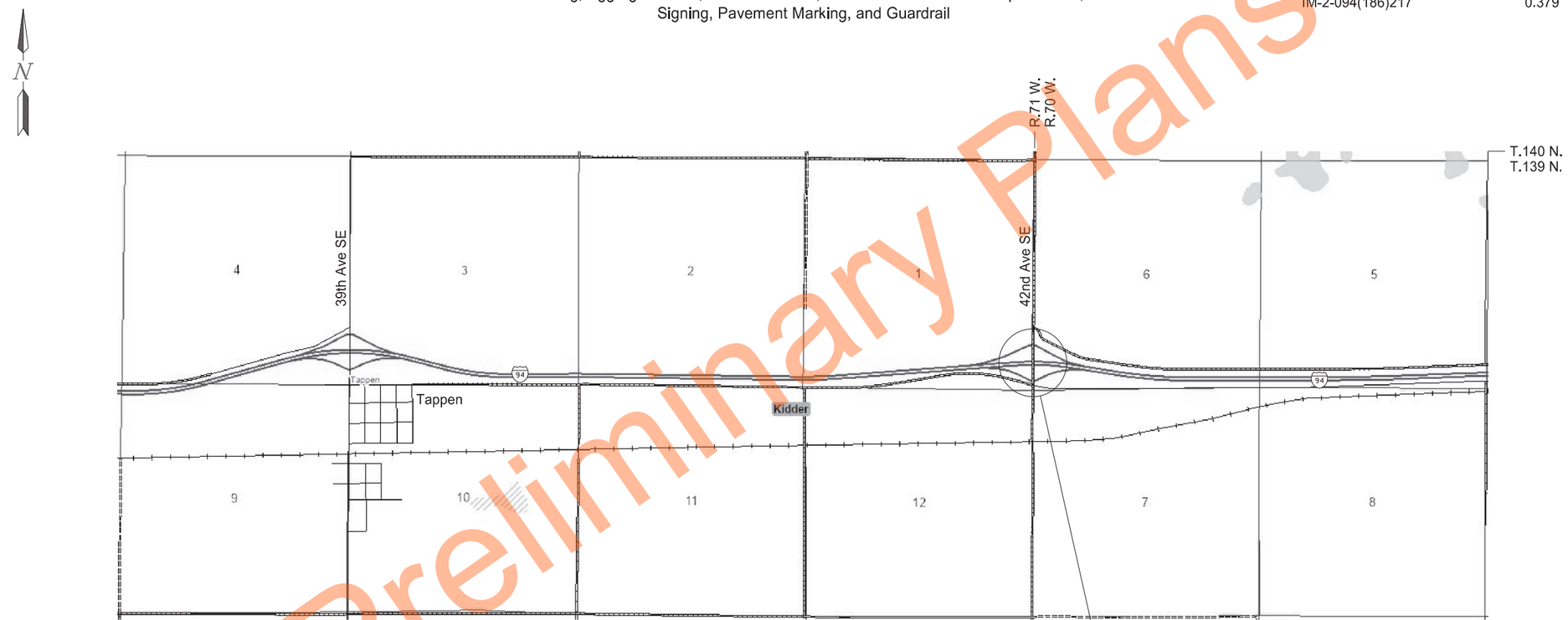
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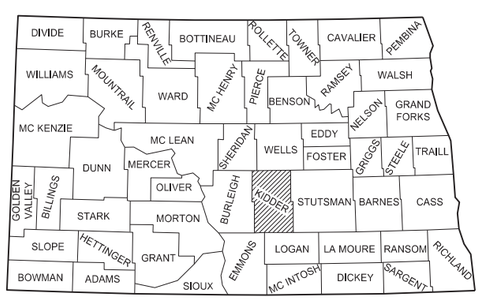
Kidder County
I-94/PETTIBONE INTERCHANGE

Grading, Aggregate Base, HMA Pavement, Structure Removal and Replacement, Signing, Pavement Marking, and Guardrail

| GOVERNING SPECIFICATIONS | Date Published and Adopted by the North Dakota Department of Transportation |
|---|---|
| Standard Specifications | 7/1/2024 |
| Supplemental Specifications | NONE |

| PROJECT NUMBER \ DESCRIPTION | NET MILES | GROSS MILES |
|---|---|---|
| IM-2-094(186)217 | 0.379 | 0.379 |




STATE COUNTY MAP

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jason Thorenson
07/22/26

BRIDGE DIVISION

REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE
07/22/26
NORTH DAKOTA

Preliminary Plans

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| SSP 2 | Federal Migratory Bird Treaty Act |
| SP 198(24) | Snow Fence |
| SP 199(24) | Architectural Surface Finish |
| SP 292(24) | Commercial Grade Asphalt |
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| SP 642(24) | Pile Dynamic Analyzer (PDA) Testing and Analysis |
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Preliminary Plans

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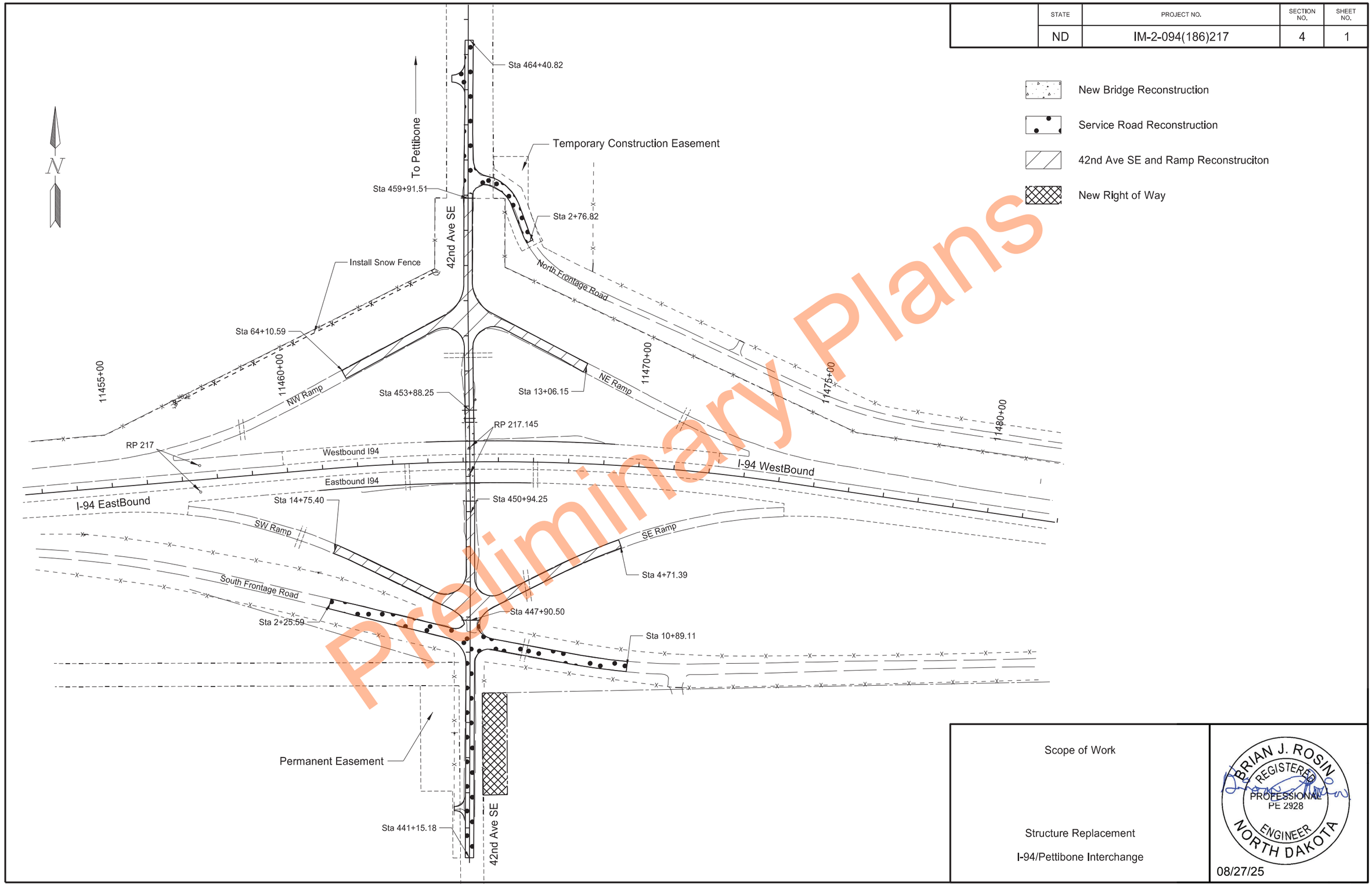
## LIST OF STANDARD DRAWINGS


| Number | Description |
|---|---|
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| D-101-10 | NDDOT Utility Company and Organization Abbreviations |
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| D-203-8 | Standard Rural Approaches |
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| D-261-1 | Erosion Control - Fiber Roll Placement Details |
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| D-714-22 | Concrete Pipe, Cattle Pass, or Precast Concrete Box Culvert Ties |
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| D-754-2 | Breakaway Coupler System For Standard Pipe - Stub Post |
| D-754-3 | Breakaway System for Standard Pipe - Stub Post |
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| D-754-9 | Letter and Arrow Details |
| D-754-12 | Breakaway Coupler System - Structural Details For W-Shape Supports |
| D-754-13 | Breakaway System Structural Details For W-Shape Supports |
| D-754-14 | Wind Beams And Anchor Plates For W-Shape Supports |
| D-754-23 | Perforated Tube Assembly Details |
| D-754-24, 25 | Mounting Details Perforated Tube |
| D-754-24A | Breakaway Coupler System For Perforated Tubes |
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Preliminary Plans

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Preliminary Plans

Scope of Work

Structure Replacement

I-94/Pettibone Interchange

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08/27/25

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# NOTES

100-P01 LANDOWNER COORDINATION: Notify the landowners two weeks prior to beginning construction so they have adequate notice to move livestock. Landowner contacts are Clint Kramlich at 701.426.8115 and Roger Thorsness 701.316.0045 (or Nancy Fuchs at 701.400.7963).

105-200 UTILITY COORDINATION: A utility coordination meeting is required.

107-P01 MAINTAINING TRAFFIC –DROP OFFS: If a shoulder and the adjacent lane are uneven due to milling or paving operations, the requirements of Section 704.04 O, "Traffic Control for Uneven Pavement" apply. If the uneven shoulder and adjacent lane are due to other circumstance, the contents of this note apply. If, at the end of the work-day, drop-offs greater than 2 inches and less than 18 inches or slopes steeper than 4:1 exist between the edge of a traffic lane and the outside edge of the proposed roadway, perform one of the following actions:

- Construct a traversable wedge in the area of the drop-off or steep slope; or
- Close the lane adjacent to the drop-off or steep slope and provide 24-hour flagging or pilot car operations.

When constructing a wedge, construct a wedge composed of aggregate or earthen materials with a 4:1 or flatter slope along the entire length of the area. Compact materials using Type C compaction, as specified in 203.04 G.4, "Compaction Control Type C".

Install stackable vertical panels that meet the requirements of Section 704.03 H, "Stackable Vertical Panels", along the edge of the driving lane closest to the wedge.

The Engineer will measure stackable vertical panels as specified in Section 704.05, "Method of Measurement" and will pay for panels as specified in Section 704.06, "Basis of Payment".

The Engineer will not measure material used to construct the wedge. Include the cost of materials, equipment, labor, and incidentals required for this operation within the bid price for “AGGREGATE BASE COURSE CL 5”.

If a 4:1 or flatter wedge is not installed, provide 24-hour flagging or pilot car operations and associated traffic control at no additional cost to the Department.

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

107-P03 MAINTAINING TRAFFIC ON INTERCHANGE RAMPS: Maintain traffic on interchange ramps during removal of existing bridge superstructure and setting of new bridge beams, as directed in Note 704-P02. Unless otherwise approved by the Engineer, the existing bituminous surfacing on the ramps must remain in place or the new surfacing should be already paved when mainline I-94 traffic is being diverted onto the interchange ramps.

201-P01 CLEARING & GRUBBING: Remove existing brush and trees within the seeding limits shown in Section 77 of the Plans. All tree removals will be paid under the “Clearing and Grubbing” bid item regardless of size.

202-P01 REMOVE AGGREGATE BASE AND SURFACING: Removal of bituminous surfacing includes removing full bituminous pavement depth and 5” of the 7” base. The bottom 2” of base is considered unsuitable and may remain in place. The existing bituminous pavement and base thicknesses are based on previous construction plans. Actual thicknesses may vary.

203-P01 CONTRACTOR FURNISHED BORROW: Obtain the proper clearance for contractor furnished borrow. Contact the following adjacent land owners identified as borrow clues or stockpile location clues: Clint Kramlich at 701.426.8115 and Roger Thorsness 701.316.0045 (or Nancy Fuchs at 701.400.7963).

203-P02 COMPACTION AND DENSITY CONTROL FOR EMBANKMENT BACKFILL: Compact material used for embankment Station 450+70 to 454+15 to at least 95 percent of the maximum dry density with a moisture content at the time of compaction not less than the optimum moisture and no more than 5.0 percentage points above the optimum moisture content. The Engineer will determine the maximum dry density and optimum moisture content as specified in ND T180.

The engineer will test at least one density and moisture content on each side of the proposed bridge between Station 450+70 and 454+15 for every 12” lift of material.

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

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

302-P01 TRAFFIC SURFACE AGGREGATE: Maintain a minimum of 4” of traffic surface aggregate in the areas designated for roadway travel. Provide temporary service aggregate meeting the requirements of Section 817 for Salvaged Base Course, A quantity of 5,000 tons has been provided for use. No additional payment for aggregate will be made to salvage and relay the material. Include all costs associated with providing, placing, maintaining, removing, and replacing the material in the contract unit price for “Traffic Surface Aggregate”.

302-P02 COMPACTION AND DENSITY CONTROL FOR AGGREGATE BASE: Compact aggregate material used for roadway base from Station 450+70 to 454+15 to at least 95 percent of the maximum dry density with a moisture content at the time of compaction not less than 2.0 percentage points below, nor more than 3.0 percentage points above the optimum moisture content. The Engineer will determine the maximum dry density and optimum moisture content as specified in ND T180.

The engineer will test at least one density and moisture content on each side of the proposed bridge between Station 450+70 and 454+15.

430-P01 PAVEMENT PATCHING ON RAMPS: A quantity of 200 tons of Commercial Grade Hot Mix Asphalt has been provided for patching ramps, at location determined by the Engineer, before using ramp detour for mainline traffic.

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Preliminary Plans

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# NOTES

704-200 STATE FURNISHED MEDIAN BARRIER: Obtain (224) 2.5' x 10' concrete barriers. They can be picked up and returned to the Casselton yard at 15482 37th St SE in Casselton ND 58012. The hardware can be picked up and returned to the Fargo District yard at 503 38th St S in Fargo ND 58103. Contact the Fargo District office at 701-239-8900 to facilitate the exchanges.

If returning barriers with connection components, coordinate the delivery location for the connecting components with the Engineer. Some 4 inch x 4 inch boards are available at the return location. Provide any additional 4 inch x 4 inch boards necessary to stack barriers. The boards will become property of the Department.

Include all costs associated with median barriers in the contract unit price for "State Furnished Median Barrier"

704-P01 TRAFFIC CONTROL: Traffic control device quantities are based on the following list:

1. D-704-15, Temporary Road Closure
2. D-704-21, Detour Sign Layouts
3. D-704-22, Layouts Type K and L for construction trucks hauling material.
4. D-704-26, Layout Type JJ for break in pavement.
5. D-704-26, Layouts EE as needed.
6. D-704-35 One Lane Closure for constructing embankment on the median shoulder to accommodate the median barriers and for the placement/removal of these barriers.
7. D-704-58 for the removal of bridge piers and construction of the new bridge

704-P02 WORK ZONE TRAFFIC CONTROL PHASES: The device list and plan sheets have been developed based on the following phases:

Phase 1 - Remove Superstructure:
Close the Pettibone Interchange structure and 42nd Ave SE crossroad (from ramp intersection to ramp intersection). Place detour signing for the crossroad traffic in accordance with the Sec 100 Detour Sign Layout plan sheets. Interchange ramps are to remain open.

When removal of the existing bridge superstructure is taking place over I-94, direct each bound of I-94 traffic onto the ramps. Place signs and devices for the interstate road closure/ramp detour in accordance with Section 100 Ramp Detour Sign Layout. Detouring I-94 traffic onto the ramps is only allowed during daylight hours from 6:00 am to 8:00 pm daily. Signs and devices have been provided for detouring EB I-94 on to the south ramps concurrently with detouring WB I-94 onto the north ramps.

Pending engineers approval, dirt can be placed/stockpiled prior to closing the superstructure.

Phase 2 – Place Barriers on I-94 Shoulders:
Two one–lane closures (one for eastbound I-94 and one for westbound I-94) have been provided to construct the median embankment and placement of the portable barriers shown in D-704-58. Place signs and devices for the two one-lane closures in accordance with D-704-35.

Maintain the detour signing for the crossroad traffic of 42nd Ave SE in accordance with the Sec 100 Detour Sign Layout plan sheets.

In addition, use the two one-lane closures when removing the median barriers and median embankment after the structure and median pier protection are complete.

Phase 3 – Remove Substructure and Construct New Bridge:
Maintain two lanes of traffic in each direction of I-94 while the remaining substructure is being removed, the new structure is being constructed, and the ramps and frontage roads are being reconstructed. Place signs and devices in accordance with Sec 100 Pettibone Interchange plan sheets based on D-704-58 and D-704-15.

In addition, use the interstate road closure/ramp detour (as described in Phase 1) when placing bridge beams over I-94. Incorporate additional signs and devices for the interstate road closure/ramp detour in accordance with Section 100 Ramp Detour Sign Layout.

704-P03 PORTABLE CHANGEABLE MESSAGE SIGN: Install Portable Changeable Message Signs (PCMS) before work begins on the project. The Engineer will determine the locations for PCMS installation. Relocate the PCMS as directed by the Engineer.

Provide an operator trained in the use of the PCMS.

The Engineer will determine the message to be displayed. The operator shall program the message within one hour of the Engineer's request to change the message.

704-P04 MAINLINE TRAFFIC DETOUR: Use of a ramp detour during bridge superstructure removal and placement, barrier removal, and canopy placement and removal over a mainline roadway is restricted to 10 calendar days for the mainline roadway closure in that direction of travel.

Liquidated damages for failure to meet the requirements of this note will be in accordance with Section 108.07. Work will be stopped if the detour ramp traffic exceeds 10 calendar days without written approval from the Engineer.

Preliminary Plans

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# NOTES

706-P01 FIELD OFFICE: Provide a field office which meets the following requirements:

1. Be completely insulated and weather tight.
2. Minimum total area of 450 square feet.
3. Bathroom facilities, which includes sewer, potable water, and weekly cleaning or weekly service of a portapotty.
4. Have a dependable source of electricity for power and lights with a minimum of 6 electrical outlets spaced throughout the building and light fixtures spaced to uniformly light the entire interior (lumens required 110 foot-candles).
5. Be wired for DSL Broadband internet with wireless Wi-Fi and have the capability to allow for hard wiring the computer. Include the cost of the installation and monthly fees.
6. A heating and cooling system that is capable of maintaining the temperature between 65°F and 78°F year around.
7. A minimum of 3 desks and 3 desk chairs, 3 extra chairs, a drawer file cabinet with at least two drawers, one table minimum of 2.5 ft x 5 ft.
8. Photocopy machine/Printer capable of 11x17 photocopies/prints and toner to last the duration of the project. Engineer will provide paper. Other features to include digital copying & scanning. (Fax capabilities can be included but not necessary).
9. The location of the field office will be on, or as close to the project as possible and approved by the Engineer. Any rental fees will be paid by the Contractor.
10. Make the field office available for occupancy one week before the start of the project and remain through project completion. Provide a field office that is separate or independent from the contractor's field office.
11. Heat, electric, internet service, sewer, water hookups, and portapotty service to be furnished by Contractor, Contractor to pay utility bills.

All requirements of the Field Office are subject to approval by the Engineer. Include the costs for the field office in the bid item "Field Office" and the Schedule for Payment is as follows:

- 25% when set up on site.
- 50% when 30% of the work is complete.
- 75% when 60% of the work is complete.
- 100% when project is complete.

714-P01 PLUG PIPE – ALL TYPES & SIZES: Plug and abandon pipe located at Station 455+44 (42nd Ave SE). Pump the pipe full of controlled density backfill to prevent any future collapse or failure of the abandoned pipe. Controlled density backfill consists of cement, water, fly ash, and fine aggregate at the ratio specified below. Mix the material continuously during pumping or placement to keep the solution from separation. Maintain the surface temperature of the newly placed controlled density backfill above 40°F for 5 days. Include all costs for labor, materials, and equipment in the contract unit price bid for "PLUG PIPE – ALL TYPES AND SIZES".

| Mix Design | |
|---|---|
| Material | Weight (lbs) |
| Cement | 70 |
| Fly Ash | 125 |
| Fine Aggregate | 2600 |
| Water | 50 Gallons |

714-P02 PIPE CONDUIT 30IN – JACKED OR BORED: Bore or jack pipe indicated as jacked on the plans. If the boring method is used, use of smooth wall steel pipe in lieu of RCP is acceptable. For jacked concrete pipe sections, use the class required for the height of fill, but with a minimum concrete compressive strength of 6,000 psi.

Install bored or jacked pipe culverts in accordance with section 714 and section 830 of the standard specifications.

Supply pipe meeting Section 830.02 F, "Smooth Wall Steel Pipe"; pipe meeting ASTM A 252, Grade 2; or pipe meeting ASTM A 53, Grade B.

Provide pipes with a minimum wall thickness as specified in Table 830-01 of the Standard Specifications.

Protect the traveling public with proper traffic control and traffic safety measures during the jacking or boring process (while extending the pipe through the undisturbed fill) without disrupting traffic, or damaging roadway grade and surface.

Bore or jack pipe culvert with equipment that encases the hole as the earth is removed and installs the pipe concurrently. Use an encased hole a maximum of 0.1 foot greater than the outside diameter of the pipe. Do not use water in the boring or jacking process. Use proper cushioning material between the jack and pipe. Remove damaged sections with an unsatisfactory joint and install a new section.

Start the boring or jacking from the low or downstream end and proceed in straight lines to the grade and alignment as shown on the plans. Maintain flow line elevation at the starting point for boring or jacking within 0.1 ft. of staked grade; do not reverse the flow line at any point; and do not vary the line and grade at any point within the pipe more than 0.5 ft. from the designated line and grade.

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

Fill openings greater than 1/4 inch (5 mm) in width between adjacent sections of concrete pipe with 1:2 cement/sand mortar. Tie all concrete pipe sections and end sections in accordance with standard drawing D-714-22. Weld all steel sections continuously around their periphery.

Preliminary Plans

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# NOTES

Include temporary removal and replacement of embankment in the price bid for Pipe Conduit – Jacked or Bored. Use a maximum 2:1 slope beyond the existing pavement section (base, pavement, etc.) for any temporary removal of embankment. Protect and stabilize the slope throughout the jacking or boring process.

The culvert consists of separate bid items for each portion: “Pipe Conduit 30 In –Jacked or Bored” and “Pipe Conduit 30 In”. The pay lengths of the pipe bid items are as shown for the type and size specified per linear foot. Include all costs for required materials, labor, and equipment (including connecting bands or couplers) in the unit price bid for “Pipe Conduit 30 In – Jacked or Bored” and ”Pipe Conduit 30IN”.

Install pipe prior to the proposed embankment fill placement and pipe plug.

720-P01 ALIGNMENT MONUMENT IN BRIDGE DECK: For alignment monuments located within the bridge deck, construct in accordance with Standard Drawing D-720-1 Alignment Monument details for a concrete roadway with the following changes:

1. Install the alignment monument into the bridge deck after the longitudinal grooving is complete.
2. The No. 5 x 18” deformed bar is not required.
3. Recess the top of the aluminum cap 1/8” to 1/4” below the finished bridge deck surface by drilling a hole slightly larger in diameter than the aluminum survey cap.
4. Modify the stem depth of the aluminum cap to be placed in a drilled hole of 3/4” max. depth into the bridge deck.
5. Epoxy the cap into the bridge deck.

Include all costs for this work in the price bid for “Alignment Monuments”.

752-P01 FENCING: Give the landowner (Roger Thorsness) a 2-week notice, prior to the anticipated fencing removal date, to deactivate the existing electric fence in the field located north of the frontage road in northeast corner of the site. The temporary fencing will not be electric fencing. The contractor will remove the existing fencing (which consists of electric and 3 strand barb wire) prior to construction and reset the fencing after project completion.

Preliminary Plans

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# NOTES

## SECTION 130

602-P01 SINGLE SLOPE BARRIER: This work consists of constructing a reinforced concrete single slope barrier at the median bridge pier at the Pettibone Interchange, as shown in the plans.

The single slope barrier consists of a single slope barrier wall on each side of the pier. The barriers taper to a common end. The pay length is from the beginning to the end of the complete barrier wall installation. Each barrier wall will not be measured separately.

Use Class AE concrete meeting Section 602.03B. Design a mix that meets Section 802 and will attain a minimum compressive strength of 4,000 PSI at 28-days. Use grade 60 reinforcing steel meeting Section 612.

Install Cl 43 aggregate fill and a 4" thick reinforced concrete cap slab between the two barrier walls as shown in the plans.

Include all costs to construct the single slope barrier in the contract unit price bid "Single Slope Barrier." The work includes furnishing and installing Class AE concrete, grade 60 reinforcing steel, mastic, joint sealant materials, aggregate, and all other materials, equipment and labor required to complete the installations as shown in the plans.

748-P01 CURB & GUTTER – TYPE 1 SPECIAL: Install curb and gutter at the Pettibone Interchange, in accordance with Standard Drawing D-748-1, except for transitions at each end, as shown on Standard Drawing D-764-60. Install #4 rebar with a length that will provide 3" clear distance on each end. Use grade 60 reinforcing steel meeting Section 612.

Include all costs for constructing the curb and gutter as described above in the contract unit price bid for the item "Curb & Gutter – Type 1 Special."

764-P01 BARREL ATTENUATION DEVICE BASES: Construct the bases out of either 2 inches of aggregate base and 6 inches of Class AE concrete meeting 602.03 B or 2 inches of aggregate base and 8 inches of Superpave FAA 45.

Include all costs associated with the construction of the attenuation device bases in the contract unit price bid for "Barrel Attenuation Device -Type B-75."

764-P02 REMOVED W-BEAM GUARDRAIL MATERIALS: Deliver the removed guardrail materials to the NDDOT Maintenance Storage Yard in Medina, and neatly stack them at a location designated by the Engineer. Deliver the W-Beam guardrail rail sections and impact head to the maintenance storage yard. All other materials will become the contractor's property. The address of the NDDOT Maintenance Storage Yard is:

MEDINA NDDOT
3682 55th Ave SE
Medina, ND 58467-9998

Include all costs for delivery of the removed guardrail materials in the contract unit prices bid for "Remove W-Beam Guardrail & Posts," and "Remove End Treatment & Transition."

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Docusign Envelope ID: 2EC39C04-B784-498C-9ABA-40AA8DEC309D

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 6 | 6 |

# ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation and the Federal Highway Administration has made environmental commitments to secure approval of this project. The following environmental notes are requirements to comply with these commitments:

EN-1 THREATENED AND ENDANGERED SPECIES: The project is located near/within suitable habitat for the species listed in the following table

| SPECIES | HABITAT | PRESENCE |
|---|---|---|
| **Whooping Crane** | Cropland/Wetland Associations | Spring: March 15 - May 15*<br>Fall: September 10 – November 15 |
| **Piping Plover** | Sparsely Vegetated Islands/Shoreline | April 15 - August 15* |
| **Dakota Skipper** | Native Prairie | Year-Round |
| **Rufa Red Knot** | Sparsely Vegetated Islands/Shoreline | Spring: April 15 - May 31*<br>Fall: August 1 - September 15* |

*Time frames can differ slightly, depending on the year

If any of the above threatened and endangered species are identified within 1 mile of the project, the Contractor will notify the Engineer immediately and cease construction activities in the vicinity until an avoidance area is established. The Engineer will establish an avoidance area that is at least a 0.5 mile and immediately coordinate with the USFWS (701-355-8513), FHWA (701-221-9464), and NDDOT Environmental and Transportation Services (701-328-2592). The Contractor will not resume work within the avoidance area until the Engineer has confirmed with the agencies that work may proceed (either the species have left the area, or approved avoidance/minimization measures have been implemented).

EN-2 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-3 WETLAND MITIGATION: Wetland mitigation is required for unavoidable permanent wetland impacts. The wetland mitigation plan is incorporated into the plans for this project. After completion of the mitigation area, the Engineer will complete the Onsite Mitigation Certification Form SFN 61042. Any sedimentation occurring within the mitigation area will be removed.

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 08/28/25
NORTH DAKOTA

# ESTIMATE OF QUANTITIES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 8 | 1 |

| SPEC | CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|---|---|---|---|---|---|
| 103 | 0100 | CONTRACT BOND | L SUM | 1 | 1 |
| 109 | 1000 | E-TICKETING | L SUM | 1 | 1 |
| 201 | 0330 | CLEARING & GRUBBING | L SUM | 1 | 1 |
| 202 | 0021 | REMOVE AGGREGATE BASE & SURFACING | TON | 6,921 | 6,921 |
| 202 | 0105 | REMOVAL OF STRUCTURE | L SUM | 1 | 1 |
| 202 | 0113 | REMOVAL OF CONCRETE | CY | 6 | 6 |
| 202 | 0169 | REMOVAL OF END SECTION-ALL TYPES & SIZES | EA | 2 | 2 |
| 202 | 0174 | REMOVAL OF PIPE ALL TYPES AND SIZES | LF | 190 | 190 |
| 202 | 0312 | REMOVE EXISTING FENCE | LF | 7,378 | 7,378 |
| 203 | 0101 | COMMON EXCAVATION-TYPE A | CY | 5,847 | 5,847 |
| 203 | 0109 | TOPSOIL | CY | 13,950 | 13,950 |
| 203 | 0140 | BORROW-EXCAVATION | CY | 64,687 | 64,687 |
| 210 | 0099 | CLASS 1 EXCAVATION | L SUM | 1 | 1 |
| 210 | 0201 | FOUNDATION PREPARATION | EA | 1 | 1 |
| 216 | 0100 | WATER | M GAL | 907 | 907 |
| 230 | 0165 | SUBGRADE PREPARATION-TYPE A-12IN | STA | 16.36 | 16.36 |
| 251 | 0200 | SEEDING CLASS II | ACRE | 11.51 | 11.51 |
| 251 | 2000 | TEMPORARY COVER CROP | ACRE | 11.15 | 11.15 |
| 253 | 0101 | STRAW MULCH | ACRE | 11.15 | 11.15 |
| 253 | 0301 | BONDED FIBER MATRIX | ACRE | 11.51 | 11.51 |
| 255 | 0102 | ECB TYPE 2 | SY | 190 | 190 |
| 255 | 0202 | TRM TYPE 2 | SY | 440 | 440 |
| 260 | 0100 | SILT FENCE UNSUPPORTED | LF | 325 | 325 |
| 260 | 0101 | REMOVE SILT FENCE UNSUPPORTED | LF | 325 | 325 |
| 261 | 0112 | FIBER ROLLS 12IN | LF | 28,395 | 28,395 |
| 261 | 0113 | REMOVE FIBER ROLLS 12IN | LF | 14,535 | 14,535 |
| 302 | 0050 | TRAFFIC SERVICE AGGREGATE | TON | 5,000 | 5,000 |
| 302 | 0120 | AGGREGATE BASE COURSE CL 5 | TON | 8,945 | 8,945 |
| 401 | 0050 | TACK COAT | GAL | 449 | 449 |
| 401 | 0060 | PRIME COAT | GAL | 2,152 | 2,152 |
| 430 | 0045 | SUPERPAVE FAA 45 | TON | 2,549 | 2,549 |
| 430 | 0500 | COMMERCIAL GRADE HOT MIX ASPHALT | TON | 200 | 200 |
| 430 | 5803 | PG 58S-28 ASPHALT CEMENT | TON | 156 | 156 |

Preliminary Plans

ESTIMATE NUMBER: 25007  ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 07/23/2026 TIME: 09:10:32

# ESTIMATE OF QUANTITIES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 8 | 2 |

| SPEC | CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|---|---|---|---|---|---|
| 602 | 0500 | BRIDGE SUBSTRUCTURE CONCRETE | CY | 147.5 | 147.5 |
| 602 | 0510 | BRIDGE DECK CONCRETE | CY | 298.6 | 298.6 |
| 602 | 0520 | BRIDGE BARRIER CONCRETE | CY | 72.2 | 72.2 |
| 602 | 1134 | PILE SUPPORTED APPROACH SLAB | SY | 158.1 | 158.1 |
| 602 | 1220 | SINGLE SLOPE BARRIER | LF | 112 | 112 |
| 602 | 1250 | PENETRATING WATER REPELLENT TREATMENT | SY | 1,045 | 1,045 |
| 604 | 9920 | PRESTRESSED I-BEAM-63IN | LF | 1,250 | 1,250 |
| 612 | 0116 | REINFORCING STEEL-GRADE 60-EPOXY COATED | LBS | 87,100 | 87,100 |
| 616 | 5890 | STRUCTURAL STEEL | L SUM | 1 | 1 |
| 622 | 0020 | STEEL PILING HP 10 X 42 | LF | 340 | 340 |
| 622 | 0060 | STEEL PILING HP 14 X 73 | LF | 420 | 420 |
| 622 | 0070 | STEEL PILING HP 14 X 102 | LF | 350 | 350 |
| 622 | 7001 | DYNAMIC PILE TEST | EA | 3 | 3 |
| 702 | 0100 | MOBILIZATION | L SUM | 1 | 1 |
| 704 | 0100 | FLAGGING | MHR | 925 | 925 |
| 704 | 1000 | TRAFFIC CONTROL SIGNS | UNIT | 4,794 | 4,794 |
| 704 | 1046 | ATTENUATION DEVICE-TYPE B-80 | EA | 2 | 2 |
| 704 | 1052 | TYPE III BARRICADE | EA | 22 | 22 |
| 704 | 1060 | DELINEATOR DRUMS | EA | 76 | 76 |
| 704 | 1067 | TUBULAR MARKERS | EA | 98 | 98 |
| 704 | 1080 | STACKABLE VERTICAL PANELS | EA | 50 | 50 |
| 704 | 1086 | SEQUENCING ARROW PANEL-TYPE B | EA | 2 | 2 |
| 704 | 1087 | SEQUENCING ARROW PANEL-TYPE C | EA | 2 | 2 |
| 704 | 3511 | STATE FURNISHED MEDIAN BARRIER | LF | 2,240 | 2,240 |
| 704 | 4011 | PORTABLE CHANGEABLE MESSAGE SIGN | EA | 2 | 2 |
| 706 | 0400 | FIELD OFFICE | EA | 1 | 1 |
| 706 | 0500 | AGGREGATE LABORATORY | EA | 1 | 1 |
| 706 | 0550 | BITUMINOUS LABORATORY | EA | 1 | 1 |
| 706 | 0600 | CONTRACTOR'S LABORATORY | EA | 1 | 1 |
| 714 | 4106 | PIPE CONDUIT 24IN-APPROACH | LF | 91 | 91 |
| 714 | 4110 | PIPE CONDUIT 30IN | LF | 162 | 162 |
| 714 | 4113 | PIPE CONDUIT 30IN-APPROACH | LF | 91 | 91 |
| 714 | 4166 | PIPE CONDUIT 30IN-JACKED OR BORED | LF | 120 | 120 |

Preliminary Plans

ESTIMATE NUMBER: 25007  ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 07/23/2026 TIME: 09:10:32

# ESTIMATE OF QUANTITIES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 8 | 3 |

| SPEC | CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|---|---|---|---|---|---|
| 714 | 9680 | PLUG PIPE-ALL TYPES & SIZES | EA | 1 | 1 |
| 720 | 0110 | RIGHT OF WAY MARKERS | EA | 12 | 12 |
| 720 | 0125 | ALIGNMENT MONUMENTS | EA | 2 | 2 |
| 720 | 0130 | IRON PIN R/W MONUMENTS | EA | 17 | 17 |
| 748 | 0141 | CURB & GUTTER-TYPE 1 SPECIAL | LF | 60 | 60 |
| 752 | 0110 | FENCE BARBED WIRE 3 STRAND-STEEL POST | LF | 7,230 | 7,230 |
| 752 | 0922 | FENCE REMOVE & RESET | LF | 173 | 173 |
| 752 | 0993 | FENCE TERMINAL | EA | 4 | 4 |
| 752 | 2100 | VEHICLE GATE | EA | 1 | 1 |
| 752 | 3150 | CORNER ASSEMBLY BARBED WIRE-WOOD POST | EA | 16 | 16 |
| 752 | 3995 | DOUBLE BRACE ASSEMBLY-WOOD POST | EA | 6 | 6 |
| 752 | 5000 | SNOW FENCE | LF | 832 | 832 |
| 754 | 0110 | FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING | SF | 127 | 127 |
| 754 | 0112 | FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING | SF | 33 | 33 |
| 754 | 0206 | STEEL GALV POSTS-TELESCOPING PERFORATED TUBE | LF | 425 | 425 |
| 754 | 0210 | GALV STEEL POST-STANDARD PIPE | LF | 92 | 92 |
| 754 | 0214 | GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE) | LF | 111 | 111 |
| 754 | 0534 | PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING | SF | 36 | 36 |
| 754 | 0592 | RESET SIGN PANEL | EA | 15 | 15 |
| 754 | 0805 | OBJECT MARKERS - CULVERTS | EA | 4 | 4 |
| 754 | 1100 | CLASS AE CONCRETE-SIGN FOUNDATIONS | CY | 3 | 3 |
| 754 | 1104 | REMOVE SIGN FOUNDATION | EA | 8 | 8 |
| 762 | 0422 | SHORT TERM 6IN LINE-TYPE R | LF | 1,250 | 1,250 |
| 762 | 0426 | SHORT TERM 24IN LINE-TYPE R | LF | 145 | 145 |
| 762 | 1106 | PVMT MK PAINTED 6IN LINE | LF | 7,214 | 7,214 |
| 762 | 1124 | PVMT MK PAINTED 24IN LINE | LF | 145 | 145 |
| 764 | 0131 | W-BEAM GUARDRAIL | LF | 183 | 183 |
| 764 | 0145 | W-BEAM GUARDRAIL END TERMINAL | EA | 4 | 4 |
| 764 | 0151 | REMOVE W-BEAM GUARDRAIL & POSTS | LF | 762 | 762 |
| 764 | 2081 | REMOVE END TREATMENT & TRANSITION | EA | 6 | 6 |
| 764 | 8071 | BARREL ATTENUATION DEVICE-TYPE B-75 | EA | 2 | 2 |
| 766 | 0100 | MAILBOX-ALL TYPES | EA | 1 | 1 |
| 930 | 3000 | BRIDGE BENCH MARKS | SET | 1 | 1 |

Preliminary Plans

ESTIMATE NUMBER: 25007  ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 07/23/2026 TIME: 09:10:32

# ESTIMATE OF QUANTITIES

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 8 | 4 |

| SPEC | CODE | ITEM DESCRIPTION | UNIT | MAINLINE | TOTAL |
|---|---|---|---|---|---|
| 930 | 7012 | ROADWAY CANOPY | L SUM | 1 | 1 |
| 930 | 8230 | SHORING | EA | 1 | 1 |
| 930 | 8600 | ELASTOMERIC BEARING PAD | SF | 40 | 40 |
| 930 | 8686 | AGGREGATE SLOPE PROTECTION | SY | 427.3 | 427.3 |
| 930 | 9537 | ABUTMENT UNDERDRAIN SYSTEM | EA | 2 | 2 |

Preliminary Plans

ESTIMATE NUMBER: 25007  ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 07/23/2026 TIME: 09:10:32

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| | | 42nd Ave SE | | | North Frontage Road | South Frontage Road | Totals |
|---|---|---|---|---|---|---|---|
| | | 441+15 to 447+90 (Gravel) | 447+90 to 459+90 (Paved) | 459+90 to 464+41 (Gravel) | 0+65 to 2+77 (Gravel) | 2+25 to 10+89 (Gravel) | |
| | | 675 ft | 895 ft (Bridge Exception) | 451 ft | 212 ft | 708 ft (42nd Ave Exception) | |
| Material | Unit | Quantity | Quantity | Quantity | Quantity | Quantity | |
| 302 0120 AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY | Ton | 894.17 | 3855.09 | 587.12 | 228.19 | 764.10 | 6328.67 |
| 430 0045 SUPERPAVE FAA 45 @ 2Ton/CY | Ton | | 1685.67 | | | | 1685.67 |
| 401 0050 TACK COAT @ 0.05 Gal/SY (2nd lift) | Gal | | 276.58 | | | | 276.58 |
| 401 0060 PRIME COAT @ 0.25 Gal/SY | Gal | | 1354.19 | | | | 1354.19 |
| 430 5803 PG 58H-34 ASPHALT CEMENT @ 6.1% (2nd Lift - 2") | Ton | | 45.65 | | | | 45.65 |
| 430 5803 PG 58H-34 ASPHALT CEMENT @ 6.1% (1st Lift - 2.5") | Ton | | 57.17 | | | | 57.17 |

| | | SW Ramp | SE Ramp | NE Ramp | NW Ramp | Totals |
|---|---|---|---|---|---|---|
| | | 14+75 to 17+90 | 1+07 to 4+72 | 13+06 to 15+38 | 61+27 to 64+11 | |
| | | 315 ft | 365 ft | 232 ft | 284 ft | |
| Material | Unit | Quantity | Quantity | Quantity | Quantity | |
| 302 0120 AGGREGATE BASE COURSE CL 5 @ 1.875 Ton/CY | Ton | 689.06 | 798.44 | 507.50 | 621.25 | 2616.25 |
| 430 0045 SUPERPAVE FAA 45 @ 2Ton/CY | Ton | 227.50 | 263.61 | 167.56 | 205.11 | 863.78 |
| 401 0050 TACK COAT @ 0.05 Gal/SY (2nd lift) | Gal | 45.50 | 52.72 | 33.51 | 41.02 | 172.76 |
| 401 0060 PRIME COAT @ 0.25 Gal/SY | Gal | 210.00 | 243.33 | 154.67 | 189.33 | 797.33 |
| 430 5803 PG 58H-34 ASPHALT CEMENT @ 6.1% (2nd Lift - 2") | Ton | 6.16 | 7.14 | 4.54 | 5.56 | 23.39 |
| 430 5803 PG 58H-34 ASPHALT CEMENT @ 6.1% (1st Lift - 2.5") | Ton | 7.72 | 8.94 | 5.68 | 6.96 | 29.30 |

Earthwork Summary

| Location | 203-0101 COMMON EXCAVATION (Type A) | Embankment* | 203-0140 BORROW | 203-109 TOPSOIL |
|---|---|---|---|---|
| | Pay Item | | Pay Item | Pay Item |
| | (CY) | (CY) | (CY) | (CY) |
| | A | B | C=B-A | |
| 42nd Ave - North of I-94 - Includes North Frontage Road, NW Ramp, NE | 1030 | 37689 | 36659 | 5075 |
| 42nd Ave - South of I-94 - Includes South Frontage Road, SW Ramp, SE | 4317 | 31845 | 27528 | 8825 |
| Median Attenuation Device | 0 | 0 | 0 | 50 |
| Temp I-94 Shoulders for WZTC | 0 | 500 | 500 | |
| Removal of Temp I-94 Shoulders for WZTC | 500 | | | |
| Totals | 5847 | 70034 | 64687 | 13950 |

*25% Volume was added to embankment volumes to allow for shrinkage.

| Location/Allgnment | Start Station | Stop Station | 230-0165 SUBGRADE PREPARATION - TYPE A-12IN (Sta) |
|---|---|---|---|
| 42nd Ave (OFL), South End | 441+15 | 443+13 | 1.98 |
| 42nd Ave (OFL), North End | 462+75 | 464+41 | 1.66 |
| South Frontage Road, West End | 2+25 | 4+15 | 1.90 |
| South Frontage Road, East End | 8+58 | 10+89 | 2.31 |
| Northeast Ramp | 13+06 | 14+67 | 1.61 |
| Southeast Ramp | 2+37 | 4+72 | 2.35 |
| Northwest Ramp | 62+63 | 64+11 | 1.48 |
| Southwest Ramp | 14+75 | 16+75 | 2.00 |
| North Frontage Road, East End | 1+70 | 2+77 | 1.07 |
| Total | | | 16.36 |

| 216-0100 Water | Total (MGal) |
|---|---|
| 25 MGal/Mile for Dust Palliative | 20 |
| 25 MGal/Mile for Subgrade Preparation | 8 |
| 20 Gal/Ton for Aggregates | 179 |
| 10 Gal/CY for Embankment | 700 |

**754-0805 Object Markers - Culverts**

| Location of Pipe | Each |
|---|---|
| Station | # |
| 1+68 (SE_Ramp) | 2 |
| 455+20- CL, Rt - (OFL) | 1 |
| 455+23- CL, Lt - (OFL) | 1 |

766-0100 MAILBOX-ALL TYPES, EA

Sta 460+68, LT

Preliminary Plans

Basis of Estimate

Structure Replacement

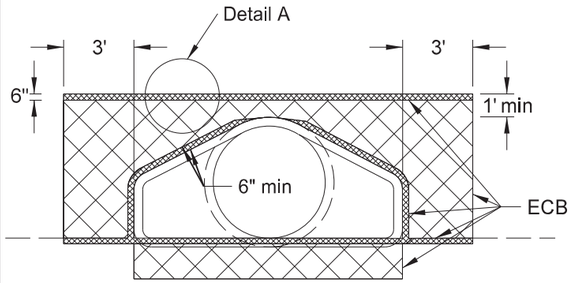
I-94/Pettibone Interchange

BRIAN J. ROSIN REGISTERED PROFESSIONAL PE 2928 ENGINEER NORTH DAKOTA

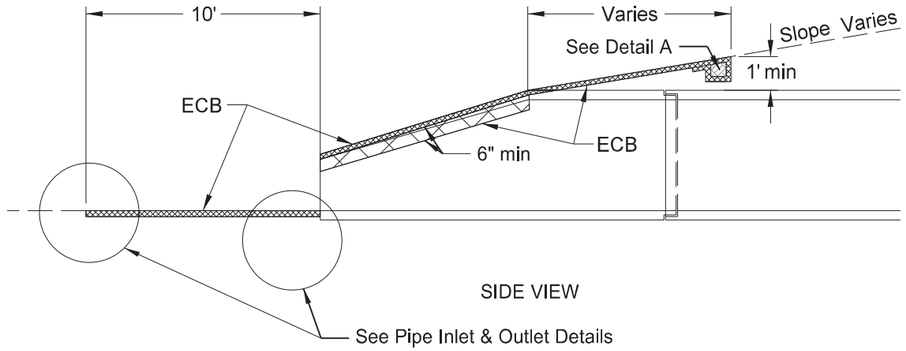
04/21/25

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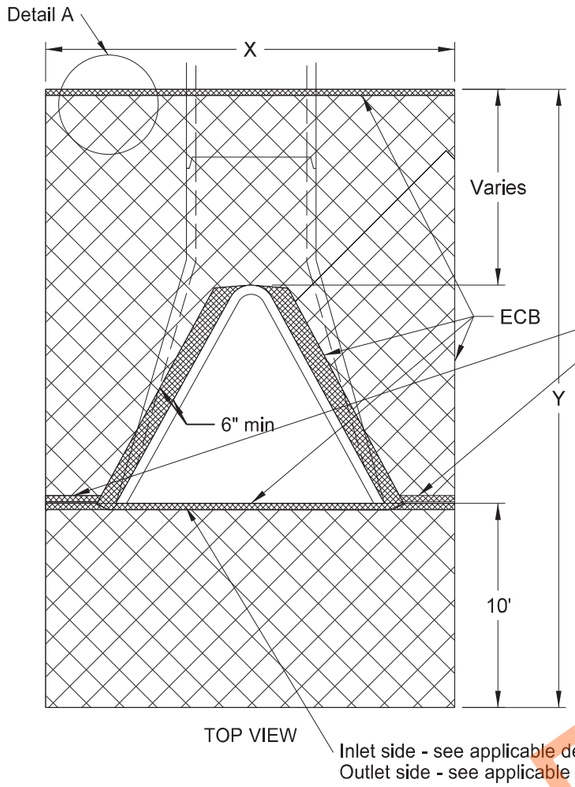
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 20 | 1 |




FRONT VIEW

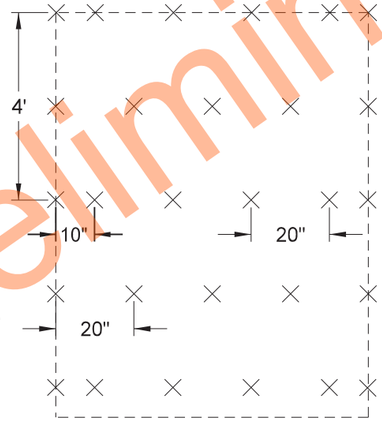



SIDE VIEW




TOP VIEW

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

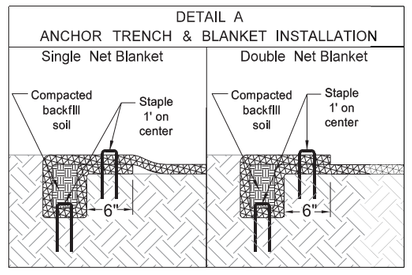


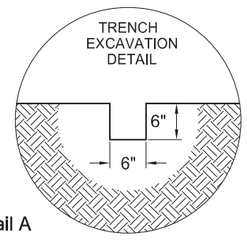

STAPLE PATTERN

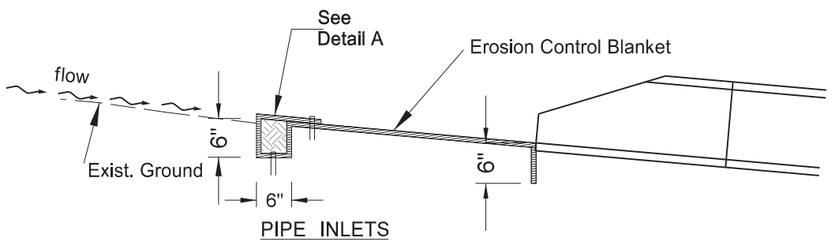
| Erosion Control Blanket (ECB) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Location to be protected | Culvert Type Appr/CL | Pipe Diam (Inch) | No | Unit Quantity | Total Quantity | | | |
| Station | | | | (SY) | Type 1 (SY) | Type 2 (SY) | Type 3 (SY) | Type 4 (SY) |
| 7+98 (FR_S) | Appr | 30 | 2 | 25 | | 50 | | |
| 1+68 (Align_SE_Ramp | CL | 30 | 2 | 25 | | 50 | | |
| 455+23 (OFL) | CL | 30 | 2 | 25 | | 50 | | |
| 0-58 (FR_N) | Appr | 24 | 2 | 20 | | 40 | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| Total (SY) | | | | | | 190 | | |

| APPROACH CULVERTS | | | | |
|---|---|---|---|---|
| DIA | X | Y | Surface area to be protected | ECB |
| In | Ft | Ft | SF | SY |
| 15 | 9.0 | 20.0 | 176.0 | 20 |
| 18 | 9.5 | 20.7 | 190.7 | 22 |
| 21 | 9.5 | 21.0 | 190.9 | 22 |
| 24 | 10.5 | 21.6 | 214.1 | 24 |
| 27 | 11.0 | 22.0 | 226.3 | 25 |
| 30 | 11.6 | 22.5 | 241.5 | 27 |
| 36 | 12.7 | 23.3 | 268.8 | 30 |
| 42 | 13.3 | 23.3 | 279.7 | 31 |
| 48 | 13.8 | 24.0 | 293.2 | 33 |
| 54 | 14.5 | 23.4 | 300.6 | 34 |
| 60 | 15.0 | 23.0 | 307.5 | 35 |
| 66 | 15.6 | 24.0 | 325.6 | 37 |
| 72 | 16.2 | 24.5 | 340.6 | 38 |
| Note: Quantities based on 8:1 slope. | | | | |

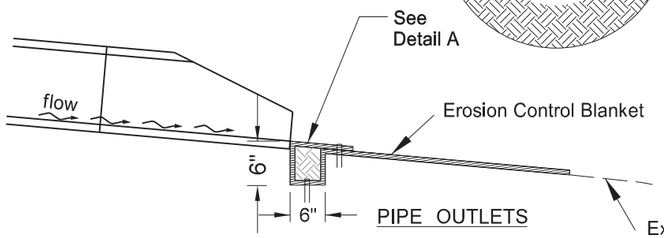
| CENTERLINE CULVERTS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DIA | X | Y | Surface area to be protected | ECB | DIA | X | Y | Surface area to be protected | ECB |
| In | Ft | Ft | SF | SY | In | Ft | Ft | SF | SY |
| 24 | 10.5 | 19.6 | 193.1 | 22 | 24 | 10.5 | 17.6 | 172.1 | 20 |
| 27 | 11.0 | 20.0 | 204.3 | 23 | 27 | 11.0 | 18.0 | 182.3 | 21 |
| 30 | 11.6 | 20.5 | 218.3 | 25 | 30 | 11.6 | 18.5 | 195.1 | 22 |
| 36 | 12.7 | 21.2 | 242.1 | 27 | 36 | 12.7 | 19.2 | 216.7 | 24 |
| 42 | 13.3 | 21.2 | 251.8 | 28 | 42 | 13.3 | 19.2 | 225.2 | 25 |
| 48 | 13.8 | 22.0 | 265.6 | 30 | 48 | 13.8 | 20.0 | 238.0 | 27 |
| 54 | 14.5 | 21.5 | 273.7 | 31 | 54 | 14.5 | 19.5 | 244.7 | 28 |
| 60 | 15.0 | 21.0 | 278.3 | 31 | 60 | 15.0 | 19.0 | 248.3 | 28 |
| 66 | 15.6 | 22.0 | 295.7 | 33 | 66 | 15.6 | 20.0 | 264.5 | 30 |
| 72 | 16.2 | 22.5 | 309.2 | 35 | 72 | 16.2 | 20.5 | 276.8 | 31 |
| Note: Quantities based on 6:1 slope. | | | | | Note: Quantities based on 4:1 slope. | | | | |




PIPE INLETS




PIPE OUTLETS

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ENGINEER
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04/21/25

Erosion Control at Culvert Flared End Sections

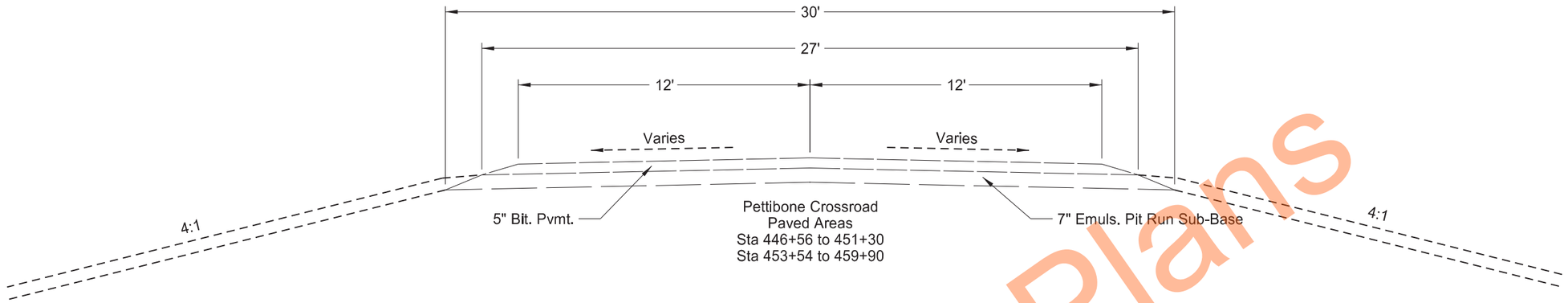
Structure Replacement

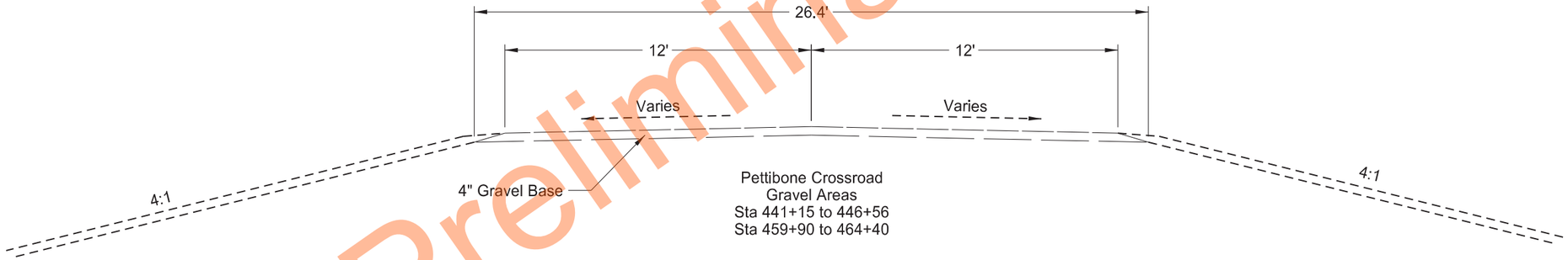
I-94/Pettibone Interchange

Preliminary Plans

Docusign Envelope ID: 968054C0-8ABB-4E54-BD0E-AB1FC51EC908

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 30 | 1 |




Preliminary Plans

Typical Section

Existing Crossroad

Structure Replacement

I-94/Pettibone Interchage

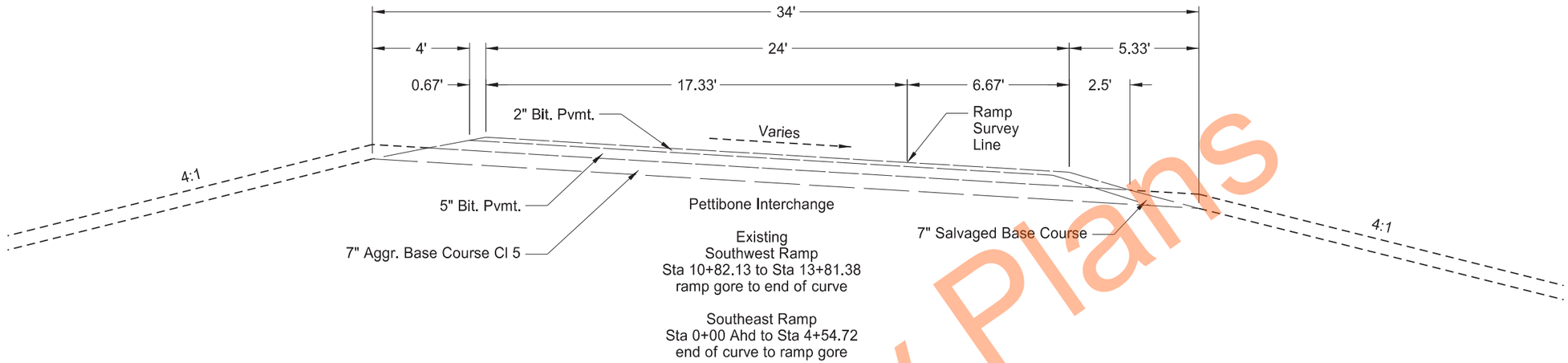
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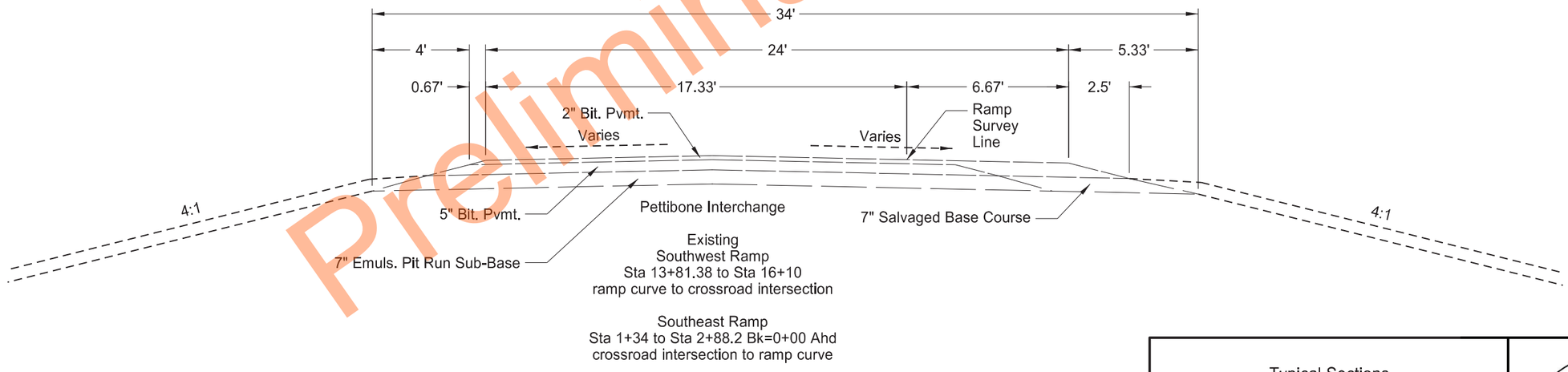
04/21/25

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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 30 | 2 |




Preliminary Plans

Typical Sections

Existing SW & SE Ramp

Structure Replacement

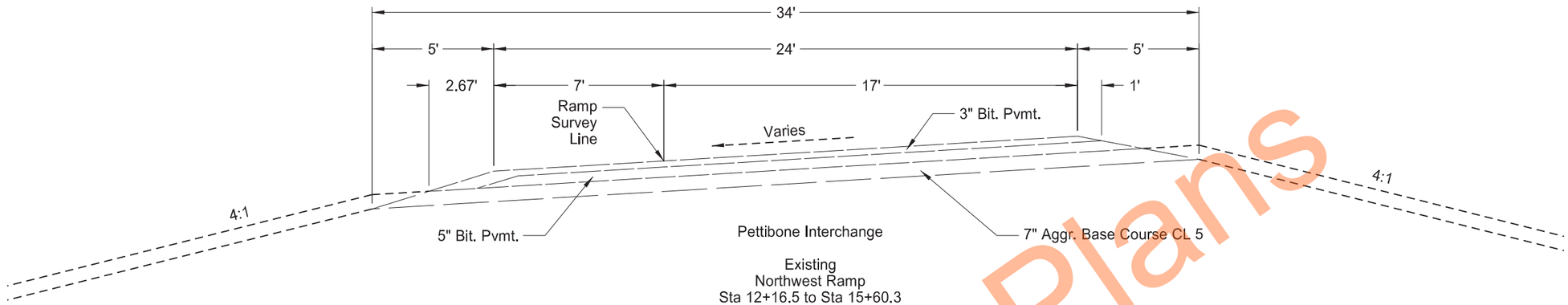
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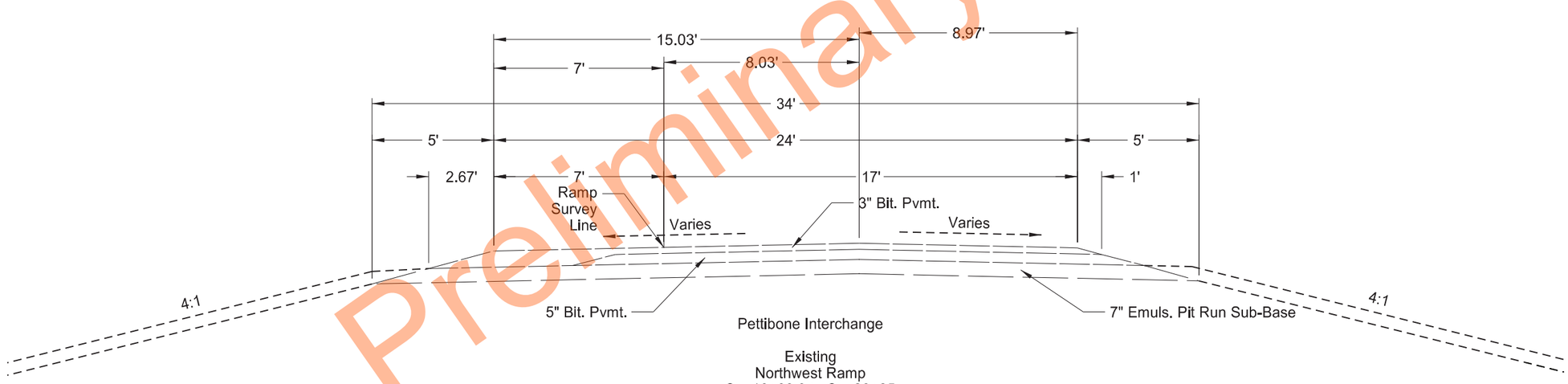
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 30 | 3 |




Pettibone Interchange

Existing
Northwest Ramp
Sta 12+16.5 to Sta 15+60.3
ramp gore to end of curve

Northeast Ramp
Sta 6+04.4 to Sta 9+00
end of curve to ramp gore




Pettibone Interchange

Existing
Northwest Ramp
Sta 16+60.3 to Sta 20+25
ramp curve to crossroad intersection

Northeast Ramp
Sta 1+32 to Sta 6+04.4
crossroad intersection to ramp curve

Preliminary Plans

Typical Section

Existing NE & NW Ramps

Structure Replacement

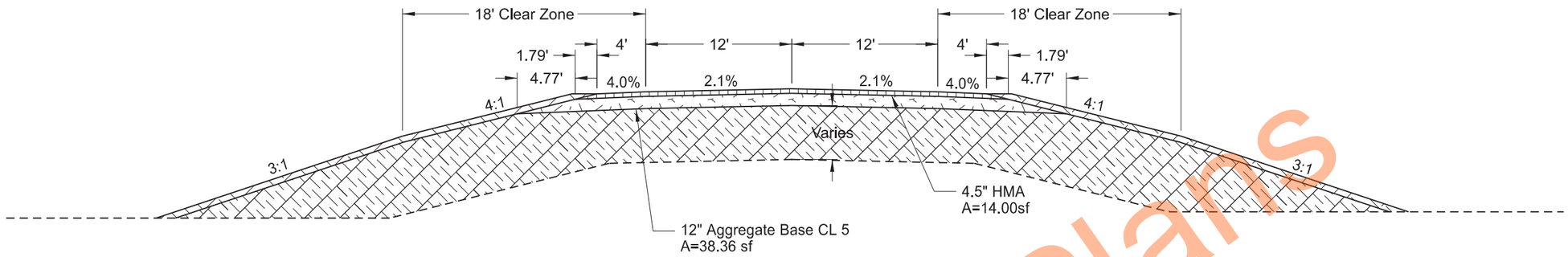
I-94/ Pettibone Interchange

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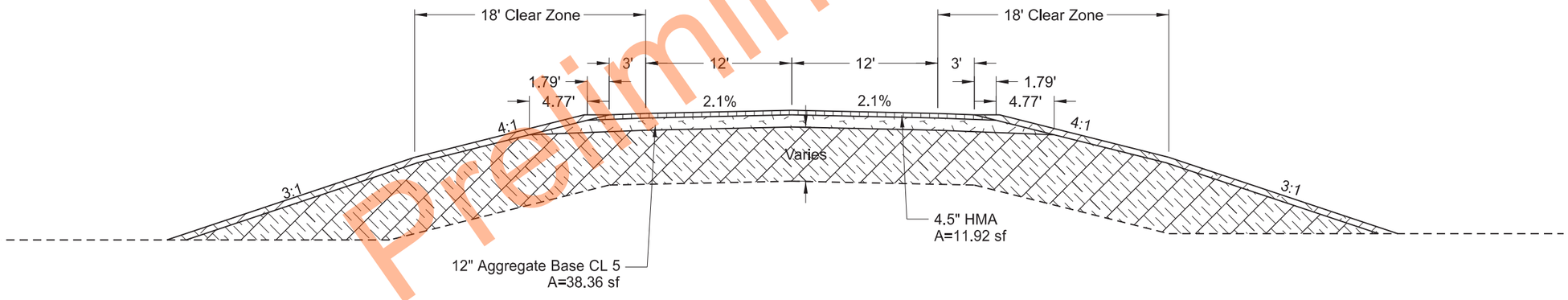
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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 30 | 4 |




Sta. 447+90 to 457+45
(Exclude Bridge)




Sta. 457+45 to 459+90

Typical Section

Proposed Crossroad

Structure Replacement

I-94/Pettibone Interchange

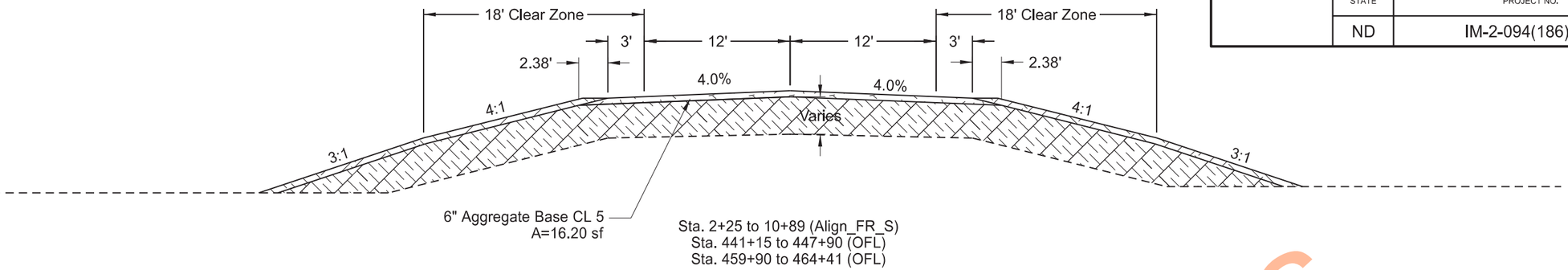
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04/21/25

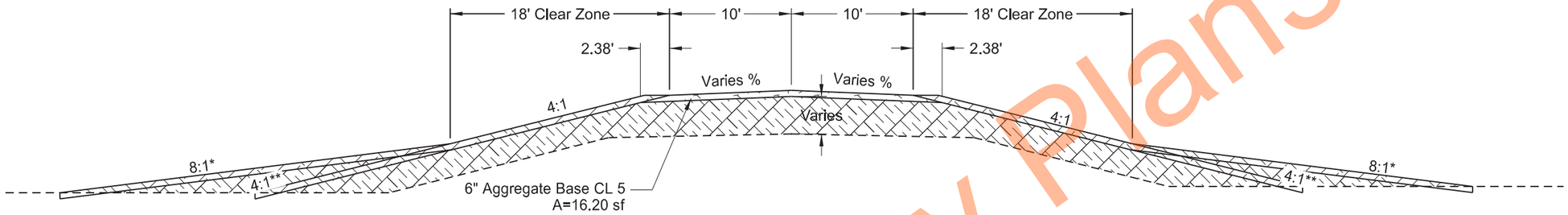
Preliminary Plans

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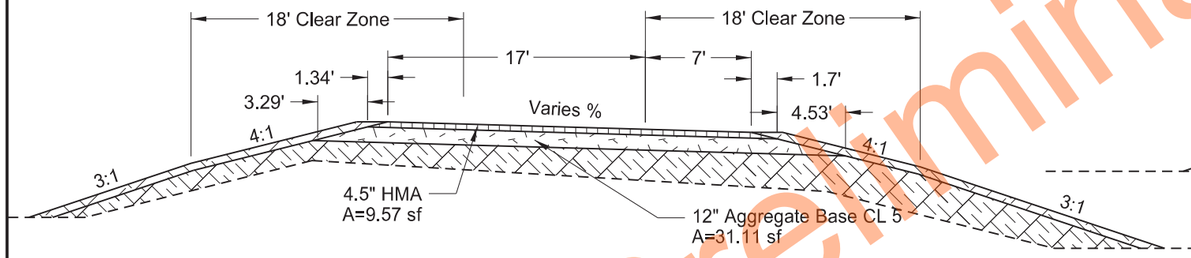
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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 30 | 5 |



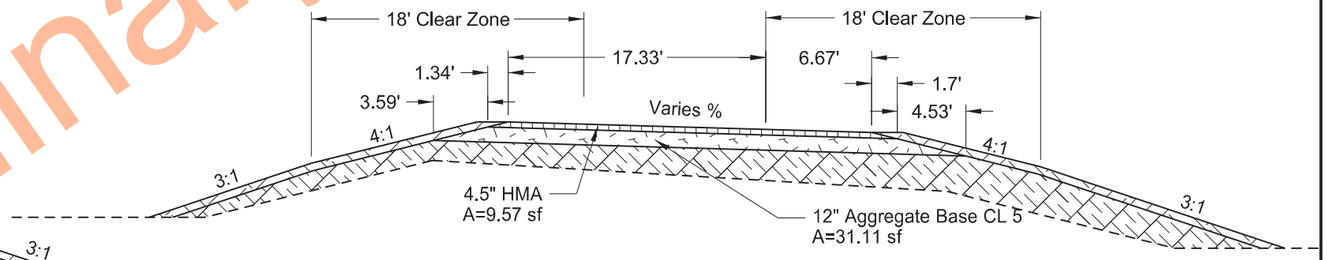

Sta. 2+25 to 10+89 (Align_FR_S)
Sta. 441+15 to 447+90 (OFL)
Sta. 459+90 to 464+41 (OFL)



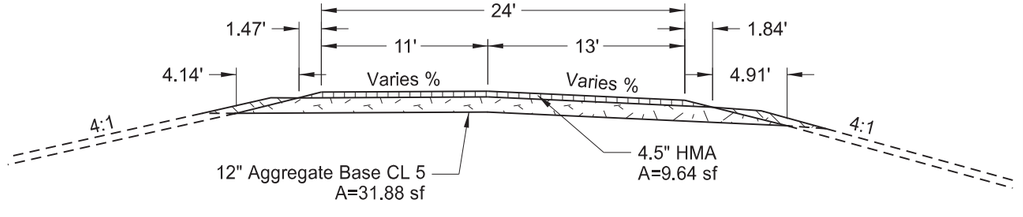

* Sta. 0+15 to 1+70 (Align_FR_N)
** Sta. 1+70 to 2+77 (Align_FR_N)




NE Ramp - Sta. 13+60 to 16+81
NW Ramp Sta. 60+00 to 62+80




SE Ramp Sta. 0+00 to 4+72
SW Ramp Sta. 14+75 to 19+04




NW Ramp Sta. 62+80 to 64+11
NE Ramp Sta. 13+06 to 13+60

Typical Section

Proposed Gravel Crossroad & Frontage Roads
Proposed Ramps

Structure Replacement

I-94/Pettibone Interchange

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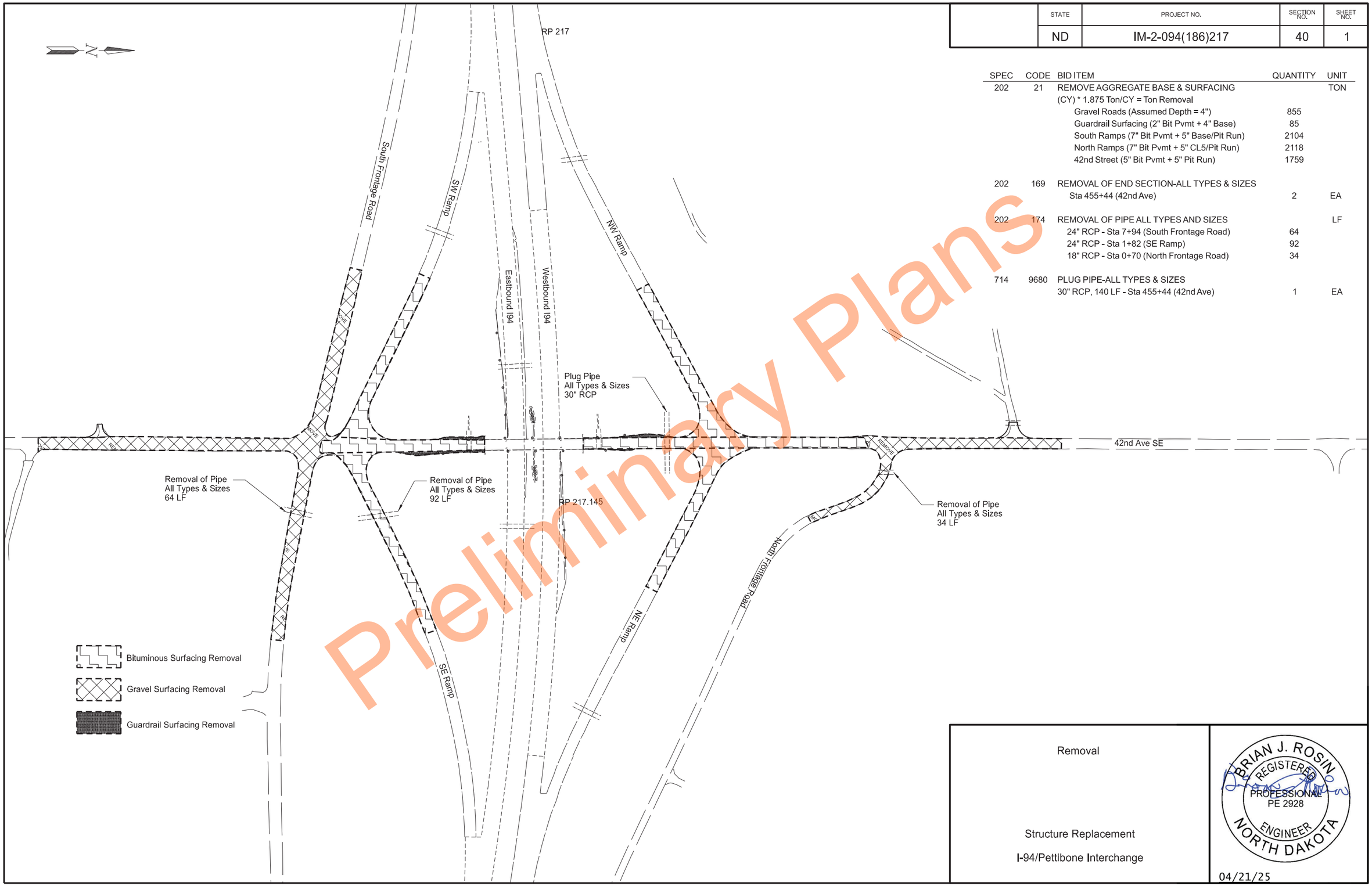
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Preliminary Plans

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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 40 | 1 |

| SPEC | CODE | BID ITEM | QUANTITY | UNIT |
|---|---|---|---|---|
| 202 | 21 | REMOVE AGGREGATE BASE & SURFACING (CY) * 1.875 Ton/CY = Ton Removal | | TON |
| | | Gravel Roads (Assumed Depth = 4") | 855 | |
| | | Guardrail Surfacing (2" Bit Pvmt + 4" Base) | 85 | |
| | | South Ramps (7" Bit Pvmt + 5" Base/Pit Run) | 2104 | |
| | | North Ramps (7" Bit Pvmt + 5" CL5/Pit Run) | 2118 | |
| | | 42nd Street (5" Bit Pvmt + 5" Pit Run) | 1759 | |
| 202 | 169 | REMOVAL OF END SECTION-ALL TYPES & SIZES | | |
| | | Sta 455+44 (42nd Ave) | 2 | EA |
| 202 | 174 | REMOVAL OF PIPE ALL TYPES AND SIZES | | LF |
| | | 24" RCP - Sta 7+94 (South Frontage Road) | 64 | |
| | | 24" RCP - Sta 1+82 (SE Ramp) | 92 | |
| | | 18" RCP - Sta 0+70 (North Frontage Road) | 34 | |
| 714 | 9680 | PLUG PIPE-ALL TYPES & SIZES | | |
| | | 30" RCP, 140 LF - Sta 455+44 (42nd Ave) | 1 | EA |




Preliminary Plans

Removal

Structure Replacement

I-94/Pettibone Interchange

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04/21/25

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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 50 | 1 |

HYDRAULIC DATA FOR IM-2-094(186)217 (A)

| STATION | EXISTING PIPE | PROPOSED PIPE SIZE | DRAINAGE AREA (ACRES) | 50-YEAR DATA | | | | 100-YEAR DATA | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | DESIGN DISCHARGE (CFS) | DESIGN HEADWATER (FT) | DESIGN VELOCITY (FPS) | DESIGN STAGE (NAVD 88) | 100-YEAR DISCHARGE (CFS) | 100-YEAR STAGE (NAVD 88) |
| 7+94 (FR_S) | 24" RCP | 30" | 25.5 | 28.7 | 3.08 | 7.47 | 1810.77 | 35.5 | 1811.43 |
| 1+83 (Align_SE_Ramp) | 24" RCP | 30" | 9.4 | 14.4 | 2.03 | 5.70 | 1810.07 | 17.5 | 1810.33 |
| 455+23 (OFL) | 30" RCP | 30" | 48.4 | 33.6 | 4.31 | 8.09 | 1813.28 | 41.6 | 1814.52 |

(A) Hydraulic data provided is for smooth-walled (Manning's n=0.012) type conduits.

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
MONTE DEIS
PE-29092
DATE
09/04/24
NORTH DAKOTA

Culvert Hydraulic Data

Structure Replacement

I-94/Pettibone Interchange

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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 51 | 1 |

| Begin Station / Location | Begin Offset | End Station / Location | End Offset | Pipe Installation (Pay Item) | | | Allowable Material | Required Diameter | Steel Pipe Coatings | Steel Pipe Corrugations or Spiral Ribs | Steel Pipe Minimum Thickness | Geosythetic Material - Type G (Pay Item) | (*) End Sections | | Applicable Backfill |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | In | Bid Item | LF | | In | Type | | In | SY | Begin EA | End EA | |
| 7+93 (FR_S) | 45' Rt | 7+96 (FR_S) | 46.3' Lt | 30 | Pipe Conduit - Approach | 91 | Reinforced Concrete Pipe - Class II **(barrel length = 88 LF)** | 30 | | | | - | FES | FES | Specification 714.04 A |
| | | | | | | | Corrugated Steel Pipe | 30 | A, P | 2 | 0.064 | | | | |
| | | | | | | | Spiral Rib Steel Pipe | 30 | A, P | 3/4, 1 | 0.064 | | | | |
| | | | | | | | Polypropylene Pipe (AASHTO M330, Type S) | 30 | | | | | | | |
| 1+68.8 (Align_SE_Ramp) | 39.2' Rt | 1+98.3 (Align_SE_Ramp) | 50.5' Lt | 30 | Pipe Conduit | 93 | Reinforced Concrete Pipe - Class II **(barrel length = 90 LF)** | 30 | | | | - | FES | FES | D-714-25 |
| | | | | | | | Corrugated Steel Pipe | 30 | A | 2 | 0.168 | | | | |
| | | | | | | | Corrugated Steel Pipe | 30 | P | 2 | 0.064 | | | | |
| | | | | | | | Spiral Rib Steel Pipe | 30 | A, P | 3/4, 1 | | | | | |
| 455+23 (OFL) | 93.8' Lt | 455+22 (OFL) | 60' Lt | 30 | Pipe Conduit | 34 | Reinforced Concrete Pipe - Class IV **(barrel length = 32 LF)** | 30 | | | | - | FES | | D-714-25 |
| 455+22 (OFL) | 60' Lt | 455+20 (OFL) | 60' Rt | 30 | Pipe Conduit - Jacked or Bored | 120 | Reinforced Concrete Pipe - Class IV **(barrel length = 120 LF)** | 30 | | | | - | | | D-714-16 |
| | | | | | | | Smooth Wall Steel Pipe | 30 | | | 0.406 | | | | |
| 455+20 (OFL) | 60' Rt | 455+20 (OFL) | 95.4' Rt | 30 | Pipe Conduit | 35 | Reinforced Concrete Pipe - Class IV **(barrel length = 33 LF)** | 30 | | | | - | | FES | D-714-25 |
| 0+58 (FR_N) | 41.4' Lt | 0-92 (FR_N) | 37.2' Rt | 24 | Pipe Conduit - Approach | 91 | Reinforced Concrete Pipe - Class III **(barrel length =88 LF)** | 24 | | | | - | FES | FES | Specification 714.04 A |
| | | | | | | | Corrugated Steel Pipe | 30 | A, P | 2 | 0.064 | | | | |
| | | | | | | | Spiral Rib Steel Pipe | 30 | A, P | 3/4, 1 | 0.064 | | | | |
| | | | | | | | Polypropylene Pipe (AASHTO M330, Type S) | 30 | | | | | | | |

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

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

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

(*) End sections are measured and paid for separately for pipe extensions.
**FES** = Flared End Section
**TES** = Traversable End Section

Preliminary Plans

Allowable Pipe List

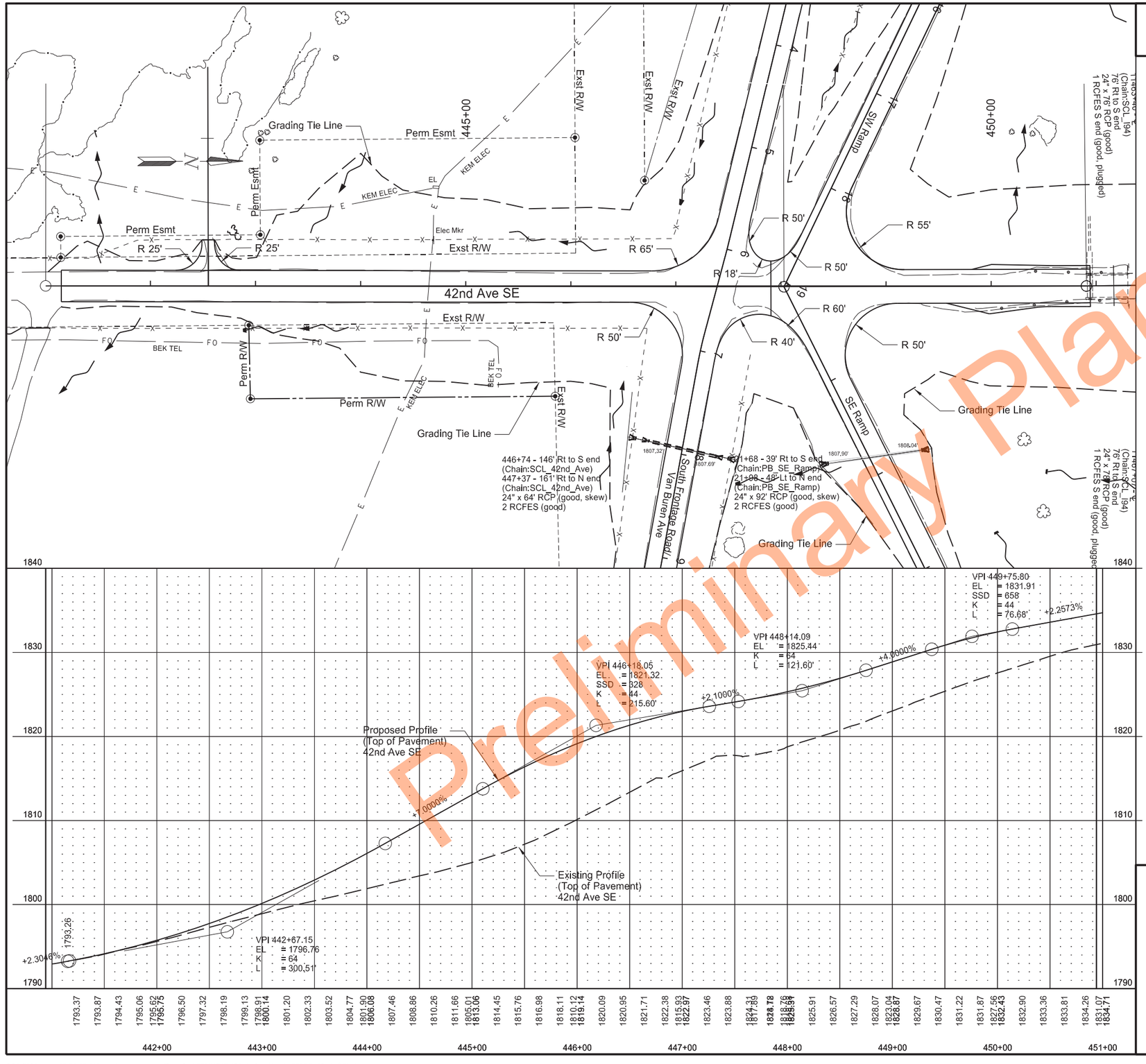
Structure Replacement

I-94/Pettibone Interchange

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ENGINEER
NORTH DAKOTA
04/21/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 1 |




Preliminary Plans

Plan & Profile

42nd_OFL
Sta. 441+00 to 451+00

Structure Replacement

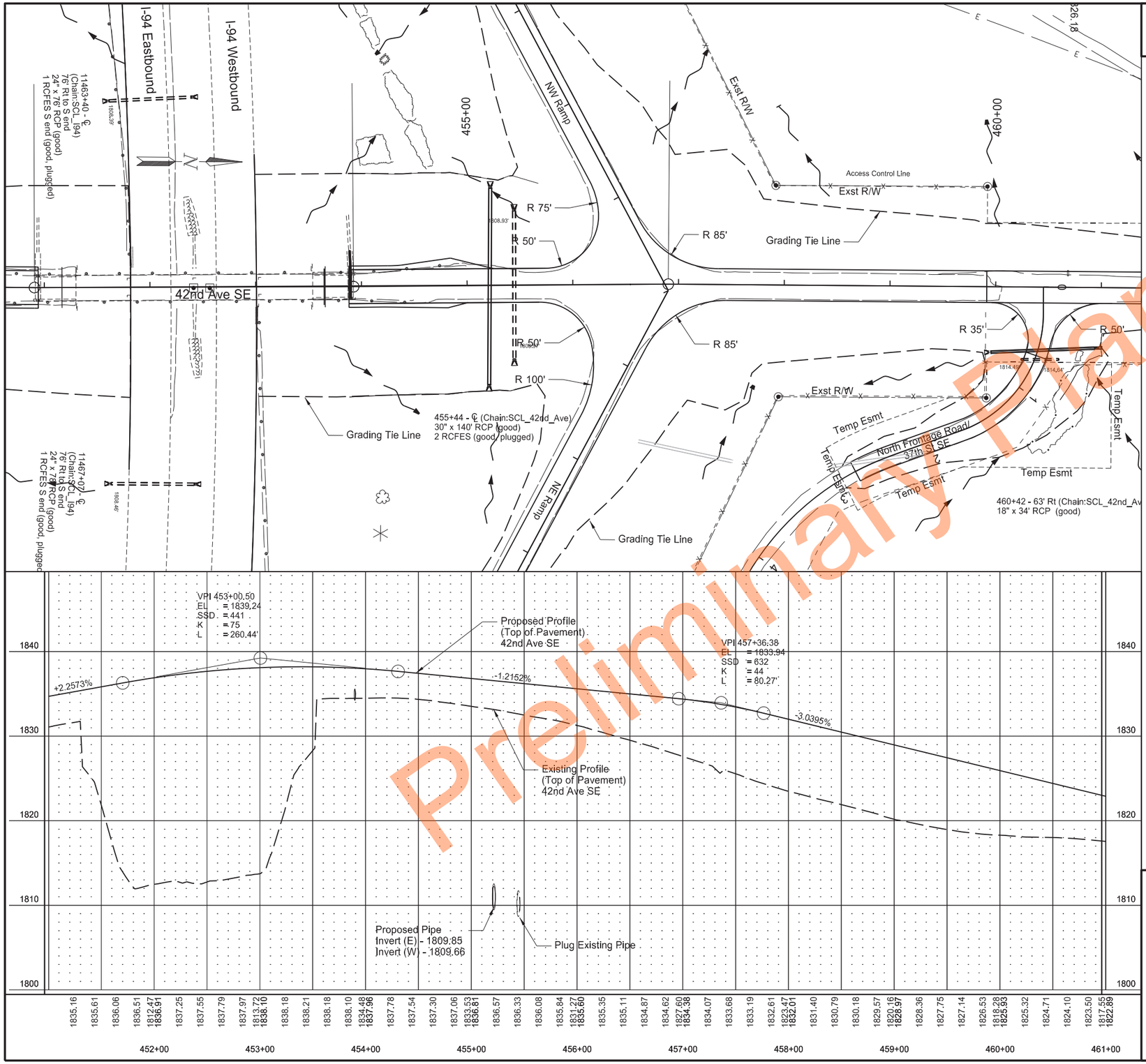
I-94/Pettibone Interchange

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08/27/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 2 |

Plan & Profile

42nd_OFL
Sta. 451+00 to 461+00

Structure Replacement

I-94/Pettibone Interchange

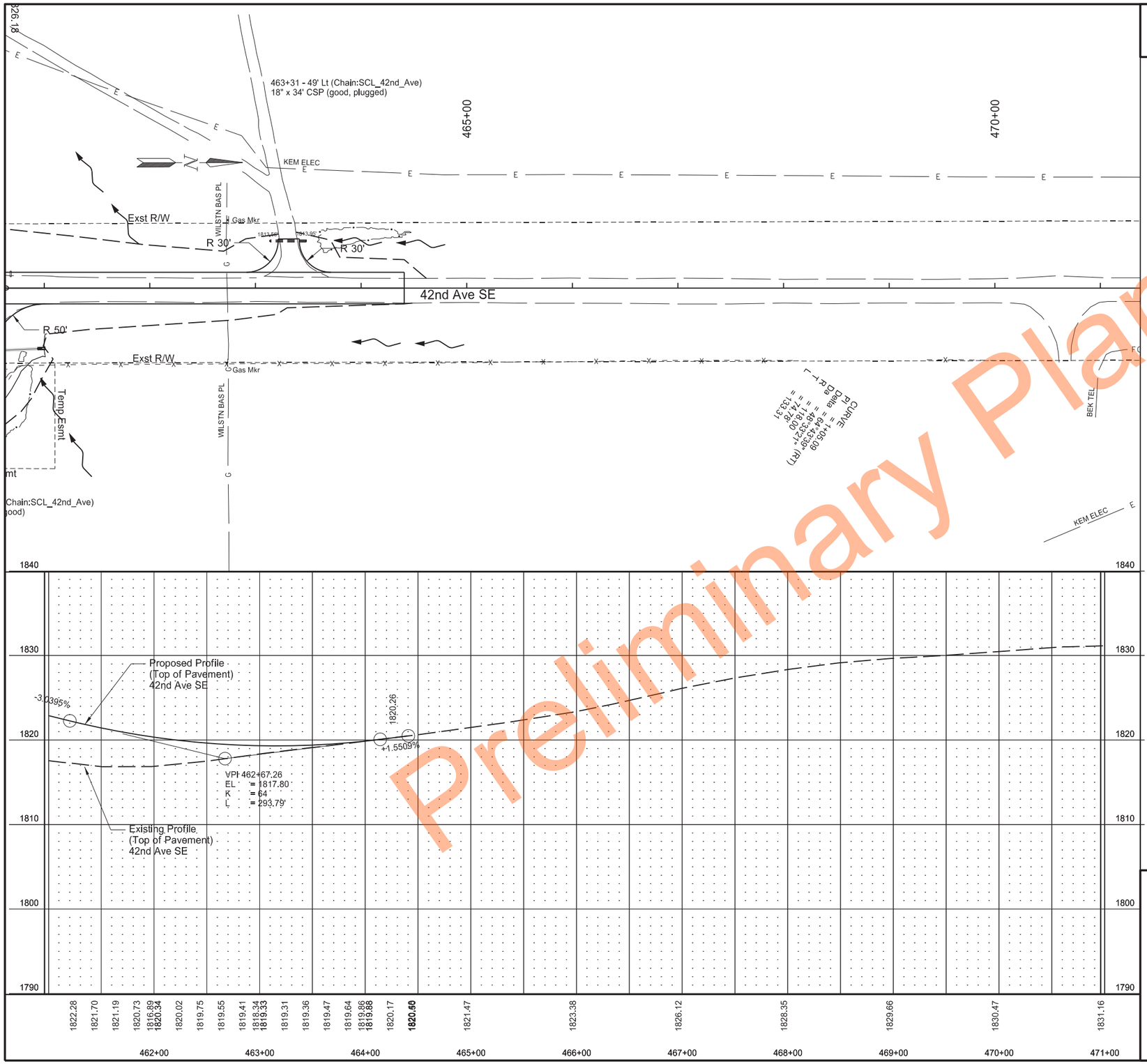
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08/27/25

Preliminary Plans

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 3 |




Plan & Profile

42nd_OFL
Sta. 461+00 to 471+00

Structure Replacement

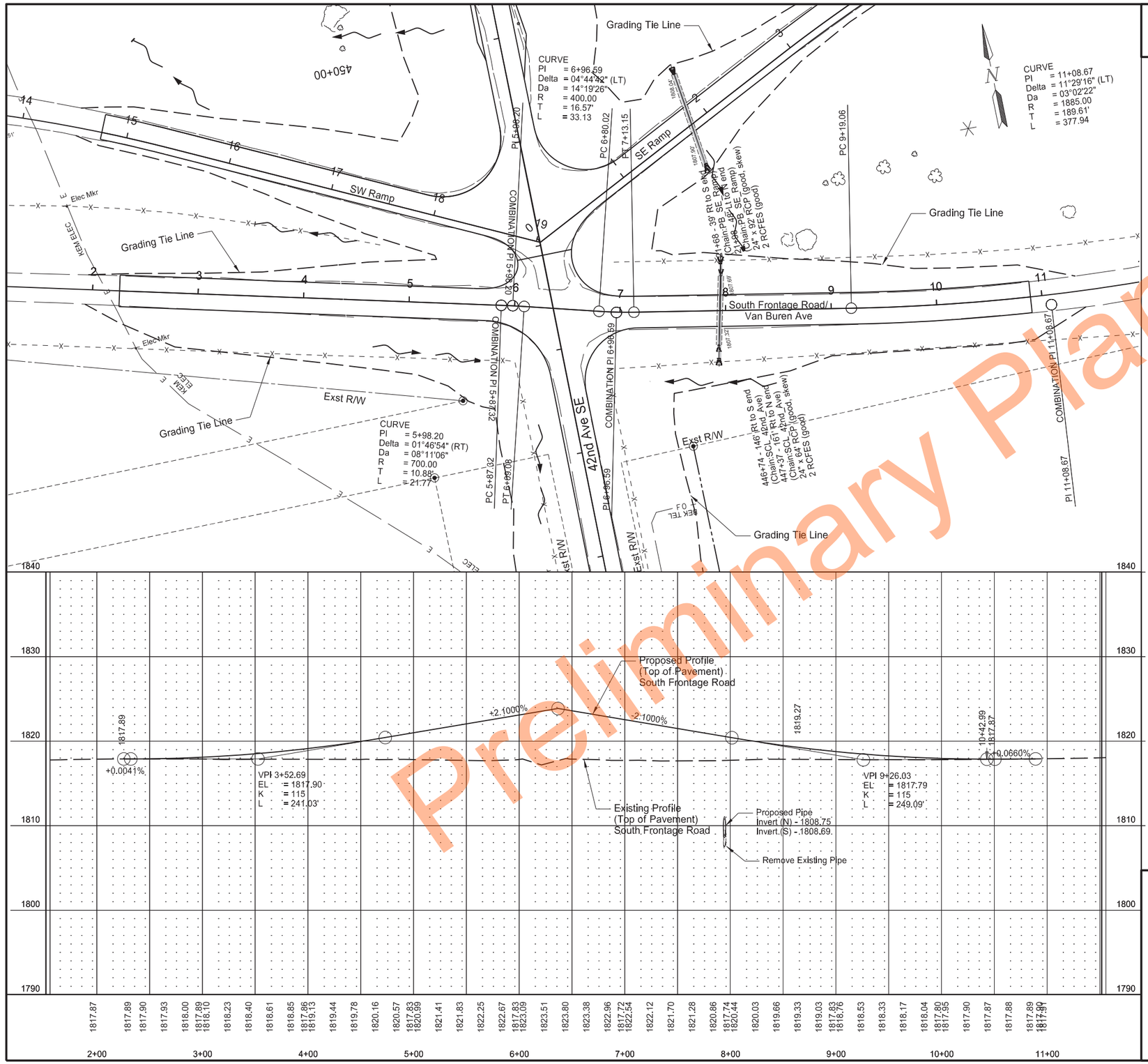
I-94/Pettibone Interchange

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|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 4 |




Preliminary Plans

Plan & Profile

South Frontage Road
Sta. 2+00 to 11+00

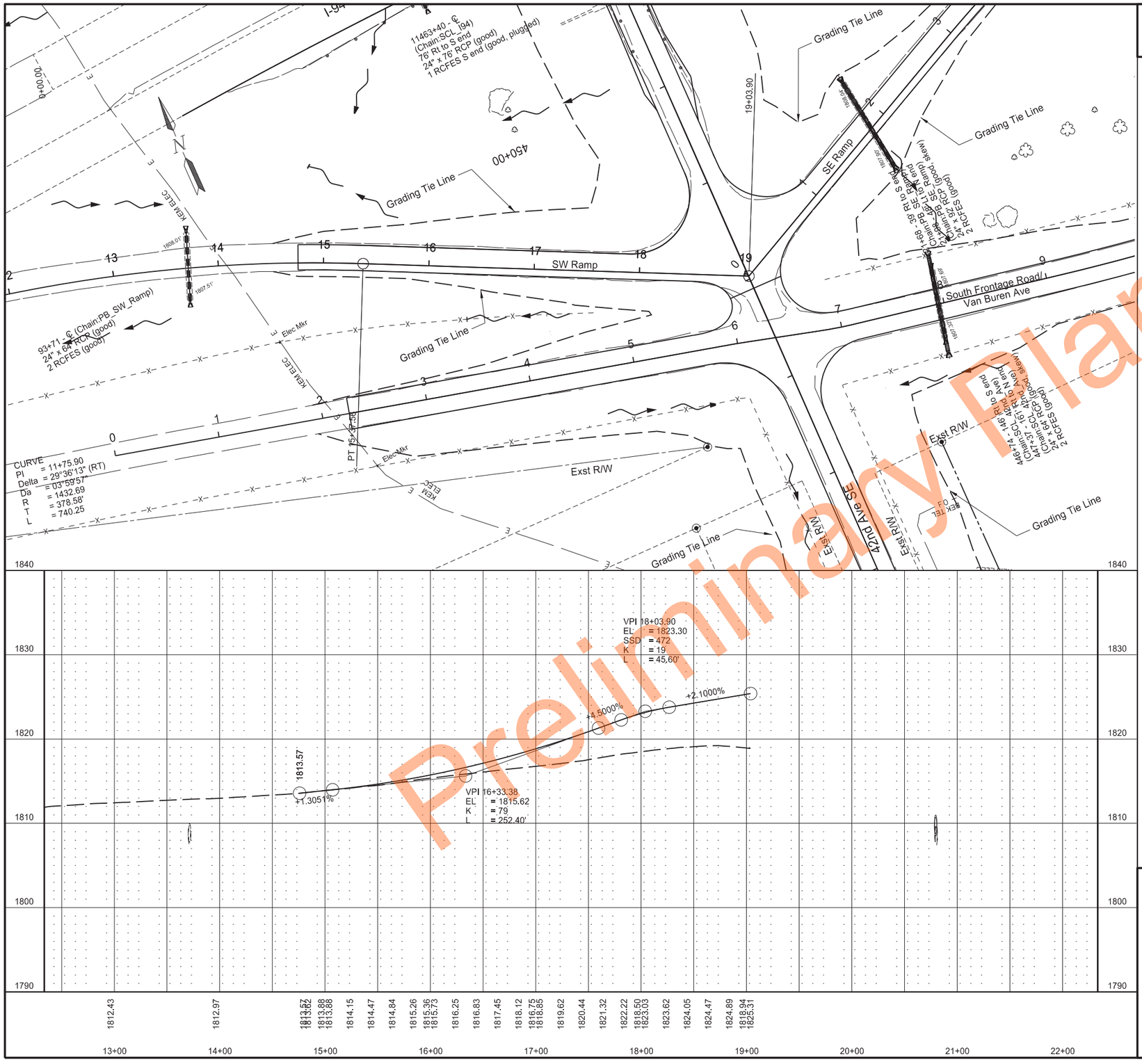
Structure Replacement

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Preliminary Plans

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 60 | 5 |

Plan & Profile

SW Ramp
Sta. 13+00 to 22+00

Structure Replacement

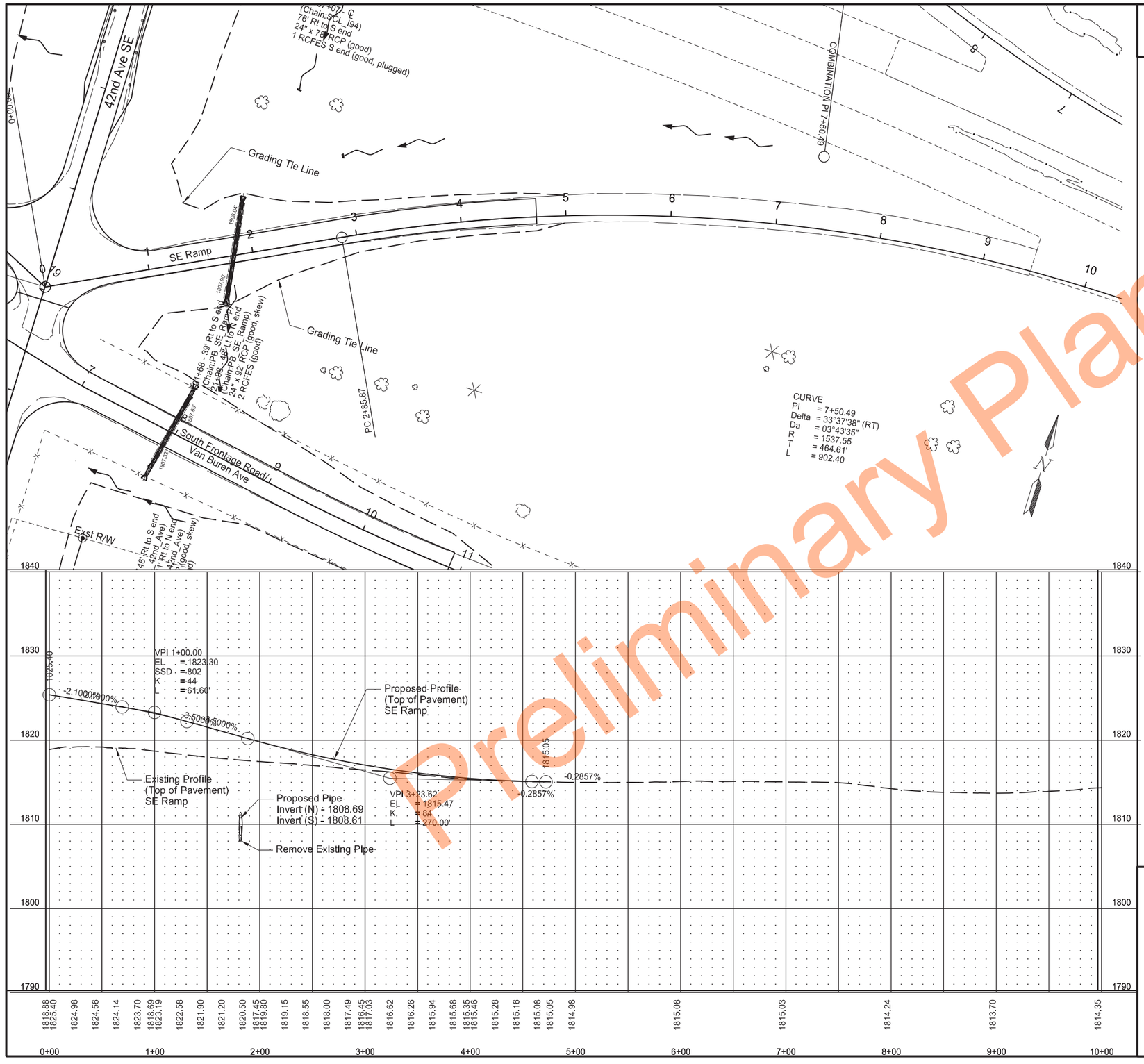
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08/27/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 6 |




Preliminary Plans

Plan & Profile

SE Ramp
Sta. 0+00 to 10+00

Structure Replacement

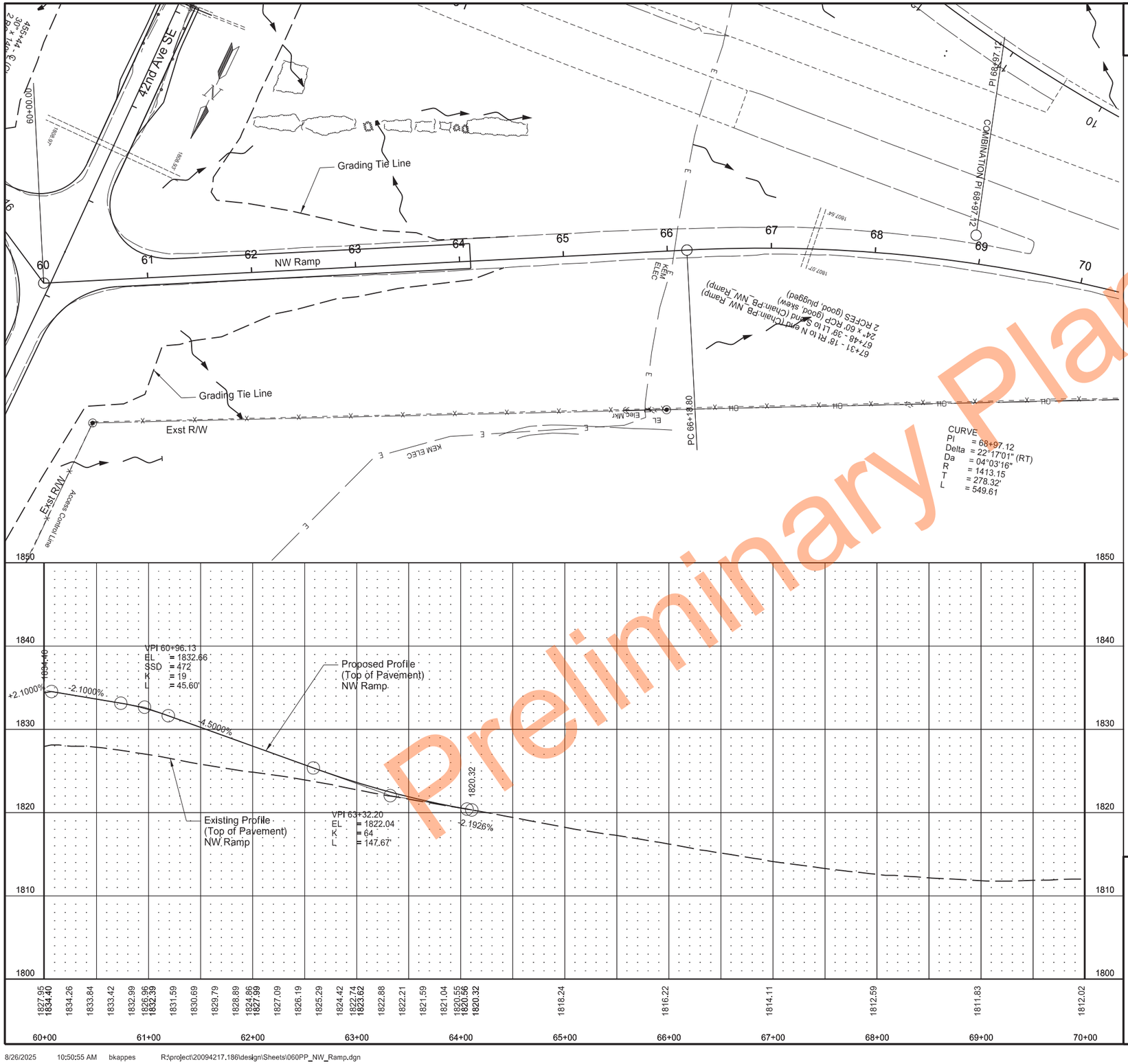
I-94/Pettibone Interchange

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08/27/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 7 |




Preliminary Plans

Plan & Profile

NW Ramp
Sta. 60+00 to 70+00

Structure Replacement

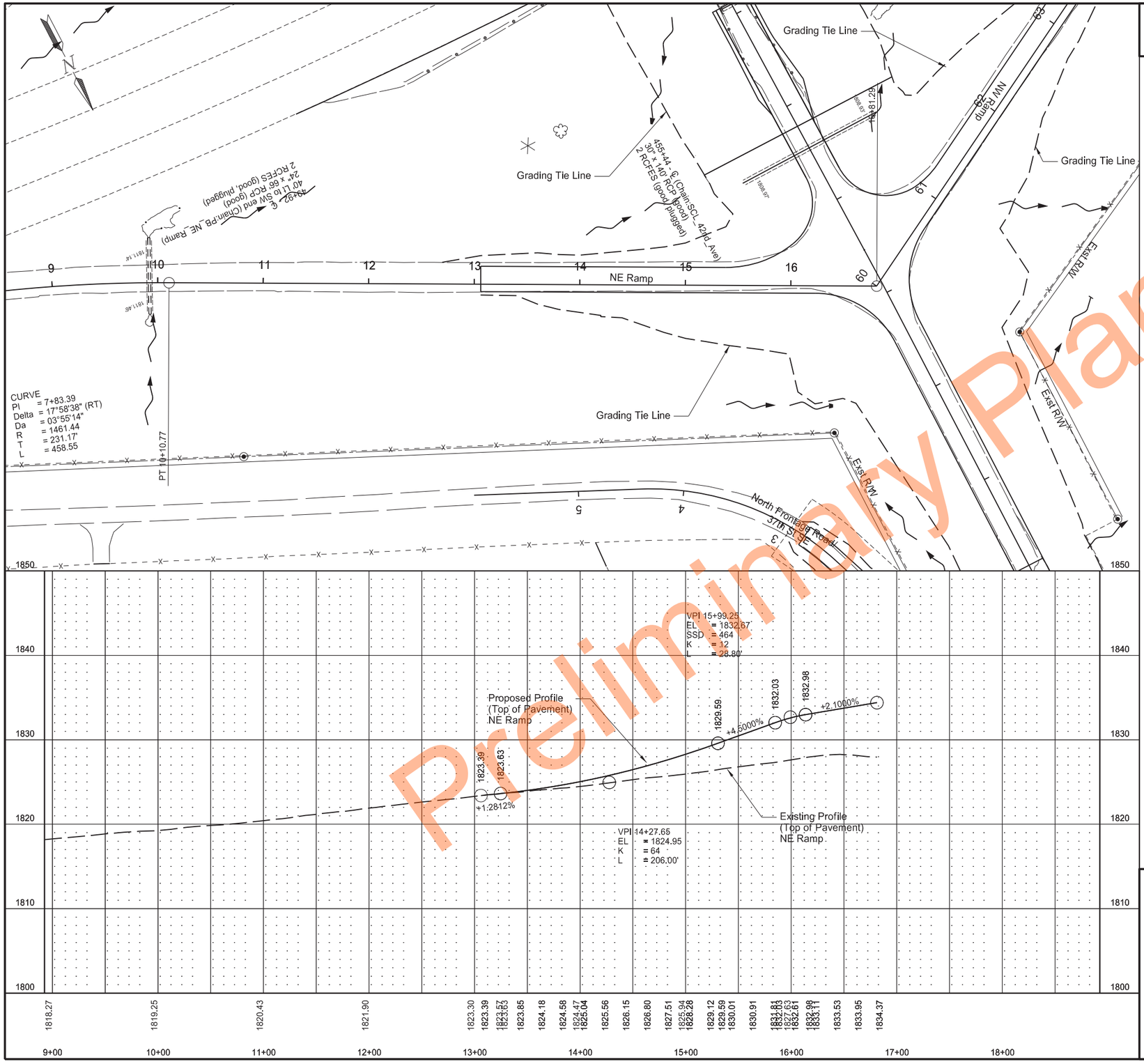
I-94/Pettibone Interchange

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08/27/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 60 | 8 |




Preliminary Plans

Plan & Profile

NE Ramp
Sta. 9+00 to 16+81.29

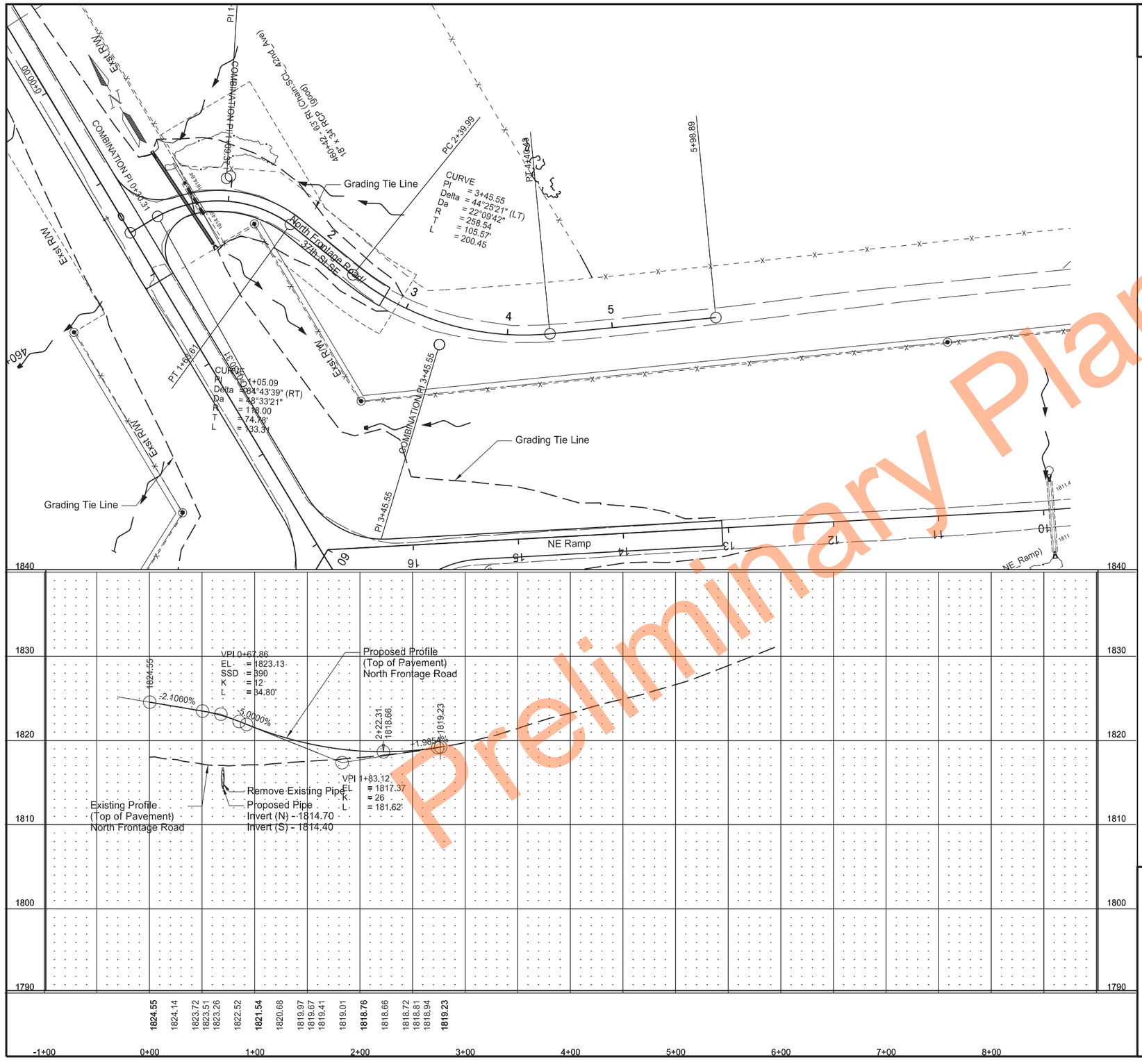
Structure Replacement

I-94/Pettibone Interchange

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ENGINEER
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08/27/25

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Preliminary Plans

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 60 | 9 |

Plan & Profile

North Frontage Road
Sta. 0+00 to 5+98.89

Structure Replacement

I-94/Pettibone Interchange

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| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 75 | 1 |

## Wetland Impact Table

| Wetland Impact | | | | | | | | | | Wetland Mitigation | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Wetland Impacts Acre(s) | | | USFWS Easement Impacts Acre(s) | | Mitigation Proposed | | | USACE/11990 Bank | | 11990 Bank | | USFWS Bank | | Onsite Mitigation Method | | | Onsite Constructed Location | |
| Wetland Number | Location | Wetland Type | Wetland Feature | USACE Jurisdictional Wetlands[1] | Temp. | Perm. (Fill/Drain) | Perm. (Cut) | Temp. | Perm. | EO 11990 | USACE | USFWS | Location | Acre(s) | Location | Acre(s) | Location | Acre(s) | Mitigation Location; Ratio | Ditch Shift Acre(s) | Onsite Acre(s) | Onsite Constructed Site # | Onsite Constructed Size Acre(s) |
| 1 | Sec.12, T139N, R71W | Basin | Created | No | - | - | - | - | - | N | N | N | | | | | | | | | | | |
| 2 | Sec.7, T139N, R70W | Basin | Created | No | - | - | - | - | - | N | N | N | | | | | | | | | | | |
| 3 | Sec.12, T139N, R71W | Basin | Created | No | - | - | - | - | - | N | N | N | | | | | | | | | | | |
| | | | | Totals | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | | | | | | | | | 0.000 | 0.000 | | 0.000 |

[1] A wetland Jurisdictional Determination was issues by the USACE on 11/22/2022; NWO-2008-01688-BIS

## Impact Summary Table

| Permanent Impact Summary | | Temporary Impacts and additional information | |
|---|---|---|---|
| Wetland Type | Total Acre(s) | WaterType | Total Acre(s) |
| Natural/JD (Fill/Drain) | 0.000 | Temporary Wetland JD | 0.000 |
| Natural/ Non-JD (Fill/Drain) | 0.000 | Non-JD Wetland Temporary | 0.000 |
| Artificial/ JD (Fill/Drain) | 0.000 | | |
| Artificial/ Non-JD (Fill/Drain)) | 0.000 | Permanent OW | 0.000 |
| Total | 0.000 | Temporary OW | 0.000 |
| JD Natural (Cut) | 0.000 | Permanent OW-d | 0.000 |
| JD Artificial (Cut) | 0.000 | Temporary OW-d | 0.000 |
| Non-JD Natural (Cut) | 0.000 | | |
| Non-JD Artificial (Cut) | 0.000 | | |
| Total | 0.000 | | |

## Mitigation Summary Table

| | Location | Ditch Shift Acre(s) | Onsite Acre(s) | 11990 Bank Acre(s) | USACE/ 11990 Bank Acre(s) | USFWS Bank Acre(s) |
|---|---|---|---|---|---|---|
| USACE Only | | - | - | | - | |
| EO 11990 Only | | - | - | - | | |
| USACE/ 11990 | | - | - | | - | |
| USFWS | | - | | | | - |
| | Total | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |

Preliminary Plans

Wetland Table

Structure Replacement

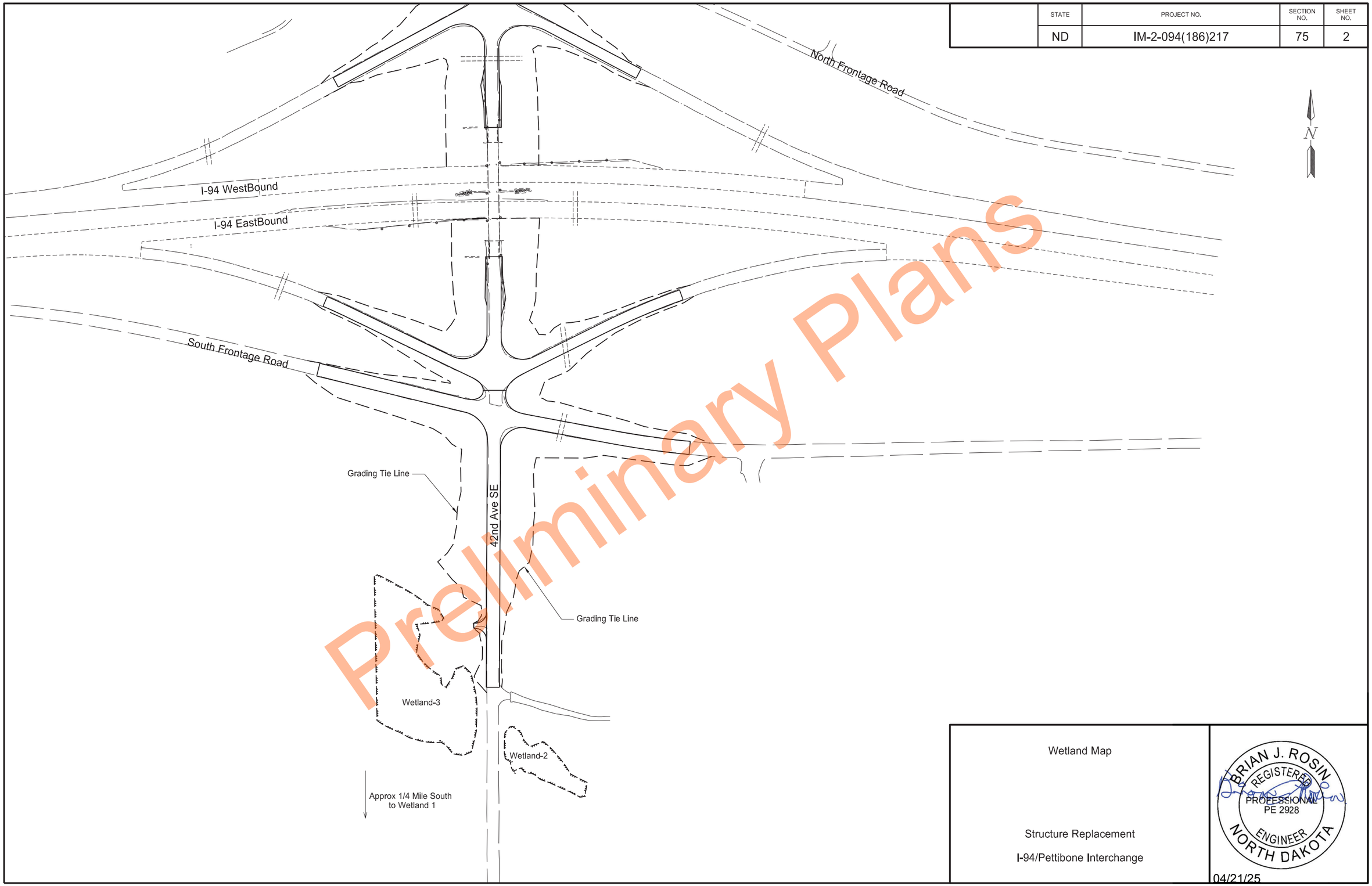
I-94/Pettibone Interchange




04/21/25

Docusign Envelope ID: 06A95AF6-185E-4D64-A5E4-1F402F0D85AA

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 75 | 2 |




Preliminary Plans

Wetland Map

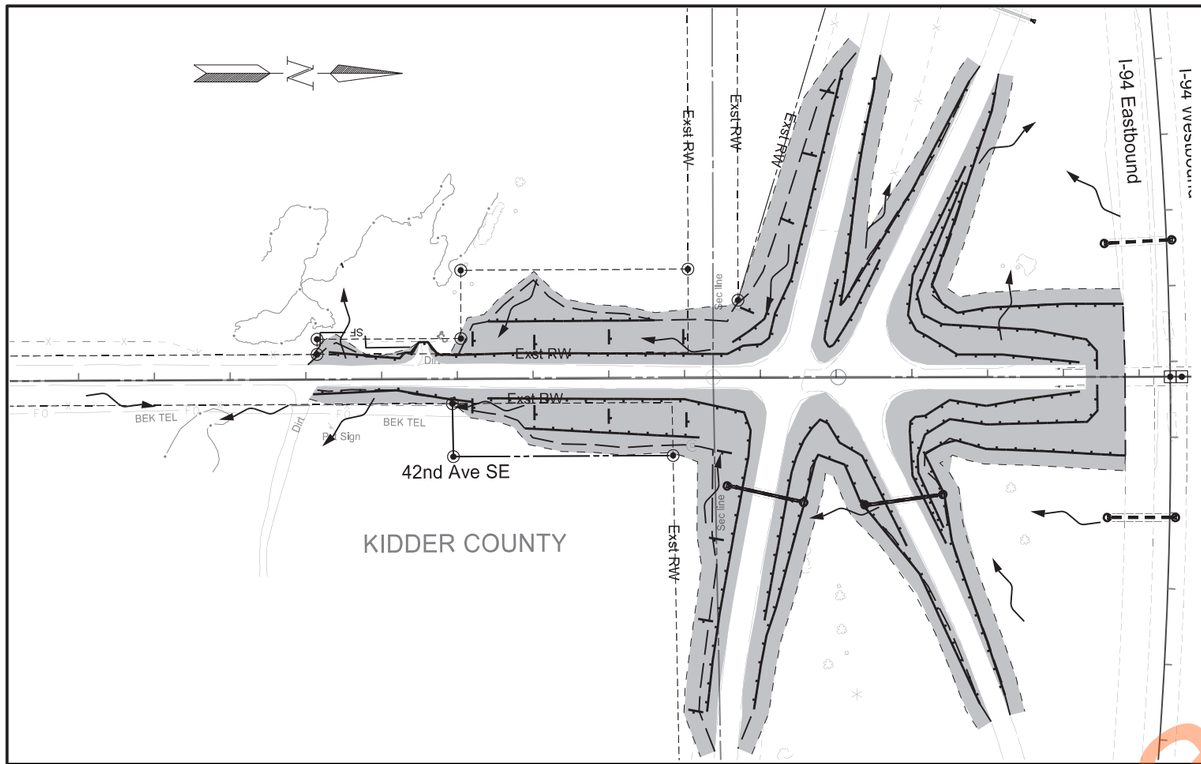
Structure Replacement

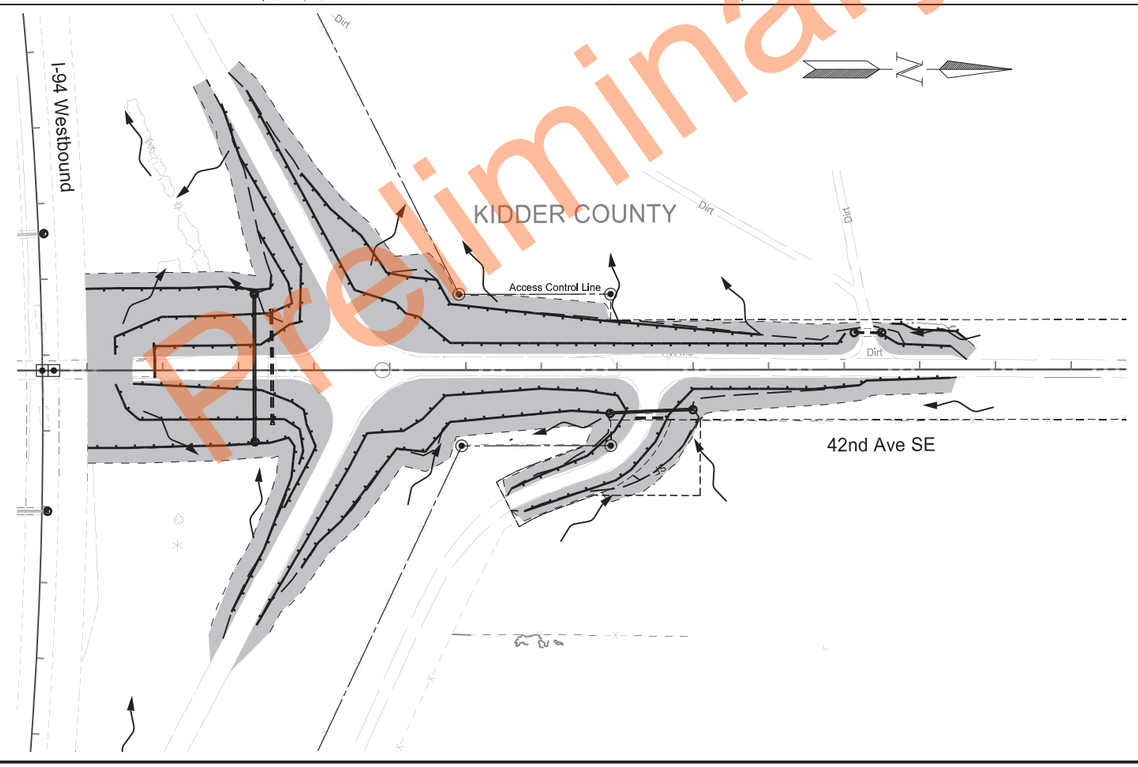
I-94/Pettibone Interchange

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Preliminary Plans

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 76 | 1 |

| SPEC | CODE | BID ITEM | QUANTITY | UNIT |
|---|---|---|---|---|
| 251 | 2000 | TEMPORARY COVER CROP | | ACRE |
| | | SW Quadrant | 1.89 | |
| | | SE Quadrant | 2.18 | |
| | | West Side Between Ramps | 2.10 | |
| | | East Side Between Ramps | 1.97 | |
| | | NW Quadrant | 1.47 | |
| | | NE Quadrant | 1.54 | |
| 253 | 101 | STRAW MULCH | | ACRE |
| | | SW Quadrant | 1.89 | |
| | | SE Quadrant | 2.18 | |
| | | West Side Between Ramps | 2.10 | |
| | | East Side Between Ramps | 1.97 | |
| | | NW Quadrant | 1.47 | |
| | | NE Quadrant | 1.54 | |
| 260 | 100 | SILT FENCE UNSUPPORTED | | LF |
| | | SW Quadrant | 175 | |
| | | NE Quadrant | 150 | |
| 260 | 101 | REMOVE SILT FENCE UNSUPPORTED | | LF |
| | | SW Quadrant | 175 | |
| | | NE Quadrant | 150 | |
| 261 | 112 | FIBER ROLLS 12IN | | LF |
| | | SW Quadrant | 2365 | |
| | | SE Quadrant | 2715 | |
| | | West Side Between Ramps | 2845 | |
| | | East Side Between Ramps | 2640 | |
| | | NW Quadrant | 1930 | |
| | | NE Quadrant | 2040 | |
| 261 | 113 | REMOVE FIBER ROLLS 12IN | | LF |
| | | SW Quadrant | 2365 | |
| | | SE Quadrant | 2715 | |
| | | West Side Between Ramps | 2845 | |
| | | East Side Between Ramps | 2640 | |
| | | NW Quadrant | 1930 | |
| | | NE Quadrant | 2040 | |

12" Fiber Roll

Temp Seeding & Straw Mulch

SF Silf Fence

Temporary Erosion Control

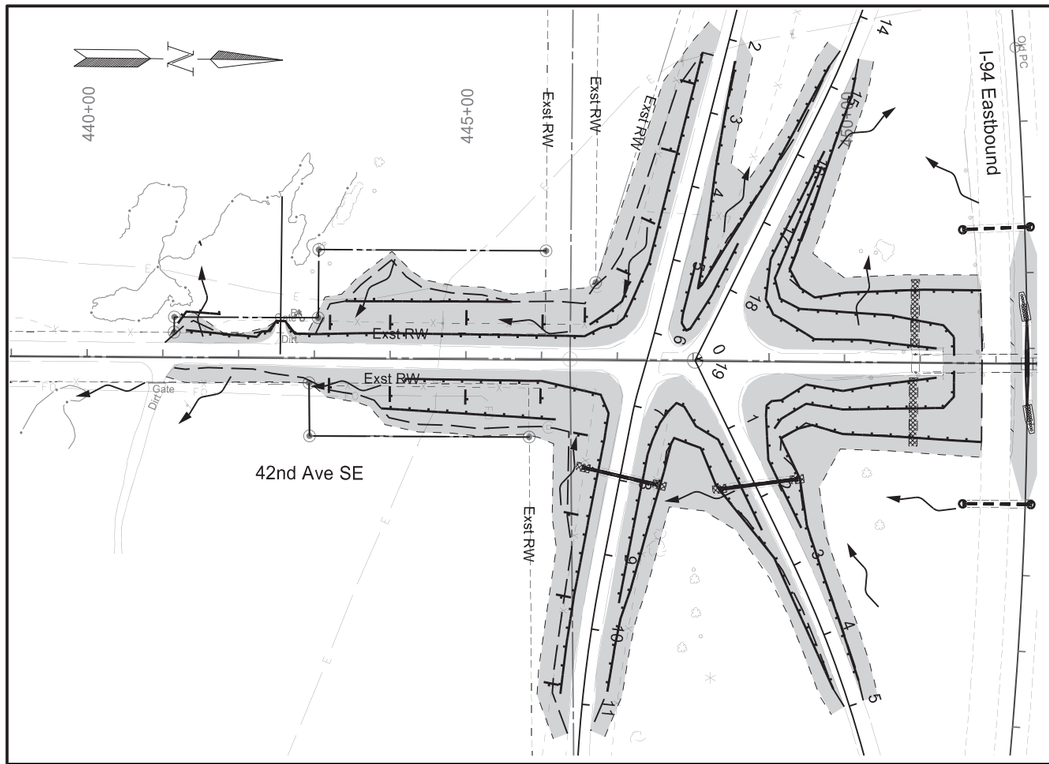
Structure Replacement

I-94/Pettibone Interchange

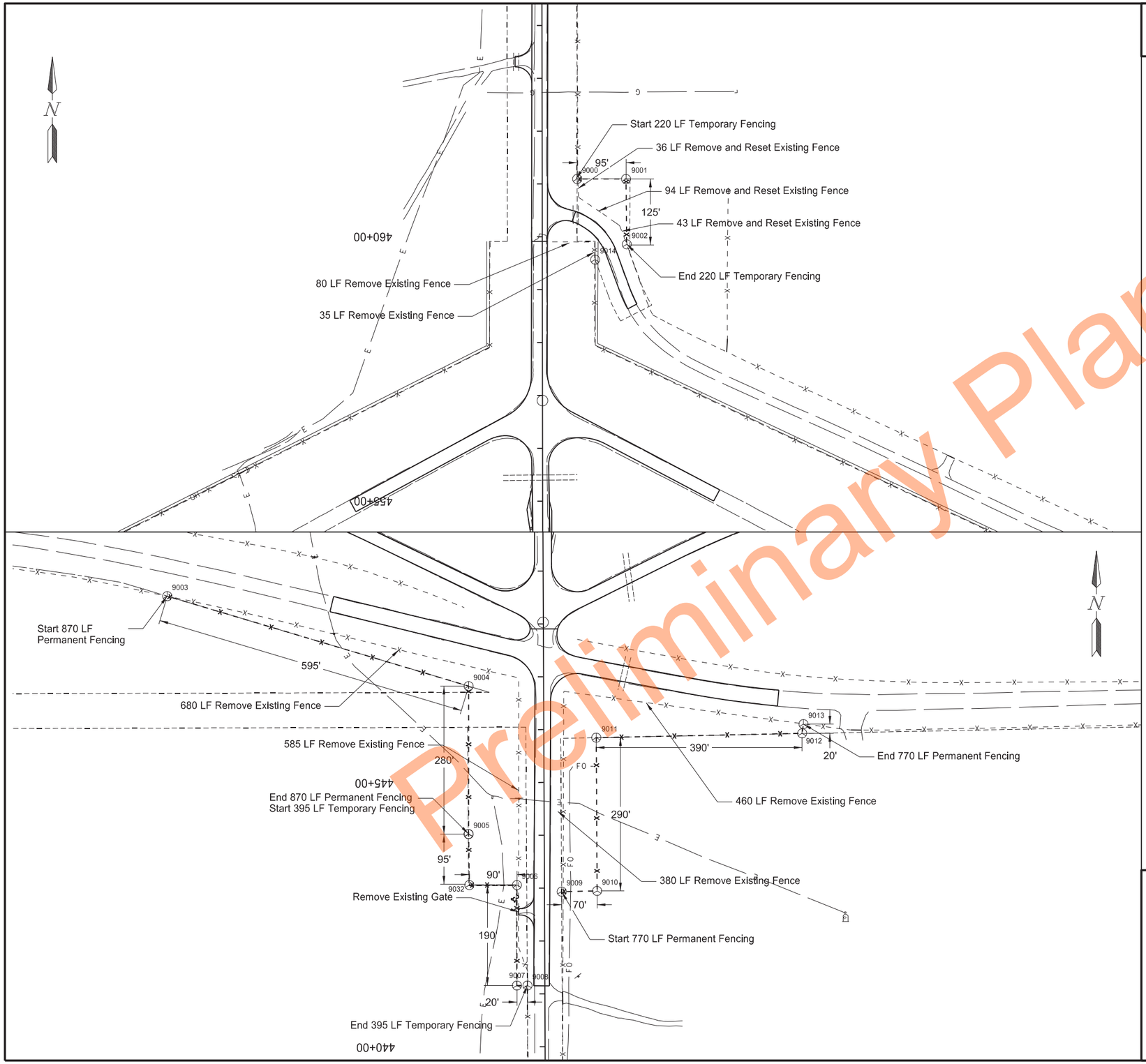
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440+00
445+00
Exst RW
Exst RW
Exst RW
I-94 Eastbound
Exst RW
Exst RW
42nd Ave SE
Exst RW
Gate
Dirt
Pvt Mb
Pvt Mb
Dirt
Dirt
Dirt

Docusign Envelope ID: 2B42812B-194C-45CA-896F-93D53B71AF81




Preliminary Plans

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 80 | 1 |

| SPEC | CODE | BID ITEM | QUANTIT | UNIT |
|---|---|---|---|---|
| 202 | 312 | REMOVE EXISTING FENCE | | LF |
| | | North Frontage Road | 115 | |
| | | SE Corner | 840 | |
| | | SW Corner | 1265 | |
| 752 | 110 | FENCE BARBED WIRE 3 STRAND-STEEL POST | | LF |
| | | **Temporary** | | |
| | | North Frontage Road | 220 | |
| | | SW Corner | 395 | |
| | | **Permanent** | | |
| | | SE Corner | 770 | |
| | | SW Corner | 875 | |
| 752 | 922 | FENCE REMOVE & RESET | | LF |
| | | North Frontage Road | 173 | |
| 752 | 3150 | CORNER ASSEMBLY BARBED WIRE-WOOD POST | | EA |
| | | Points: 9004, 9005, 9009, 9010, 9011, 9012, 9013 | 7 | |
| 752 | 3995 | DOUBLE BRACE ASSEMBLY-WOOD POST | | EA |
| | | Point: 9003 | 1 | |

Fencing Points (Alignment SCL_42nd_Ave)

| POINT | NORTHING | EASTING | STATION | OFFSET |
|---|---|---|---|---|
| 9000 | 444814.875 | 2200504.818 | 461+09.47 | 66' RT |
| 9001 | 444814.875 | 2200597.409 | 461+09.35 | 159' RT |
| 9002 | 444691.262 | 2200598.743 | 459+85.74 | 160' RT |
| 9003 | 443557.861 | 2199729.411 | 448+53.41 | 711' LT |
| 9004 | 443387.652 | 2200299.546 | 446+82.50 | 141' LT |
| 9006 | 443011.171 | 2200390.953 | 443+06.13 | 52' LT |
| 9007 | 442821.171 | 2200390.953 | 441+16.13 | 52' LT |
| 9008 | 442821.171 | 2200410.953 | 441+16.02 | 32' LT |
| 9009 | 442998.776 | 2200475.57 | 442+93.26 | 33' RT |
| 9010 | 443000.103 | 2200542.651 | 442+94.21 | 100' RT |
| 9011 | 443290.129 | 2200541.02 | 445+84.24 | 100' RT |
| 9012 | 443298.334 | 2200930.484 | 445+90.25 | 490' RT |
| 9013 | 443315.754 | 2200933.011 | 446+07.66 | 492' RT |
| 9014 | 444662.306 | 2200538.904 | 459+56.85 | 100' RT |
| 9029 | 443107.652 | 2200299.546 | 444+03.12 | 142' LT |
| 9032 | 443011.171 | 2200300.953 | 443+06.63 | 142' LT |

Fencing Layout
Phase 1

Structure Replacement

I-94/Pettibone Interchange

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08/27/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 80 | 2 |

| SPEC | CODE | BID ITEM | QUANTITY | UNIT |
|---|---|---|---|---|
| 202 | 312 | REMOVE EXISTING FENCE | | LF |
| | | NW Corner | 1321 | |
| | | NE Corner | 1267 | |
| | | North Frontage Road (Temp Fencing) | 220 | |
| | | SW Corner | 915 | |
| | | SW Corner (Temp Fencing) | 395 | |
| | | SE Corner | 1040 | |
| 752 | 110 | FENCE BARBED WIRE 3 STRAND-STEEL POST | | LF |
| | | NW Corner | 1321 | |
| | | NE Corner | 1382 | |
| | | SW Corner | 1227 | |
| | | SE Corner | 1040 | |
| 752 | 993 | FENCE TERMINAL | | EA |
| | | Points: 9026, 9027, 9032, 9033 | 4 | |
| 752 | 2100 | VEHICLE GATE | | EA |
| | | Point: 9030-9031 | 1 | |
| 752 | 3150 | CORNER ASSEMBLY BARBED WIRE-WOOD POST | | EA |
| | | Points: 9015, 9016, 9017, 9018, 9019, 9020, 9021, 9024, 9029 | 9 | |
| 752 | 3995 | DOUBLE BRACE ASSEMBLY-WOOD POST | | EA |
| | | Points: 9000, 9002, 9008, 9025, 9028 | 5 | |
| 752 | 5000 | SNOW FENCE | | LF |
| | | NW Corner: Point 9022-9023 | 832 | |

Fencing Points (Alignment SCL_42nd_Ave)

| POINT | NORTHING | EASTING | STATION | OFFSET |
|---|---|---|---|---|
| 9000 | 444814.57 | 2200506.648 | 461+09.16 | 68' RT |
| 9002 | 444685.801 | 2200600.514 | 459+80.27 | 162' RT |
| 9005 | 443107.652 | 2200299.546 | 444+03.12 | 142' LT |
| 9008 | 442821.171 | 2200410.953 | 441+16.02 | 33' LT |
| 9015 | 444726.491 | 2200585.328 | 460+20.98 | 146' RT |
| 9016 | 444779.805 | 2200507.146 | 460+74.39 | 68' RT |
| 9017 | 444695.404 | 2200537.787 | 459+89.95 | 99' RT |
| 9018 | 444499.903 | 2200537.91 | 457+94.45 | 99' RT |
| 9019 | 444695.785 | 2200340.254 | 459+90.58 | 99' LT |
| 9020 | 444495.694 | 2200339.207 | 457+90.49 | 100' LT |
| 9021 | 444022.912 | 2199402.273 | 453+18.87 | 1037' LT |
| 9022 | 444111.245 | 2199595.324 | 454+06.96 | 844' LT |
| 9023 | 444488.346 | 2200342.574 | 457+83.14 | 97' LT |
| 9024 | 444029.096 | 2201539.065 | 453+22.40 | 1099' RT |
| 9025 | 443735.257 | 2199401.099 | 450+31.22 | 1039' LT |
| 9026 | 443536.108 | 2200291.359 | 448+30.96 | 149' LT |
| 9027 | 443476.021 | 2200504.876 | 447+70.61 | 64' RT |
| 9028 | 443396.113 | 2201541.333 | 446+89.42 | 1101' RT |
| 9030 | 442966.432 | 2200394.204 | 442+61.37 | 49' LT |
| 9031 | 442954.432 | 2200394.204 | 442+49.37 | 49' LT |
| 9032 | 444695.926 | 2200457.742 | 459+90.57 | 19' RT |
| 9033 | 444695.785 | 2200410.254 | 459+90.49 | 29' LT |

Reset 173 LF Existing Fence

1051' - R/W Fence
Remove and Replace

832' - Snow Fence
(offset 8' inside and parallel to R/W fence)

1107' - R/W Fence
Remove and Replace

915' - R/W Fence
Remove and Replace

1040' - R/W Fence
Remove and Replace

595'
Installed During Phase 1

280'
Installed During Phase 1

Vehicle Gate

70'*
80'**
200'*
160'*
35'**
170'
130'

Note:
* Remove and Replace Existing R/W Fencing
** Replace R/W Fencing Removed in Phase 1

Fencing Layout
Phase 2

Structure Replacement

I-94/Pettibone Interchange

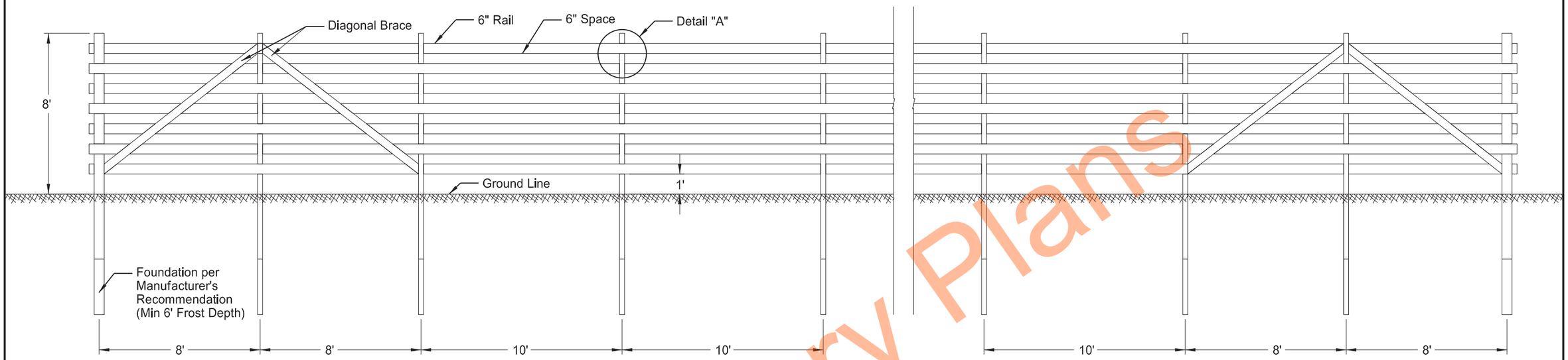
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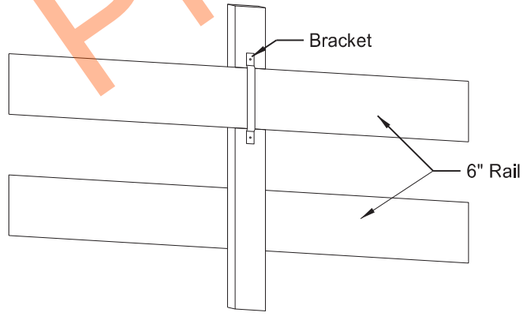
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Preliminary Plans

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 80 | 3 |




Detail "A"

Preliminary Plans

Snow Fence Detail

Structure Replacement

I-94/Pettibone Interchange

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08/27/25

# PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I-94/Pettibone Interchange

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094-(186)217 | 81 | 1 |

## HORIZONTAL ALIGNMENT

| PNT | STATION | NORTHING | EASTING |
|---|---|---|---|
| I 94 (SCL_I94) | | | |
| Begin | 11359+72.78 | 443,544.78 | 2,189,909.29 |
| PC | 11410+11.80 | 443,533.43 | 2,194,948.29 |
| Sec line Xing | 11411+93.69 Bk Tan | 443,533.02 | 2,195,130.18 |
| PI Curve | 11415+17.47 | 443,532.29 | 2,195,453.96 |
| PT | 11420+22.48 | 443,575.70 | 2,195,957.76 |
| PC | 11461+02.06 | 443,925.88 | 2,200,022.28 |
| Station Equation I 94 (SCL_I94) & 42nd Ave SE (SCL_42nd_Ave) | | | |
| I 94 | 11465+20.24 | 443,946.55 | 2,200,439.86 |
| 42nd Ave SE | 452+41.22 | 443,946.55 | 2,200,439.86 |
| Rge line Xing | 11465+21.16 Bk Tan | 443,961.86 | 2,200,439.84 |
| PI Curve | 11467+70.66 | 443,983.28 | 2,200,688.42 |
| PT | 11474+33.24 | 443,885.75 | 2,201,349.87 |
| PC | 11483+95.44 | 443,745.40 | 2,202,301.77 |
| PI Curve | 11493+20.52 | 443,610.46 | 2,203,216.96 |
| PT | 11502+41.60 | 443,624.08 | 2,204,141.95 |
| PC | 11538+34.48 | 443,676.97 | 2,207,734.43 |
| PI Curve | 11543+41.63 | 443,684.45 | 2,208,241.53 |
| PT | 11548+48.67 | 443,709.87 | 2,208,748.04 |
| POT | 11570+00.00 | 443,817.76 | 2,210,896.66 |
| PC | 11669+91.50 | 444,318.83 | 2,220,875.59 |
| Sec line Xing | 11676+56.74 Bk Tan | 444,352.19 | 2,221,539.99 |
| PI Curve | 11676+58.68 | 444,352.29 | 2,221,541.93 |
| PT | 11683+24.36 | 444,308.19 | 2,222,207.65 |
| TS | 11702+09.23 | 444,183.62 | 2,224,088.40 |
| SC | 11704+09.23 | 444,168.95 | 2,224,287.86 |
| PI Spiral | 11718+01.69 | 444,078.36 | 2,225,677.38 |
| Sec line Xing | 861.90' from ST | 443,610.16 | 2,226,238.19 |
| CS | 11730+94.70 | 443,184.84 | 2,226,745.37 |
| Sec line Xing | 49.61' from ST | 443,089.30 | 2,226,862.08 |
| ST | 11732+94.70 | 443,057.79 | 2,226,899.82 |
| End | 11743+29.14 | 442,394.84 | 2,227,693.90 |

## CURVE DATA

ARC DEFINITION

| Curve | | Curve | |
|---|---|---|---|
| PI STA | = 11415+17.47 | PI STA | = 11676+58.68 |
| Delta | = 5° 03' 12" (LT) | Delta | = 6° 39' 51" (RT) |
| Da | = 0° 30' 00" | Da | = 0° 30' 00" |
| R | = 11,459.19' | R | = 11,459.19' |
| T | = 505.67' | T | = 667.18' |
| L | = 1,010.69' | L | = 1,332.85' |
| Curve | | Spiral Curve | |
| PI STA | = 11467+70.66 | PI STA | = 11718+01.69 |
| Delta | = 13° 18' 42" (RT) | Delta | = 33° 34' 04" (RT) |
| Da | = 1° 00' 00" | Da | = 1° 15' 00" |
| R | = 5,729.65' | R | = 4,583.75' |
| T | = 668.60' | Ls | = 200.00' |
| L | = 1,331.18' | Sc | = 1° 15' 00" |
| | | Ts | = 200.00' |
| Curve | | L | = 2,685.47' |
| PI STA | = 11493+20.52 | | |
| Delta | = 9° 13' 51" (LT) | | |
| Da | = 0° 30' 00" | | |
| R | = 11,459.19' | | |
| T | = 925.08' | | |
| L | = 1,846.16' | | |
| Curve | | | |
| PI STA | = 11543+41.63 | | |
| Delta | = 2° 01' 42" (LT) | | |
| Da | = 0° 12' 00" | | |
| R | = 28,647.90' | | |
| T | = 507.15' | | |
| L | = 1,014.19' | | |

## US PUBLIC LAND SURVEY DATA

| CORNER | IRN | NORTHING | EASTING |
|---|---|---|---|
| T-139-N R-70-W | | | |
| NW Cor Sec 7 | 1-C | 443,343.13 | 2,200,440.61 |
| W Qtr Cor Sec 19 | 1-H | 430,133.77 | 2,200,496.89 |
| SW Cor Sec 19 | 1-J | 427,486.82 | 2,200,508.01 |
| NE Cor Sec 7 | 3-C | 443,447.09 | 2,205,695.60 |
| NW Cor Sec 9 | 5-C | 443,484.81 | 2,210,958.79 |
| NW Cor Sec 10 | 7-C | 443,518.91 | 2,216,280.50 |
| SE Cor Sec 9 | 7-E | 438,182.03 | 2,216,325.16 |
| NW Cor Sec 2 | 9-A | 448,841.61 | 2,221,529.48 |
| NE Cor Sec 10 | 9-C | 443,560.84 | 2,221,541.84 |
| SW Cor Sec 11 | 9-E | 438,278.73 | 2,221,608.80 |
| NW Cor Sec 1 | 11-A | 448,897.31 | 2,226,807.15 |
| W Qtr Cor Sec 1 | 11-B | 446,257.01 | 2,226,833.57 |
| NW Cor Sec 12 | 11-C | 443,616.70 | 2,226,859.96 |
| SW Cor Sec 12 | 11-E | 438,332.58 | 2,226,881.22 |
| N Qtr Cor Sec 12 | 12-C | 443,643.65 | 2,229,498.37 |
| S Qtr Cor Sec 12 | 12-E | 438,352.90 | 2,229,525.55 |
| T-139-N R-71-W | | | |
| N Qtr Cor Sec 10 | 8-C | 443,302.55 | 2,187,236.16 |
| S Qtr Cor Sec 10 | 8-E | 438,004.26 | 2,187,231.89 |
| NE Cor Sec 3 | 9-A | 448,588.53 | 2,189,837.79 |
| SE Cor Sec 3 | 9-C | 443,339.80 | 2,189,912.19 |
| SW Cor Sec 11 | 9-E | 438,031.65 | 2,189,897.98 |
| NW Cor Sec 1 | 11-A | 448,623.13 | 2,195,139.35 |
| NW Cor Sec 12 | 11-C | 443,328.02 | 2,195,129.81 |
| NE Cor Sec 1 | 13-A | 448,623.13 | 2,200,434.05 |
| SE Cor Sec 12 | 13-E | 438,067.61 | 2,200,470.28 |
| E Qtr Cor Sec 12 | 13-D | 440,705.37 | 2,200,455.44 |
| T-140-N R-70-W | | | |
| NE Cor Sec 33 | 7-L | 454,093.63 | 2,216,235.70 |

## SURVEY CONTROL POINTS

| PNT | NORTHING | EASTING | ELEV | STATION | OFFSET | ALIGNMENT | MONUMENT |
|---|---|---|---|---|---|---|---|
| PRIMARY CONTROL | | | | | | | |
| GPS 2 | 443,552.06 | 2,209,521.57 | 1,803.99 | 11556+13 | 196' Rt | SCL_I94 | #5 x 18" Rebar w/ 1 1/2" Alum Cap Mrk'd NDDOT CONTROL |
| GPS 1 | 443,906.95 | 2,216,705.40 | 1,792.30 | 11628+06 | 202' Rt | SCL_I94 | #5 x 18" Rebar w/ 1 1/2" Alum Cap Mrk'd NDDOT CONTROL |
| SECONDARY CONTROL | | | | | | | |
| BM V484 1982 | 443,691.79 | 2,189,883.04 | 1,776.54 | N/A | N/A | SCL_I94 | Rod in Casing |
| BM U484 | 443,681.28 | 2,195,095.68 | 1,786.16 | 11411+60 | 147' Lt | SCL_I94 | Rod in Casing |
| BM U484 2006 | 444,058.68 | 2,200,453.09 | 1,834.68 | 11465+34 | 112' Lt | SCL_I94 | Rod in Casing |
| BM S484 | 443,815.40 | 2,205,716.51 | 1,808.48 | 11518+18 | 168' Lt | SCL_I94 | Rod in Casing |
| BM R484 1982 | 443,988.25 | 2,210,943.02 | 1,801.51 | 11570+54 | 168' Lt | SCL_I94 | Rod in Casing |
| BM L484 1982 | 444,243.47 | 2,216,240.83 | 1,791.70 | 11623+58 | 157' Lt | SCL_I94 | Rod in Casing |
| RTK 30000 | 443,540.15 | 2,200,275.01 | 1,812.93 | 11463+37 | 402' Rt | SCL_I94 | #5 x 18" Rebar |
| RTK 35618 | 443,864.87 | 2,200,359.59 | 1,810.94 | 11464+37 | 80' Rt | SCL_I94 | #5 x 18" Rebar |
| RTK 35619 | 444,027.05 | 2,200,506.86 | 1,812.96 | 11465+87 | 80'Lt | SCL_I94 | #5 x 18" Rebar |
| RTK 34980 | 444,185.27 | 2,201,214.55 | 1,831.80 | 11472+63 | 279' Lt | SCL_I94 | #5 x 18" Rebar |
| RTK 34199 | 443,442.10 | 2,202,051.63 | 1,823.58 | 11481+92 | 337' Rt | SCL_I94 | #5 x 18" Rebar |
| RTK 30001 | 443,642.08 | 2,224,447.99 | 1,828.32 | 11706+40 | 506' Rt | SCL_I94 | #5 x 18" Rebar |

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

INITIALIZING BENCH MARK NDGPS Station (OPUS)

☒ NAVD-88 ☐ _____ ☐ GEOID12B ☒ GEOID18 ☐ _____

Date Survey Completed 10/12/22

☐ Assumed Coordinates

☒ All coordinates on this sheet are Kidder County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998515

REGISTERED PROFESSIONAL LAND SURVEYOR
KJ JOHNSON
LS-10169
DATE
NORTH DAKOTA
03/02/23

NOTES: Sheet 1 of 3

Alignment per NDDOT ROW Plat I-01-06(6)1958 and NDDOT Grading Plans IR-094(6)011 1958
Control part of NDDOT Project 2-094(187)221

Preliminary Plans

# PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I-94/Pettibone Interchange

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094-(186)217 | 81 | 2 |

## HORIZONTAL ALIGNMENT

| PNT | STATION | NORTHING | EASTING |
|---|---|---|---|
| 42nd Ave SE (SCL_42nd_Ave) | | | |
| Begin | 420+00.00 | 440,705.37 | 2,200,455.45 |
| Sec line Xing | 446+37.80 | 443,343.13 | 2,200,440.61 |
| Station Equation = 42nd Ave SE (SCL_42nd_Ave) & SW Ramp (PB_SW_Ramp) & SE Ramp (PB_SE_Ramp) | | | |
| 42nd Ave SE | 448+02.87 | 443,508.20 | 2,200,440.40 |
| SW Ramp | 99+03.90 | 443,508.20 | 2,200,440.40 |
| SE Ramp | 20+00.00 | 443,508.20 | 2,200,440.40 |
| Station Equation = 42nd Ave SE (SCL_42nd_Ave) & NW Ramp (PB_NW_Ramp) & NE Ramp (PB_NE_Ramp) | | | |
| 42nd Ave SE | 456+90.24 | 444,395.57 | 2,200,439.30 |
| NW Ramp | 60+00.00 | 444,395.57 | 2,200,439.30 |
| NE Ramp | 56+81.29 | 444,395.57 | 2,200,439.30 |
| End | 476+86.75 | 446,392.07 | 2,200,436.82 |
| | | | |
| NW Ramp (PB_NW_Ramp) | | | |
| Begin/ 42nd Ave SE | 60+00.00 | 444,395.57 | 2,200,439.30 |
| PC | 66+18.80 | 444,101.24 | 2,199,894.99 |
| PI Curve | 68+97.12 | 443,968.85 | 2,199,650.17 |
| PT | 71+68.40 | 443,939.19 | 2,199,373.43 |
| End | 79+58.80 | 443,854.95 | 2,198,587.53 |
| NE Ramp (PB_NE_Ramp) | | | |
| Begin | 40+00.00 | 443,840.74 | 2,202,008.60 |
| PC | 45+52.22 | 443,935.17 | 2,201,464.52 |
| PI Curve | 47+83.39 | 443,974.70 | 2,201,236.75 |
| PT | 50+10.77 | 444,082.60 | 2,201,032.30 |
| End/ 42nd Ave SE | 56+81.29 | 444,395.57 | 2,200,439.30 |
| SE Ramp (PB_SE_Ramp) | | | |
| Begin/ 42nd Ave SE | 20+00.00 | 443,508.20 | 2,200,440.40 |
| PC | 22+85.87 | 443,635.33 | 2,200,696.45 |
| PI Curve | 27+50.49 | 443,841.95 | 2,201,112.59 |
| PT | 31+88.27 | 443,783.54 | 2,201,573.52 |
| End | 37+82.85 | 443,708.80 | 2,202,163.38 |

## CURVE DATA

ARC DEFINITION

| | | |
|---|---|---|
| Curve | | |
| PI STA | = | 68+97.12 |
| Delta | = | 22° 17' 01" (RT) |
| Da | = | 4° 03' 16" |
| R | = | 1,413.15' |
| T | = | 278.32' |
| L | = | 549.61' |
| Curve | | |
| PI STA | = | 47+83.39 |
| Delta | = | 17° 58' 38" (RT) |
| Da | = | 3° 55' 14" |
| R | = | 1,461.44' |
| T | = | 231.17' |
| L | = | 458.55' |
| Curve | | |
| PI STA | = | 27+50.49 |
| Delta | = | 33° 37' 38" (RT) |
| Da | = | 3° 43' 35" |
| R | = | 1,537.55' |
| T | = | 464.61' |
| L | = | 902.40' |

## REFERENCE MARKERS

| # | NORTHING | EASTING | STATION | OFFSET | ALIGN |
|---|---|---|---|---|---|
| 215 | 443,464.83 | 2,189,122.10 | N/A | N/A | N/A |
| 215 | 443,602.27 | 2,189,118.22 | N/A | N/A | N/A |
| 217 | 443,829.62 | 2,199,679.84 | 11457+53 | 67' Rt | SCL_I94 |
| 217 | 443,964.24 | 2,199,669.98 | 11457+54 | 68' Lt | SCL_I94 |
| 222 | 443,749.80 | 2,225,992.76 | 11721+61 | 68' Lt | SCL_I94 |

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

INITIALIZING BENCH MARK
NDGPS Station (OPUS)

☒ NAVD-88 ☐ _____ ☐ GEOID12B ☐ _____ ☒ GEOID18

Date Survey Completed 10/12/22

☐ Assumed Coordinates

☒ All coordinates on this sheet are Kidder County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998515

REGISTERED PROFESSIONAL LAND SURVEYOR
KEVIN J. JOHNSON
LS-10169
DATE
NORTH DAKOTA
03/02/23

NOTES: Sheet 2 of 3
Alignment per NDDOT ROW Plat I-01-06(6)1958 and NDDOT Grading Plans IR-094(6)011 1958
Control part of NDDOT Project 2-094(187)221

Preliminary Plans

# PRELIMINARY SURVEY COORDINATE AND CURVE DATA - I-94/Pettibone Interchange

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094-(186)217 | 81 | 3 |

## HORIZONTAL ALIGNMENT

| PNT | STATION | NORTHING | EASTING |
|---|---|---|---|
| SW Ramp (PB_SW_Ramp) | | | |
| Begin | 80+00.00 | 443,753.34 | 2,198,596.29 |
| PC | 87+97.31 | 443,806.69 | 2,199,391.82 |
| PI Curve | 91+75.90 | 443,832.02 | 2,199,769.55 |
| PT | 95+37.56 | 443,667.45 | 2,200,110.49 |
| End/ 42nd Ave SE | 99+03.90 | 443,508.20 | 2,200,440.40 |

## CURVE DATA

ARC DEFINITION

Curve

| | | |
|---|---|---|
| PI STA | = | 91+75.90 |
| Delta | = | 29° 36' 13" (RT) |
| Da | = | 3° 59' 57" |
| R | = | 1,432.69' |
| T | = | 378.58' |
| L | = | 740.25' |

Preliminary Plans

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

INITIALIZING BENCH MARK
NDGPS Station (OPUS)

☒ NAVD-88 ☐ _____

☐ GEOID12B ☐ _____

☒ GEOID18

Date Survey Completed 10/12/22

☐ Assumed Coordinates

☒ All coordinates on this sheet are Kidder County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998515

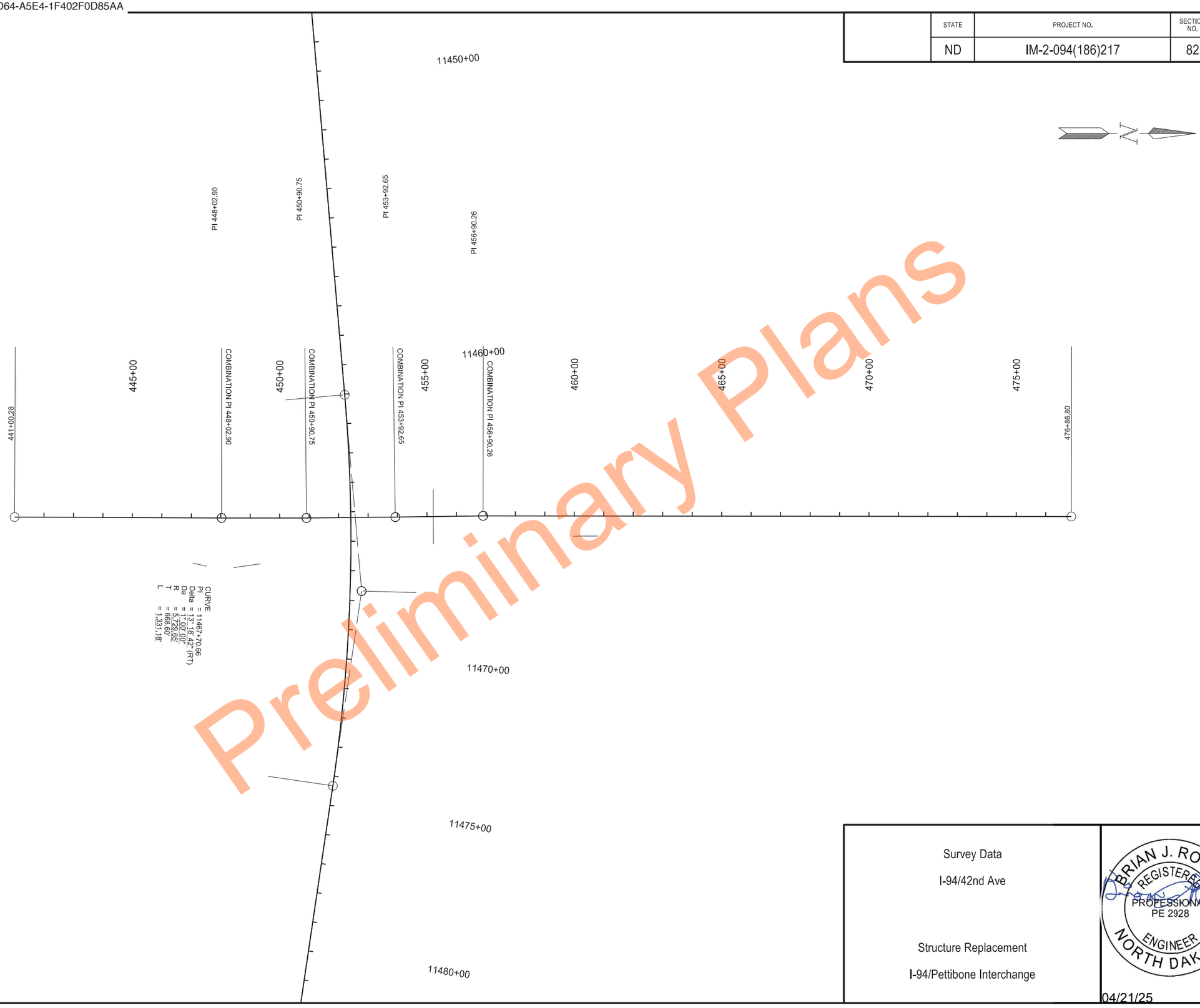
REGISTERED PROFESSIONAL LAND SURVEYOR
STEFAN JOHNSON
LS-10169
DATE
NORTH DAKOTA
03/02/23

NOTES: Sheet 3 of 3

Alignment per NDDOT ROW Plat I-01-06(6)1958 and NDDOT Grading Plans IR-094(6)011 1958
Control part of NDDOT Project 2-094(187)221

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 82 | 1 |




Preliminary Plans

Survey Data

I-94/42nd Ave

Structure Replacement

I-94/Pettibone Interchange

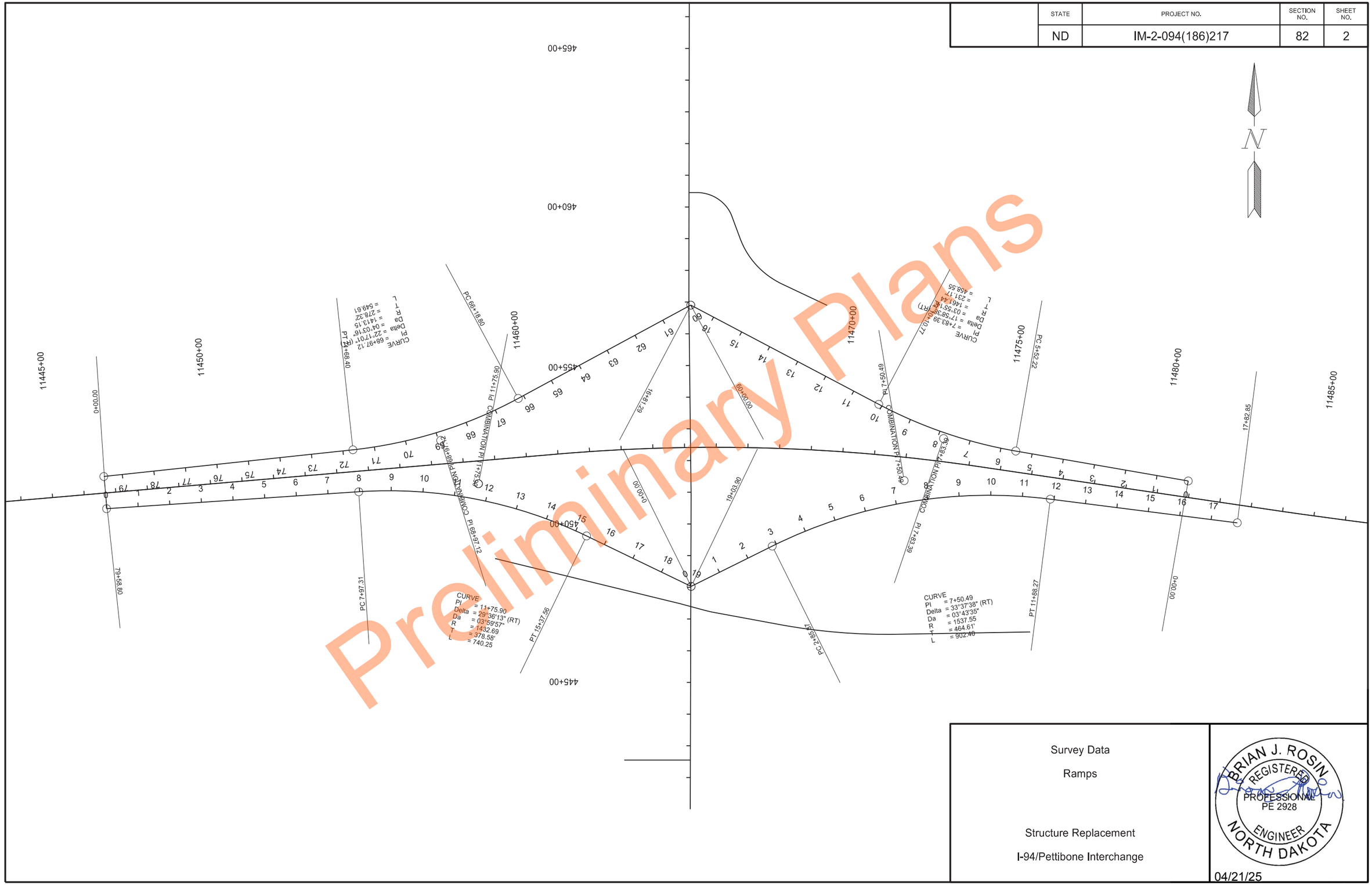
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04/21/25

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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 82 | 2 |




Preliminary Plans

Survey Data

Ramps

Structure Replacement

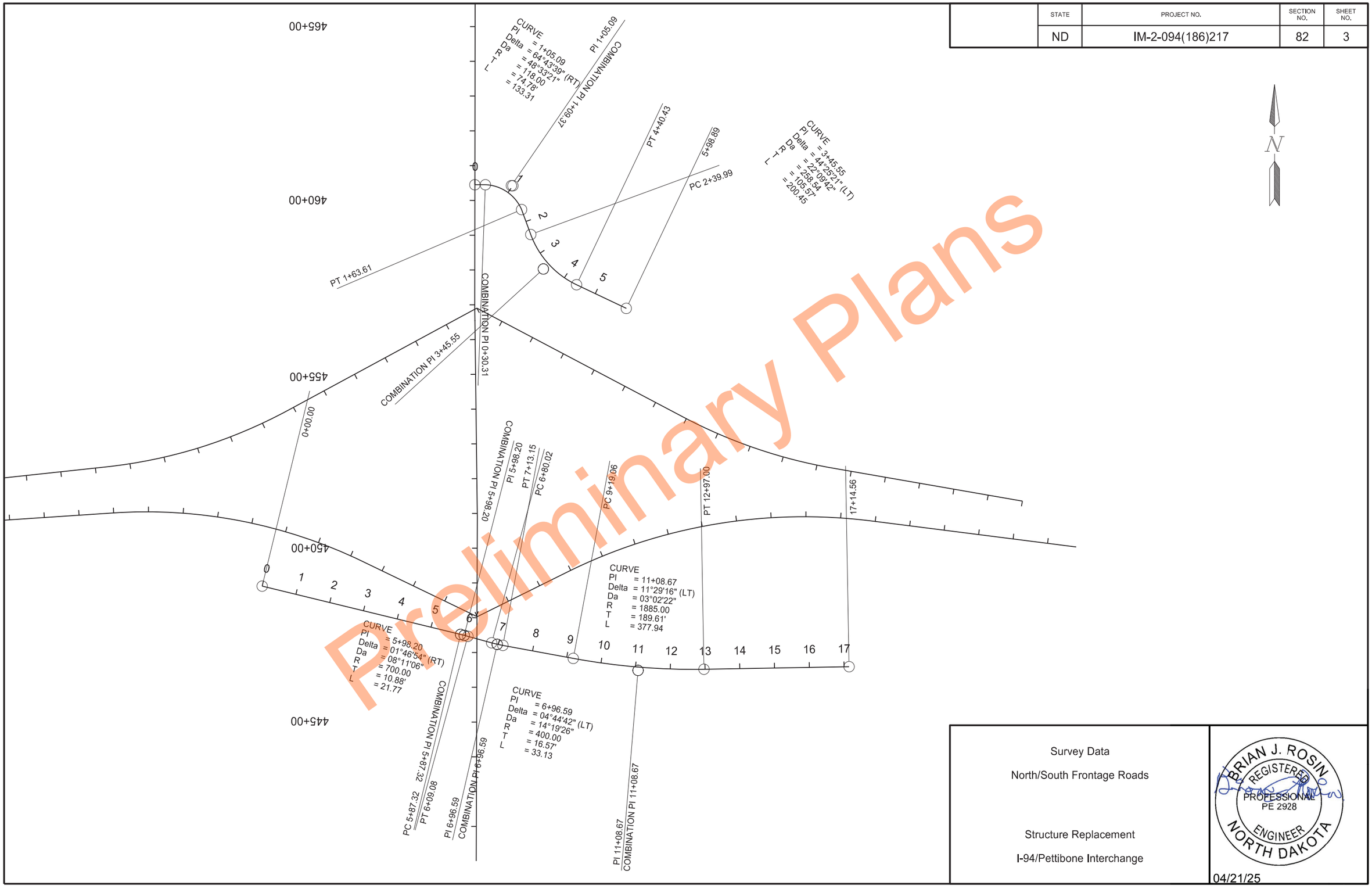
I-94/Pettibone Interchange

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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 82 | 3 |




Preliminary Plans

Survey Data

North/South Frontage Roads

Structure Replacement

I-94/Pettibone Interchange

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04/21/25

Docusign Envelope ID: 06A95AF6-185E-4D64-A5E4-1F402F0D85AA

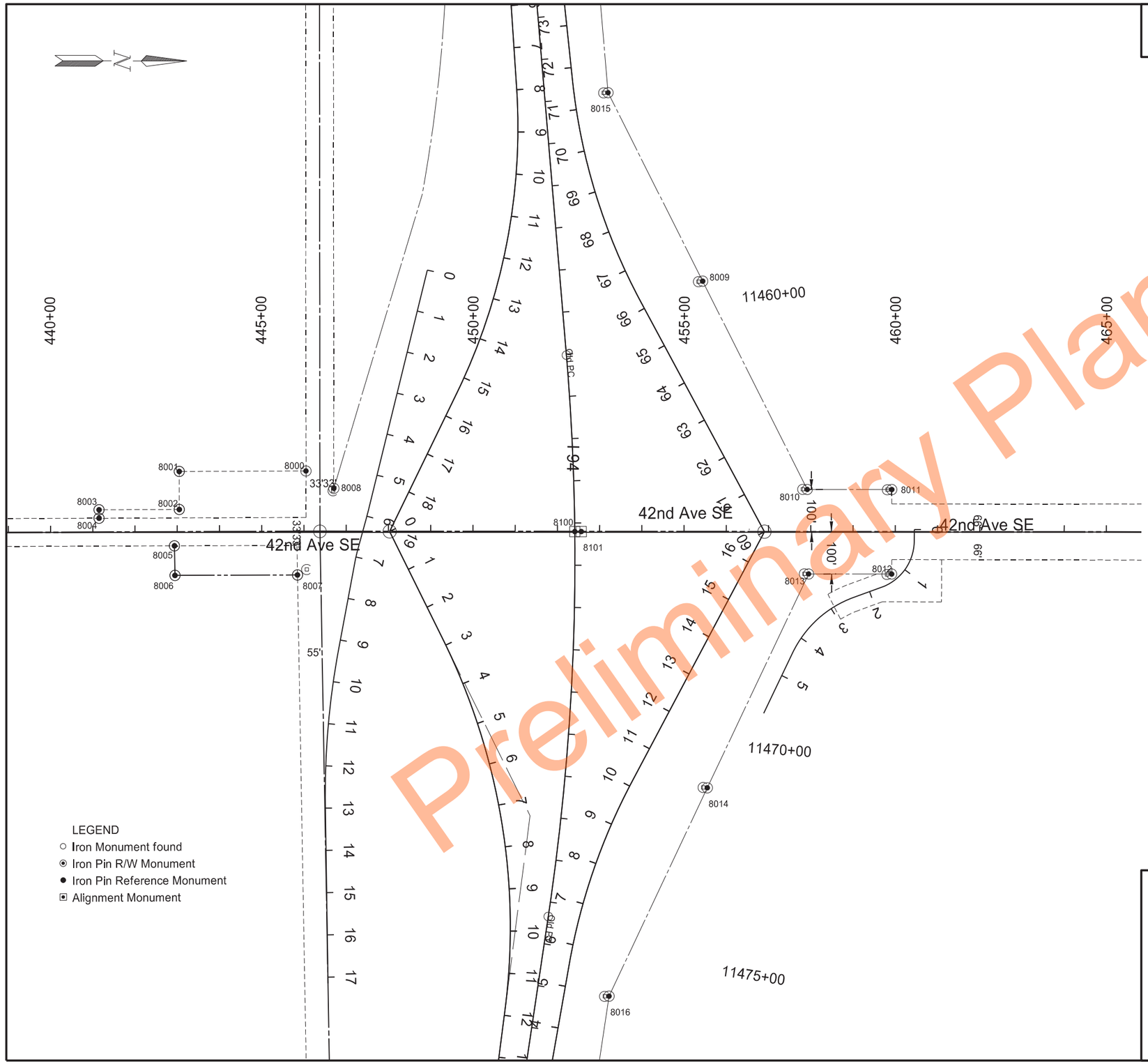
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 82 | 4 |

## R/W Monuments (Alginment SCL_42nd_Ave)

| POINT | NORTHING | EASTING | STATION | OFFSET |
|---|---|---|---|---|
| 8004 | 442820.04 | 2200410.55 | 441+14.89 | 33' LT |
| 8003 | 442819.99 | 2200390.55 | 441+14.94 | 53' LT |
| 8005 | 442998.75 | 2200475.55 | 442+93.23 | 33' RT |
| 8006 | 443000.14 | 2200545.54 | 442+94.22 | 103' RT |
| 8002 | 443009.98 | 2200389.48 | 443+04.94 | 53' LT |
| 8001 | 443009.73 | 2200299.48 | 443+05.19 | 143' LT |
| 8007 | 443290.16 | 2200543.91 | 445+84.25 | 103' RT |
| 8000 | 443309.72 | 2200297.79 | 446+05.19 | 143' LT |
| 8008 | 443375.84 | 2200338.84 | 446+70.63 | 101.7' LT |
| 8015 | 444023.22 | 2199401.06 | 453+19.18 | 1038.7' LT |
| 8016 | 444029.81 | 2201539.29 | 453+23.11 | 1099.5' RT |
| 8009 | 444248.19 | 2199846.63 | 455+43.60 | 592.9' LT |
| 8014 | 444261.46 | 2201045.74 | 455+55.37 | 606.3' RT |
| 8010 | 444496.73 | 2200339.18 | 457+91.52 | 100' LT |
| 8013 | 444500.30 | 2200539.17 | 457+94.84 | 100' RT |
| 8012 | 444697.13 | 2200538.93 | 459+91.67 | 100' RT |
| 8011 | 444696.88 | 2200338.93 | 459+91.67 | 100' LT |

## Alignment Monuments (Alginment SCL_42nd_Ave)

| POINT | NORTHING | EASTING | STATION | OFFSET |
|---|---|---|---|---|
| 8100 | 443946.55 | 2200439.86 | 452+41.22 | 0 |
| 8101 | 443961.86 | 2200439.84 | 452+56.53 | 0 |




Preliminary Plans

Note: Monuments 8000-8004 are pins only, no posts.

R/W Monuments & Alignment Monuments

Structure Replacement

I-94 Pettibone Interchange

BRIAN J. ROSIN REGISTERED PROFESSIONAL PE 2928 ENGINEER NORTH DAKOTA

04/21/25

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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 100 | 1 |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED BY PHASE NO. 1 | 2 | 3 | | TOTAL AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| E5-1-48 | 48"x48" | EXIT GORE | | | | | | 35 | |
| G20-1-60 | 60"x24" | ROAD WORK NEXT ___ MILES | | | | | | 28 | |
| G20-1b-60 | 60"x24" | NO WORK IN PROGRESS (Sign and installation only) | | | | | | 18 | |
| **G20-2-48** | **48"x24"** | **END ROAD WORK** | | **4** | **7** | | **7** | **26** | **182** |
| G20-4-36 | 36"x18" | PILOT CAR FOLLOW ME (Mounted to back of pilot car) | | | | | | 18 | |
| G20-4b-36 | 36"x30" | WAIT FOR PILOT CAR | | | | | | 18 | |
| G20-50a-72 | 72"x36" | ROAD WORK NEXT ___ MILES RT & LT ARROWS | | | | | | 43 | |
| G20-52a-72 | 72"x24" | ROAD WORK NEXT ___ MILES RT or LT ARROW | | | | | | 36 | |
| G20-55-96 | 96"x48" | SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT | | | | | | 59 | |
| **G20-55-96** | **96"x48"** | **SPEED LIMIT ENFORCED - MINIMUM FEE $150 WHEN WORKERS PRESENT** | | **4** | **4** | | **4** | **59** | **236** |
| **M1-1-24** | **24"x24"** | **INTERSTATE ROUTE MARKER (Post and installation only)** | **10** | **6** | **10** | | **10** | **10** | **100** |
| **M1-1-36** | **36"x36"** | **INTERSTATE ROUTE MARKER (Post and installation only)** | **9** | **9** | **11** | | **11** | **11** | **121** |
| 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)** | **3** | **3** | **5** | | **5** | **7** | **35** |
| **M3-2-36** | **36"x18"** | **EAST (Mounted on route marker post)** | **5** | **5** | **6** | | **6** | **10** | **60** |
| **M3-2(I)-24** | **24"x12"** | **EAST (Mounted on route marker post)** | **2** | | | | **2** | **7** | **14** |
| M3-3-24 | 24"x12" | SOUTH (Mounted on route marker post) | | | | | | 7 | |
| **M3-4-24** | **24"x12"** | **WEST (Mounted on route marker post)** | **3** | **3** | **5** | | **5** | **7** | **35** |
| **M3-4-36** | **36"x18"** | **WEST (Mounted on route marker post)** | **4** | **4** | **5** | | **5** | **10** | **50** |
| **M3-4(I)-24** | **24"x12"** | **WEST (Mounted on route marker post)** | **2** | | | | **2** | **7** | **14** |
| **M4-8-24** | **24"x12"** | **DETOUR (Mounted on route marker post)** | **10** | **6** | **10** | | **10** | **7** | **70** |
| **M4-8-36** | **36"x18"** | **DETOUR (Mounted on route marker post)** | **9** | **9** | **11** | | **11** | **10** | **110** |
| M4-9-30 | 30"x24" | DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT | | | | | | 15 | |
| **M4-10-48** | **48"x18"** | **DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)** | **2** | | **2** | | **2** | **7** | **14** |
| **M5-1-21** | **21"x15"** | **ADVANCE TURN ARROW RT or LT(Mounted on route marker post)** | **2** | **2** | **4** | | **4** | **7** | **28** |
| M5-1-30 | 30"x21" | ADVANCE TURN ARROW RT or LT(Mounted on route marker post) | | | | | | 9 | |
| **M5-2(I)-21** | **21"x15"** | **ADVANCE TURN ARROW DIAGONAL RT or LT (Mounted on route marker post** | **2** | | | | **2** | **7** | **14** |
| **M6-1-21** | **21"x15"** | **DIRECTIONAL ARROW RT or LT (Mounted on route marker post)** | **4** | **4** | **6** | | **6** | **7** | **42** |
| **M6-1-30** | **30"x21"** | **DIRECTIONAL ARROW RT or LT (Mounted on route marker post)** | **2** | **2** | **2** | | **2** | **9** | **18** |
| **M6-2-30** | **30"x21"** | **DIRECTIONAL ARROW DIAGONAL RT or LT (Mounted on route marker post)** | **2** | **2** | **2** | | **2** | **9** | **18** |
| **M6-2(I)-21** | **21"x15"** | **DIRECTIONAL ARROW DIAGONAL RT or LT (Mounted on route marker post)** | **2** | | | | **2** | **7** | **14** |
| M6-3-21 | 21"x15" | DIRECTIONAL ARROW UP (Mounted on route marker post) | | | | | | 7 | |
| **M6-3-30** | **30"x21"** | **DIRECTIONAL ARROW UP (Mounted on route marker post)** | **5** | **5** | **7** | | **7** | **9** | **63** |
| **R1-1-48** | **48"x48"** | **STOP** | | **4** | **4** | | **4** | **32** | **128** |
| R1-2-60 | 60"x60" | YIELD | | | | | | 29 | |
| **R2-1-36** | **36"x48"** | **SPEED LIMIT __ (Portable only)** | **10** | **4** | | | **10** | **30** | **300** |
| **R2-1-48** | **48"x60"** | **SPEED LIMIT __** | | **8** | **9** | | **9** | **39** | **351** |
| R2-1aP-24 | 24"x18" | MINIMUM FEE $80 (Mounted on Speed Limit post) | | | | | | 10 | |
| **R2-1aP-24** | **24"x18"** | **MINIMUM FEE $150 (Mounted on Speed Limit post)** | **10** | **8** | **7** | | **10** | **10** | **100** |
| R3-2-48 | 48"x48" | NO LEFT TURN | | | | | | 35 | |
| R4-1-48 | 48"x60" | DO NOT PASS | | | | | | 39 | |
| R4-7-48 | 48"x60" | KEEP RIGHT | | | | | | 39 | |
| R5-1-48 | 48"x48" | DO NOT ENTER | | | | | | 35 | |
| R6-1-54 | 54"x18" | ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post) | | | | | | 14 | |
| R7-1-12 | 12"x18" | NO PARKING ANY TIME | | | | | | 11 | |
| R10-6-24 | 24"x36" | STOP HERE ON RED | | | | | | 16 | |
| **R11-2-48** | **48"x30"** | **ROAD CLOSED (Mounted on barricade)** | **2** | | **2** | | **2** | **12** | **24** |
| R11-2a-48 | 48"x30" | STREET CLOSED (Mounted on barricade) | | | | | | 12 | |
| R11-3a-60 | 60"x30" | ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade) | | | | | | 15 | |
| R11-3c-60 | 60"x30" | STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade) | | | | | | 15 | |
| R11-4a-60 | 60"x30" | STREET CLOSED TO THRU TRAFFIC (Mounted on barricade) | | | | | | 15 | |
| W1-3-48 | 48"x48" | REVERSE TURN RIGHT or LEFT | | | | | | 35 | |
| W1-4-48 | 48"x48" | REVERSE CURVE RIGHT or LEFT | | | | | | 35 | |
| W1-4b-48 | 48"x48" | TWO LANE REVERSE CURVE RIGHT or LEFT | | | | | | 35 | |
| W1-6-48 | 48"x24" | ONE DIRECTION LARGE ARROW | | | | | | 26 | |
| W3-1-48 | 48"x48" | STOP AHEAD | | | | | | 35 | |
| W3-3-48 | 48"x48" | SIGNAL AHEAD | | | | | | 35 | |
| **W3-4-48** | **48"x48"** | **BE PREPARED TO STOP** | | | **4** | | **4** | **35** | **140** |
| **W3-5-48** | **48"x48"** | **SPEED REDUCTION AHEAD** | **4** | **4** | **9** | | **9** | **35** | **315** |
| **W4-2-48** | **48"x48"** | **LANE ENDS RIGHT or LEFT** | **4** | **4** | | | **4** | **35** | **140** |
| W5-1-48 | 48"x48" | ROAD NARROWS | | | | | | 35 | |
| W5-8-48 | 48"x48" | THRU TRAFFIC RIGHT LANE | | | | | | 35 | |
| W5-9-48 | 48"x48" | ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW | | | | | | 35 | |
| W6-3-48 | 48"x48" | TWO WAY TRAFFIC | | | | | | 35 | |
| **W8-1-48** | **48"x48"** | **BUMP** | | | **10** | | **10** | **35** | **350** |
| W8-3-48 | 48"x48" | PAVEMENT ENDS | | | | | | 35 | |
| W8-7-48 | 48"x48" | LOOSE GRAVEL | | | | | | 35 | |
| W8-11-48 | 48"x48" | UNEVEN LANES | | | | | | 35 | |
| W8-12-48 | 48"x48" | NO CENTER LINE | | | | | | 35 | |
| W8-17-48 | 48"x48" | SHOULDER DROP-OFF SYMBOL | | | | | | 35 | |
| W8-53-48 | 48"x48" | TRUCKS ENTERING HIGHWAY | | | | | | 35 | |
| **W8-54-48** | **48"x48"** | **TRUCKS ENTERING AHEAD or __ FT or _ MILE** | | **4** | **4** | | **4** | **35** | **140** |
| W8-55-48 | 48"x48" | TRUCKS CROSSING AHEAD or __ FT or _ MILE | | | | | | 35 | |
| W8-56-48 | 48"x48" | TRUCKS EXITING HIGHWAY | | | | | | 35 | |
| W9-3a-48 | 48"x48" | CENTER LANE CLOSED SYMBOL | | | | | | 35 | |
| W13-1P-30 | 30"x30" | __ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post) | | | | | | 14 | |
| **W13-4p-36** | **36"x36"** | **ON RAMP (Mounted on other sign post)** | | | **6** | | **6** | **17** | **102** |
| W14-3-64 | 64"x48" | NO PASSING ZONE | | | | | | 28 | |
| W16-2P-30 | 30"x24" | __ FEET PLAQUE (Mounted on warning sign post) | | | | | | 10 | |
| **W20-1-48** | **48"x48"** | **ROAD WORK AHEAD or _FT or _ MILE** | | **4** | **7** | | **7** | **35** | **245** |

| SIGN NUMBER | SIGN SIZE | DESCRIPTION | AMOUNT REQUIRED BY PHASE NO. 1 | 2 | 3 | | TOTAL AMOUNT REQUIRED | UNITS PER AMOUNT | UNITS SUB TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| **W20-2-48** | **48"x48"** | **DETOUR AHEAD or __ FT or _ MILE** | **4** | | **2** | | **4** | **35** | **140** |
| **W20-3-48** | **48"x48"** | **ROAD or STREET CLOSED AHEAD or __ FT or _ MILE** | | | **2** | | **2** | **35** | **70** |
| **W20-4-48** | **48"x48"** | **ONE LANE ROAD AHEAD or __ FT or _ MILE** | | | **3** | | **3** | **35** | **105** |
| **W20-5-48** | **48"x48"** | **RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE** | **4** | **4** | | | **4** | **35** | **140** |
| **W20-7-48** | **48"x48"** | **FLAGGER** | | **2** | **7** | | **7** | **35** | **245** |
| **W20-8-18** | **18"x18"** | **STOP - SLOW PADDLE Back to Back** | | **2** | **7** | | **7** | **5** | **35** |
| W20-52P-54 | 54"x12" | NEXT __ MILES (Mounted on warning sign post) | | | | | | 12 | |
| W21-1-48 | 48"x48" | WORKERS | | | | | | 35 | |
| W21-2-48 | 48"x48" | FRESH OIL | | | | | | 35 | |
| W21-3-48 | 48"x48" | ROAD MACHINERY AHEAD or __ FT or _ MILE | | | | | | 35 | |
| W21-5-48 | 48"x48" | SHOULDER WORK | | | | | | 35 | |
| W21-5a-48 | 48"x48" | RIGHT or LEFT SHOULDER CLOSED | | | | | | 35 | |
| **W21-5b-48** | **48"x48"** | **RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE** | | | **4** | | **4** | **35** | **140** |
| W21-6-48 | 48"x48" | SURVEY CREW | | | | | | 35 | |
| W21-50-48 | 48"x48" | BRIDGE PAINTING AHEAD or __ FT | | | | | | 35 | |
| W21-51-48 | 48"x48" | MATERIAL ON ROADWAY | | | | | | 35 | |
| **W21-52-48** | **48"x48"** | **PAVEMENT BREAKS** | | | **2** | | **2** | **35** | **70** |
| W21-53-48 | 48"x48" | RUMBLE STRIPS AHEAD | | | | | | 35 | |
| W22-8-48 | 48"x48" | FRESH OIL LOOSE ROCK | | | | | | 35 | |
| W24-1-48 | 48"x48" | DOUBLE REVERSE CURVE | | | | | | 35 | |
| | **18"x18"** | **ORANGE BLANK SIGN** | | | **10** | | **10** | **12** | **120** |

**SPECIAL SIGNS**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **CONSIGN1** | **108"x72"** | **EXIT 217 NORTHBOUND CLOSED USE EXIT 221** | **1** | **1** | **1** | | **1** | **78** | **78** |
| **CONSIGN2** | **108"x72"** | **EXIT 217 SOUTHBOUND CLOSED USE EXIT 214** | **1** | **1** | **1** | | **1** | **78** | **78** |

**SPEC & CODE**

| | | | |
|---|---|---|---|
| **704-1000** | **TRAFFIC CONTROL SIGNS** | **TOTAL UNITS** | **4794** |

| SPEC & CODE | DESCRIPTION | UNIT | QUANTITY BY PHASE NO. 1 | 2 | 3 | | TOTAL QUANTITY |
|---|---|---|---|---|---|---|---|
| **704-0100** | **FLAGGING** | MHR | | **50** | **875** | | **925** |
| **704-1046** | **ATTENUATION DEVICE-TYPE B-80** | EA | | **2** | **2** | | **2** |
| 704-1048 | PORTABLE RUMBLE STRIPS | EACH | | | | | |
| 704-1050 | TYPE I BARRICADES | EACH | | | | | |
| **704-1052** | **TYPE III BARRICADES** | EACH | **6** | **2** | **22** | | **22** |
| **704-1060** | **DELINEATOR DRUMS** | EACH | **76** | **46** | **54** | | **76** |
| 704-1065 | TRAFFIC CONES | EACH | | | | | |
| **704-1067** | **TUBULAR MARKERS** | EACH | | **28** | **98** | | **98** |
| 704-1070 | DELINEATOR | EACH | | | | | |
| 704-1072 | FLEXIBLE DELINEATORS | EACH | | | | | |
| **704-1080** | **STACKABLE VERTICAL PANELS** | EACH | | | **50** | | **50** |
| 704-1081 | VERTICAL PANELS - BACK TO BACK | EACH | | | | | |
| 704-1085 | SEQUENCING ARROW PANEL - TYPE A | EACH | | | | | |
| **704-1086** | **SEQUENCING ARROW PANEL - TYPE B** | EACH | | **2** | **2** | | **2** |
| **704-1087** | **SEQUENCING ARROW PANEL - TYPE C** | EACH | **2** | **2** | | | **2** |
| 704-1500 | OBLITERATION OF PVMT MK | SF | | | | | |
| 704-3501 | PORTABLE PRECAST CONCRETE MED BARRIER | LF | | | | | |
| 704-3510 | PRECAST CONCRETE MED BARRIER - STATE FURNISHED | EACH | | | | | |
| **704-3511** | **STATE FURNISHED MEDIAN BARRIER** | LF | | **2240** | **2240** | | **2240** |
| **704-4011** | **PORTABLE CHANGEABLE MESSAGE SIGN** | EA | **2** | | | | **2** |
| 762-0200 | RAISED PAVEMENT MARKERS | EACH | | | | | |
| 762-0420 | SHORT TERM 4IN LINE - TYPE R | LF | | | | | |
| **762-0422** | **SHORT TERM 6IN LINE-TYPE R** | LF | | | **1250** | | **1250** |
| **762-0426** | **SHORT TERM 24IN LINE-TYPE R** | LF | | | **145** | | **145** |
| 762-0430 | SHORT TERM 4IN LINE - TYPE NR | LF | | | | | |

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

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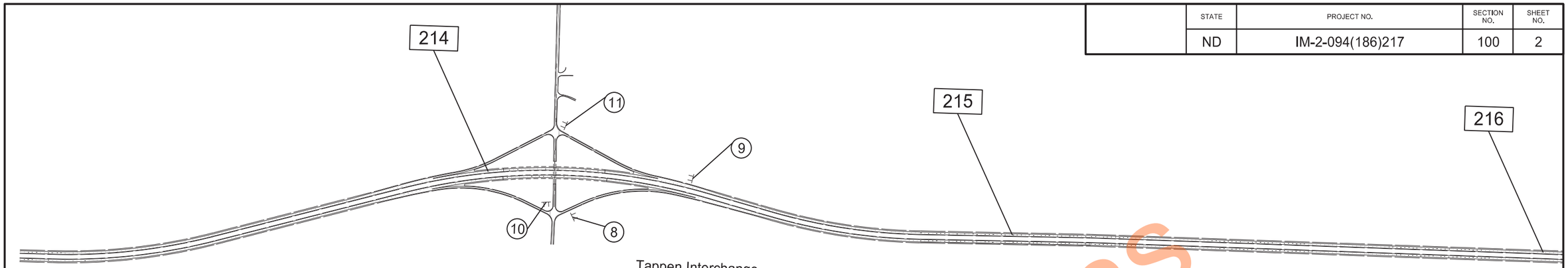
08/27/25

Traffic Control Devices List

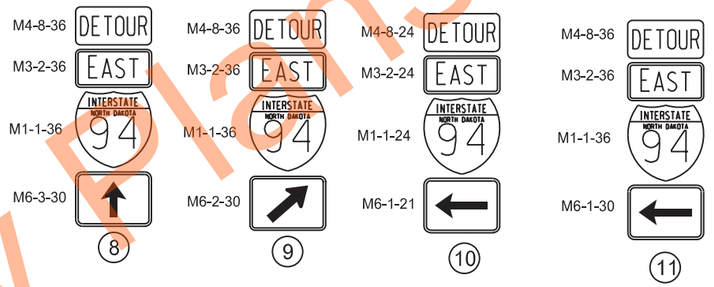
Preliminary Plans

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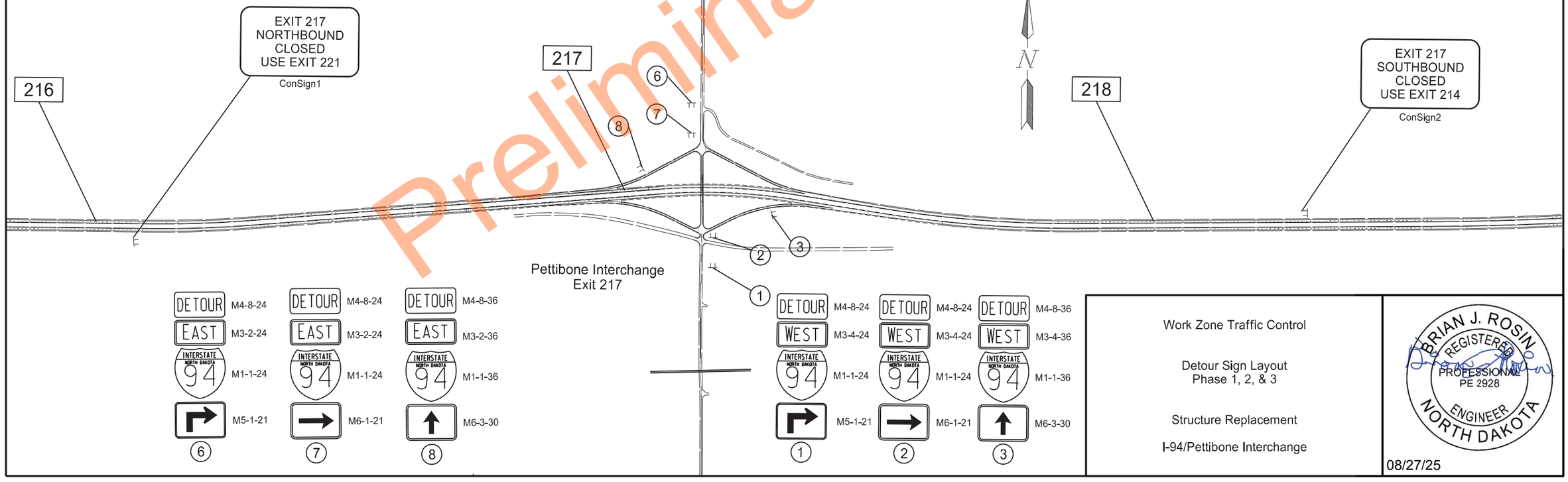
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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 100 | 2 |




Tappen Interchange
Exit 214




See D-704-53+54 for detour sign spacing




Pettibone Interchange
Exit 217




Work Zone Traffic Control

Detour Sign Layout
Phase 1, 2, & 3

Structure Replacement

I-94/Pettibone Interchange

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Preliminary Plans

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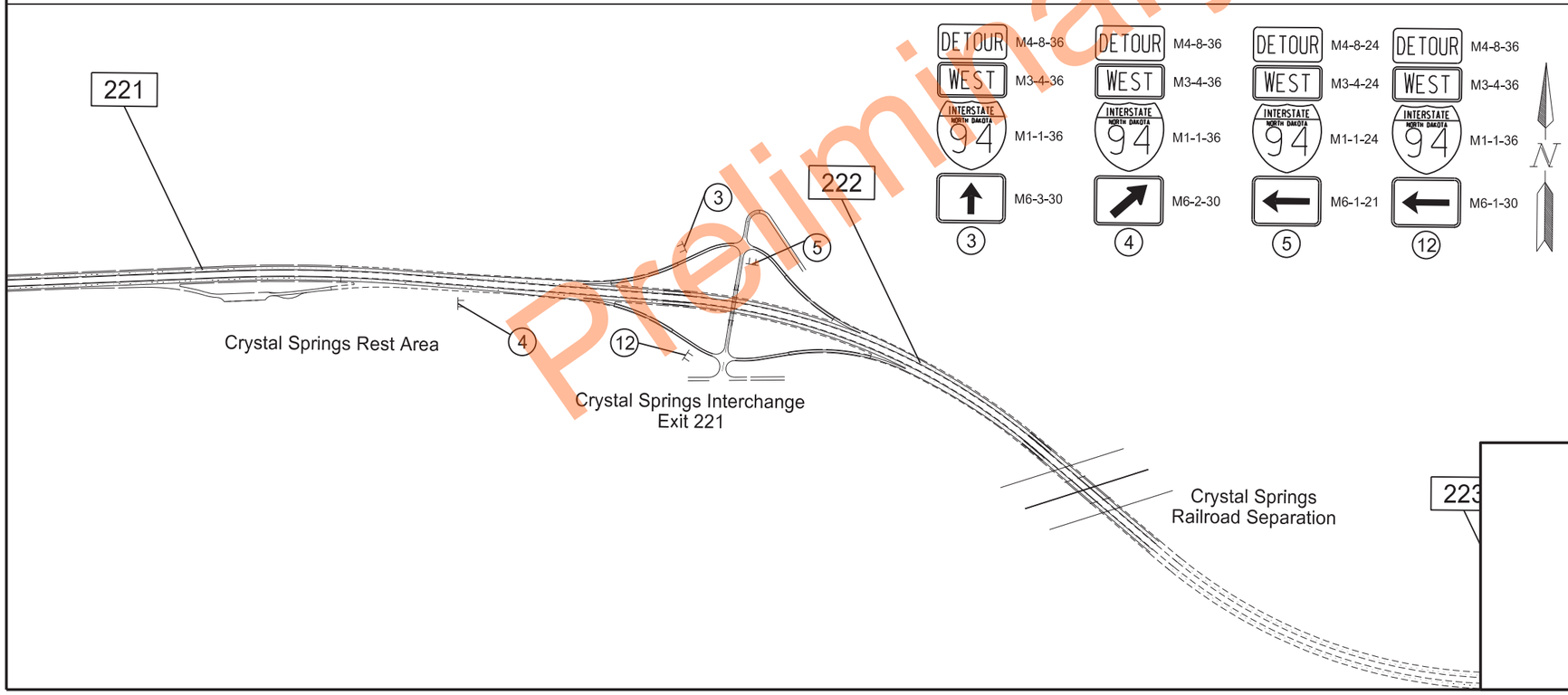
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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 100 | 3 |







See D-704-53+54 for detour sign spacing










Work Zone Traffic Control

Detour Sign Layout
Phase 1, 2, & 3

Structure Replacement

I-94/Pettibone Interchange

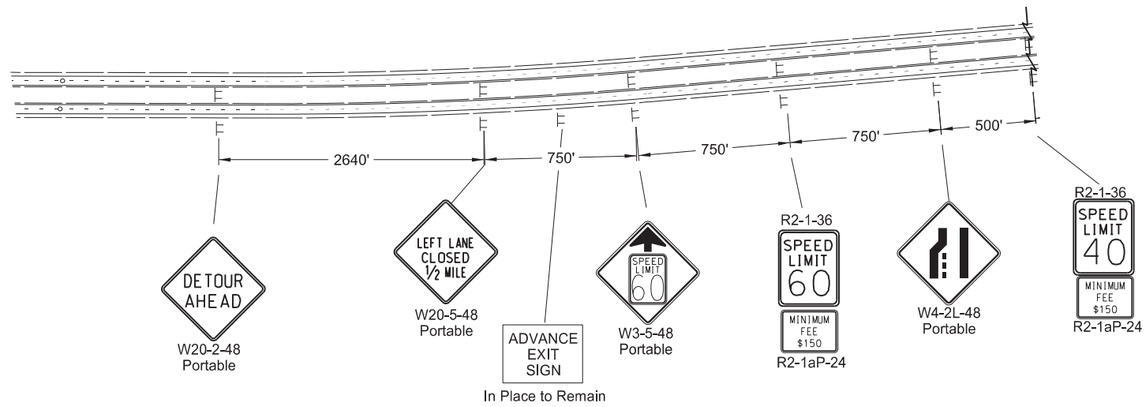



08/27/25

Preliminary Plans

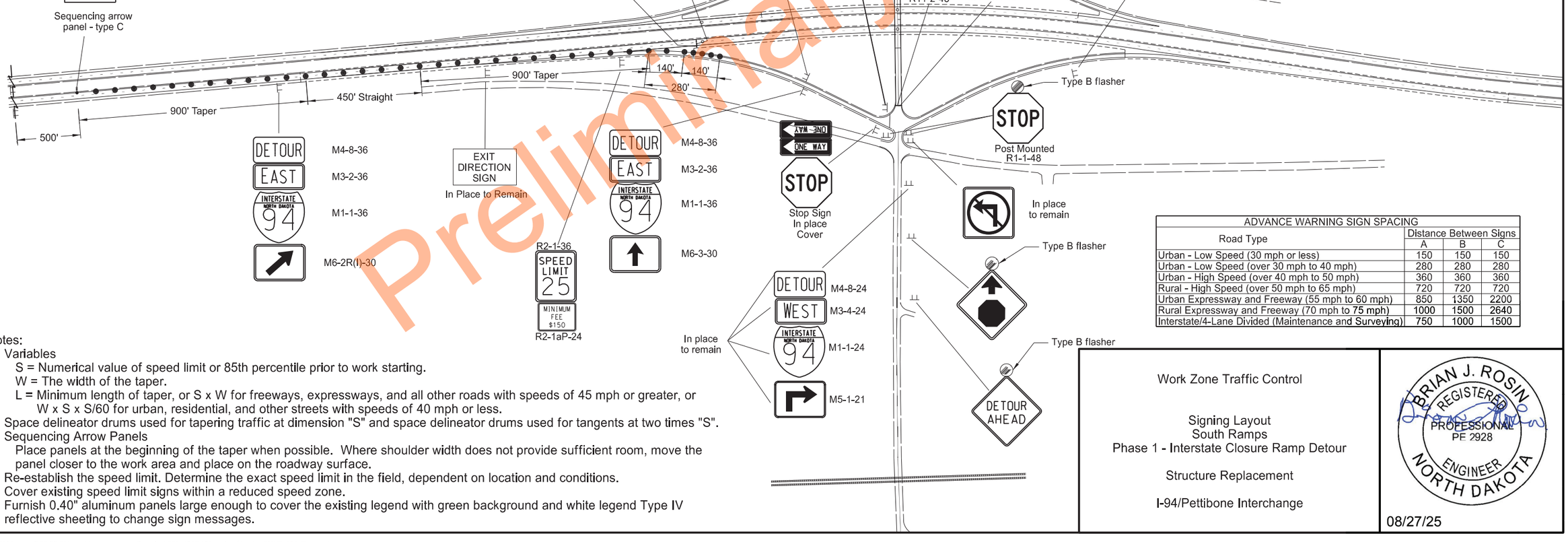
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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 100 | 4 |













| STOP AHEAD SIGN PLACEMENT DISTANCE | |
|---|---|
| POSTED OR 85th PERCENTILE SPEED | STOP CONDITION Min. (FT) |
| 35 mph | 250 ft |
| 40 mph | 305 ft |
| 45 mph | 360 ft |
| 50 mph | 425 ft |
| 55 mph | 495 ft |
| 60 mph | 570 lf |
| 65 mph | 645 ft |

| ADVANCE WARNING SIGN SPACING | | | |
|---|---|---|---|
| Road Type | Distance Between Signs | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 mph 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 |

Notes:
1. Variables
   S = Numerical value of speed limit or 85th percentile prior to work starting.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S x S/60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums used for tapering traffic at dimension "S" and space delineator drums used for tangents at two times "S".
3. Sequencing Arrow Panels
   Place 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 the roadway surface.
4. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
5. Cover existing speed limit signs within a reduced speed zone.
6. Furnish 0.40" aluminum panels large enough to cover the existing legend with green background and white legend Type IV reflective sheeting to change sign messages.

Preliminary Plans

Work Zone Traffic Control

Signing Layout
South Ramps
Phase 1 - Interstate Closure Ramp Detour

Structure Replacement

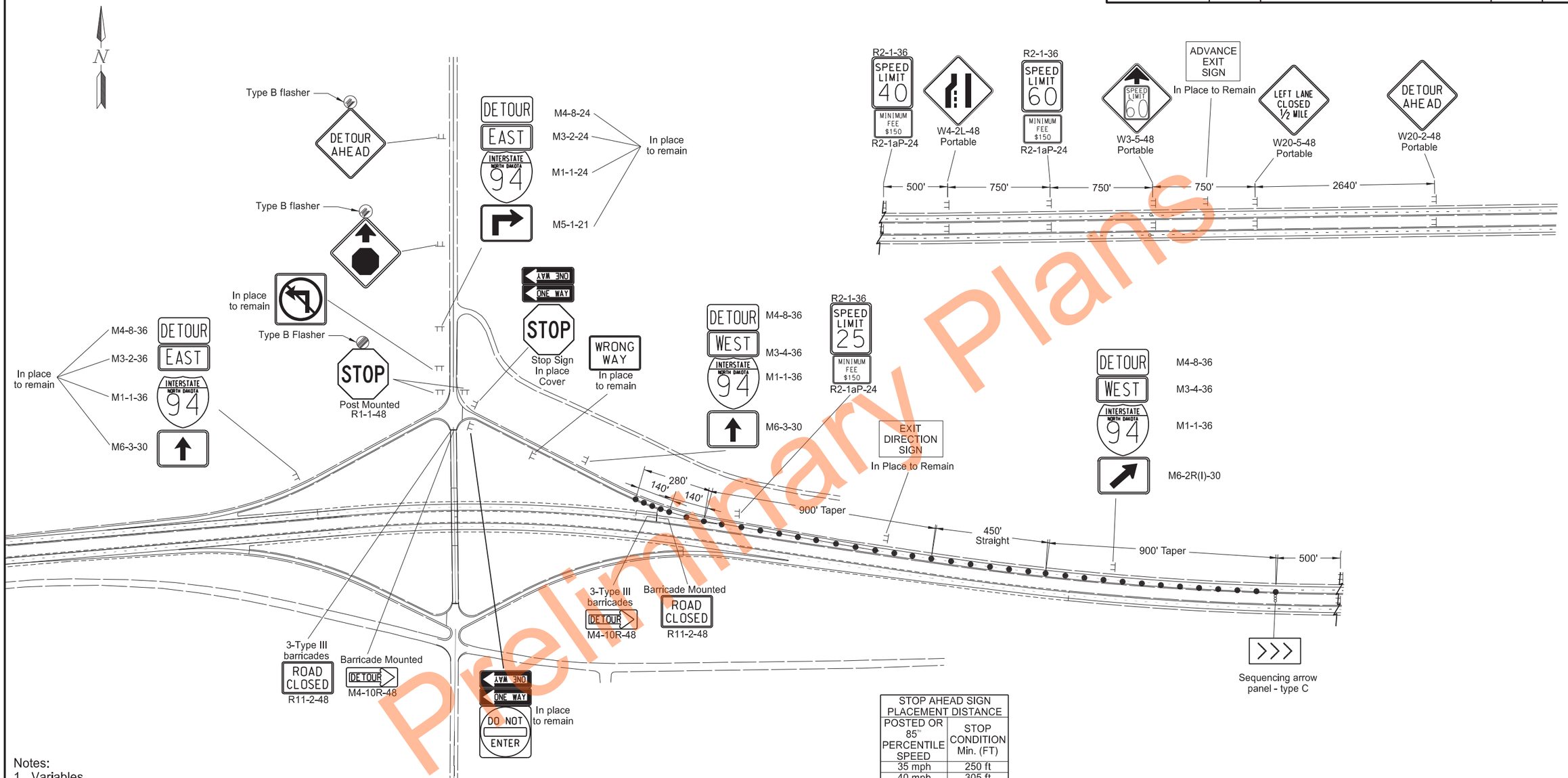
I-94/Pettibone Interchange




08/27/25

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| | ND | IM-2-094(186)217 | 100 | 5 |




Preliminary Plans

| STOP AHEAD SIGN PLACEMENT DISTANCE | |
|---|---|
| POSTED OR 85th PERCENTILE SPEED | STOP CONDITION Min. (FT) |
| 35 mph | 250 ft |
| 40 mph | 305 ft |
| 45 mph | 360 ft |
| 50 mph | 425 ft |
| 55 mph | 495 ft |
| 60 mph | 570 lf |
| 65 mph | 645 ft |

Notes:
1. Variables
   S = Numerical value of speed limit or 85th percentile prior to work starting.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S x S/60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums used for tapering traffic at dimension "S" and space delineator drums used for tangents at two times "S".
3. Sequencing Arrow Panels
   Place 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 the roadway surface.
4. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
5. Cover existing speed limit signs within a reduced speed zone.
6. Furnish 0.40" aluminum panels large enough to cover the existing legend with green background and white legend Type IV reflective sheeting to change sign messages.

| ADVANCE WARNING SIGN SPACING | | | |
|---|---|---|---|
| Road Type | Distance Between Signs | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 mph 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 |

Work Zone Traffic Control

Signing Layout
North Ramps
Phase 1 - North Ramp Detour

Structure Replacement

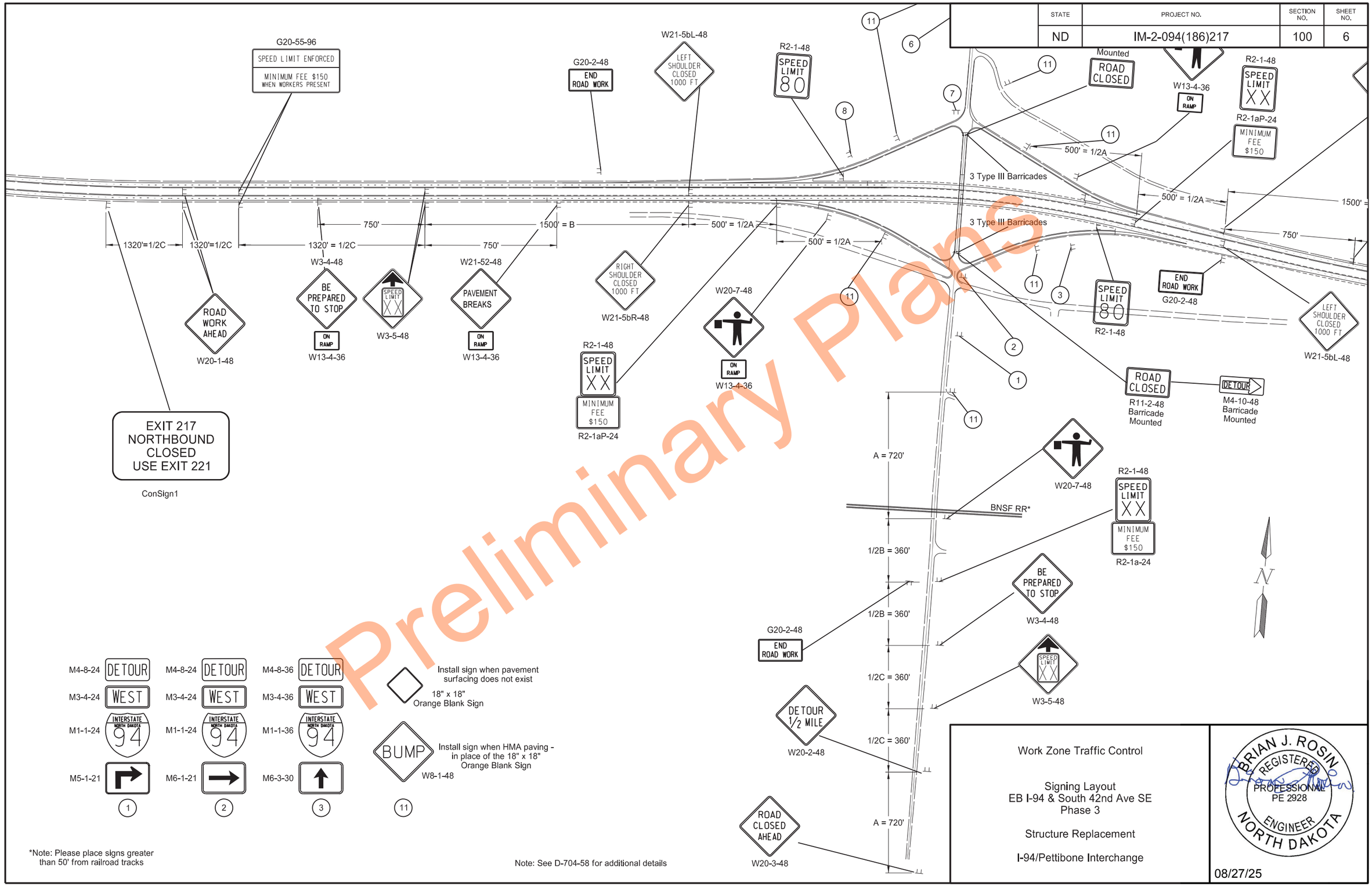
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| ND | IM-2-094(186)217 | 100 | 6 |




*Note: Please place signs greater than 50' from railroad tracks

Note: See D-704-58 for additional details

Work Zone Traffic Control

Signing Layout
EB I-94 & South 42nd Ave SE
Phase 3

Structure Replacement

I-94/Pettibone Interchange

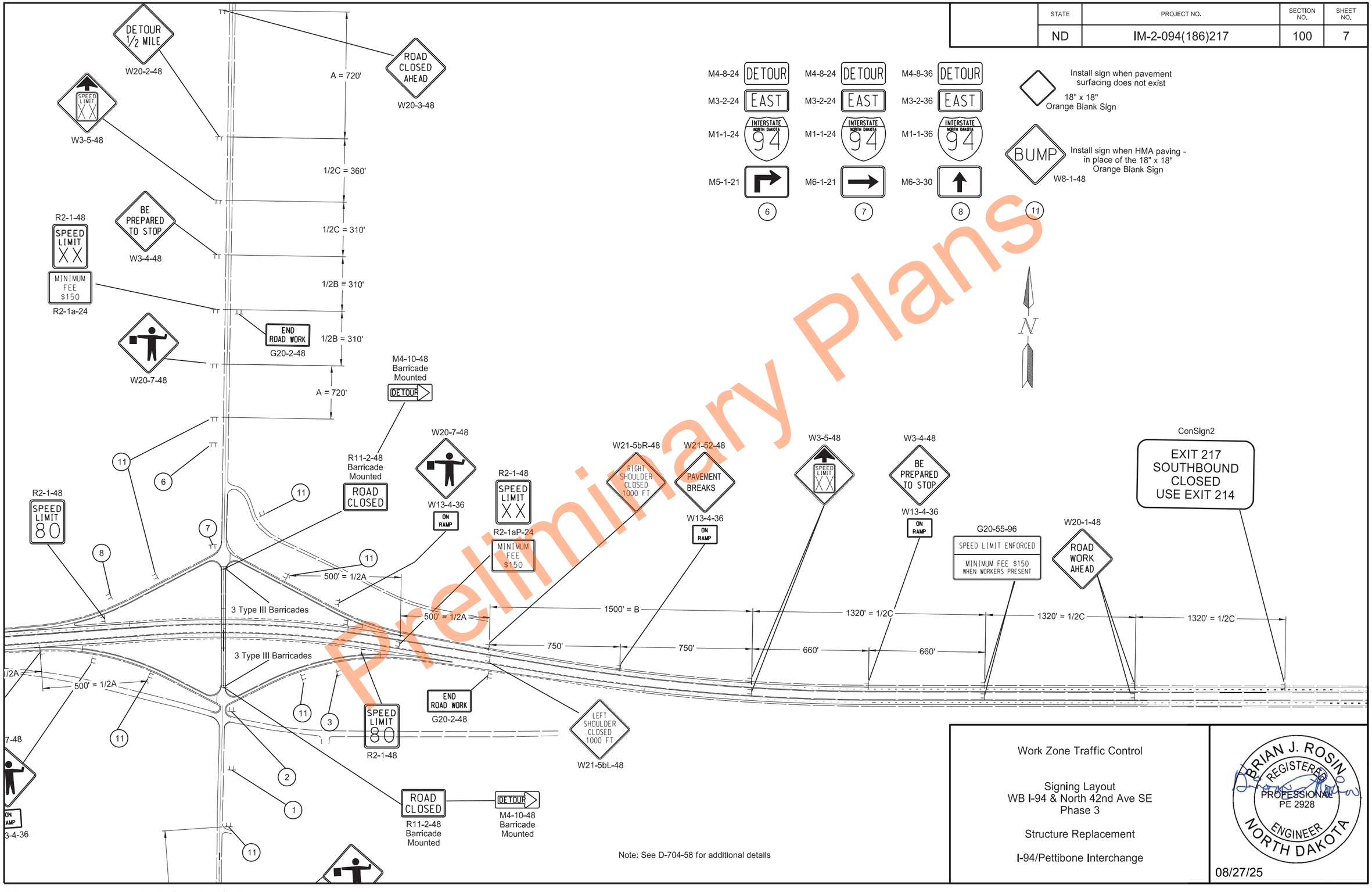
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| | ND | IM-2-094(186)217 | 100 | 7 |










Note: See D-704-58 for additional details

Work Zone Traffic Control

Signing Layout
WB I-94 & North 42nd Ave SE
Phase 3

Structure Replacement

I-94/Pettibone Interchange

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|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 100 | 8 |

Install sign when pavement surfacing does not exist

18" x 18" Orange Blank Sign

BUMP

W8-1-48

Install sign when HMA paving - in place of the 18" x 18" Orange Blank Sign

11

**Legend**

- Tubular Markers (Spaced at 40 feet)
- Delineator Drums (Spaced at 20 feet)

See Sheet 100-07 for sign details on 42nd Ave SE

See Sheet 100-07 for sign details on I-94 (Ramps and Mainline)

See Sheet 100-06 for sign details on I-94 (Ramps and Mainline)

See Sheet 100-06 for sign details on 42nd Ave SE

Type III Barricade

Type III Barricade

3 - Type III Barricades

Flagger

R2-1-48 SPEED TIMIL XX

MINIMUM FEE $150

R2-1aP-24

1/2A = 360'

1/2A = 360'

1/2B = 360'

1/2B = 360'

C = 720'

W20-7-48

W3-5-48 SPEED LIMIT

W20-4-48 ONE LANE ROAD AHEAD

W20-1-48 ROAD WORK AHEAD

END ROAD WORK

G20-2-48

100'

Type III Barricades

3 - Type III Barricades

Flagger

1/2A=360'

1/2A=360'

1/2B = 360'

C = 720'

Type III Barricade

Note: See D-704-15 for additional details

Work Zone Traffic Control

Signing Layout
Frontage Roads
Phase 3

Structure Replacement

I-94/Pettibone Interchange

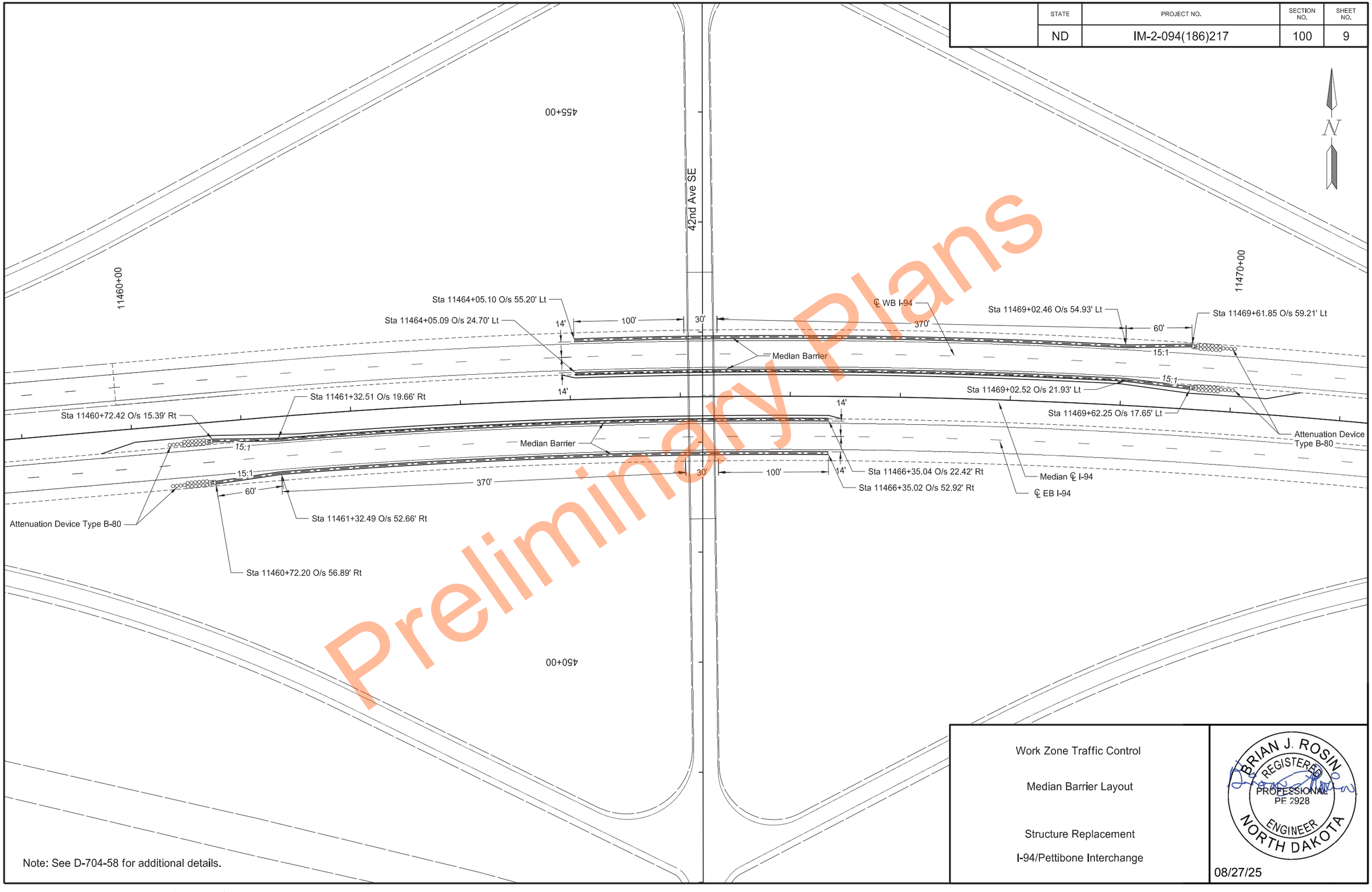
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| | ND | IM-2-094(186)217 | 100 | 9 |




Preliminary Plans

Work Zone Traffic Control

Median Barrier Layout

Structure Replacement

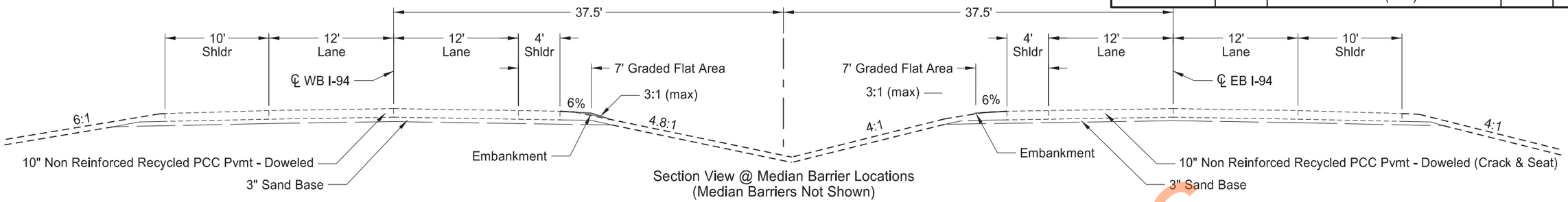
I-94/Pettibone Interchange

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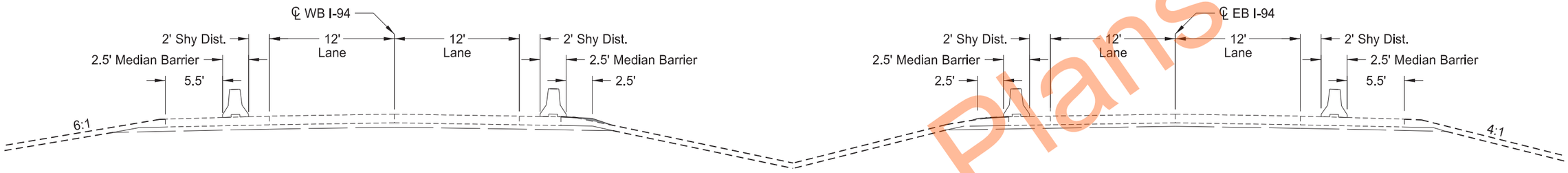
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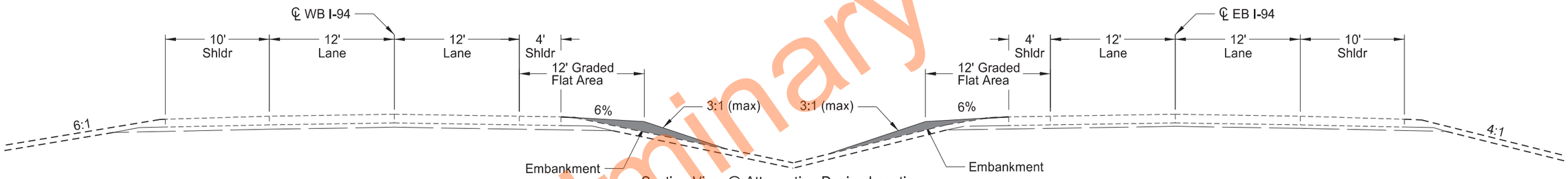
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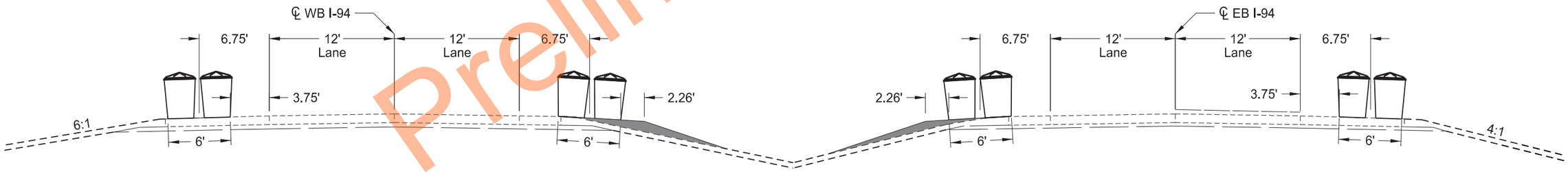

Section View @ Median Barrier Locations
(Median Barriers Not Shown)




Section View @ Median Barrier Locations
(Showing Median Barriers)




Section View @ Attenuation Device Locations
(Attenuation Devices Not Shown)




Section View @ Attenuation Device Locations
(Showing Attenuation Devices)

Work Zone Traffic Control

I-94 Typical Section
using Median Barrier and
Attenuation Devices

Structure Replacement

I-94/Pettibone Interchange

BRIAN J. ROSIN
REGISTERED
PROFESSIONAL
PE 2928
ENGINEER
NORTH DAKOTA

08/27/25

Preliminary Plans

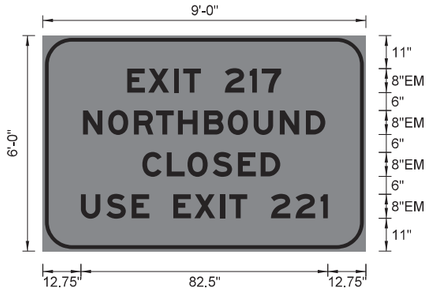
Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 100 | 11 |

| | |
|---|---|
| SIGN NUMBER | ConSign 1 |
| WIDTH X HEIGHT | 9'-0" x 6'-0" |
| BORDER WIDTH | 1.25" (inset 0.75") |
| CORNER RADIUS | 9" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: XI Reflective |
| | COLOR: Fluorescent Orange |
| LEGEND/BORDER | TYPE: Non-reflective |
| | COLOR: Black |

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

STATION(S): AREA: 54.0 Sq.Ft.




Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

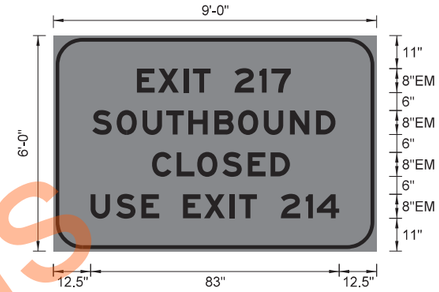
PANEL STYLE: ND_Const_Detour.ssi

| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | X | I | T | | 2 | 1 | 7 | | | | | | | | | | | | | 51.4 | 8 | EM 2000 |
| 28.2 | 35.2 | 43.9 | 46.9 | 52.8 | 60.8 | 69.2 | 73.2 | | | | | | | | | | | | | | | |
| N | O | R | T | H | B | O | U | N | D | | | | | | | | | | | 81 | 8 | EM 2000 |
| 13.4 | 21.8 | 30.5 | 37.8 | 45.2 | 53.9 | 61.8 | 70.5 | 79.2 | 87.9 | | | | | | | | | | | | | |
| C | L | O | S | E | D | | | | | | | | | | | | | | | 46.1 | 8 | EM 2000 |
| 33.2 | 41.5 | 48.4 | 56.8 | 65.2 | 72.8 | | | | | | | | | | | | | | | | | |
| U | S | E | | E | X | I | T | | 2 | 2 | 1 | | | | | | | | | 82.5 | 8 | EM 2000 |
| 12.8 | 21.2 | 29.7 | 35.6 | 43.6 | 50.7 | 59.3 | 62.4 | 68.3 | 76.3 | 84.5 | 92.8 | | | | | | | | | | | |

| | |
|---|---|
| SIGN NUMBER | ConSign 2 |
| WIDTH X HEIGHT | 9'-0" x 6'-0" |
| BORDER WIDTH | 1.25" (inset 0.75") |
| CORNER RADIUS | 9" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: XI Reflective |
| | COLOR: Fluorescent Orange |
| LEGEND/BORDER | TYPE: Non-reflective |
| | COLOR: Black |

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

STATION(S): AREA: 54.0 Sq.Ft.




Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Const_Detour.ssi

| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | X | I | T | | 2 | 1 | 7 | | | | | | | | | | | | | 51.4 | 8 | EM 2000 |
| 27.9 | 35 | 43.6 | 46.6 | 52.6 | 60.6 | 68.9 | 72.9 | | | | | | | | | | | | | | | |
| S | O | U | T | H | B | O | U | N | D | | | | | | | | | | | 81.3 | 8 | EM 2000 |
| 13 | 21.2 | 29.8 | 37.7 | 45.1 | 53.8 | 61.7 | 70.4 | 79.1 | 87.8 | | | | | | | | | | | | | |
| C | L | O | S | E | D | | | | | | | | | | | | | | | 46.1 | 8 | EM 2000 |
| 33 | 41.2 | 48.1 | 56.5 | 65 | 72.6 | | | | | | | | | | | | | | | | | |
| U | S | E | | E | X | I | T | | 2 | 1 | 4 | | | | | | | | | 83 | 8 | EM 2000 |
| 12.5 | 21 | 29.4 | 35.4 | 43.4 | 50.4 | 59 | 62.1 | 68 | 76 | 84.3 | 88.1 | | | | | | | | | | | |

Preliminary Plans

Construction Sign Details
When Crossroad is Closed

Construction Sign Details
Phases 1, 2, & 3

Structure Replacement

I-94/Pettibone Interchange

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| N.D. | IM-2-094(186)217 | 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **42nd Ave SE** | | | | | | | | | | | | | | | | | | | | | | | |
| 441+60 Lt | S.A.D | | | 10.0 | 14.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.1 | 4.4 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 441+60 Rt | | 9 | | 5.0 | 12.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.0 | | | | | | 1 | 4 | 2.5 x 2.5 12 ga | | | | |
| 446+06 Rt | | 379 | 8.2 | | 13.3 | | | | 5.0 | 2.5 x 2.5 10 ga | 15.3 | | | | | | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 446+34 Lt | SN 4 | 9 | | 5.0 | 12.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.0 | | | | | | 1 | 4 | 2.5 x 2.5 12 ga | | | | |
| 446+56 Rt | | | | | 13.5 | | | | 5.0 | 2.25 x 2.25 12 ga | 16.1 | 3.4 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| 447+80 Rt | | | | | 13.0 | 13.4 | | | 5.0 | 2.5 x 2.5 10 ga | 14.7 | | | | | | 2 | 4 | 3 x 3 7 ga | 1 | | 2 | |
| 447+87 Lt | S.A.E | | | 5.0 | 13.5 | | | | 5.0 | 2.25 x 2.25 12 ga | 16.1 | 3.5 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| 449+18 Lt | | | | | 13.0 | 13.4 | | | 5.0 | 2.5 x 2.5 10 ga | 14.7 | | | | | | 2 | 4 | 3 x 3 7 ga | 1 | | 2 | |
| 450+18 Lt | | 379 | 8.2 | | 13.3 | | | | 5.0 | 2.5 x 2.5 10 ga | 15.3 | | | | | | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 454+67 Rt | | 379 | 8.2 | | 13.3 | | | | 5.0 | 2.5 x 2.5 10 ga | 15.3 | | | | | | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 455+68 Rt | | 17 | | 16.0 | 12.2 | 12.7 | | | 5.0 | 2.5 x 2.5 10 ga | 13.9 | | | | | | 2 | 4 | 3 x 3 7 ga | | | 2 | |
| 457+47 Lt | | 17 | | 16.0 | 12.2 | 12.7 | | | 5.0 | 2.5 x 2.5 10 ga | 13.9 | | | | | | 2 | 4 | 3 x 3 7 ga | | | 2 | |
| 458+47 Lt | | 379 | 8.2 | | 13.3 | | | | 5.0 | 2.5 x 2.5 10 ga | 15.3 | | | | | | 1 | 4 | 3 x 3 7 ga | | | 1 | |
| 458+74 Rt | | | | | 12.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.0 | | | | | | 1 | 4 | 2.5 x 2.5 12 ga | 1 | | | |
| 460+65 Rt | | | | | 13.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 14.6 | 3.9 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| 464+00 Rt | S.A.D | | | 5.0 | 14.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.1 | 4.4 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| 464+00 Lt | | 9 | | 5.0 | 12.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.0 | | | | | | 1 | 4 | 2.5 x 2.5 12 ga | | | | |
| **Sub Total** | | | 32.8 | 67.0 | | **Total** | 271.8 | | | | | | | | | | **Total** | 84.0 | | 7 | 0 | 17 | |
| **South Frontage Rd** | | | | | | | | | | | | | | | | | | | | | | | |
| 98+04-60 Rt | S.A.D | | | 5.0 | 14.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.1 | 4.4 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| 98+72-92 Rt | | | | | 12.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 13.7 | | | | | | 1 | 4 | 2.5 x 2.5 12 ga | 1 | | | |
| 446+72-160 Rt | S.A.D | | | 5.0 | 14.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 15.1 | 4.4 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| 447+46 Rt | | | | | 13.0 | | | | 5.0 | 2.25 x 2.25 12 ga | 14.6 | 4.0 | | | | 2.5 x 2.5 12 ga | 1 | 4 | 3 x 3 7 ga | 1 | | 1 | |
| **Sub Total** | | | 0.0 | 10.0 | | **Total** | 53.0 | | | | | | | | | | **Total** | 16.0 | | 4 | 0 | 3 | |
| **Grand Total** | | | **32.8** | **77.0** | | **Total** | **324.8** | | | | | | | | | | **Total** | **100** | **0** | **11** | **0** | **20** | |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Sign Summary
Perforated Tube

Pettibone Interchange

I-94

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| N.D. | IM-2-094(186)217 | 110 | 2 |

| Station / RP | Sign / Assembly No. | Flat Sheet For Signs IV SF | Flat Sheet For Signs XI SF | Panel For Signs IV SF | Panel For Signs XI SF | Overlay Panel IV SF | Overlay Panel XI SF | Vert Clear-ance FT | Galv Steel Sheet Standard Pipe 1st LF | Galv Steel Sheet Standard Pipe 2nd LF | Size | Galv Steel Post W-Shape Posts 1st LF | Galv Steel Post W-Shape Posts 2nd LF | Galv Steel Post W-Shape Posts 3rd LF | Max Post Len LF | Post Space FT | Revise Fuse Joint EA | Std Pipe Fdn Dia FT | Std Pipe Fdn Dep FT | Std Pipe Fdn Vol CY | W-Shape Pile LF | Remove Sign Fdns Conc Fdn EA | Remove Sign Fdns W-Shape Pile EA | Reset Sign Panel EA | Reset Sign Support EA | Stub Post EA | Multi Dir Base EA | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **I-94 EB Off-Ramp** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 94+91 Rt | SN 1 | | | 18.0 | | | | 7.0 | | | W4x13 | 13.1 | 14.2 | | 33.6 | 4.5 | | | | | 28 | | 1 | | | | | |
| 95+22 Lt | S.A.C | | 8.8 | | | | | 7.0 | 13.5 | | 3.5 | | | | 21.2 | | | 1.3 | 5.0 | 0.3 | | 1 | | | | | | |
| 97+73 Lt | S.A.B | | 22.0 | | | | | 7.0 | 16.1 | | 5.0 | | | | 23.7 | | | 1.8 | 6.5 | 0.6 | | 1 | | | | | 1 | |
| 98+90 Rt | S.A.A | | 19.0 | | | | | 7.0 | 16.1 | | 5.0 | | | | 23.7 | | | 1.8 | 6.5 | 0.6 | | 1 | | 1 | | | 1 | |
| **Sub Total** | | | 49.8 | 18.0 | | | | | **Total** | 45.7 | | **Total** | 27.3 | | | | | | | 1.5 | 28 | 3 | 1 | 1 | 0 | 0 | 2 | |
| **I-94 WB Off-Ramp** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 52+95 Rt | SN 2 | | | 18.0 | | | | 7.0 | | | W4x13 | 13.1 | 14.2 | | 33.6 | 4.5 | | | | | 28 | | 1 | | | | | |
| 52+99 Lt | | | | | | | | 7.0 | 13.5 | | 3.5 | | | | 21.2 | | | 1.3 | 5.0 | 0.3 | | 1 | | 1 | | | | |
| 55+49 Lt | | | | | | | | 7.0 | 16.1 | | 5.0 | | | | 23.7 | | | 1.8 | 6.5 | 0.6 | | 1 | | 1 | | | 1 | |
| 55+96 Rt | | | | | | | | 7.0 | 16.1 | | 5.0 | | | | 23.7 | | | 1.8 | 6.5 | 0.6 | | 1 | | 1 | | | 1 | |
| **Sub Total** | | | | 18.0 | | | | | **Total** | 45.7 | | **Total** | 27.3 | | | | | | | 1.5 | 28 | 3 | 1 | 3 | 0 | 0 | 2 | |
| **Grand Total** | | **49.8** | | **36.0** | | | | | **Total** | **91.4** | | **Total** | **54.6** | | | | | | | **3.0** | **56** | **6** | **2** | **4** | **0** | **0** | **4** | |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Sign Summary
Round Steel Pipe & W-Shape

Pettibone Interchange

I-94

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 110 | 3 |

11450
85+00
90+00
95+00
20+00
450+00
70+00
75+00
445+00
440+00
42nd Ave SE
Frontage Rd

Sta 95+22 Lt
Remove sign, support and foundation (x1)
WRONG WAY

Sta 95+22 Lt
Special Assembly C
R5-1A-42
WRONG WAY

Sta 97+73 Lt
Remove sign, support and foundation (x1)
ONE WAY ONE WAY
DO NOT ENTER

Sta 97+73 Lt
Special Assembly B
R6-1L -36
R6-1R -36
R5-1 -48
ONE WAY ONE WAY
DO NOT ENTER

Sta 449+18 Lt
Reset sign on new support

Sta 450+18 Lt
Assembly 379
EAST
INTERSTATE NORTH DAKOTA 94
M3-2-24
M1-1-24
M6-1L-21

Sta 450+12 Lt
Remove
EAST
INTERSTATE NORTH DAKOTA 94

Pettibone 19
Sta 94+91 Rt
Remove sign, support and footing (x2)

Sign 1
Pettibone 19
Sta 94+91 Rt

R6-1L-36
ONE WAY ONE WAY
Reset
R1-1-48
STOP
Sta 98+90 Rt
Special Assembly A

ONE WAY
STOP
Sta 98+90 Rt
Remove sign, support and foundation (x1)

LOADED TRUCKS 30 MPH
Sta 98+04-60' Rt
Remove

SPEED LIMIT 55
LOADED
TRUCKS 30
Reset
Sign 3
R2-2P-24
Sta 98+04-60' Rt
Special Assembly D

STOP
Sta 98+72-92' Rt
Reset sign on new support

FRONTAGE ROAD
M6-7P-30
WEIGHT LIMIT 6 TONS PER AXLE 50,000 LBS MAX
Reset
Sta 447+87 Lt
Special Assembly E

FRONTAGE ROAD
Sta 98+94 Rt
Remove

WEIGHT LIMIT 6 TONS PER AXLE 50,000 LBS MAX
Sign 4
Sta 446+34 Lt
Assembly 9

SPEED LIMIT 55
LOADED TRUCKS
SPEED LIMIT 30
WEIGHT LIMIT 6 TONS PER AXLE 50,000 LBS MAX
Sta 445+39 Lt
Remove

SPEED LIMIT 55
LOADED
TRUCKS 30
R2-1-24
Sign 3
R2-2P-24
Sta 441+60 Lt
Special Assemby D

M3-2-24
M1-1-24
EAST
INTERSTATE NORTH DAKOTA 94
M5-2R-21
Sta 446+06 Rt
Assembly 379

FRONTAGE ROAD
WEIGHT LIMIT 6 TONS PER AXLE 50,000 LBS MAX
Sta 446+56 Rt
Reset sign on new support

EAST
INTERSTATE NORTH DAKOTA 94
Sta 446+58 Rt
Remove

SPEED LIMIT 55
Sta 446+72-160' Rt
Remove

SPEED LIMIT 45
R2-1-24
Sta 441+60 Rt
Assembly 9

Sta 447+80 Rt
Reset sign on new support

42 AVE SE HWY 10
42 AVE SE HWY 10
STOP
Sta 447+46 Rt
Reset sign on new support

SPEED LIMIT 55
R2-1-24
LOADED
Reset
TRUCKS 30
Reset
Sta 446+72-160' Rt
Special Assembly D

N

Preliminary Plans

Signing Layout

Pettibone Interchange South

I-94

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 110 | 4 |

N

470+00

Sta 464+00 Lt
Assembly 9
SPEED LIMIT 45
R2-1-24

Sta 464+00 Rt
Special Assembly D
SPEED LIMIT 55
Reset
LOADED TRUCKS 30
Sign 3
R2-2P-24

Sta 460+65 Rt
Reset sign on
new support
37 St SE / 42 AVE SE
37 St SE / 42 AVE SE
YIELD

Sta 458+47 Lt
Assembly 379
M3-4-24 WEST INTERSTATE NORTH DAKOTA 94
M1-1-24
M6-2R-21

465+00

Sta 55+96 Rt
Reset sign on new
support and foundation (x1)
Remove support and foundation (x1)
ONE WAY / ONE WAY
STOP

Sta 460+08 Rt
Remove
LOADED TRUCKS 30 MPH

Sta 458+47 Lt
Remove
WEST INTERSTATE NORTH DAKOTA 94

42nd Ave SE

Sta 455+68 Rt
Assembly 17
R3-1-48

Sta 458+74 Rt
Reset sign from
Sta 460+08 Rt
on new support
WEIGHT LIMIT 6 TONS PER AXLE 50,000 LBS MAX

Sta 55+49 Lt
Reset sign on new
support and foundation (x1)
Remove support and foundation(x1)
ONE WAY / ONE WAY
DO NOT ENTER

Sta 454+67 Rt
Assembly 379
M3-4-24 WEST INTERSTATE NORTH DAKOTA 94
M1-1-24
M6-1L-21

Sta 454+67 Rt
Remove
WEST INTERSTATE NORTH DAKOTA 94

460+00

Sta 455+68 Rt
Remove

Sta 52+95 Rt
Pettibone 19
Sign 2

Sta 52+95 Rt
Remove sign, support
and footing (x2)
Pettibone 19

Sta 457+47 Lt
Assembly 17
R3-1-48

Sta 457+47 Lt
Remove

Sta 52+99 Lt
Reset sign on new
support and foundation(x1)
Remove support and foundation (x1)
WRONG WAY

11460+00

455+00

11470+00

90+00

85+00

95+00

25+00

Preliminary

Signing Layout

Pettibone Interchange
North

I-94

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

8/27/2024 2:09:07 PM Jallery R:\project\20094217.186\traffic\Sheets\110SN_004_LSign2.dgn

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

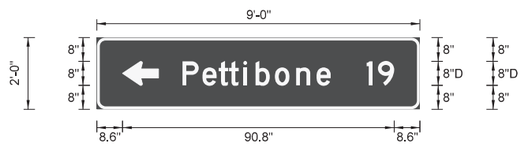
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 110 | 5 |

| | |
|---|---|
| SIGN NUMBER | Sign 1 |
| WIDTH X HEIGHT | 9'-0" x 2'-0" |
| BORDER WIDTH | 1" (inset 0") |
| CORNER RADIUS | 3" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: IV Reflective |
| | COLOR: Green |
| LEGEND/BORDER | TYPE: IV Reflective |
| | COLOR: White |

| SYMBOL | X | Y | WID | HT | ANGLE |
|---|---|---|---|---|---|
| ND_8IN_TYPE D | 8.6 | 8 | 8 | 12 | 90 |

STATION(S): 94+91 Rt

AREA: 18.0 Sq.Ft.




Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Fwy_Destination.ssi

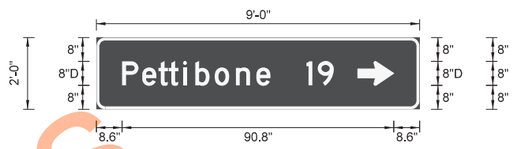
| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | e | t | t | i | b | o | n | e | | | | | | | | | | | | | 49.6 | 8/6 | D 2000 |
| 28.6 | 35.3 | 40.7 | 44.2 | 49 | 53 | 59.5 | 66.6 | 73.5 | | | | | | | | | | | | | | | |
| 1 | 9 | | | | | | | | | | | | | | | | | | | | 9.2 | 8 | D 2000 |
| 90.2 | 93.9 | | | | | | | | | | | | | | | | | | | | | | |

| | |
|---|---|
| SIGN NUMBER | Sign 2 |
| WIDTH X HEIGHT | 9'-0" x 2'-0" |
| BORDER WIDTH | 1" (inset 0") |
| CORNER RADIUS | 3" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: IV Reflective |
| | COLOR: Green |
| LEGEND/BORDER | TYPE: IV Reflective |
| | COLOR: White |

| SYMBOL | X | Y | WID | HT | ANGLE |
|---|---|---|---|---|---|
| ND_8IN_TYPE D | 87.4 | 8 | 8 | 12 | 270 |

STATION(S): 52+95 Rt

AREA: 18.0 Sq.Ft.




Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Fwy_Destination.ssi

| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | e | t | t | i | b | o | n | e | | | | | | | | | | | | | 49.6 | 8/6 | D 2000 |
| 8.6 | 15.3 | 20.7 | 24.2 | 29 | 33 | 39.5 | 46.6 | 53.5 | | | | | | | | | | | | | | | |
| 1 | 9 | | | | | | | | | | | | | | | | | | | | 9.2 | 8 | D 2000 |
| 70.2 | 73.9 | | | | | | | | | | | | | | | | | | | | | | |

Preliminary Plans

Sign Details

Pettibone Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

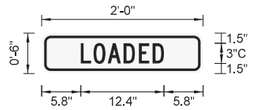
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| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 110 | 6 |

| | |
|---|---|
| SIGN NUMBER | Sign 3 |
| WIDTH X HEIGHT | 2'-0" x 0'-6" |
| BORDER WIDTH | 0.38" (inset 0.38") |
| CORNER RADIUS | 1" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: XI Reflective |
| | COLOR: White |
| LEGEND/BORDER | TYPE: Non-reflective |
| | COLOR: Black |

STATION(S):
98+04-60' Rt
441+60 Lt
459+74 Rt

AREA: 1.0 Sq.Ft.




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

Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

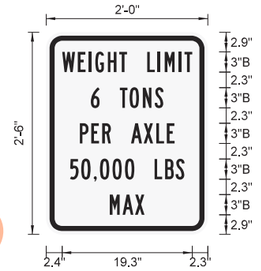
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| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| L | O | A | D | E | D | | | | | | | | | | | | | | | | | 12.4 | 3 | C 2000 |
| 5.8 | 7.7 | 9.8 | 12.2 | 14.5 | 16.5 | | | | | | | | | | | | | | | | | | | |

| | |
|---|---|
| SIGN NUMBER | Sign 4 |
| WIDTH X HEIGHT | 2'-0" x 2'-6" |
| BORDER WIDTH | 0.75" (inset 0.5") |
| CORNER RADIUS | 1.88" |
| MOUNTING | Ground |
| BACKGROUND | TYPE: XI Reflective |
| | COLOR: White |
| LEGEND/BORDER | TYPE: Non-reflective |
| | COLOR: Black |

STATION(S):
446+34 Lt

AREA: 5.0 Sq.Ft.




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

Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Reg_30_Med.ssl

| LETTER POSITION (X) | | | | | | | | | | | | | | | | | | | | | | LENGTH | SIZE | SERIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| W | E | I | G | H | T | | L | I | M | I | T | | | | | | | | | | | 19.3 | 3 | B 2000 |
| 2.4 | 4.7 | 6.3 | 7.3 | 9.2 | 10.9 | 12 | 15 | 16.6 | 17.6 | 19.7 | 20.6 | | | | | | | | | | | | | |
| 6 | | T | O | N | S | | | | | | | | | | | | | | | | | 10.8 | 3 | B 2000 |
| 6.6 | 7.9 | 10.9 | 12.4 | 14.4 | 16.1 | | | | | | | | | | | | | | | | | | | |
| P | E | R | | A | X | L | E | | | | | | | | | | | | | | | 14.1 | 3 | B 2000 |
| 5 | 6.7 | 8.3 | 9.6 | 12.6 | 14.5 | 16.4 | 17.9 | | | | | | | | | | | | | | | | | |
| 5 | 0 | , | 0 | 0 | 0 | | L | B | S | | | | | | | | | | | | | 17 | 3 | B 2000 |
| 3.5 | 5.2 | 7.1 | 8 | 9.9 | 11.7 | 13.1 | 16.1 | 17.7 | 19.2 | | | | | | | | | | | | | | | |
| M | A | X | | | | | | | | | | | | | | | | | | | | 5.2 | 3 | B 2000 |
| 9.5 | 11.3 | 13.2 | | | | | | | | | | | | | | | | | | | | | | |

Preliminary Plans

Sign Details

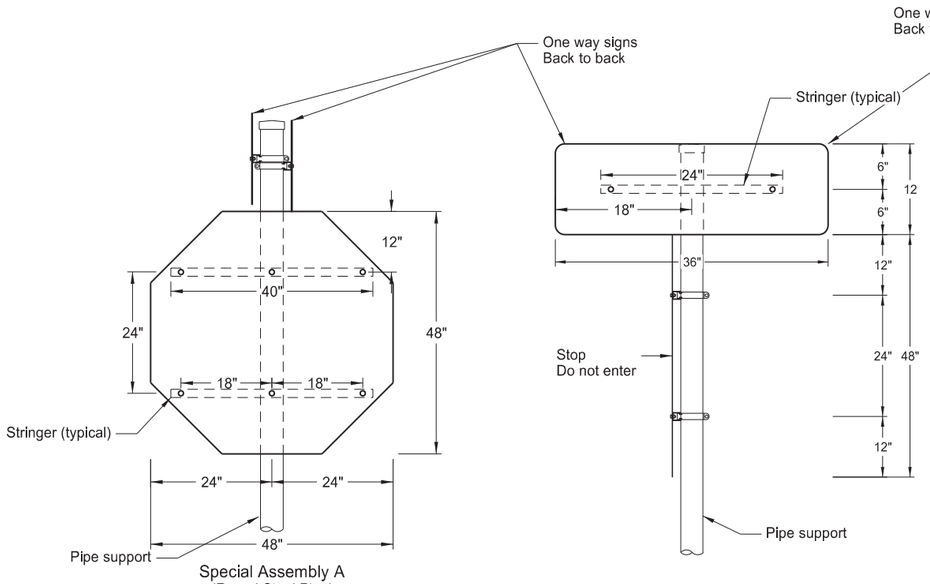
Pettibone Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 110 | 7 |

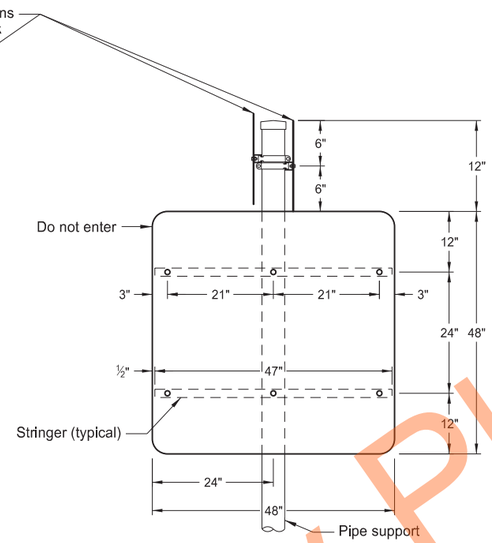



Special Assembly A
(Round Steel Pipe)

Sta 98+90 Rt

Pay Area: 19 Sq Ft

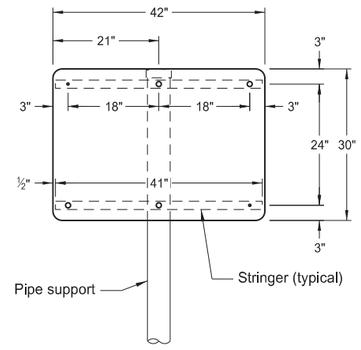



Special Assembly B
(Round Steel Pipe)

Sta 97+73 Lt

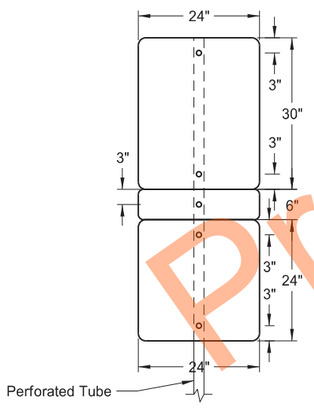
Pay Area: 22 Sq Ft




Special Assembly C
(Round Steel Pipe)

Sta 95+22 Lt

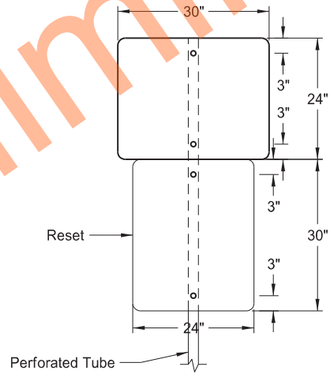
Pay Area: 18 Sq Ft




Special Assembly D
(Perforated Tube)

Sta 98+04-60' Rt
Sta 441+60 Lt
Sta 446+72-160' Rt
Sta 464+00 Rt

Pay Area: 10 Sq Ft




Special Assembly E
(Perforated Tube)

Sta 447+87 Lt

Pay Area: 5 Sq Ft

Sign Assemblies

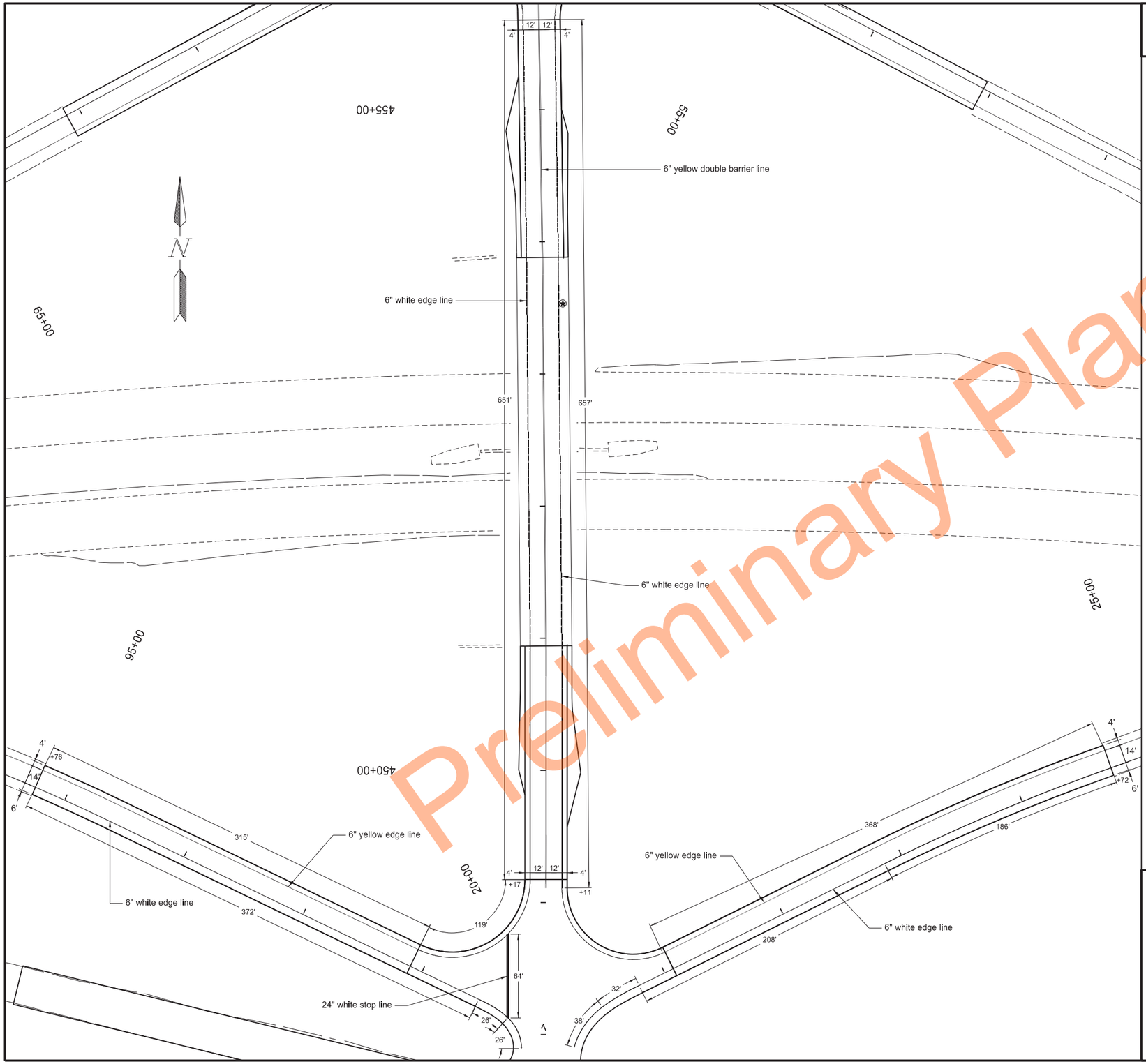
Pettibone Interchange

I-94

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Darell Arne
PE-6529
DATE
08/29/25
NORTH DAKOTA

Preliminary Plans

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Preliminary Plans

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 120 | 1 |

| SPEC | CODE | BID ITEM | QTY | UNIT |
|---|---|---|---|---|
| 762 | 1106 | PVMT MK PAINTED 6IN LINE | | |
| | | 6" white edge line | 2195 | LF |
| | | 6" yellow edge line | 910 | LF |
| | | 6" yellow double barrier line | 1314 | LF |
| | | Total | 4419 | LF |
| 762 | 1124 | PVMT MK PAINTED 24IN LINE | | |
| | | 24" white stop line | 64 | LF |

Pavement Marking Layout

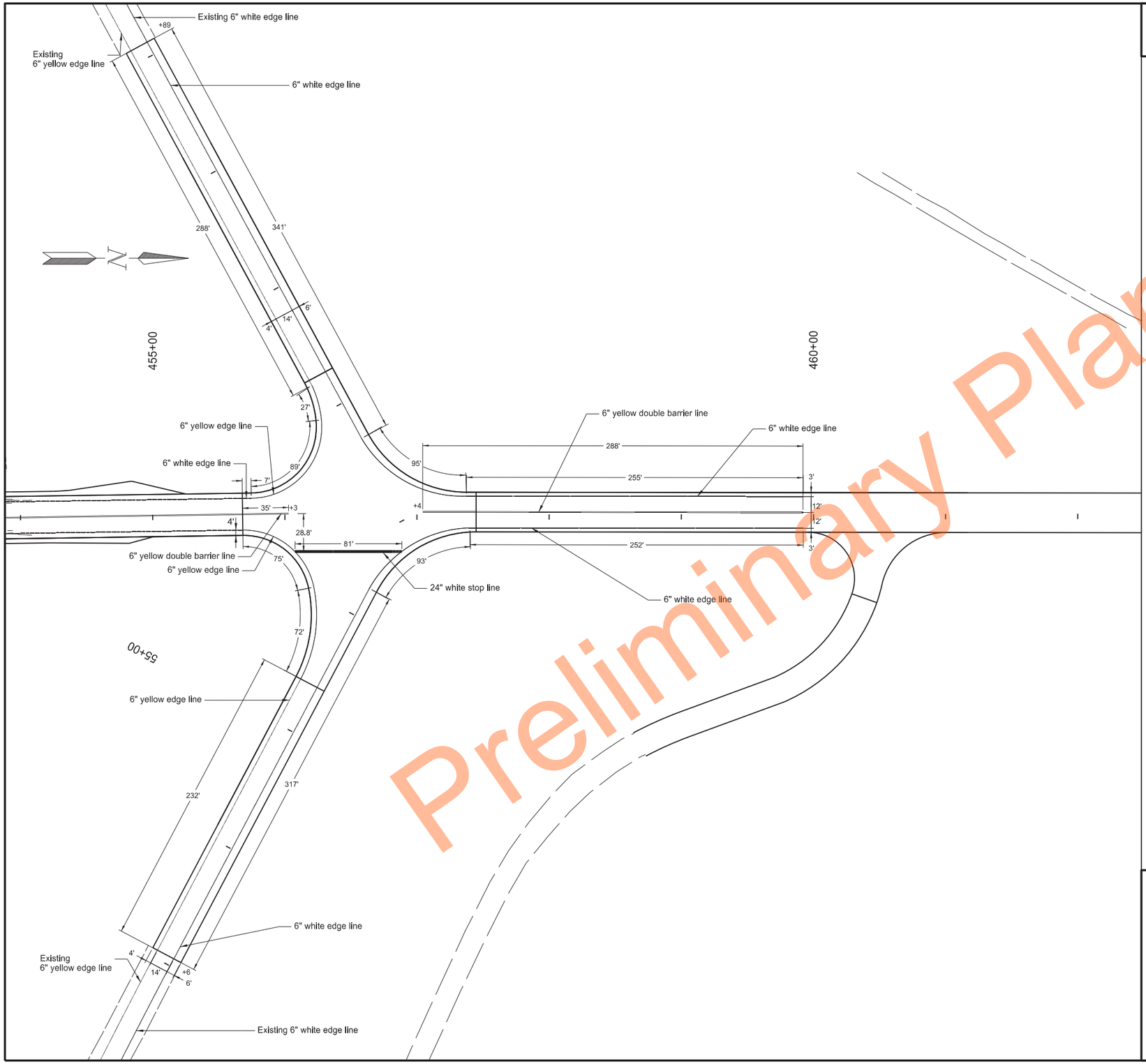
Pettibone Interchange
South & Overpass

I-94

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

8/27/2024 2:19:56 PM jallery R:\project\20094217.186\traffic\Sheets\120MK_001_LPvmt.dgn

Docusign Envelope ID: FE85C71D-6445-4351-9A92-B68ADB20BE40




Preliminary Plans

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 120 | 2 |

| SPEC | CODE | BID ITEM | QTY | UNIT |
|---|---|---|---|---|
| 762 | 1106 | PVMT MK PAINTED 6IN LINE | | |
| | | 6" white edge line | 1360 | LF |
| | | 6" yellow edge line | 783 | LF |
| | | 6" yellow double barrier line | 652 | LF |
| | | Total | 2795 | LF |
| 762 | 1124 | PVMT MK PAINTED 24IN LINE | | |
| | | 24" white stop line | 81 | LF |

Pavement Marking Layout

Pettibone Interchange
North

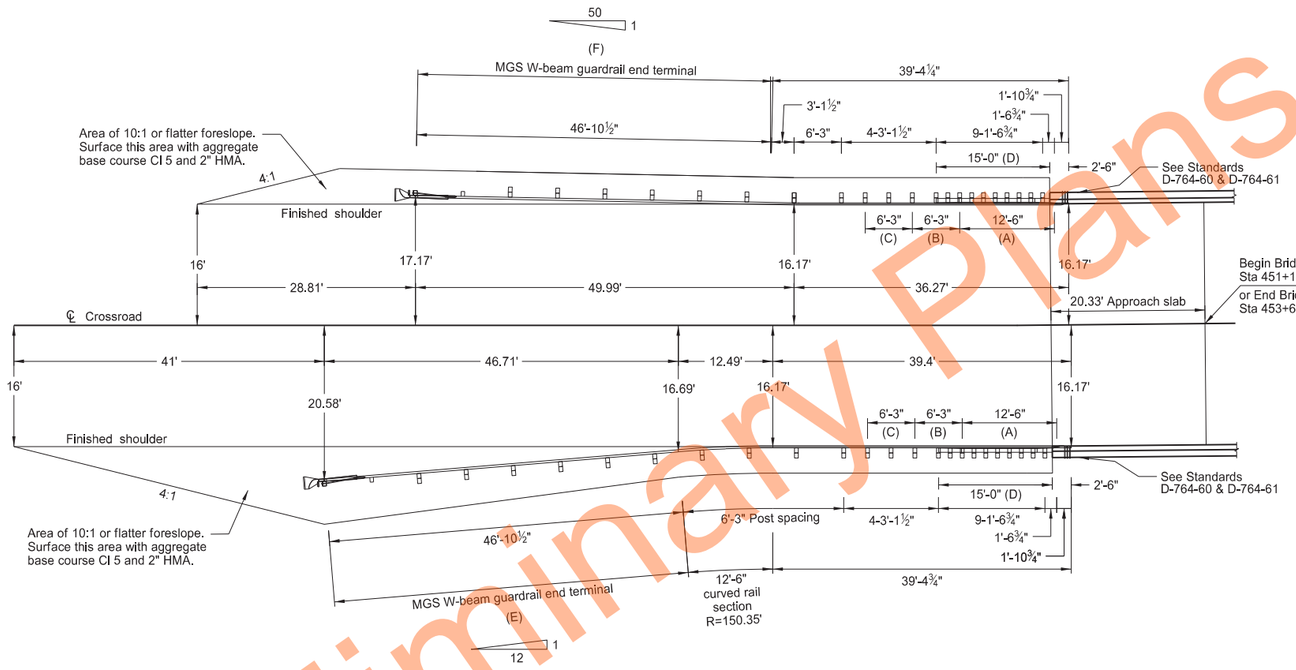
I-94

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PE-6529
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NORTH DAKOTA

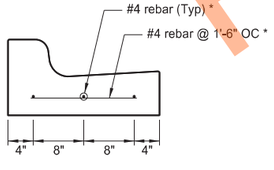
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 130 | 1 |




Preliminary Plans




Curb & Gutter Detail

* Install #4 rebar in the curb and gutter section as shown. Use a length of rebar that will provide 3" clear distance to the concrete at each end. Include the cost to furnish and install rebar in the unit cost for "Curb & Gutter - Type 1 Special".

(A) Thrie beam rail section (double thickness)

(B) Thrie beam rail section

(C) Asymmetrical W-Thrie beam transition section

(D) Curb & gutter - type 1 special. Install in accordance with Standard Drawing D-748-1, except for transitions on each end as shown on Standard Drawing D-764-60.

(E) Install an MGS FLEAT end terminal at this location. See Standard D-764-38.

(F) Install either a MASH SKT or a MASH SoftStop Terminal at this location.

If a MASH SKT is installed, install the end terminal as shown above. See Standard D-764-51.

If a MASH SoftStop is installed, install it with the offset as shown on Standard D-764-50. Additional guardrail embankment required is at the contractor's expense.

Thrie/MGS W-Beam Guardrail Layout
At Both Ends of Bridge

Pettibone Interchange Crossroad
RP 217.146

I-94

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Darell Arne
PE-6529
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**23 U.S.C. § 407 Documents**
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|---|---|---|---|
| ND | IM-2-094(186)217 | 130 | 2 |

## MGS W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

### THRIE/MGS W-BEAM GUARDRAIL AT BRIDGE ENDS

| LOCATION | (A) 5/8" Ø x 18" LONG GUARD-RAIL BOLT | (A) 6" x 8" x 6'-0" TIMBER POST | (A) 6" x 8" x 14" TIMBER BLOCK | (A) 5/8" Ø x 1 1/4" LONG GUARD-RAIL BOLT | (A) 12'- 6" STRAIGHT W-BEAM RAIL SECTION | (A) 12'- 6" CURVED W-BEAM RAIL SECTION | (A) REFL-ECTOR-IZED PLATES | (A) 6" x 8" x 7' WOOD POST | (A) 6" x 8" x 19" WOOD OFF-SET BLOCK | (A) 6'-3" W-THRIE BEAM TRANS-ITION SECTION | (A) 6'-3" THRIE BEAM SECTION | (A) 12'-6" DOUBLE THRIE BEAM SECTION | (A) 2'-6" THRIE BEAM TERM-INAL CON-NECTOR | (A) 7/8" Ø x 18" LONG HEX HEAD BOLT | (A) SINGLE SLOPE TO THRIE BEAM CONN-ECTOR PLATE |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH | EACH |
| Sta 450+44.86 to 450+96.75 Rt | 28 | 11 | 5 | 60 | 1 | 1 | 6 | 6 | 12 | 1 | 1 | 1 | 1 | 5 | 1 |
| Sta 450+57.36 to 450+96.75 Lt | 26 | 9 | 3 | 52 | 1 | | 5 | 6 | 12 | 1 | 1 | 1 | 1 | 5 | 1 |
| Sta 453+85.75 to 454+25.15 Rt | 26 | 9 | 3 | 52 | 1 | | 5 | 6 | 12 | 1 | 1 | 1 | 1 | 5 | 1 |
| Sta 453+85.75 to 454+37.64 Lt | 28 | 11 | 5 | 60 | 1 | 1 | 6 | 6 | 12 | 1 | 1 | 1 | 1 | 5 | 1 |
| TOTAL | 108 | 40 | 16 | 224 | 4 | 2 | 22 | 24 | 48 | 4 | 4 | 4 | 4 | 20 | 4 |

(A) Include these items in the contract unit price bid for "W-Beam Guardrail".

(B) Remove from mainline I-94

| SPEC | CODE | BID ITEM | QTY | UNIT | |
|---|---|---|---|---|---|
| 202 | 0113 | REMOVAL OF CONCRETE | | | |
| | | Sta 11464+79.22 to 11465+27.22 Rt | 3 | CY | (B) |
| | | Sta 11465+10.41 to 11465+58.41 Lt | 3 | CY | (B) |
| | | Total | 6 | CY | |
| 748 | 0141 | CURB & GUTTER - TYPE 1 SPECIAL | | | |
| | | Sta 450+79.25 to 450+94.25 Rt | 15 | LF | |
| | | Sta 450+79.25 to 450+94.25 Lt | 15 | LF | |
| | | Sta 453+88.25 to 454+03.25 Rt | 15 | LF | |
| | | Sta 453+88.25 to 454+03.25 Lt | 15 | LF | |
| | | Total | 60 | LF | |
| 764 | 0131 | W-BEAM GUARDRAIL | | | |
| | | Sta 450+44.86 to 450+96.75 Rt | 51.9 | LF | |
| | | Sta 450+57.36 to 450+96.75 Lt | 39.4 | LF | |
| | | Sta 453+85.75 to 454+25.15 Rt | 39.4 | LF | |
| | | Sta 453+85.75 to 454+37.64 Lt | 51.9 | LF | |
| | | Total | 182.6 | LF | |
| 764 | 0145 | W-BEAM GUARDRAIL END TERMINAL | | | |
| | | Sta 449+98.15 to 450+44.86 Rt | 1 | Ea | |
| | | Sta 450+10.49 to 450+57.36 Lt | 1 | Ea | |
| | | Sta 454+25.15 to 454+72.01 Rt | 1 | Ea | |
| | | Sta 454+37.64 to 454+84.35 Lt | 1 | Ea | |
| | | Total | 4 | Ea | |

| SPEC | CODE | BID ITEM | QTY | UNIT | |
|---|---|---|---|---|---|
| 764 | 0151 | REMOVE W-BEAM GUARDRAIL & POSTS | | | |
| | | Sta 450+36.63 to 451+32.14 Rt | 95.7 | LF | |
| | | Sta 450+86.49 to 451+32.14 Lt | 45.7 | LF | |
| | | Sta 453+51.94 to 453+97.59 Rt | 45.7 | LF | |
| | | Sta 453+51.94 to 454+47.45 Lt | 95.7 | LF | |
| | | Sta 11462+58.97 to 11465+00.47 Rt | 239.4 | LF | (B) |
| | | Sta 11465+37.16 to 11467+73.88 Lt | 239.4 | LF | (B) |
| | | Total | 761.6 | LF | |
| 764 | 2081 | REMOVE END TREATMENT & TRANSITION | | | |
| | | Sta 449+86.80 to 450+36.63 Rt | 1 | Ea | |
| | | Sta 450+36.50 to 450+86.49 Lt | 1 | Ea | |
| | | Sta 453+97.59 to 454+47.58 Rt | 1 | Ea | |
| | | Sta 454+47.45 to 454+97.28 Lt | 1 | Ea | |
| | | Sta 11462+08.38 to 11462+58.97 Rt | 1 | Ea | (B) |
| | | Sta 11467+73.88 to 11468+23.11 Lt | 1 | Ea | (B) |
| | | Total | 6 | Ea | |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

**Thrie/MGS W-Beam Guardrail Quantities**

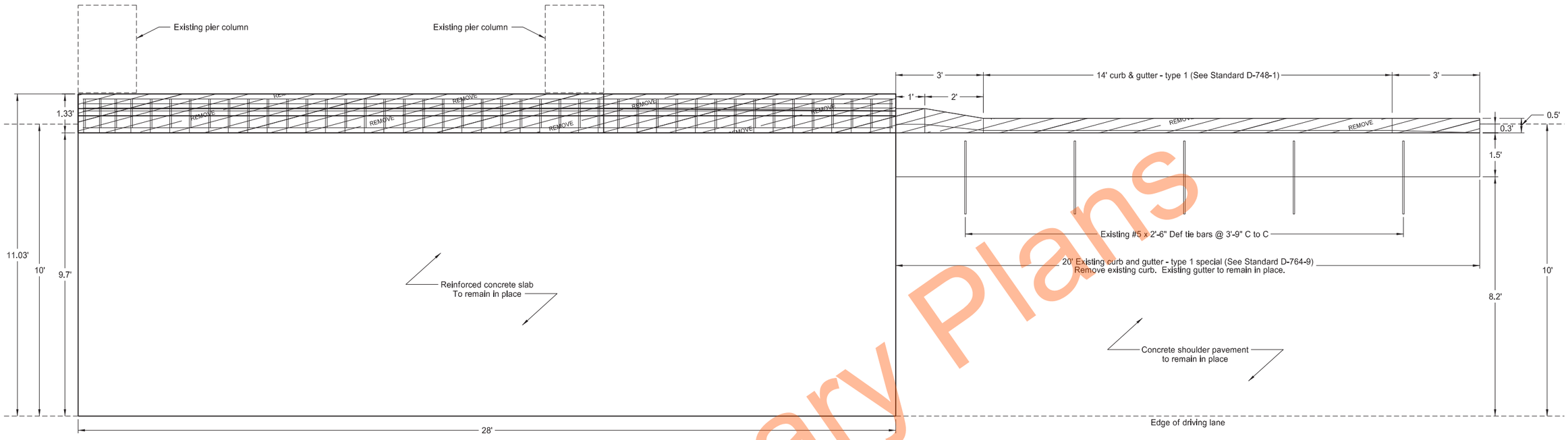
**Pettibone Interchange Crossroad**
**RP 217.146**

**I-94**

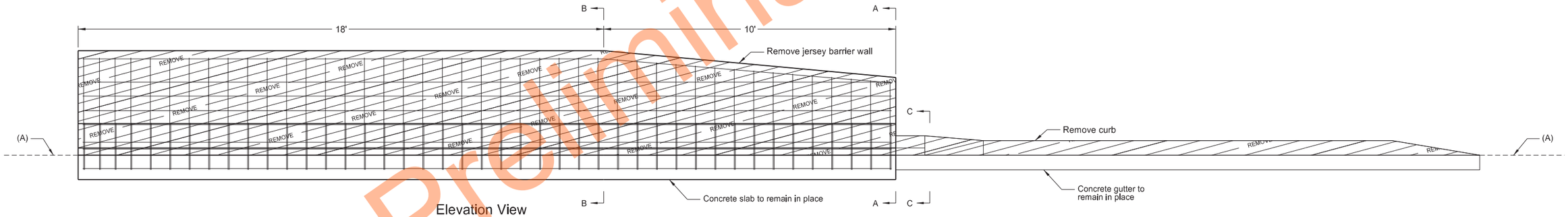
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 130 | 3 |



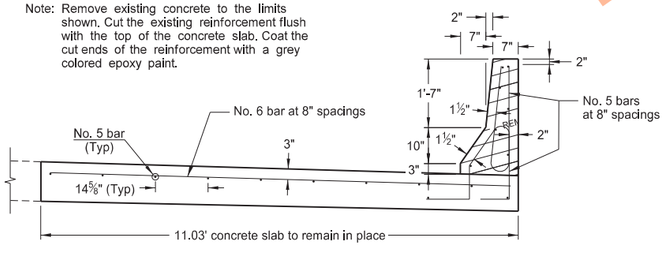

Plan View



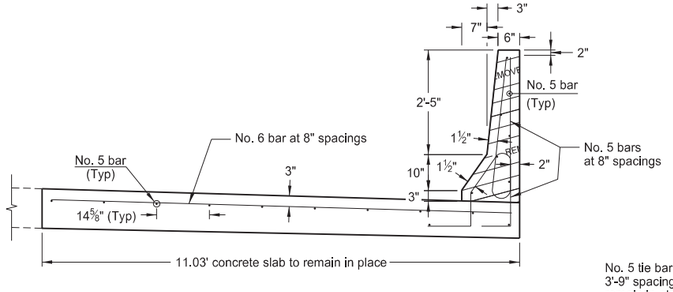

Elevation View
Facing South for Eastbound Roadway
Facing North for Westbound Roadway

(A) Finished shoulder

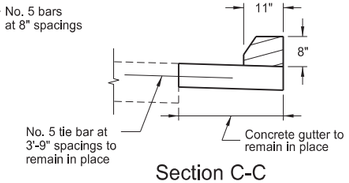
Note: Remove existing concrete to the limits shown. Cut the existing reinforcement flush with the top of the concrete slab. Coat the cut ends of the reinforcement with a grey colored epoxy paint.




Section A-A




Section B-B




Section C-C

Removal of Concrete

Outside Pier Protection

Pettibone Interchange
RP 217.146

Eastbound and Westbound I-94

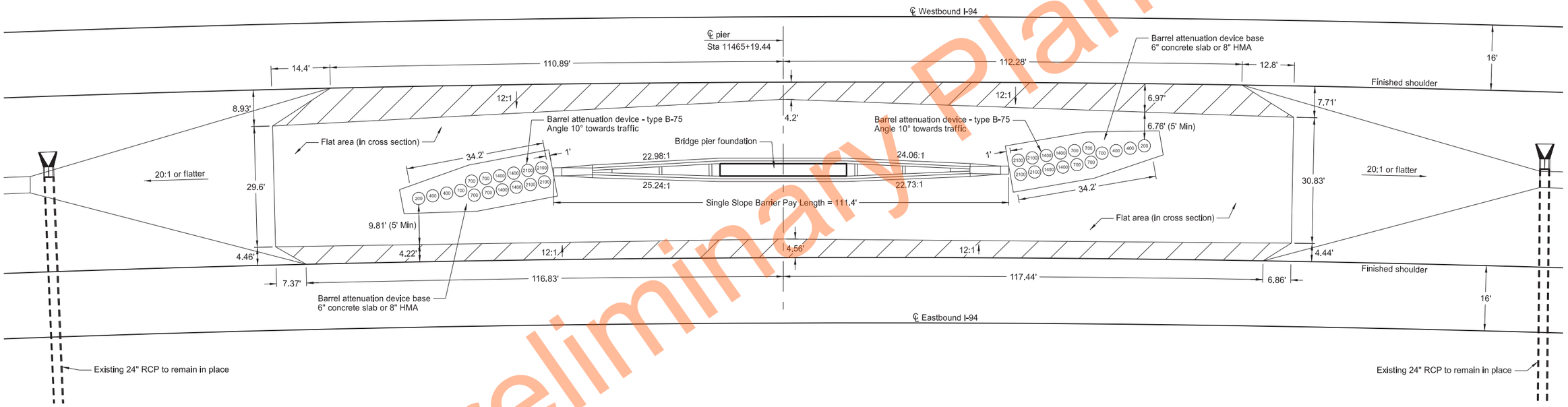
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE
08/29/25
NORTH DAKOTA

Preliminary Plans

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NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 130 | 4 |




Preliminary Plans

| SPEC | CODE | BID ITEM | QTY | UNIT |
|---|---|---|---|---|
| 602 | 1220 | SINGLE SLOPE BARRIER | 111.4 | LF |
| 764 | 8071 | BARREL ATTENUATION DEVICE - TYPE B-75 | 2 | EA |

Single Slope Barrier and Attenuation Device Layout

Median Pier Protection

Pettibone Interchange
RP 217.146

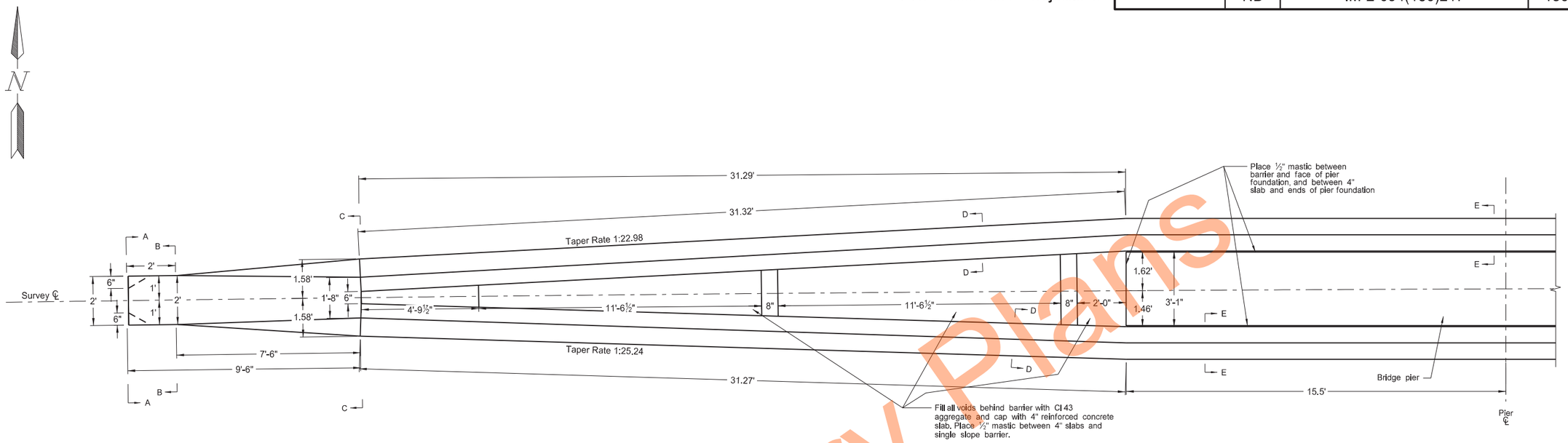
I-94

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Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

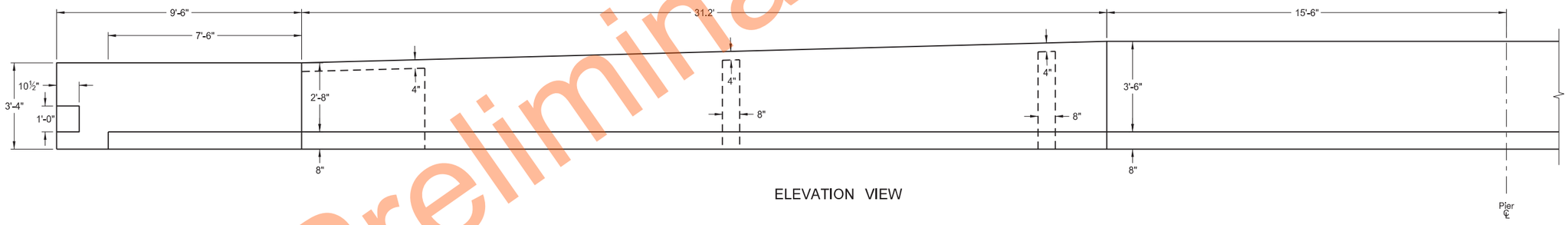
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

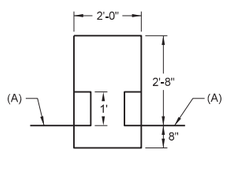
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| ND | IM-2-094(186)217 | 130 | 5 |



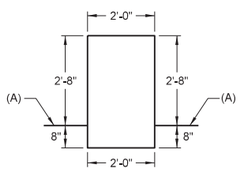

PLAN VIEW



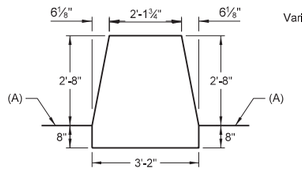

ELEVATION VIEW



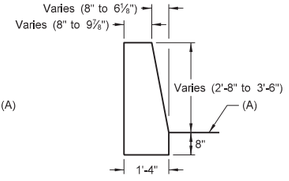

Section A-A



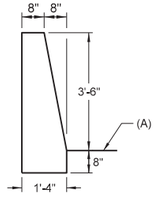

Section B-B




Section C-C




Section D-D




Section E-E

(A) Finished surface

Single Slope Barrier Details

Median Pier Protection

Pettibone Interchange
RP 217.146

I-94

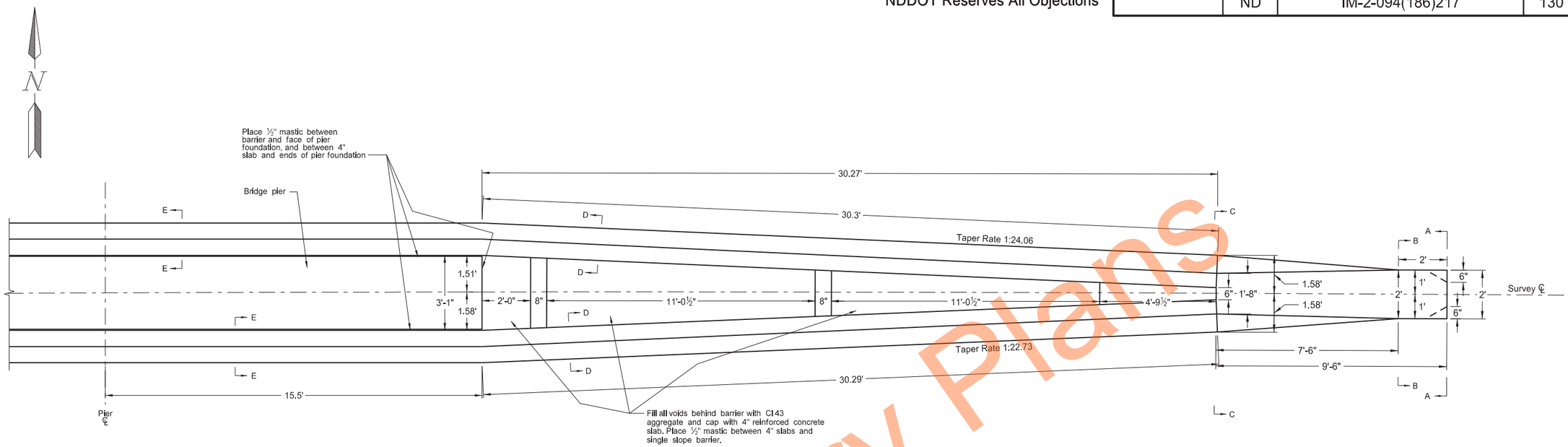
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

Preliminary Plans

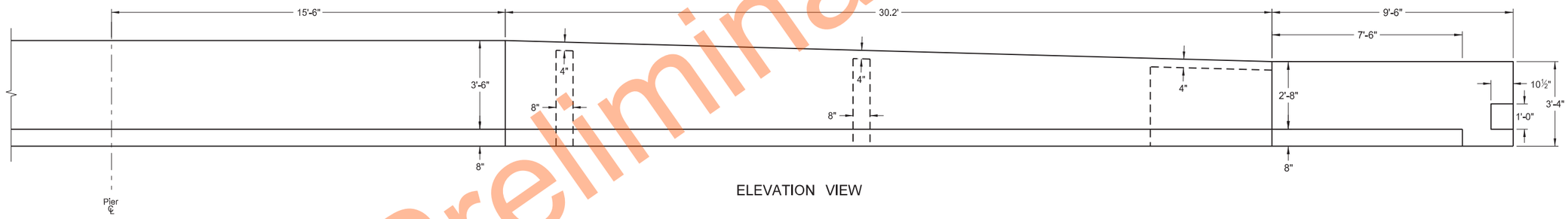
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23 U.S.C. § 407 Documents
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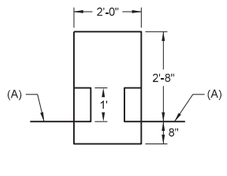
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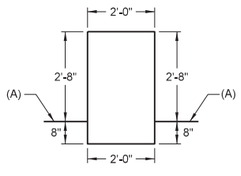

PLAN VIEW



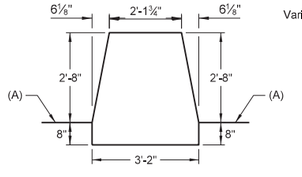

ELEVATION VIEW



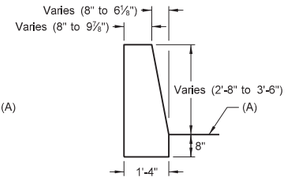

Section A-A



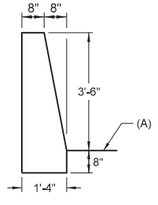

Section B-B




Section C-C




Section D-D




Section E-E

(A) Finished surface

Single Slope Barrier Details

Median Pier Protection

Pettibone Interchange
RP 217.146

I-94

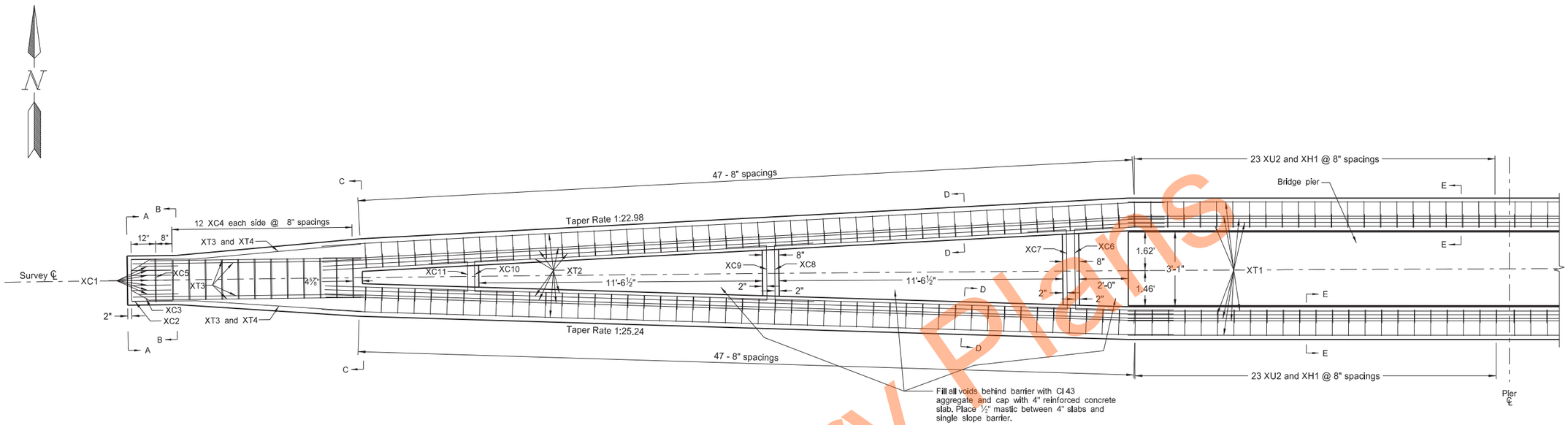
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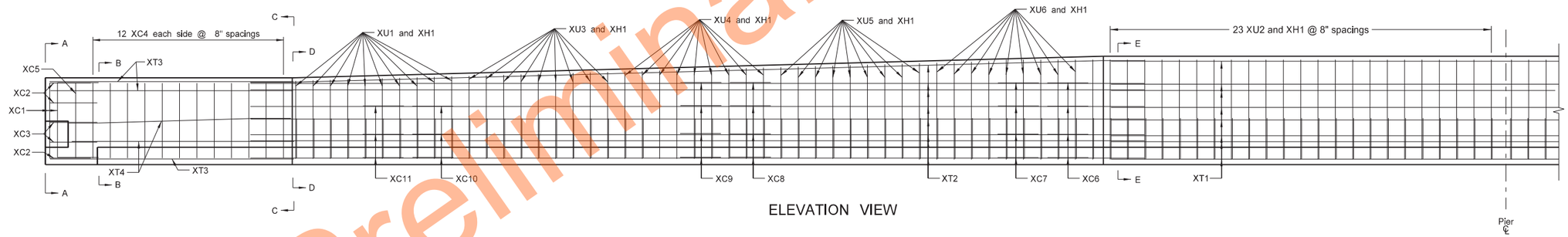
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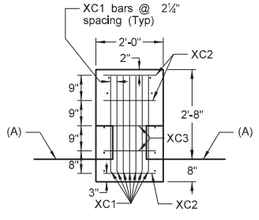
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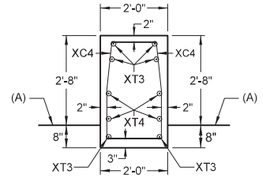

PLAN VIEW



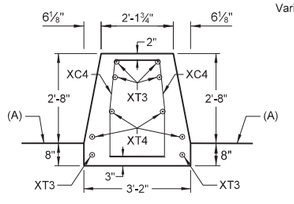

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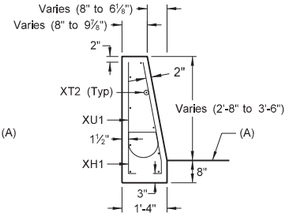

SECTION A-A



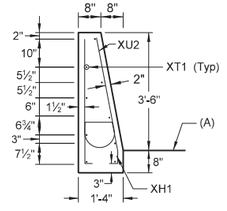

SECTION B-B




SECTION C-C




SECTION D-D




SECTION E-E

(A) Finished surface

Single Slope Barrier Details
Reinforcing Steel Layout

Median Pier Protection

Pettibone Interchange
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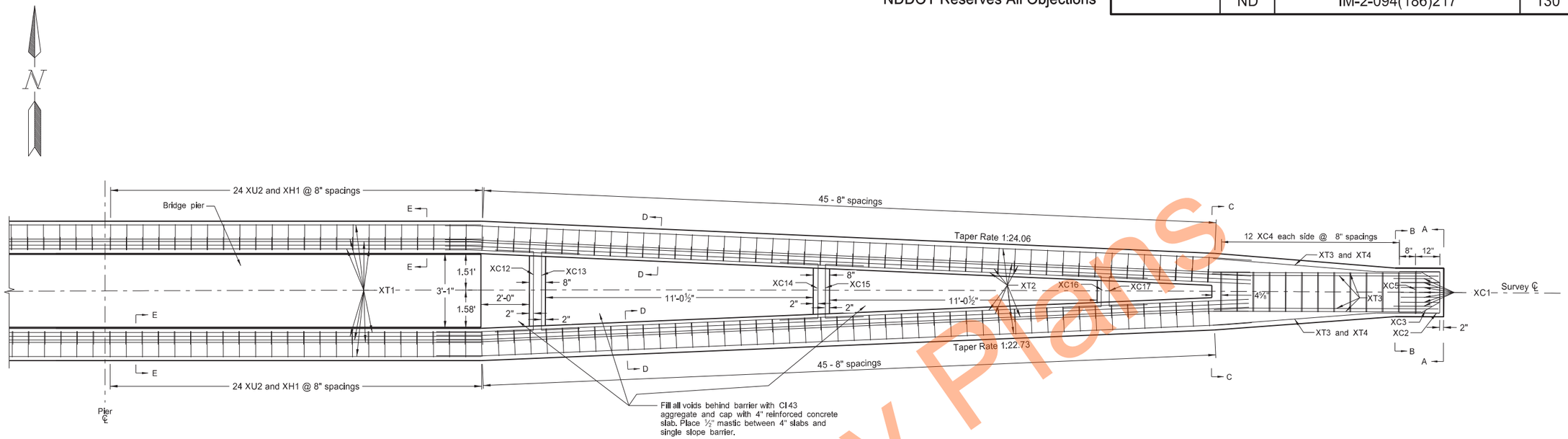
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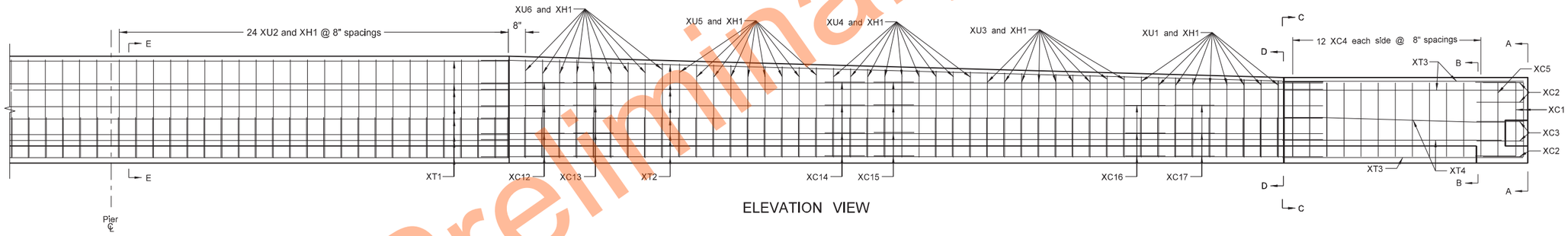
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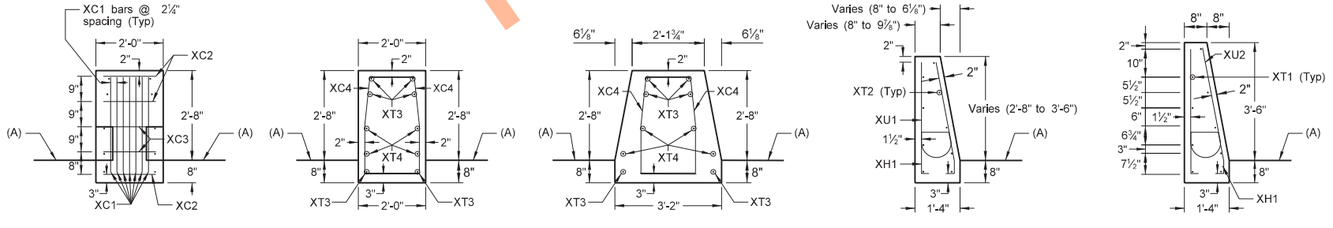
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PLAN VIEW




ELEVATION VIEW




Single Slope Barrier Details
Reinforcing Steel Layout

Median Pier Protection

Pettibone Interchange
RP 217.146

I-94

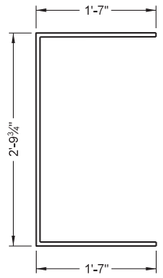
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Preliminary Plans

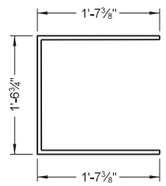
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NDDOT Reserves All Objections

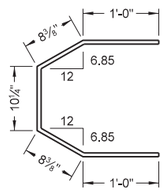
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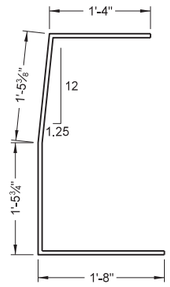

XC1



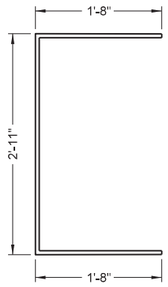

XC2



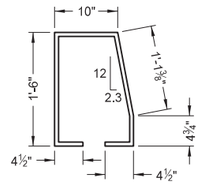

XC3



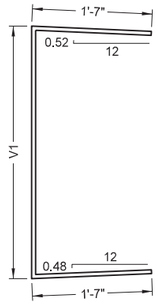

XC4




XC5

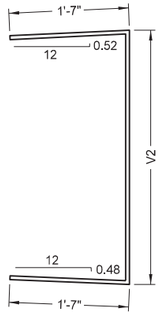



XH1



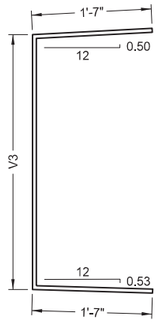

XC7, XC9, XC11

| XC7, XC9, XC11 | |
|---|---|
| MARK | V1 DIMENSION |
| XC7 | 3'-4⅛" |
| XC9 | 2'-4" |
| XC11 | 1'-3⅞" |



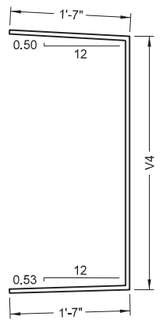

XC6, XC8, XC10

| XC6, XC8, XC10 | |
|---|---|
| MARK | V2 DIMENSION |
| XC6 | 3'-4⅜" |
| XC8 | 2'-4¼" |
| XC10 | 1'-4⅛" |



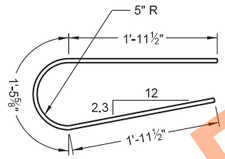

XC12, XC14, XC16

| XC12, XC14, XC16 | |
|---|---|
| MARK | V3 DIMENSION |
| XC12 | 3'-4¼" |
| XC14 | 2'-4¼" |
| XC16 | 1'-4⅜" |

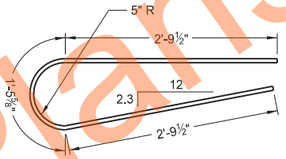



XC13, XC15, XC17

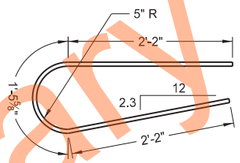
| XC13, XC15, XC17 | |
|---|---|
| MARK | V4 DIMENSION |
| XC13 | 3'-4" |
| XC15 | 2'-4" |
| XC17 | 1'-4" |



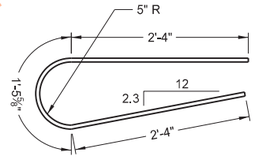

XU1



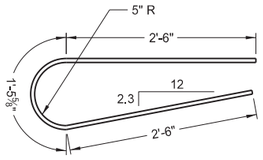

XU2



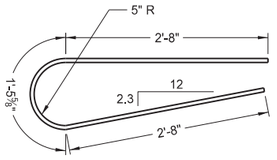

XU3




XU4




XU5



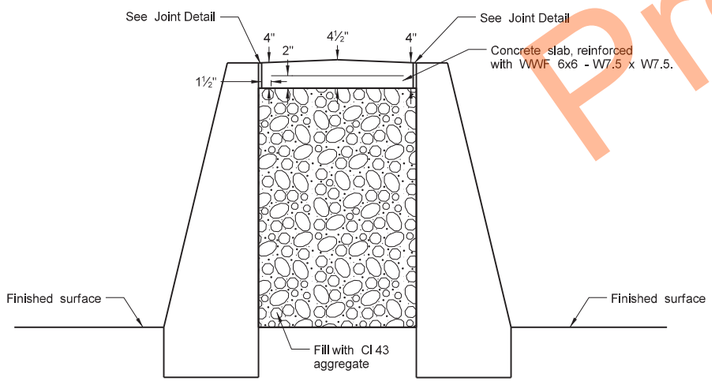

XU6

BENT BAR DETAILS

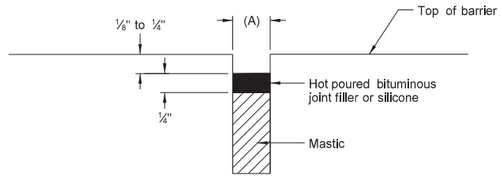
| BAR LIST | | | | |
|---|---|---|---|---|
| MARK | SIZE | NO. | LENGTH | SHAPE |
| XC1 | 6 | 14 | 5'-11¾" | BENT |
| XC2 | 5 | 6 | 4'-9½" | BENT |
| XC3 | 5 | 4 | 4'-3" | BENT |
| XC4 | 5 | 48 | 5'-11⅛" | BENT |
| XC5 | 5 | 4 | 6'-3" | BENT |
| XC6 | 5 | 4 | 6'-6⅜" | BENT |
| XC7 | 5 | 4 | 6'-6⅛" | BENT |
| XC8 | 5 | 4 | 5'-6¼" | BENT |
| XC9 | 5 | 4 | 5'-6" | BENT |
| XC10 | 5 | 3 | 4'-6⅛" | BENT |
| XC11 | 5 | 3 | 4'-5⅞" | BENT |
| XC12 | 5 | 4 | 6'-6¼" | BENT |
| XC13 | 5 | 4 | 6'-6" | BENT |
| XC14 | 5 | 4 | 5'-6¼" | BENT |
| XC15 | 5 | 4 | 5'-6" | BENT |
| XC16 | 5 | 3 | 4'-6⅜" | BENT |
| XC17 | 5 | 3 | 4'-6" | BENT |
| XH1 | 5 | 276 | 4'-7⅛" | BENT |
| XT1 | 5 | 18 | 31'-0" | STRAIGHT |
| XT2 | 5 | 36 | 34'-6" | STRAIGHT |
| XT3 | 5 | 12 | 9'-4¼" | STRAIGHT |
| XT4 | 5 | 8 | 8'-7" | STRAIGHT |
| XU1 | 5 | 38 | 5'-4⅝" | BENT |
| XU2 | 5 | 94 | 7'-0⅝" | BENT |
| XU3 | 5 | 36 | 5'-9⅝" | BENT |
| XU4 | 5 | 36 | 6'-1⅝" | BENT |
| XU5 | 5 | 36 | 6'-5⅝" | BENT |
| XU6 | 5 | 36 | 6'-9⅝" | BENT |

Construction notes:

1. Construct barriers according to the provisions of Section 602.04 G, except no deflection joints are required. Make ¾" V-grooves in all faces of the barriers at approximately 10 foot spacings.
2. Dimensions of bent bars are given out to out. The length of bent bars listed is the sum of the detailing dimensions. All radii are given to the inside of the bend.
3. Use grade 60 reinforcing steel meeting Section 612
4. Use Class AE concrete meeting Section 602.03B. Design a mix that meets Section 802 and will attain a minimum compressive strength of 4,000 PSI at 28-days.
5. Longitudinal reinforcing splice length is 19"
6. Surface finish "D" is required for all exposed surfaces of the barrier. See Section 170 for surface finish color.
7. An "X" preceding a bar designation indicates an epoxy coated bar




4" Slab and Aggregate Fill Detail




Joint Detail

(A) The joint width is ½" between barrier and 4" slab, and between barrier and pier columns.

Single Slope Barrier Details, Bent Bar Details, Bar Lists, Joint Detail, 4" Slab and Aggregate Fill Detail

Median Pier Protection

Pettibone Interchange
RP 217.146

I-94

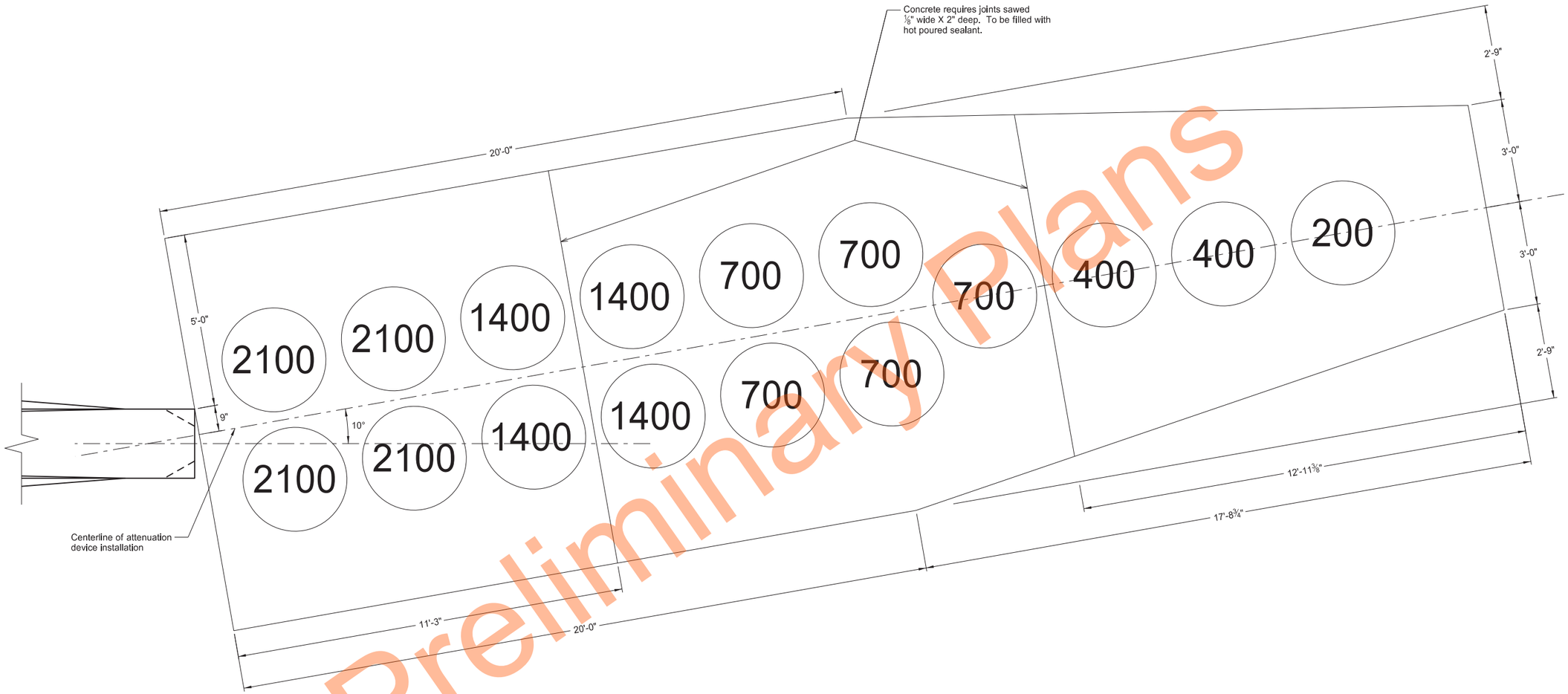
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Docusign Envelope ID: 7C780DC8-9CA1-450F-A030-3512CB44C496

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|---|---|---|---|
| ND | IM-2-094(186)217 | 130 | 10 |




Plan View
Area = 385.13 square feet

Construct the barrel attenuation device bases using either 2" of aggregate base and 8" of HMA, or 2" of aggregate base and 6" of Class AE concrete meeting 602.03 B. Slightly slope the surface of the bases to facilitate drainage.

Paint the perimeter of each attenuation device module, and the specified mass (weight) of Cl 43 aggregate in each module on the surface of the bases.

Include all materials, equipment and labor required to construct the concrete or asphalt slab in the contract unit price bid for item "Barrel Attenuation Device - Type B-75."

Barrel Attenuation Device Base Details

Median Pier Protection

Pettibone Interchange
RP 217.146

I-94

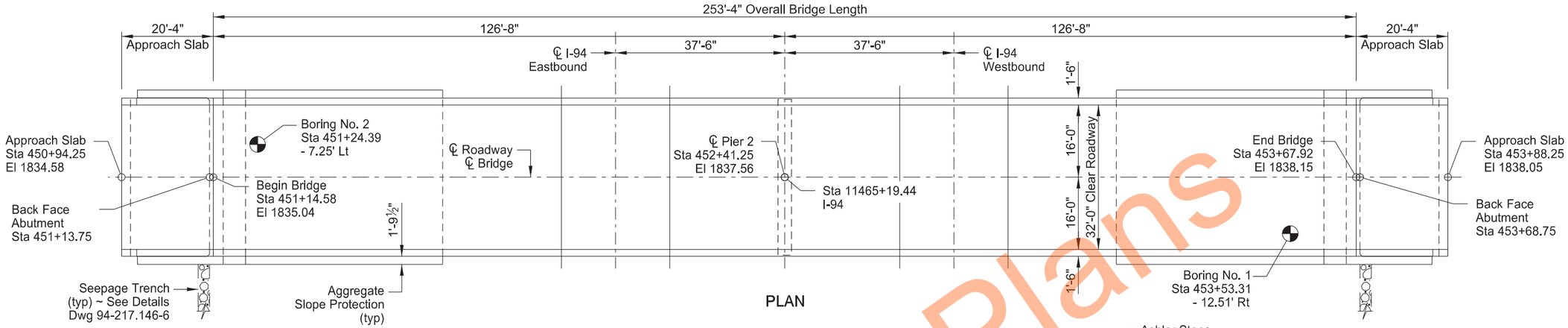
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE
08/29/25
NORTH DAKOTA

Preliminary Plans

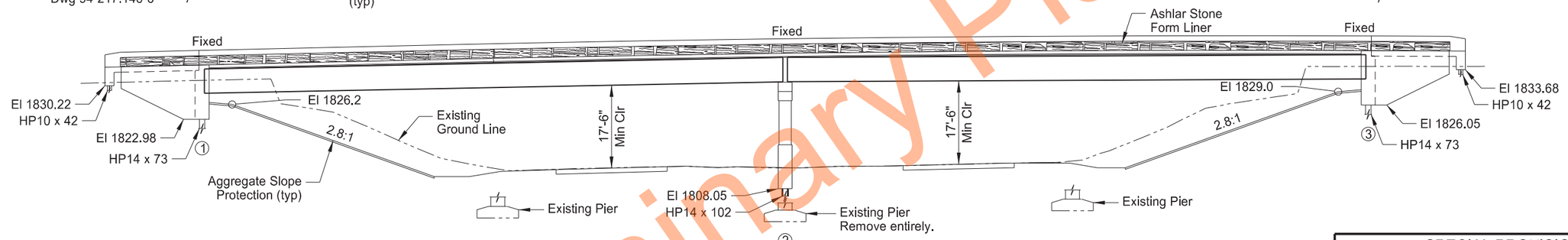
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23 U.S.C. § 407 Documents
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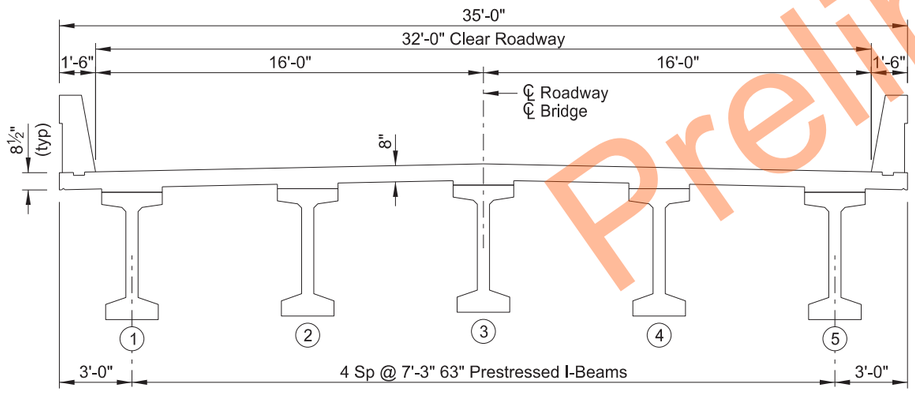
| BRIDGE CODE | | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|---|
| X781 | | ND | IM-2-094(186)217 | 170 | 1 |



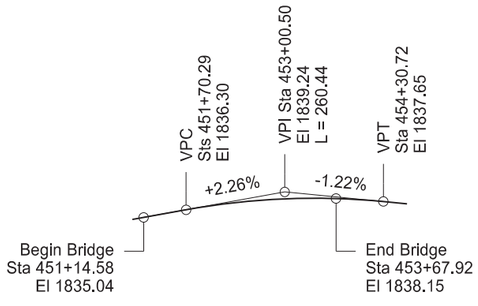

PLAN




ELEVATION




TYPICAL SECTION




VERTICAL CURVE DATA

## DESIGN STRENGTHS:

f'c = 4,000 psi ~ Bridge Substructure Concrete
f'c = 4,000 psi ~ Bridge Deck Concrete
f'c = 4,000 psi ~ Bridge Barrier Concrete
f'c = 7,000 psi ~ Prestressed Beam Concrete
fy = 60,000 psi ~ Reinforcing Steel

Load & Resistance Factor Design

| SURVEY CONTROL POINTS | | | |
|---|---|---|---|
| POINT | NORTHING | EASTING | ELEVATION |
| RTK 30000 | 443,540.15 | 2,200,275.01 | 1,812.93 |
| RTK 35619 | 447,027.05 | 2,200,506.86 | 1,812.96 |

| SPECIAL PROVISIONS | |
|---|---|
| SSP 2 | MIGRATORY BIRD TREATY ACT |
| SP 199(24) | ARCHITECTURAL SURFACE FINISH |
| SP 642(24) | PILE DYNAMIC ANALYZER |

| STANDARD DRAWINGS |
|---|
| D-622-1, D-714-18, D-900-1 |

| DESIGN SPECIFICATIONS |
|---|
| AASHTO LRFD BRIDGE DESIGN 9TH EDITION |
| HL-93 DESIGN LOADING |
| F.W.S. 15 PSF |

I-94/PETTIBONE INTERCHANGE

STATION: 11465+19.44

BRIDGE LAYOUT

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
07/21/26

DRAWING NO. 94-217.146-1

Preliminary Plans

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|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 2 |

# NOTES

100 SCOPE OF WORK: This project consists of removing an existing bridge and building a new 2-span prestressed concrete I-beam bridge with an overall bridge length of 253'-4" and a clear roadway width of 32'-0".

100 GENERAL: Include the cost of furnishing and placing preformed expansion joint filler, concrete inserts, rebar couplers, silicone sealant, waterproof membrane, and other miscellaneous items in the price bid for the appropriate concrete bid items.

202 REMOVAL OF STRUCTURE: The existing structure is a 4-span prestressed concrete I-beam bridge, 224'-0" long with a clear roadway width of 24'-0", and concrete substructures. The abutments are supported on steel H-piling and the piers are supported on spread footings. There are pier protection items including concrete barriers, barrels, and concrete barrel slabs, adjacent to the middle pier.

Remove the bridge superstructure, concrete abutments, middle pier and middle pier protection items entirely. Cut the abutment piling at a depth 1 foot below the finished grade. Remove the outside piers to a depth 1 foot below the finished ground line. Removal of outside pier protection items are paid separately.

Include all costs for the removal of the bridge and median pier protection items in the contract unit price for “Removal of Structure.”

210 EXCAVATION: Include the excavation costs at the abutments, as shown in the “Detail at Abutment”, and the excavation costs at the pier in the lump sum bid item, “Class 1 Excavation.”

602 BRIDGE CONCRETE: Supply AE Portland Cement Concrete using well graded or optimized aggregates as specified in Section 802.02 B. Design a mix that meets Section 802 and will attain a minimum compressive strength of 4,000 psi at 28-days.

The Engineer will verify the mix design using materials that are to be used on the project. Supply samples of materials as specified in the table below. Provide additional materials upon request.

| Material | Sample Size |
|---|---|
| Cement | 100 lbs |
| SCM | 35 lbs |
| Aggregate | 1000 lbs |
| Admixtures | ½ pint each |

Deliver the samples and the mix design, including the test results, to the Materials and Research Division a minimum of 14 calendar days before placing concrete. Attach a tag to all samples identifying the Department’s project number and the type of material. On the day the material is delivered, provide the Engineer with a copy of the mix design and test results, and notify the Engineer the samples have been delivered.

602 DIAPHRAGMS AND ENDWALLS: Place the pier diaphragm and endwall concrete at the same time as the bridge slab concrete.

602 DECK PLACEMENT: Do not place deck concrete until the entire deck is formed. Place the deck concrete at a minimum rate of 40 CY per hour. Allow the deck to cure a minimum of 72 hours between deck pours.

602 FORM LINERS: Include the cost to provide and install the form liners in the price bid for the appropriate concrete bid items.

602 BARRIERS: Do not construct V-grooves through form liner areas.

602 WATER WASHING EQUIPMENT: In addition to the water-washing equipment listed in Section 602.02 D, a cold water pressure washer that provides a minimum nozzle pressure of 3,000 psi may be used.

602 PENETRATING WATER REPELLENT TREATMENT: Apply penetrating water repellent to the driving surface of the bridge deck and approach slabs prior to crack sealing. Do not allow traffic on the driving surfaces until the solution has completely penetrated and the entire driving surface is dry.

602 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the bridge deck and approach slabs to determine the need for crack sealing. Mark and repair all visible cracks on the top surface measuring 0.012" or greater in width at the widest segment or as directed by the Engineer.

Immediately before applying the sealer, clean the cracks by removing all dust and debris with compressed air. Seal the cracks with a two-part epoxy in accordance with the manufacturer’s recommendations. Chase crack with the sealant application to the limits of the crack, including those portions that are narrower than 0.012" wide. Use Paulco TE-2501 (Viking Paints, Inc.), Dural 50 LM (Euclid Chemical Co.), TK-9000 or TK-2110 (TK Products), or an approved equal epoxy sealer.

Include all material, labor, and equipment required to crack seal the bridge deck and approach slabs in the price bid for Bridge Deck Concrete.

602 SPECIAL SURFACE FINISH: Clean the surfaces that are to receive the Tex-Cote surface finish using sandblasting, shot blasting, or water-washing equipment to remove all dirt, grease, oil, efflorescence, and laitance. Ensure any curing compounds and release agents have been completely removed from the surfaces to receive the Tex-Cote surface finish.

Apply Tex-Cote XL 70 Bridge Cote with Silane to the areas listed below. Apply the surface finish in accordance with the manufacturer’s recommended application procedures to attain a dry film thickness of 15 mils. Do not apply Tex-Cote special surface finish to any form liner areas.

- All exposed substructure surfaces
- Outside edges of the bridge deck
- Underside of the bridge deck overhang
- Outside and bottom surfaces of the exterior beams
- Exposed endwall areas outside the exterior beams
- All bridge and approach slab barrier surfaces (except form liner areas)

Finish the surface with a uniform texture, color, and appearance free from fins, projections, cavities, and porous areas. Use a sand textured finish. Use gray surface finish color number 36424 meeting AMS-STD-595 for the inside and top surfaces of the bridge and approach slab barriers. Use a color matching the lightest shade of brown used in the Architectural Surface Finish, as it looks applied to the barrier form liner areas, for all other surfaces. Submit to the Engineer a 1’ x 1’ sample of the brown surface finish.

Include all special surface finish costs in the price bid for the appropriate concrete bid items.

602 WEATHER LIMITATIONS: All requests in accordance with 602.04 C.4 “Weather Limitations” require approval from the NDDOT Bridge Division.

602 REMOVAL OF FORMS: Deck slab forms may be removed 1 day after completion of the curing period if the bridge deck concrete has reached 70 percent of the required design strength.




Preliminary Plans

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|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 3 |

# NOTES

604 PRESTRESSED BEAMS: Set prestressed beams on bearing seats without field bending substructure or beam reinforcing steel.

616 STRUCTURAL STEEL: Provide work drawings in accordance with Section 105.08 for the steel intermediate diaphragms and diaphragm connection plates.

622 PILING: Drive piling using a diesel hammer meeting the minimum specifications listed below for each substructure unit. The operating energy is the energy a hammer is capable of producing during pile driving under actual project conditions, and shall be estimated to be no greater than 85% of the hammer's maximum rated energy as specified in the manufacturer's literature. Submit specifications for all pile hammers proposed for use on the project to the Engineer for review at least 14 calendar days prior to beginning pile driving operations.

| | |
|---|---|
| Approach Slab Piling: | Minimum Ram Weight = 3,500 lbs<br>Minimum Operating Energy = 32,000 foot-pounds |
| Abutment Piling: | Minimum Ram Weight = 5,500 lbs<br>Minimum Operating Energy = 53,000 foot-pounds |
| Pier Piling: | Minimum Ram Weight = 6,500 lbs<br>Minimum Operating Energy = 60,000 foot-pounds |

Run the hammer at an energy that produces a penetration at bearing between ½" and 3 inches in the last 10 blows.

If the pile has not reached bearing 10 feet beyond the estimated depth, stop driving the pile and wait 24 hours to allow pile setup to occur. After 24 hours, warm the hammer with a minimum of 20 blows by striking the ground or timber mats. If bearing was not achieved during restrike, continue to drive the pile until bearing is achieved.

930 ROADWAY CANOPY: Construct a canopy above the traveled roadway under the new structure to protect traffic from falling material. The canopy is an added safeguard and does not relieve the Contractor from any responsibility for the safety of the public.

Submit the canopy details, including materials that will be used, to the Engineer for review at least 14 calendar days prior to installation of the canopy. Provide a canopy under the new structure with a minimum vertical clearance of 16'-6" above the traveled roadway. Extend the canopy a minimum distance of 5'-0" beyond the outside edge of the bridge deck and a minimum distance of 5'-0" beyond the edge of the driving lanes beneath the structure. Notify the Engineer two calendar days prior to installation of the canopy. The Engineer will update the NDDOT travel map for the reduced vertical clearance with the canopy in place.

The canopy must be in place before installing formwork for the new deck and remain in place until after the new superstructure is complete. The canopy may be supported from the ground or suspended from the girders. Complete the installation of the canopy in a minimum amount of time and with the least inconvenience to the public. Remove the canopy after the bridge superstructure is completed.

Include all costs for construction, maintenance, and removal of the canopy system in the contract unit price for "Roadway Canopy."

930 AGGREGATE SLOPE PROTECTION: Place aggregate slope protection on the embankment slopes as shown.

Clear the subgrade of rubbish and vegetation before placing the aggregate slope protection. Thoroughly compact all loose material. Excavate or backfill as required to obtain the plan cross-section or lines and grades established in the field.

The gradation of the material used to form the slope protection is given in the following chart:

| Sieve Size | % Passing |
|---|---|
| 2" | 100% |
| ¾" | 5-35% |
| #4 | 0-5% |

The minimum fractured face requirement of the aggregate is 50% by weight on the portion of the aggregate retained on the No. 4 sieve. To be considered fractured the rock must have at least one fractured face.

Deposit, spread, consolidate, and shape the aggregate by mechanical or hand methods to provide a uniform depth and density and produce a uniform surface appearance. Apply MC-250 that meets the requirements of Section 818.02 C, "Medium-Curing Cutback Asphalt" at an approximate rate of 1.8 gallons per square yard. Emulsified asphalts grade CSS-1, CSS-1H, RS-1, or CRS-2 that meet the requirements of Section 818.02 E, "Cationic Emulsified Asphalt," or Section 818.02 F "Anionic Emulsified Asphalt", can be substituted for MC-250. Apply the emulsified asphalts at a rate of 2.5 gallons per square yard based on a dilution ratio of 7 parts emulsion to 3 parts water.

The bituminous materials are to penetrate to a depth of not less than one-half the required thickness of the aggregate. Protect adjacent structure surfaces against bituminous splatter.

Include all costs for labor, materials, and equipment to complete this work in the unit price bid for "Aggregate Slope Protection".

930 SHORING: Install temporary shoring as needed for removal of the center bridge pier. Temporary shoring may only be in place when barriers shown in the Median Barrier Layout are present. Design, construct, maintain, and remove the temporary shoring. Submit a shoring plan to the Engineer at least 14 calendar days prior to installation of the temporary shoring. Include all labor, equipment, and materials required to complete this work, including any excavation required outside the limits of Class 1 Excavation defined in the plans, in the bid item "Shoring". A quantity of 1 EA will be paid for this work.



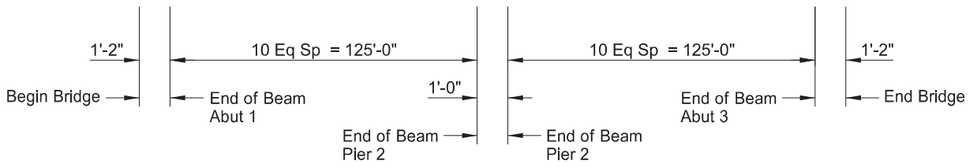

Preliminary Plans

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23 U.S.C. § 407 Documents
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|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 4 |

| | CL BEAM 1 | CL BEAM 2 | CL BEAM 3 | CL BEAM 4 | CL BEAM 5 |
|---|---|---|---|---|---|
| | 1834.74 | 1834.89 | 1835.04 | 1834.89 | 1834.74 |
| | 1834.76 | 1834.92 | 1835.07 | 1834.92 | 1834.76 |
| | 1835.10 | 1835.25 | 1835.40 | 1835.25 | 1835.10 |
| | 1835.43 | 1835.58 | 1835.73 | 1835.58 | 1835.43 |
| | 1835.75 | 1835.90 | 1836.05 | 1835.90 | 1835.75 |
| | 1836.05 | 1836.20 | 1836.35 | 1836.20 | 1836.05 |
| | 1836.34 | 1836.49 | 1836.64 | 1836.49 | 1836.34 |
| | 1836.59 | 1836.74 | 1836.89 | 1836.74 | 1836.59 |
| | 1836.80 | 1836.95 | 1837.11 | 1836.95 | 1836.80 |
| | 1836.98 | 1837.13 | 1837.29 | 1837.13 | 1836.98 |
| | 1837.13 | 1837.28 | 1837.43 | 1837.28 | 1837.13 |
| | 1837.25 | 1837.41 | 1837.56 | 1837.41 | 1837.25 |
| | 1837.27 | 1837.42 | 1837.57 | 1837.42 | 1837.27 |
| | 1837.47 | 1837.62 | 1837.77 | 1837.62 | 1837.47 |
| | 1837.65 | 1837.80 | 1837.95 | 1837.80 | 1837.65 |
| | 1837.80 | 1837.95 | 1838.10 | 1837.95 | 1837.80 |
| | 1837.91 | 1838.06 | 1838.21 | 1838.06 | 1837.91 |
| | 1837.99 | 1838.14 | 1838.29 | 1838.14 | 1837.99 |
| | 1838.03 | 1838.18 | 1838.33 | 1838.18 | 1838.03 |
| | 1838.03 | 1838.19 | 1838.34 | 1838.19 | 1838.03 |
| | 1838.00 | 1838.16 | 1838.31 | 1838.16 | 1838.00 |
| | 1837.94 | 1838.09 | 1838.25 | 1838.09 | 1837.94 |
| | 1837.86 | 1838.01 | 1838.16 | 1838.01 | 1837.86 |
| | 1837.85 | 1838.00 | 1838.15 | 1838.00 | 1837.85 |

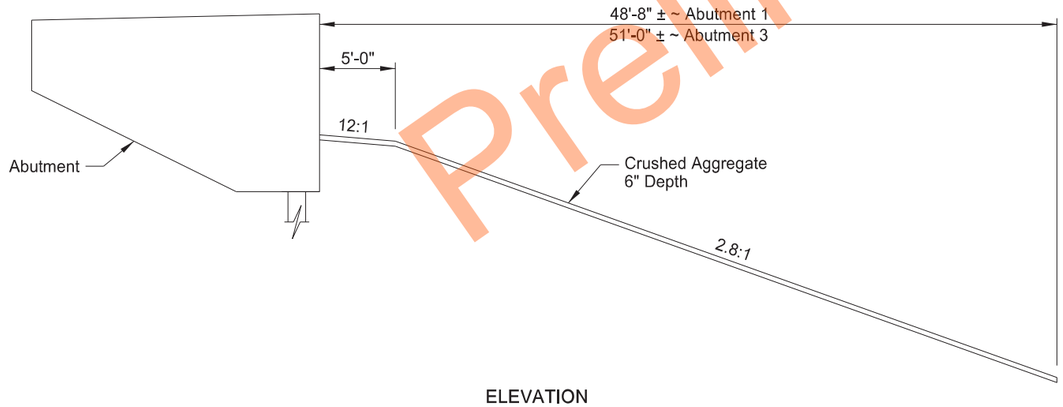



Beam 1 is the west beam.

SCREED ELEVATIONS

## BRIDGE BID ITEMS

| SPEC | CODE | ITEM DESCRIPTION | UNIT | QUANTITY |
|---|---|---|---|---|
| 202 | 0105 | REMOVAL OF STRUCTURE | L SUM | 1 |
| 210 | 0099 | CLASS 1 EXCAVATION | L SUM | 1 |
| 210 | 0201 | FOUNDATION PREPARATION | EA | 1 |
| 602 | 0500 | BRIDGE SUBSTRUCTURE CONCRETE | CY | 147.5 |
| 602 | 0510 | BRIDGE DECK CONCRETE | CY | 298.6 |
| 602 | 0520 | BRIDGE BARRIER CONCRETE | CY | 72.2 |
| 602 | 1134 | PILE SUPPORTED APPROACH SLAB | SY | 158.1 |
| 602 | 1250 | PENETRATING WATER REPELLENT TREATMENT | SY | 1,045 |
| 604 | 9920 | PRESTRESSED I-BEAM-63IN | LF | 1,250 |
| 612 | 0116 | REINFORCING STEEL-GRADE 60-EPOXY COATED | LBS | 87,100 |
| 616 | 5890 | STRUCTURAL STEEL | L SUM | 1 |
| 622 | 0020 | STEEL PILING HP 10 X 42 | LF | 340 |
| 622 | 0060 | STEEL PILING HP 14 X 73 | LF | 420 |
| 622 | 0070 | STEEL PILING HP 14 X 102 | LF | 350 |
| 622 | 7001 | DYNAMIC PILE TEST | EA | 3 |
| 930 | 3000 | BRIDGE BENCH MARKS | SET | 1 |
| 930 | 7012 | ROADWAY CANOPY | L SUM | 1 |
| 930 | 8230 | SHORING | EA | 1 |
| 930 | 8600 | ELASTOMERIC BEARING PAD | SF | 40 |
| 930 | 8686 | AGGREGATE SLOPE PROTECTION | SY | 427.3 |
| 930 | 9537 | ABUTMENT UNDERDRAIN SYSTEM | EA | 2 |




ELEVATION

AGGREGATE SLOPE PROTECTION DETAIL

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

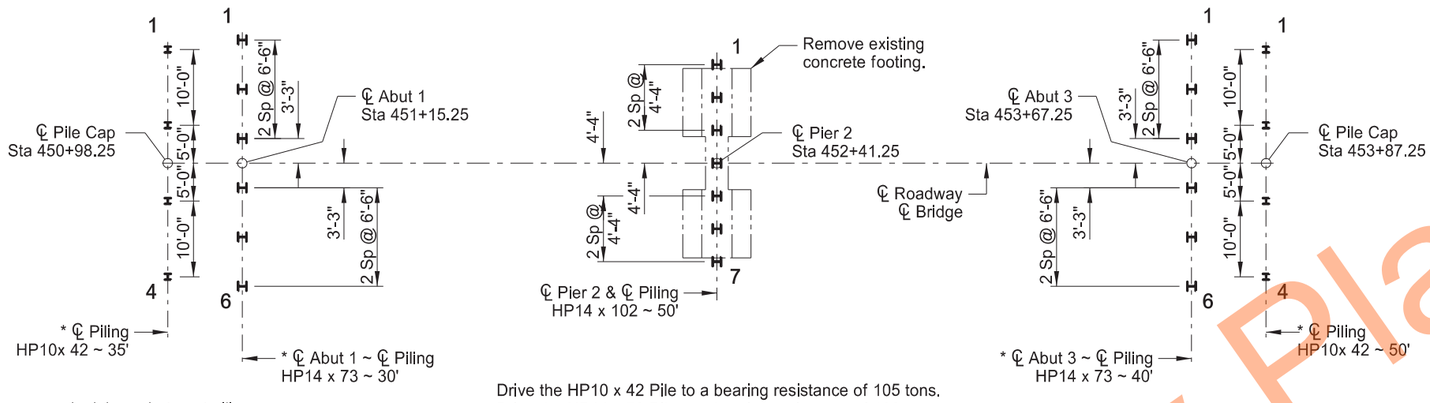
SCREED ELEVATIONS, BID ITEM QUANTITIES & SLOPE PROTECTION DETAIL

DRAWING NO. 94-217.146-4

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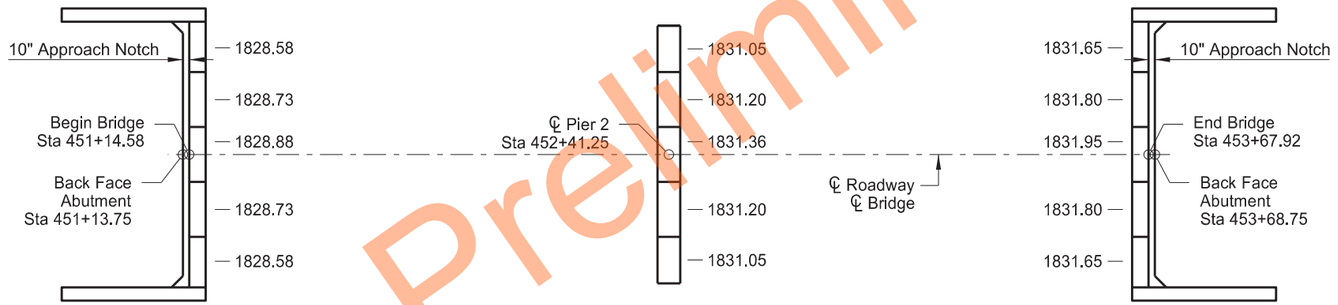
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 5 |




* Do not drive approach slab or abutment piling until all constructed embankment is in place.

Drive the HP10 x 42 Pile to a bearing resistance of 105 tons.
Drive the HP14 x 73 Pile to a bearing resistance of 180 tons.
Drive the HP14 x 102 Pile to a bearing resistance of 250 tons.

PILING LAYOUT




Elevations shown are to top of finished concrete.

BEARING ELEVATION

NOTE:

For double acting or single acting diesel hammers, calculate the bearing resistance of piles by the following formula:

$$\Phi Rn = \frac{4.5E}{S + 0.2} \times \frac{W + 0.2M}{W + M}$$

Where:

ΦRn = Factored pile bearing resistance, in pounds. The Φ factor is included in equation.
W = Weight of striking parts (ram), in pounds.
M = Weight of parts being driven, in pounds. Includes pile weight, anvil (if any), driving cap, etc.
E = Energy per blow, in foot-pounds.
S = Average penetration of pile in inches per blow for last ten blows.

For single acting hammers, calculate E by multiplying observed stroke (ft) and W (lbs).

| | PILE COORDINATES | | |
|---|---|---|---|
| | PILE | NORTHING | EASTING |
| APPR SLAB | 1 | 443,800.40 | 2,200,425.44 |
| | 4 | 443,800.68 | 2,200,455.44 |
| ABUT 1 | 1 | 443,820.39 | 2,200,424.00 |
| | 6 | 443,820.70 | 2,200,456.50 |
| PIER 2 | 1 | 443,946.41 | 2,200,426.06 |
| | 7 | 443,946.66 | 2,200,452.06 |
| ABUT 3 | 1 | 444,072.38 | 2,200,421.62 |
| | 6 | 444,072.68 | 2,200,454.11 |
| APPR SLAB | 1 | 444,092.39 | 2,200,422.68 |
| | 4 | 444,092.67 | 2,200,452.69 |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

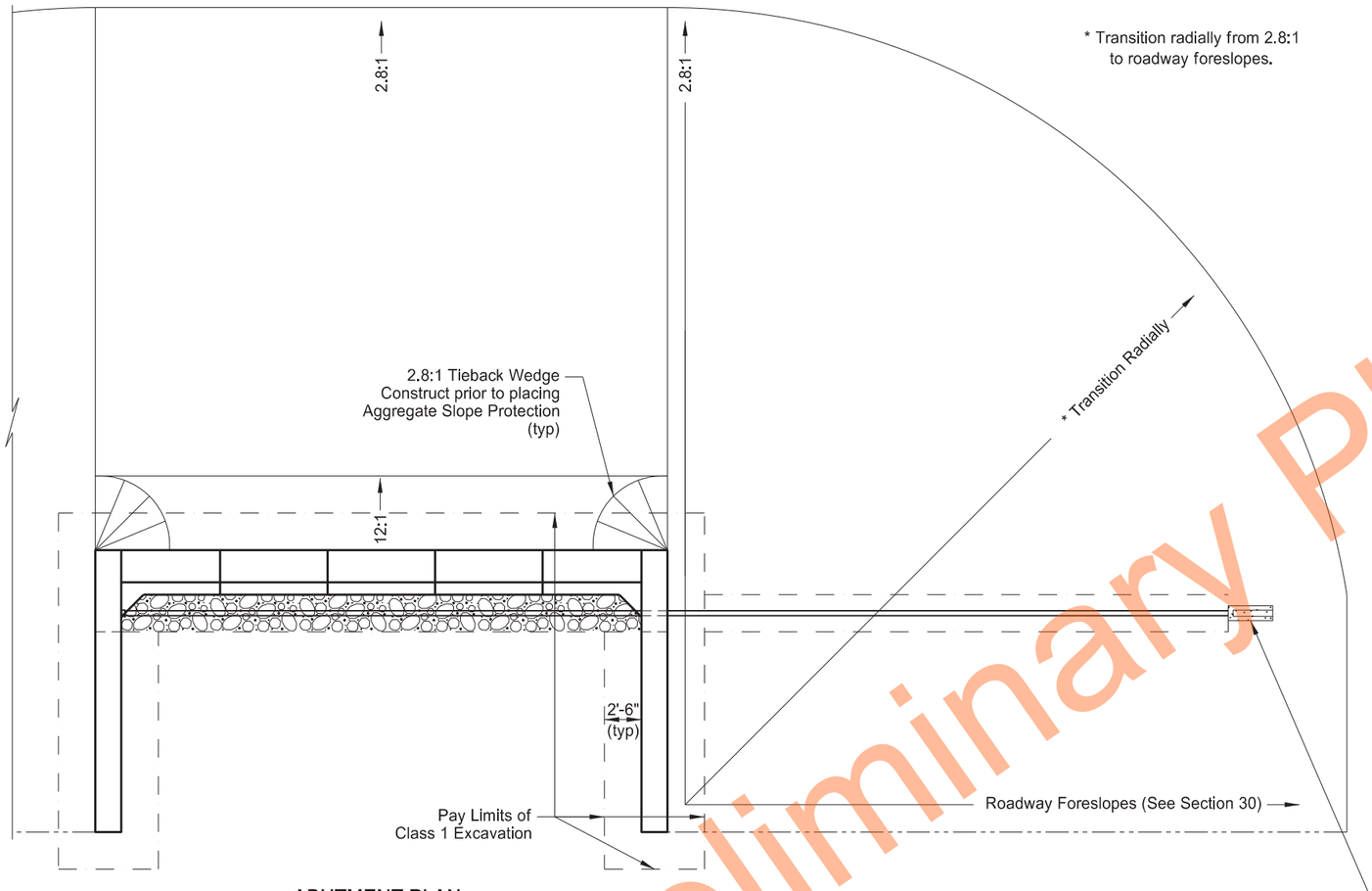
PILING LAYOUT &
BEARING ELEVATIONS

DRAWING NO. 94-217.146-5

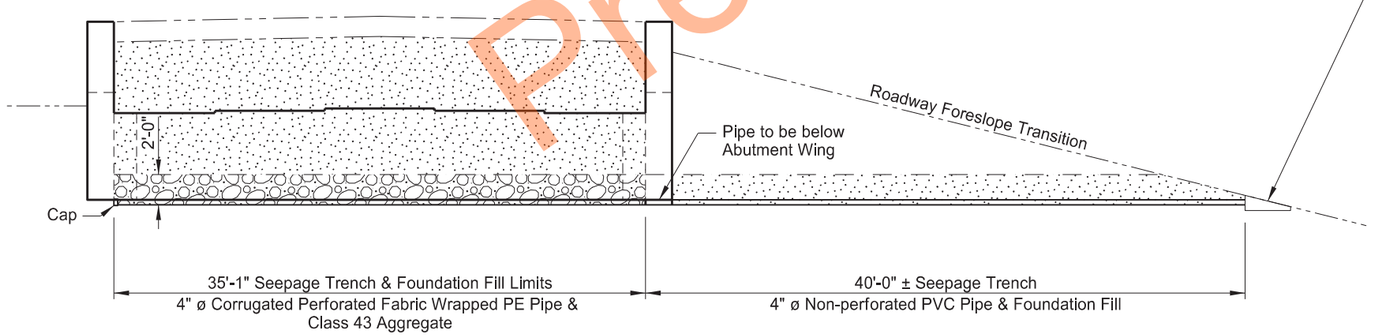
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| ND | IM-2-094(186)217 | 170 | 6 |




ABUTMENT PLAN

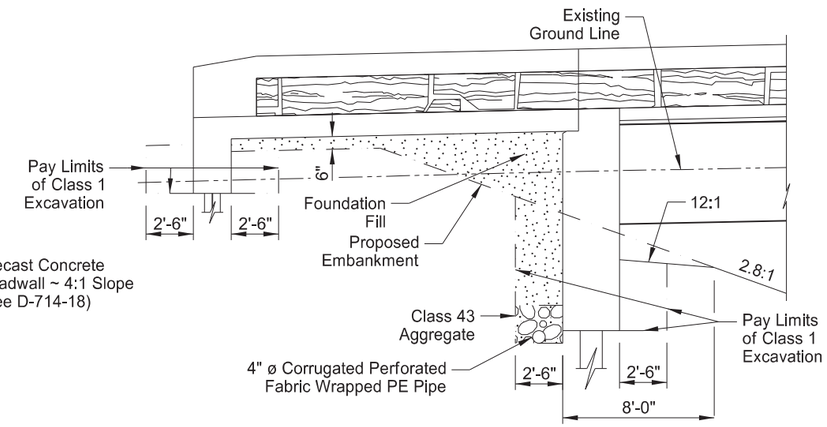



BACK FACE OF ABUTMENT

NOTES:

Use corrugated perforated fabric wrapped PE pipe that meets the requirements of Section 830.03 A.4. Provide fabric wrapping for the pipe that meets the requirements of Section 858.01 for D3 or D4 drainage fabric. Provide aggregate that meets the requirements of Section 816.03, Class 43. Provide foundation fill that meets the requirements of Section 210. Compact the foundation fill beneath the approach slab according to Section 714.04 A.10

Include the cost to furnish and place the foundation fill, aggregate, corrugated perforated pipe and headwalls in the pay item "Abutment Underdrain System."




DETAIL AT ABUTMENT

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

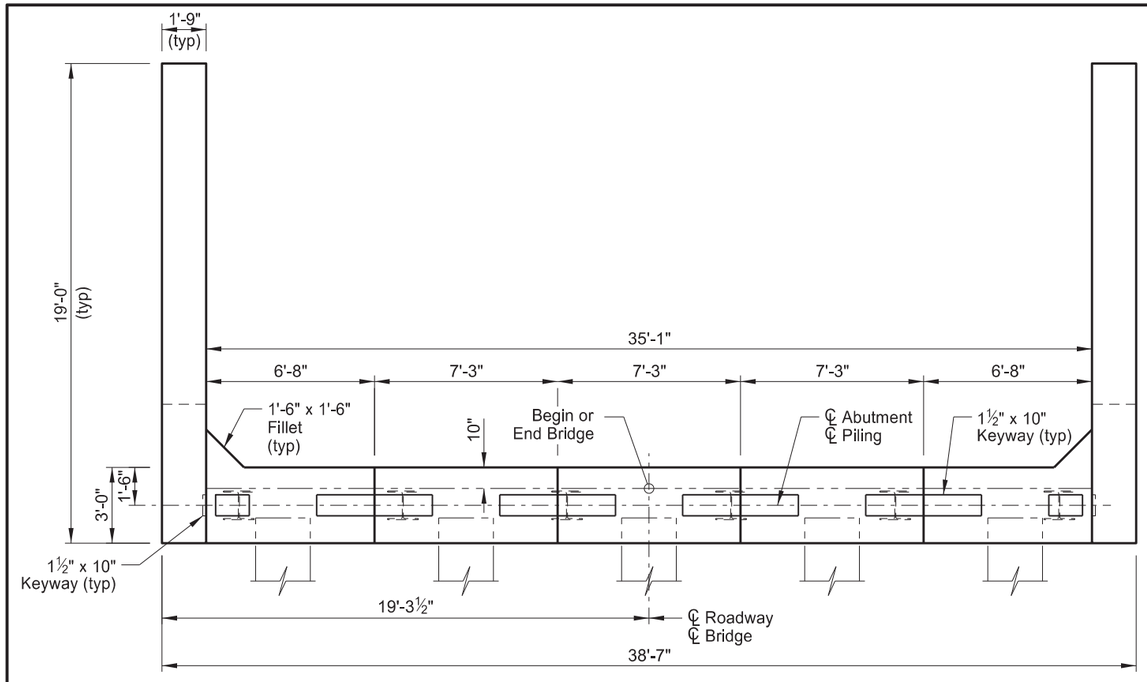
ABUTMENT UNDERDRAIN & EXCAVATION DETAILS

| DRAWING NO. | 94-217.146-6 |
|---|---|

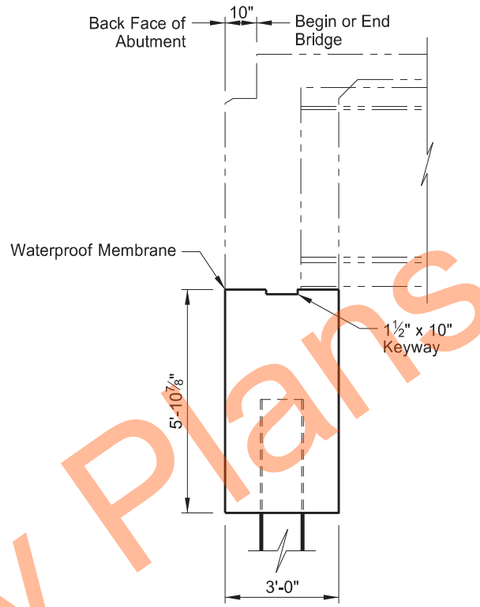
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

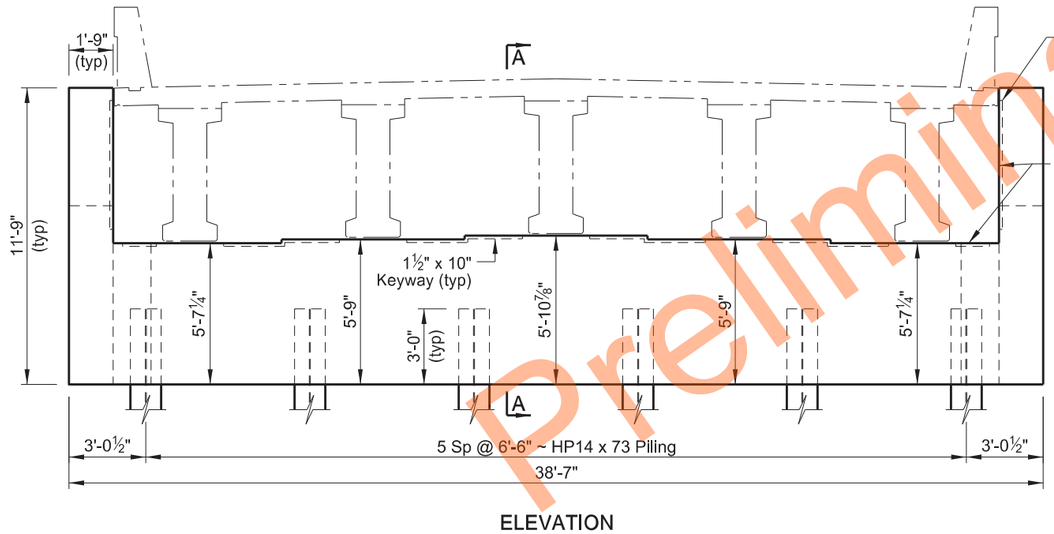
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| ND | IM-2-094(186)217 | 170 | 7 |



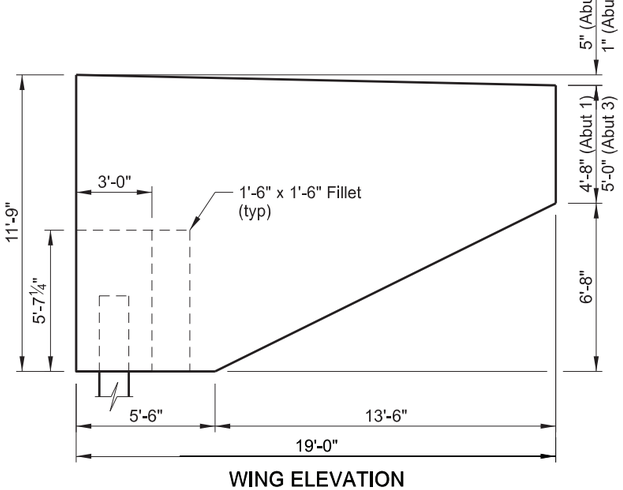

PLAN




A-A




ELEVATION




WING ELEVATION

NOTE:

Use waterproof membrane that meets the requirements of Section 602.03 B. Center the waterproof membrane (1'-0" minimum width) on the joint.

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

| QUANTITIES |
|---|
| SEE DWG 94-217.146-9 |

I-94/PETTIBONE INTERCHANGE

(SHOWING DIMENSIONS)

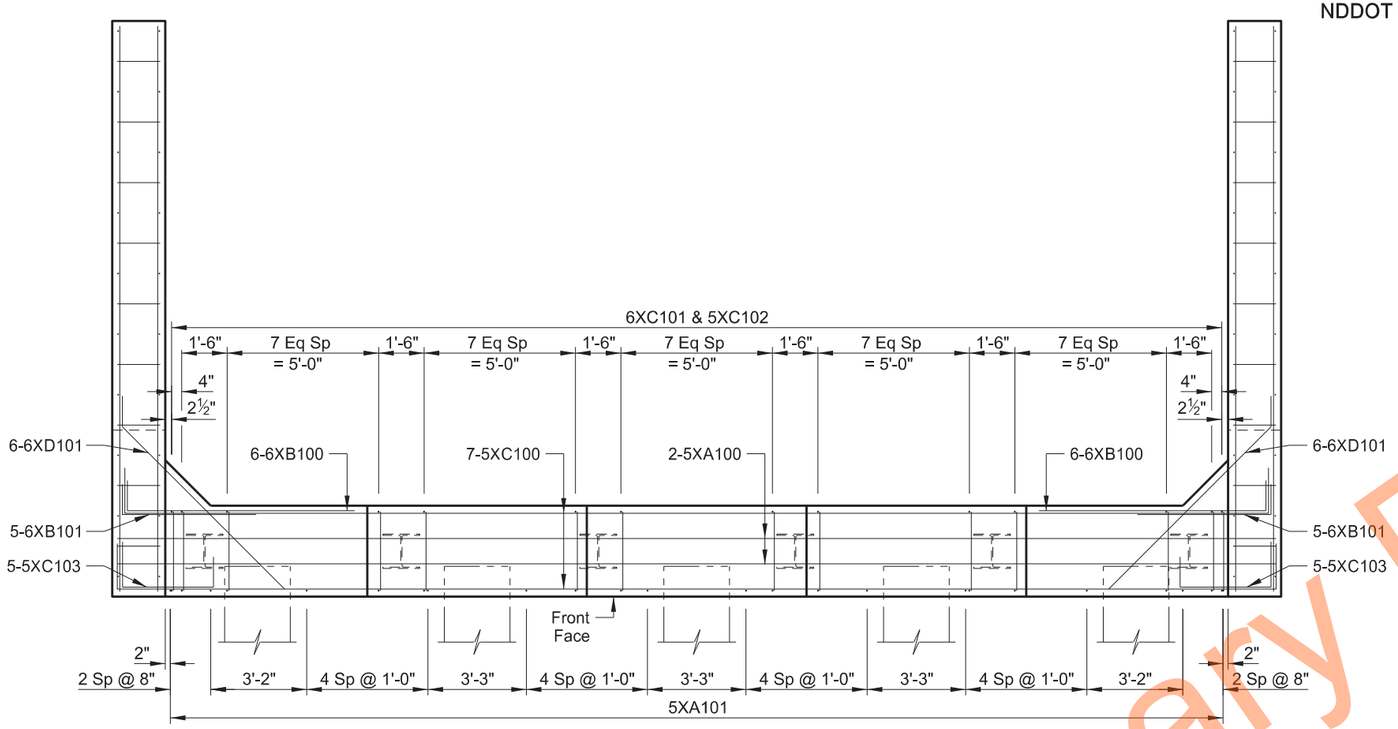
ABUTMENT DETAILS

| DRAWING NO. | 94-217.146-7 |
|---|---|

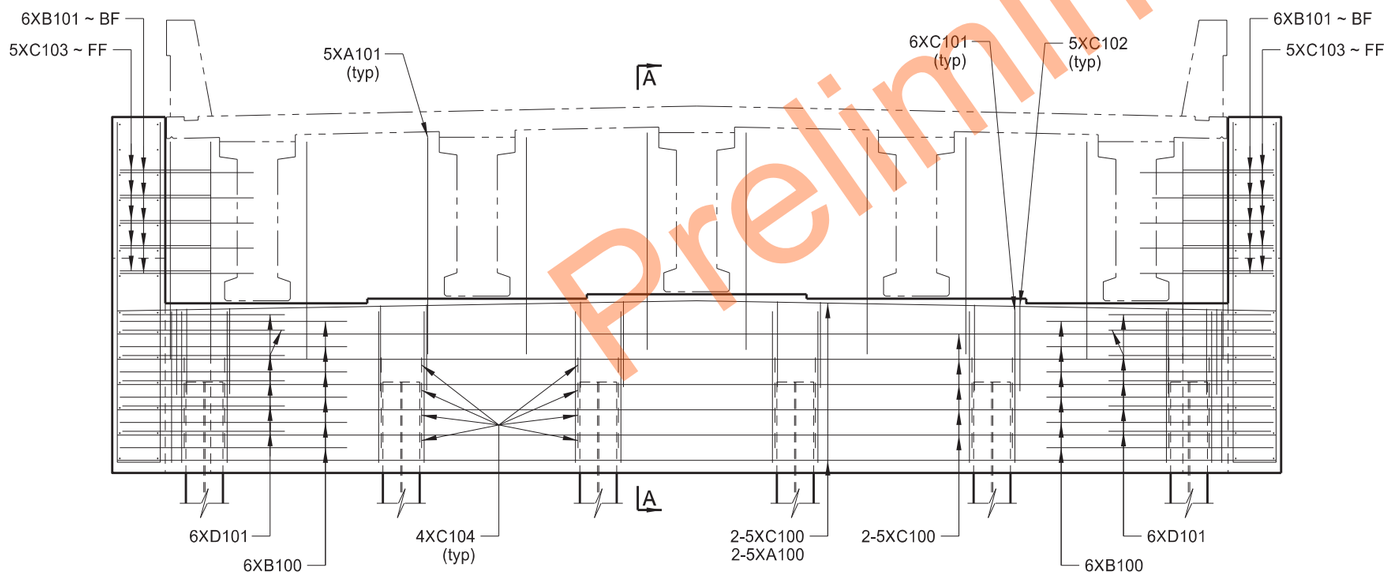
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

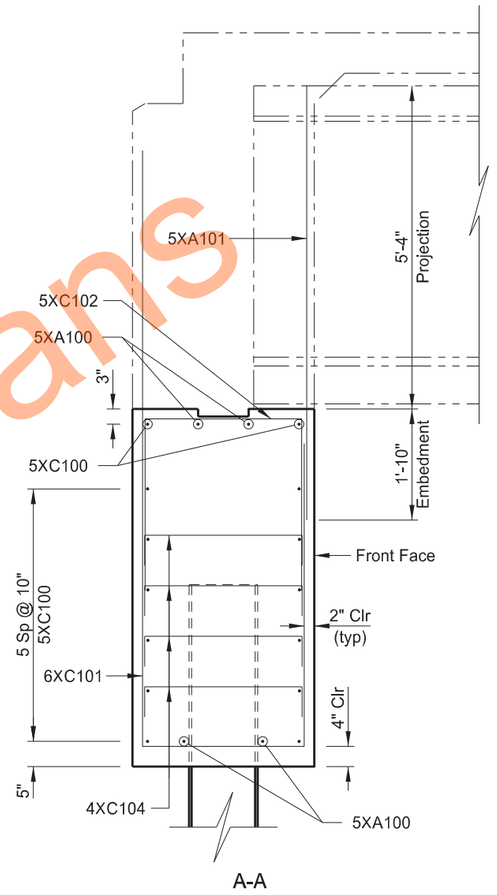
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 8 |




PLAN




ELEVATION




A-A

NOTES:

See Dwg 94-217.149-9
for Wingwall Reinforcement.

NOMECLATURE:

FF = Front Face
BF = Back Face

Preliminary Plans




QUANTITIES

SEE DWG 94-217.146-9

I-94/PETTIBONE INTERCHANGE

(SHOWING REINFORCING)

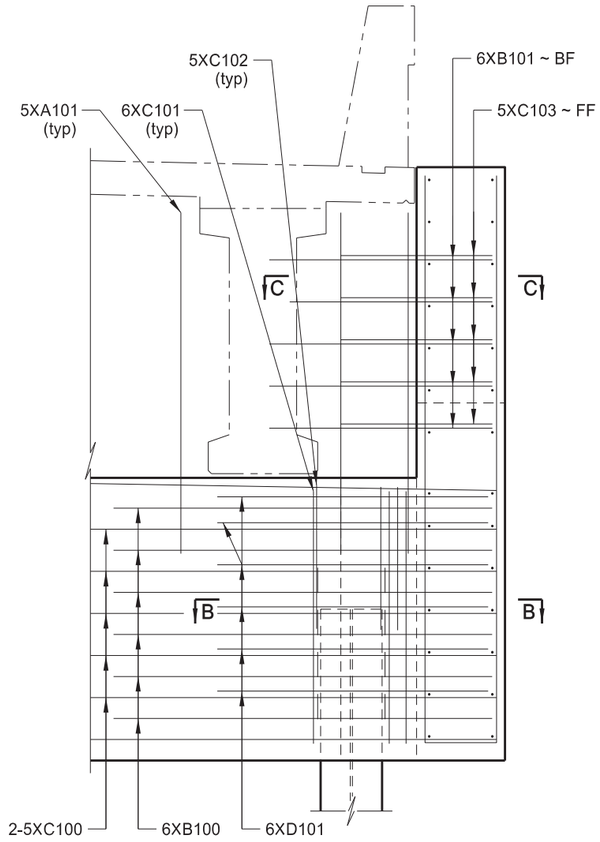
ABUTMENT DETAILS

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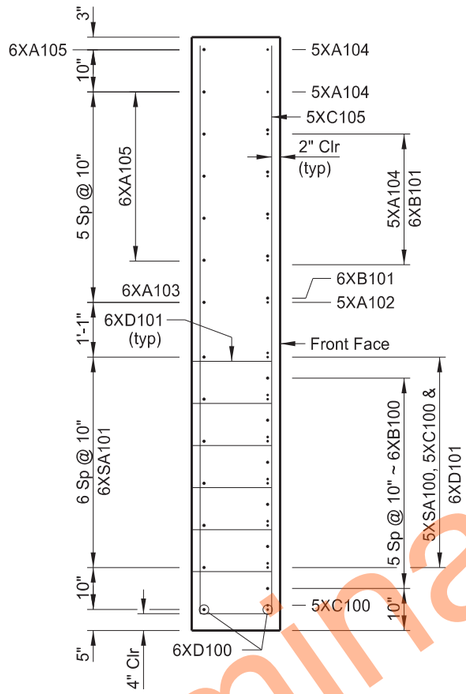
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

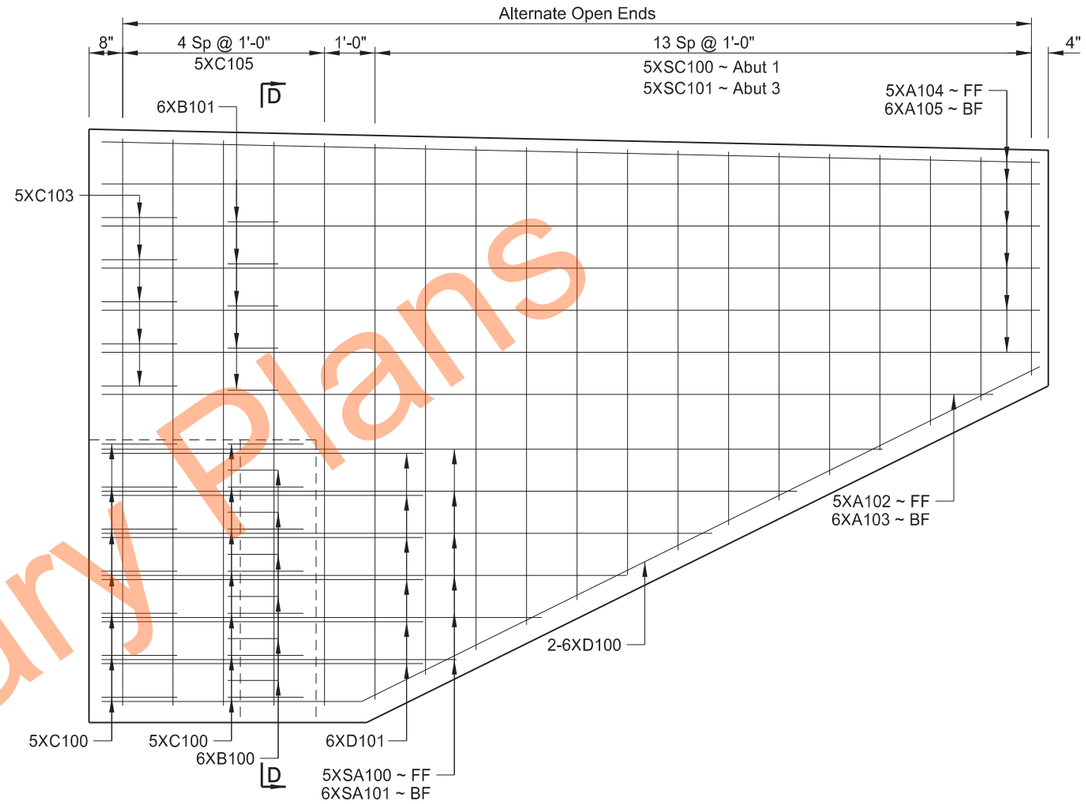
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 9 |



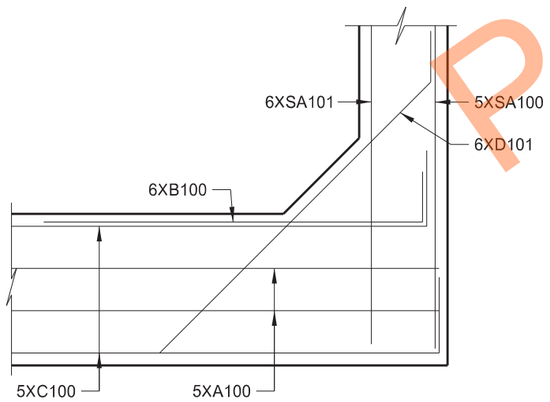

PARTIAL ELEVATION



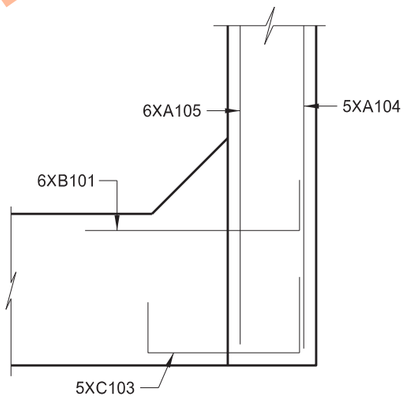

D-D




WING ELEVATION




B-B




C-C

NOMENCLATURE:

FF = Front Face
BF = Back Face

| QUANTITIES | (ABUTMENT 1) |
|---|---|
| BRIDGE SUBSTRUCTURE CONCRETE | 45.4 CY |
| REINFORCING STEEL (EPOXY) | 4,914 LBS |
| **QUANTITIES** | **(ABUTMENT 3)** |
| BRIDGE SUBSTRUCTURE CONCRETE | 45.8 CY |
| REINFORCING STEEL (EPOXY) | 4,926 LBS |

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DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

(SHOWING REINFORCING)

ABUTMENT DETAILS

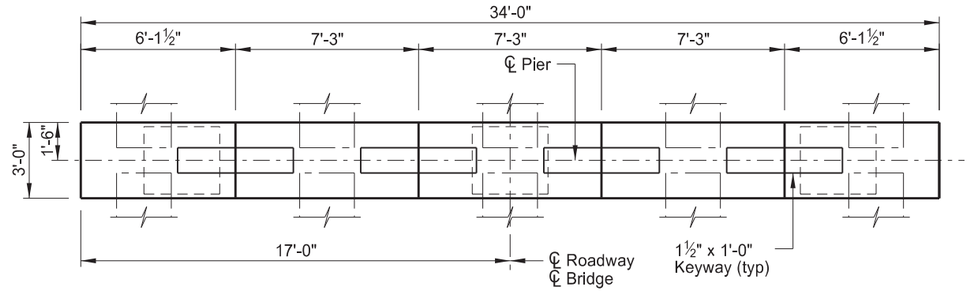
DRAWING NO. 94-217.146-9

Preliminary Plans

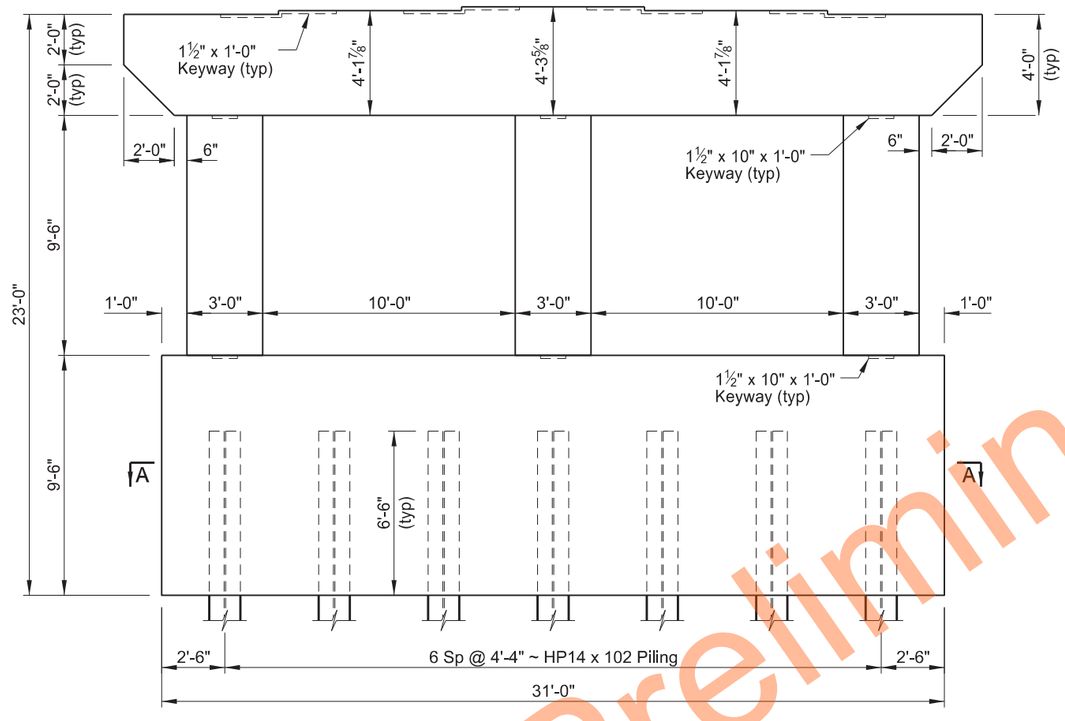
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

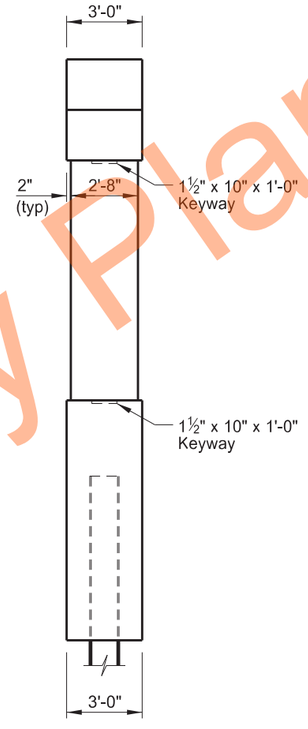
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 10 |



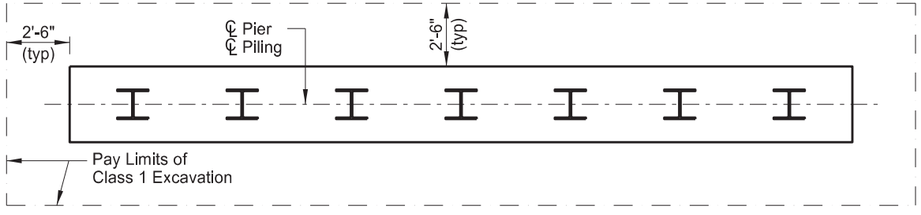

PLAN




ELEVATION




END VIEW




A-A

Preliminary Plans

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JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

**QUANTITIES**

SEE DWG 94-217.146-11

I-94/PETTIBONE INTERCHANGE

(SHOWING DIMENSIONS)

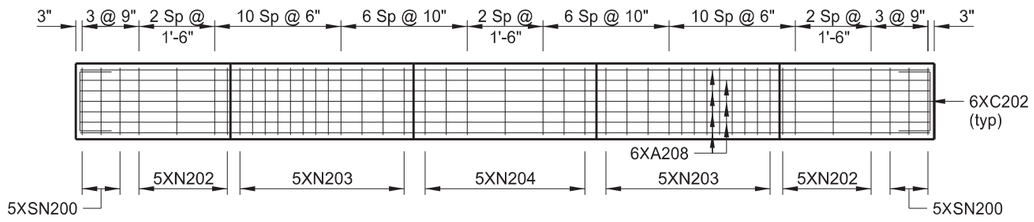
PIER DETAILS

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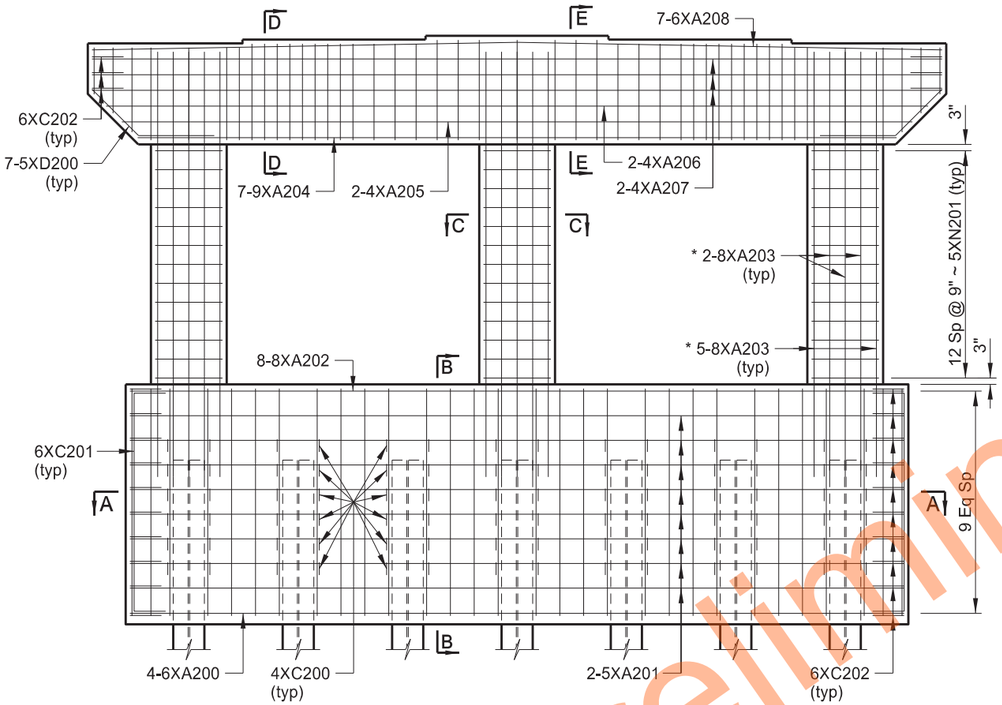
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

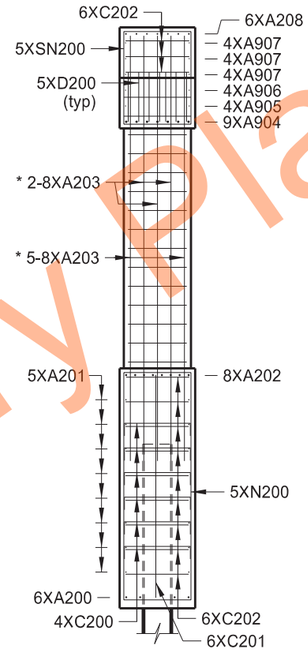
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| ND | IM-2-094(186)217 | 170 | 11 |



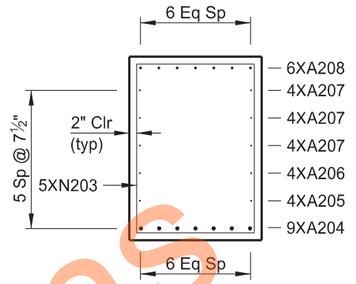

PLAN



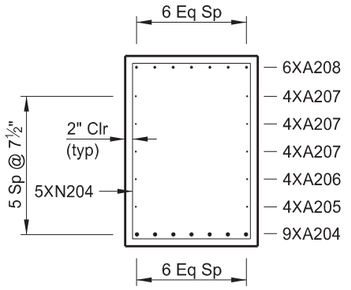

ELEVATION



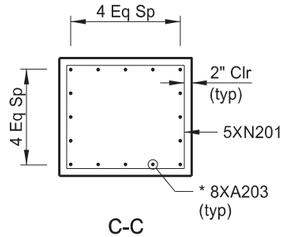

END VIEW




D-D

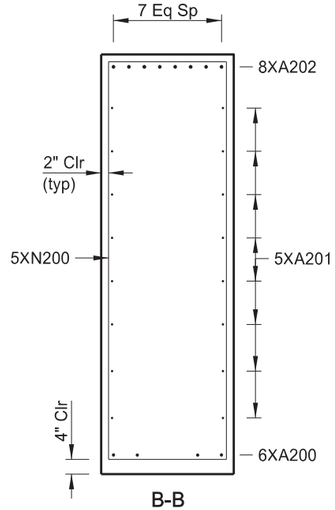



E-E

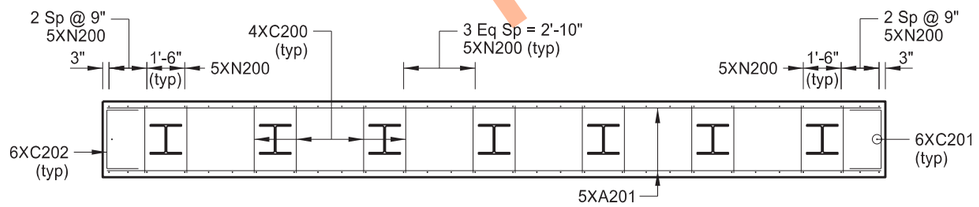



C-C

* Embed the 8XA203 bars 3'-8" into the footing wall and pier cap.




B-B




A-A

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

| QUANTITIES | (PIER) |
|---|---|
| BRIDGE SUBSTRUCTURE CONCRETE | 56.3 CY |
| REINFORCING STEEL (EPOXY) | 7,158 LBS |

I-94/PETTIBONE INTERCHANGE

(SHOWING REINFORCING)

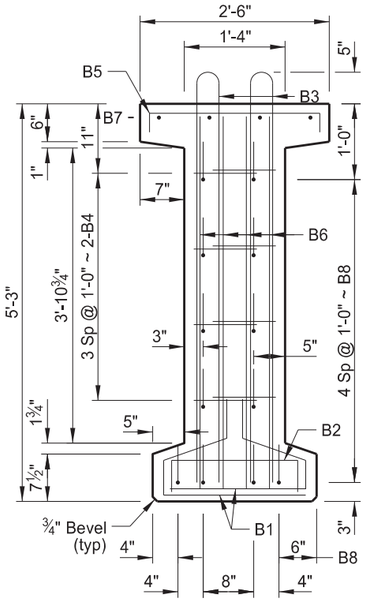
PIER DETAILS

| DRAWING NO. | 94-217.146-11 |
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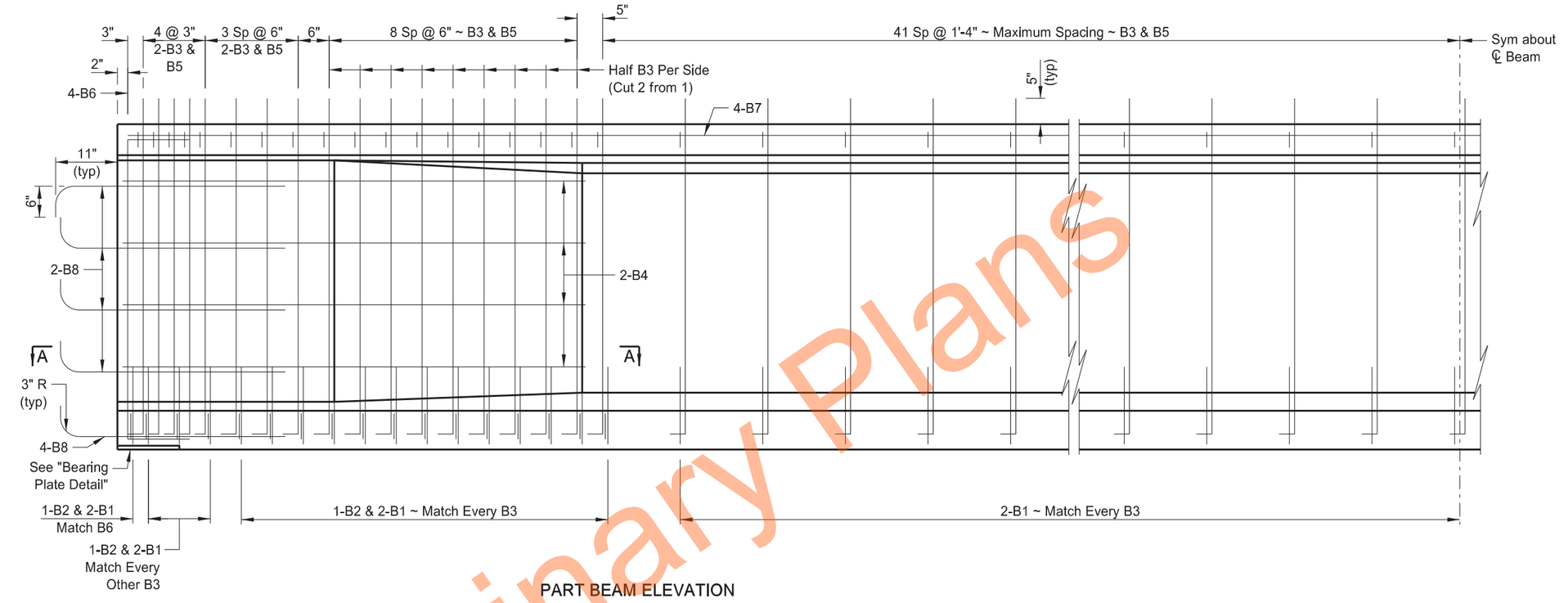
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 12 |

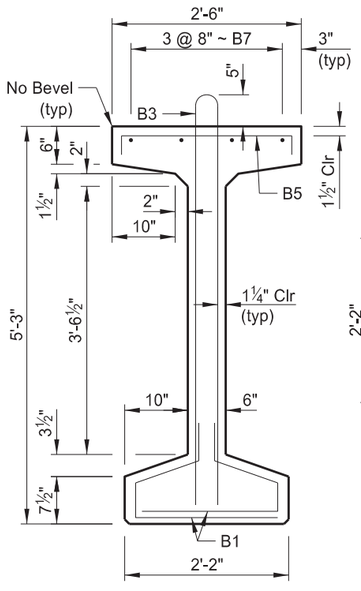



(DETAILS NOT SHOWN ARE SAME AS "SECTION @ ℄")

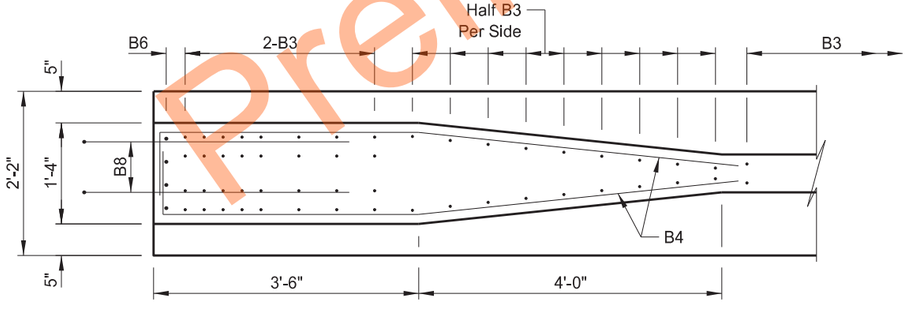
END VIEW




PART BEAM ELEVATION




SECTION @ ℄




A-A

| BAR LIST ~ ONE BEAM | | | | |
|---|---|---|---|---|
| MARK | SIZE | NO. | LENGTH | SHAPE |
| B1 | 3 | 232 | 3'- 9" | BENT |
| B2 | 3 | 34 | 2'- 10" | BENT |
| ** B3 | 4 | 134 | 11'- 6" | BENT |
| B4 | 4 | 16 | 8'- 5" | BENT |
| B5 | 3 | 118 | 2'- 9" | BENT |
| B6 | 5 | 8 | 6'- 11" | BENT |
| B7 | 5 | 16 | 33'- 6" | STR |
| * B8 | 5 | 24 | 4'- 0" | STR |

* Field bend as shown with a 2.5" minimum bar bend diameter.

** Epoxy Coated




I-94/PETTIBONE INTERCHANGE

125'-0" BEAM LENGTH

PRE-TENSIONED 63" PRESTRESSED I-BEAM

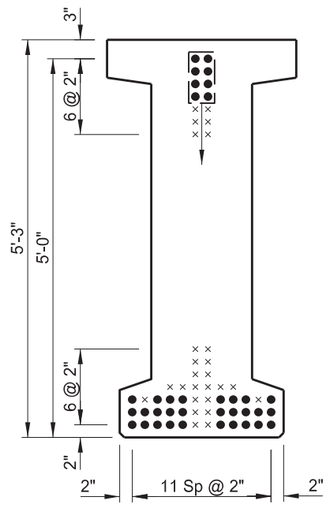
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Preliminary Plans

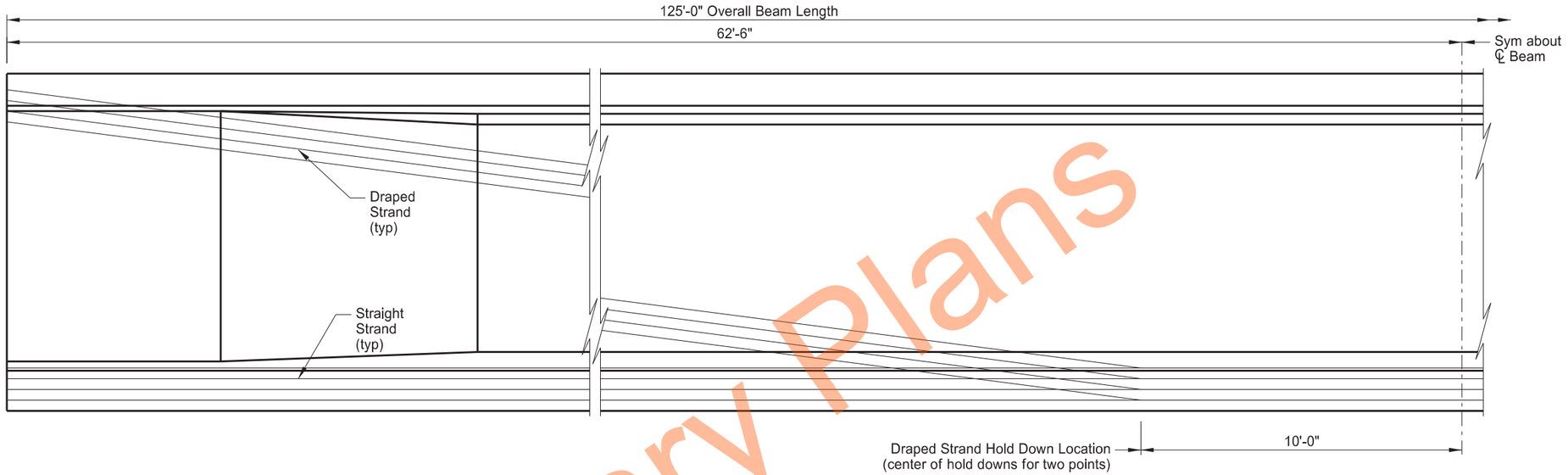
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

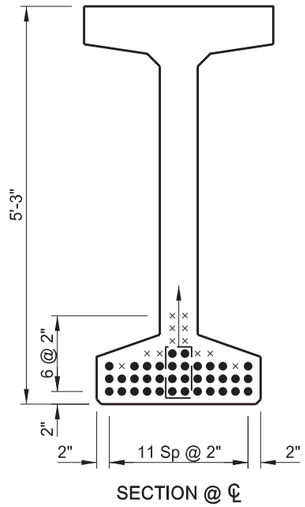
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 13 |




END VIEW




BEAM ELEVATION




SECTION @ ℄

PRESTRESSING STRAND LAYOUT

KEY:

× Vacant Strand Location

● Filled Strand Location (Bonded)

or — Indicates Locations of Draped Strands

| BEAM SECTION DATA | | |
|---|---|---|
| Beam Weight = 787.9 lbs/ft + 5337 lbs | | |
| Beam Length | 125 | ft |
| Total Beam Weight | 51.9 | tons |
| Cross Sectional Area at End | 1182.75 | $in^2$ |
| Cross Sectional Area at Midspan | 732 | $in^2$ |
| C.G. from Bottom of Beam at Midspan | 31.17 | in |
| Midspan Moment of Inertia (I) | 392,056 | $in^4$ |
| Midspan Section Modulus (Sb) | 12,578 | $in^3$ |
| **MINIMUM CONCRETE COMPRESSIVE STRENGTH** | | |
| Detensioning Strength (f'ci) | 7.0 | ksi |
| Acceptance Strength (f'c) | 7.0 | ksi |
| **PRESTRESSING STRAND DATA** | | |
| 0.6" Diameter Grade 270 Prestressing Strands | | |
| Initial Prestress = 0.75 * fpu | | |

| | Number | Y Distance (inches) | |
|---|---|---|---|
| | | Midspan | End |
| Straight Strands | 28 | 3.86 | 3.86 |
| Draped Strands | 8 | 5.00 | 57.00 |
| Total Strands | 36 | 4.11 | 15.67 |

| | | |
|---|---|---|
| **PRESTRESS LOSSES** | | |
| Elastic Shortening Loss | 17.74 | ksi |
| Long Term Losses | 23.41 | ksi |
| Total Losses | 41.15 | ksi |
| **PRESTRESS FORCES** | | |
| Initial Prestress Force | 1,581.9 | kips |
| Final Prestress Force after Losses | 1,260.5 | kips |
| **ESTIMATED CAMBER** | | |
| Midspan Camber at Strand Release | 2.58 | inches |

Preliminary Plans

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DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

125'-0" BEAM LENGTH

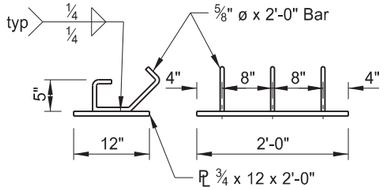
PRE-TENSIONED 63" PRESTRESSED I-BEAM

DRAWING NO. 94-217.146-13

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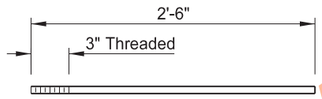
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 14 |




(Use ASTM A36 steel. Galvanize per Section 854. Include in the bid item for Prestressed Beam.)

BEARING PLATE DETAIL




No. 6 Deformed Rebar (Grade 60). Include in bid item for Prestressed Beam.

6AT500 DETAIL

NOTES:

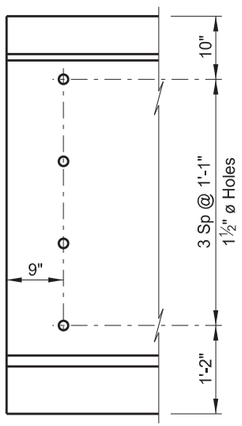
Provide holes and inserts in the beams at the locations shown to accommodate the diaphragm bars. Provide 6AT500 bars threaded to fit the inserts. Use galvanized, epoxy-coated, stainless steel, or non-metallic material for holes and inserts. See Slab Layout for diaphragm location details and required skew angle.

Provide lifting loops or handling hooks as required by the Contractor. Additional inserts, brackets, and hardware may be incorporated into the finished beam for the convenience of the Contractor. Use galvanized, epoxy-coated, stainless steel, or non-metallic material for all inserts, brackets, and hardware if less than 1 inch of concrete cover will be provided in the finished structure.

The required Detensioning Strength indicates the minimum required concrete strength at the time of prestress transfer. The required Acceptance Strength indicates the minimum required concrete strength prior to transporting and erecting the beams.

Y Distances shown in the table are measured from the bottom of the beam to the center of gravity of the strand group listed.

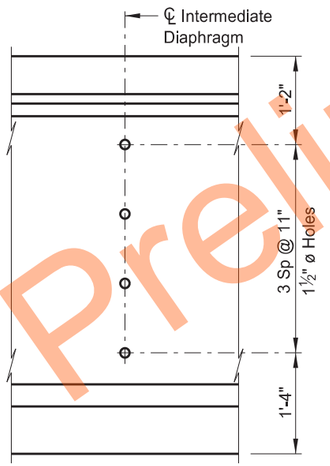
Minor changes to the shape of the beam and to the reinforcing steel may be made to accommodate the forms of various Contractors and their construction methods with the approval of the Engineer.




Use holes for all beams at the abutments and for interior beams at the piers. Use inserts for exterior beams at the piers.

ELEVATION

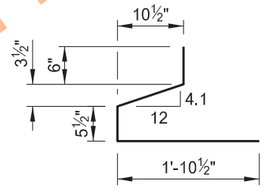
BEAM END DETAIL



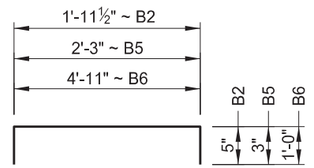

Use holes for all beams. See Dwg 94-217.146-15 for locations.

ELEVATION

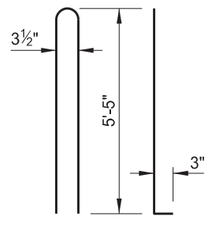
INTERMEDIATE DIAPHRAGM DETAIL



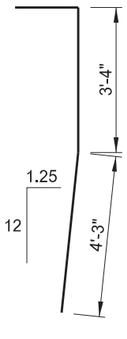

B1




B2, B5 & B6




B3




B4

BENT BAR DETAILS

NOTES:

All bar dimensions shown are out-to-out.

Unless noted otherwise, bend bars to the bend diameter (D) listed below.

#3 Bar: D = 1½"
#4 Bar: D = 2"
#5 Bar: D = 2½"

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I-94/PETTIBONE INTERCHANGE

PRE-TENSIONED 63" PRESTRESSED I-BEAM

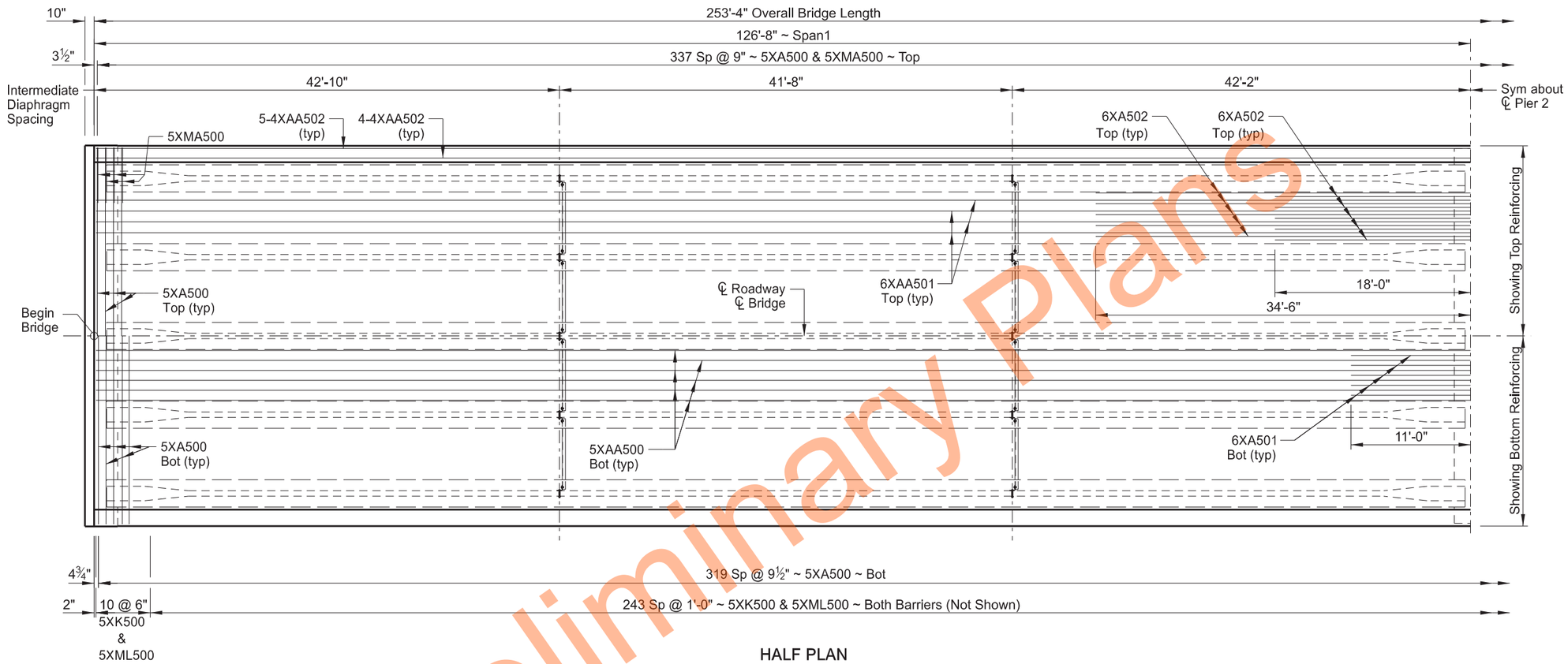
DRAWING NO. 94-217.146-14

Preliminary Plans

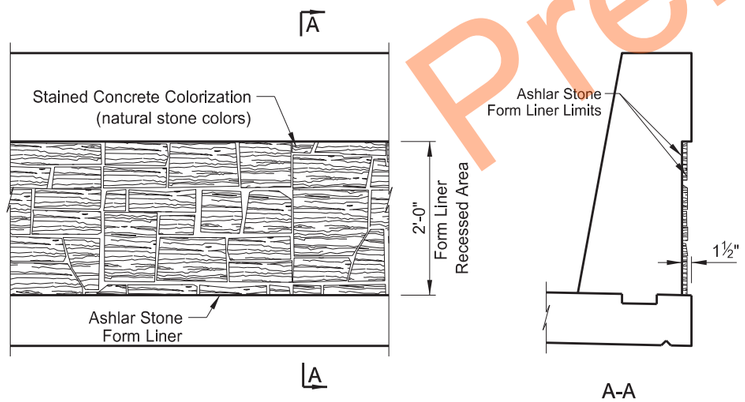
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
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HALF PLAN




(SHOWING FORM LINER ~ BACK FACE)

BARRIER ELEVATION




A-A

Preliminary Plans




**QUANTITIES**

SEE DWG 94-217.146-18

I-94/PETTIBONE INTERCHANGE

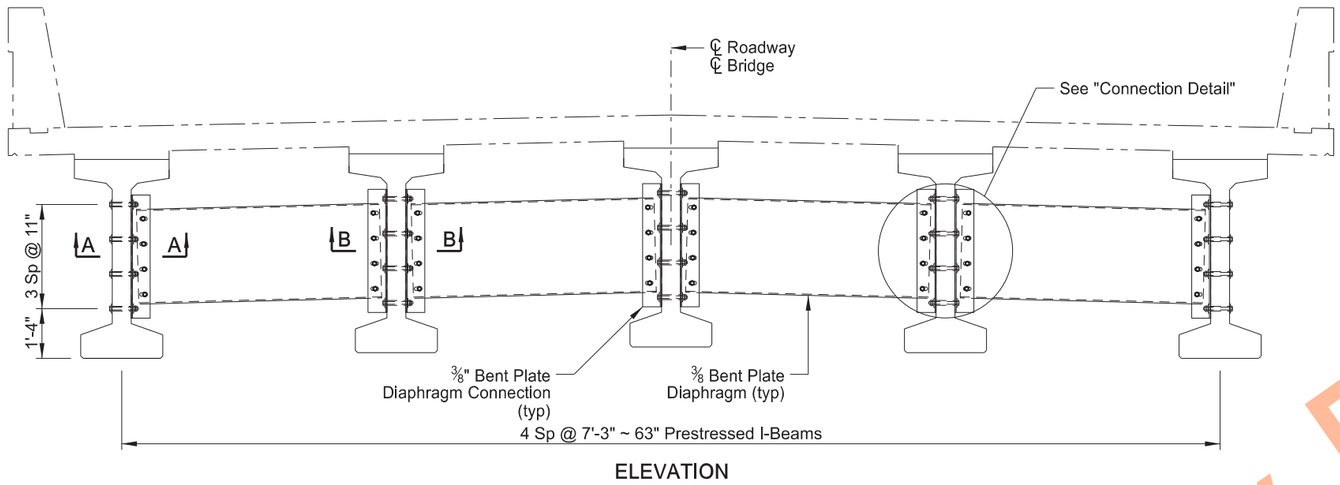
HALF SLAB LAYOUT

DRAWING NO. 94-217.146-15

Docusign Envelope ID: 616F5738-14CC-8887-82B5-560A7A4CDF5E

23 U.S.C. § 407 Documents
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|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 16 |




ELEVATION

NOTES:

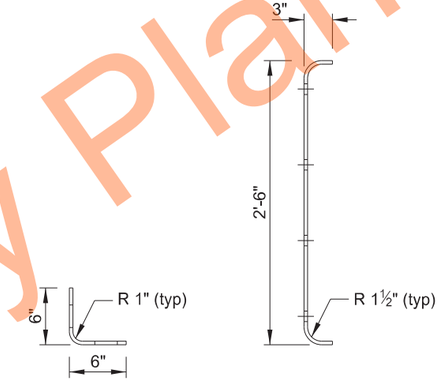
Use AASHTO M270 Grade 36 structural steel

Galvanize all structural steel and connection hardware per Section 854

⅜" x 6" x 6" angles may be substituted for the bent plate diaphragm connection plates shown

Install diaphragms between adjacent girders in conjunction with girder erection

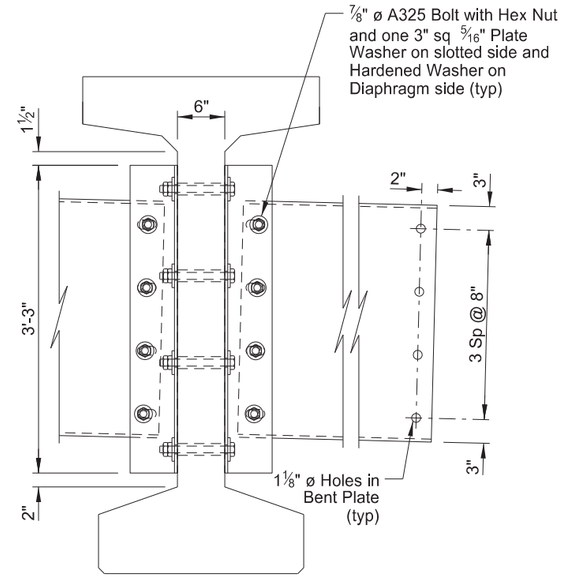
Include all costs for furnishing, fabricating, and installing the steel diaphragm in the lump sum price bid for structural steel



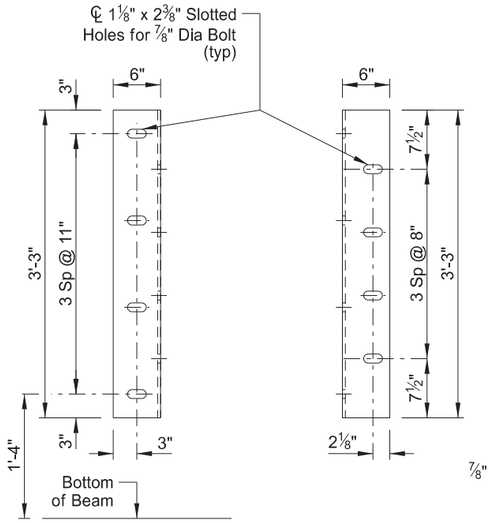

DIAPHRAGM CONNECTION
⅜" BENT PLATE




DIAPHRAGM
⅜" BENT PLATE

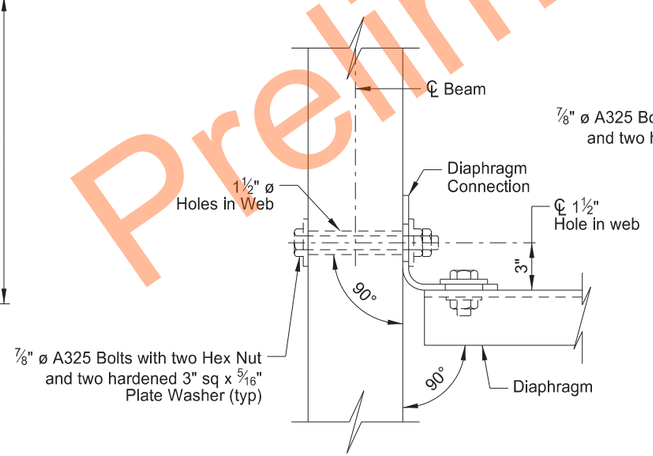



CONNECTION DETAIL

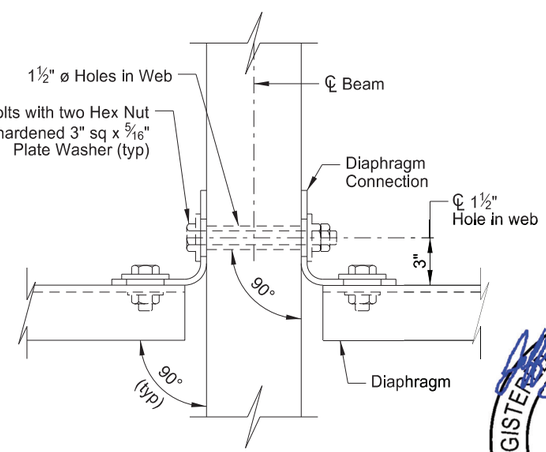



(BEAM FACE) (DIAPHRAGM FACE)

DIAPHRAGM CONNECTION
⅜" x 12" BENT PLATE




SECTION A-A




SECTION B-B

Preliminary Plans

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PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

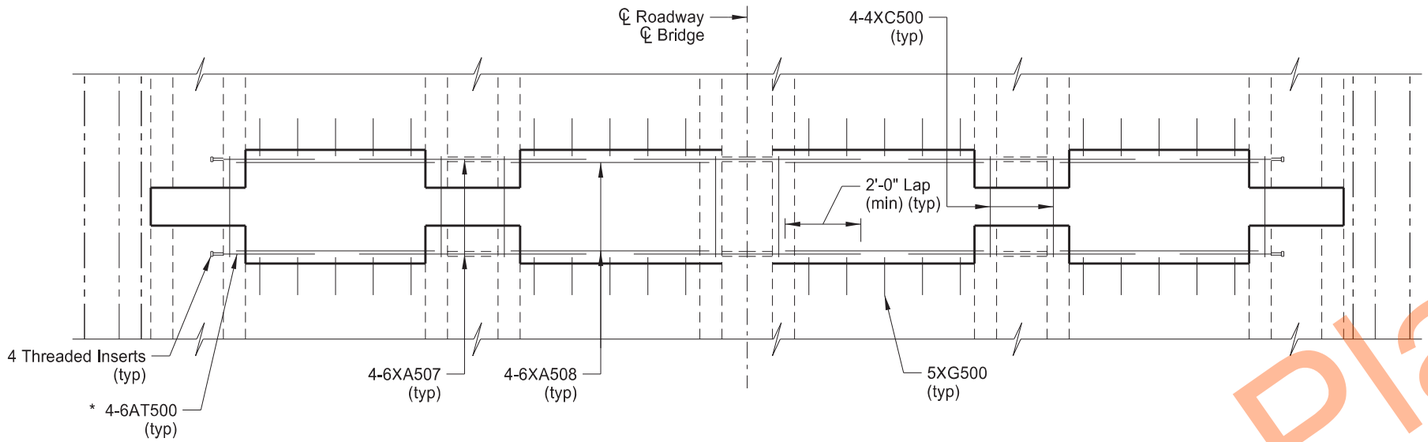
INTERMEDIATE
DIAPHRAGM DETAILS

DRAWING NO. 94-217.146-16

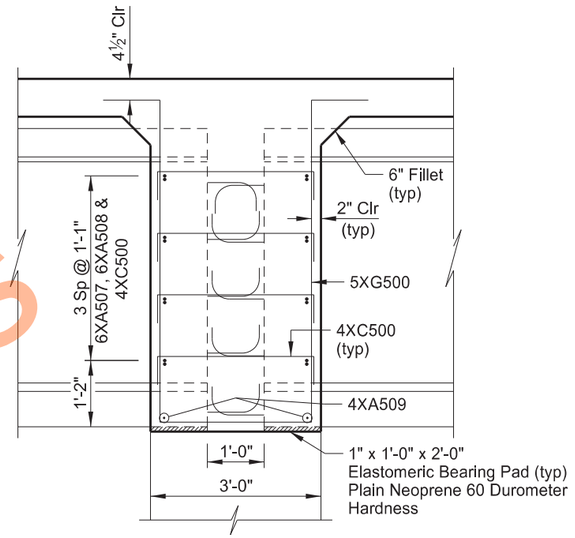
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

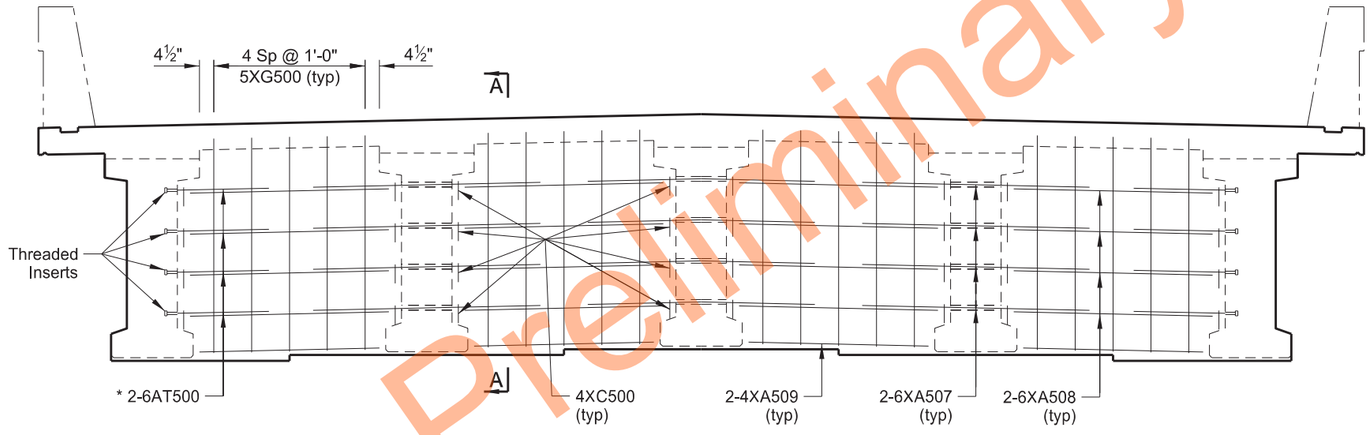
| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
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PLAN




A-A




ELEVATION

* See "6AT500 Detail" Dgn 94-217.146-14

Preliminary Plans

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**QUANTITIES**

SEE DWG 94-217.146-19

I-94/PETTIBONE INTERCHANGE

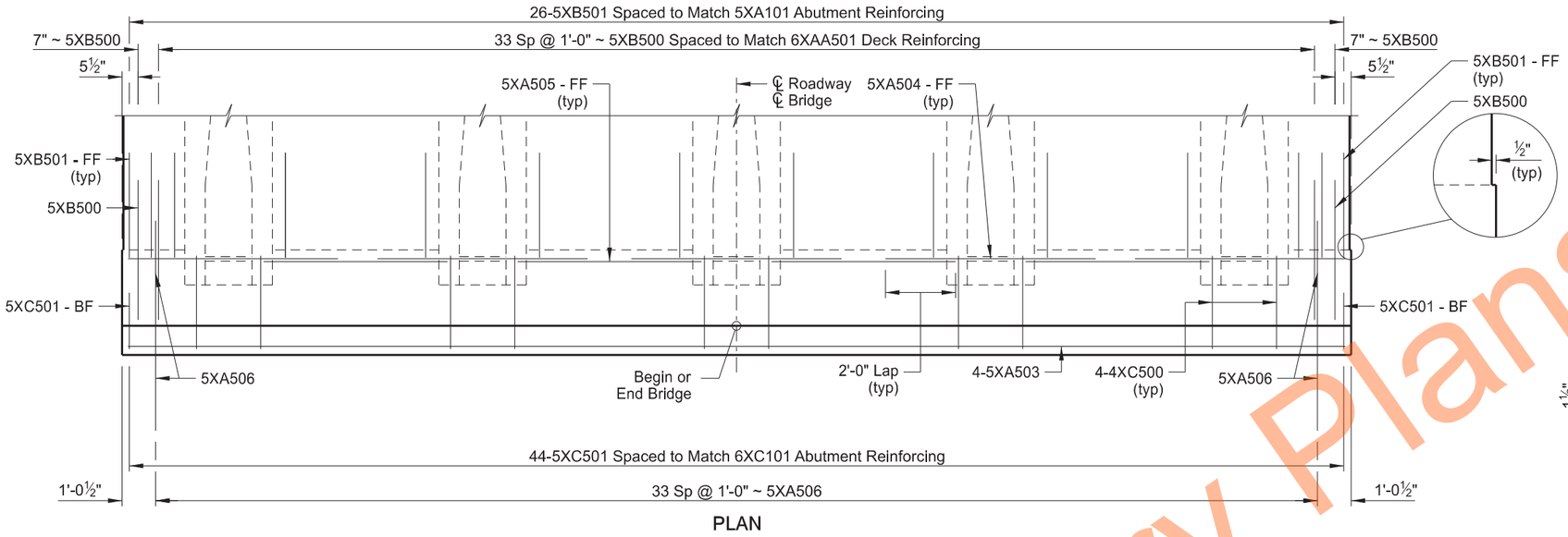
PIER DIAPHRAGM DETAILS

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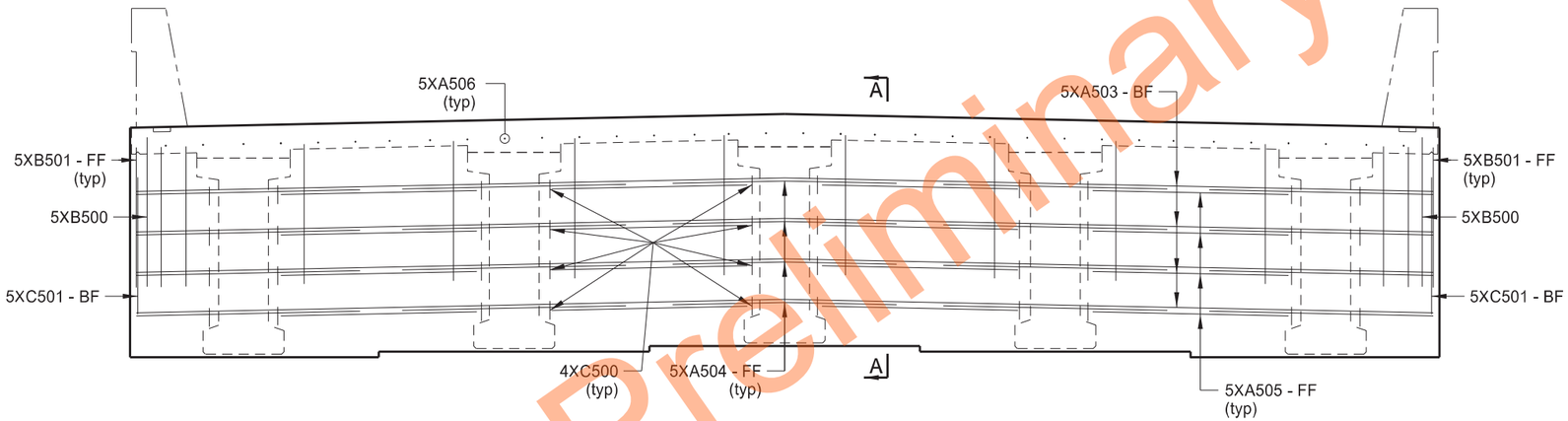
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|---|---|---|---|
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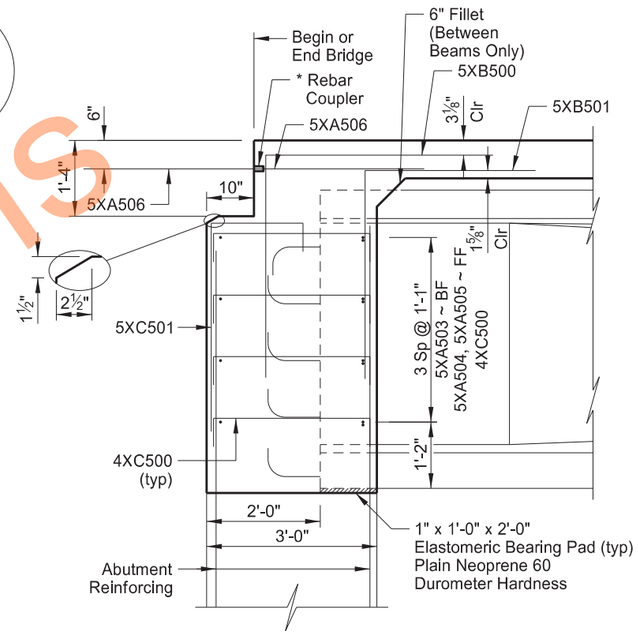



PLAN




(APPROACH NOTCH NOT SHOWN)

ELEVATION



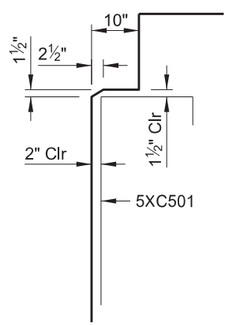

A-A

* Use mechanical connectors for the couplers capable of developing 125% of the reinforcing steel specified yield strength. Provide epoxy coated couplers according to Section 836.02 A and repair any damaged epoxy coating according to Section 612.04 E.

NOTE:

Do not install the 5XA506 bars into the approach slab until all of the foundation fill is in place.

Position the 4'-0" leg of 5XB500 bar and the 3'-0" leg of 5XB501 bar horizontal.




APPROACH NOTCH DETAIL

NOMENCLATURE:

FF = Front Face
BF = Back Face

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**QUANTITIES**

SEE DWG 94-217.146-19

I-94/PETTIBONE INTERCHANGE

ENDWALL DETAILS

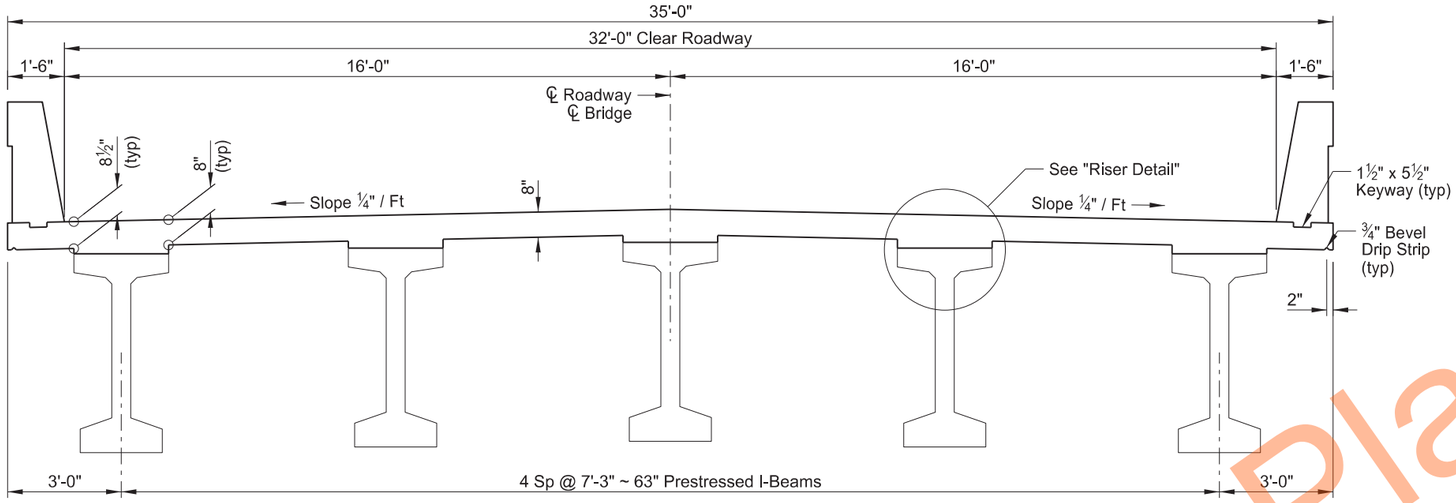
DRAWING NO. 94-217.146-18

Preliminary Plans

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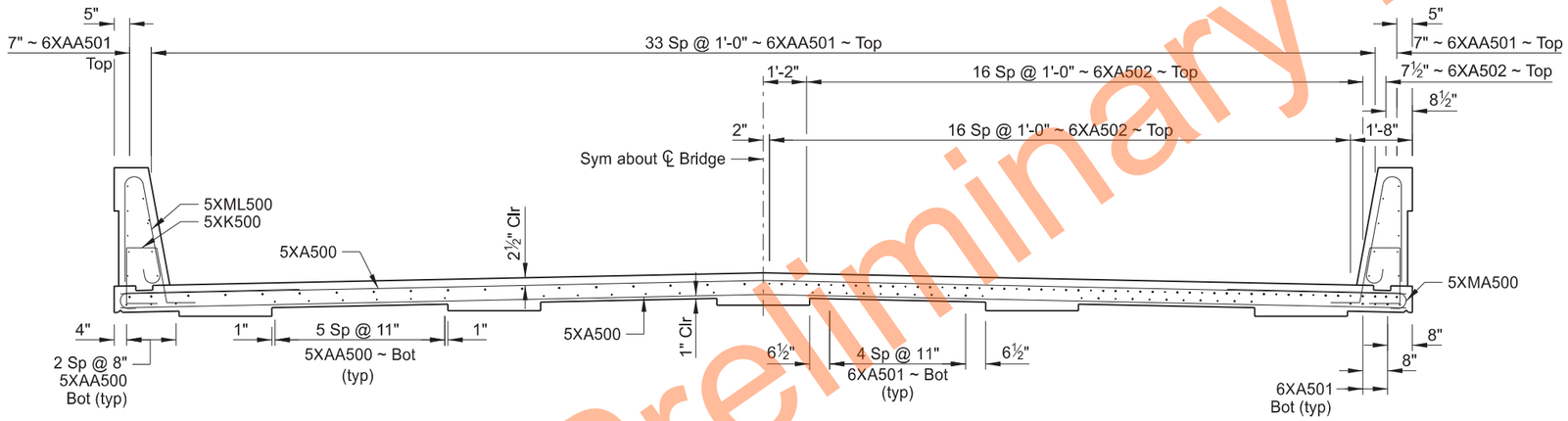
23 U.S.C. § 407 Documents
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|---|---|---|---|
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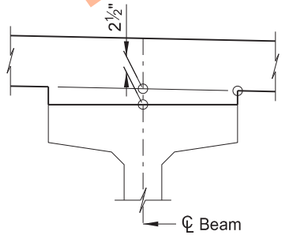

(SHOWING DIMENSIONS)

SLAB SECTION



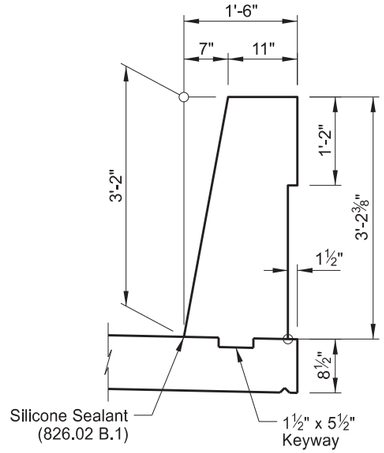

(SHOWING REINFORCING BETWEEN SUPPORTS) (SHOWING REINFORCING OVER PIERS)

SLAB SECTION

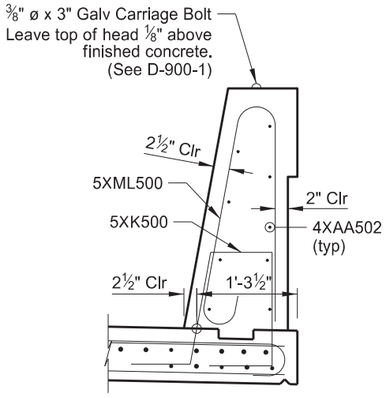



RISER DETAIL

The 2½" dimension shown is located at the supports. The anticipated midspan riser for span 1 is 1½" and for span 2 is 3". Adjust the riser to maintain the 8" slab thickness.




SHOWING DIMENSIONS




SHOWING REINFORCING BARRIER DETAIL

| QUANTITIES | |
|---|---|
| BRIDGE DECK CONCRETE | 298.6 CY |
| BRIDGE BARRIER CONCRETE | 72.2 CY |
| REINFORCING STEEL (EPOXY) | 70,103 LBS |

I-94/PETTIBONE INTERCHANGE

SLAB SECTION

| DRAWING NO. | 94-217.146-19 |
|---|---|

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Preliminary Plans

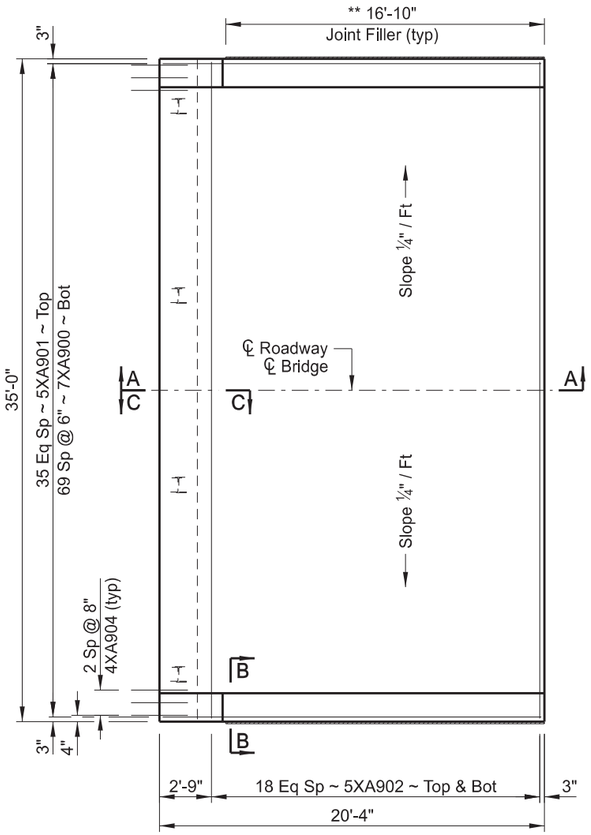
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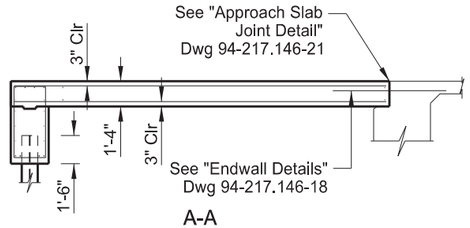
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 20 |

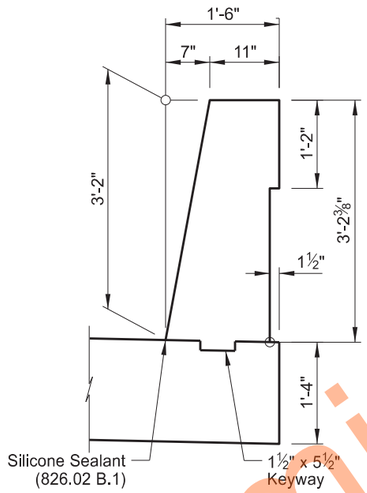
** ½" x 16" Pref Exp Joint Filler
Place between approach
slab & abutment wing (typ).



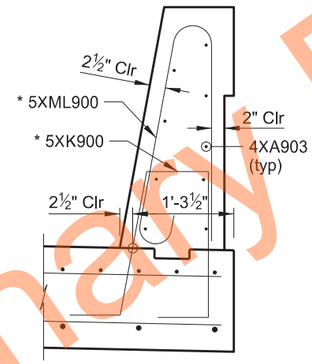

PLAN




A-A

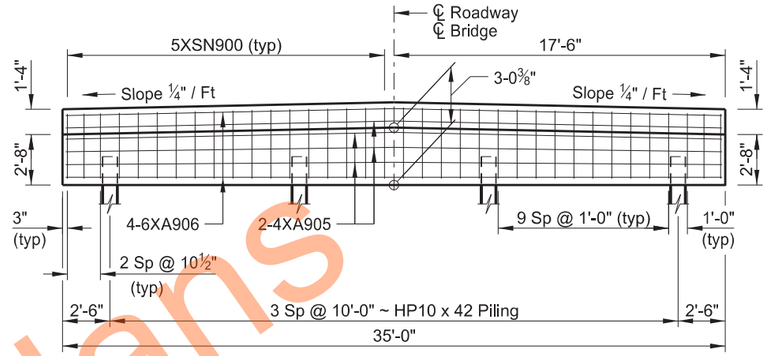



SHOWING DIMENSIONS

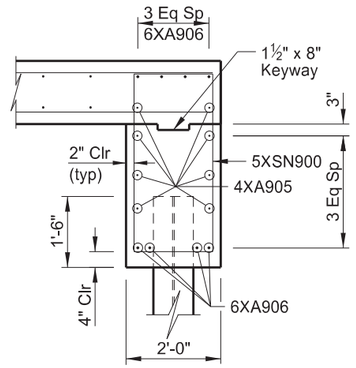



SHOWING REINFORCING

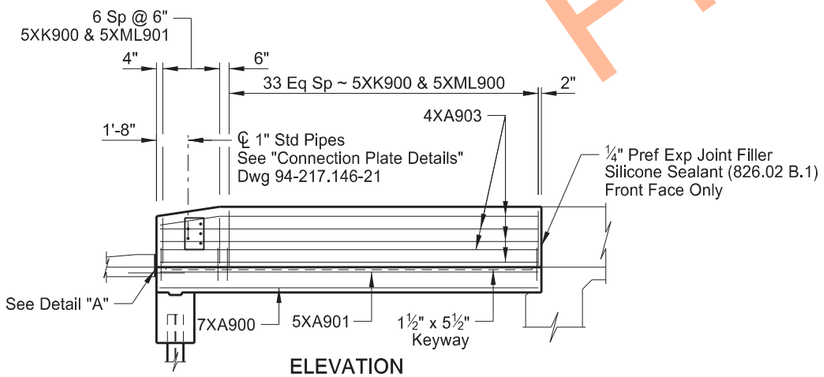
B-B



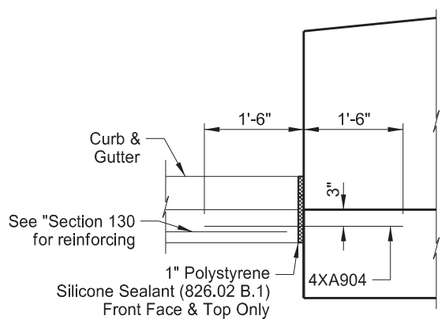

FOOTING ELEVATION




C-C




ELEVATION




DETAIL "A"

Preliminary Plans

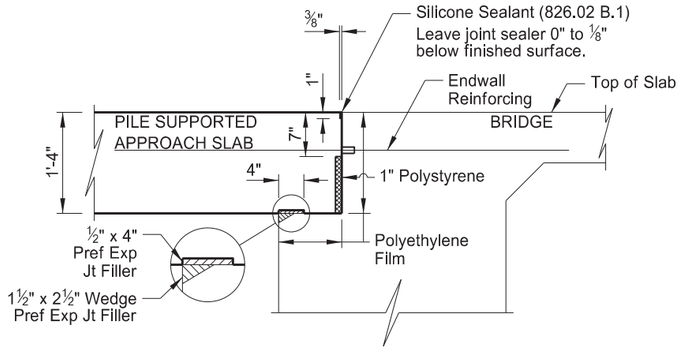
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PE-8211
DATE 07/10/26
NORTH DAKOTA

| QUANTITIES |
|---|
| SEE DWG 94-217.146-21 |
| I-94/PETTIBONE INTERCHANGE |
| APPROACH SLAB DETAILS |
| DRAWING NO. 94-217.146-20 |

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|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 21 |

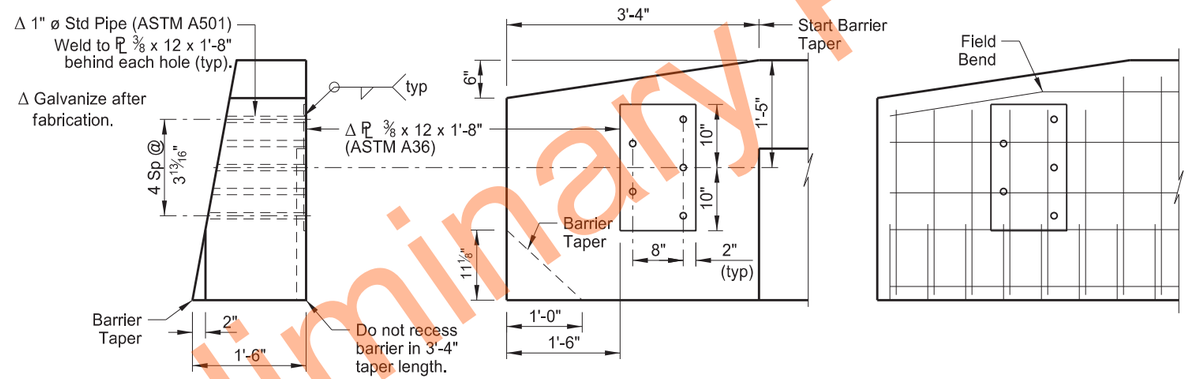



APPROACH SLAB JOINT DETAIL

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, connection plates and pipes, and labor required to build the approach slabs and barriers in the Approach Slab pay item. Use concrete that meets the requirements of Section 602. Provide grade 60 reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

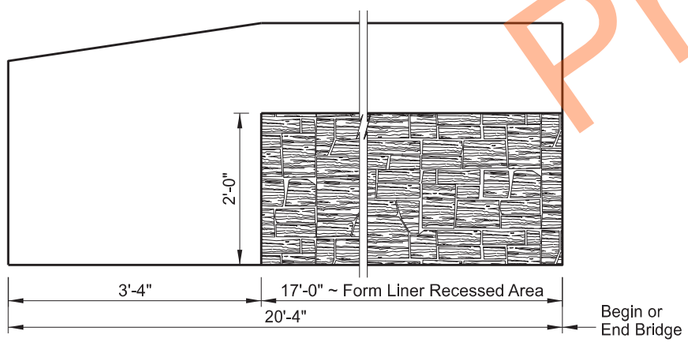
| ESTIMATED MATERIAL QUANTITIES | | |
|---|---|---|
| BRIDGE SUBSTRUCTURE CONCRETE | 7.4 | CY |
| BRIDGE DECK CONCRETE | 35.1 | CY |
| BRIDGE BARRIER CONCRETE | 5.8 | CY |
| REINFORCING STEEL (EPOXY) | 7,377 | LBS |




SHOWING DIMENSIONS

SHOWING REINFORCING

(SHOWING BACK FACE)
CONNECTION PLATE DETAILS




(SHOWING FORM LINER ~ BACK FACE)
BARRIER ELEVATION

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

| QUANTITIES | (ONE SLAB) |
|---|---|
| APPROACH SLAB | 79.1 SY |

I-94/PETTIBONE INTERCHANGE

APPROACH SLAB DETAILS

DRAWING NO. 94-217.146-21

Docusign Envelope ID: 616F5738-14CC-8887-82B5-560A7A4CDF5E

# BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 22 |

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| LOCATION | SIZE | MARK | NO. EACH /SET | NOMINAL LENGTH | DETAILING DIMENSIONS a | b | c | d | e | f | g | h | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ABUTMENTS | 5 | XA100 | 8 | 38'- 3" | | 38'- 3" | | | | | | | |
| | 5 | XA101 | 52 | 7'- 2" | | 7'- 2" | | | | | | | |
| | 5 | XA102 | 4 | 17'- 7" | | 17'- 7" | | | | | | | |
| | 6 | XA103 | 4 | 17'- 7" | | 17'- 7" | | | | | | | |
| | 5 | XA104 | 24 | 18'- 7" | | 18'- 7" | | | | | | | |
| | 6 | XA105 | 24 | 18'- 7" | | 18'- 7" | | | | | | | |
| | 6 | XB100 | 24 | 8'- 6" | | 1'- 0" | 7'- 6" | | | | | | |
| | 6 | XB101 | 20 | 5'- 5" | | 1'- 0" | 4'- 5" | | | | | | |
| | 5 | XC100 | 28 | 41'- 3" | | 1'- 6" | 38'- 3" | 1'- 6" | | | | | |
| | 6 | XC101 | 88 | 17'- 6" | | 5'- 0" | 2'- 8" | 9'- 10" | | | | | |
| | 5 | XC102 | 88 | 8'- 4" | | 2'- 10" | 2'- 8" | 2'- 10" | | | | | |
| | 5 | XC103 | 20 | 5'- 6" | | 1'- 0" | 3'- 0" | 1'- 6" | | | | | |
| | 4 | XC104 | 96 | 3'- 8" | | 6" | 2'- 8" | 6" | | | | | |
| | 5 | XC105 | 20 | 23'- 9" | | 11'- 2" | 1'- 5" | 11'- 2" | | | | | |
| | 6 | XD100 | 8 | 20'- 0" | | 5'- 3" | 14'- 9" | | | | | 12 | 5.9 |
| | 6 | XD101 | 24 | 8'- 7" | | 1'- 0" | 7'- 7" | | | | | 12 | 12 |
| | 5 | XSA100 | 4 | 67'- 3" | 7'- 0" | 15'- 5" | | | 5 | | | | |
| | 6 | XSA101 | 4 | 67'- 3" | 7'- 0" | 15'- 5" | | | 5 | | | | |
| | 5 | XSC100 | 2 | 233'- 4" | 1'- 5" | 4'- 3" | 11'- 0" | 1'- 5" | 13 | | | | |
| | 5 | XSC101 | 2 | 239'- 2" | 1'- 5" | 4'- 7" | 11'- 1" | 1'- 5" | 13 | | | | |

| LOCATION | SIZE | MARK | NO. EACH /SET | NOMINAL LENGTH | DETAILING DIMENSIONS a | b | c | d | e | f | g | h | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PIER | 6 | XA200 | 4 | 30'- 8" | | 30'- 8" | | | | | | | |
| | 5 | XA201 | 16 | 30'- 8" | | 30'- 8" | | | | | | | |
| | 8 | XA202 | 8 | 30'- 8" | | 30'- 8" | | | | | | | |
| | 8 | XA203 | 48 | 16'- 10" | | 16'- 10" | | | | | | | |
| | 9 | XA204 | 7 | 30'- 0" | | 30'- 0" | | | | | | | |
| | 4 | XA205 | 2 | 31'- 3" | | 31'- 3" | | | | | | | |
| | 4 | XA206 | 2 | 32'- 6" | | 32'- 6" | | | | | | | |
| | 4 | XA207 | 6 | 33'- 8" | | 33'- 8" | | | | | | | |
| | 6 | XA208 | 7 | 33'- 8" | | 33'- 8" | | | | | | | |
| | 4 | XC200 | 84 | 3'- 8" | | 6" | 2'- 8" | 6" | | | | | |
| | 6 | XC201 | 2 | 11'- 4" | | 1'- 3" | 8'- 10" | 1'- 3" | | | | | |
| | 6 | XC202 | 26 | 5'- 0" | | 1'- 3" | 2'- 6" | 1'- 3" | | | | | |
| | 5 | XD200 | 14 | 5'- 7" | | 3'- 0" | 2'- 7" | | | | | 12 | 12 |
| | 5 | XN200 | 30 | 24'- 4" | 2'- 8" | 9'- 0" | 6" | | | | | 0 | 12 |
| | 5 | XN201 | 39 | 11'- 0" | 2'- 8" | 2'- 4" | 6" | | | | | 0 | 12 |
| | 5 | XN202 | 8 | 13'- 8" | 2'- 8" | 3'- 8" | 6" | | | | | 0 | 12 |
| | 5 | XN203 | 24 | 13'- 10" | 2'- 8" | 3'- 9" | 6" | | | | | 0 | 12 |
| | 5 | XN204 | 7 | 14'- 2" | 2'- 8" | 3'- 11" | 6" | | | | | 0 | 12 |
| | 5 | XSN200 | 2 | 34'- 6" | 2'- 8" | 1'- 10" | 6" | 3'- 4" | 2 | | | | |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-22

Docusign Envelope ID: 616F5738-14CC-8887-82B5-560A7A4CDF5E

# BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 23 |

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

| LOCATION | SIZE | MARK | NO. EACH /SET | NOMINAL LENGTH | DETAILING DIMENSIONS a | b | c | d | e | f | g | h | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUPERSTRUCTURE | 5 | XA500 | 658 | 34'- 8" | | 34'- 8" | | | | | | | |
| | 6 | XA501 | 24 | 22'- 0" | | 22'- 0" | | | | | | | |
| | 6 | XA502 | 68 | 52'- 6" | | 52'- 6" | | | | | | | |
| | 5 | XA503 | 8 | 34'- 9" | | 34'- 9" | | | | | | | |
| | 5 | XA504 | 40 | 6'- 0" | | 6'- 0" | | | | | | | |
| | 5 | XA505 | 32 | 5'- 3" | | 5'- 3" | | | | | | | |
| | 5 | XA506 | 136 | 3'- 0" | | 3'- 0" | | | | | | | |
| | 6 | XA507 | 24 | 6'- 0" | | 6'- 0" | | | | | | | |
| | 6 | XA508 | 32 | 5'- 3" | | 5'- 3" | | | | | | | |
| | 4 | XA509 | 8 | 4'- 9" | | 4'- 9" | | | | | | | |
| | 5 | XB500 | 72 | 8'- 0" | | 4'- 0" | 4'- 0" | | | | | | |
| | 5 | XB501 | 52 | 6'- 9" | | 3'- 9" | 3'- 0" | | | | | | |
| | 4 | XC500 | 112 | 3'- 8" | | 6" | 2'- 8" | 6" | | | | | |
| | 5 | XC501 | 88 | 5'- 9" | | 6" | 1'- 7" | 3'- 8" | | | | | |
| | 5 | XG500 | 20 | 16'- 0" | 5'- 8" | 2'- 8" | 5'- 8" | 1'- 0" | | | | 12 | 0 |
| | 5 | XK500 | 528 | 5'- 6" | 1'- 6" | 10" | | | 1'- 0" | | 10" | 2.2 | 12 |
| | 5 | XL500 | 528 | 6'- 7" | | 2'- 7" | 9" | 2'- 8" | | 2.375 | | 2.2 | 12 |
| | 5 | XMA500 | 676 | 5'- 5" | | 4'- 10" | | | | | | | |
| | 5 | XAA500 | 30 | 265'- 0" | | 60'- 0" | 3'- 0" | 25'- 0" | 4 | | 253'- 0" | | |
| | 6 | XAA501 | 36 | 268'- 0" | | 60'- 0" | 3'- 9" | 28'- 0" | 4 | | 253'- 0" | | |
| | 4 | XAA502 | 18 | 263'- 0" | | 60'- 0" | 2'- 6" | 23'- 0" | 4 | | 253'- 0" | | |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-23

Docusign Envelope ID: 616F5738-14CC-8887-82B5-560A7A4CDF5E

# BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 170 | 24 |

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

APPROACH SLAB (ONE SLAB)

| LOCATION | SIZE | MARK | NO. EACH /SET | NOMINAL LENGTH | DETAILING DIMENSIONS a | b | c | d | e | f | g | h | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7 | XA900 | 70 | 20'- 0" | | 20'- 0" | | | | | | | |
| | 5 | XA901 | 36 | 20'- 0" | | 20'- 0" | | | | | | | |
| | 5 | XA902 | 38 | 34'- 8" | | 34'- 8" | | | | | | | |
| | 4 | XA903 | 18 | 20'- 0" | | 20'- 0" | | | | | | | |
| | 4 | XA904 | 6 | 3'- 0" | | 3'- 0" | | | | | | | |
| | 4 | XA905 | 8 | 34'- 8" | | 34'- 8" | | | | | | | |
| | 6 | XA906 | 8 | 34'- 8" | | 34'- 8" | | | | | | | |
| | 5 | XK900 | 82 | 6'- 6" | 2'- 0" | 10" | | | 1'- 1" | | 10" | 2.2 | 12 |
| | 5 | XL900 | 68 | 6'- 7" | | 2'- 7" | 9" | 2'- 8" | | 2.375 | | 2.2 | 12 |
| | 5 | XL901 | 14 | 5'- 7" | | 2'- 0" | 11" | 2'- 1" | | 3 | | 2.2 | 12 |
| | 5 | XSN900 | 2 | 207'- 0" | 1'- 8" | 3'- 5" | 6" | 3'- 9" | 17 | | | | |

| LOCATION | SIZE | MARK | NO. EACH /SET | NOMINAL LENGTH | DETAILING DIMENSIONS a | b | c | d | e | f | g | h | k |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

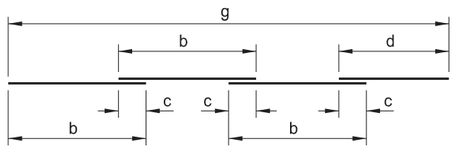
REINFORCING BAR LIST

DRAWING NO. 94-217.146-24

Docusign Envelope ID: 616F5738-14CC-8887-82B5-560A7A4CDF5E

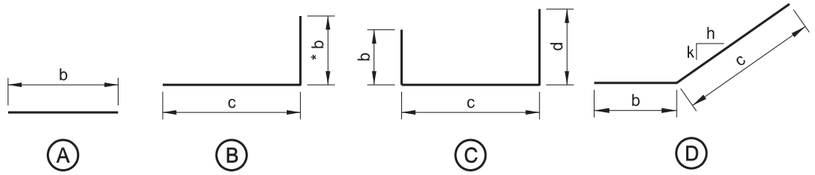
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 170 | 25 |

23 U.S.C. § 407 Documents
NDDOT Reserves All Objections



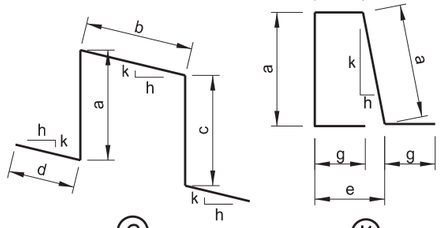

c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d

AA

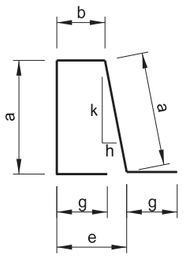



A B C D

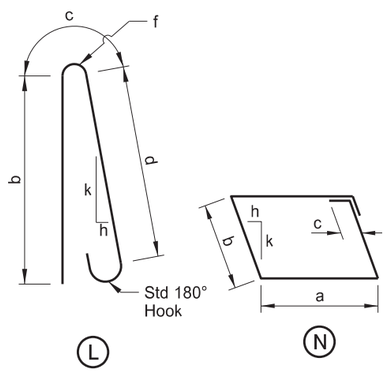
* b = Vertical Leg for
XB500 and XB501




G



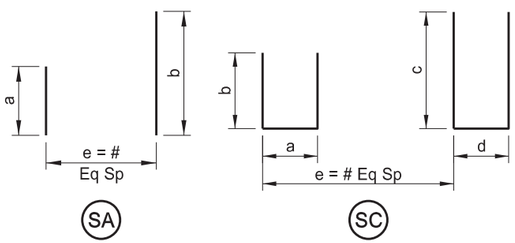

K




L



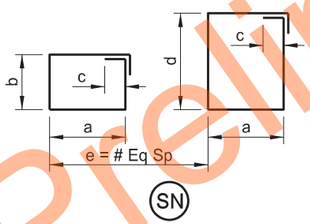

N



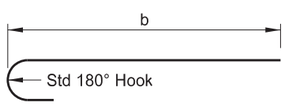

SA




SC




SN




MA

NOTES:

1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
4. Turn adjacent "AA" bars end for end so that the splice locations are staggered.
5. The "f" dimension indicates the inside radius unless otherwise noted.
6. An "X" preceding a bar designation indicates an epoxy coated bar.
7. Reinforcing steel bid items do not include bar list quantity of approach slab reinforcing steel. Include the approach slab bar list quantity in the approach slab pay items.

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 07/10/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-25

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 175 | 1 |

NDDOT North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

# LOG OF BORING SB - 1

PAGE 1 OF 1

**PROJECT NUMBER** IM-2-094(186)217 **DATE STARTED** 7/25/22 **COMPLETED** 7/25/22
**PCN** 23444 **ELEVATION** 1832 ft
**LOCATION** Kidder County **Northing** 456283.06 ft **Easting** 5192031.29 ft
**DRILLED BY** Dallan **LOGGED BY** Jamie **DRILLING METHOD**
**ENGINEER**
**NOTES** North Abutment

| ELEVATION (ft) | DEPTH (ft) | MATERIAL DESCRIPTION | AASHTO | USCS | SAMPLE TYPE & NUMBER | RECOVERY (%) | SPT N VALUE | MC / PL / LL / CLAY FRACTION (%) | TESTS & REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 1830 | 0 | Medium Stiff to Stiff Moist/Wet Brn Clayey/Silty Sand. Water Bearing at 24' & 26'. | A-2-4 | SC-SM | 340 | 80 | 6 | 14 23 | |
| | | | A-2-6 | SC | 341 | 20 | 4 | 14 25 | |
| 1820 | 10 | | A-2-4 | SC | 342 | 85 | 0 | 15 26 | |
| | | | A-2-6 | SC | | | | 10 38 | $\gamma_d$ = 106.8 pcf<br>$\gamma$ = 126.1 pcf<br>Con-1-22 |
| | | | A-2-4 | SM | 343 | 40 | 9 | 18 31 | |
| 1810 | 20 | | A-6 | SC | 344 | 85 | 0 | 19 34 | |
| | | | A-6 | CL | | | | | |
| | | | A-2-4 | SM | 345 | 75 | 28 | 0 | |
| | | | A-2-6 | SC | 346 | 85 | 8 | 0 | |
| | | 1803.0 ft 29.0 ft | A-2-4 | SM | | | | | |
| | | | A-1-b | SM | 347 | 85 | 16 | 0 | |
| 1800 | 30 | Medium Dense Moist Brn Silty Sand. | A-1-b | SP-SM | 348 | 65 | 8 | 0 | |
| | | | A-4 | ML | 349 | 25 | 18 | 0 | |
| | | | A-2-4 | SM | 350 | 15 | 14 | 0 | |
| | | 1791.0 ft 41.0 ft | A-2-4 | SM | | | | | |
| 1790 | 40 | | A-1-b | SM | 351 | 65 | 20 | 0 | |
| | | Dense to Very Dense Moist/Wet Brn Silty/Clayey Sand. Water bearing at 59'. | A-1-b | SP-SM | 352 | 60 | 38 | 0 | |
| | | | A-1-b | SC-SM | 353 | 60 | 31 | 0 | |
| | | | A-1-b | SM | 354 | 60 | 23 | 0 | |
| 1780 | 50 | | A-1-b | SW-SM | 355 | 50 | 35 55 | 0 | |
| | | | A-1-b | SC-SM | 356 | 60 | | | |
| | | 1773.0 ft 59.0 ft | | | 357 | 65 | 21 | 0 | |
| | | Dense Gr/Blk/Brn Wet Silty Sand | A-1-b | SM | 358 | 65 | 24 | 0 | |
| 1770 | 60 | | A-1-b | SM | 359 | 65 | | | |
| | | | | | 360 | 75 | 24 | 0 | |
| | | | A-1-b | SM | 361 | 55 | 16 | 0 | |
| 1760 | 70 | | A-1-b | SM | 362 | 65 | | | |
| | | | | | 363 | 60 | | | |
| | | | | | | 65 | 23 | 0 | |
| 1750 | 80 | | A-2-4 | SM | 364 | 60 | | | |
| | | | | | | 70 | | | |
| | | | | | | 65 | 24 | 0 | |
| 1740 | 90 | | A-1-a | SP-SM | 365 | | | | |
| | | 1728.0 ft 104.0 ft | | | | | 7 | 0 | |
| | | Soft to Stiff Moist/Wet Gry Silt. Water bearing at 104' ,114', & 124'. | A-4 | ML | 366 | 90 | | | |
| 1730 | 100 | | | | | | 3 | 37 | |
| | | | A-4 | ML | 367 | 95 | | | |
| | | | | | 368 | 95 | 13 | 28 42 | |
| 1720 | 110 | | | | | | | | |
| | | 1698.0 ft 134.0 ft | | | | | | | |
| | | Very Stiff Moist/Wet Gry Sandy Fat Clay. Water bearing at 136', 146', 154', & 164'. | A-7-6 | CL | 369 | 65 | 22 | 23 46 | $\gamma_d$ = 94.7 pcf<br>$\gamma$ = 120.6 pcf<br>UU=2555psf |
| 1710 | 120 | | A-7-6 | CL | 370 | 60 | | | |
| | | | A-6 | SC | 371 | 75 | 14 | 16 29 25 50 | |
| | | | A-7-6 | CH | 372 | 95 | | | $\gamma_d$ = 94.2 pcf<br>$\gamma$ = 121.9 pcf<br>UU=1856psf |
| 1700 | 130 | | A-7-6 | CL | 373 | 100 | 16 | 24 48 | |
| | | | A-7-6 | CH | 374 | 10 | 16 | 26 54 | |
| 1690 | 140 | | | | | | | | |
| | | | A-7-6 | CH | 375 | 100 | 24 | 25 54 | |
| 1680 | 150 | | | | | 5 | 19 | | |
| | | 1638.0 ft 194.0 ft | | | | | | | |
| | | Hard Moist Gry Elastic Silt. | A-7-5 | MH | 376 | 90 | 34 | 33 66 | |
| 1670 | 160 | | | | | | | | |
| | | 1626.0 ft 206.0 ft | | | | | | | |
| 1660 | 170 | | A-7-5 | MH | 377 | 95 | 69 | 38 66 | |
| 1650 | 180 | | | | | | | | |
| 1640 | 190 | | | | | | | | |
| 1630 | 200 | Bottom of borehole at 206.0 ft | | | | | | | |

Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
COLTER SCHWAGLER
PE-27747
DATE 07/30/24
NORTH DAKOTA

Boring Log 1

| STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|
| ND | IM-2-094(186)217 | 175 | 2 |

NDDOT
North Dakota Department of Transportation

NORTH DAKOTA DEPARTMENT OF TRANSPORATION
300 AIRPORT ROAD
BISMARCK, ND 58504

# LOG OF BORING SB - 2



**PROJECT NUMBER** IM-2-094(186)217 **DATE STARTED** 7/25/22 **COMPLETED** 7/25/22
**PCN** 23444 **ELEVATION** 1831 ft
**LOCATION** Kidder County **Northing** 456276.35 ft **Easting** 5191961.60 ft
**DRILLED BY** Dallan **LOGGED BY** Jamie **DRILLING METHOD**
**ENGINEER**
**NOTES** South Abutment

| ELEVATION (ft) | DEPTH (ft) | MATERIAL DESCRIPTION | AASHTO | USCS | SAMPLE TYPE & NUMBER | RECOVERY (%) | SPT N VALUE | MC / PL / LL / CLAY FRACTION (%) | TESTS & REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| 1830 | 0 | Loose Moist Brn Silty, Clayey Sand w/Gravel | A-1-b | SC-SM | 378 | 40 | 8 | 124 | |
| 1820 | 10 | 1817.0 ft — 14.0 ft | A-1-b | SC-SM | 379 | 50 | 7 | 125 | |
| | | Medium Dense Moist Brn Silty Sand w/Gravel | A-2-4 | SC-SM | 380 | 60 | 42 | 124 | |
| 1810 | 20 | | A-2-4 | SM | 381 | 65 | 17 | 111 | |
| | | 1799.0 ft — 32.0 ft | A-1-b | SP-SM | 382 | 70 | 24 | 0 | |
| 1800 | 30 | | A-1-b | SW-SM | 383 | 75 | 21 | 0 | |
| | | Dense Moist Brn Well-Graded Sand w/Silt & Gravel | A-1-b | SW-SM | 384 | 70 | 37 | 0 | |
| 1790 | 40 | | A-1-b | SW-SM | 385 | 75 | 44 | 0 | |
| | | 1782.0 ft — 49.0 ft | A-1-b | SW-SM | 386 | 90 | 43 | 0 | |
| 1780 | 50 | Medium Dense Moist/Wet Brn/Gry Silty Sand. Water bearing from 54'-79' | A-2-6 | SC | 387 | 85 | 23 | 24 36 | |
| | | | A-1-b | SM | 388 | 70 | 26 | 0 | |
| 1770 | 60 | | A-2-4 | SM | 389 | 90 | 18 | 0 | |
| | | | A-1-b | SM | 390 | 90 | 24 | 0 | |
| 1760 | 70 | | A-1-b | SM | 391 | 75 | 17 | 0 | |
| | | | A-2-4 | SP-SM | 392 | 90 | 14 | 0 | |
| 1750 | 80 | | A-3 | SP-SM | 393 | 75 | 12 | 0 | |
| 1740 | 90 | | A-1-b | SM | 394 | 80 | 24 | 0 | |
| 1730 | 100 | 1722.0 ft — 109.0 ft | A-6 | ML | 395 | 90 | 8 | 27 39 | |
| | | Medium Stiff to Stiff Moist Gry Silt. Water bearing at 139'. | A-7-5 | ML | 396 | 100 | 5 | 30 46 | |
| 1720 | 110 | | A-7-6 | CL | 397 | 85 | | 23 46 | |
| 1710 | 120 | | | | | | | | |
| 1700 | 130 | | | | | | 10 | 234 | $\gamma_d$ = 86.7 pcf<br>$\gamma$ = 119.1 pcf<br>UU=1358psf |
| 1690 | 140 | 1682.0 ft — 149.0 ft | A-4 | ML | 398 | 80 | | | |
| 1680 | 150 | Very Stiff Moist Gry Sandy Fat Clay | A-7-6 | CH | 399 | 90 | 24 | 27 53 | |
| 1670 | 160 | | A-7-6 | CH | 400 | 60 | 20 | 23 50 | |
| 1660 | 170 | 1652.0 ft — 179.0 ft | | | | 0 | 19 | | |
| 1650 | 180 | Hard Moist/Wet Gry Elastic Silt. Water bearing at 179'. | | | 401 | 20 | 40 | | |
| 1640 | 190 | | A-7-5 | MH | 402 | 90 | 36 | 32 58 | |
| 1630 | 200 | | A-7-5 | MH | 403 | 90 | 41 | 33 66 | |
| 1620 | 210 | | A-7-5 | CH | 404 | 90 | 100 | 33 74 | |
| 1610 | 220 | 1610.0 ft — 221.0 ft | A-7-5 | MH | 405 | 100 | 100 | 37 74 | |
| | | Bottom of borehole at 221.0 ft | | | | | | | |

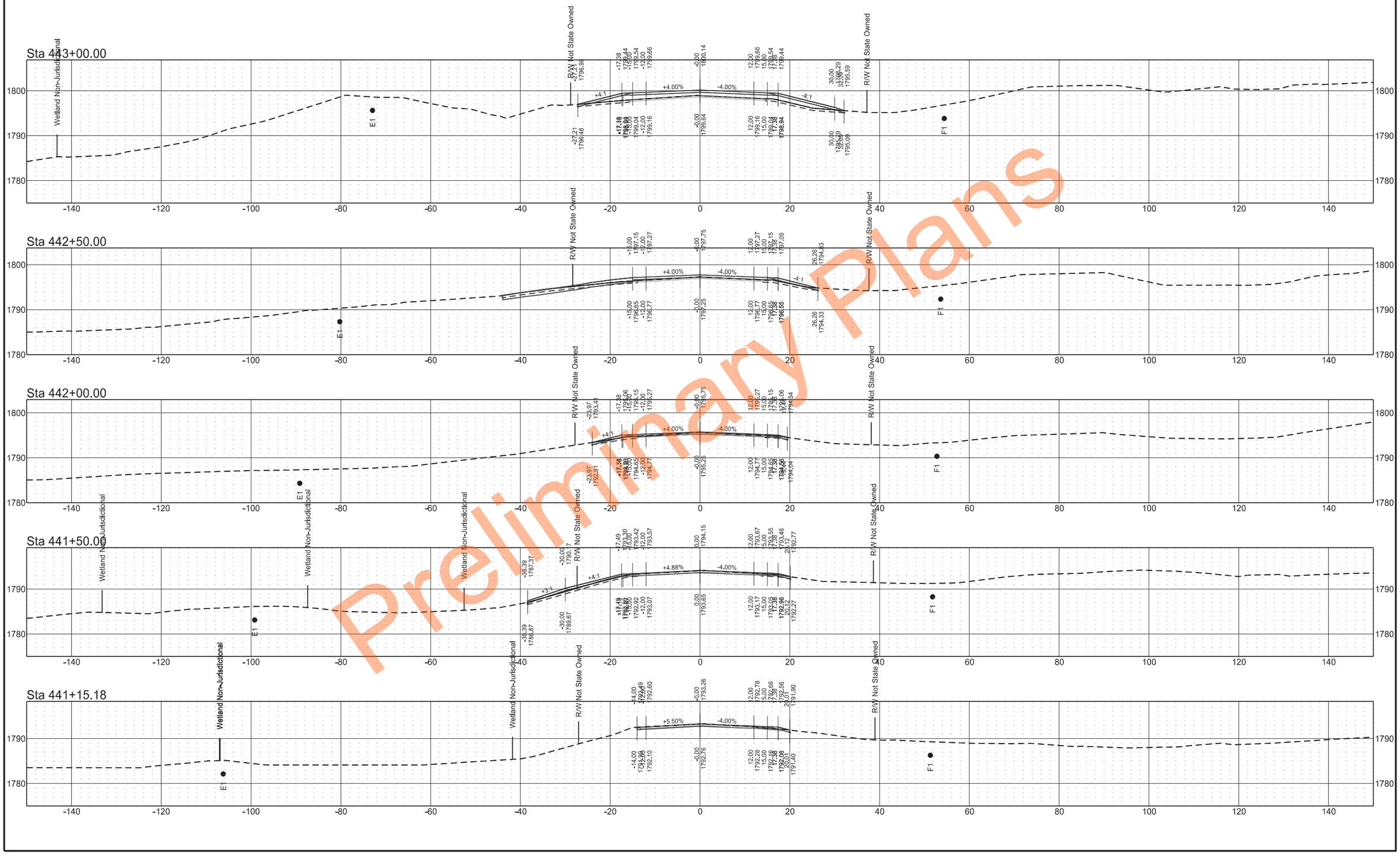
Preliminary Plans

REGISTERED PROFESSIONAL ENGINEER
COLTER SCHWAGLER
PE-27747
DATE 07/30/24
NORTH DAKOTA

Boring Log 2

# I94/Pettibone Interchange
## Cross Sections
## 42nd Ave (OFL Align)

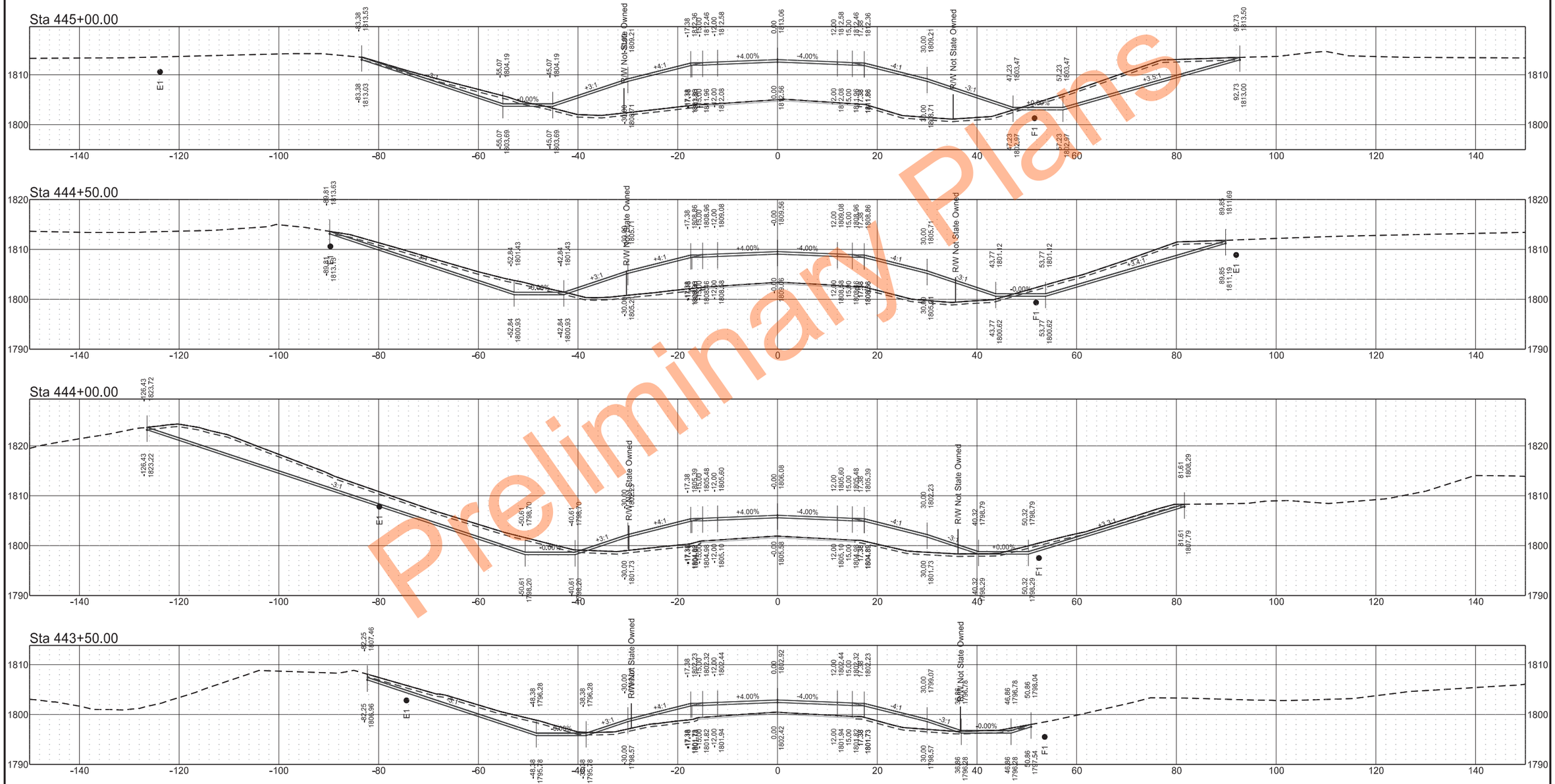
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 200 | 1 |




Preliminary Plans

I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

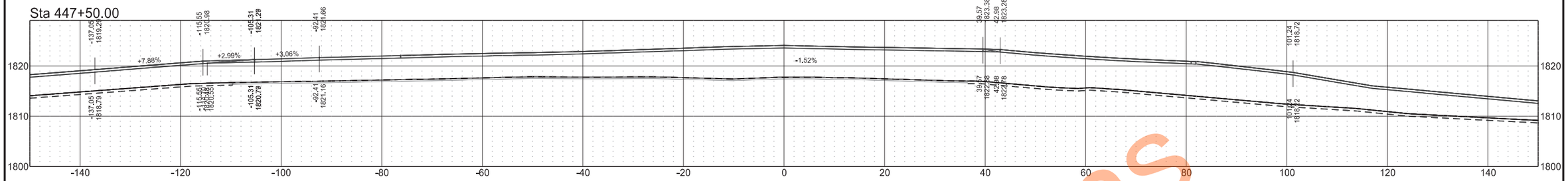
| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 200 | 2 |

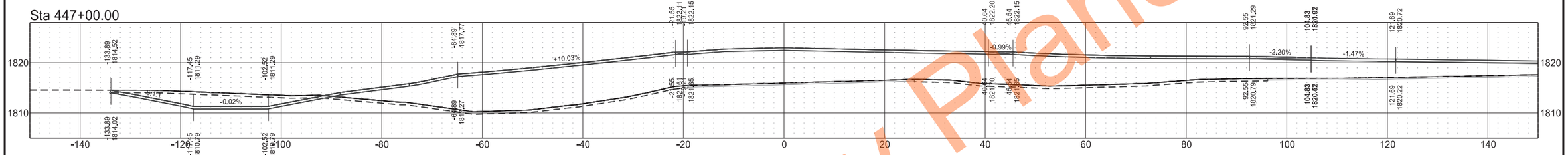


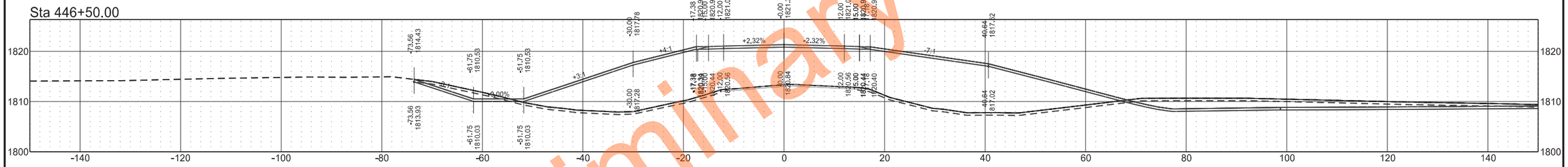

Preliminary Plans

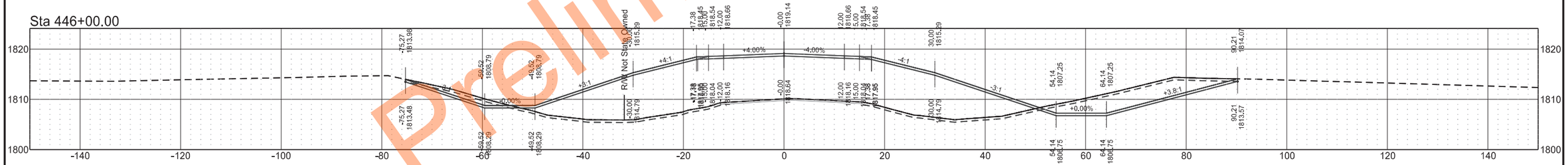
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

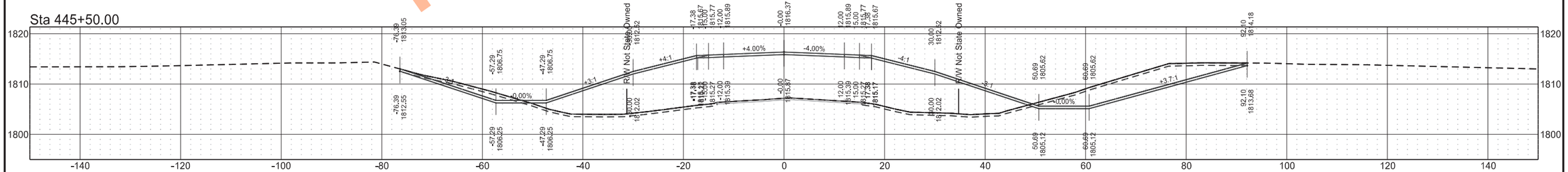
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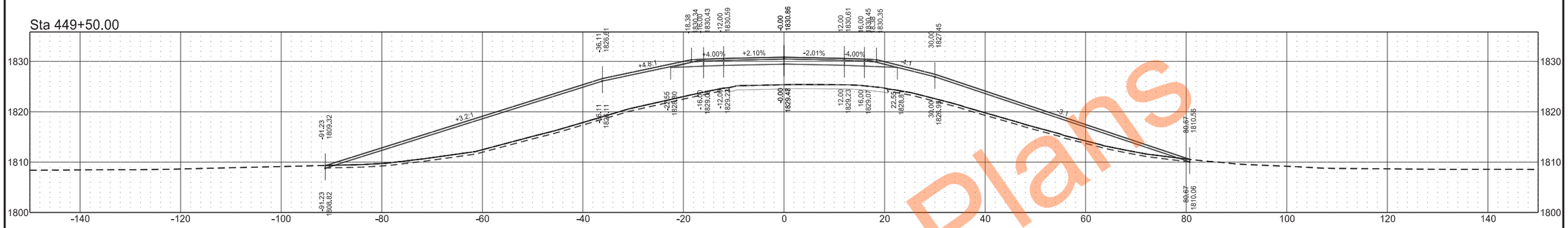




Preliminary Plans

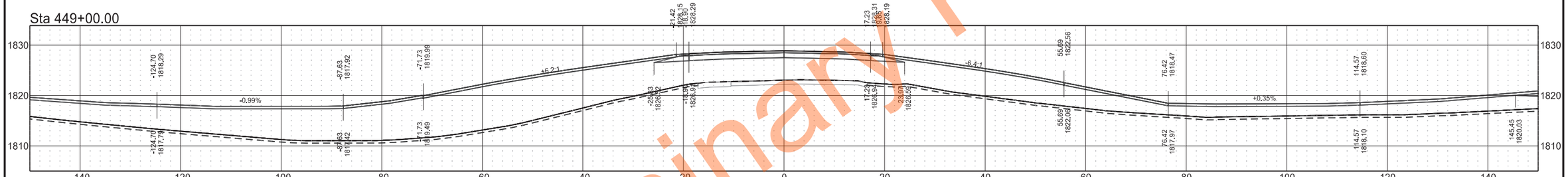
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

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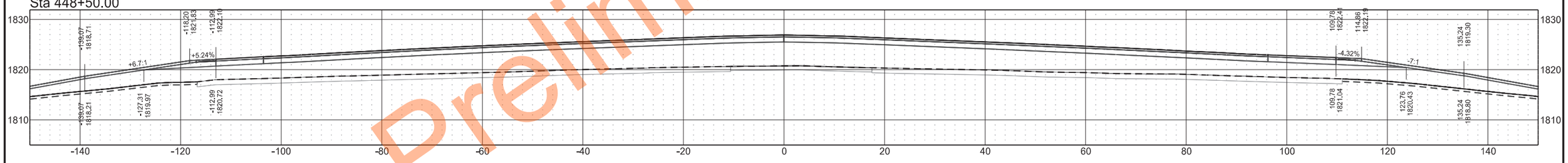
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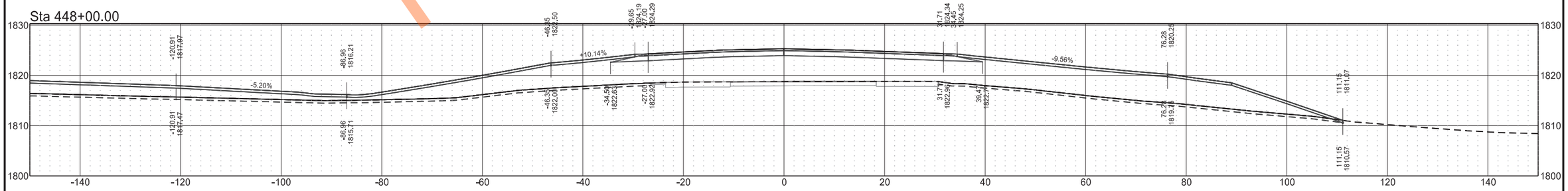

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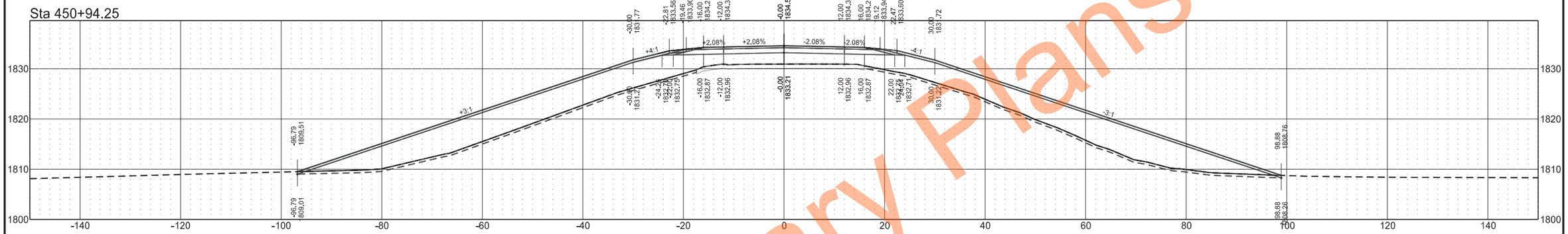



Preliminary Plans

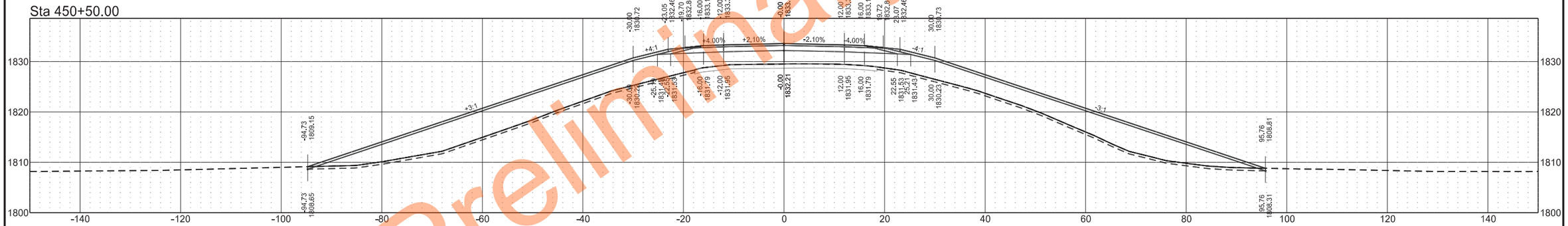
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

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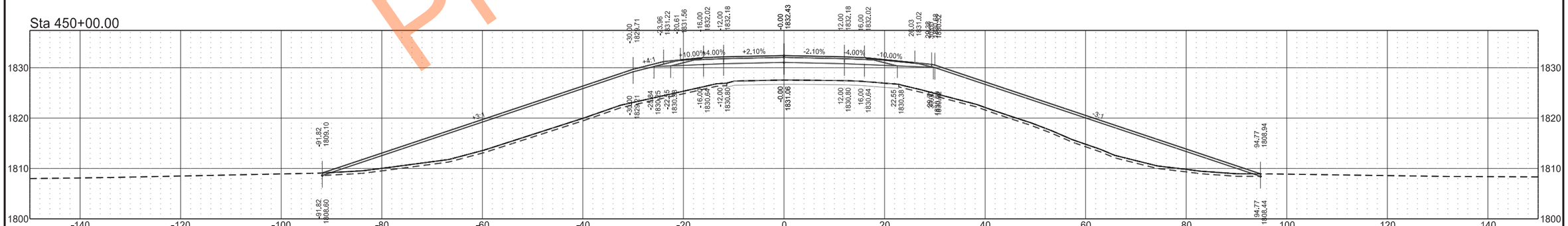
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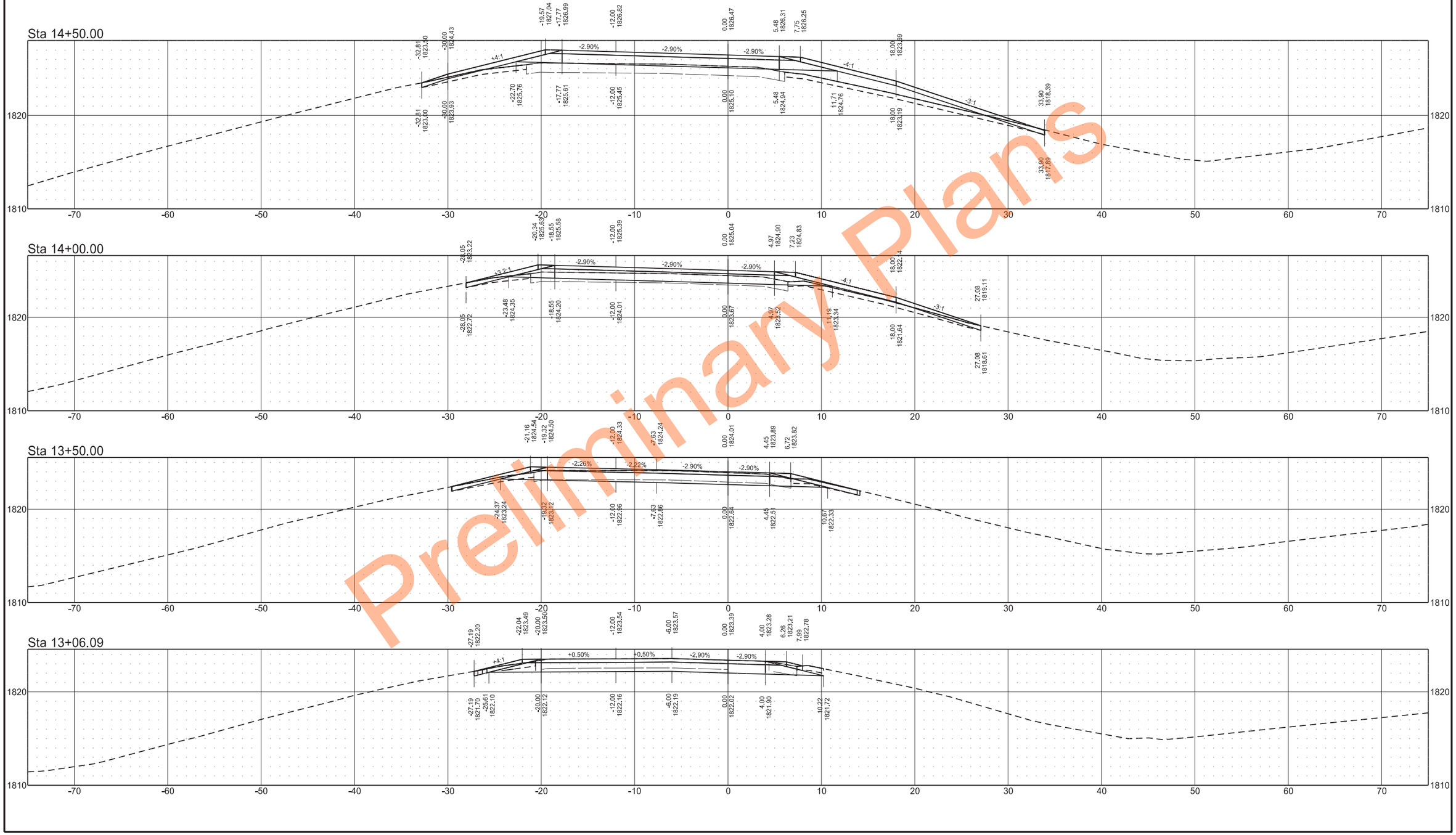

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Preliminary Plans

# I94/Pettibone Interchange
## Cross Sections
## NE Ramp

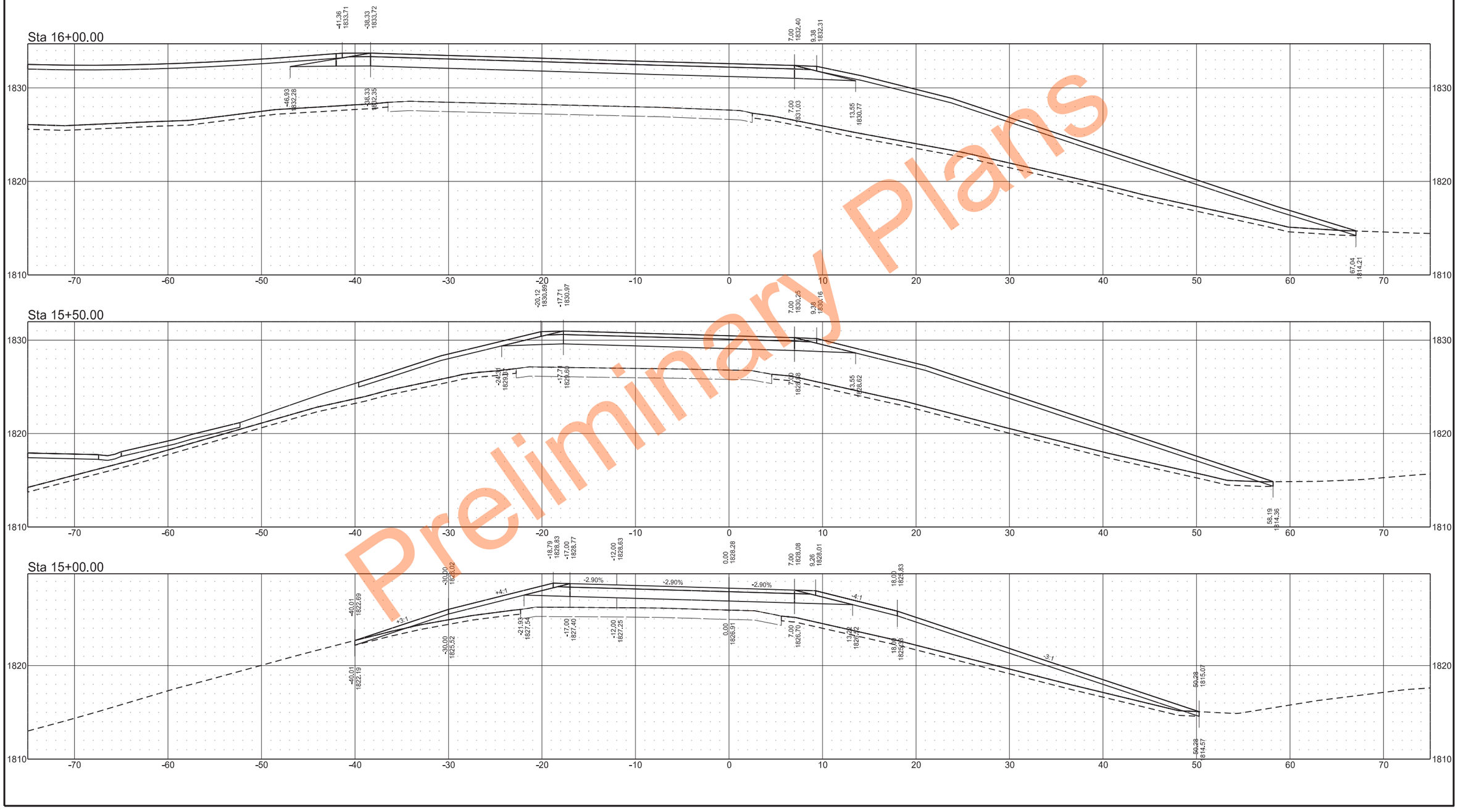
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Preliminary Plans

I94/Pettibone Interchange
Cross Sections
NE Ramp

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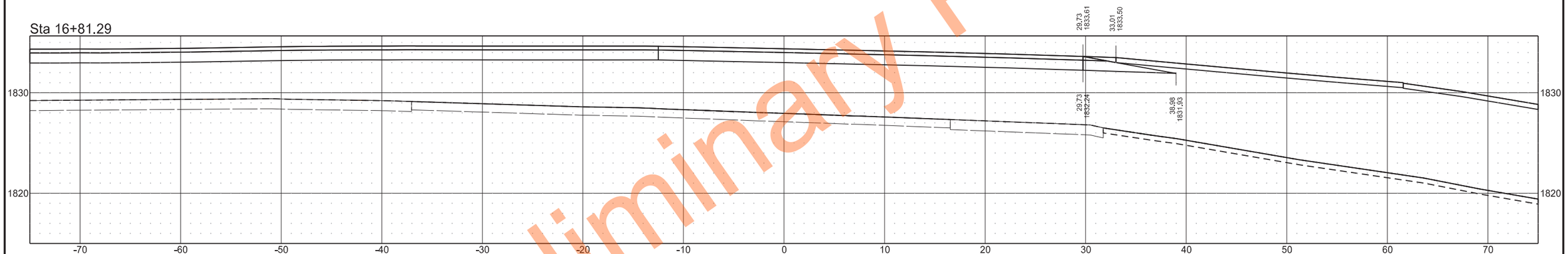

Preliminary Plans

I94/Pettibone Interchange
Cross Sections
NE Ramp

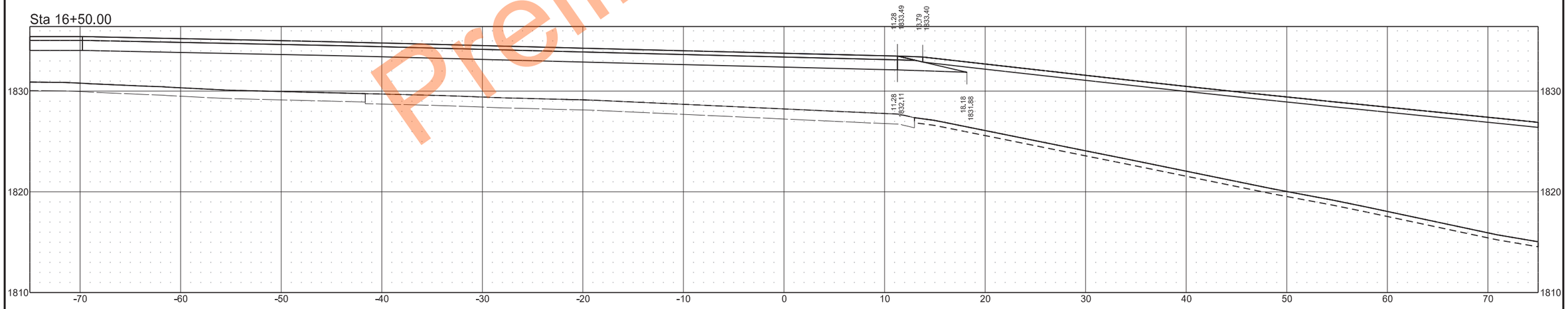
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Preliminary Plans

Sta 16+81.29



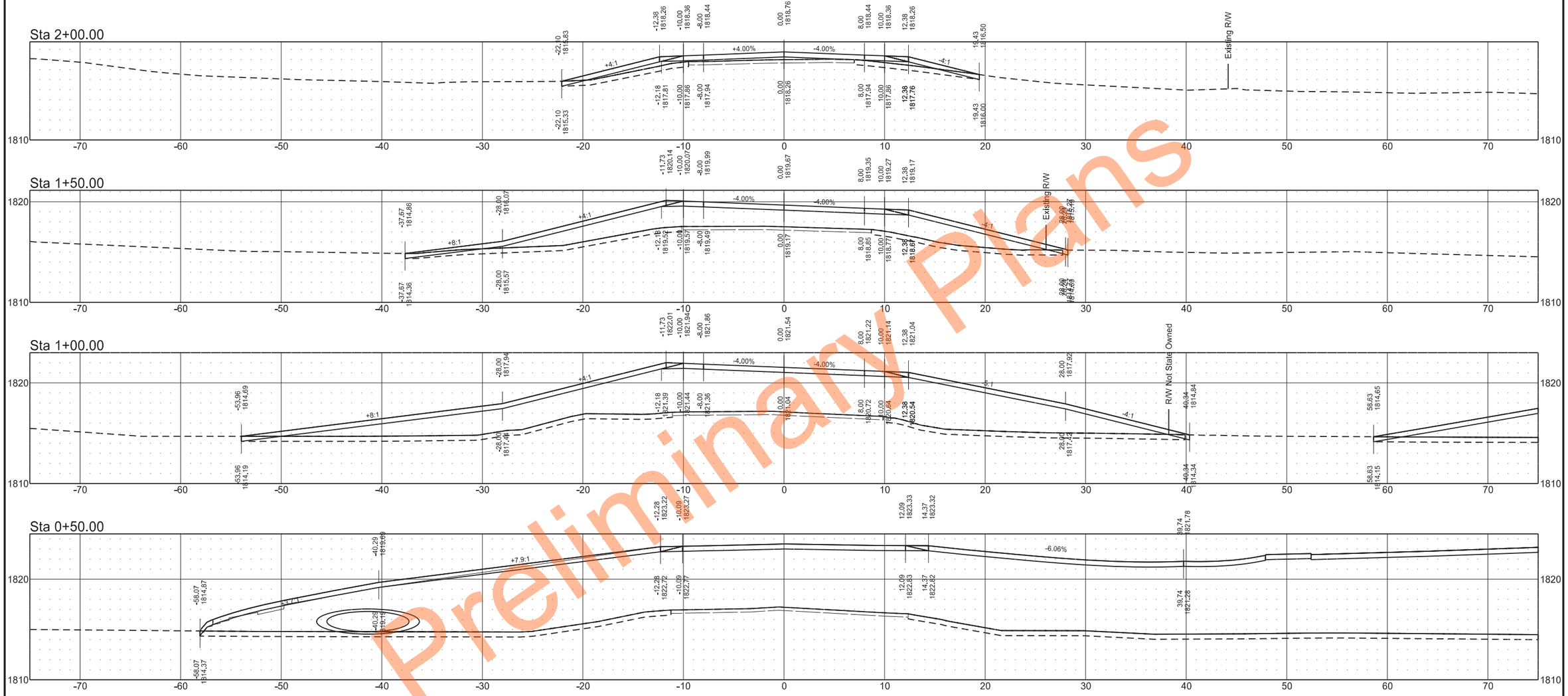

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# I94/Pettibone Interchange
## Cross Sections
## North Frontage Road

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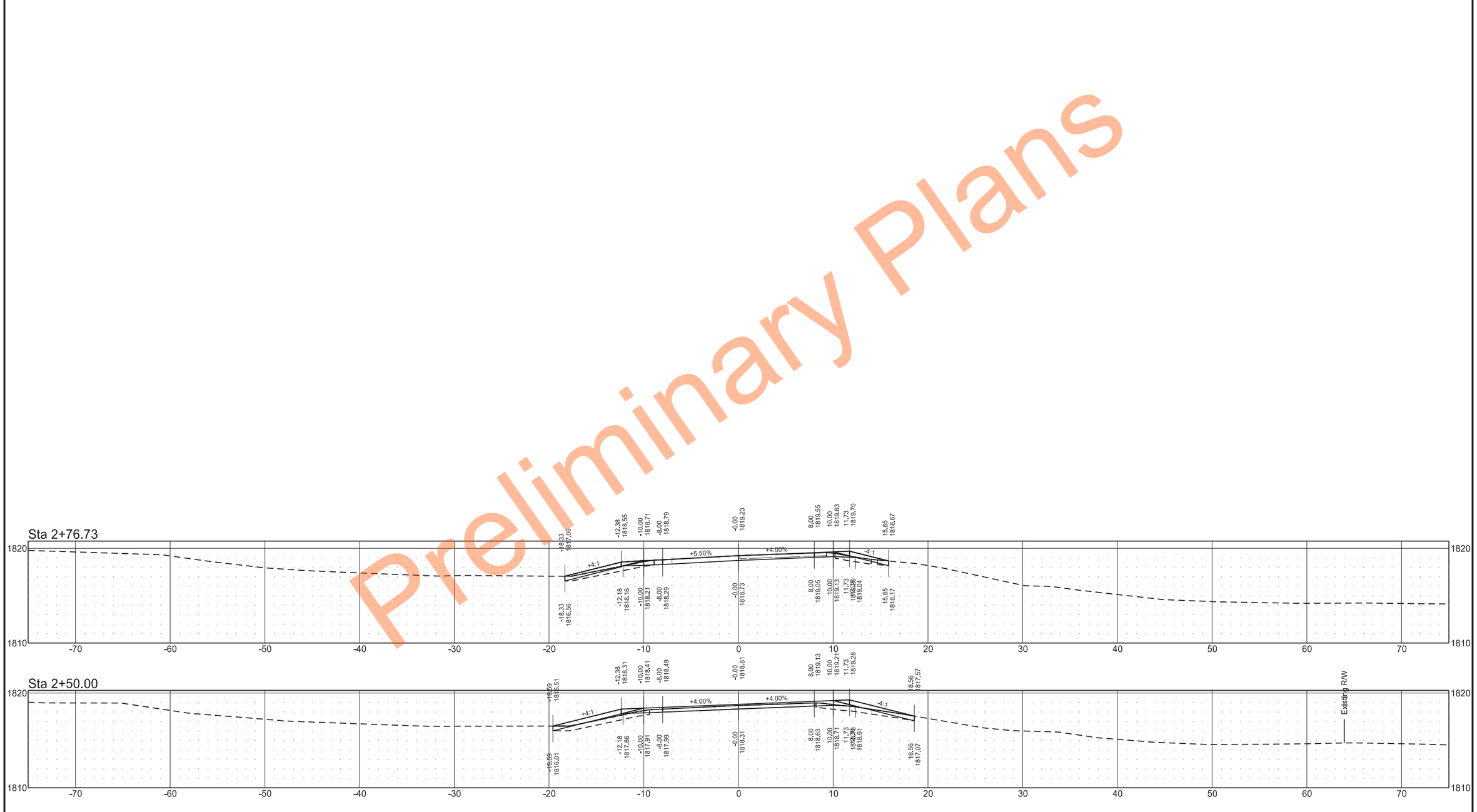



Preliminary Plans

I94/Pettibone Interchange
Cross Sections
North Frontage Road

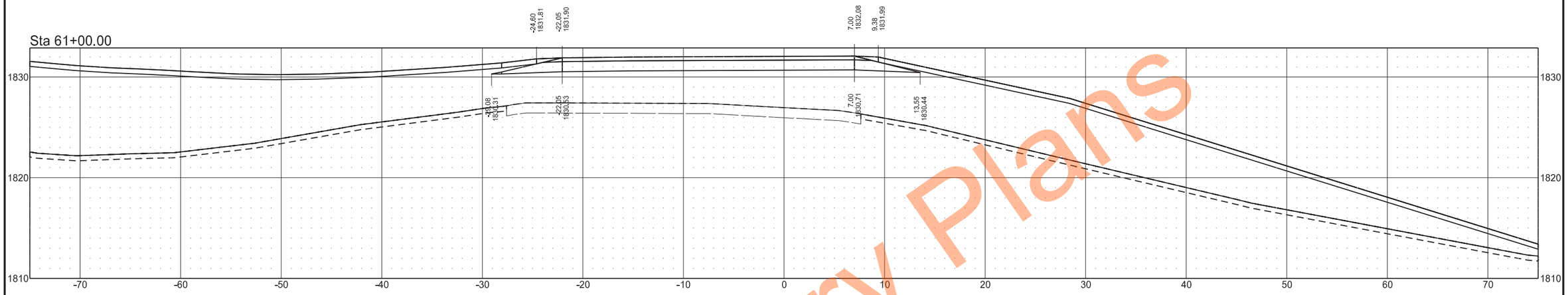
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Preliminary Plans



I94/Pettibone Interchange
Cross Sections
NW Ramp

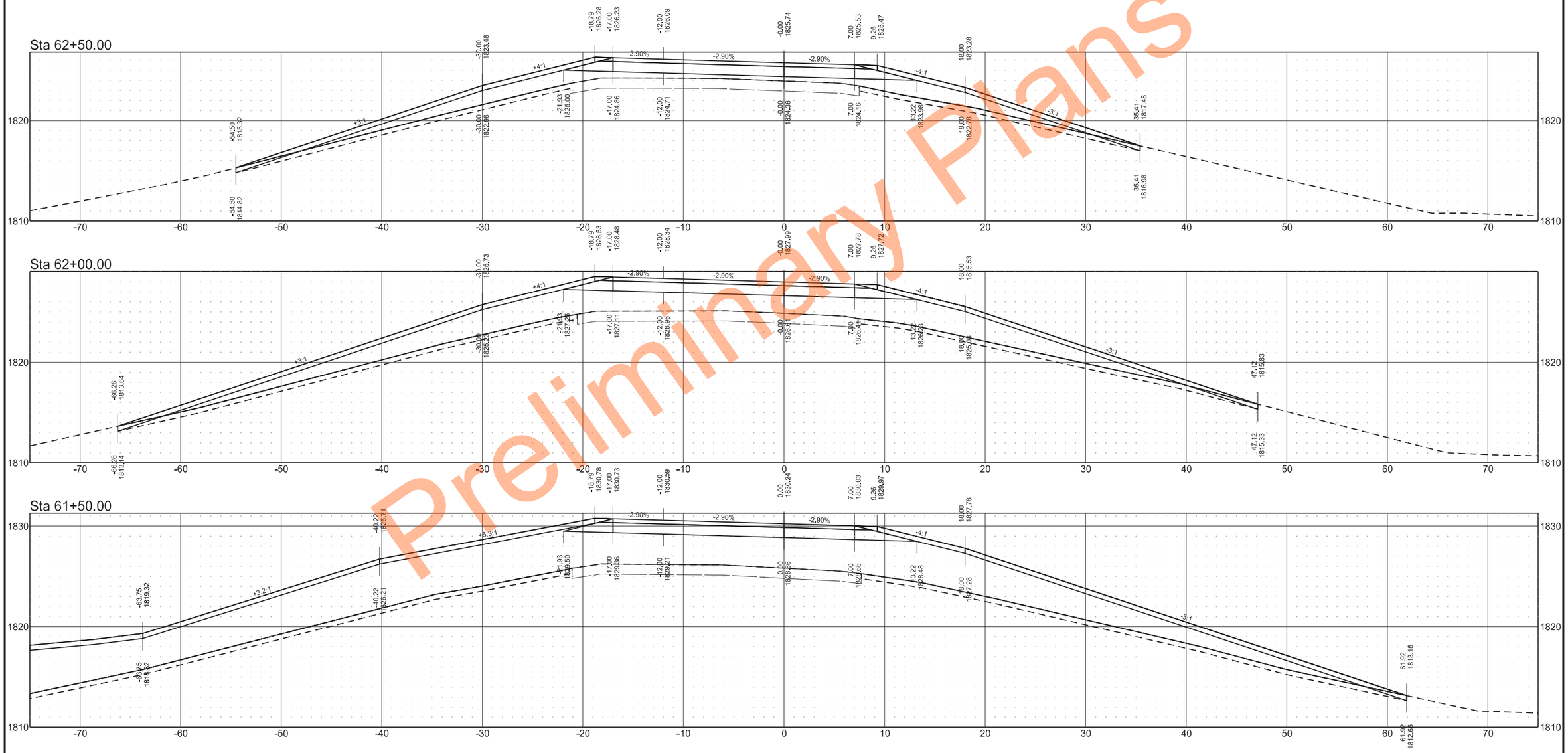
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Preliminary Plans

I94/Pettibone Interchange
Cross Sections
NW Ramp

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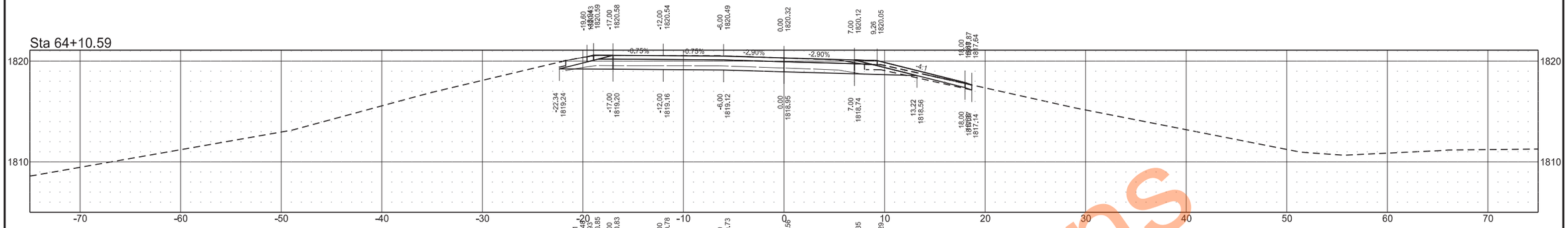



Preliminary Plans

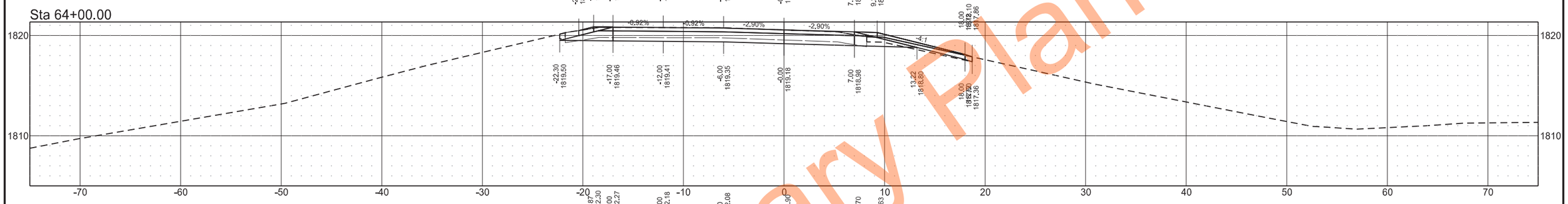
# I94/Pettibone Interchange
## Cross Sections
## NW Ramp

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
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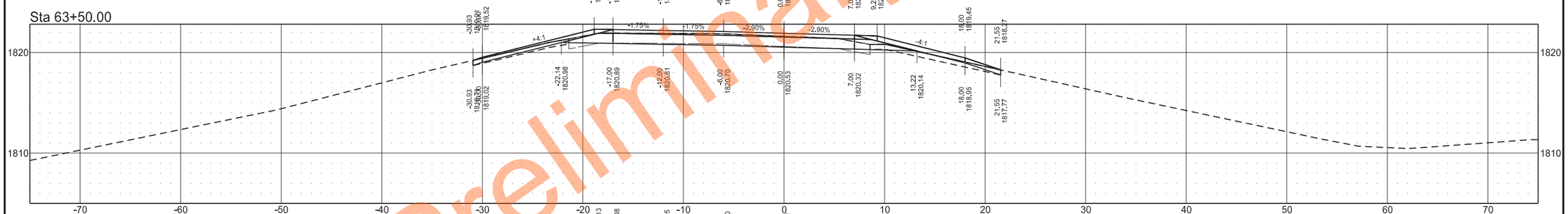
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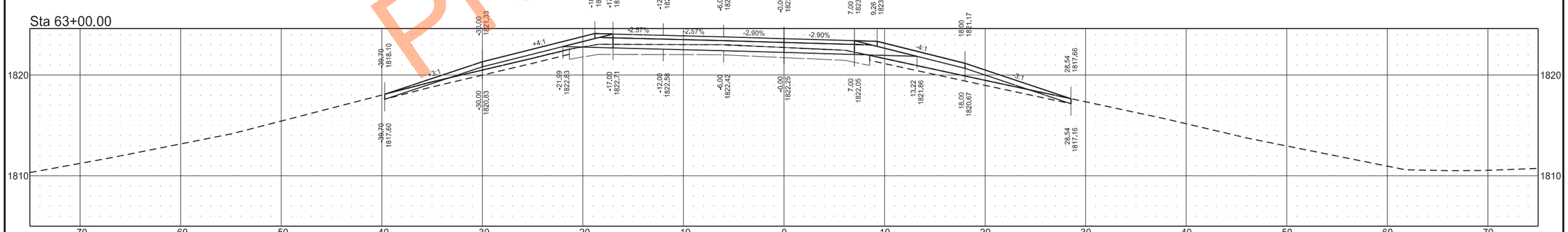

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Sta 63+50.00



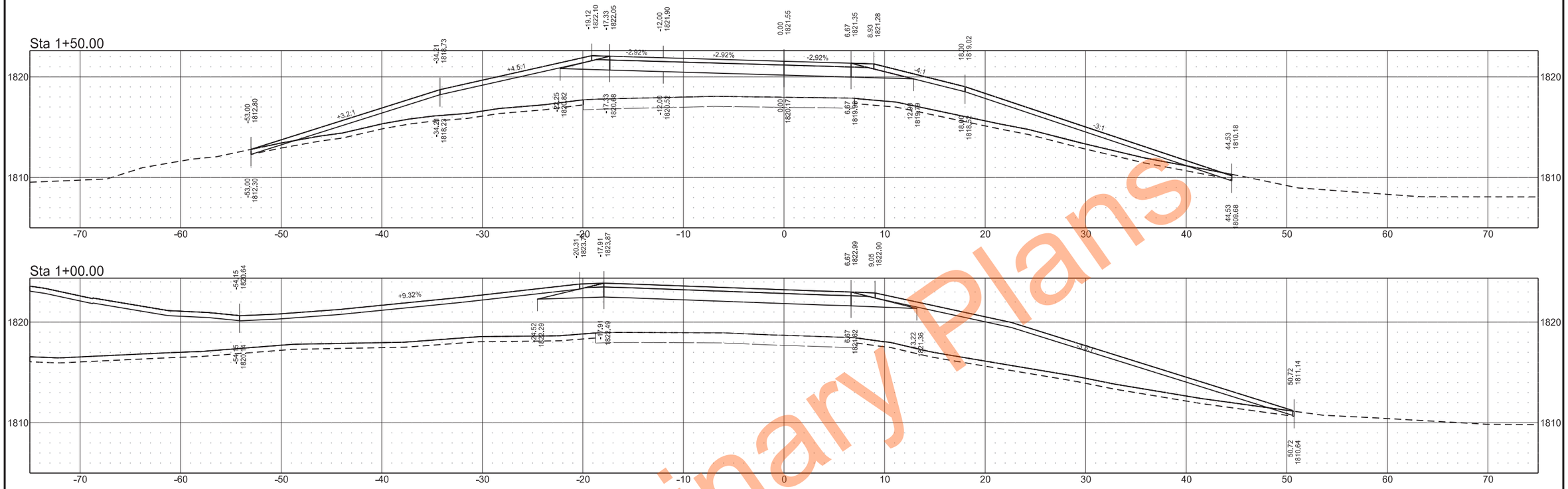

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Preliminary Plans

I94/Pettibone Interchange
Cross Sections
SE Ramp

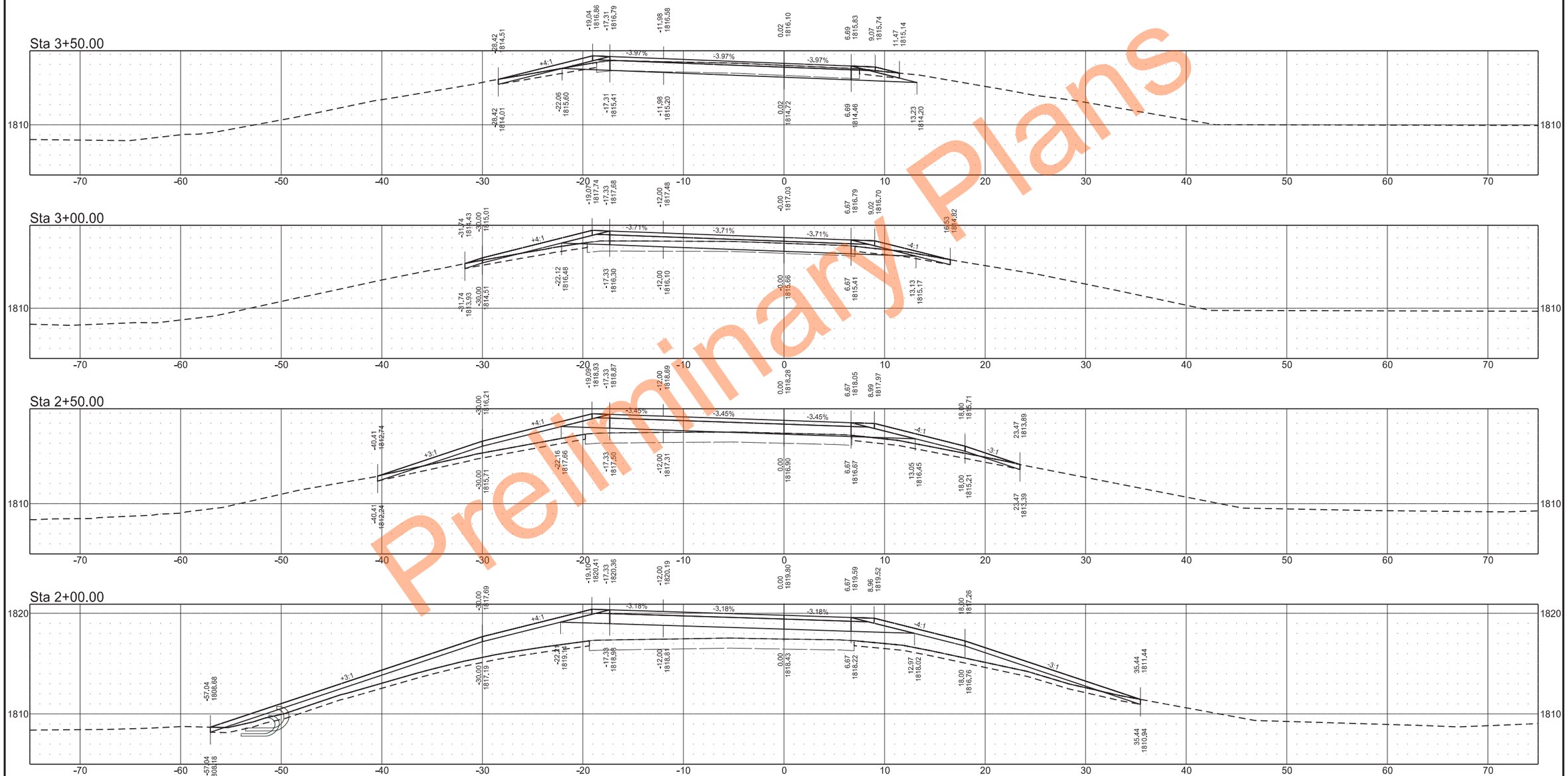
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Preliminary Plans

I94/Pettibone Interchange
Cross Sections
SE Ramp

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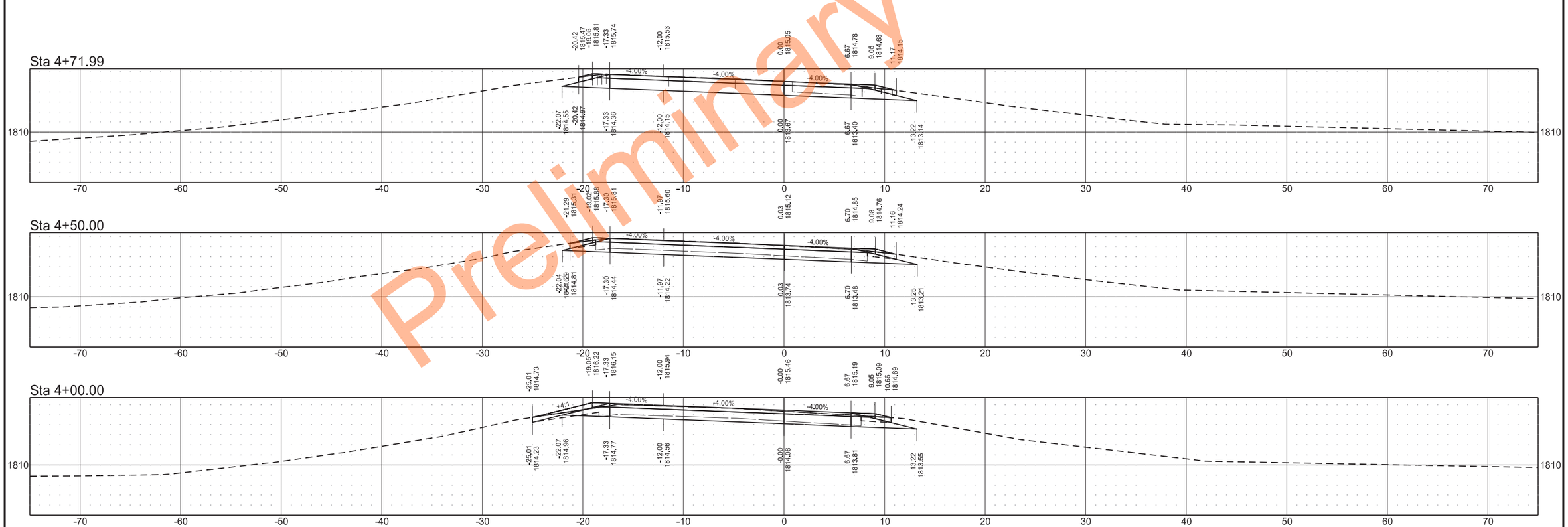



Preliminary Plans

I94/Pettibone Interchange
Cross Sections
SE Ramp

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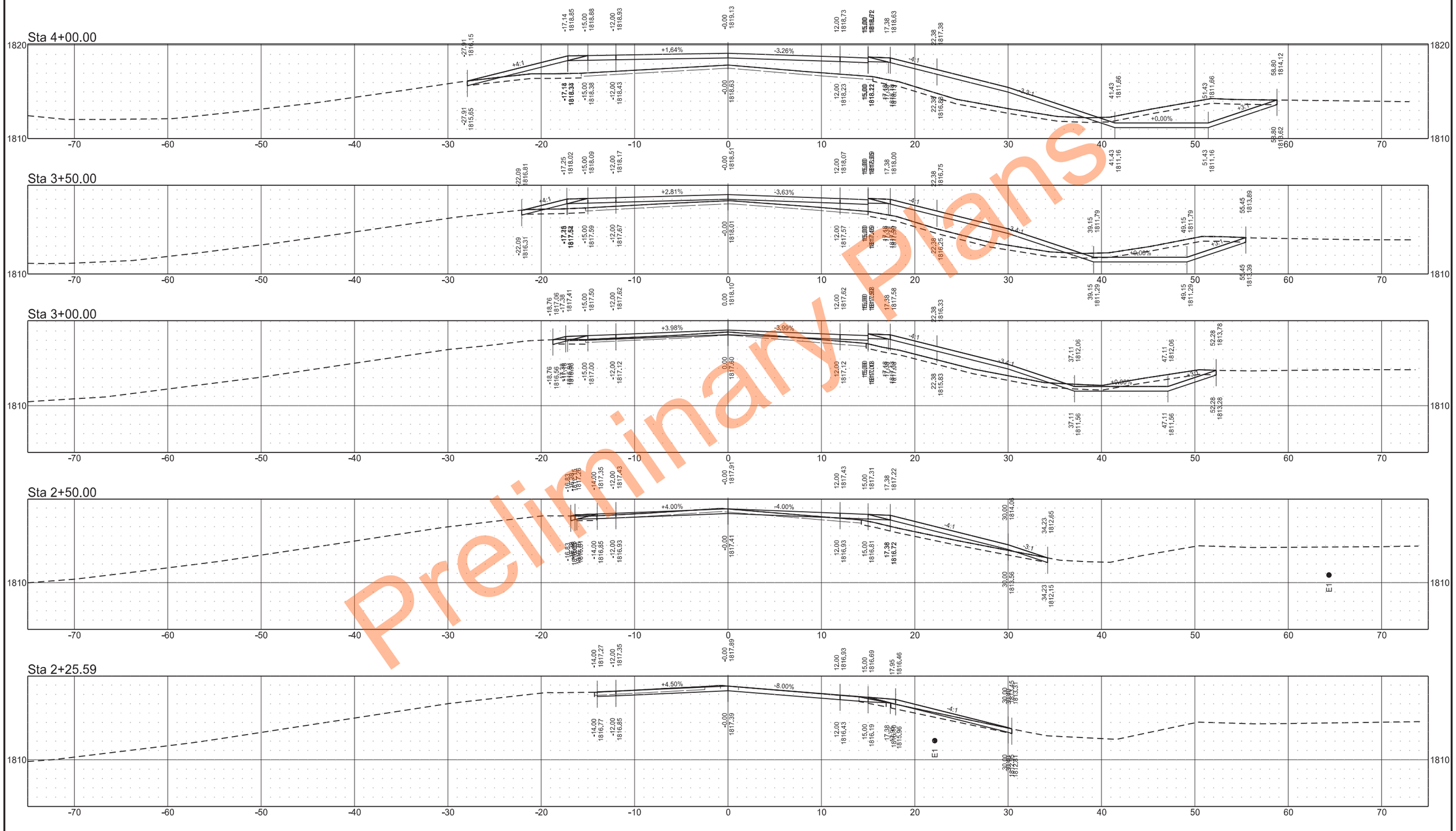
Preliminary Plans




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# I94/Pettibone Interchange
## Cross Sections
## South Frontage Road

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 200 | 17 |




Preliminary Plans

I94/Pettibone Interchange
Cross Sections
South Frontage Road

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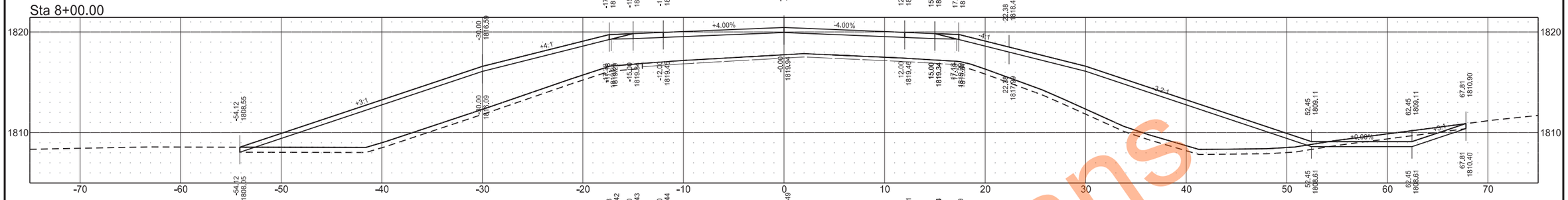



Preliminary Plans

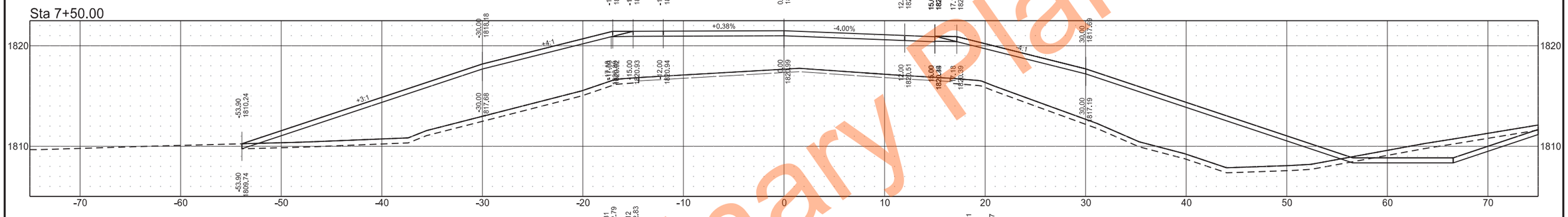
I94/Pettibone Interchange
Cross Sections
South Frontage Road

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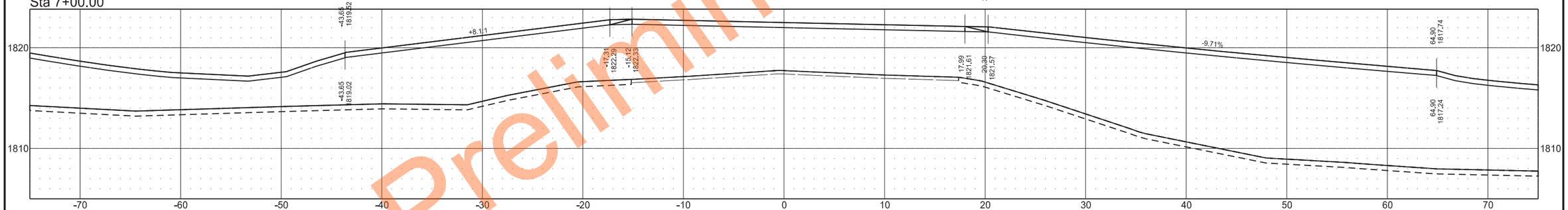
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Sta 7+50.00



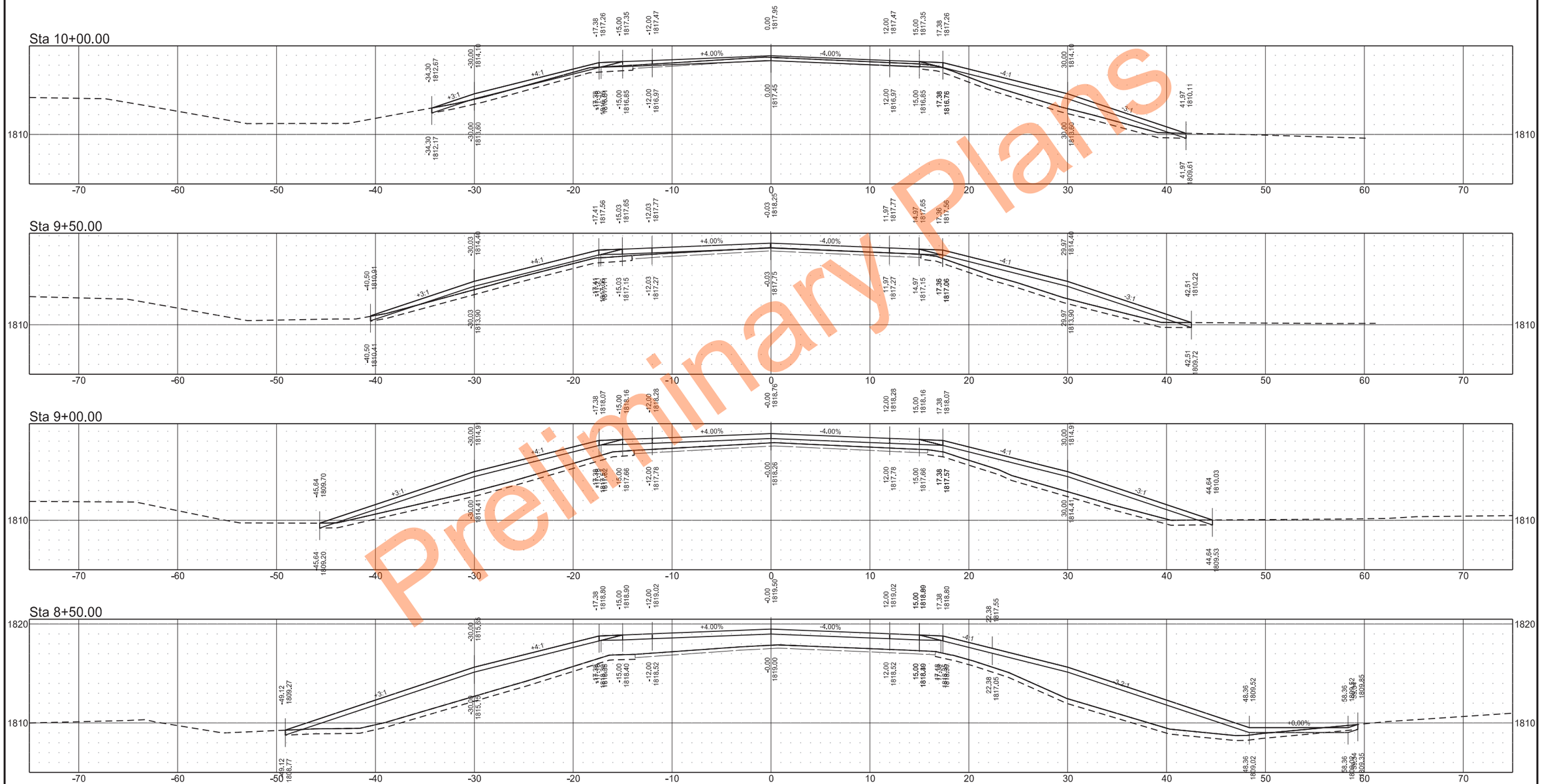

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Preliminary Plans

I94/Pettibone Interchange
Cross Sections
South Frontage Road

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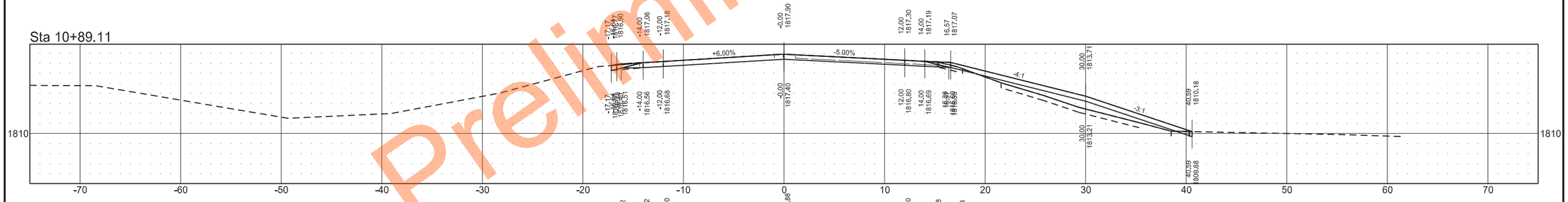

Preliminary Plans

I94/Pettibone Interchange
Cross Sections
South Frontage Road

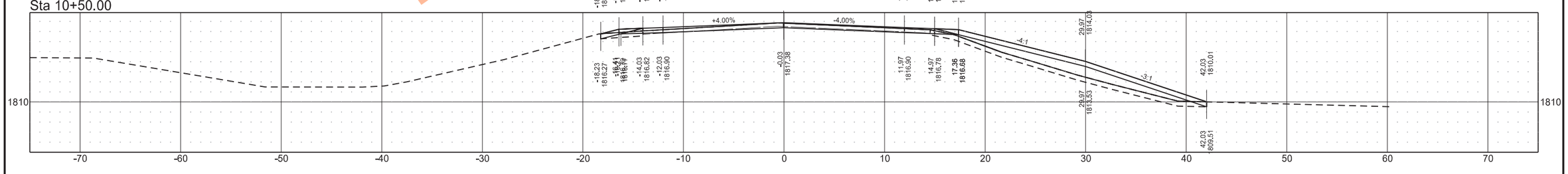
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Preliminary Plans

Sta 10+89.11



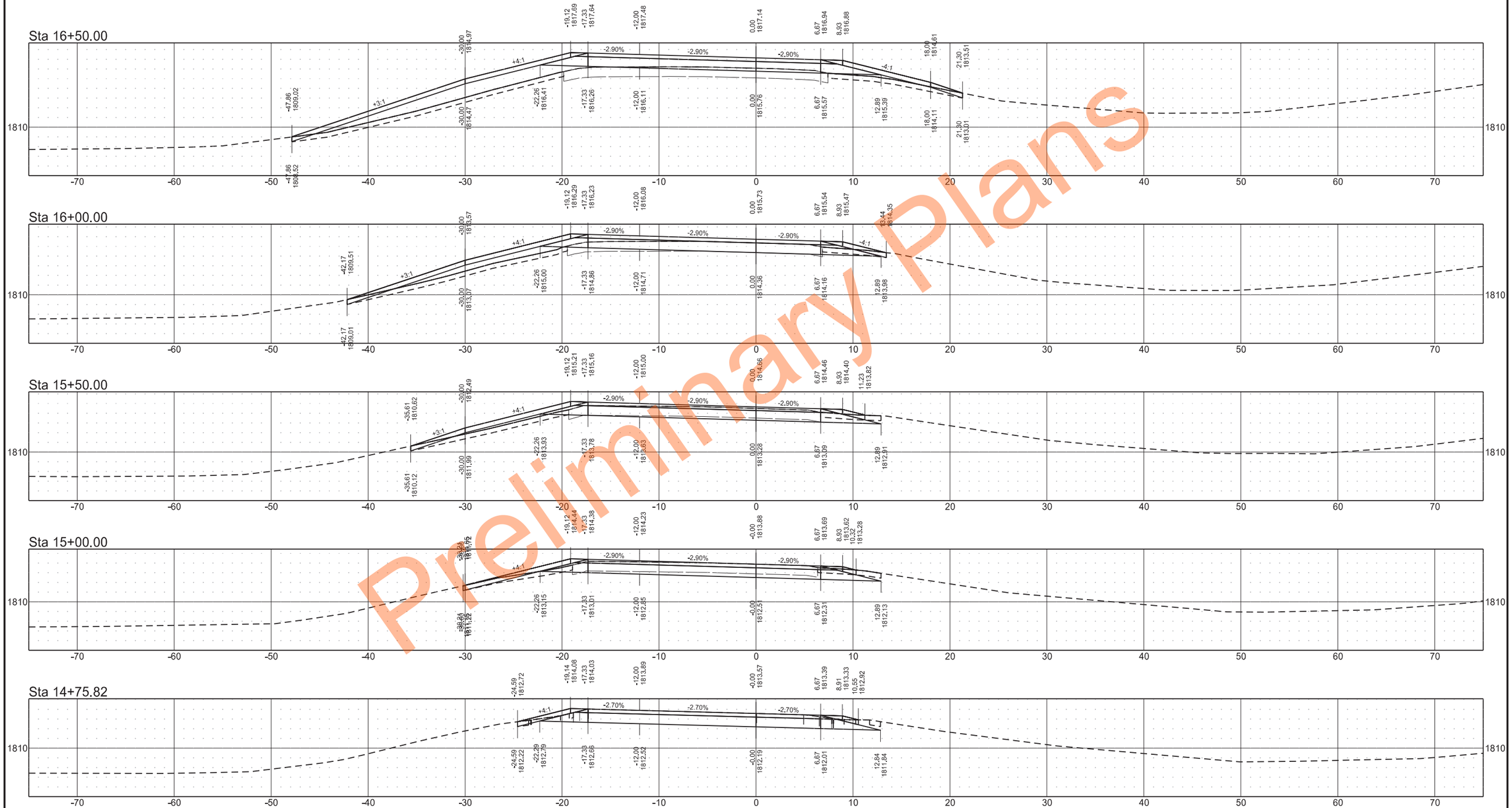

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I94/Pettibone Interchange
Cross Sections
SW Ramp

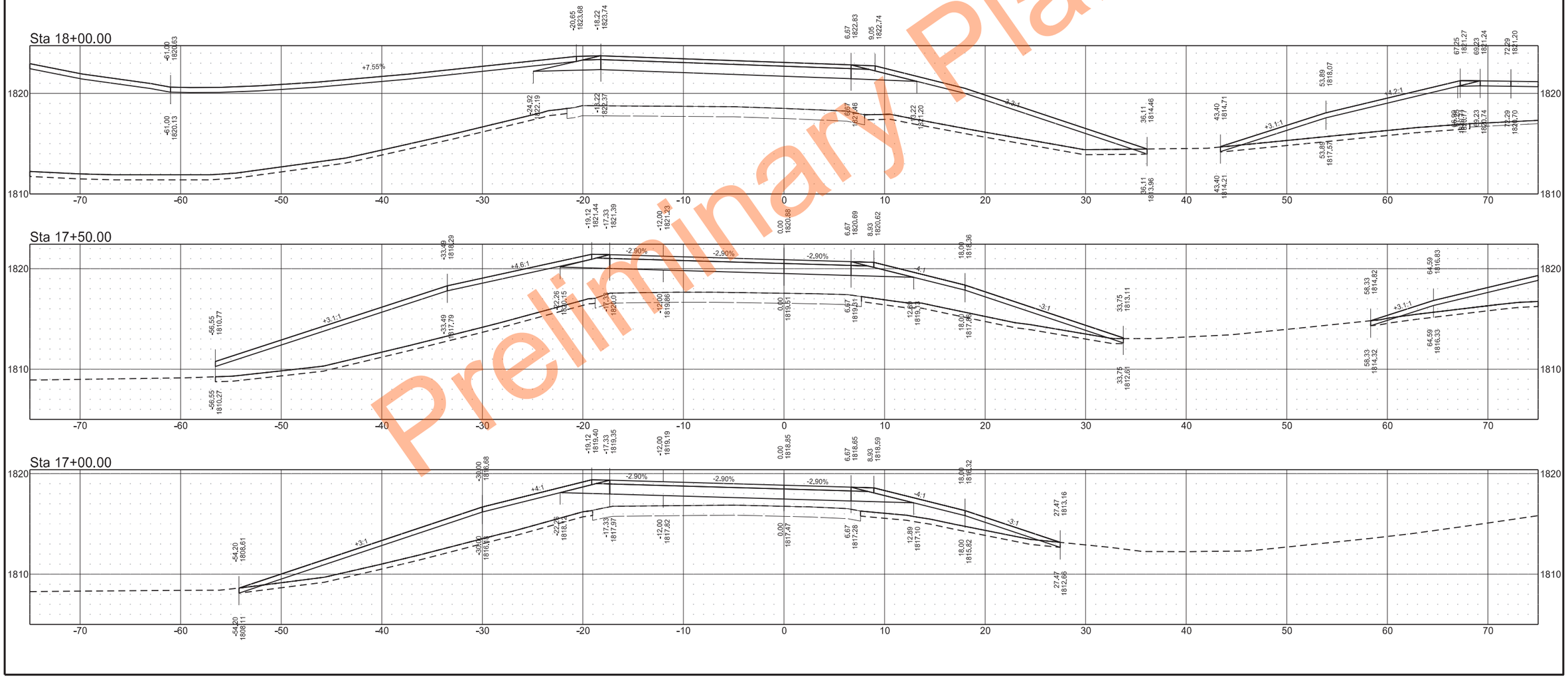
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Preliminary Plans

I94/Pettibone Interchange
Cross Sections
SW Ramp

| | STATE | PROJECT NO. | SECTION NO. | SHEET NO. |
|---|---|---|---|---|
| | ND | IM-2-094(186)217 | 200 | 23 |




Preliminary Plans

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# 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 |
| Adj | adjusted |
| Aggr | aggregate |
| Ahd | ahead |
| ARV | air release valve |
| Align | alignment |
| Al | alley |
| Alt | alternate |
| Alum | aluminum |
| ADA | Americans with Disabilities Act |
| & | 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 |
| Bk | back |
| BF | back face |
| Balc | balcony |
| B Wire | barbed wire |
| Barr | barricade |
| Btry | battery |
| BI | beehive inlet |
| Beg | begin |
| BG | below grade |
| BM | bench mark |
| Bkwy | bikeway |
| Bit | bituminous |
| Blk | block |
| BH | bore hole |
| Bot | bottom |
| Blvd | Boulevard |
| Bndry | boundary |
| Brkwy | breakaway |
| Br | bridge |
| Bldg | building |
| Bus. | business |
| BV | butterfly valve |
| Byp | bypass |
| C Gdrl | cable guardrail |
| Calc | calculate |
| CIP | cast iron pipe |
| CB | catch basin |
| CRS | cationic rapid setting |
| C Gd | cattle guard |
| C To C | center to center |
| CL or ℄ | centerline |
| Ch | chain |
| Chnlk | chain-link |
| Ch Blk | channel block |
| Ch Ch | channel change |
| Chk | check |
| Chsld | chiseled |
| Cir | circle |
| Cl | class |
| Clnt | clean-out |
| Clr | clear |
| Cl&gr | clearing & grubbing |
| 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 |
| Co | County |
| Crse | course |
| Ct | Court |
| Xarm | cross arm |
| Xbuck | cross buck |
| Xsec | cross sections |
| Xing | crossing |
| Xrd | crossroad |
| Crn | crown |
| Culv | culvert |
| C&G | curb & gutter |
| CI | curb inlet |
| CR | curb ramp |
| C | cut |
| Dd Ld | dead load |
| Defl | deflection |
| Defm | deformed |
| 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 |
| Ea | each |
| Esmt | easement |
| E | East |
| EB | Eastbound |
| Elast | elastomeric |
| EL | electric locker |
| E Mtr | electric meter |
| EVSE | electric vehicle supply equipment |
| 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 |
| Evgr | evergreen |
| Exc | excavation |
| Exst | existing |
| Exp | expansion |
| Expy | Expressway |
| E | external of curve |
| Extru | extruded |
| FOS | factor of safety |
| Fed | Federal |
| FP | feed point |
| Fn | fence |
| Fn P | fence post |
| FO | fiber optic |
| FD | field drive |
| F | fill |
| FAA | fine aggregate angularity |
| 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 |
| 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 |

Preliminary Plans

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| 07-01-14 | |
| REVISIONS | |
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# NDDOT ABBREVIATIONS

D-101-2

| | |
|---|---|
| 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 |
| Gov | government |
| Grd | graded/grade |
| Grnd | ground |
| GWM | ground water monitor |
| Gdrl | guardrail |
| Gtr | gutter |
| H Plg | H piling |
| Hdwl | headwall |
| Ht | height |
| Hel | helical |
| HDPE | high density polyethylene |
| HM | high mast |
| HP | high pressure |
| HPS | high pressure sodium |
| HTCG | high tension cable guardrail |
| Hwy | highway |
| Hor | horizontal |
| HBP | hot bituminous pavement |
| HMA | hot mix asphalt |
| Hyd | hydrant |
| Ph | hydrogen ion content |
| Id | identification |
| Incl | inclinometer tube |
| IMH | inlet manhole |
| ID | inside diameter |
| Inst | instrument |
| Intchg | interchange |
| Intmdt | intermediate |
| Intscn | intersection |
| Inv | invert |
| IP | iron pipe |
| Jt | joint |
| Jct | junction |
| Ln | lane |
| Lg | large |
| Lat | latitude |
| Lt | left |
| Lens | lenses |
| Lvl | level |
| Lvlng | leveling |
| Lht | light |
| LP | light pole |
| Ltg | lighting |
| Liq | liquid |
| LL | liquid limit |
| Loc | location |
| Long. | longitude |
| Lp | loop |
| LD | loop detector |
| Lum | luminaire |
| Mb | mailbox |
| ML | main line |
| MH | manhole |
| Mkd | marked |
| Mkr | marker |
| Mkg | marking |
| MA | mast arm |
| Matl | material |
| Max | maximum |
| Meas | measure |
| Mdn | median |
| MD | median drain |
| MC | medium curing |
| MGS | Midwest Guardrail System |
| MM | mile marker |
| MP | mile post |
| Min | minimum |
| Misc | miscellaneous |
| Mon | monument |
| Mnd | mound |
| Mtbl | mountable |
| Mtd | mounted |
| Mtg | mounting |
| Mk | muck |
| Neop | neoprene |
| Ntwk | network |
| N | North |
| NE | Northeast |
| NW | Northwest |
| NB | Northbound |
| No. or # | number |
| Obsc | obscure(d) |
| Ocpd | occupied |
| Ocpy | occupy |
| 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 |
| PSD | passing sight distance |
| Pvmt | pavement |
| Ped | pedestal |
| Ped | pedestrian |
| PPP | pedestrian pushbutton post |
| Pen. | penetration |
| Perf | perforated |
| Per. | perimeter |
| Perm | permanent |
| PL | pipeline |
| Pl | place |
| P&P | plan & profile |
| PL | plastic limit |
| Pl or ℄ | plate |
| Pt | point |
| PE | polyethylene |
| PVC | polyvinyl chloride |
| PCC | Portland Cement concrete |
| PP | power pole |
| Preempt | preemption |
| Prefab | prefabricated |
| Prfmd or Pref | preformed |
| Prep | preperation |
| Press. | pressure |
| PRV | pressure relief valve |
| Prestr | prestressed |
| Pvt | private |
| PD | private drive |
| Prod. | production/produce |
| Prog | programmed |
| Prop. | property |
| Ppsd | proposed |
| PB | pull box |
| Qty | quantity |
| Qtr | quarter |
| Rad or R | radius |
| RR | railroad |
| Rlwy | railway |
| Rsd | raised |
| 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 |
| RCP | reinforced concrete pipe |
| RCPS | reinforced concrete pipe sewer |
| RCTES | reinforced concrete traversable end section |
| Reinf | reinforcement |
| Res | reservation |
| Res | 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 |

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# NDDOT ABBREVIATIONS

D-101-3

| | |
|---|---|
| Salv | salvage(d) |
| San | sanitary sewer line |
| Sec | section |
| SL | section line |
| Sep | separation |
| Seq | sequence |
| Serv | service |
| Sht | sheet |
| Shtng | sheeting |
| Shldr | shoulder |
| Sw or Sdwk | sidewalk |
| SD | sight distance |
| SN | sign number |
| Sig | signal |
| Sgl | single |
| SRCP | slotted reinforced concrete pipe |
| SC | slow curing |
| SS | slow setting |
| Sm | small |
| S | South |
| SE | Southeast |
| SW | Southwest |
| SB | Southbound |
| Sp | spaces |
| Spcl | special |
| SA | special assembly |
| SP | special provisions |
| G | specific gravity |
| Spk | spike |
| SB | split barrel sample |
| SH | sprinkler head |
| SV | sprinkler valve |
| Sq | square |
| Stk | stake |
| Std | standard |
| N | standard penetration test |
| Std Specs | standard specifications |
| 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 |
| SS | supplement specification |
| Supp | supplemental |
| Surf | surfacing |
| Surv | survey |
| Sym | symmetrical |

| | |
|---|---|
| Tel | telephone |
| Tel B | Telephone Booth |
| Tel P | telephone pole |
| Tv | television |
| Temp | temperature |
| Temp | temporary |
| TBM | temporary bench mark |
| T | thinwall tube sample |
| Ts | topsoil |
| Traf | traffic |
| TSCB | traffic signal control box |
| Tr | trail |
| Transf | transformer |
| Trans | transition |
| TT | transmission tower |
| TES | traversable end section |
| Trans | transverse |
| Trtd | treated |
| Trmt | treatment |
| Qc | triaxial compression |
| TERO | tribal employment rights ordinance |
| Tpl | triple |
| Typ | typical |
| Qu | unconfined compressive strength |
| Ugrnd | underground |
| Util | utility |
| VG | valley gutter |
| Vap | vapor |
| Vert | vertical |
| VCP | vitrified clay pipe |
| Vol | volume |
| VSFS | vehicle speed feedback sign |
| 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 |
| Wrng | wearing |
| WIM | weigh in motion |
| W | west |
| WB | westbound |
| Wrng | wiring |
| W/ | with |
| W/o | without |

Preliminary Plans

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# NDDOT ABBREVIATIONS

D-101-4

## MEASUREMENTS

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

## SURVEY DESCRIPTIONS

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

## SOIL TYPES

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

Preliminary Plans

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

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

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# NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

| | |
|---|---|
| 702COM | 702 Communications |
| ACCENT | Accent Communications |
| AGASSIZ WU | Agassiz Water Users District |
| AGC | Associated General Contractors of America |
| ALL PL | Alliance Pipeline |
| ALL SEAS WU | All Seasons Water Users District |
| 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 WRD | Burleigh County Water Resource District |
| CABLE ONE | Cable One |
| CABLE SERV | Cable Services |
| CAP ELEC | Capital Electric Cooperative Incorporated |
| CASS CO ELEC | Cass County Electric Cooperative |
| CASS RWU | Cass Rural Water Users District |
| 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 |
| CENTURYLINK | CenturyLink |
| COE | Corps of Engineers |
| CONS COMM | Consolidated Communications |
| CONS TELCOM | Consolidated Telcom |
| 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 WRD | Dickey County Water Resource District |
| DICKEY TEL | Dickey Telephone |
| DNRR | Dakota Northern Railroad |
| DOME PL | Dome Pipeline Company |
| DVELEC | Dakota Valley Electric Cooperative |
| DVMW | Dakota, Missouri Valley & Western |
| E CENT REG WD | East Central Water District |
| ENBRDG | Enbridge Pipelines Incorporated |
| ENVENTIS | Enventis Telephone |
| EQUINOR | Equinor Pipeline |
| 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 |
| 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 |
| LWR YELL R ELEC | Lower Yellowstone Rural Electric |
| LUMEN | Lumen Technologies Incorporated |
| 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 District |
| MDU | Montana-dakota Utilities |
| MIDCO | MidContinent Communications |
| MIDSTATE TEL | Midstate Telephone Company |
| MINOT CABLE | Minot Cable Television |
| MINOT TEL | Minot Telephone Company |
| MISS VALL COMM | Missouri Valley Communications Incorporated |
| 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 |
| MLGC | Moore & Liberty - Griggs County |
| MUNICIPAL | City Water And Sewer |
| MUNICIPAL | City Of '.....' |
| N CENT ELEC | North Central Electric Cooperative |
| N PRAIR REG WD | North Prairie Regional Water District |
| ND PKS & REC | North Dakota Parks And Recreation |
| ND TEL | North Dakota Telephone Company |
| NDDOT | North Dakota Department of Transportation |
| NE REG WD | Northeast Regional Water District |
| 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 |
| 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 |
| PAAP | Plains All American Pipeline |
| P L E M | Prairielands Energy Marketing |
| POLAR COM | Polar Communications |
| PVT ELEC | Private Electric |
| QWEST | Qwest Communications |
| R&T REG WD | R & T Water District |
| RED RIV COMM | Red River Communications |
| 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 |
| SE W U | Southeast 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 RWD | Stutsman Rural Water District |
| SW PL PRJ | Southwest Pipeline Project |
| SWWA | Southwest Water Authority |
| SUNOCO | Sunoco LP |
| 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 WRD | Traill County Water Resource District |
| UNTD TEL | United Telephone |
| UPPR SOUR WD | Upper Souris Water District |
| 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 |
| WAPA | Western Area Power Administration |
| WAWSA | Western Area Water Supply Authority |
| WEB | W. E. B. Water Development Association |
| WILLI WRD | Williams County Water Resource District |
| WILSTN BAS PL | Williston Basin Interstate Pipeline Company |
| WLSH RWD | Walsh Water Rural Water District |
| WOLVRTN TEL | Wolverton Telephone |
| XLENER | Xcel Energy |
| YSVR | Yellowstone Valley Railroad |

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# 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
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts

## Proposed Topography

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

Preliminary Plans

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

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Kirk J Hoff
12 18 2020

# 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

## Countours

- Depression Contours
- Supplemental Contour

## Profile

- Failure Line
- 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

- Small Hidden Object
- Large Hidden Object
- Phantom Object
- Existing Conditions Object
- Centerline Main
- Centerline Secondary
- Excavation Limits
- Proposed Ground
- 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

Preliminary Plans

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

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# SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

Right of Way Marker (Exst, Ppsd, Reset)

Existing Federal Reference Corner

Existing Section Corner (Full, Quarter, Sixteenth, Meander)

Existing Witness Corner

Existing Control Point (CP, GPS-RTK, TRI)

Existing Traverse PI Aerial Panel

Existing Reference Marker Point NGS

Existing EFB Misc

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

Preliminary Plans

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

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# SYMBOLS

D-101-31

- Flexible Delineator
- Flexible Delineator Type A (Exst, Ppsd)
- Flexible Delineator Type B (Exst, Ppsd)
- Flexible Delineator Type C (Exst, Ppsd)
- Flexible Delineator Type D (Exst, Ppsd)
- Flexible Delineator Type E (Exst, Ppsd)
- Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)
- Delineator Type C (Exst, Ppsd, Diamond Grade)
- Delineator Type D (Exst, Ppsd, Diamond Grade)
- Delineator Type E (Exst, Ppsd, Diamond Grade)
- Barricade (Type I, Type II, Type III}
- Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)
- Attenuation Device
- Truck Mounted Attenuator
- Delineator Drums
- Flagger
- Tubular Marker
- Traffic Cone
- Back to Back Vertical Panel Sign

- Highway Sign (Exst, Ppsd)
- Mile Post Type A (Exst-Ppsd-Reset)
- Mile Post Type B (Exst, Ppsd)
- Mile Post Type C (Exst, Ppsd)
- Object Marker Type I (Exst, Ppsd)
- Object Marker Type II (Exst, Ppsd)
- Object Marker Type III (Exst, Ppsd)
- Existing Reference Marker
- Road Closure Gate 18 Ft (Exst, Ppsd)
- Road Closure Gate 28 Ft (Exst, Ppsd)
- Road Closure Gate 40 Ft (Exst, Ppsd)
- Existing Railroad Battery Box
- Existing RR Profile Spot
- Existing Railroad Crossbuck
- Existing Railroad Frog
- Existing Mailbox (Private, Federal)

Preliminary Plans

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

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# SYMBOLS

D-101-32

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

Preliminary Plans

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

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# SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)

Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)

Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)

Force Main Storm Drain Manhole (Exst, Exst with Valve)

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

Existing Curb Inlet (Round, Square)

Existing Slotted Reinforced Concrete Pipe

Catch Basin (Riser 30 Inch, Beehive, Type A)

Inlet Mountable Curb (Type A, Type B)

Inlet Saddle Base (Type 1, Type 2)

Inlet Special (Catch Basin, Type 1, Type A)

Inlet (Tee, Type 1, Type 2, Type 2 Double)

Median Drain

Headwall (Exst, Ppsd, Ppsd Single with Vegitation Barrier, Ppsd Double with Vegitation Barrier)

Cap or Stub
Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water

Existing Pedestal
Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined

Existing Pipe Vent
Gas, Fuel, Sanitary, Storm Drain, Water, Undefined

Valve
Exst Gas, Exst Water, Ppsd Water, Exst Undefined

Pump
Sanitary, Storm Drain, Exst Water

Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

Preliminary Plans

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

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12 18 2020

# Cross Section Legend

D-101-40

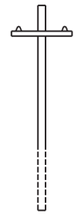
| Description | Longitudinal Parallel to Roadway | Transverse Perpendicular to Roadway* |
|---|---|---|
| Cable Line | CBL1 | CBL2 |
| Conduit Line | CDU1 | CDU2 |
| Electric Line | E1 | E2 |
| Fiber Optic Line | F1 | F2 |
| Gas Main Line | GM1 | GM2 |
| Gas Service Line | GS1 | GS2 |
| Gas Transmission Line | GT1 | GT2 |
| Fuel Pipeline | PL1 | PL2 |
| Sanitary Sewer Force Main | SSF1 | SSF2 |
| Sanitary Sewer | SS1 | SS2 |
| Steam Line | STE1 | STE2 |
| Storm Drain (Assumed Depth) | SD1 | SD2 |
| Telephone Line | T1 | T2 |
| TV Line | TV1 | TV2 |
| Water Main Line | WM1 | WM2 |
| Water Service Line | WS1 | WS2 |

| Description | Longitudinal Parallel to Roadway | Transverse Perpendicular to Roadway* |
|---|---|---|
| Overhead Power Transmission Line | OHT1 | OHT2 |
| Overhead Line | OH1 | OH2 |

Light Standard - Multiple Variations
- Concrete
- Steel
- Wood
- with Traffic Signal



Pole - Multiple Variations
- Utility
- Brace
- Feed Point
- Guy
- Power
- Power Structure
- Power with Light
- Power with Transformer



Manhole - Multiple Variations
- Electric
- Fiber Optic
- Gas
- Inlet
- Sanitary Force Main
- Sanitary
- Sanitary with Valve
- Steam
- Storm
- Storm Force Main
- Storm with Valve
- Telephone
- Water
- Water with Meter
- Water with Valve
- Water with Air Release Valve



Anchor



High Tension Cable Guardrail




* Usually the transverse utilities are shown on a cross section with 2 or more symbols. The utility runs from one symbol to the other, but the connection may not be shown.




Connection to infer that probably will not be displayed

When storm drain invert elevations are NOT used to draw pipe, they will appear as shown to the left. When invert elevations are used to draw pipe, they will be a cross section similar to the graphics shown below.



Preliminary Plans

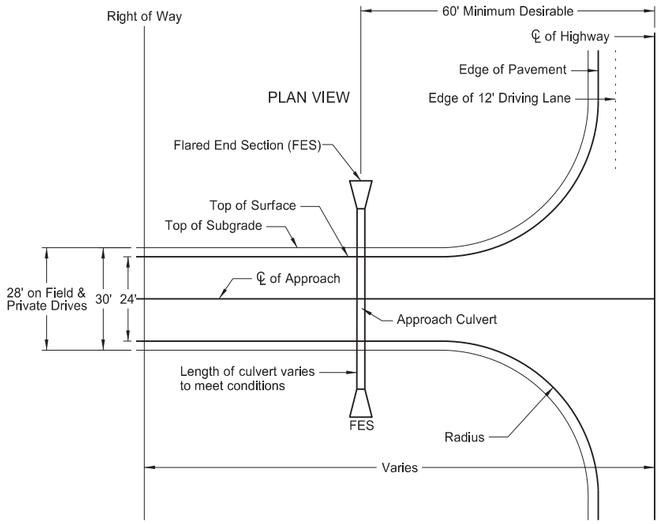
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-20-18 | |
| REVISIONS | |
| DATE | CHANGE |
| 6/14/2023 | CADD Standards Update |

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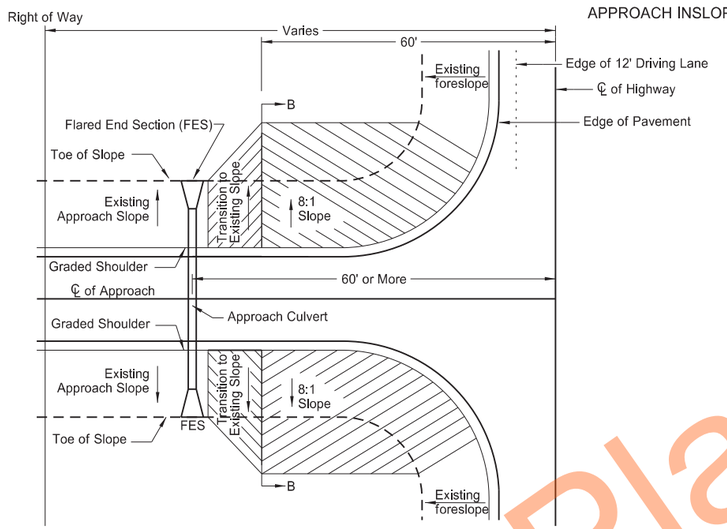
06/14/23

# STANDARD RURAL APPROACHES

D-203-8

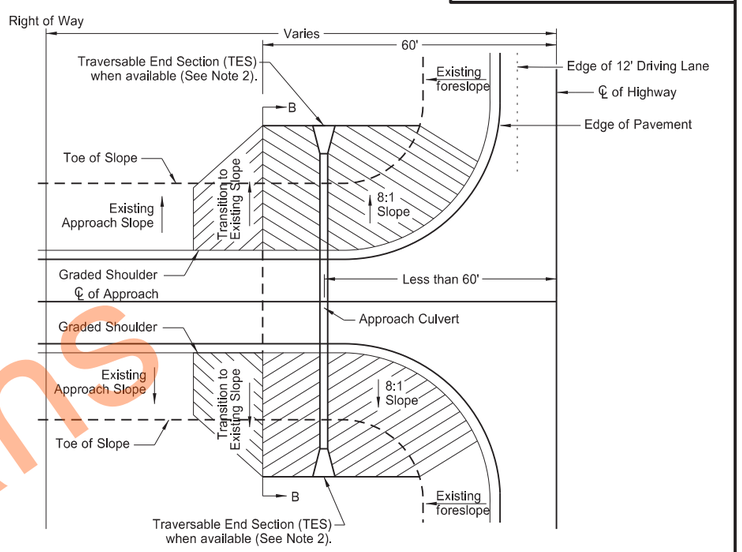



APPROACH INSLOPES




CASE 1

APPROACH PIPE LOCATED
60' OR MORE FROM ℄




CASE 2

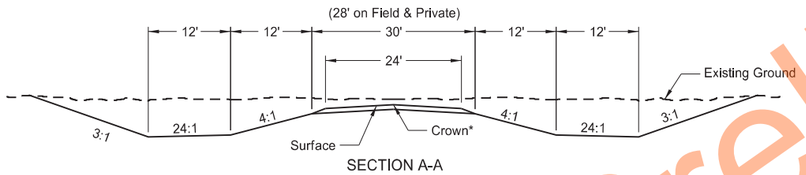
APPROACH PIPE LOCATED
LESS THAN 60' FROM ℄

Approach Pipe Traversable End Sections (TES)

| RCP | CSP | CSP Arch |
|---|---|---|
| 15" | 15" | |
| 18" | 18" | 21"x15" |
| | | 24"x18" |
| 24" | 24" | 28"x20" |

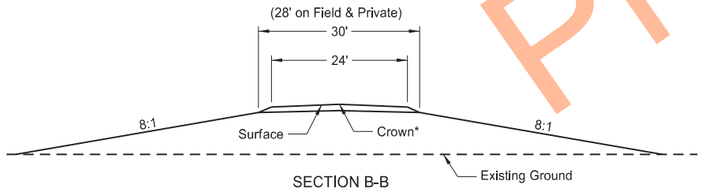
CRITERIA FOR RURAL APPROACH TYPES

| | Field Drives | Private Drives | Low Volume Public Roads |
|---|---|---|---|
| Radius | R=40 ft | R=40 ft | R=50 ft |
| Maximum Grade | 10% | 7% | 7% |
| Storage Platform | 24 ft | 24 ft | 50 ft |
| Vertical Curve Length | 10 ft | 10 ft | Varies (Min. 20 mph) |

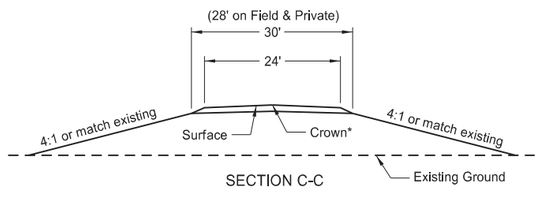



SECTION A-A

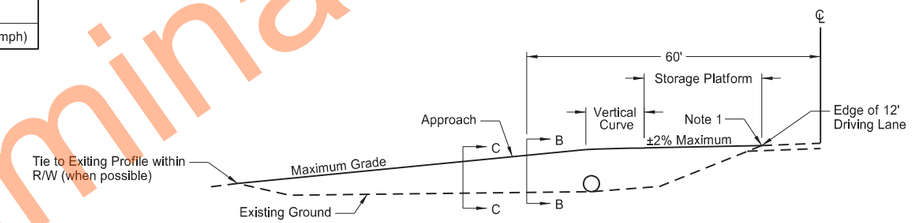
*2.1% crown for paved surface
*3.0% crown for gravel surface



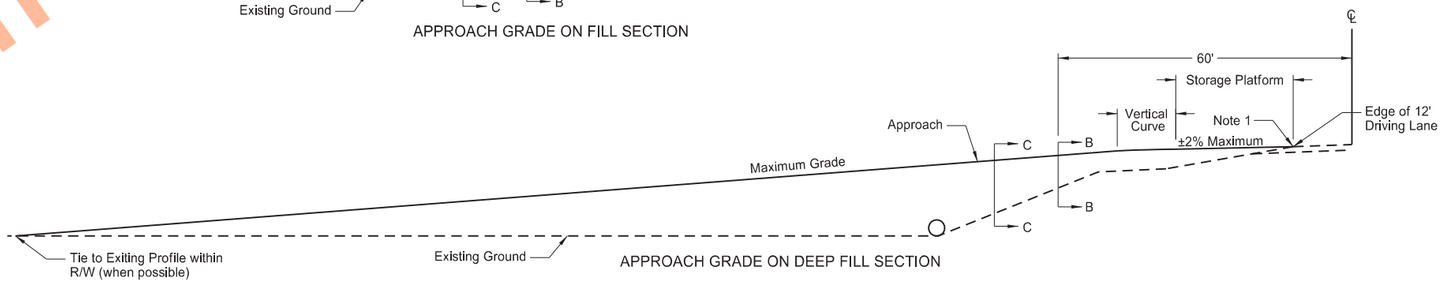

SECTION B-B



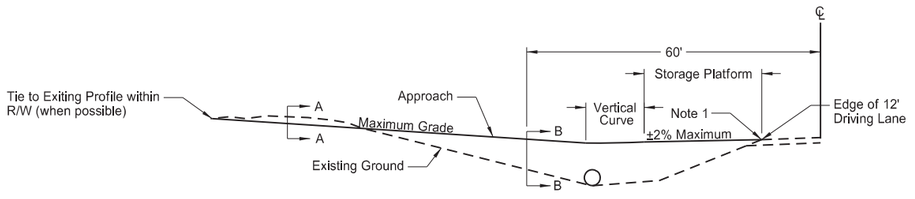

SECTION C-C




APPROACH GRADE ON FILL SECTION




APPROACH GRADE ON DEEP FILL SECTION




APPROACH GRADE ON CUT SECTION

NOTES:

1. 5% Max Rollover between approach storage platform and highway.
2. Approach pipes up to 24" diameter are acceptable (with traversable end sections) for Case 2. Install approach pipes larger than 24" diameter in accordance with Case 1.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 2-25-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-30-17 | Revised Radius, Storage Platform, Inslope dimensions, and Note 1 |
| 10-25-19<br>06-29-22 | Changed "Inslope" to "Foreslope"<br>Added "TES", Table, and Note 2 |

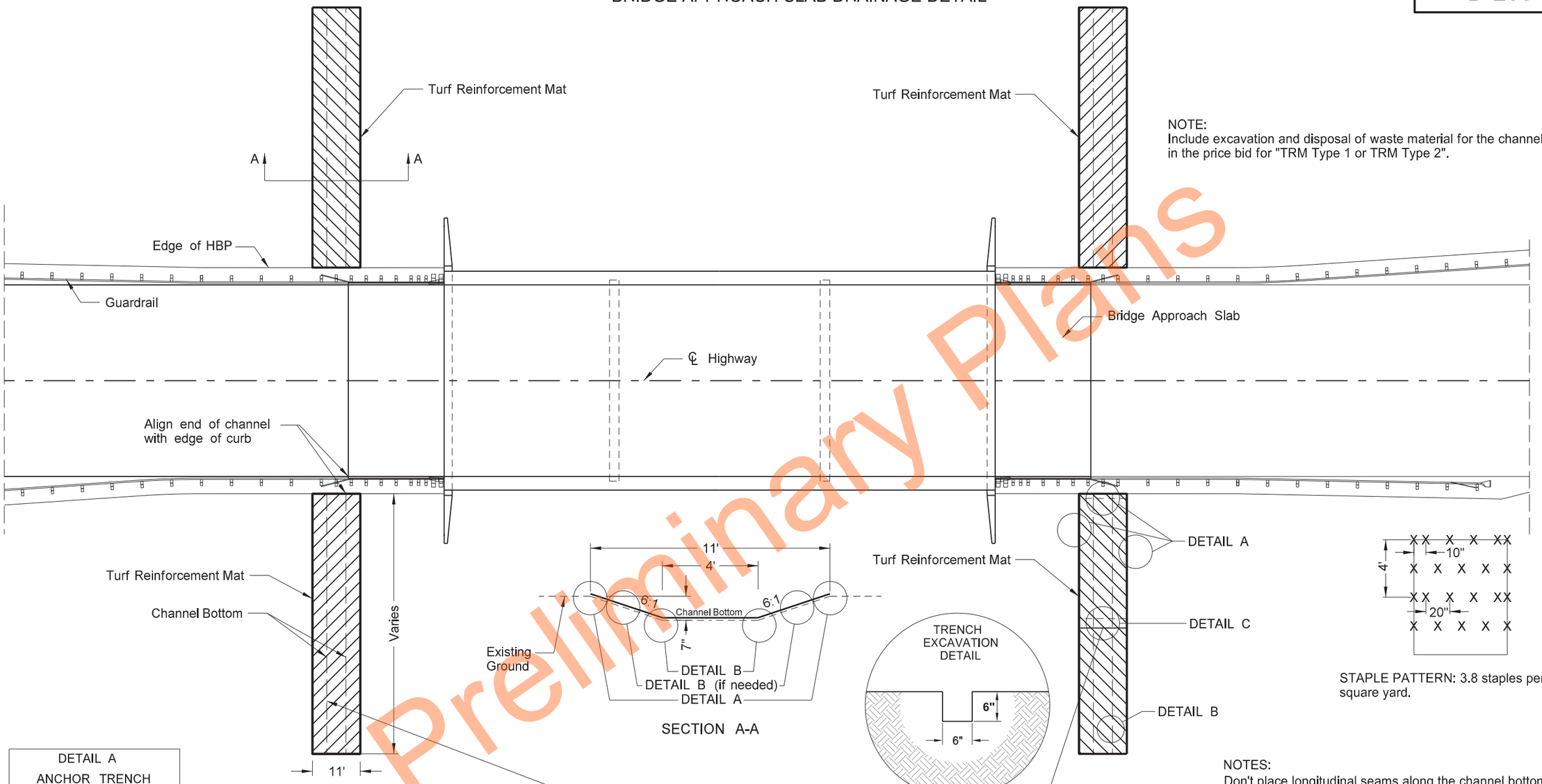
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06/29/22

Preliminary Plans

# BRIDGE APPROACH SLAB DRAINAGE DETAIL

D-255-1

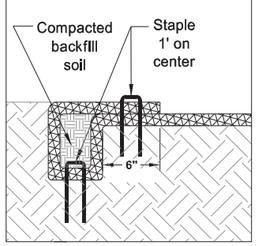


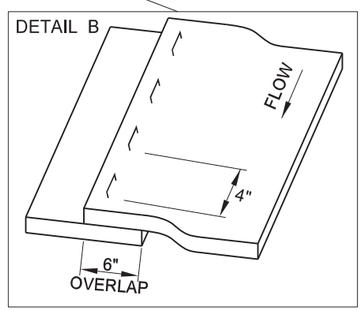

STAPLE PATTERN: 3.8 staples per square yard.

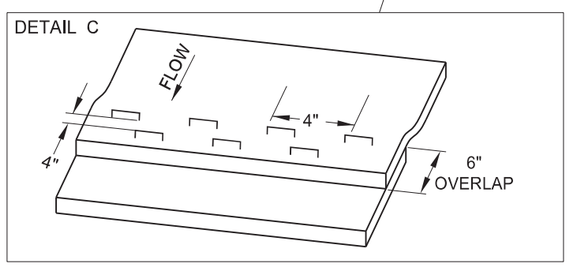
NOTE:
Include excavation and disposal of waste material for the channel in the price bid for "TRM Type 1 or TRM Type 2".

Preliminary Plans

DETAIL A
ANCHOR TRENCH
&
TRM INSTALLATION




NOTES:
Don't place longitudinal seams along the channel bottom.
Top seam must be minimum 0.5' above the channel bottom.

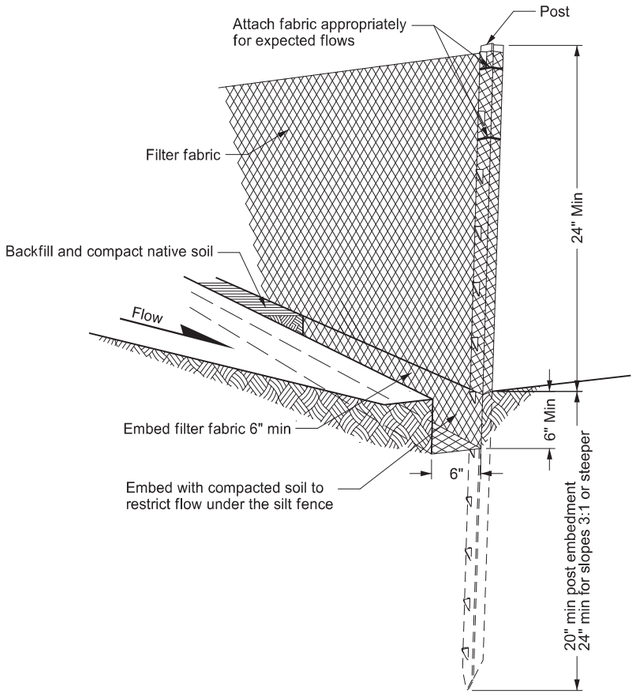
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 11-23-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Changed standard drawing number from D-708-4 to D-255-1. |
| 07-27-15 | Changed installation details. |
| 08-27-19 | New Design Engineer PE Stamp. |

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 08/27/19 and the original document is stored at the North Dakota Department of Transportation

Docusign Envelope ID: B2017174-2071-4D82-BD09-F2B4B86DFDCB

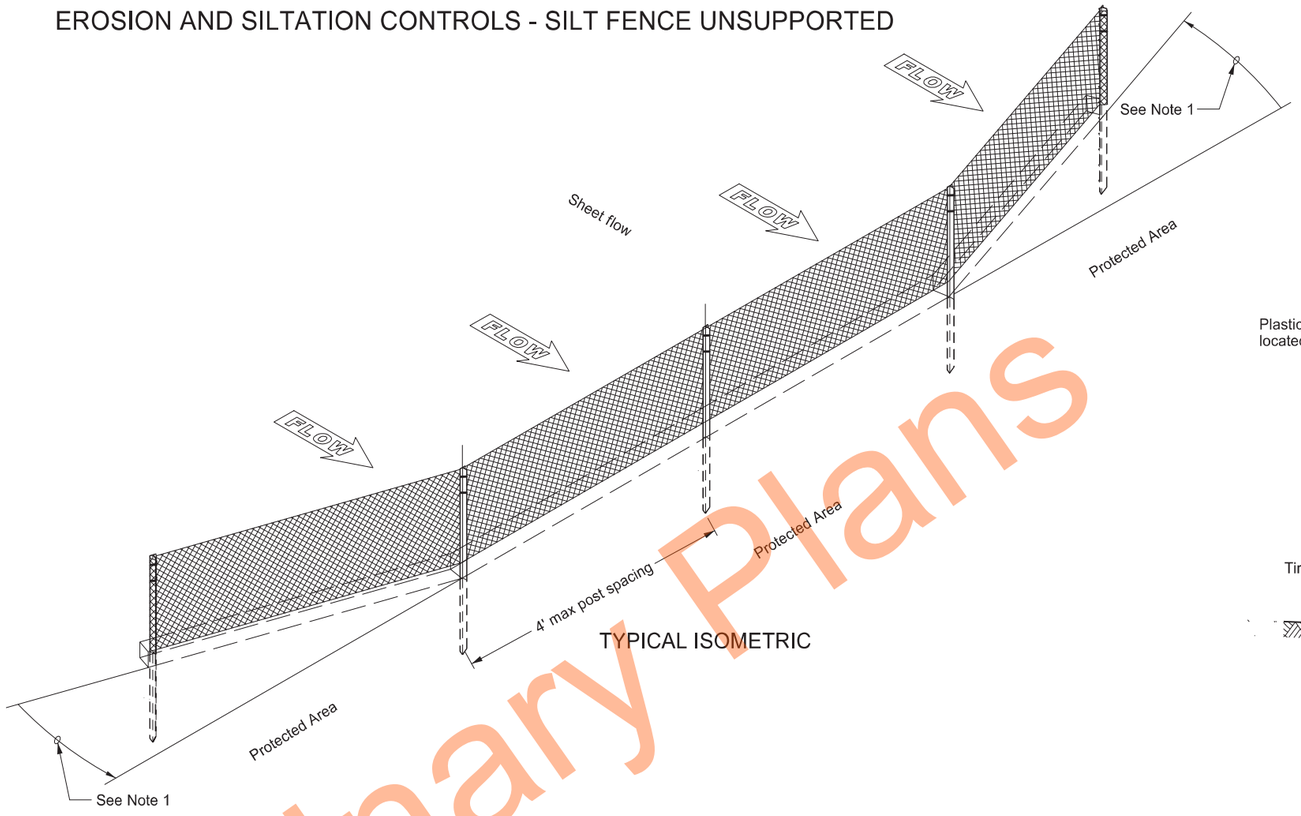
# EROSION AND SILTATION CONTROLS - SILT FENCE UNSUPPORTED

D-260-1

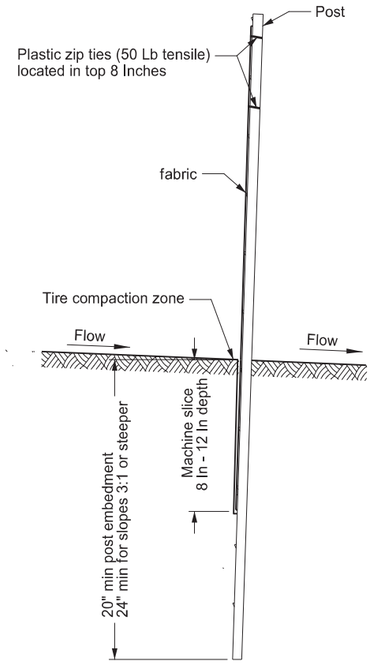



## HAND PLACED INSTALLATION DETAIL

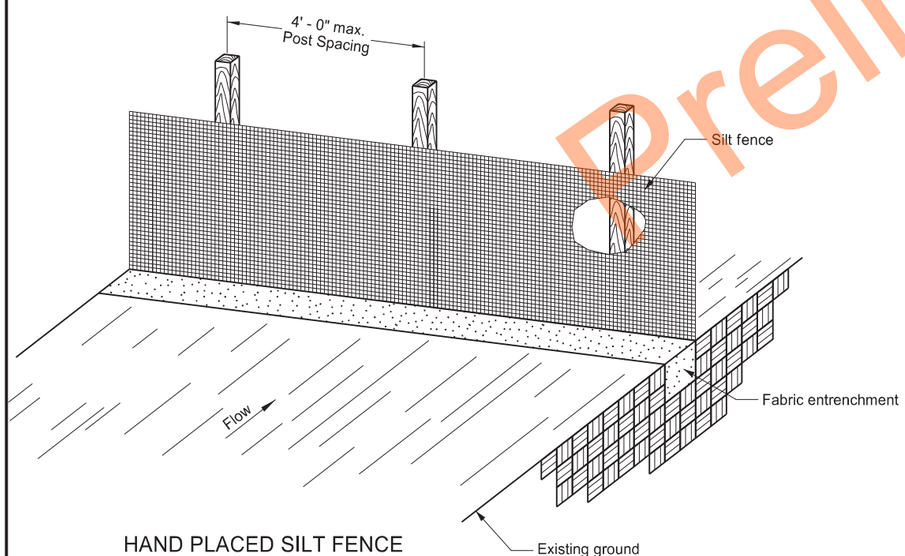
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.




## TYPICAL ISOMETRIC




## MACHINE SLICED INSTALLATION DETAIL




## HAND PLACED SILT FENCE

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. Do not embed silt fence placed in standing water.

| 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. |
| 08-27-19 | New Design Engineer PE Stamp. |
| 07-22-25 | Matched Revised Silt Fence Specs. |

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ENGINEER
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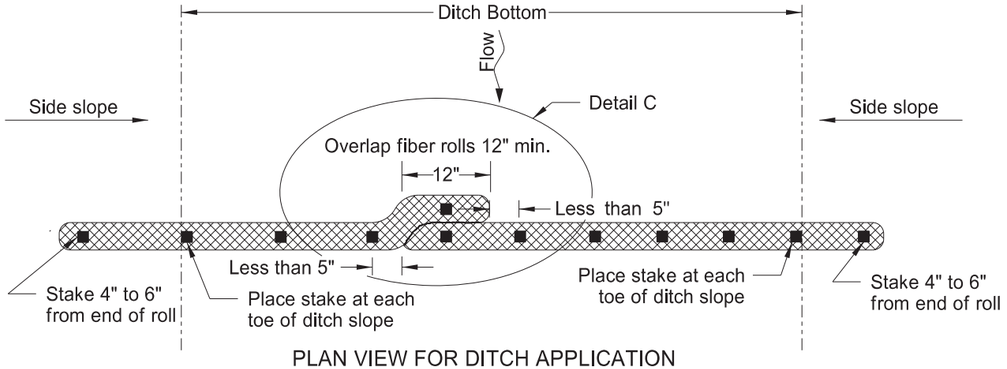
07/22/25

Preliminary Plans

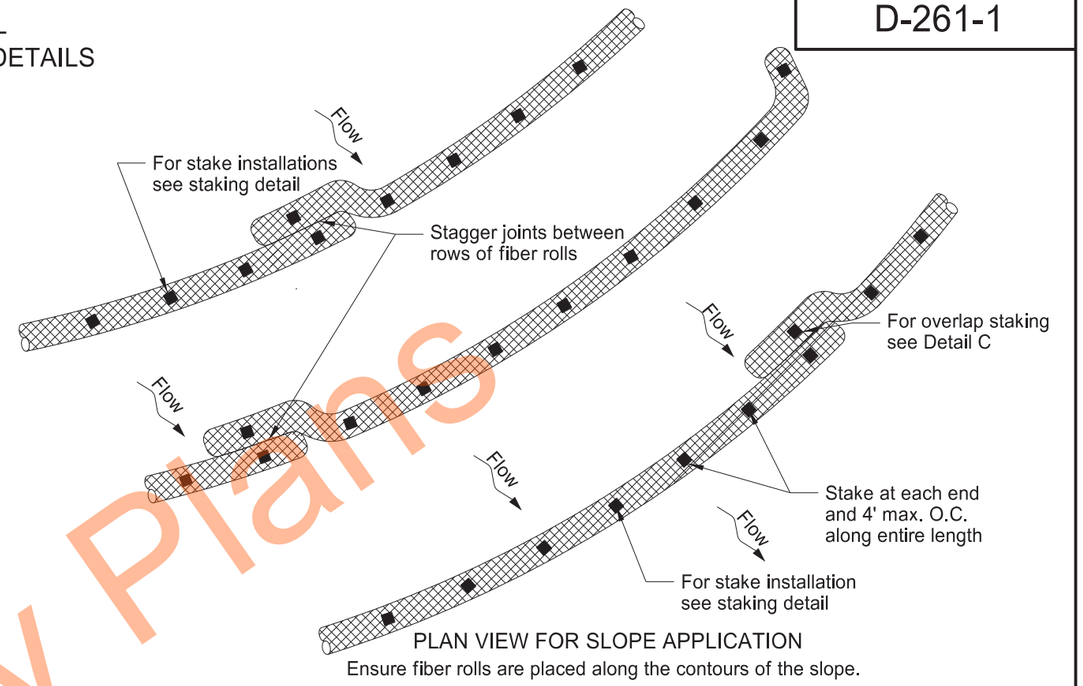
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D-261-1

# EROSION CONTROL
# FIBER ROLL PLACEMENT DETAILS

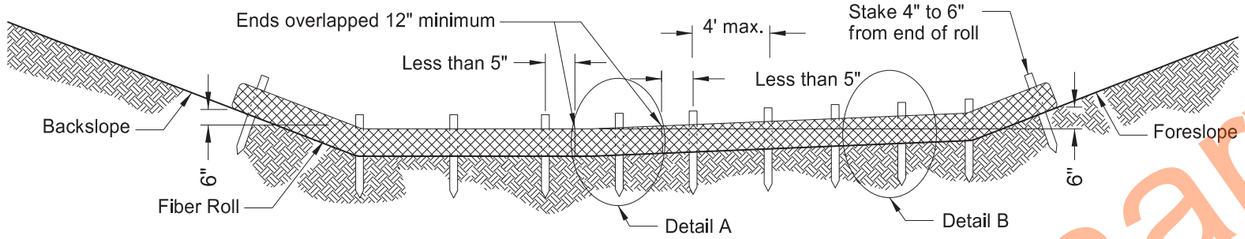



PLAN VIEW FOR DITCH APPLICATION

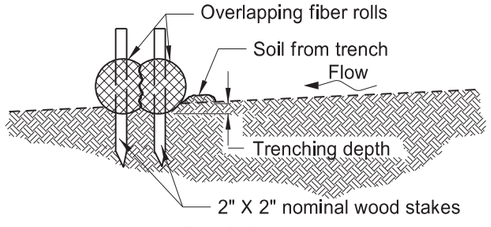



PLAN VIEW FOR SLOPE APPLICATION

Ensure fiber rolls are placed along the contours of the slope.

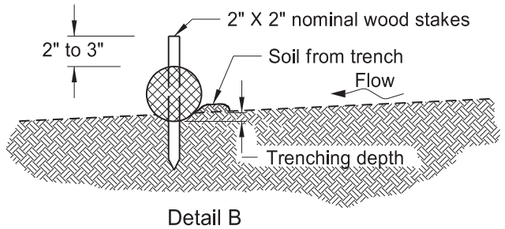



12 OR 20 INCH FIBER ROLL - DITCH BOTTOM




Detail A

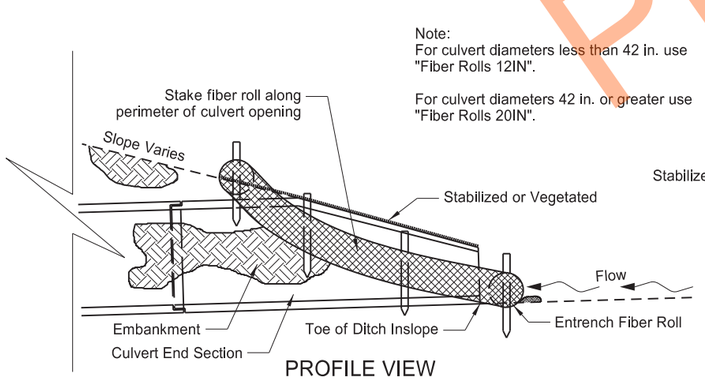
Fiber Roll Overlapping Staking Detail




Detail B

Fiber Roll Staking Detail

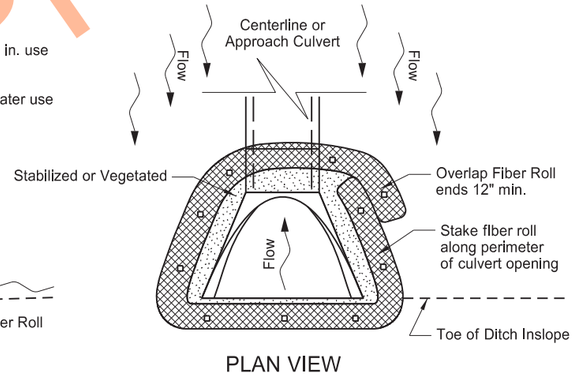
NOTE: Do not allow runoff to run under or around roll.




PROFILE VIEW

Note:
For culvert diameters less than 42 in. use "Fiber Rolls 12IN".

For culvert diameters 42 in. or greater use "Fiber Rolls 20IN".




PLAN VIEW

FIBER ROLL PROTECTION (INLET OF CULVERT)

| FIBER ROLL DIAMETER | NOMINAL STAKE SIZE | MINIMUM STAKE LENGTH | TRENCH DEPTH | |
|---|---|---|---|---|
| | | | MINIMUM | MAXIMUM |
| 6" | 2" x 2" | 18" | 2" | 2" |
| 9" or 12" | 2" x 2" | 24" | 2" | 3" |
| 20" | 2" x 2" | 36" | 3" | 5" |

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. |
| 08-27-19 | New Design Engineer PE Stamp. |
| 04-22-24 | Slope Plan View-overlap change. |
| 03-13-25 | Added D-708-6 Culvert Inlet detail |

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

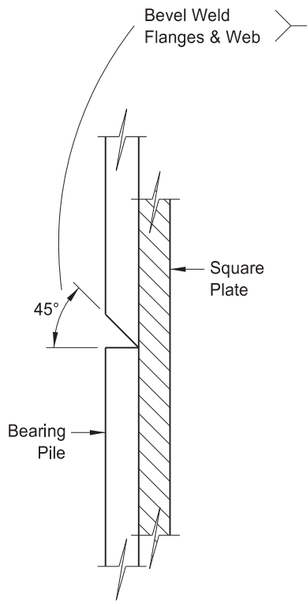
03/13/25

Preliminary Plans

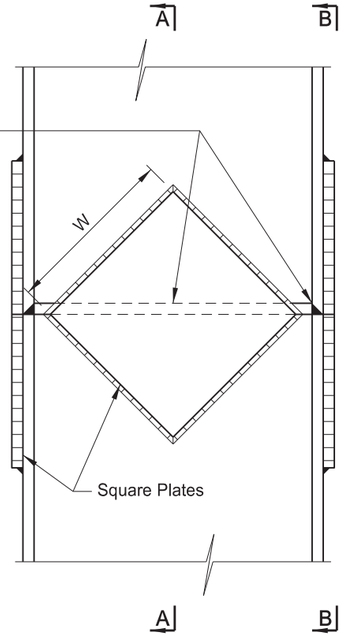
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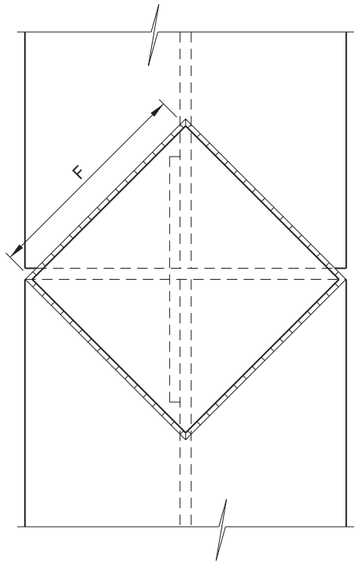
# PILE SPLICE DETAILS

D-622-1

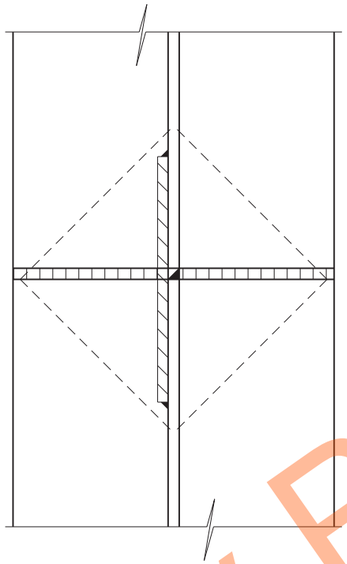



ENLARGED VIEW



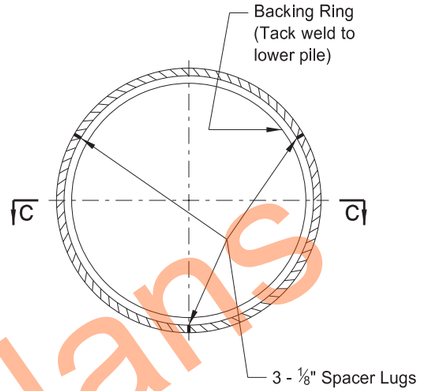




B-B

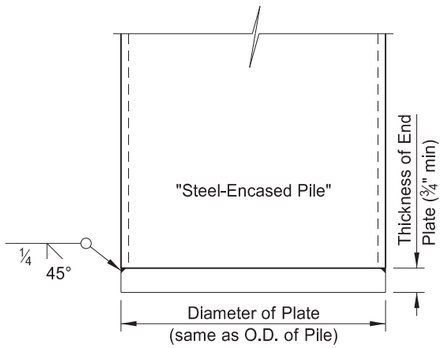


A-A

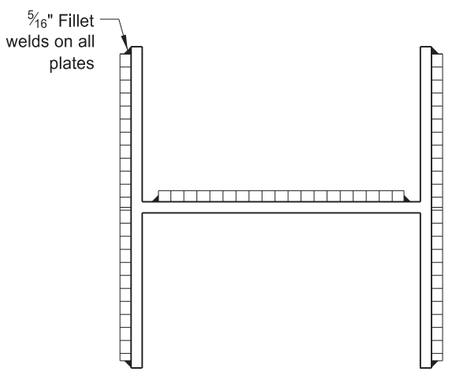
Flame scarf inside of both flanges and one side of web of upper section.




Backing Ring may be made from pile cut-offs or other material of a like quality.

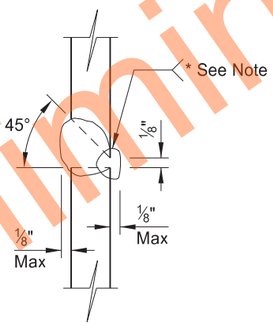



END PLATE DETAIL

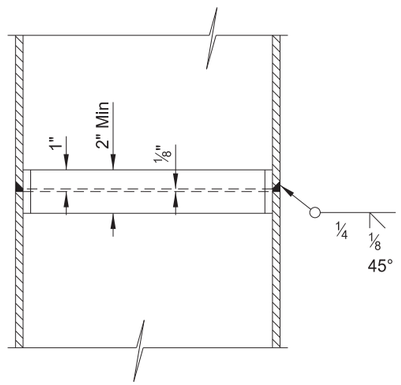



| PILE | 8" | 10" | 12" | 14" |
|---|---|---|---|---|
| "F" FLANGE | 5" | 6½" | 8" | 10" |
| "W" WEB | 4" | 5½" | 6½" | 8" |

H-PILE SPLICE DETAIL

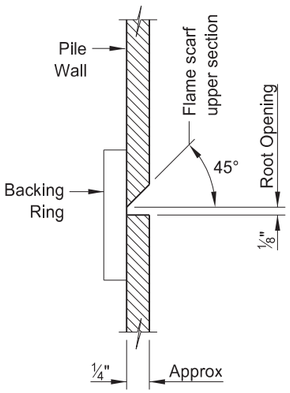



ALTERNATE H-PILE SPLICE DETAIL




C-C

STEEL-ENCASED CONCRETE PILE SPLICE DETAIL




ENLARGED VIEW

## NOTES:

Construct splices in accordance with Section 622. Weld as specified in the latest AASHTO/AWS D 1.5 Bridge Welding Code.

Construct splices in steel H-Piles utilizing complete penetration groove welds in both flanges and the web, or using steel reinforcing plates as shown. If reinforcing plates are used to construct the pile splice, use plates with a minimum thickness equal to the flange thickness of the H-Pile and matching the steel grade of the H-pile.

Use electrodes that meet the requirements of AWS-A5.1, Classification E6010, E6011, or E7018.

* Root gouge to sound metal and weld from the second side if backing material is not used.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 09/14/11 | |
| REVISIONS | |
| DATE | CHANGE |
| 09/03/19<br>02/23/24 | Updated Signature<br>Updated Signature<br>Revised notes & updated to active voice |

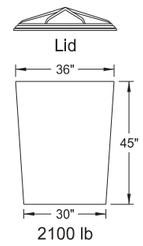
REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE
02/23/24
NORTH DAKOTA

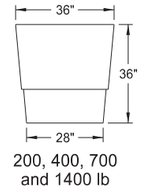
Preliminary Plans

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# ATTENUATION DEVICE

D-704-1

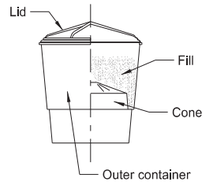



Outer Containers

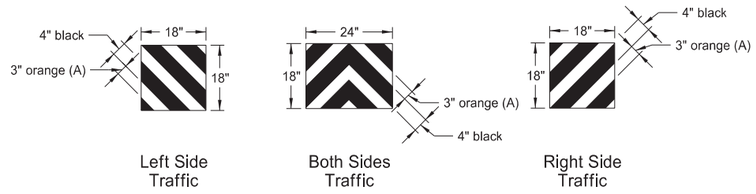



Cones




Typical Assembly

Typical Module
Construction Detail

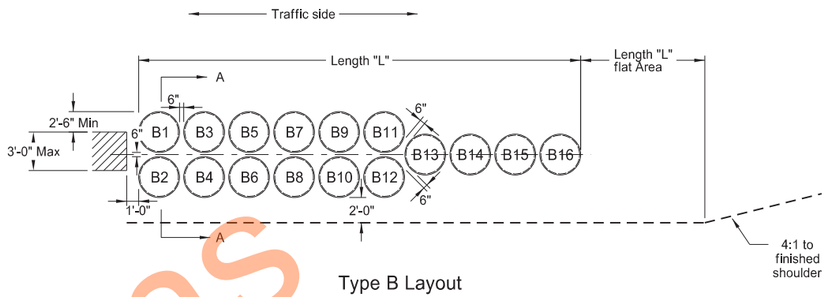



Left Side Traffic | Both Sides Traffic | Right Side Traffic

Reflective Sheet Detail

Note:
Apply Type IV reflective sheeting (as specified in the NDDOT Standard Specifications) directly to the outer container of the last attenuation device facing traffic, following the details above. Or apply the sheet to a metallic sheet and attach it to the container with approved fasteners.

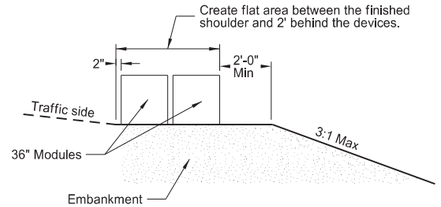
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.




Type B Layout

Note:
Angle attenuation devices 10 degrees towards traffic when placed at piers offset from roadway.

| Fill Chart | | | | | |
|---|---|---|---|---|---|
| | Module Weights (LBS) | | | | |
| | 200 | 400 | 700 | 1400 | 2100 |
| Distance from top edge | 8½" | 5" | 4" | 3" | 0" |




Section A-A
(Type B Layout)

| Type B Attenuation Device | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Module Number | Dash Number | | | | | | | | | | | |
| | 80 | 75 | 70 | 65 | 60 | 55 | 50 | 45 | 40 | 35 | 30 | 25 |
| | Module Weights (LBS) | | | | | | | | | | | |
| B1 | 2100 | 2100 | | | | | | | | | | |
| B2 | 2100 | 2100 | | | | | | | | | | |
| B3 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | | |
| B4 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | 2100 | | |
| B5 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 |
| B6 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 |
| B7 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 |
| B8 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 | 1400 |
| B9 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 |
| B10 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 |
| B11 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 |
| B12 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 |
| B13 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 | 700 |
| B14 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| B15 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| B16 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Length (L) | 34.2' | 34.2' | 30.7' | 30.7' | 30.7' | 30.7' | 30.7' | 30.7' | 30.7' | 30.7' | 27.2' | 27.2' |
| Module Weights (LBS) | Replacement Module | | | | | | | | | | | |
| 2100 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| 1400 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 700 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 400 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 200 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

Notes:

1. Materials
   A) Use modules manufactured from frangible polyethylene material which shatters upon impact.
   B) Fill modules with class 43 aggregate meeting NDDOT Standard Specifications aggregate requirements. Use fill with a unit weight of at least 100 pounds per cubic foot. Use fill with a moisture content of 2% or less when left over winter.

2. Modules
   Provide modules in two sizes containing volumes of either 2, 4, 7, 14, or 21 cubic feet minimum.
   A) Provide three components for 2, 4, or 7 cubic foot module containers:
      1) A 14 C.F., yellow outer container.
      2) A black lid securely locking over the top lip of the container.
      3) A variable cone-shaped supporting insert capable of supporting 200, 400, or 700 pounds of sand mass to allow for three sizes of modules. Place cone inserts inside the 14 cubic foot container.
   B) Provide two components for the 14 cubic foot module container:
      1) A 14 C.F., yellow outer container.
      2) A black lid securely locking over the top lip of the container.
   C) Provide two components for the 21 cubic foot module container:
      1) A 36" height X 36" width yellow outer container.
      2) A black lid which locks securely over the top of the container.

3. For temporary installations use Energite or Fitch attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal modules. As an option, place attenuation devices on 3½" maximum thickness pallets to facilitate maintenance.

4. For permanent installations use Barrel Attenuation Device consisting of one-piece outer sand container modules with separate detachable lid. Energite attenuation barrels manufactured by Energy Absorption Systems of Chicago, IL, TrafFix barrels manufactured by TrafFix Devices, Inc. of San Clemente, CA, or approved equal meet these requirements.

5. The Typical Module Construction Detail and Type B Layout are based on the Energite Crash Cushion manufactured by Energy Absorption. Provide any required layouts and details from other sand filled attenuation module manufacturers which differ from those shown here.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-25-12

REVISIONS

| DATE | CHANGE |
|---|---|
| 07-18-14 | Revised sheeting in reflective sheet detail |
| 09-27-17 | Update to active voice |
| 10-03-19 | New Design Engr PE Stamp |
| 08-01-24 | Electronic Stamp/Signature |
| 06-30-25 | Legislative Changes |

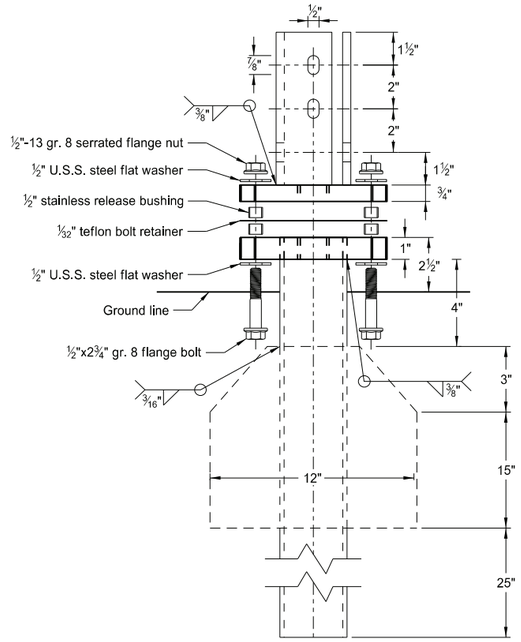
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

Preliminary Plans

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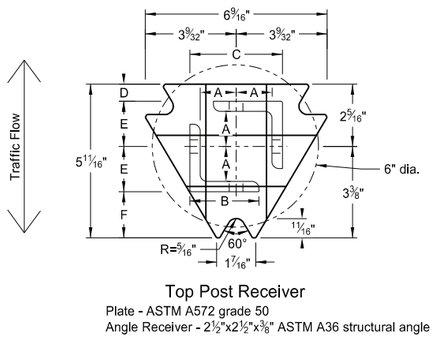
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

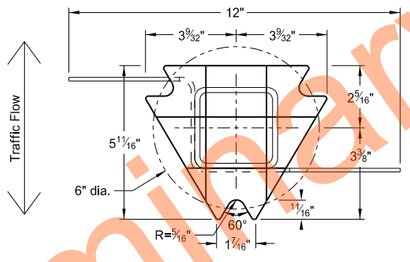



Multi-Directional
Slip Base Assembly

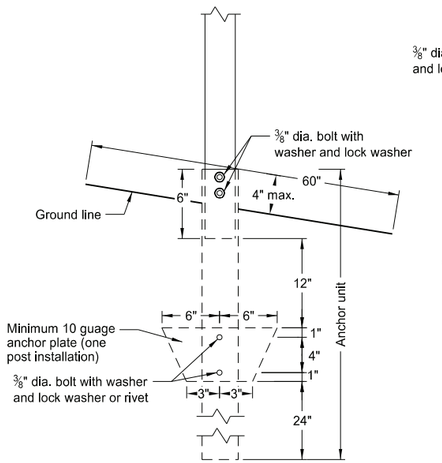
## Perforated Tube



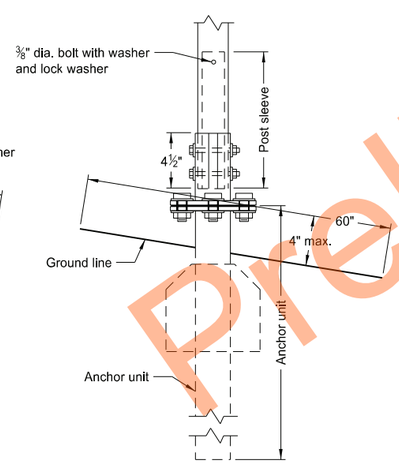

Top Post Receiver
Plate - ASTM A572 grade 50
Angle Receiver - 2½"x2½"x⅜" ASTM A36 structural angle



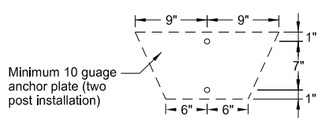

Bottom Soil Stub
Tube - 3"x3"x7 gauge ASTM A500 grade B tube
Stabilizing Wing - 7 gauge H.R.P.O. ASTM A1011
Plate - ASTM A572 grade 50

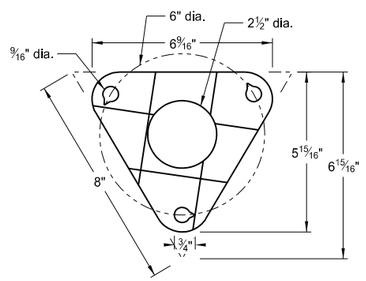



Anchor Unit and Post Assembly




Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly




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

Notes:

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

**Telescoping Perforated Tube**

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

**Properties of Telescoping Perforated Tube**

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

**Top Post Receiver Data Table**

| Square Post Sizes (B) | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| 2 3/16"x10 ga. | 1 9/64" | 2½" | 3 1/32" | 25/32" | 1 33/64" | 1 7/8" |
| 2½"x10 ga. | 1 9/32" | 2½" | 3 5/16" | ⅝" | 1 21/32" | 1¾" |

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

(B) For additional wind load, insert the 2 3/16"x10 ga. into 2½"x10 ga.

Preliminary Plans

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

2-28-14

REVISIONS

| DATE | CHANGE |
|---|---|
| 9-27-17 | Updated to active voice |
| 10-03-19 | New Design Engr PE Stamp |
| 8-01-24 | Electronic Stamp/Signature |

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PROFESSIONAL
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ENGINEER
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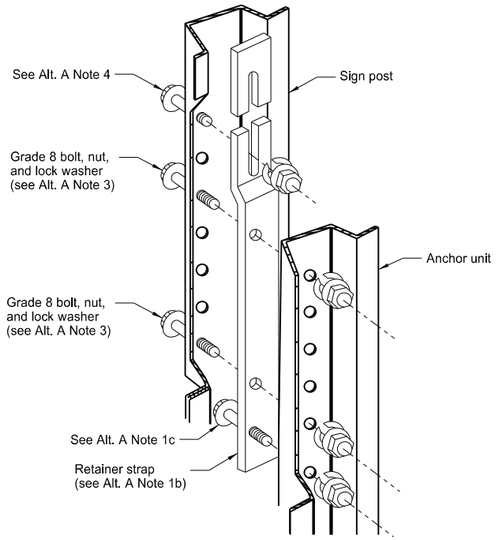
08/01/24

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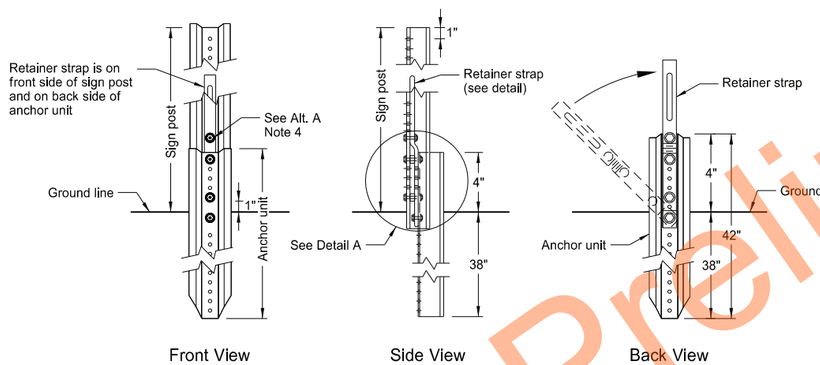
# BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

## U-Channel Post



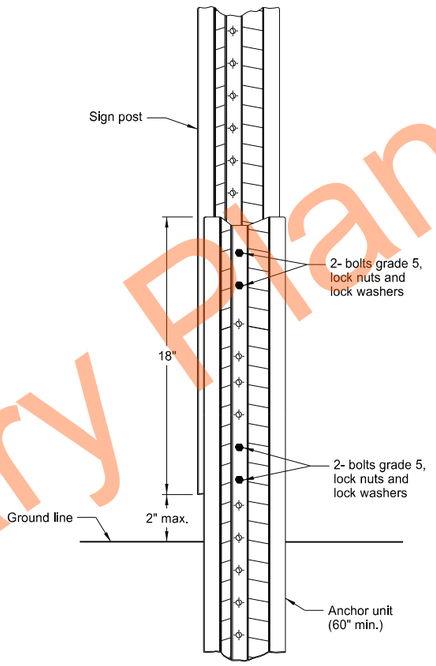

Detail A




Front View | Side View | Back View

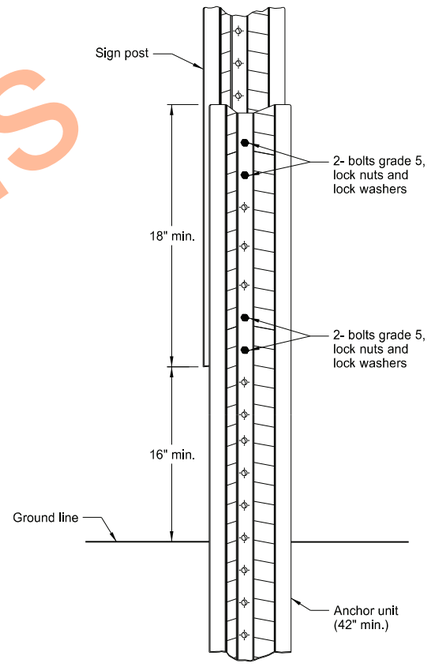
Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



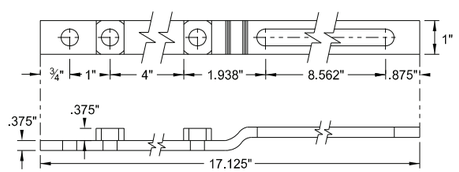

Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.




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

Install a maximum of 3 posts within 7'.




Retainer Strap Detail

Alternate A Steps of Installation:

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

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

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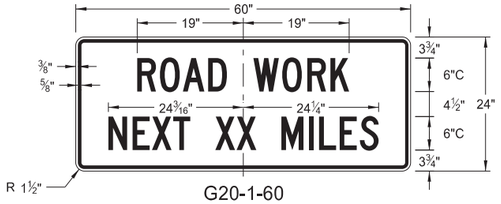
08/01/24

Preliminary Plans

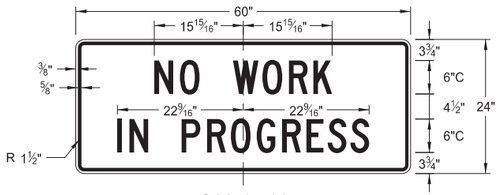
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# CONSTRUCTION SIGN DETAILS
# TERMINAL AND GUIDE SIGNS

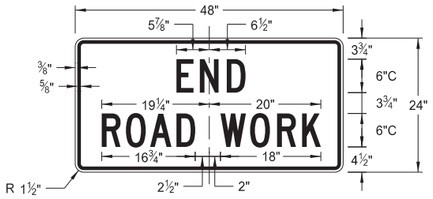
D-704-9



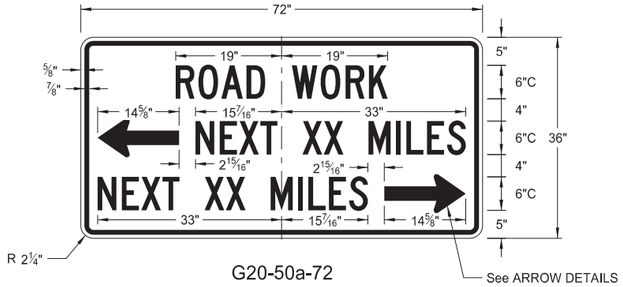

G20-1-60
Legend: black (non-refl)
Background: orange



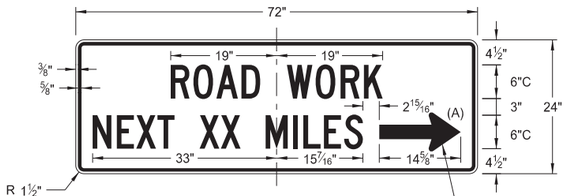

G20-1b-60
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Background: orange



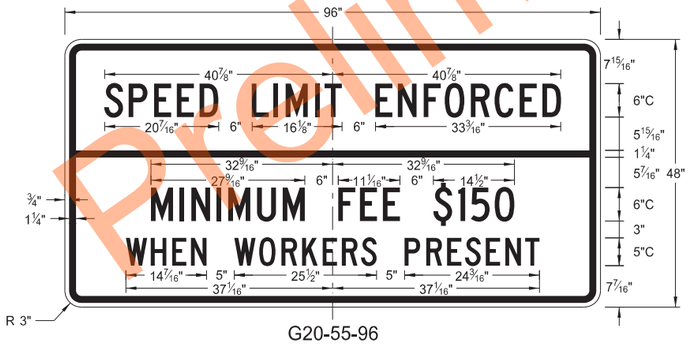

G20-2-48
Legend: black (non-refl)
Background: orange




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



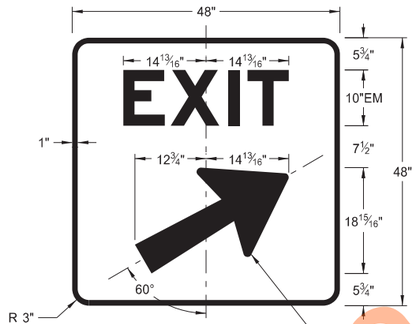

G20-52a-72
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Background: orange



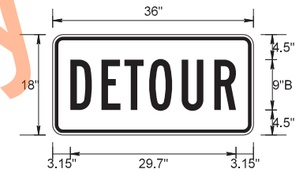

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Background: orange



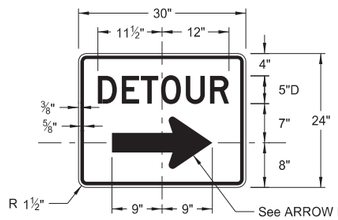

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Background: orange



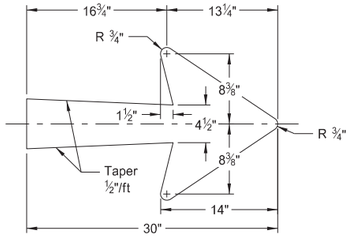

E5-1(L or R)-48
Legend: white
Background: green (orange optional)



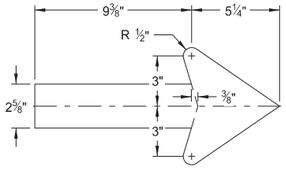

M4-8-36
Legend: black (non-refl)
Background: orange



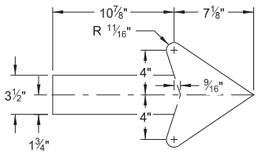

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange



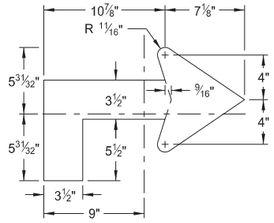

E5-1-48



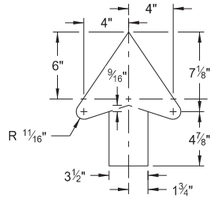
G20-50a-72
G20-52a-72



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 |
| 08-17-17 | Added sign & background color |
| 10-03-19 | New Design Engineer PE Stamp |
| 08-01-24 | Electronic Stamp/Signature |
| 06-30-25 | Legislative Changes |

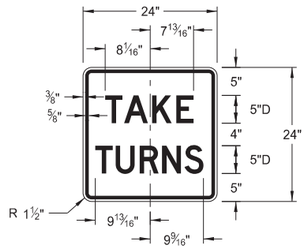
KIRK J. HOFF
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PROFESSIONAL
PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

Preliminary Plans

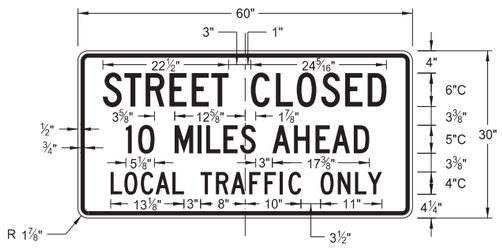
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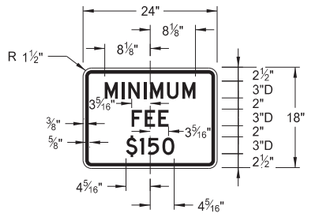
# CONSTRUCTION SIGN DETAILS
## REGULATORY SIGNS



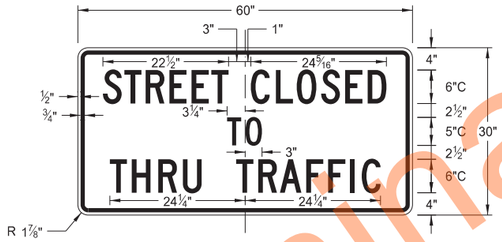

R1-50P-24
Legend: black (non-refl)
Background: white




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




R2-1aP-24
Legend: black (non-refl)
Background: white




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




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

Preliminary Plans

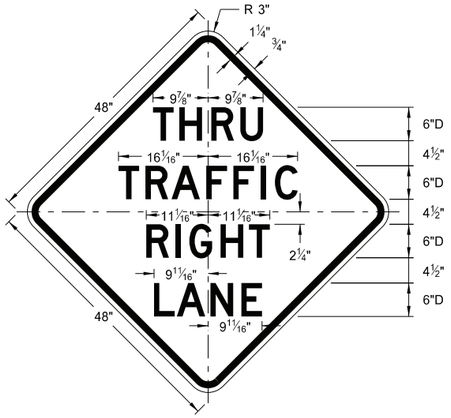
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-13-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 08-17-17 | Revised sign number |
| 10-03-19 | New Design Engineer PE Stamp |
| 08-01-24 | Electronic Stamp/Signature |
| 06-30-25 | Legislative Changes |

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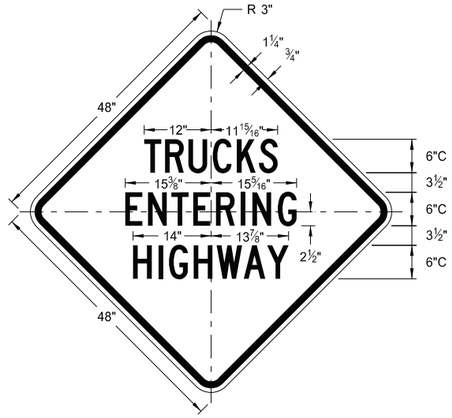
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# CONSTRUCTION SIGN DETAILS
## WARNING SIGNS

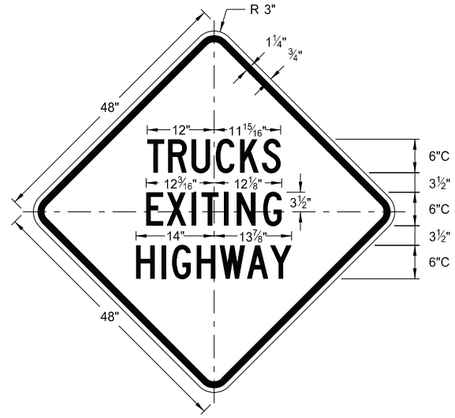
D-704-11



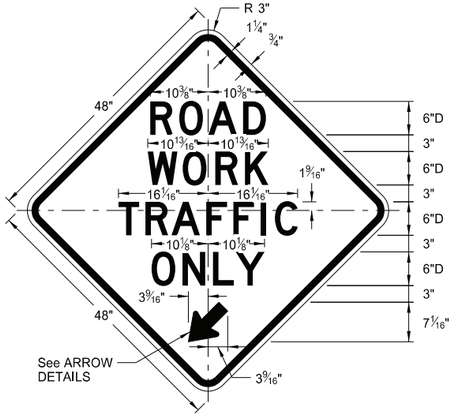

W5-8-48
Legend: black (non-refl)
Background: orange



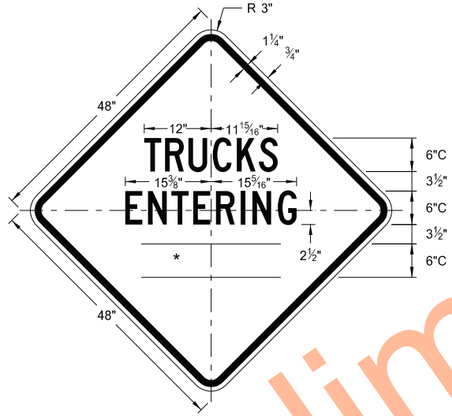

W8-53-48
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Background: orange



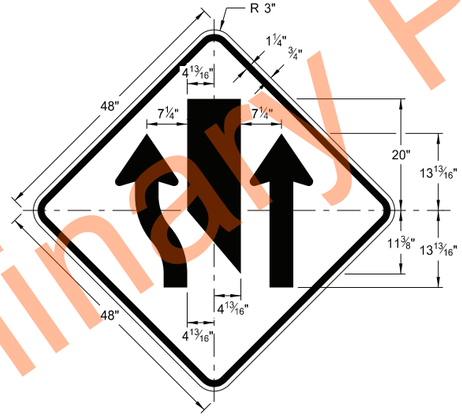

W8-56-48
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Background: orange



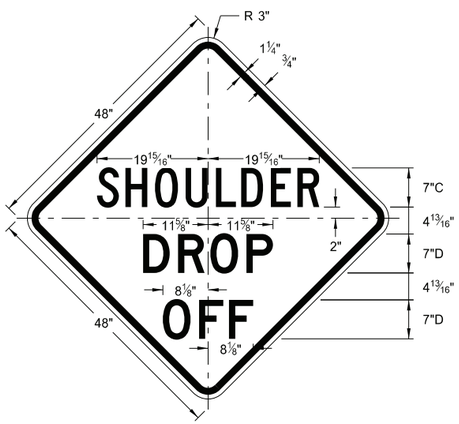

W5-9-48
Legend; black (non-refl)
Background: orange



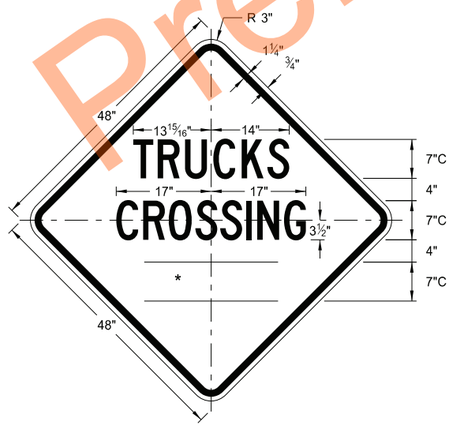

W8-54-48
Legend; black (non-refl)
Background: orange




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



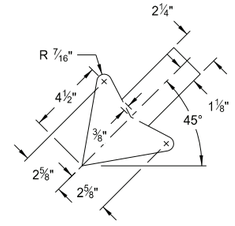

W8-9a-48
Legend: black (non-refl)
Background: orange



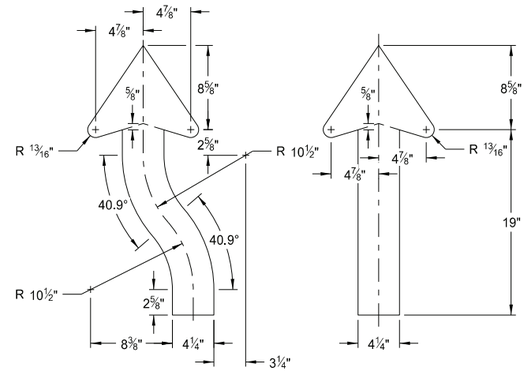

W8-55-48
Legend: black (non-refl)
Background: orange

| 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 |
| 10-03-19 | New Design Engineer PE Stamp |
| 8-01-24 | Electronic Stamp/Signature |

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NORTH DAKOTA

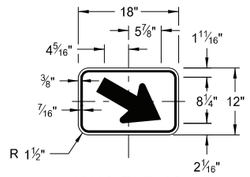
08/01/24

Preliminary Plans

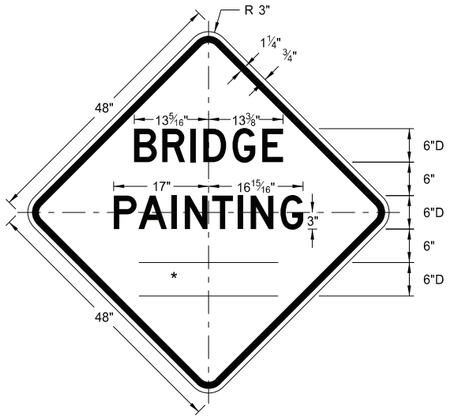
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# CONSTRUCTION SIGN DETAILS
## WARNING SIGNS

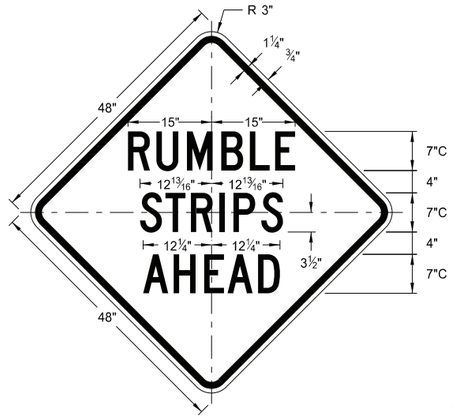
D-704-11A




W16-7aP-18
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Background: orange



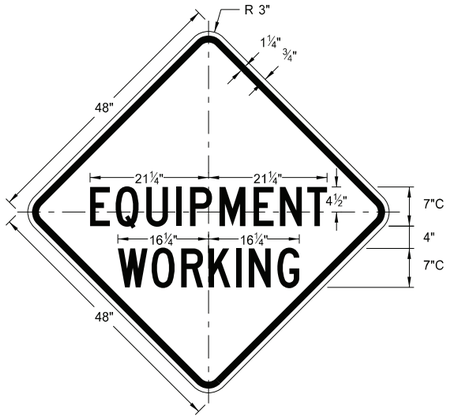

W21-50-48
Legend: black (non-refl)
Background: orange



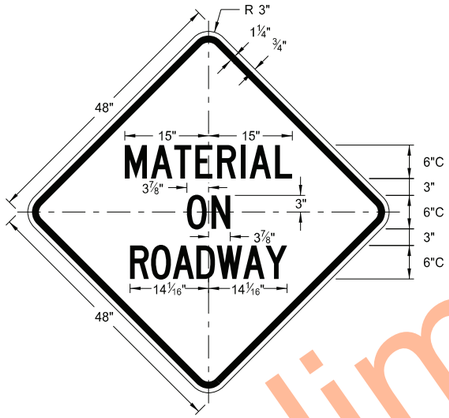

W21-53-48
Legend: black (non-refl)
Background: orange

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

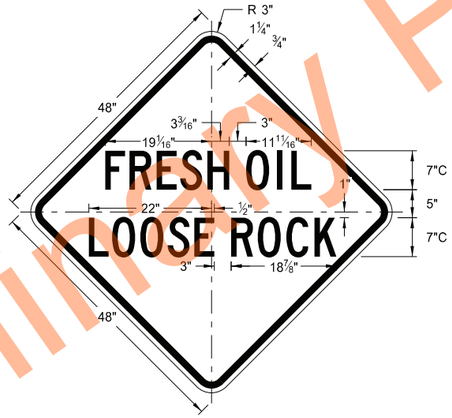
* DISTANCE MESSAGES



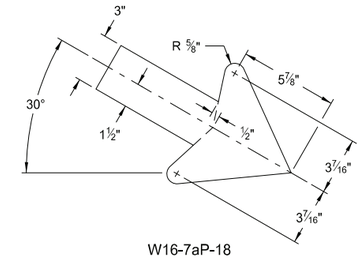

W20-51-48
Legend: black (non-refl)
Background: orange



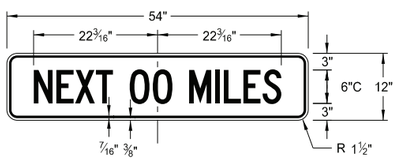

W21-51-48
Legend: black (non-refl)
Background: orange



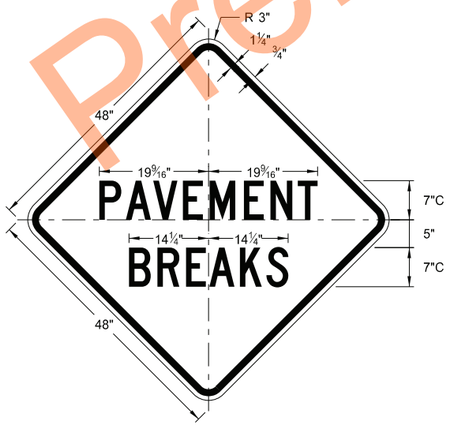

W22-8-48
Legend: black (non-refl)
Background: orange




W16-7aP-18




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




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

Preliminary Plans

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

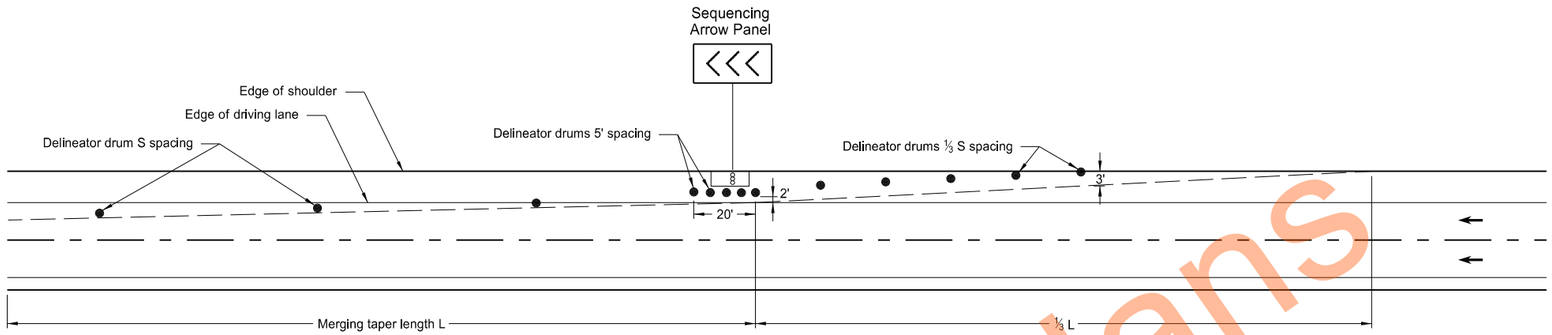
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

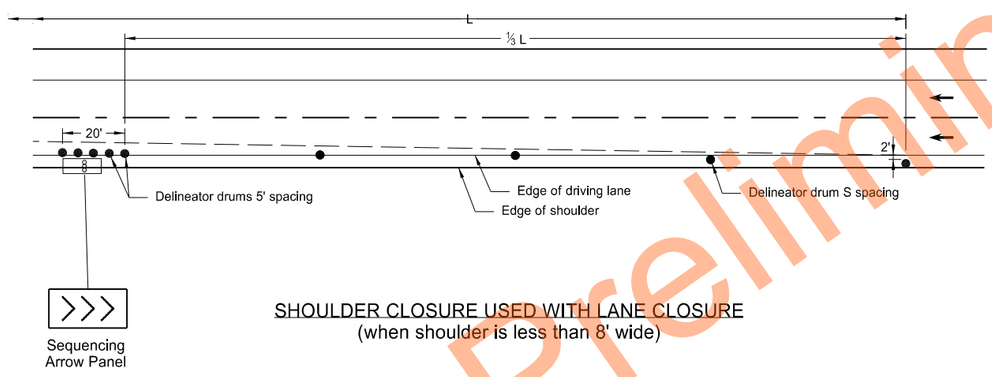
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# SHOULDER CLOSURE TAPERS

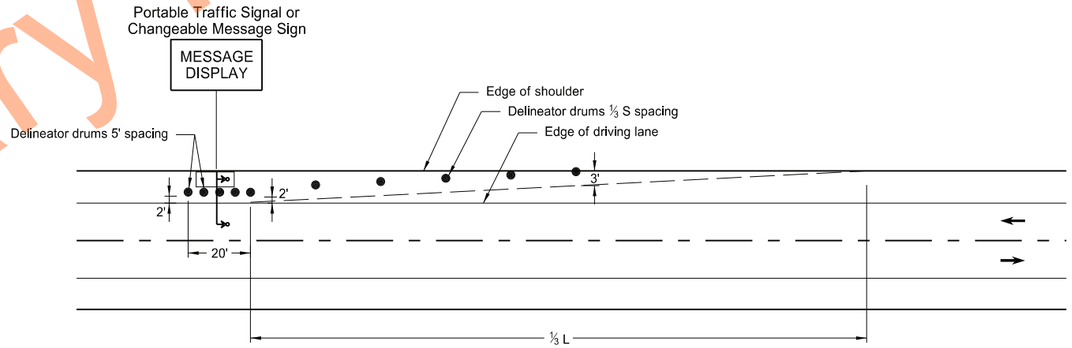
D-704-12




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




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




PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY

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

Notes:

1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   $L = WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, use a length of approximately ½L. 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 volce |
| 10-25-19 | Added L dimension to detail |
| 8-01-24 | Electronic Stamp/Signature |

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PE-4683
ENGINEER
NORTH DAKOTA

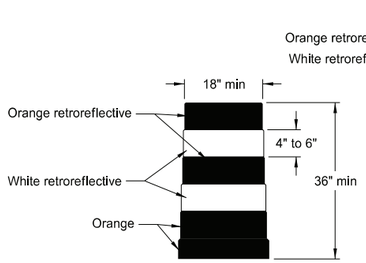
08/01/24

Preliminary Plans

DocuSign Envelope ID: B6D1C72A-6E5E-4E5C-A02F-4D3D1C582775

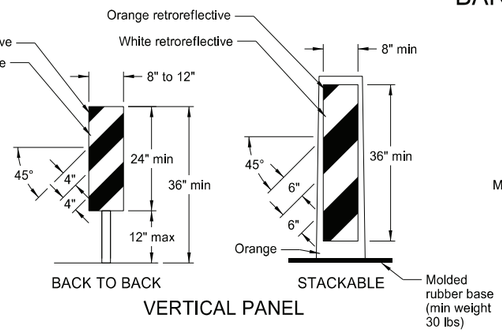
# BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



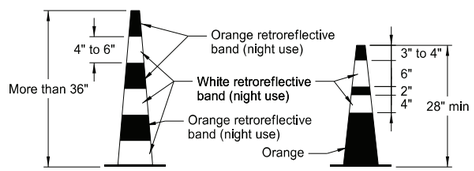

## DELINEATOR DRUM

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.



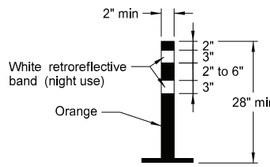

## VERTICAL PANEL

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.



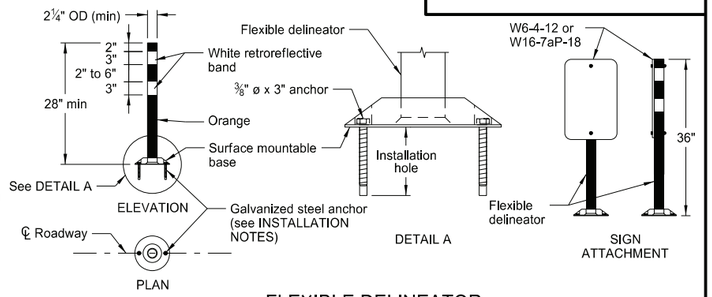

## TRAFFIC CONE

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

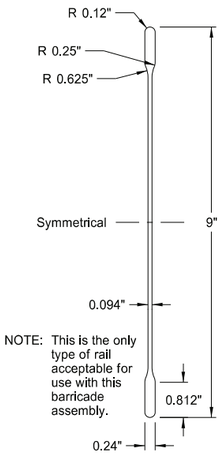
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.




## FLEXIBLE DELINEATOR

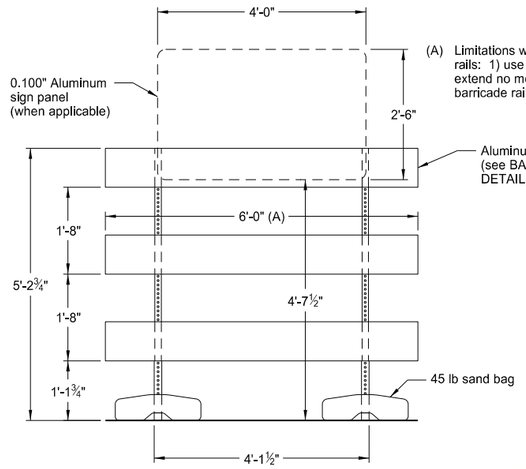
INSTALLATION NOTES:

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.



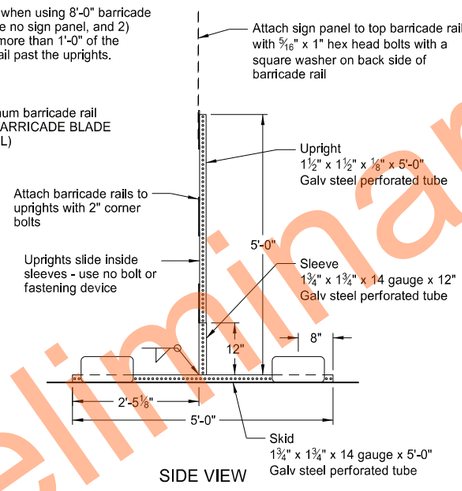

NOTE: This is the only type of rail acceptable for use with this barricade assembly.

## BARRICADE BLADE DETAIL



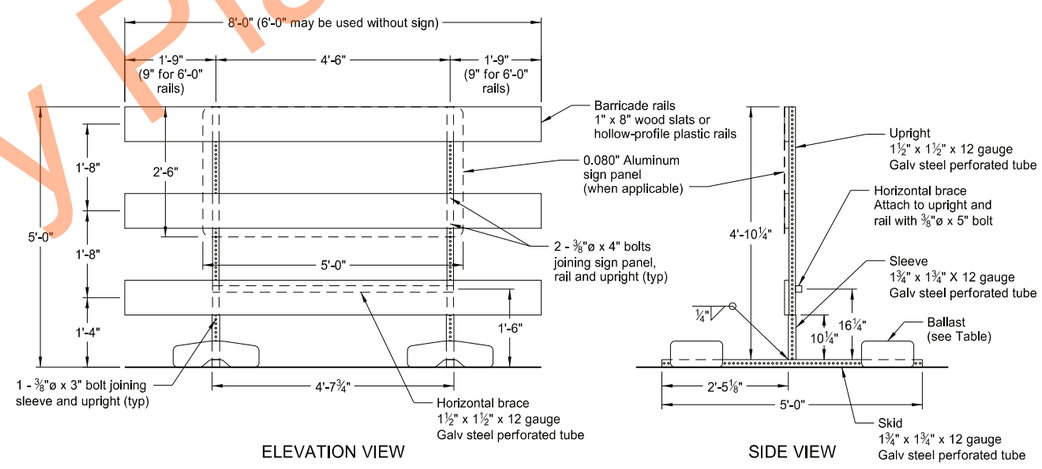

(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

## ELEVATION VIEW




## SIDE VIEW

## BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

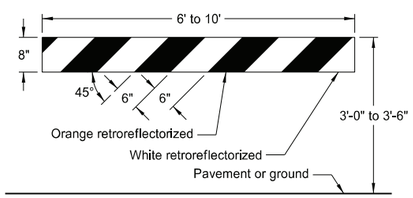



ELEVATION VIEW

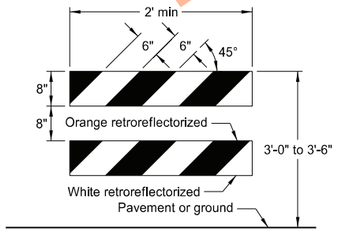
SIDE VIEW

## BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

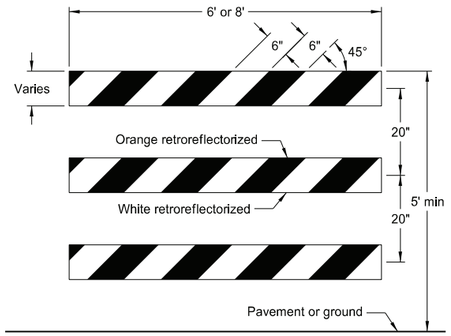
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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




## TYPE I BARRICADE

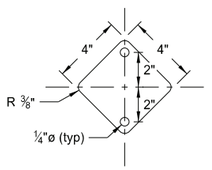


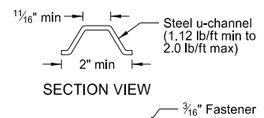

## TYPE II BARRICADE

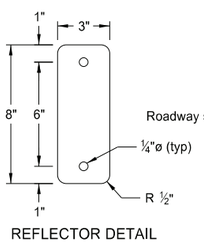



## TYPE III BARRICADE

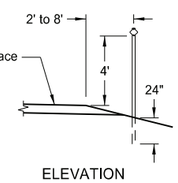
## BARRICADE RAIL DETAILS




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 |
| 11-01-19 | Revised details for Flexible Delineator |
| 8-01-24 | Electronic Stamp/Signature |

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

08/01/24

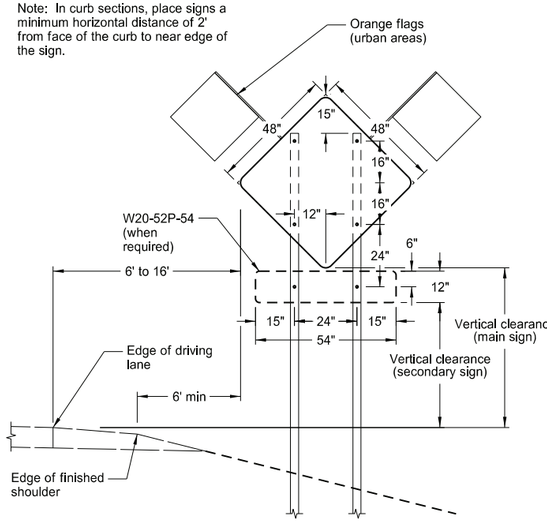
Preliminary Plans

DocuSign Envelope ID: B6D1C72A-6E5E-4E5C-A02F-4D3D1C582775

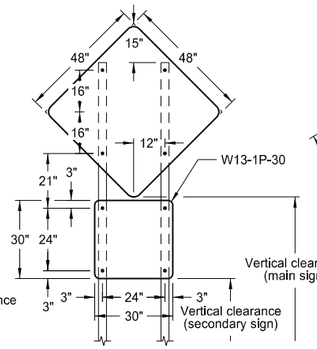
# CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

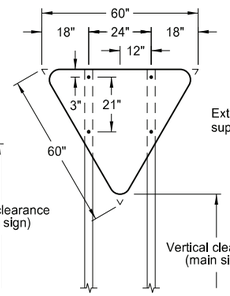
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



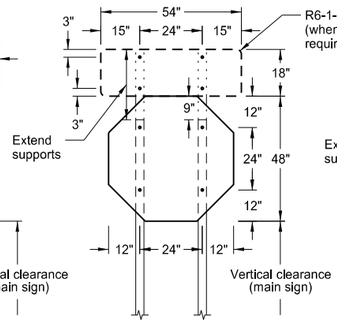

TYPICAL SECTION
(48" x 48" diamond warning sign shown)



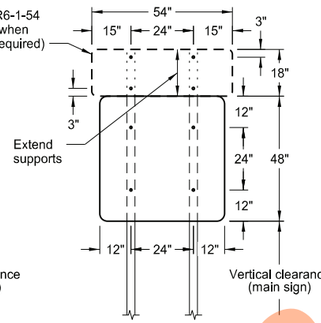

48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



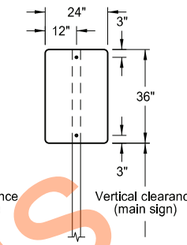

R1-2-60 - YIELD SIGN



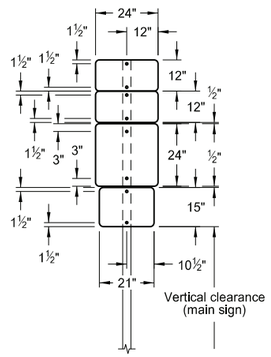

R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



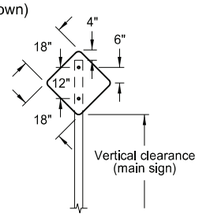

48" x 48" SIGN
(with R6-1-54 sign as required)



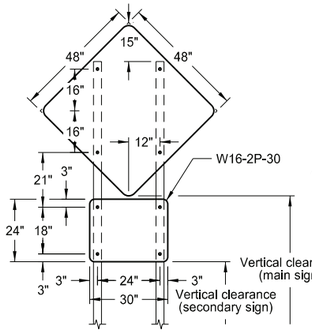

24" x 36" SIGN



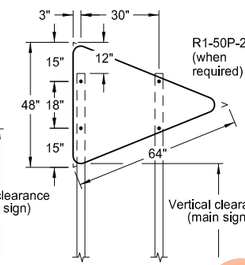

24" x 24"
ROUTE MARKER
ASSEMBLY



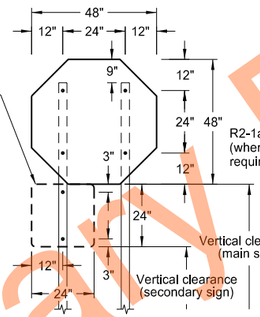

18" x 18"
DIAMOND SIGN



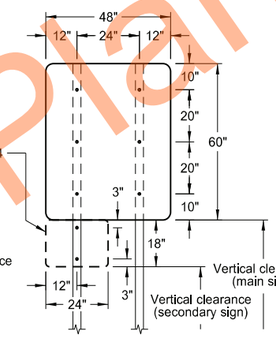

48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



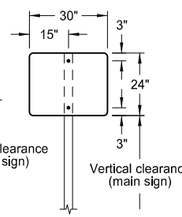

W14-3-64 - PENNANT SIGN



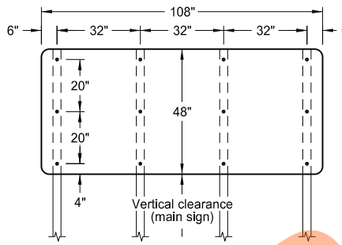

R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



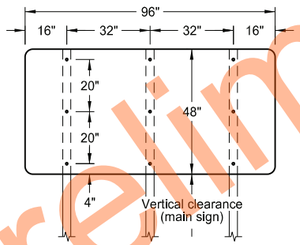

48" x 48" SIGN
(with R2-1aP-24 sign as required)



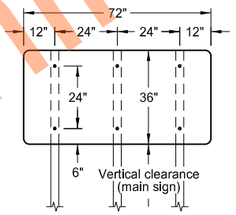

30" x 24" SIGN



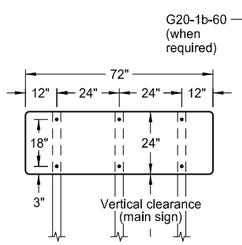

108" x 48" SIGN



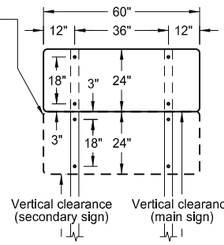

96" x 48" SIGN



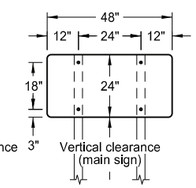

72" x 36" SIGN



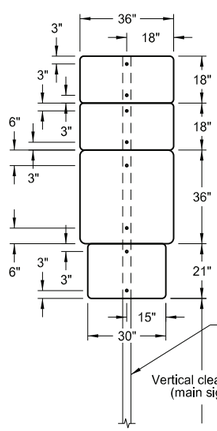

72" x 24" SIGN



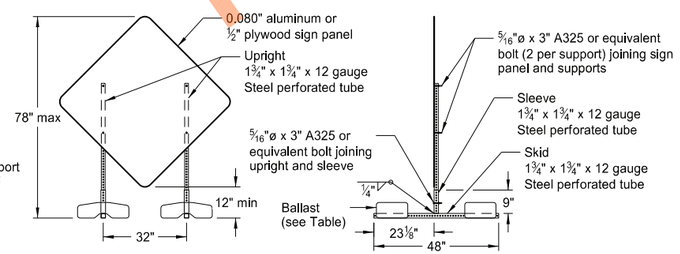

60" x 24" SIGN



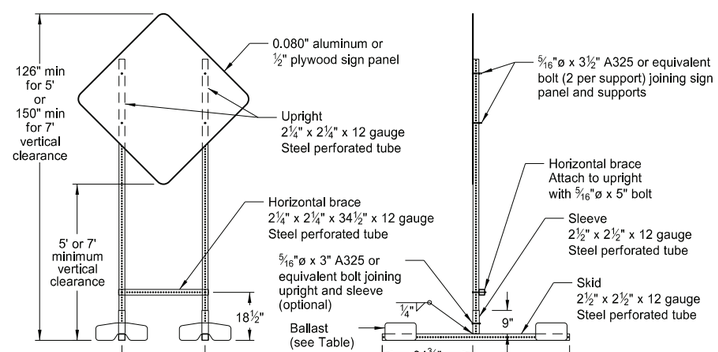

48" x 24" SIGN




36" x 36"
ROUTE MARKER
ASSEMBLY




PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT




PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

10-4-13

REVISIONS

| DATE | CHANGE |
|---|---|
| 11-14-13 | Revised Note 6 |
| 9-27-17 | Updated to active voice |
| 11-01-19 | Revised 60"x24" sign detail |
| 8-01-24 | Electronic Stamp/Signature |

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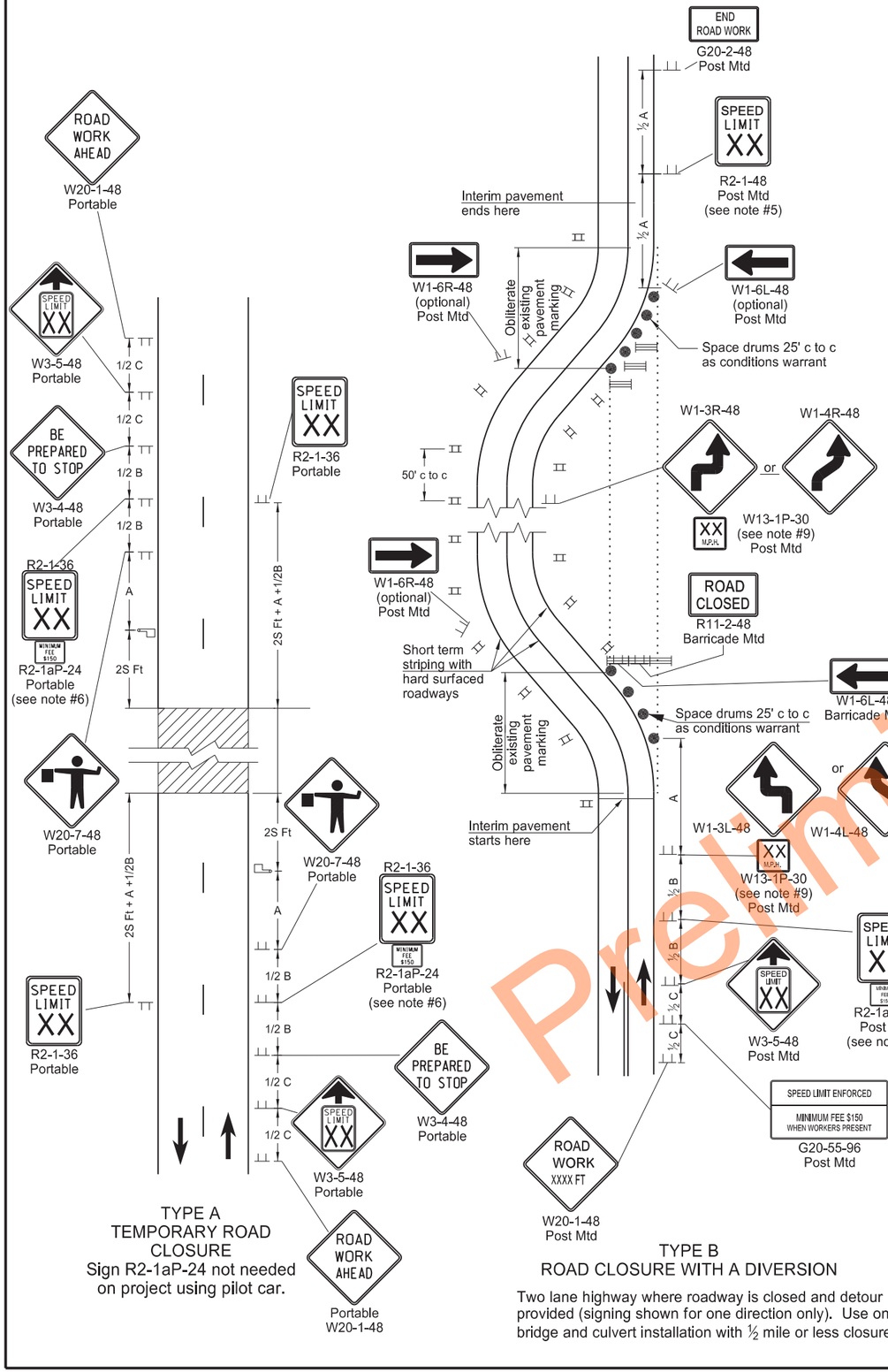
08/01/24

Preliminary Plans

Docusign Envelope ID: 2F5C9714-A0E1-42BB-B36B-42204844BFCB

# ROAD CLOSURE LAYOUTS

D-704-15



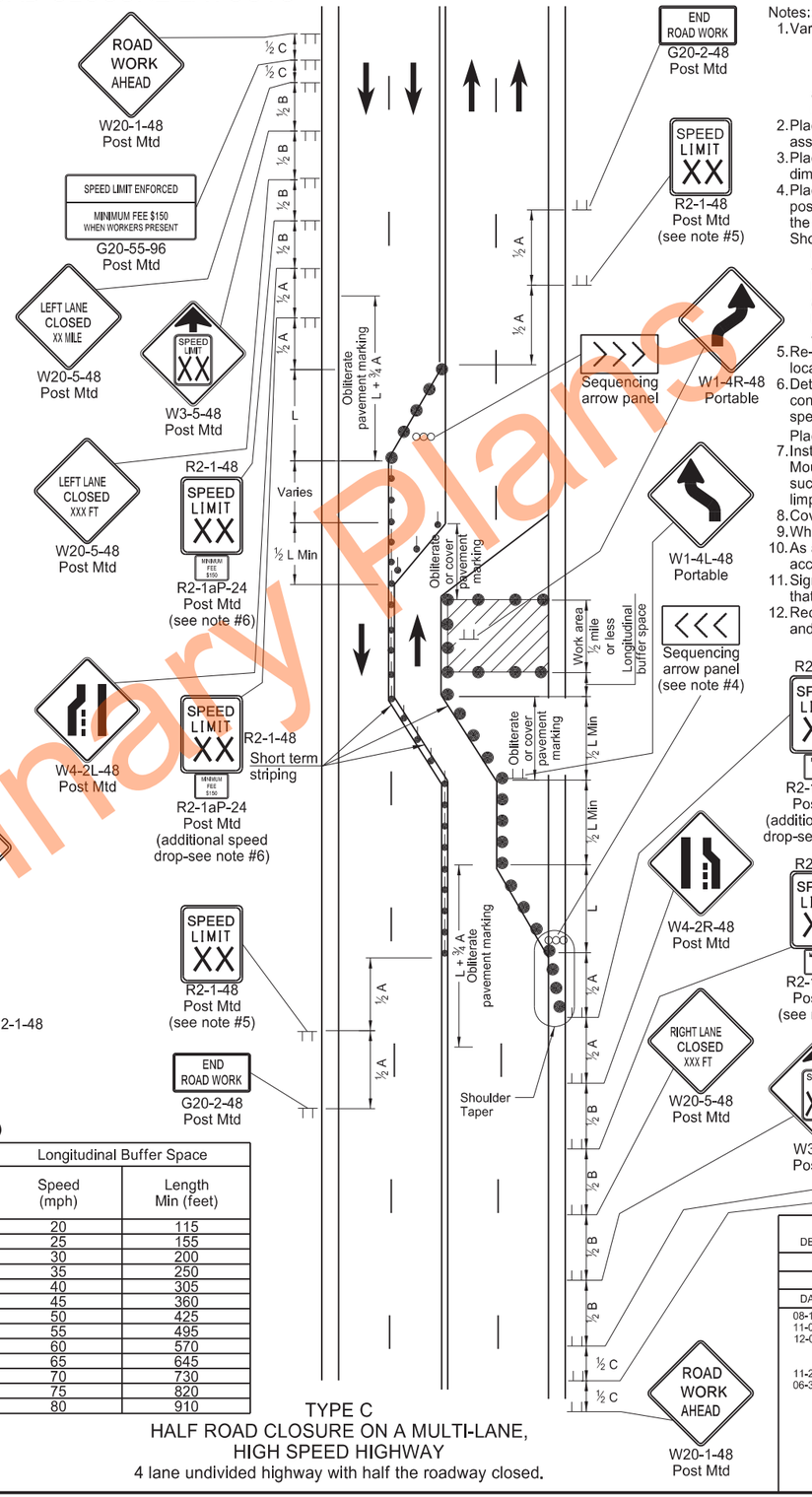

TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.



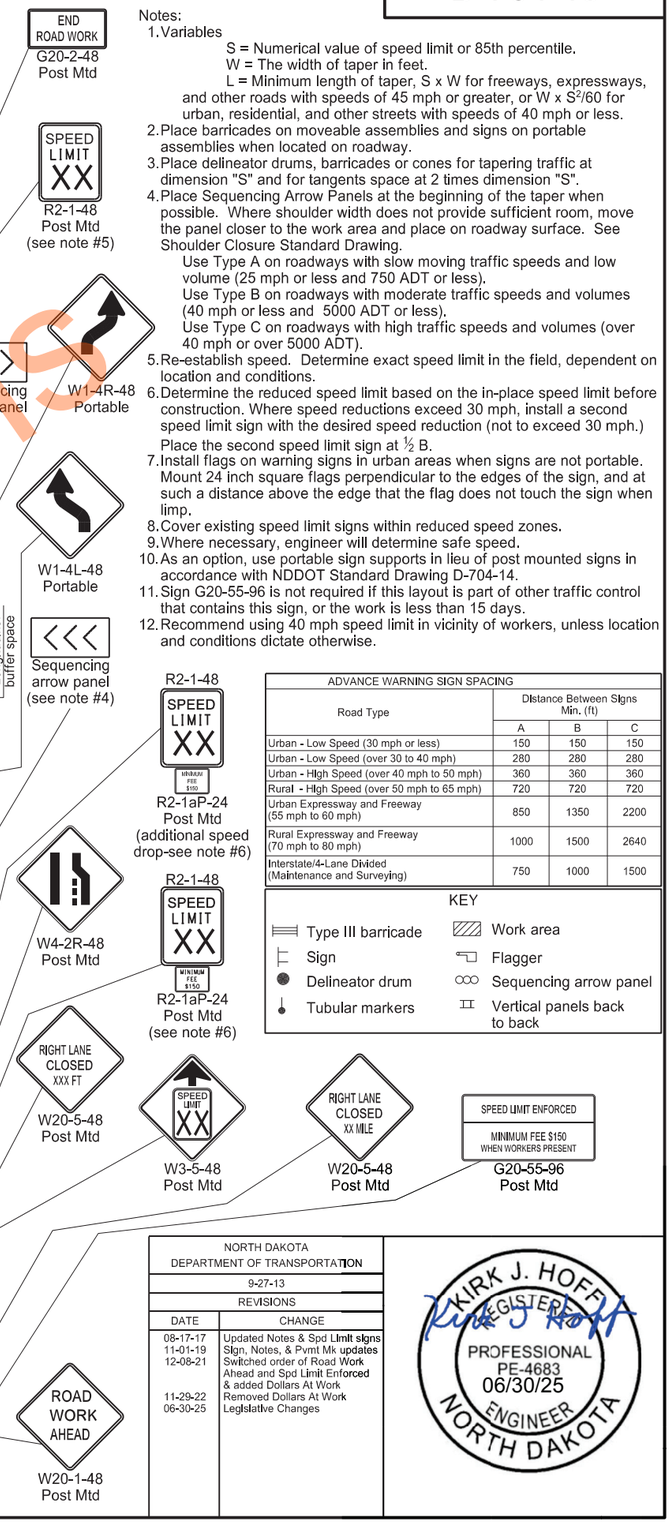

TYPE B
ROAD CLOSURE WITH A DIVERSION

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

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




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




Notes:

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

| ADVANCE WARNING SIGN SPACING | | | |
|---|---|---|---|
| Road Type | Distance Between Signs Min. (ft) | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (over 40 mph to 50 mph) | 360 | 360 | 360 |
| Rural - High Speed (over 50 mph to 65 mph) | 720 | 720 | 720 |
| Urban Expressway and Freeway (55 mph to 60 mph) | 850 | 1350 | 2200 |
| Rural Expressway and Freeway (70 mph to 80 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 |
|---|---|
| 08-17-17 | Updated Notes & Spd Limit signs |
| 11-01-19 | Sign, Notes, & Pvmt Mk updates |
| 12-08-21 | Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work |
| 11-29-22 | Removed Dollars At Work |
| 06-30-25 | Legislative Changes |

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06/30/25
ENGINEER
NORTH DAKOTA

Preliminary Plans

Docusign Envelope ID: 2F5C9714-A0E1-42BB-B36B-42204844BFCB

# TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20

END ROAD WORK — G20-2-48 Barricade mounted
ROAD WORK ⇦ NEXT 00 MILES NEXT 00 MILES ⇨ — G20-50a-72 Post mounted
ROAD WORK AHEAD — W20-1-48 Post mounted
State Highway or High volume local road
ROAD WORK AHEAD — W20-1-48 Post mounted
State Highway or High volume local road
Private Drive or Section Line
ROAD WORK ⇦ NEXT 00 MILES NEXT 00 MILES ⇨ — G20-50a-72 Post mounted
ROAD WORK NEXT 00 MILES — G20-52aR-72 Post mounted
SPEED LIMIT ENFORCED / MINIMUM FEE $150 WHEN WORKERS PRESENT — G20-55-96 Post mounted
ROAD WORK NEXT 00 MILES — G20-1-60
NO WORK IN PROGRESS — G20-1b-60 (See note #9)
Post mounted

½ A — ½ A — ½ A — ½ A

ROAD WORK NEXT 00 MILES — G20-1-60
NO WORK IN PROGRESS — G20-1b-60 (See note #9)
Post mounted
SPEED LIMIT ENFORCED / MINIMUM FEE $150 WHEN WORKERS PRESENT — G20-55-96 Post Mounted
ROAD WORK ⇦ NEXT 00 MILES NEXT 00 MILES ⇨ — G20-50a-72 Post mounted
ROAD WORK AHEAD — W20-1-48 Post mounted
ROAD WORK ⇦ NEXT 00 MILES NEXT 00 MILES ⇨ — G20-50a-72 Post mounted

**TYPE G**
**TERMINAL SIGN LAYOUT**
2 and 4 lane highway with intersecting routes where traffic is maintained.

Low volume local road
Low volume local road
ROAD WORK ⇦ NEXT 00 MILES — G20-52aL-72 Post mounted
END ROAD WORK — G20-2-48 Post mounted

R2-1-48 (see note #3)
SPEED LIMIT XX — R2-1aP-24 Post mounted
FRESH OIL LOOSE ROCK — W22-8-48
NEXT 00 MILES — W20-52P-54 Post mounted
W3-5-48 Post mounted
DO NOT PASS — R4-1-48 Post mounted
NO CENTER LINE — W8-12-48 Post mounted

SPEED LIMIT XX — R2-1-48 Post mounted (see note #2)
FRESH OIL LOOSE ROCK — W22-8-48
NEXT 00 MILES — W20-52P-54 Post mounted
R2-1-48 (see note #3)
SPEED LIMIT XX — R2-1aP-24 Post mounted
DO NOT PASS — R4-1-48 Post mounted
NO CENTER LINE — W8-12-48 Post mounted

C — ½ B — ½ B — ½ A — ½ A — A — B — C — 100' Min 150' Max — 100' Min 150' Max — C — B — A — ½ A — ½ A — ½ B — ½ B — C

NO CENTER LINE — W8-12-48 Post mounted
DO NOT PASS — R4-1-48 Post mounted
SPEED LIMIT XX — W3-5-48 Post mounted
FRESH OIL LOOSE ROCK — W22-8-48
NEXT 00 MILES — W20-52P-54 Post mounted
SPEED LIMIT XX — R2-1aP-24 Post mounted (see note #3)

**TYPE H**
**SEAL COAT SIGN LAYOUT**
2 and 4 lane highway with intersecting routes where traffic is maintained over seal project.

NO CENTER LINE — W8-12-48 Post mounted
DO NOT PASS — R4-1-48 Post Mounted
R2-1-48 (see note #3)
SPEED LIMIT XX — R2-1aP-24 Post mounted
FRESH OIL LOOSE ROCK — W22-8-48
NEXT 00 MILES — W20-52P-54 Post mounted
SPEED LIMIT XX — R2-1-48 Post mounted (see note #2)

KEY
Type III barricade
Sign

Preliminary Plans

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

| ADVANCE WARNING SIGN SPACING | | | |
|---|---|---|---|
| Road Type | Distance Between Signs Min. (ft) | | |
| | A | B | C |
| Urban - Low Speed (30 mph or less) | 150 | 150 | 150 |
| Urban - Low Speed (over 30 to 40 mph) | 280 | 280 | 280 |
| Urban - High Speed (over 40 mph to 50 mph) | 360 | 360 | 360 |
| Rural - High Speed (over 50 mph to 65 mph) | 720 | 720 | 720 |
| Urban Expressway and Freeway (55 mph to 60 mph) | 850 | 1350 | 2200 |
| Rural Expressway and Freeway (70 mph to 80 mph) | 1000 | 1500 | 2640 |
| Interstate/4-Lane Divided (Maintenance and Surveying) | 750 | 1000 | 1500 |

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION
9-27-13
REVISIONS

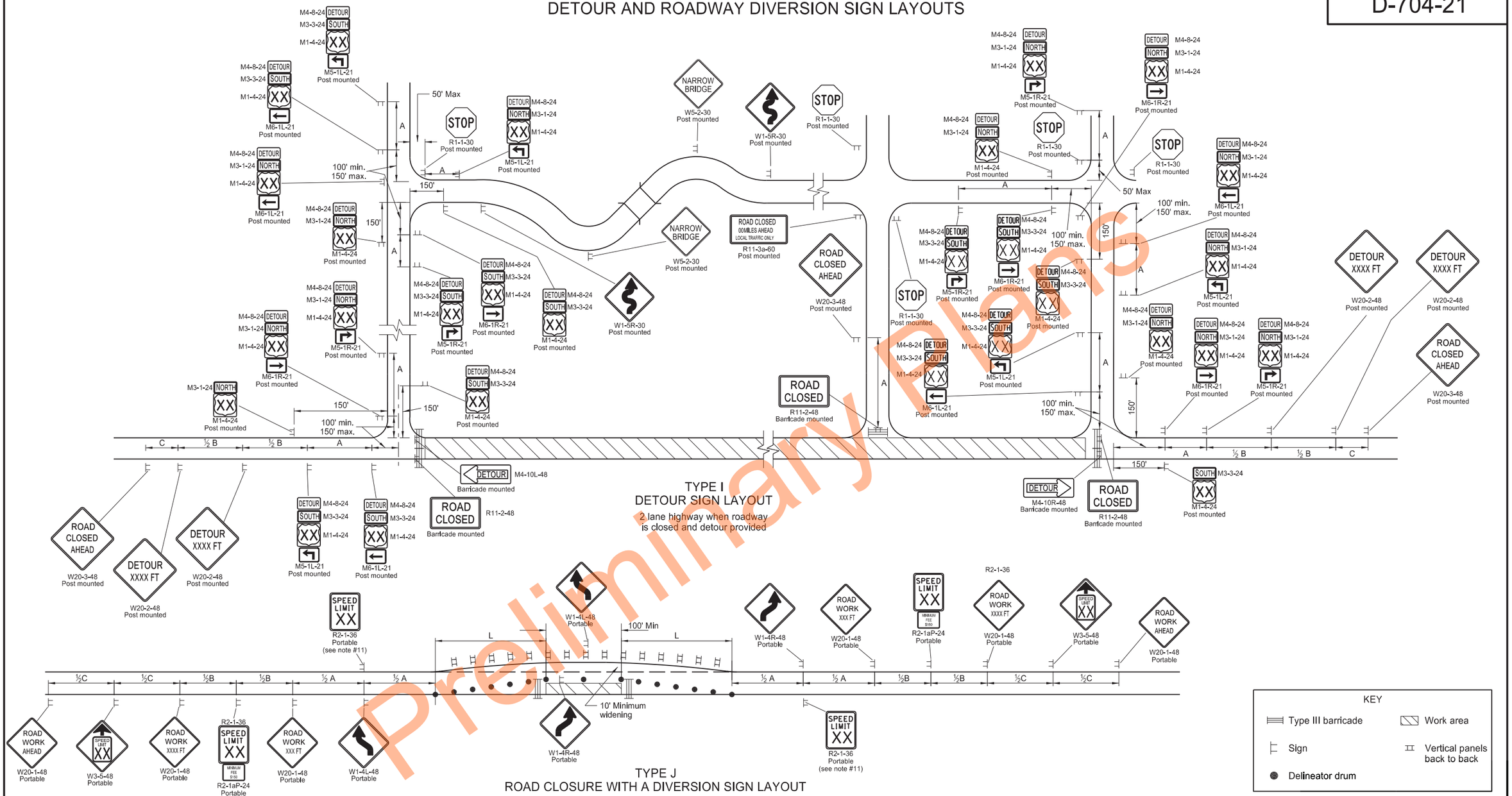
| DATE | CHANGE |
|---|---|
| 08-17-17 | Updated notes & sign numbers |
| 11-01-19 | Updated note & sign |
| 12-08-21 | Switched order of Road Work and Spd Limit Enforced & added Dollars At Work |
| 11-29-22 | Removed Dollars At Work |
| 06-30-25 | Legislative Changes |

KIRK J. HOFF — REGISTERED — PROFESSIONAL PE-4683 06/30/25 — ENGINEER — NORTH DAKOTA

Docusign Envelope ID: 2F5C9714-A0E1-42BB-B36B-42204844BFCB

# DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21

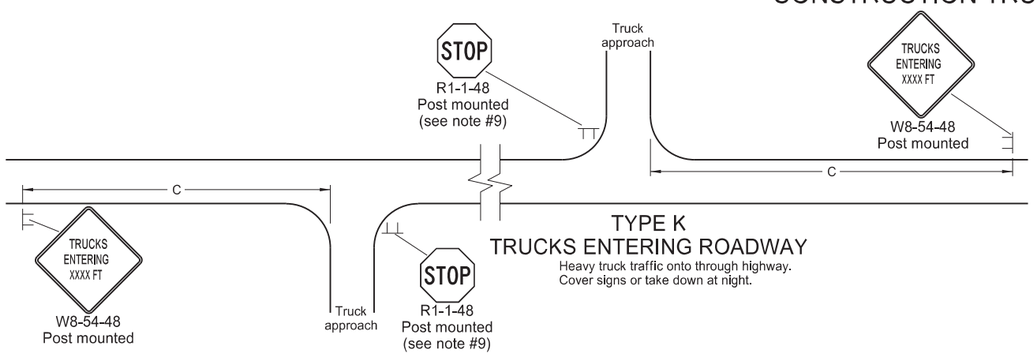

M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M5-1L-21 Post mounted
M6-1L-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M6-1L-21 Post mounted
M5-1L-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M5-1R-21 Post mounted
M6-1R-21 Post mounted
M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M6-1R-21 Post mounted
M5-1R-21 Post mounted
M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M1-4-24 Post mounted
M3-1-24 NORTH M1-4-24 XX
M1-4-24 Post mounted
M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M6-1L-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M5-1R-21 Post mounted
M6-1R-21 Post mounted
M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M5-1L-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M6-1L-21 Post mounted
M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M6-1R-21 Post mounted
M5-1R-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M6-1R-21 Post mounted
M5-1R-21 Post mounted
M4-8-24 DETOUR M3-3-24 SOUTH M1-4-24 XX
M5-1L-21 Post mounted
M6-1L-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M6-1L-21 Post mounted
M4-8-24 DETOUR M3-1-24 NORTH M1-4-24 XX
M5

Docusign Envelope ID: 2F5C9714-A0E1-42BB-B36B-42204844BFCB

# CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

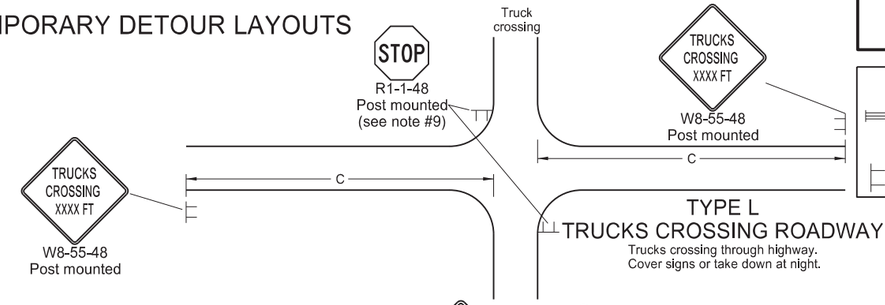
**D-704-22**

KEY: Type III barricade; Work area; Sign; Flagger



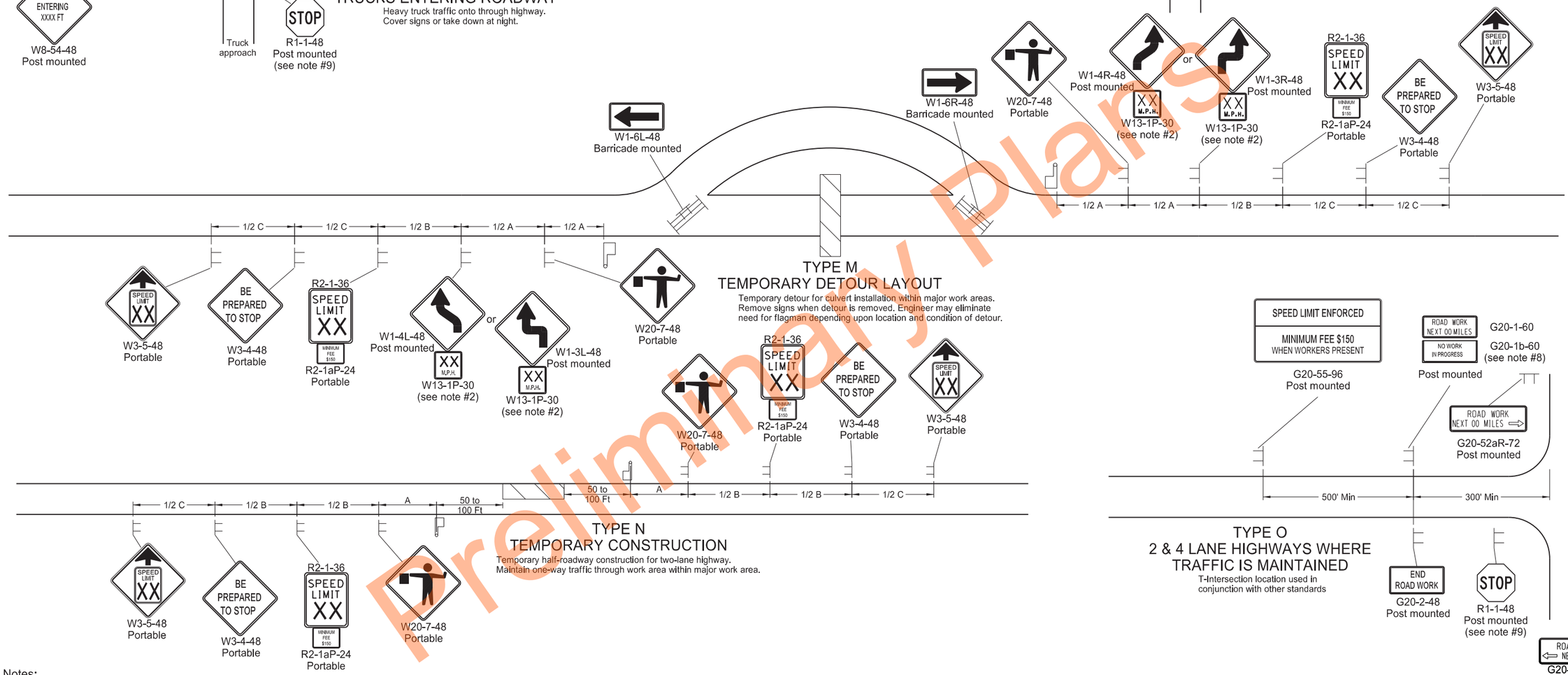

## TYPE K
## TRUCKS ENTERING ROADWAY

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 areas.



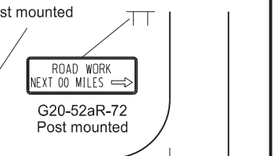




G20-55-96
Post mounted




G20-1-60
G20-1b-60
(see note #8)
Post mounted




G20-52aR-72
Post mounted




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

T-Intersection location used in conjunction with other standards

Notes:

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control that contains this sign, 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 80 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 |
|---|---|
| 08-17-17 | Update notes & sign numbers |
| 11-01-19 | Revised sign numbers & note 7 |
| 12-09-21 | Added Speed Limit Enforced and Dollars At Work signs |
| 11-29-22 | Removed Dollars At Work |
| 06-30-25 | Legislative Changes |

KIRK J. HOFFMANN REGISTERED PROFESSIONAL PE-4683 06/30/25 ENGINEER NORTH DAKOTA

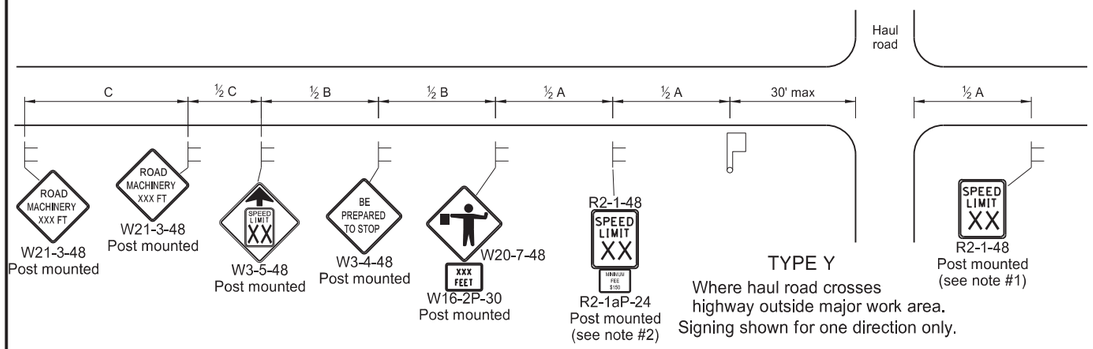
Kirk J. Hoffmann

Preliminary Plans

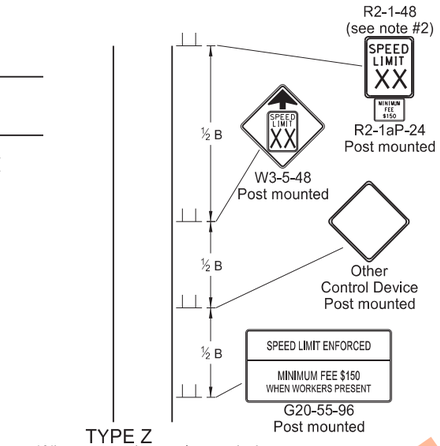
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# MISCELLANEOUS SIGN LAYOUTS

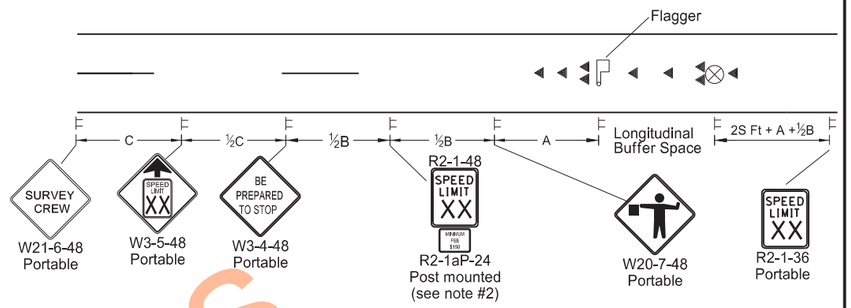
D-704-26



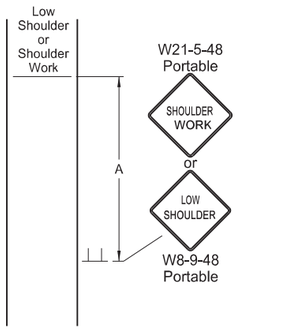

TYPE Y
Where haul road crosses highway outside major work area.
Signing shown for one direction only.



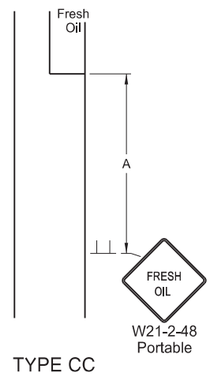

TYPE Z
Where speed zone is needed
Signing shown for one direction only.



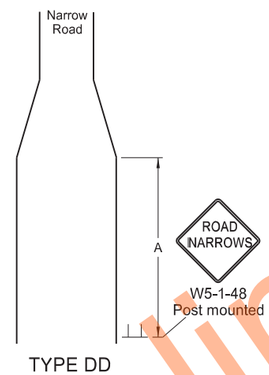

TYPE AA
Where survey crew is used
Signing shown for one direction only.



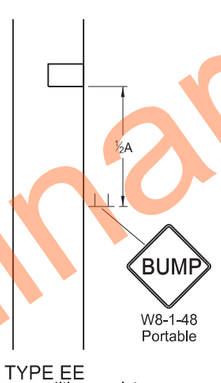

TYPE BB
Within major work area where sign conditions exist



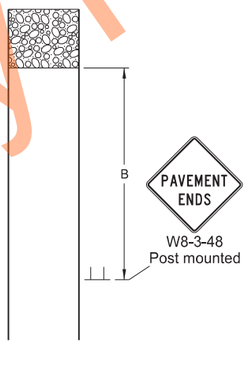

TYPE CC
Where sign conditions exist



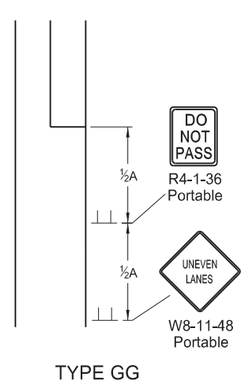

TYPE DD
Where sign conditions exist



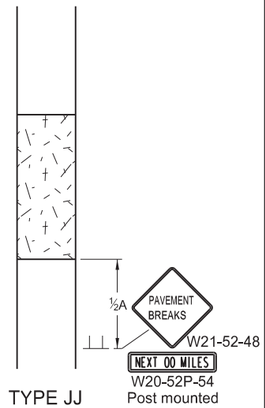

TYPE EE
Where sign conditions exist




TYPE FF
Where sign conditions exist
Signing shown for one direction only.

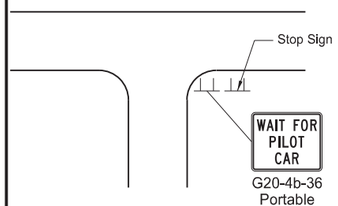



TYPE GG
Where elevation difference exists between lanes




TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.
Signing shown for one direction only.

KEY
Flagger
Sign
Cones
Survey Equipment
S = Numerical value of speed limit or 85th percentile.




TYPE KK
At major intersections within pilot car control area

Notes
1. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
2. Determine reduced speed limit based on in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
3. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
4. Cover existing speed limit signs within reduced speed zones.
5. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
6. Sign G20-55-96 is not required if this standard is part of other traffic control layouts, or work is less than 15 days.
7. When pilot car operation is used, place sign G20-4b-36 "Wait For Pilot Car" at major intersections within pilot car control area.
8. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
9. Layouts shown for one direction only.

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

Longitudinal Buffer Space

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

| DATE | CHANGE |
|---|---|
| 08-17-17 | Added speed limit signs. Updated notes & sign numbers |
| 11-01-19 | Revised note 5 & sign numbers |
| 02-23-23 | Revised distance & removed signs |
| 06-30-25 | Legislative Changes |

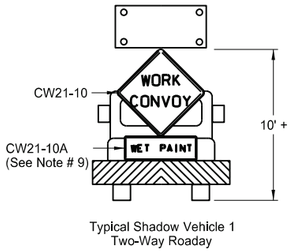
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

Preliminary Plans

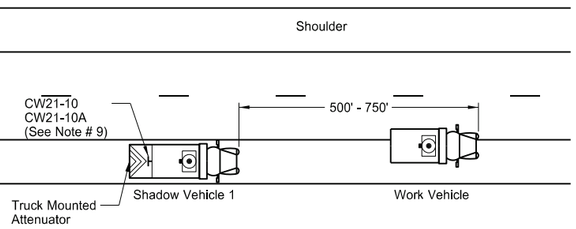
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# MOBILE OPERATION
# (PAVEMENT MARKING)

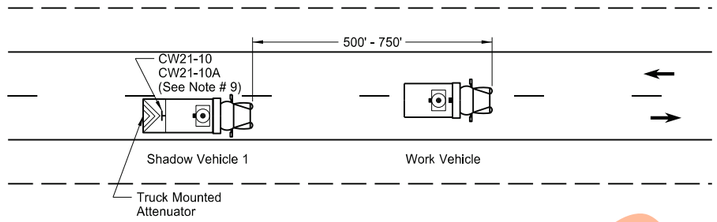
D-704-27




Typical Shadow Vehicle 1
Two-Way Roaday

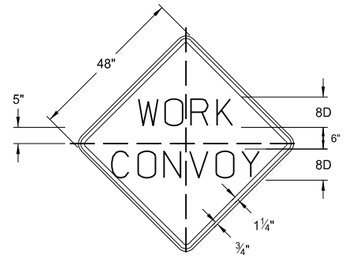



Two-Way Roadway with Paved Shoulders

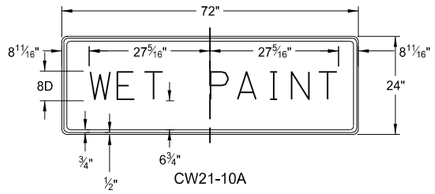



Two-Way Roadway without Paved Shoulders

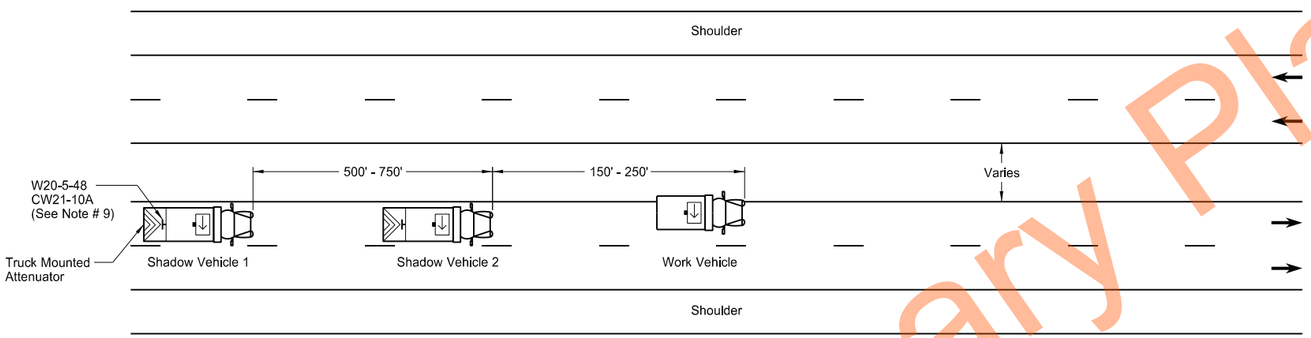
Sign Details




CW21-10

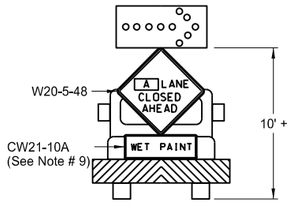



CW21-10A



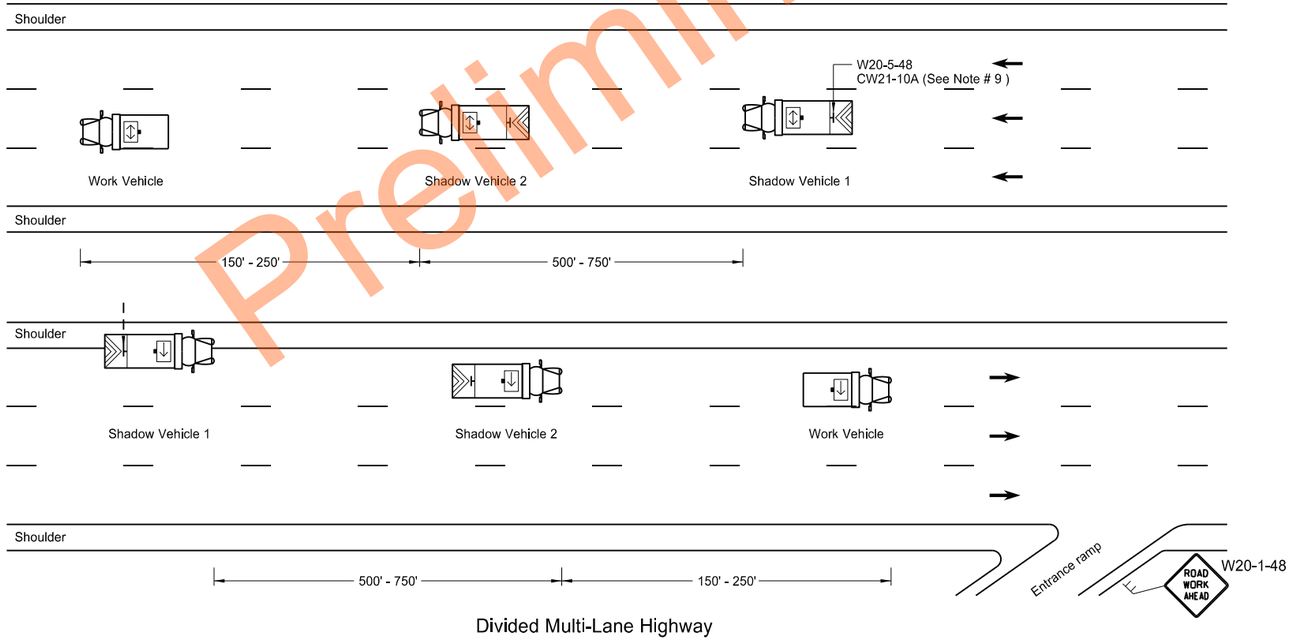

Undivided Multi-Lane Roadway

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




Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center




Divided Multi-Lane Highway

KEY

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

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-27-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 6-18-14 | Removed shadow vehicle 2 on two lane roadways |
| 9-27-17 | Updated to active voice |
| 11-08-19 | Changed Standard Heading |
| 8-02-24 | Electronic Stamp/Signature. |

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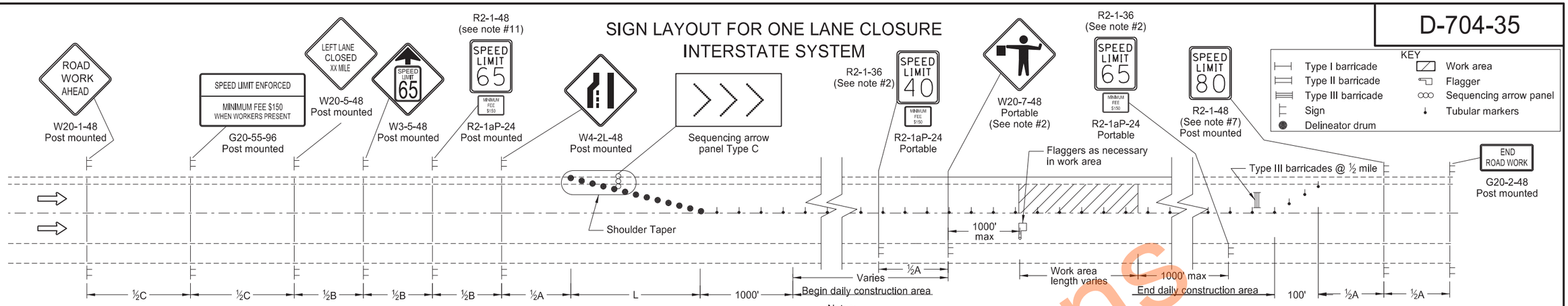
08/02/24

Preliminary Plans

Docusign Envelope ID: E17899F0-B912-4482-BF85-7148763D5F5D

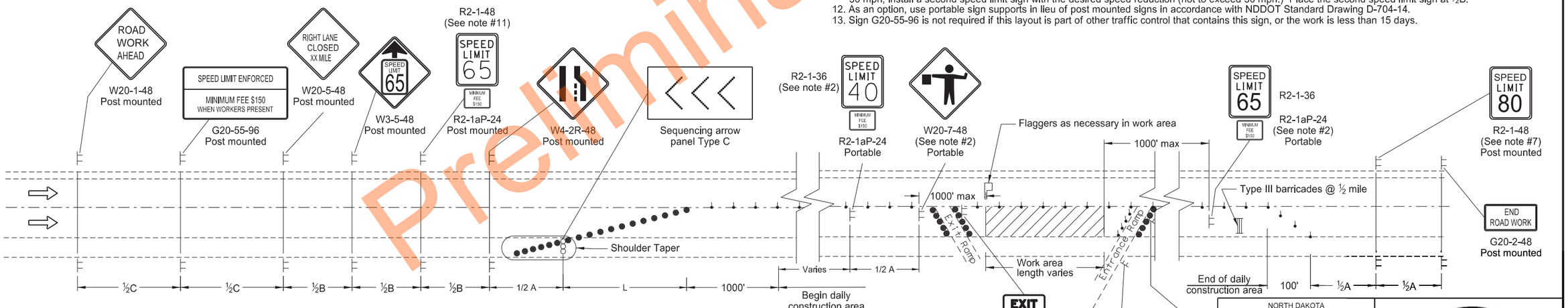
# D-704-35

## SIGN LAYOUT FOR ONE LANE CLOSURE INTERSTATE SYSTEM




LEFT LANE CLOSED
WORKERS IN WORK AREA

| ADVANCE WARNING SIGN SPACING | | | |
|---|---|---|---|
| Road Type | Distance Between Signs Min (ft) | | |
| | A | B | C |
| Rural - High Speed (over 50 mph to 65 mph) | 720 | 720 | 720 |
| Urban Expressway and Freeway (55 mph to 60 mph) | 850 | 1350 | 2200 |
| Rural Expressway and Freeway (70 mph to 80 mph) | 1000 | 1500 | 2640 |
| Interstate/4-Lane Divided (Maintenance and Surveying) | 750 | 1000 | 1500 |




RIGHT LANE CLOSED
WORKERS IN WORK AREA

Notes:
1. Install advance signs for flagging when flaggers are flagging.
2. Move the advanced flagger sign and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Space the 40 mph speed limit sign at ½A in advance of the flagger sign and move the 65 mph speed limit sign. Cover or remove the 40 mph speed limit and Minimum Fee $150 signs and the 65 mph speed limit sign upon completion of the work day or when workers are not present.
3. RAMPS: When the work area encompasses an entrance ramp, install a 40 mph speed limit sign on the ramp and cover any existing yield sign. Install new yield sign as necessary. Remove the ramp speed limit sign when the main line 40 mph speed zone is moved past the ramp.
4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   WxSxS/60 for urban, residential, and other streets with speeds of 40 mph or less.
5. Space delineator drums for tapering traffic at the dimension "S". Space tubular markers used for tangents at 2 times dimension "S".
6. 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 the roadway surface.
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
7. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
8. Cover existing speed limit signs within a reduced speed zone.
9. Upon approval, the Engineer will measure obliterated or covered pavement marking as Obliteration of Pavement Marking.
10. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the diamond sign, and at such a distance above the edge that the flag does not touch the sign when limp.
11. Determine the reduced speed limit dependent on the in place speed limit before construction. When speed limits are to be reduced more than 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
13. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.

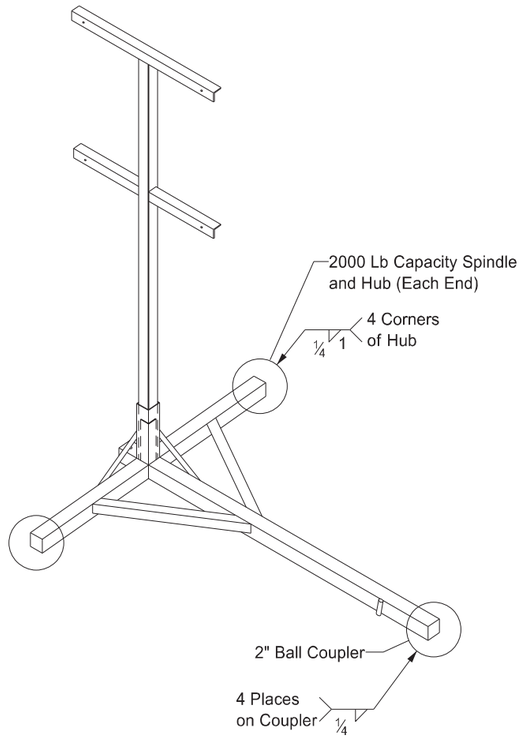
Preliminary Plans

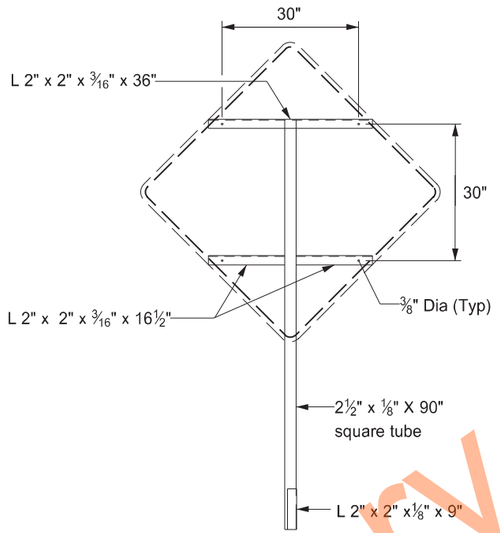
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 9-7-2012 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-23-14 | Revised Note 12 |
| 03-15-16 | Removed Do Not Pass signs & updated notes |
| 08-17-17 | Moved speed signs & added note |
| 10-17-17 | Corrected spelling of "shoulder" |
| 11-01-19 | Revised tubular Mrkrs symbols |
| 12-08-21 | Switched order of Road Work Ahead and Spd Limit Enforced, added Dollars At Work, & removed table |
| 11-29-22 | Removed Dollars At Work |
| 06-30-25 | Legislative Changes |

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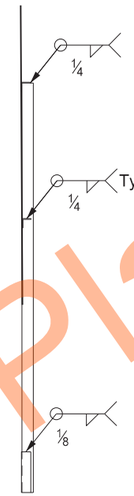
# PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



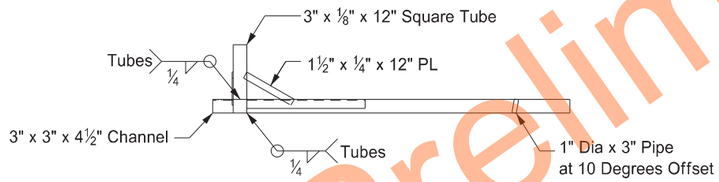



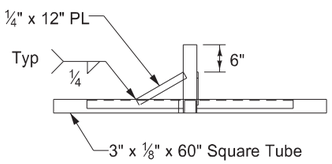

FRONT



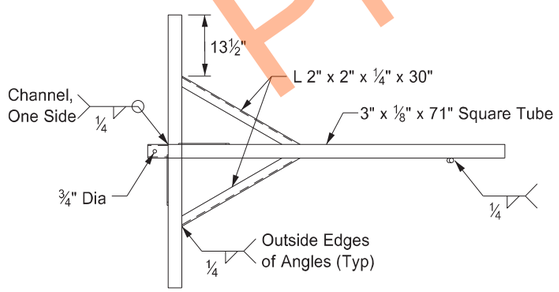

RIGHT

SIGN SUPPORT




RIGHT




TOP

TRAILER

Notes:

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

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

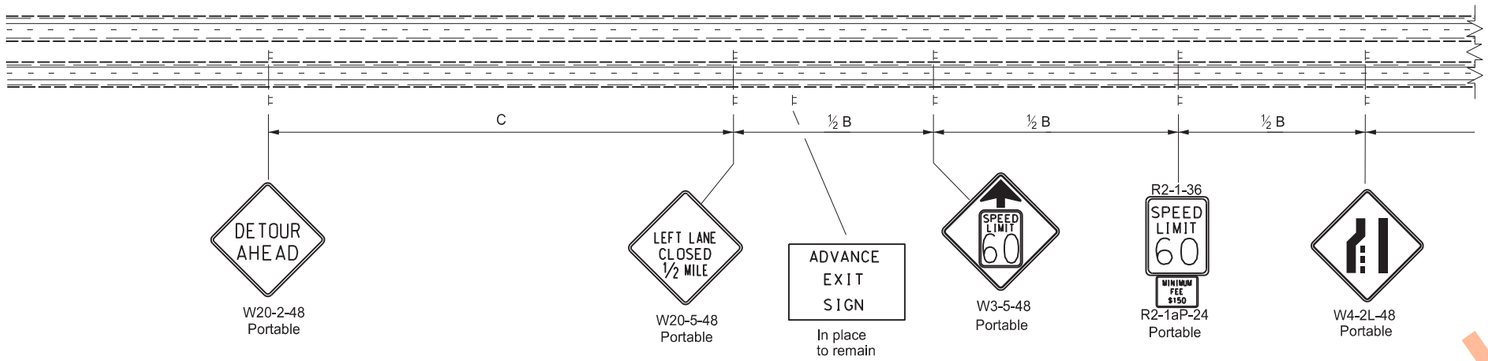
KIRK J. HOFF
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NORTH DAKOTA
12 02 2020

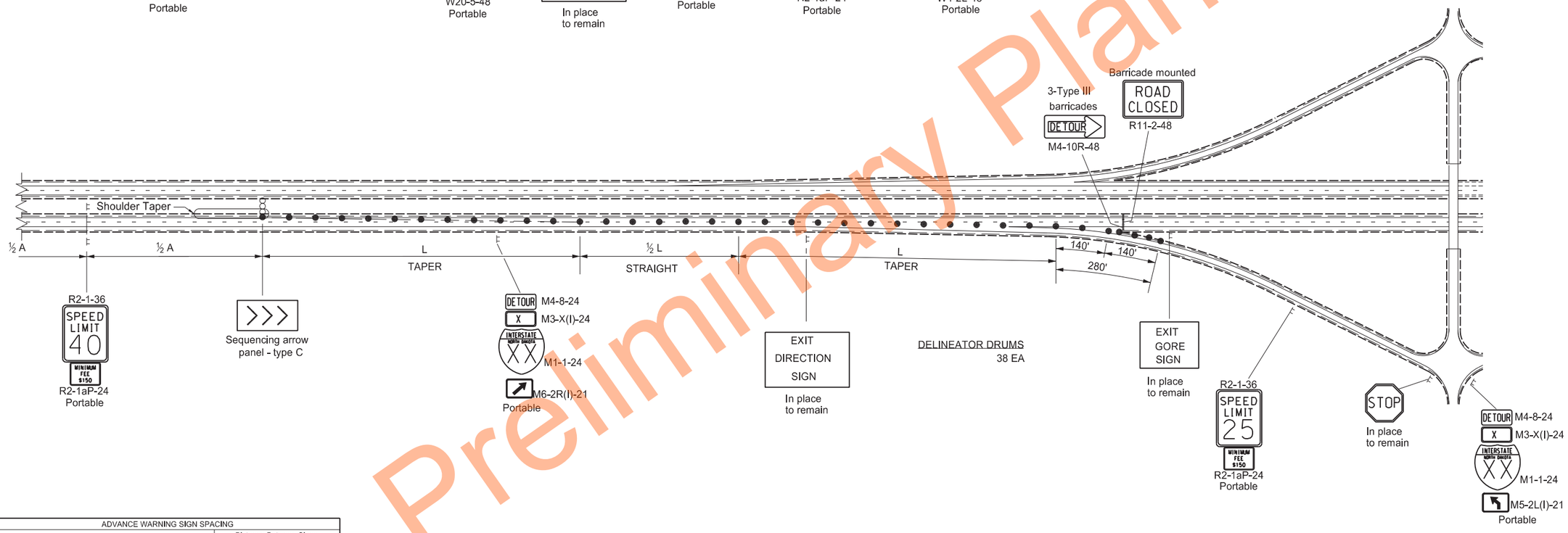
Preliminary Plans

Docusign Envelope ID: E17899F0-B912-4482-BF85-7148763D5F5D

# INTERSTATE ROAD CLOSURE USING RAMPS
# CLOSURE FOR LESS THAN ONE DAY
# and Crossroad is not Closed

D-704-52




Notes:

1. Variables
   S = Numerical value of speed limit or 85th percentile prior to work starting.
   W = The width of the taper.
   L = Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums used for tapering traffic at dimension "S". Space delineator drums used for tangents at two times "S".
3. Sequencing Arrow Panels
   Place 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 the roadway surface. Use Type C Sequencing Arrow Panel.
4. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
5. Cover existing speed limit signs within a reduced speed zone.
6. Remove signs or lay them flat on the foreslope at the end of each day's work. Remove delineator drums or place on the outside shoulder along the outside edge of the shoulder at the end of each day's work.

Preliminary Plans

| 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 80 mph) | 1000 | 1500 | 2640 |
| Interstate/4-Lane Divided (Maintenance and Surveying) | 750 | 1000 | 1500 |

KEY
- Sequencing arrow panel
- Type III barricade
- Sign
- Delineator drum

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

09-05-12

REVISIONS

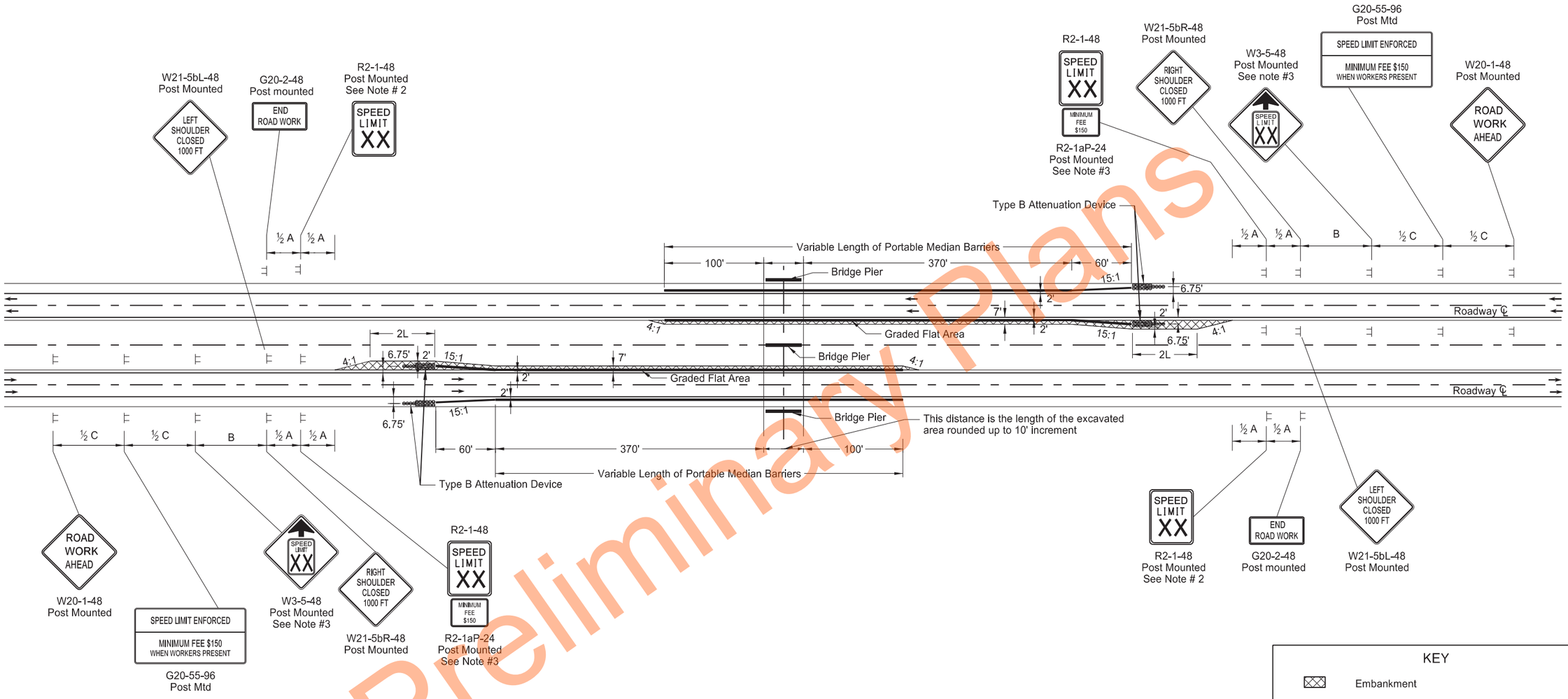
| DATE | CHANGE |
|---|---|
| 06-24-14 | Updated sign sizes and added mounting type |
| 03-15-16 | Removed Do Not Pass signs and updated notes |
| 11-01-19 | Revised note, sign #, & del drums |
| 08-02-24 | Electronic Stamp/Signature |
| 06-30-25 | Legislative Changes |

KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 06/30/25 ENGINEER NORTH DAKOTA

Docusign Envelope ID: E17899F0-B912-4482-BF85-7148763D5F5D

# Divided Highway Operation for Overhead Structure, Pier, and Footing Replacement

D-704-58




Preliminary Plans

| 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 80 mph) | 1000 | 1500 | 2640 |
| Interstate/4-Lane Divided (Maintenance and Surveying) | 750 | 1000 | 1500 |

Notes:

1. Use when a bridge structure is being constructed.
2. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
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. Close roadway at separations or use ramps at interchanges during removal and installation of beams. See notes in the plans for traffic control requirements for this operation.
5. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.

L = length of attenuation device

KEY

- Embankment
- Sign
- Type B Attenuation Device
- Portable Median Barrier

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-18-15

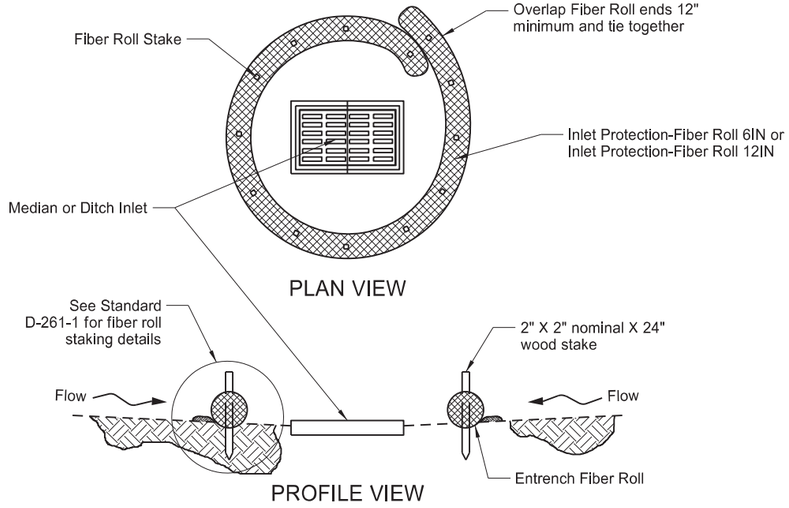
REVISIONS

| DATE | CHANGE |
|---|---|
| 09-18-15 | Revised Standard Description |
| 09-27-17 | Updated to active voice |
| 11-01-19 | Atten Device, hatching, & sign #s |
| 12-08-21 | Added Minimum Fee sign and Dollars At Work sign |
| 11-29-22 | Removed Dollars At Work |
| 08-21-24 | Portable Median Barrier Wording |
| 06-30-25 | Legislative Changes |

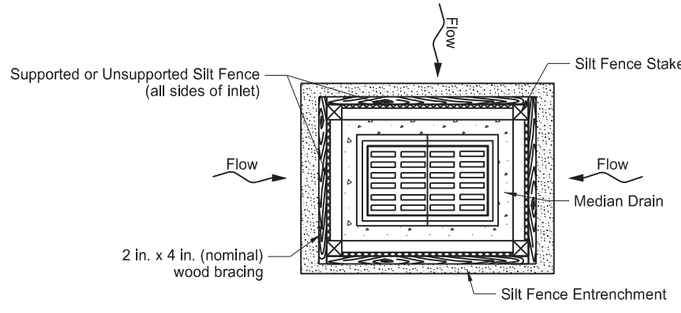
KIRK J. HOFF
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PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

# EROSION AND SILTATION CONTROLS

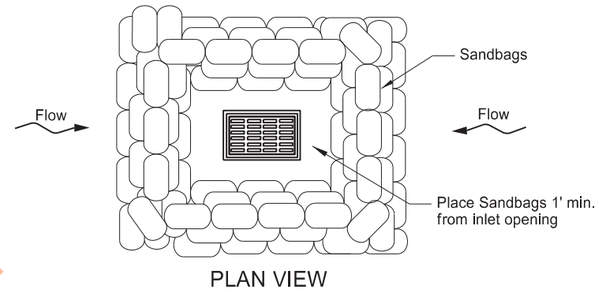
## FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



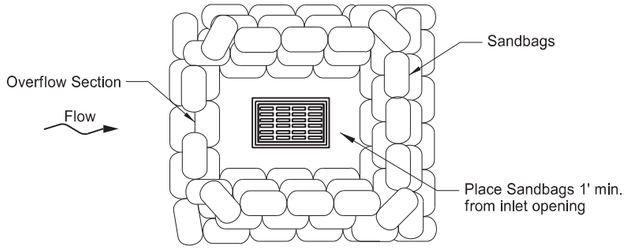

## MEDIAN OR DITCH INLET PROTECTION



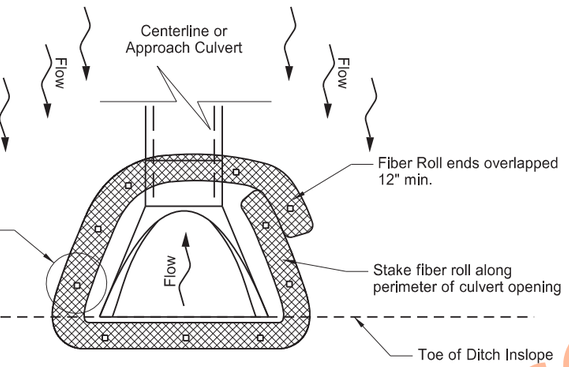

## SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



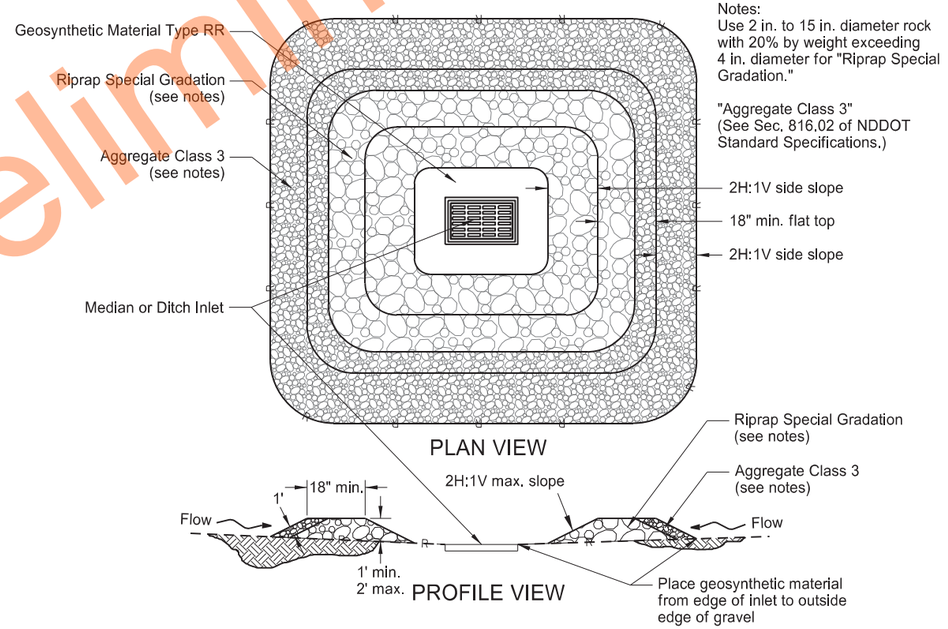

## SANDBAG PROTECTION (LOW POINT)




## SANDBAG PROTECTION (ON SLOPE)




## FIBER ROLL PROTECTION (INLET OF CULVERT)




## GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-03-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 06-26-14 | Updated reference to standard drawing number for fiber roll staking details. |
| 10-01-14 | Updated reference to standard drawing number for silt fence. |
| 10-17-17 | Updated to active voice. |
| 08-27-19 | New Design Engineer PE Stamp. |

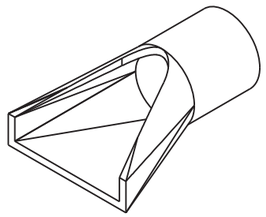
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8-27-19 and the original document is stored at the North Dakota Department of Transportation

Preliminary Plans

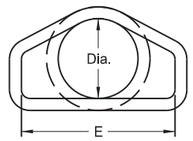
# REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
## (Round Pipe)

D-714-1

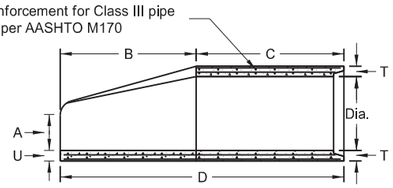
| FLARED END SECTION TERMINAL DIMENSIONS | | | | | | |
|---|---|---|---|---|---|---|
| DIA | A | B | C | D | E | U |
| 12 | 0'-4" | 2'-0" | 4'-0⅞" | 6'-0⅞" | 2'-0" | 2" |
| 15 | 0'-6" | 2'-3" | 3'-10" | 6'-1" | 2'-6" | 2¼" |
| 18 | 0'-9" | 2'-3" | 3'-10" | 6'-1" | 3'-0" | 2½" |
| 21 | 0'-9" | 3'-0" | 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" |



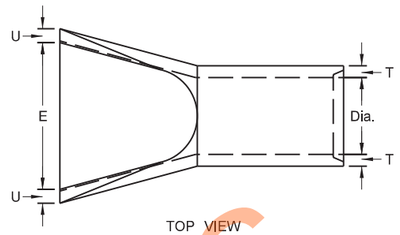
PERSPECTIVE




END VIEW




SIDE VIEW



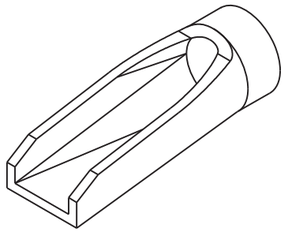

TOP VIEW

### REINFORCED CONCRETE PIPE - FLARED END SECTION
Reinforcement to be equivalent to Class III RCP

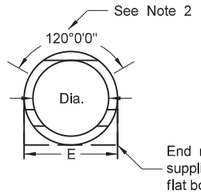
NOTES:

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.

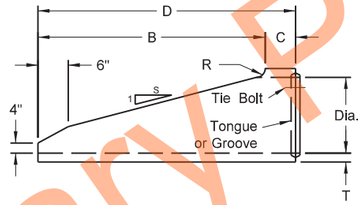
| TRAVERSABLE END SECTION | | | | | | |
|---|---|---|---|---|---|---|
| DIA | B | C | D | E | R | S |
| 15" | 4' | 9" | 4'-9" | 1'-7½" | 3" | 6 |
| 18" | 5'-9" | 9" | 6'-6" | 1'-11" | 3" | 6 |
| 24" | 6' | 1' | 7' | 2'-6" | 3" | 4 |
| 30" | 7'-6" | 1' | 8'-6" | 3'-1" | 3½" | 4 |
| 36" | 7'-3" | 15" |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



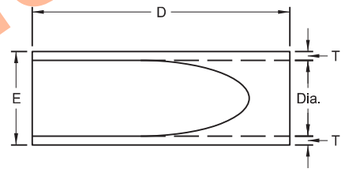
PERSPECTIVE




END VIEW




SIDE VIEW



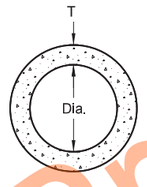

TOP VIEW

NOTES (Traversable End Section):

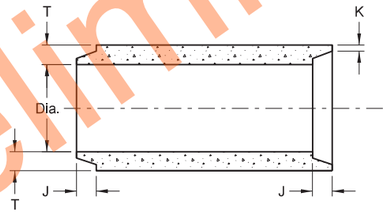
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

### REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION
Reinforcement to be equivalent to Class III RCP

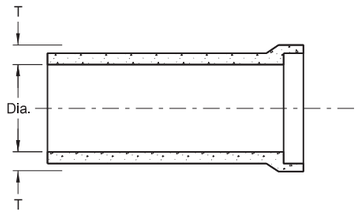
| All Classifications of Round Concrete Pipe | | | | | |
|---|---|---|---|---|---|
| Internal Dia. of Pipe in Inches | Cross-Sectional Water Area | Weight per lin. foot of Pipe Std. Wall | Joint J Groove End Min./Max. | Joint K Tongue End Min. | Minimum Wall Thickness (T) |
| Dia | Sq. ft. | Lbs. | In. | In. | In. |
| 12 | 0.79 | 92 | 1⅛-2⅛ | ¾ | 2 |
| 15 | 1.23 | 127 | 1⅛-2¼ | ⅞ | 2¼ |
| 18 | 1.77 | 168 | 1⅛-2⅛ | 1 | 2½ |
| 21 | 2.40 | 214 | 1⅛-3⅛ | 1⅛ | 2¾ |
| 24 | 3.14 | 265 | 2¾-3¾ | 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 | 3¼-4¼ | 1½ | 4 |
| 42 | 9.62 | 685 | 3⅜-4¾ | 1¾ | 4½ |
| 48 | 12.57 | 685 | 3⅜-4¾ | 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 | 5⅛-6¾ | 2⅝ | 7 |
| 78 | 33.18 | 2098 | 6¼-7¼ | 2⅞ | 7½ |
| 84 | 38.48 | 2410 | 5⅛-7¾ | 3⅜ | 8 |
| 90 | 44.18 | 2793 | 6¾-8½ | 3¼ | 8½ |
| 96 | 50.27 | 3092 | 7-8¾ | 3½ | 9 |
| 102 | 56.75 | 3466 | 7-8¾ | 3½ | 9½ |
| 108 | 63.62 | 3864 | 7¼-8½ | 3¾ | 10 |



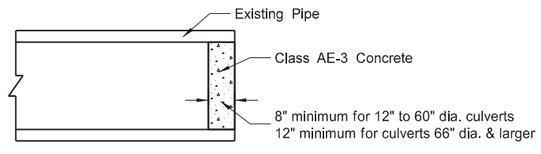

END VIEW




TONGUE & GROOVE JOINT




BELL & SPIGOT JOINT




CONCRETE PIPE PLUG

CIRCULAR PIPE

JOINTS FOR REINFORCED CONCRETE PIPE

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

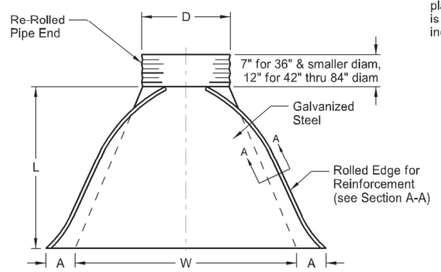
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 05-12-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 01-21-15 | Revised Note 5 |
| 11-21-16 | Revised End Section Dimensions |
| 09-18-19 | Updated Perspective View Details |

This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

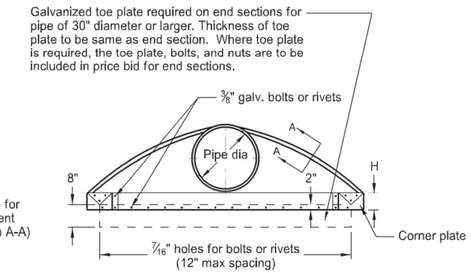
Preliminary Plans

# ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

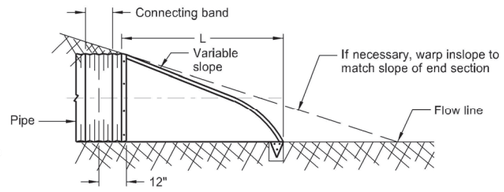
D-714-4



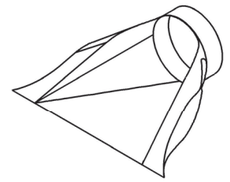

PLAN VIEW




ELEVATION VIEW




TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

| * * PIPE DIA. | GALVANIZED THICKNESS | END SECTION DIMENSIONS A | B | H | L | W | APPROX. SLOPE | BODY |
|---|---|---|---|---|---|---|---|---|
| IN | IN | IN | IN | IN | IN | IN | RATE | PIECE |
| 15 | 0.064 - 0.079 | 7 | 8 | 6 | 26 | 30 | 2½:1 | 1 |
| 18 | 0.064 - 0.109 | 8 | 10 | 6 | 31 | 36 | 2½:1 | 1 |
| 24 | 0.064 - 0.109 | 10 | 13 | 6 | 41 | 48 | 2½:1 | 1 |
| 30 | 0.064 - 0.109 | 12 | 16 | 8 | 51 | 60 | 2½:1 | 1 or 2 |
| 36 | 0.064 - 0.109 | 14 | 19 | 9 | 60 | 72 | 2½:1 | 2 |
| 42 | 0.064 - 0.138 | 16 | 22 | 11 | 69 | 84 | 2½:1 | 2 |
| 48 | 0.064 - 0.168 | 18 | 27 | 12 | 78 | 90 | 2¼:1 | 2 |
| 54 | 0.064 - 0.168 | 18 | 30 | 12 | 84 | 102 | 2:1 | 2 |
| * 60 | 0.064 - 0.168 | 18 | 33 | 12 | 87 | 114 | 1¾:1 | 3 |
| * 66 | 0.064 - 0.168 | 18 | 36 | 12 | 87 | 120 | 1½:1 | 3 |
| * 72 | 0.064 - 0.168 | 18 | 39 | 12 | 87 | 126 | 1½:1 | 3 |
| * 78 | 0.064 - 0.168 | 18 | 42 | 12 | 87 | 132 | 1¼:1 | 3 |
| * 84 | 0.064 - 0.168 | 18 | 45 | 12 | 87 | 138 | 1⅛:1 | 3 |

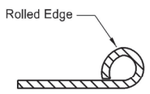
* These sizes have 0.109" sides and 0.138" center panels.

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

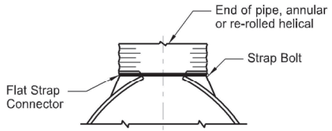
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

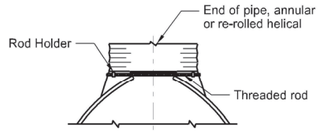
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



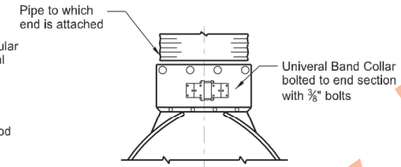

SECTION A-A




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




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

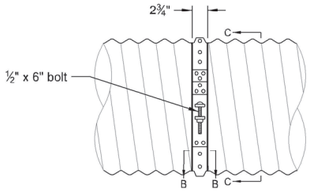



TYPE #3
For all pipe sizes

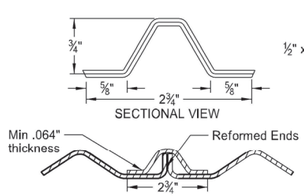
| COUPLING BAND DIMENSIONS | | | | |
|---|---|---|---|---|
| COUPLING TYPE | CORRUGATION PITCH x DEPTH | PIPE SIZE | COUPLING BAND LENGTH | MIN. BAND THICKNESS |
| Hat Band | 2⅔" x ½" | 12" - 48" | 2¾" | .064" |
| Annular Band | 2⅔" x ½" | 12" - 72" | 12" | .052" |
| | | 78" - 84" | 12" | .079" |
| |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

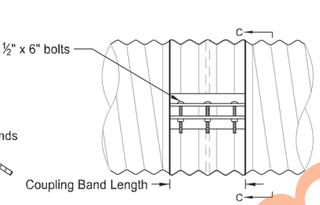



SECTIONAL VIEW

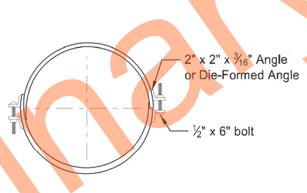



SECTION B-B

HAT BAND FOR FLANGED END PIPE

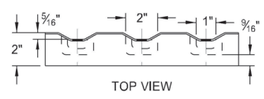



SIDE VIEW

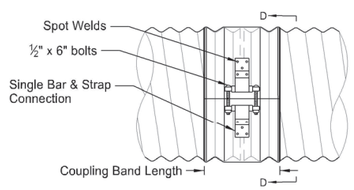



SECTION C-C
Angle Connection

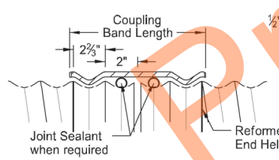
ANNULAR BAND




TOP VIEW
Die-Formed Angle Connector

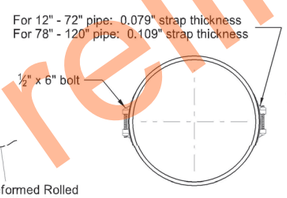



SIDE VIEW

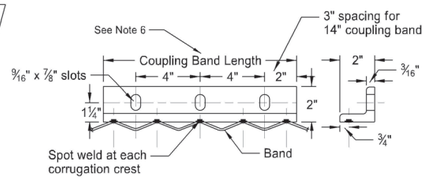



SECTIONAL VIEW

HUGGER COUPLING BAND



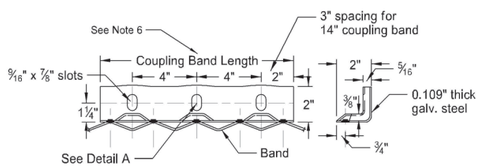

SECTION D-D
Bar & Strap Connection




SIDE VIEW

END VIEW

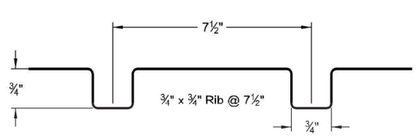
2" x 2" x 3/16" Angle Connector

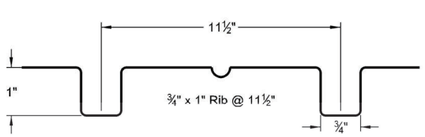



SIDE VIEW

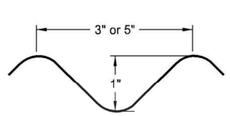
END VIEW

Die-Formed Angle Connector

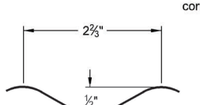


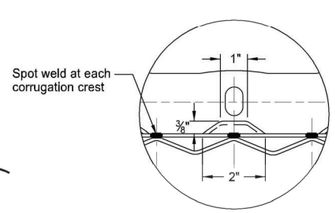

SPIRAL RIB CORRUGATIONS




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




2⅔" x ½" CORRUGATIONS




Detail A

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 08-16-13 | |
| REVISIONS | |
| DATE | CHANGE |
| 01-07-14 | End Section Plan View |
| 02-27-14 | 3" x 1" Corrugation Detail |
| 09-18-19 | Added Perspective View Detail |
| 09-23-22 | Galvanized Thickness Table |

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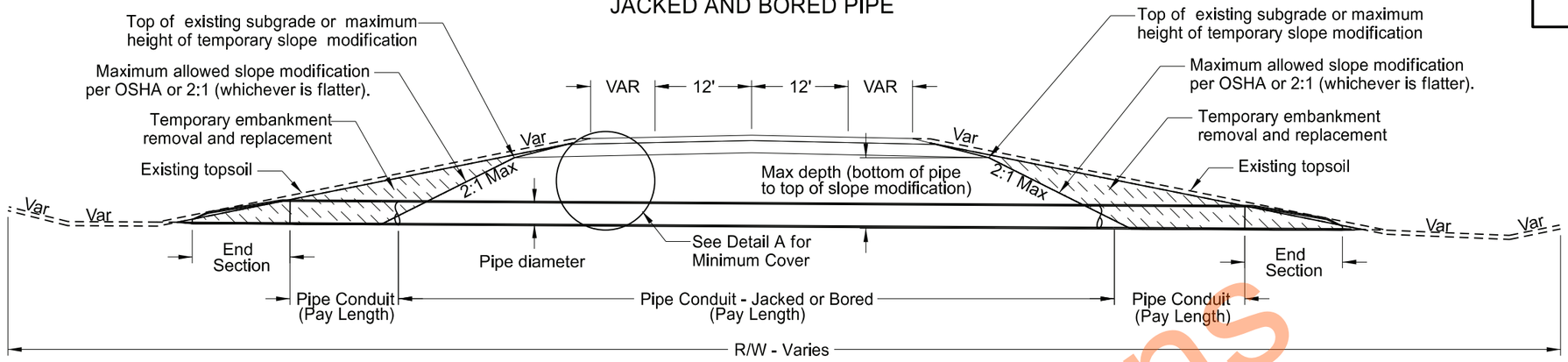
09/23/22

Preliminary Plans

DocuSign

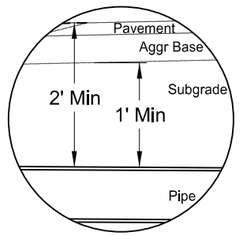
D-714-16

# JACKED AND BORED PIPE

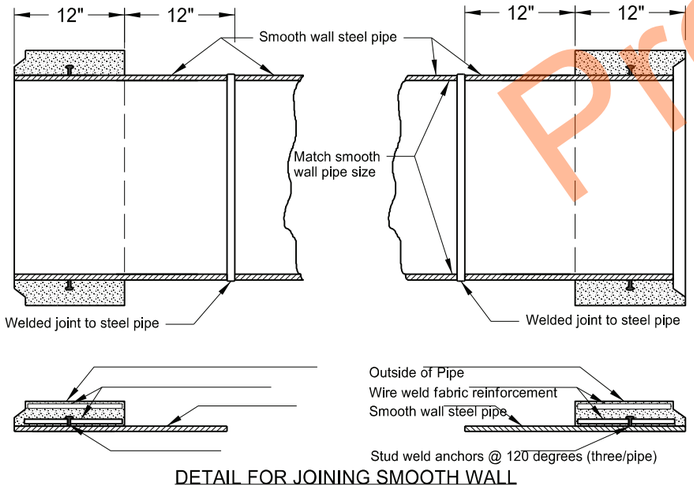



JACKED AND BORED PAY LENGTH

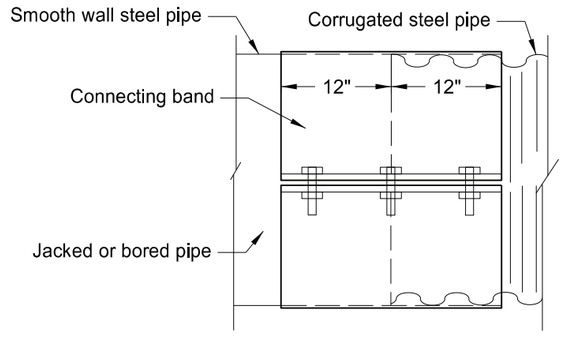
NOTE: This Detail applies to jacked and bored pipe under a roadway embankment. Additional coordination and design are needed for railroad embankments.




Detail A - Minimum Cover
2' Top of Pavement to Top of Pipe, and 1' Top of Subgrade to Top of Pipe




DETAIL FOR JOINING SMOOTH WALL STEEL PIPE TO REINFORCED CONCRETE PIPE




CONNECTING BAND FOR JOINING SMOOTH WALL STEEL PIPE TO CORRUGATED PIPE

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 07-15-2022 | |
| REVISIONS | |
| DATE | CHANGE |
| 08-31-2023 | Corrected spelling of corrugated. |

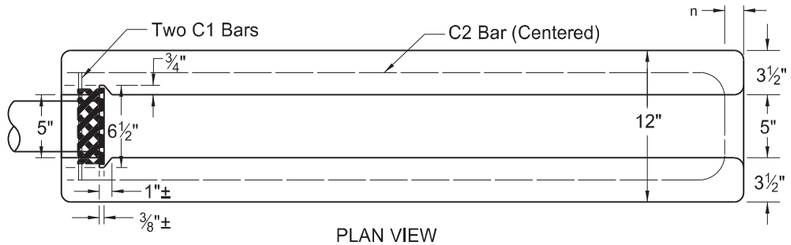
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/31/23

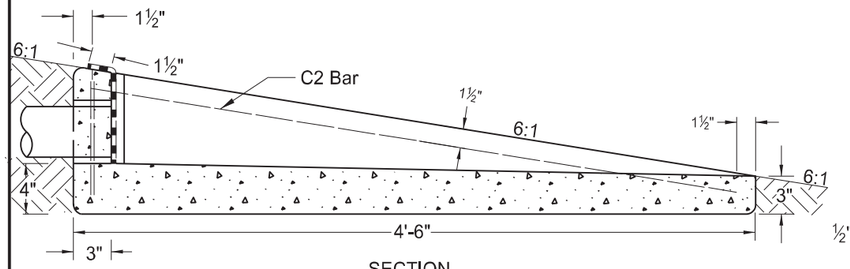
Preliminary Plans

# PRECAST CONCRETE HEADWALL DETAILS

D-714-18

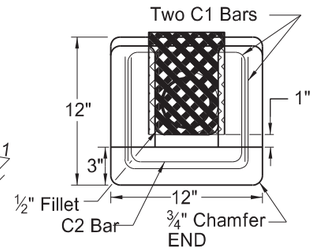


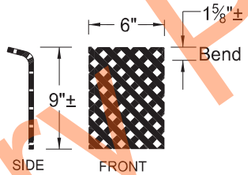

PLAN VIEW




SECTION

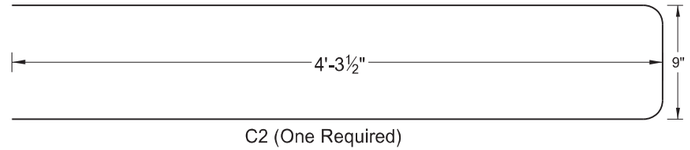
PRECAST CONCRETE HEADWALL (6:1 SLOPE)



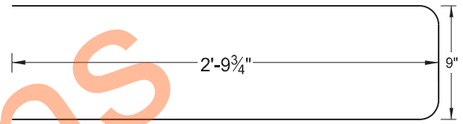




RODENT SCREEN

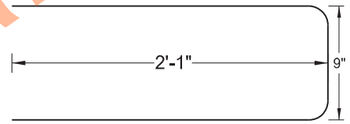
Dimensions are approximate to allow bend and a snug fit in headwall slot



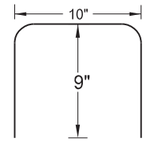

C2 (One Required)




C3 (One Required)

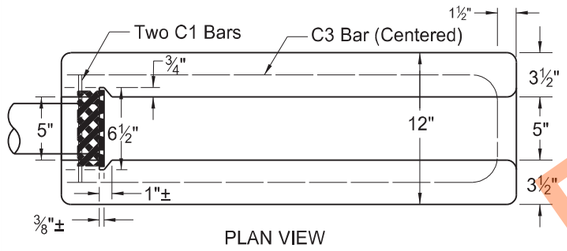



C4 (One Required)

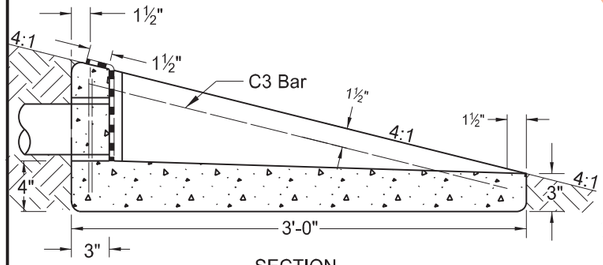



C1 (Two Required)

BENT BAR DETAILS

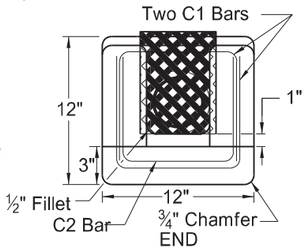


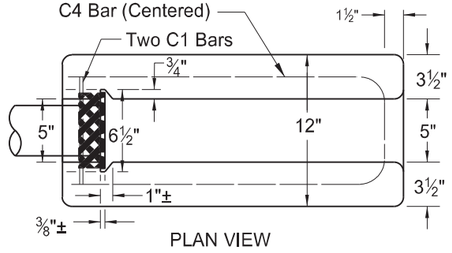

PLAN VIEW



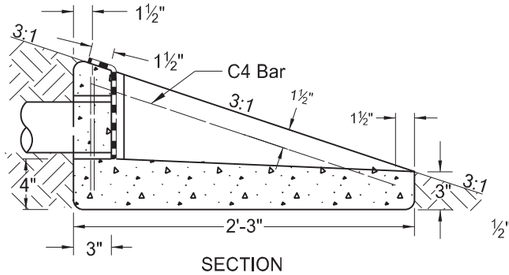

SECTION

PRECAST CONCRETE HEADWALL (4:1 SLOPE)



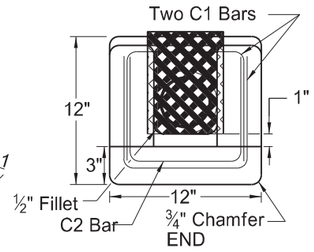




PLAN VIEW




SECTION

PRECAST CONCRETE HEADWALL (3:1 SLOPE)




NOTES:

RODENT SCREEN: Fabricate rodent screen from flattened expanded metal with screen openings of approximately 0.25 square inches. Use 16 ga metal, hot dip galvanized after fabrication, for the screen.

REINFORCING BARS: Use No. 4 deformed steel reinforcing bars.

BENT BARS: Bent bar dimensions given out to out.

SLOPE: Match headwall slope to foreslope.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-27-2010 | |
| REVISIONS | |
| DATE | CHANGE |
| 12/02/2020 | Removed drainable base details<br>Added 4:1 and 3:1 Headwalls |

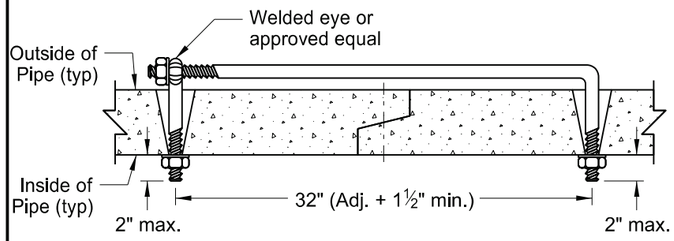
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

Preliminary Plans

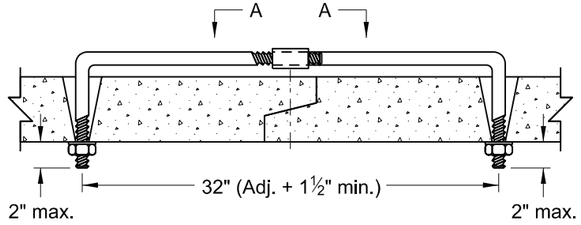
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# CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES

D-714-22

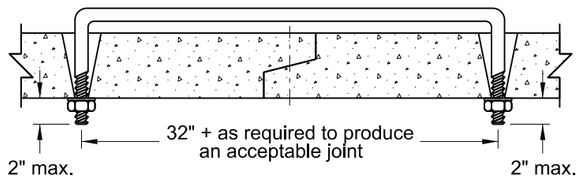



EYE BOLT TIE (PIPES ONLY)

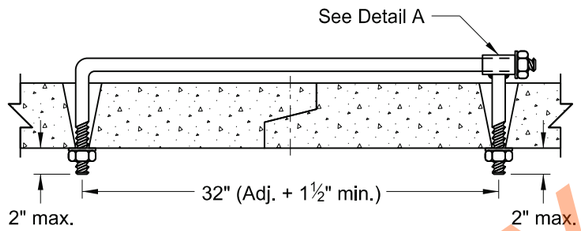



ADJUSTABLE TIE (PIPES ONLY)

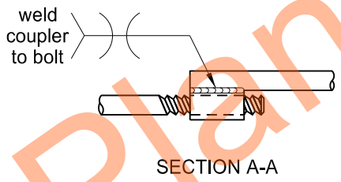
| REQUIRED SIZE OF TIE BOLTS | | |
|---|---|---|
| PIPE SIZE | THREAD ø | XXS PIPE SLEEVE INNER ø |
| 18" - 24" | ⅝" SEE NOTE 3 | ¾" |
| 30" - 66" | ¾" | 1" |
| 72" - 120" | 1" | 1¼" |
| RCB/CATTLE PASS | | |



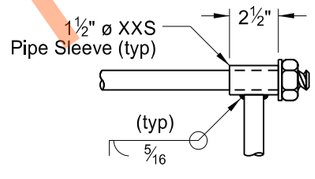

U BOLT TIE (PIPES OR CATTLE PASSES)



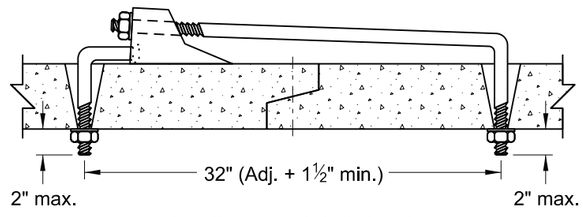

WELDED TIE (PIPES ONLY)



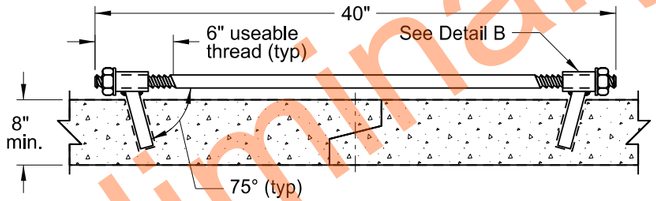

SECTION A-A



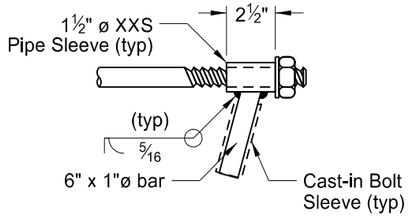

DETAIL A



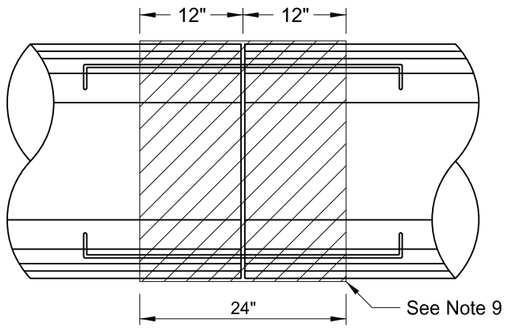

CANOPY TIE (PIPES ONLY)



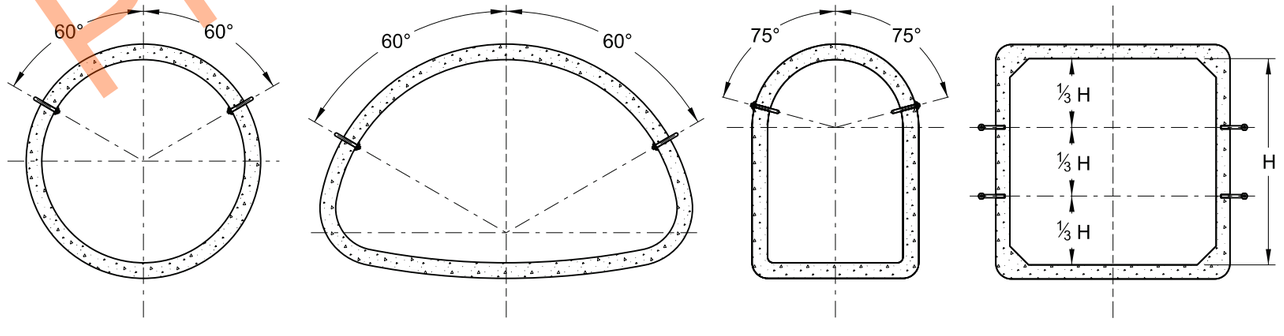

HIDDEN TIE (RCB ONLY)




DETAIL B




PLAN VIEW (PIPES ONLY)




END VIEW

NOTES:

1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Insert pipe ties from the inside of the pipes and grout into place for Cattle Pass and Jacked and Bored pipes. 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. Insert and grout tie bars into place where nuts and washers are not used.
4. Do not use pipe ties to pull the pipe or RCB sections tight. The ties are only for holding sections together.
5. Use only tie bolt assemblies that have been hot dip galvanized in accordance with ASTM A 153.
6. Holes in pipes to accommodate tie bolts will be precast. Tapered holes are permitted. Use holes that have a diameter ¼" larger than the diameter of the thread. In precast RCB's, use holes that contain cast-in bolt sleeves with an inside diameter of 1¼".
7. Include the cost of precasting the required holes and furnishing and installing the tie bolts in the price bid for the appropriate conduit or RCB pay item.
8. Tie all centerline and approach RCP culvert joints. Tie all joints including the end sections of all free ends of storm drain systems. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
9. Place joint wrap prior to installing ties. Firmly secure the wrap around the full perimeter. For concrete pipes, use Type S2 geotextile fabric and overlap the joint by 12" in both directions. For box culverts, use a waterproof membrane that meets ASTM C990. Provide a membrane that is a minimum of 12" wide and center it at the joint. Provide a minimum overlap of 2.5" at the seams.
10. Use tie bolts that conform to ASTM A 36. Use heavy hex nuts that conform to ASTM A 563. Use washers that conform to ASTM F 436, Type 1. Use welded pipe sleeves and cast-in bolt sleeves that conform to ASTM A 53, Grade B.
11. Provide lock washers or burr threads of concrete box ties after installation and tightening to prevent nut rotation.
12. Tie RCB's as noted in the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

3-18-14

REVISIONS

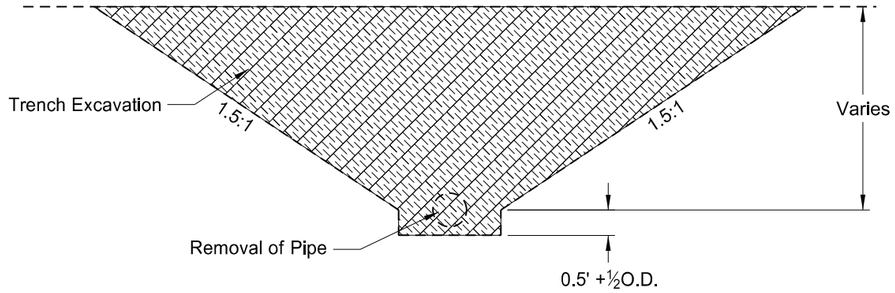
| DATE | CHANGE |
|---|---|
| 7-21-15 | Note 8 |
| 6-6-17 | Notes 2-11 Table, Title, Labels |
| 8-11-21 | Notes 2-12 Table, Label |
| 01-17-25 | Notes 9-13 Table, Labels Section A-A, End View |

REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE 01/17/25
NORTH DAKOTA

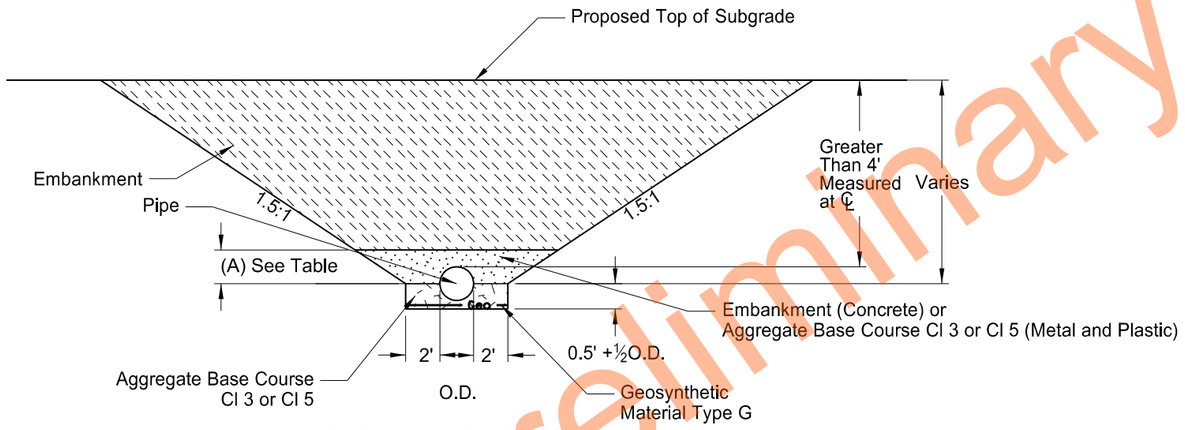
Preliminary Plans

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

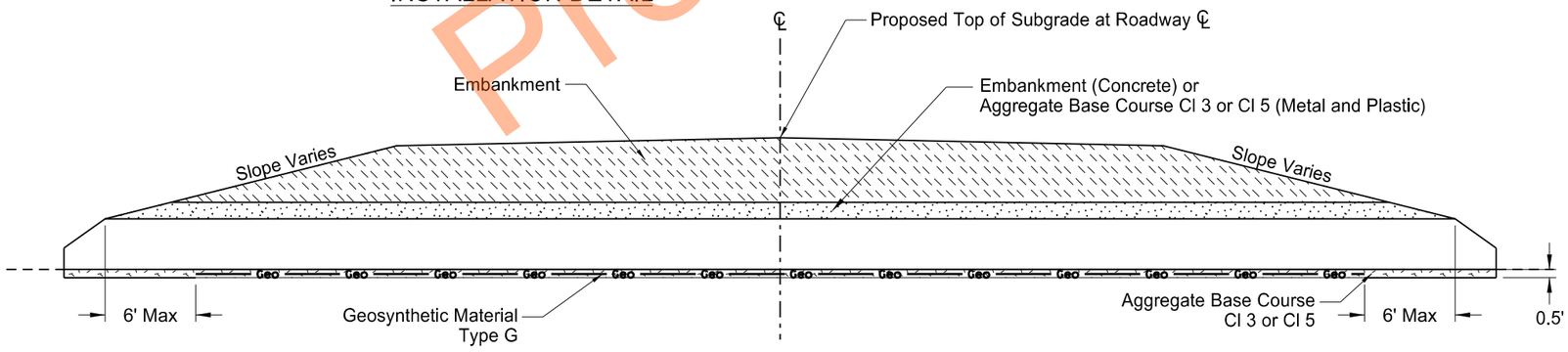
D-714-25




EXCAVATION DETAIL




INSTALLATION DETAIL




CROSS SECTION

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

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

NOTES:

1) This drawing applies to new/replaced mainline and paved intersection roadways (including ramps). It does not include pipes in approaches.

2) Embankment may be either Borrow Excavation or Common Excavation - Type A.

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

Preliminary Plans

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-26-13

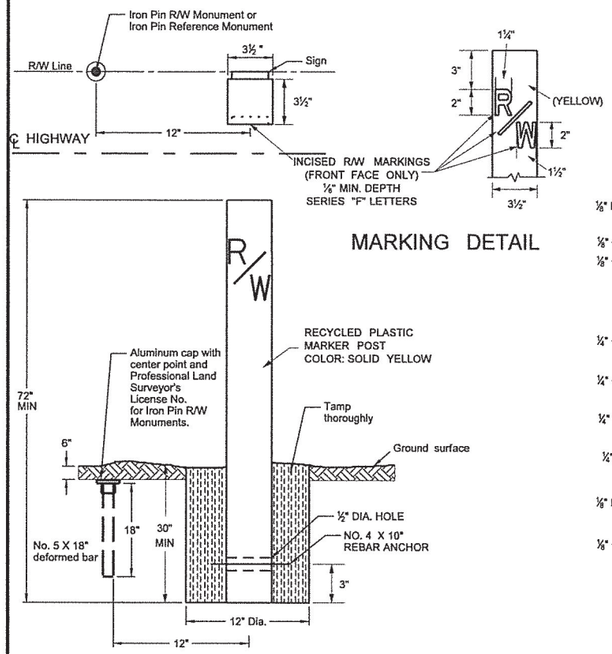
REVISIONS

| DATE | CHANGE |
|---|---|
| 10-15-13 | Label Formatting |
| 1-21-14 | Nomenclature |
| 9-18-15 | Title Rewording |
| 12-10-15 | Added Plastic Pipe |
| 5-27-20 | Replaced R1 Fabric with Geogrid<br>Changed bedding depth |

REGISTERED PROFESSIONAL ENGINEER
MATTHEW C KURLE
PE-8777
DATE
05/27/20
NORTH DAKOTA
DocuSign

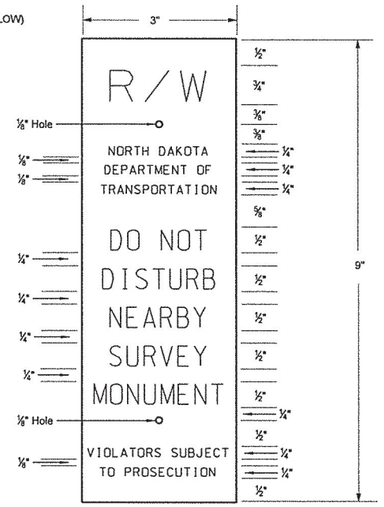
# STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

D-720-1




MARKING DETAIL

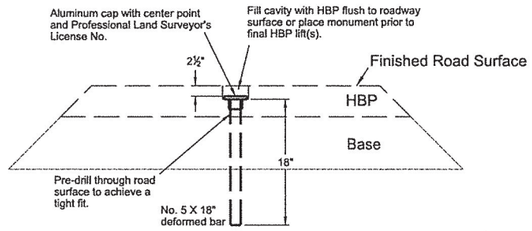
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



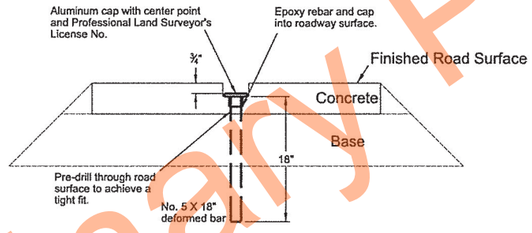

SIGN DETAIL

Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Attach sign by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Install sign 2" from top of post.

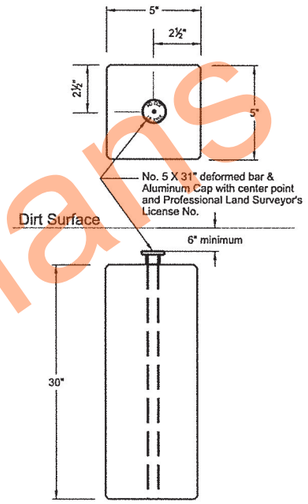
## ALIGNMENT MONUMENT DETAILS



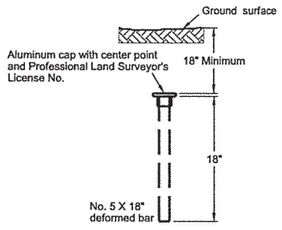

IRON PIN
(Within Finished Roadway Surface)




IRON PIN
(Within Finished Roadway Surface)




PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)




IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)

## NOTES:

Construct and install Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) according to Section 720 of the Standard Specifications.

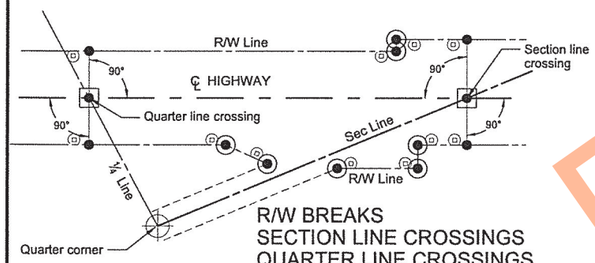
ALIGNMENT MONUMENTS: Place Iron Pin or Precast Concrete Alignment Monuments with aluminum caps on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

IRON PIN R/W MONUMENT: Place Iron Pns with aluminum caps (No. 5 X 18") at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

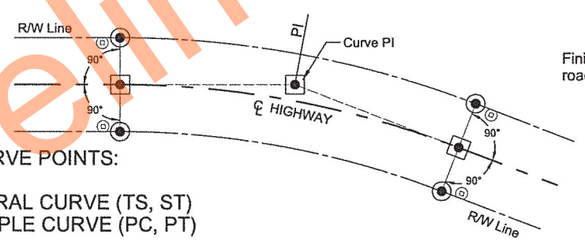
IRON PIN REFERENCE MONUMENT: Place Iron Pins without aluminum caps (No. 5 X 18") as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

R/W MARKERS (WITNESS POST) WITHIN DRIVEWAYS: If a single iron Pin R/W or Reference Monument is within a driveway, place right of way marker (witness post) 50 feet back, in stationing, from the Iron Pin Monument along the R/W line. If R/W break is within a driveway, place right of way markers (witness posts) 50 feet back, or ahead from respective Iron Pin R/W Monuments along the R/W lines. Maintain Iron Pin R/W or Reference Monument original position within driveway.

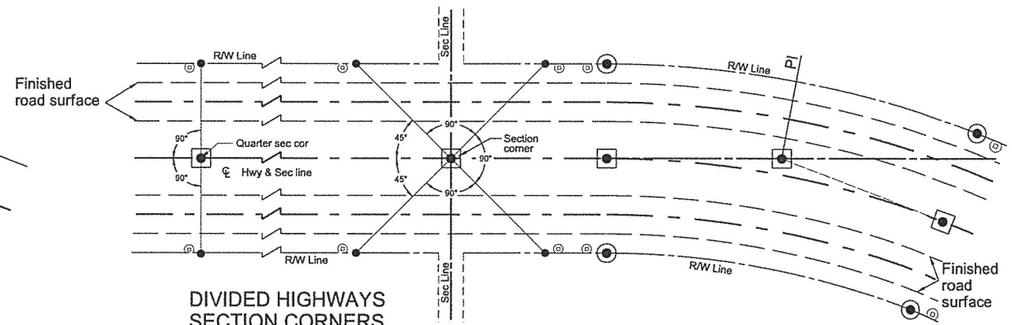
## VARIOUS MONUMENT AND MARKER PLACEMENTS



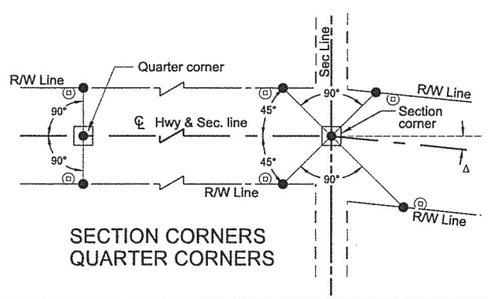

R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



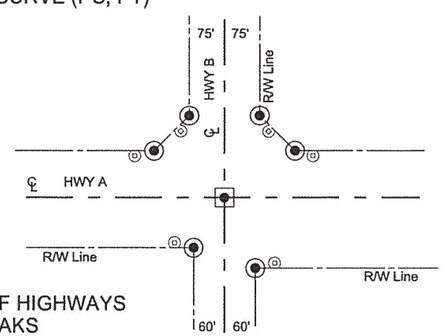

CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)




DIVIDED HIGHWAYS
SECTION CORNERS
QUARTER CORNERS




SECTION CORNERS
QUARTER CORNERS




INTERSECTION OF HIGHWAYS
FLARED R/W BREAKS

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-3-2013 | |
| REVISIONS | |
| DATE | CHANGE |
| 11/12/13 | Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38 |
| 10/17/17 | Updated to active voice. |
| 08/27/19 | New Design Engr PE Stamp. |

LEGEND
- Iron Pin Reference Monument
- R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

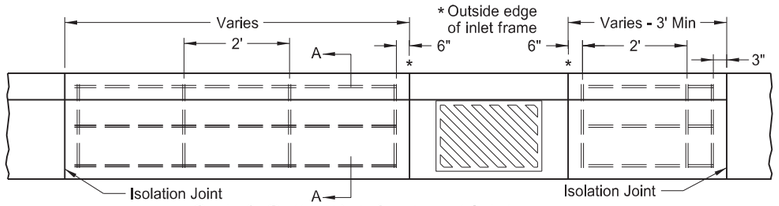
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE 4683
8/27/19
ENGINEER
NORTH DAKOTA

Preliminary Plans

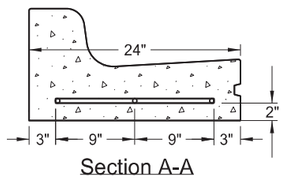
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# Curb & Gutter and Valley Gutter

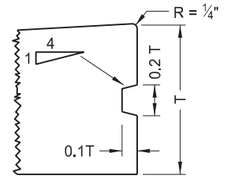
D-748-1




Curb & Gutter Reinforcing at Inlets



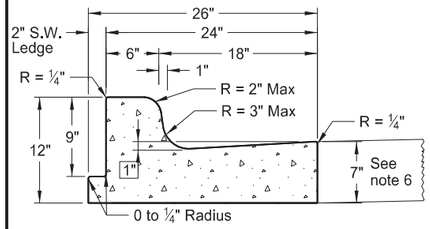

Section A-A



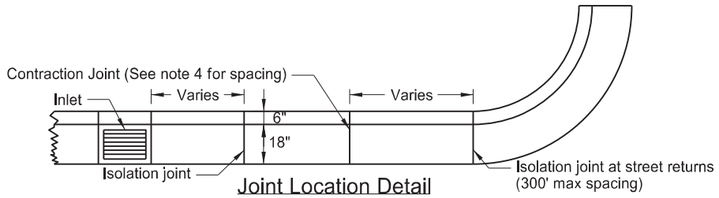

Keyway Detail for Curb & Gutter

(To be used with PCC Pavement and Drives)

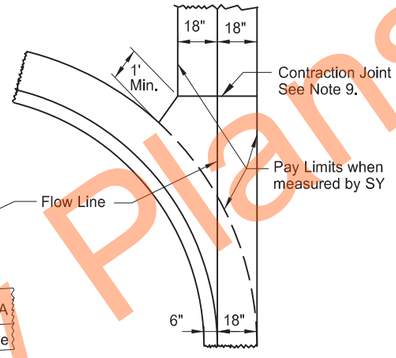
T= Thickness of pavement unless otherwise noted on plans.



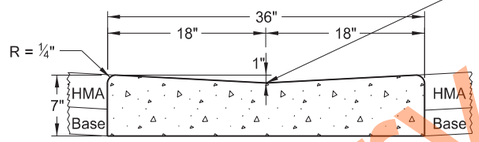

Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median, or Parking Lot. (Sec. A shown. See Sec B for additional details.)



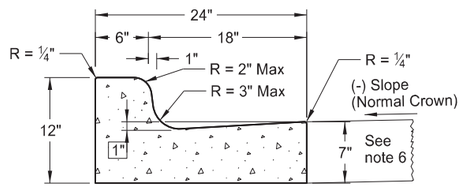

Joint Location Detail



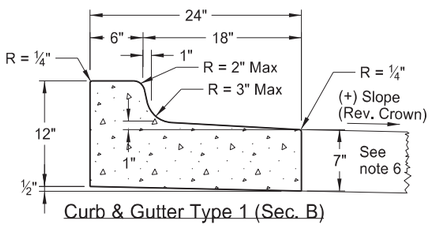

36" Concrete Valley Gutter Plan



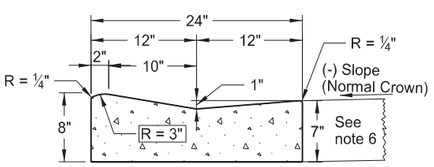

36" Concrete Valley Gutter Detail



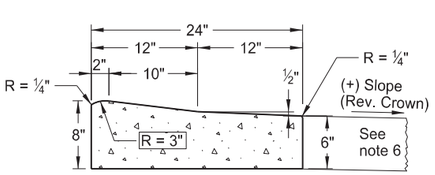

Curb & Gutter Type 1 (Sec. A)



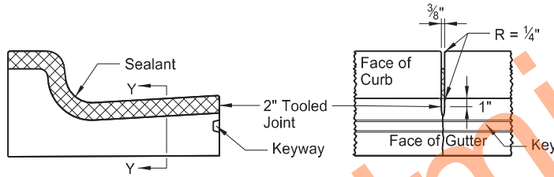

Curb & Gutter Type 1 (Sec. B)



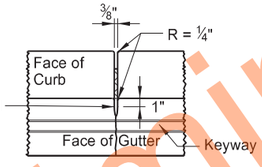

Mountable Curb & Gutter Type 1 (Sec. A)




Mountable Curb & Gutter Type 1 (Sec. B)

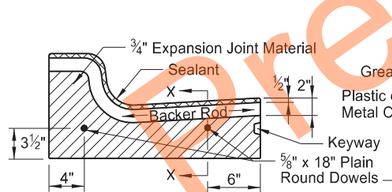



Detail
(10' Max Spacing)

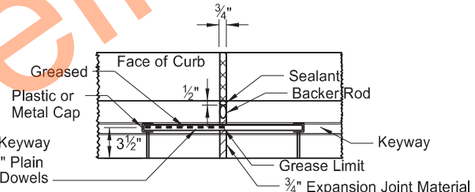



Section Y-Y

Contraction Joint

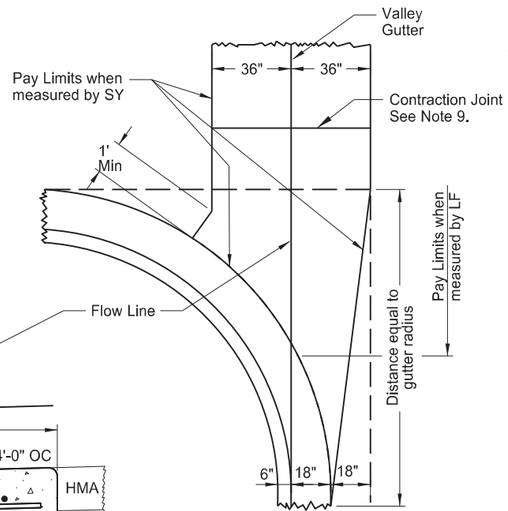



Detail

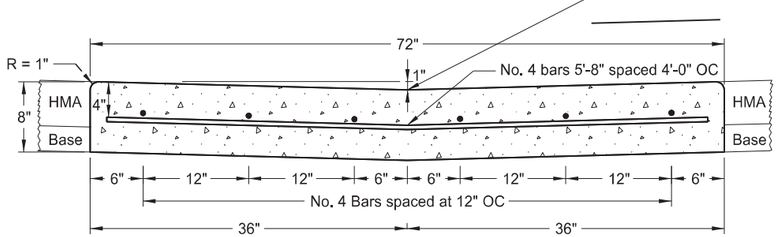



Section X-X

Isolation Joint




72" Concrete Valley Gutter Plan




72" Concrete Valley Gutter Detail

NOTES:

1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use ¾" expansion joint material for isolation joints. Form the backer rod and joint sealant opening with a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint. Install plastic or metal caps and greased dowels in the cold joint for the second pour.
4. Joint Spacing: For hot mix asphalt pavements use a 10' max joint spacing for the curb and gutter with panels on each side of the inlets. For concrete pavements match the joint spacing for the curb and gutter to the pavement joint on PCC Pavements (approximately 15' spacing.)
5. Joint sealing: For contraction joint, use joint sealant that conforms to section 826.02B. Use sealant for expansion joints specified in note 3 above. Tool and install sealant in accordance with the manufacturer's recommendations.
6. Curb & Gutter-Pavement Interface: For hot mix asphalt pavement use gutter depth shown. For PCC pavements, either match gutter depth to adjacent pavement depth or construct gutter depth shown.
7. Tie curb and gutter to abutting PCC pavement with No. 4 bars, 2'-0" in length, spaced at 3'-9" centers for 15' joint spacing (maximum spacing of 4' centers).
8. On street returns and other locations where new curb and gutter ends and does not abut existing curb and gutter, taper the last two (2) feet of the curb from 6" in height to 0". Install a 1/2" premolded full depth isolation joint (the same shape as the curb and gutter just ahead of the taper) with an 18" plain round bar across the joint.
9. Valley Gutter Joints: Form, saw, or score ⅛" min. to ⅜" max. width contraction joints (a minimum 2" depth) at approx 10' intervals. Seal the joints with hot poured elastic type joint sealer (Section 826.02A.2 of the Standard Specifications.) Include all costs for the joint and sealant in the price bid for Valley Gutter.
10. Reinforcing at Inlets: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlets (even inlets located on radii) in the price bid for "Curb & Gutter - Type 1" or "Curb & Gutter Mountable - Type 1." Extend reinforcement to the second joint (with rebar placed through the first joint) in cases where the 3' minimum panel length can't be obtained.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-7-2013

REVISIONS

| DATE | CHANGE |
|---|---|
| 10-17-17 | Updated to active voice. |
| 08-27-19 | New Design Engr PE Stamp. |
| 10-30-24 | Revised bar size & notes. |

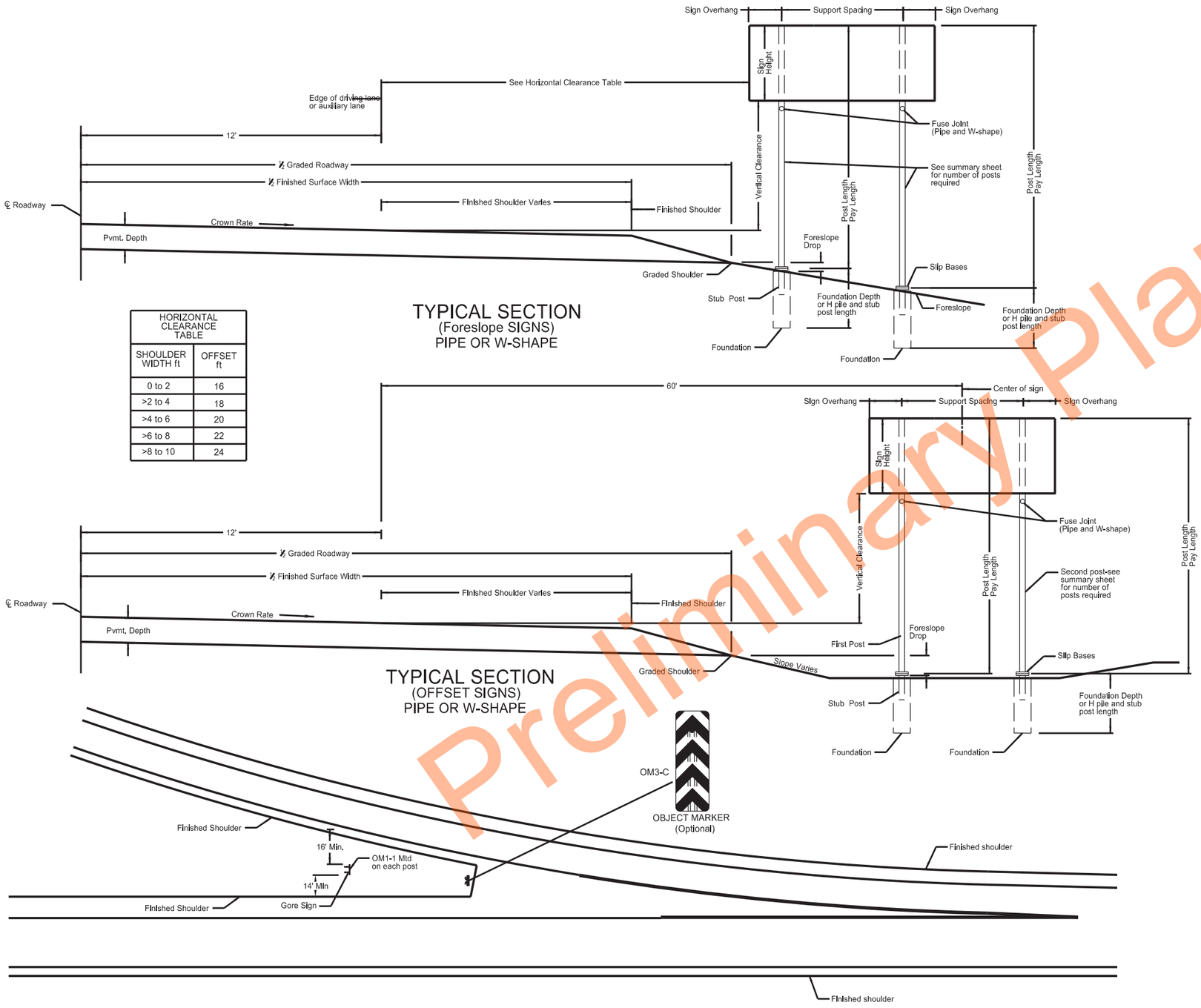
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

10/30/24

Preliminary Plans

# PIPE OR W-SHAPE ASSEMBLY DETAILS

D-754-1




| HORIZONTAL CLEARANCE TABLE | |
|---|---|
| SHOULDER WIDTH ft | OFFSET ft |
| 0 to 2 | 16 |
| >2 to 4 | 18 |
| >4 to 6 | 20 |
| >6 to 8 | 22 |
| >8 to 10 | 24 |

TYPICAL SECTION
(Foreslope SIGNS)
PIPE OR W-SHAPE

TYPICAL SECTION
(OFFSET SIGNS)
PIPE OR W-SHAPE

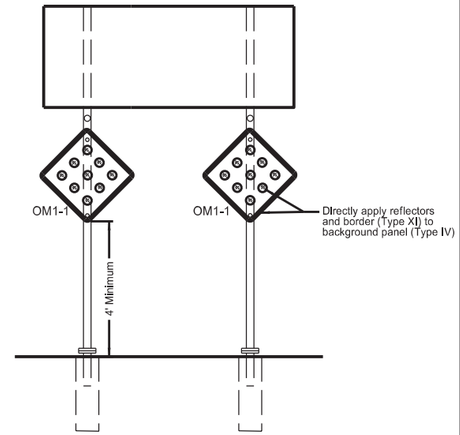
EXIT RAMP
GORE SIGN PLACEMENT

NOTES:

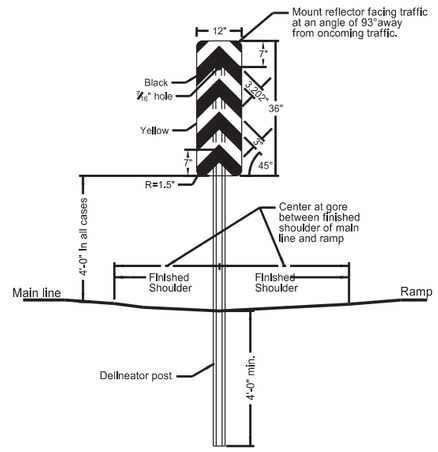
MINIMUM VERTICAL CLEARANCE:
Install signs with a minimum 5 foot vertical clearance from bottom of sign to top edge of the driving lane or auxiliary lane in rural locations. Provide a minimum 7 foot vertical clearance where parking or pedestrian movements occur. Install signs with a minimum 7 foot vertical clearance on freeways, expressways, and multi-lane conventional roadways.

A vertical clearance of 5 feet is acceptable where signs are placed a minimum of 30 feet from the edge of the traveled way.

Place signs a maximum of 6" above the vertical clearance specified above.




GORE SIGN OBJECT MARKER INSTALLATION




OBJECT MARKER INSTALLATION

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-18-14 | Modify notes and update reflective sheeting for object marker. Add correct section number for object marker post. |
| 8-30-18 | Updated notes to active voice. |
| 11-26-21 | Revised Object Marker signs. |

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

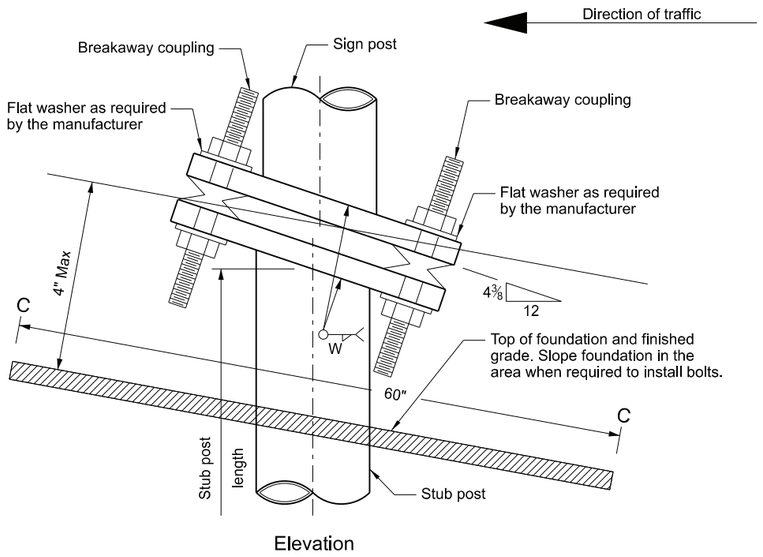
11/26/21

Preliminary Plans

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

# D-754-2

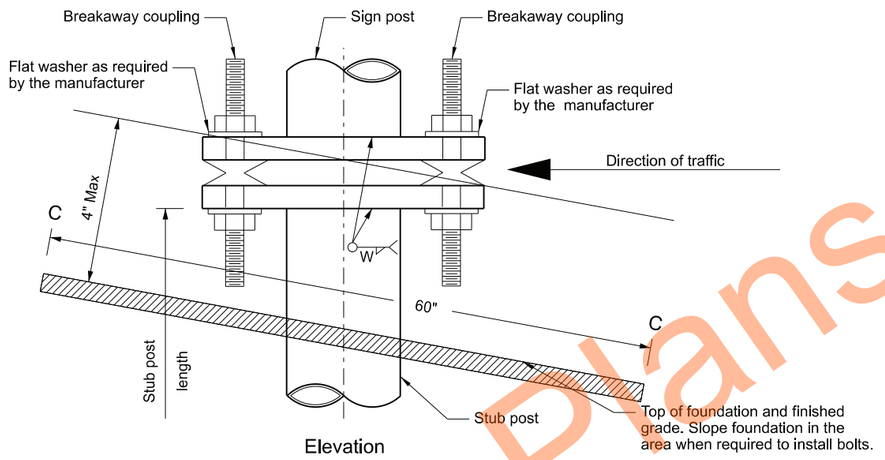
# Breakaway Coupler System for Standard Pipe Stub Post




Elevation

## Single Post Sign and Stub Post

Type A

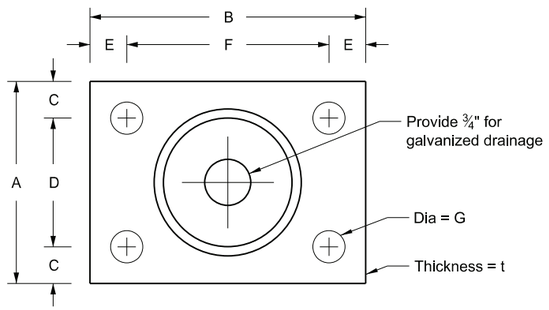



Elevation

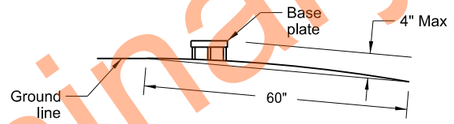
## Two or More Post Sign and Stub Post

For two post signs with 8' or more post spacing and all three or more post signs

Type C

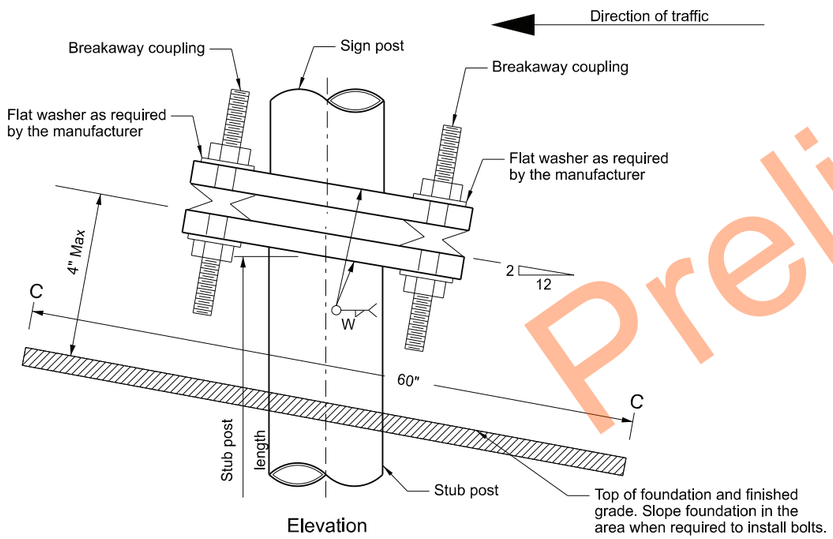



Plan Base Plate




Section C - C

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



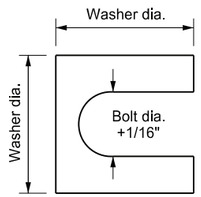

Elevation

## Two Post Sign and Stub Post

For signs with less than 8' post spacing

Type B

| Dimension / Nom. Pipe Size | Breakaway Coupling | A | B | C | D | E | F | G | t | W | Stub Post Length |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Steel** | | | | | | | | | | | |
| 3½" | ½" x 4½" | 5½" | 8⅜" | 13⁄16" | 3⅞" | 13⁄16" | 6¾" | 9⁄16" | ¾" | ⅜" | 1'-6" |
| 4" | ⅝" x 4½" | 5½" | 8¾" | 1" | 3½" | 1" | 6¾" | 11⁄16" | ¾" | ⅜" | 1'-6" |
| 5" | ¾" x 5¼" | 6½" | 10" | 1⅛" | 4¼" | 1⅛" | 7¾" | 13⁄16" | 1" | 7⁄16" | 2'-0" |
| 6" | 1" x 5¼" | 7½" | 11¾" | 1⅜" | 4¾" | 1⅜" | 9" | 1⅛" | 1¼" | 7⁄16" | 2'-0" |
| 8" | 1" x 5¼" | 9½" | 13¼" | 1⅜" | 6¾" | 1⅜" | 10½" | 1⅛" | 1¼" | 7⁄16" | 2'-6" |
| 10" | 1" x 5¼" | 11¾" | 15¼" | 1⅜" | 9" | 1⅜" | 12½" | 1⅛" | 1¼" | ½" | 3'-0" |
| 12" | 1" x 7" | 13¾" | 18" | 1⅝" | 10 ½" | 1⅝" | 14¾" | 1⅛" | 1½" | ½" | 3'-0" |
| **Aluminum** | | | | | | | | | | | |
| 3½" | ½" x 4½" | 5½" | 8⅜" | 13⁄16" | 3⅞" | 13⁄16" | 6¾" | 9⁄16" | ¾" | ⅜" | 1'-6" |
| 4" | ⅝" x 4½" | 5½" | 8¾" | 1" | 3½" | 1" | 6¾" | 11⁄16" | 1" | 7⁄16" | 1'-6" |
| 5" | ¾" x 5¼" | 6½" | 10" | 1⅛" | 4¼" | 1⅛" | 7¾" | 13⁄16" | 1" | ½" | 2'-0" |
| 6" | 1" x 5¼" | 7½" | 11¾" | 1⅜" | 4¾" | 1⅜" | 9" | 1⅛" | 1¼" | ½" | 2'-0" |
| 8" | 1" x 5¼" | 9½" | 13¼" | 1⅜" | 6¾" | 1⅜" | 10½" | 1⅛" | 1¼" | ½" | 2'-6" |
| 10" | 1" x 5¼" | 11¾" | 15¼" | 1⅜" | 9" | 1⅜" | 12½" | 1⅛" | 1½" | 7⁄16" | 3'-0" |
| 12" | 1" x 7" | 13¾" | 18" | 1⅝" | 10¼" | 1⅝" | 14¾" | 1⅛" | 1¾" | 11⁄16" | 3'-0" |




Shim Detail

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Fabricate shims from brass shim stock or strip conforming to ASTM B36.

Notes:

1. In lieu of the breakaway base system on standards D-754-3 and D-754-4, use a breakaway coupler system. Manufacture the breakaway coupler system from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.
2. Fuse Joint Cuts - For steel posts cut after galvanizing, either galvanize cut after fabrication, or treat cut surface in accordance with ASTM A780. Aluminum posts need no treatment.
3. Shim as required to plumb post.
4. Tighten all bolts the maximum possible with 12" to 15" wrench.

Preliminary Plans

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-3-2013

REVISIONS

| DATE | CHANGE |
|---|---|
| 8-30-2018 | Updated notes to active voice. |
| 8-29-2019 | New Design Engineer PE Stamp. |
| 8-05-2024 | Electronic Stamp/Signature. |

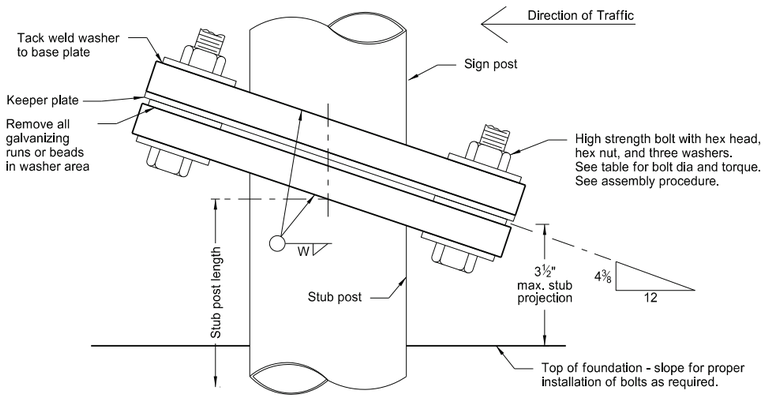
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

08/05/24

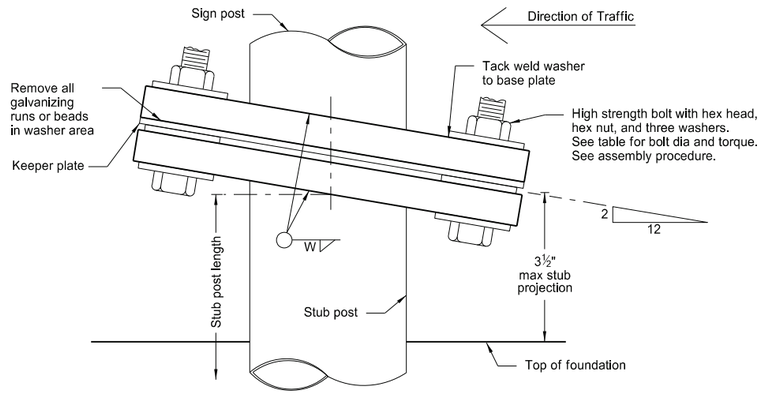
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# Breakaway System for Standard Pipe Stub Post

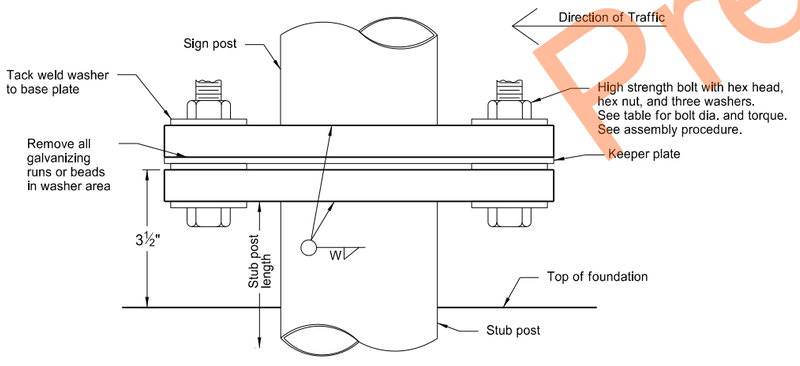
D-754-3



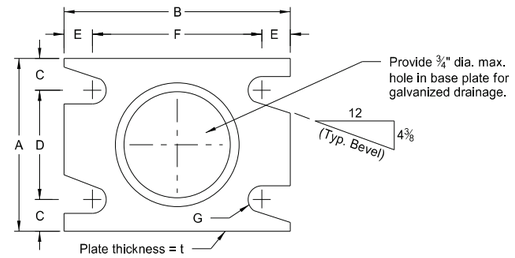

## Stub Post Connection - Type A
Elevation View
(Single Post)



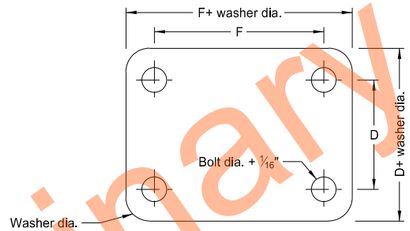

## Stub Post Connection - Type B
Elevation View
(Two Posts)



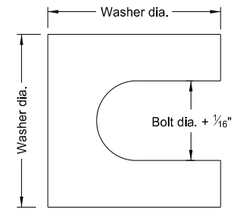

## Stub Post Connection - Type C
Elevation View
(Two Posts)




## Base Plate Plan View
Place bevel toward roadway on approach side and away on the other side.




## Keeper Plate Detail
Place keeper plate above center washer between top and bottom slip bases. Fabricate keeper plate from 28 gauge material and galvanize after fabrication in conformance with ASTM A653 G60 coating.




## Shim Detail
Furnish 2 each ±.012" thick and 2 each ±.032" thick shims per post. Fabricate shims from brass shim stock or strip in conformance with ASTM B36.

Notes:
Tack weld aluminum base plate washers to the base, when the base plate is aluminum.

Use standard drawing D-754-6 for fuse plate, hinge plate, and foundation details.

Assembly Procedure:
1. Assemble post to stub with bolts and one flat washer between base plate and keeper plate.
2. Shim as required.
3. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and shims and to clean bolt threads, then loosen.
4. Retighten bolts in a systematic order to prescribed torque. (see table)
5. Loosen each bolt and fill the gaps between the thread and mating surface with thread locking liquid resin, conforming to ASTM D5363-03 (2008), forming solid, one part assemblies secure from vibration, pressure, and corrosion.
6. Retighten each bolt to prescribed torque in the same order as initial retightening.

Preliminary Plans

**Base Data Table**

| Nominal Post Size dia. | Bolt Size (dia. x length) | Base Bolt Torque ft. lb. | A | B | C | D | E | F | G | t | W | Stub Post Length |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Steel** | | | | | | | | | | | | |
| 3½" | ½"x2½" | 12 | 5½" | 8⅜" | 13/16" | 3⅞" | 13/16" | 6¾" | 9/32" | ¾" | ⅜" | 1'-6" |
| 4" | ⅝"x2¾" | 29 | 5½" | 8¾" | 1" | 3½" | 1" | 6¾" | 11/32" | ¾" | ⅜" | 1'-6" |
| 5" | ¾"x3½" | 46 | 6½" | 10" | 1⅛" | 4¼" | 1⅛" | 7¾" | 13/32" | 1" | 7/16" | 2'-0" |
| 6" | 1"x4¼" | 61 | 7½" | 11¾" | 1⅜" | 4¾" | 1⅜" | 9" | 17/32" | 1¼" | 7/16" | 2'-0" |
| **Aluminum** | | | | | | | | | | | | |
| 3½" | ½"x2½" | 12 | 5½" | 8⅜" | 13/16" | 3⅞" | 13/16" | 6¾" | 9/32" | ¾" | ⅜" | 1'-6" |
| 4" | ⅝"x2¾" | 29 | 5½" | 8¾" | 1" | 3½" | 1" | 6¾" | 11/32" | 1" | 7/16" | 1'-6" |
| 5" | ¾"x3½" | 46 | 6½" | 10" | 1⅛" | 4¼" | 1⅛" | 7¾" | 13/32" | 1" | ½" | 2'-0" |
| 6" | 1"x4¼" | 61 | 7½" | 11¾" | 1⅜" | 4¾" | 1⅜" | 9" | 17/32" | 1¼" | ½" | 2'-0" |

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-21-11

REVISIONS

| DATE | CHANGE |
|---|---|
| 2-28-14 | Removed lower post and foundation details. |
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

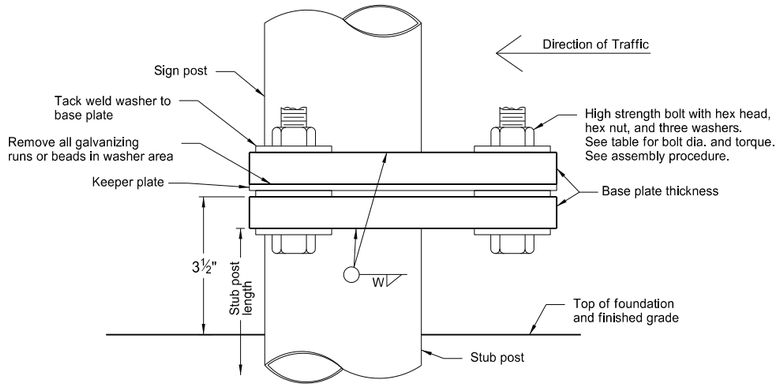
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/05/24

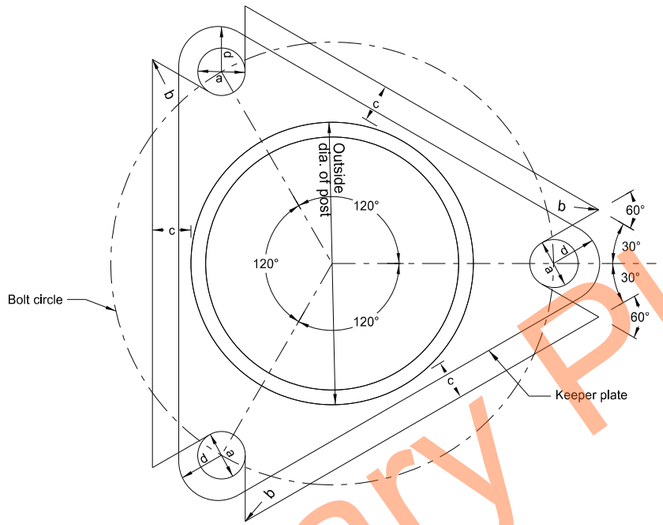
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# Multi-Directional Breakaway System for Standard Pipe Stub Post

D-754-4




Stub Post Connection - Type D
Elevation View
(Single Post)

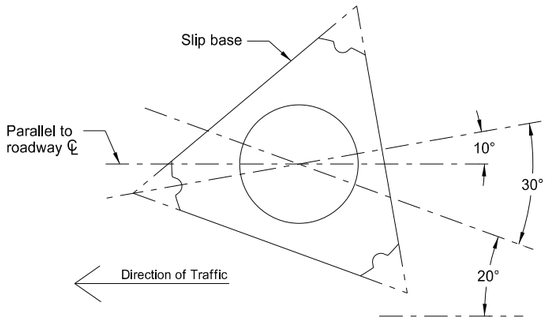



Stub Post Detail
Top View

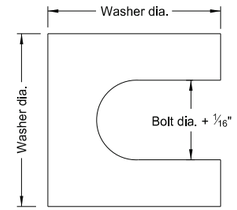
Notes:
Tack weld aluminum base plate washers to the base, when the base plate is fabricated from aluminum.

Use standard drawing D-754-6 for fuse plate, hinge plate, and foundation details.

Assembly Procedure:
1. Assemble post to stub with bolts and one flat washer between base plates and keeper plate.
2. Shim as required.
3. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and shims to clean bolt threads, then loosen.
4. Retighten bolts in a systematic order to prescribed torque. (see table)
5. Loosen each bolt and apply thread locking liquid resin conforming to ASTM D5363-03 (2008). Fill gaps between thread and mating surface with thread locker to form solid, one part assemblies secure from vibration, pressure, and corrosion.
6. Retighten each bolt to prescribed torque in the same order as initial retightening.




Slip Base Orientation
Top View




Shim Detail

Furnish 2 each ±.012" thick and 2 each ±.032" thick shims per post. Fabricate shims from brass shim stock or strip conforming to ASTM B36.

Preliminary Plans

| Base Data Table | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Post Size dia. | Outside Post dia. | Bolt Circle | a rad. | b rad. | c rad. | Bolt Size (dia. x length) | Base Plate Thickness | W | Base Bolt Torque ft. lb. | d rad. | Stub Post Length |
| Steel | | | | | | | | | | | |
| 3½" | 4" | 7" | 1 1/16" | ⅛" | 1⅛" | 1"x4" | 1¼" | 5/16" | 55 | 1⅛" | 1'-6" |
| 4" | 4.5" | 7½" | 1 1/16" | ⅛" | 1⅛" | 1"x4½" | 1½" | ⅜" | 98 | 1⅛" | 1'-6" |
| 5" | 5.563" | 9½" | 1 5/16" | ⅛" | 1⅛" | 1¼"x5" | 1½" | ⅜" | 167 | 1⅜" | 2'-0" |
| Aluminum | | | | | | | | | | | |
| 3½" | 4" | 7" | 13/16" | ⅛" | ⅞" | ¾"x3½" | 1" | 5/16" | 43 | ⅞" | 1'-6" |
| 4" | 4.5" | 7½" | 13/16" | ⅛" | ¾" | ¾"x4" | 1¼" | 5/16" | 76 | ⅞" | 1'-6" |
| 5" | 5.563" | 9½" | 1 1/16" | ⅛" | 1⅛" | 1"x4" | 1¼" | 5/16" | 98 | 1⅛" | 2'-0" |
| 6" | 6.625" | 10¼" | 1 1/16" | ⅛" | ¾" | 1"x4½" | 1½" | ⅜" | 134 | 1⅛" | 2'-0" |

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

2-28-14

REVISIONS

| DATE | CHANGE |
|---|---|
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

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

08/05/24

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# FOUNDATION DATA FOR STEEL SUPPORTS

D-754-5

| Foundation Diameter | Foundation | | | Vertical Reinforcing Steel | | | | Horizontal Tie Bars | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Depth | Conc. Vol. for 1 Post (CU YDS) | Conc. Vol. for 2 Posts (CU YDS) | Length of Each Bar | Size | No. Bars for 1 Post | No. Bars for 2 Posts | Size | No. Bars for 1 Post | No. Bars for 2 Posts |
| 1' - 4" | 4' - 6" | 0.23 | 0.47 | 4' - 2" | 5 | 6 | 12 | 3 | 6 | 12 |
| 1' - 4" | 5' - 0" | 0.26 | 0.52 | 4' - 8" | 5 | 6 | 12 | 3 | 7 | 14 |
| 1' - 4" | 5' - 6" | 0.28 | 0.57 | 5' - 2" | 5 | 6 | 12 | 3 | 8 | 16 |
| 1' - 4" | 6' - 0" | 0.31 | 0.62 | 5' - 8" | 5 | 6 | 12 | 3 | 8 | 16 |
| 1' - 4" | 6' - 6" | 0.34 | 0.67 | 6' - 2" | 5 | 6 | 12 | 3 | 9 | 18 |
| 1' - 4" | 7' - 0" | 0.36 | 0.72 | 6' - 8" | 5 | 6 | 12 | 3 | 9 | 18 |
| 1' - 4" | 7' - 6" | 0.39 | 0.78 | 7' - 2" | 5 | 6 | 12 | 3 | 10 | 20 |
| 1' - 4" | 8' - 0" | 0.41 | 0.83 | 7' - 8" | 5 | 6 | 12 | 3 | 11 | 22 |
| 1' - 4" | 8' - 6" | 0.44 | 0.88 | 8' - 2" | 5 | 6 | 12 | 3 | 11 | 22 |
| 1' - 4" | 9' - 0" | 0.47 | 0.93 | 8' - 8" | 5 | 6 | 12 | 3 | 12 | 24 |
| 1' - 4" | 9' - 6" | 0.49 | 0.98 | 9' - 2" | 5 | 6 | 12 | 3 | 12 | 24 |
| 1' - 4" | 10' - 0" | 0.52 | 1.03 | 9' - 8" | 5 | 6 | 12 | 3 | 13 | 26 |
| 1' - 4" | 10' - 6" | 0.54 | 1.09 | 10' - 2" | 5 | 6 | 12 | 3 | 14 | 28 |
| 1' - 4" | 11' - 0" | 0.57 | 1.14 | 10' - 8" | 5 | 6 | 12 | 3 | 14 | 28 |
| 1' - 4" | 11' - 6" | 0.59 | 1.19 | 11' - 2" | 5 | 6 | 12 | 3 | 15 | 30 |
| 1' - 4" | 12' - 0" | 0.62 | 1.24 | 11' - 8" | 5 | 6 | 12 | 3 | 15 | 30 |

| Foundation Diameter | Foundation | | | Vertical Reinforcing Steel | | | | Horizontal Tie Bars | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Depth | Conc. Vol. for 1 Post (CU YDS) | Conc. Vol. for 2 Posts (CU YDS) | Length of Each Bar | Size | No. Bars for 1 Post | No. Bars for 2 Posts | Size | No. Bars for 1 Post | No. Bars for 2 Posts |
| 1' - 9" | 4' - 6" | 0.40 | 0.80 | 4' - 2" | 5 | 10 | 20 | 3 | 6 | 12 |
| 1' - 9" | 5' - 0" | 0.45 | 0.89 | 4' - 8" | 5 | 10 | 20 | 3 | 7 | 14 |
| 1' - 9" | 5' - 6" | 0.49 | 0.98 | 5' - 2" | 5 | 10 | 20 | 3 | 8 | 16 |
| 1' - 9" | 6' - 0" | 0.53 | 1.07 | 5' - 8" | 5 | 10 | 20 | 3 | 8 | 16 |
| 1' - 9" | 6' - 6" | 0.58 | 1.16 | 6' - 2" | 5 | 10 | 20 | 3 | 9 | 18 |
| 1' - 9" | 7' - 0" | 0.62 | 1.25 | 6' - 8" | 5 | 10 | 20 | 3 | 9 | 18 |
| 1' - 9" | 7' - 6" | 0.67 | 1.34 | 7' - 2" | 5 | 10 | 20 | 3 | 10 | 20 |
| 1' - 9" | 8' - 0" | 0.71 | 1.43 | 7' - 8" | 5 | 10 | 20 | 3 | 11 | 22 |
| 1' - 9" | 8' - 6" | 0.76 | 1.51 | 8' - 2" | 5 | 10 | 20 | 3 | 11 | 22 |
| 1' - 9" | 9' - 0" | 0.80 | 1.60 | 8' - 8" | 5 | 10 | 20 | 3 | 12 | 24 |
| 1' - 9" | 9' - 6" | 0.85 | 1.69 | 9' - 2" | 5 | 10 | 20 | 3 | 12 | 24 |
| 1' - 9" | 10' - 0" | 0.89 | 1.78 | 9' - 8" | 5 | 10 | 20 | 3 | 13 | 26 |
| 1' - 9" | 10' - 6" | 0.94 | 1.87 | 10' - 2" | 5 | 10 | 20 | 3 | 14 | 28 |
| 1' - 9" | 11' - 0" | 0.98 | 1.96 | 10' - 8" | 5 | 10 | 20 | 3 | 14 | 28 |
| 1' - 9" | 11' - 6" | 1.02 | 2.05 | 11' - 2" | 5 | 10 | 20 | 3 | 15 | 30 |
| 1' - 9" | 12' - 0" | 1.07 | 2.14 | 11' - 8" | 5 | 10 | 20 | 3 | 15 | 30 |

| Foundation Diameter | Foundation | | | Vertical Reinforcing Steel | | | | Horizontal Tie Bars | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Depth | Conc. Vol. for 1 Post (CU YDS) | Conc. Vol. for 2 Posts (CU YDS) | Length of Each Bar | Size | No. Bars for 1 Post | No. Bars for 2 Posts | Size | No. Bars for 1 Post | No. Bars for 2 Posts |
| 2' - 0" | 4' - 6" | 0.52 | 1.05 | 4' - 2" | 6 | 10 | 20 | 3 | 6 | 12 |
| 2' - 0" | 5' - 0" | 0.58 | 1.16 | 4' - 8" | 6 | 10 | 20 | 3 | 7 | 14 |
| 2' - 0" | 5' - 6" | 0.64 | 1.28 | 5' - 2" | 6 | 10 | 20 | 3 | 8 | 16 |
| 2' - 0" | 6' - 0" | 0.70 | 1.40 | 5' - 8" | 6 | 10 | 20 | 3 | 8 | 16 |
| 2' - 0" | 6' - 6" | 0.76 | 1.51 | 6' - 2" | 6 | 10 | 20 | 3 | 9 | 18 |
| 2' - 0" | 7' - 0" | 0.81 | 1.63 | 6' - 8" | 6 | 10 | 20 | 3 | 9 | 18 |
| 2' - 0" | 7' - 6" | 0.87 | 1.75 | 7' - 2" | 6 | 10 | 20 | 3 | 10 | 20 |
| 2' - 0" | 8' - 0" | 0.93 | 1.86 | 7' - 8" | 6 | 10 | 20 | 3 | 11 | 22 |
| 2' - 0" | 8' - 6" | 0.99 | 1.98 | 8' - 2" | 6 | 10 | 20 | 3 | 11 | 22 |
| 2' - 0" | 9' - 0" | 1.05 | 2.09 | 8' - 8" | 6 | 10 | 20 | 3 | 12 | 24 |
| 2' - 0" | 9' - 6" | 1.11 | 2.21 | 9' - 2" | 6 | 10 | 20 | 3 | 12 | 24 |
| 2' - 0" | 10' - 0" | 1.16 | 2.33 | 9' - 8" | 6 | 10 | 20 | 3 | 13 | 26 |
| 2' - 0" | 10' - 6" | 1.22 | 2.44 | 10' - 2" | 6 | 10 | 20 | 3 | 14 | 28 |
| 2' - 0" | 11' - 0" | 1.28 | 2.56 | 10' - 8" | 6 | 10 | 20 | 3 | 14 | 28 |
| 2' - 0" | 11' - 6" | 1.34 | 2.68 | 11' - 2" | 6 | 10 | 20 | 3 | 15 | 30 |
| 2' - 0" | 12' - 0" | 1.40 | 2.79 | 11' - 8" | 6 | 10 | 20 | 3 | 15 | 30 |
| 2' - 0" | 12' - 6" | 1.45 | 2.91 | 12' - 2" | 6 | 10 | 20 | 3 | 16 | 32 |
| 2' - 0" | 13' - 0" | 1.51 | 3.03 | 12' - 8" | 6 | 10 | 20 | 3 | 17 | 34 |
| 2' - 0" | 13' - 6" | 1.57 | 3.14 | 13' - 2" | 6 | 10 | 20 | 3 | 17 | 34 |
| 2' - 0" | 14' - 0" | 1.63 | 3.26 | 13' - 8" | 6 | 10 | 20 | 3 | 18 | 36 |
| 2' - 0" | 14' - 6" | 1.69 | 3.37 | 14' - 2" | 6 | 10 | 20 | 3 | 18 | 36 |
| 2' - 0" | 15' - 0" | 1.75 | 3.49 | 14' - 8" | 6 | 10 | 20 | 3 | 19 | 38 |

| Foundation Diameter | Foundation | | | Vertical Reinforcing Steel | | | | Horizontal Tie Bars | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Depth | Conc. Vol. for 1 Post (CU YDS) | Conc. Vol. for 2 Posts (CU YDS) | Length of Each Bar | Size | No. Bars for 1 Post | No. Bars for 2 Posts | Size | No. Bars for 1 Post | No. Bars for 2 Posts |
| 2' - 4" | 4' - 6" | 0.71 | 1.43 | 4' - 2" | 6 | 14 | 28 | 3 | 6 | 12 |
| 2' - 4" | 5' - 0" | 0.79 | 1.58 | 4' - 8" | 6 | 14 | 28 | 3 | 7 | 14 |
| 2' - 4" | 5' - 6" | 0.87 | 1.74 | 5' - 2" | 6 | 14 | 28 | 3 | 8 | 16 |
| 2' - 4" | 6' - 0" | 0.95 | 1.90 | 5' - 8" | 6 | 14 | 28 | 3 | 8 | 16 |
| 2' - 4" | 6' - 6" | 1.03 | 2.06 | 6' - 2" | 6 | 14 | 28 | 3 | 9 | 18 |
| 2' - 4" | 7' - 0" | 1.11 | 2.22 | 6' - 8" | 6 | 14 | 28 | 3 | 9 | 18 |
| 2' - 4" | 7' - 6" | 1.19 | 2.38 | 7' - 2" | 6 | 14 | 28 | 3 | 10 | 20 |
| 2' - 4" | 8' - 0" | 1.27 | 2.53 | 7' - 8" | 6 | 14 | 28 | 3 | 11 | 22 |
| 2' - 4" | 8' - 6" | 1.35 | 2.69 | 8' - 2" | 6 | 14 | 28 | 3 | 11 | 22 |
| 2' - 4" | 9' - 0" | 1.43 | 2.85 | 8' - 8" | 6 | 14 | 28 | 3 | 12 | 24 |
| 2' - 4" | 9' - 6" | 1.50 | 3.01 | 9' - 2" | 6 | 14 | 28 | 3 | 12 | 24 |
| 2' - 4" | 10' - 0" | 1.58 | 3.17 | 9' - 8" | 6 | 14 | 28 | 3 | 13 | 26 |
| 2' - 4" | 10' - 6" | 1.66 | 3.33 | 10' - 2" | 6 | 14 | 28 | 3 | 14 | 28 |
| 2' - 4" | 11' - 0" | 1.74 | 3.48 | 10' - 8" | 6 | 14 | 28 | 3 | 14 | 28 |
| 2' - 4" | 11' - 6" | 1.82 | 3.64 | 11' - 2" | 6 | 14 | 28 | 3 | 15 | 30 |
| 2' - 4" | 12' - 0" | 1.90 | 3.80 | 11' - 8" | 6 | 14 | 28 | 3 | 15 | 30 |
| 2' - 4" | 12' - 6" | 1.98 | 3.96 | 12' - 2" | 6 | 14 | 28 | 3 | 16 | 32 |
| 2' - 4" | 13' - 0" | 2.06 | 4.12 | 12' - 8" | 6 | 14 | 28 | 3 | 17 | 34 |
| 2' - 4" | 13' - 6" | 2.14 | 4.28 | 13' - 2" | 6 | 14 | 28 | 3 | 17 | 34 |
| 2' - 4" | 14' - 0" | 2.22 | 4.43 | 13' - 8" | 6 | 14 | 28 | 3 | 18 | 36 |
| 2' - 4" | 14' - 6" | 2.30 | 4.59 | 14' - 2" | 6 | 14 | 28 | 3 | 18 | 36 |
| 2' - 4" | 15' - 0" | 2.38 | 4.75 | 14' - 8" | 6 | 14 | 28 | 3 | 19 | 38 |
| 2' - 4" | 15' - 6" | 2.45 | 4.91 | 15' - 2" | 6 | 14 | 28 | 3 | 20 | 40 |
| 2' - 4" | 16' - 0" | 2.53 | 5.07 | 15' - 8" | 6 | 14 | 28 | 3 | 20 | 40 |
| 2' - 4" | 16' - 6" | 2.61 | 5.23 | 16' - 2" | 6 | 14 | 28 | 3 | 21 | 42 |
| 2' - 4" | 17' - 0" | 2.69 | 5.38 | 16' - 8" | 6 | 14 | 28 | 3 | 21 | 42 |
| 2' - 4" | 17' - 6" | 2.77 | 5.54 | 17' - 2" | 6 | 14 | 28 | 3 | 22 | 44 |
| 2' - 4" | 18' - 0" | 2.85 | 5.70 | 17' - 8" | 6 | 14 | 28 | 3 | 23 | 46 |

| Foundation Diameter | Foundation | | | Vertical Reinforcing Steel | | | | Horizontal Tie Bars | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Depth | Conc. Vol. for 1 Post (CU YDS) | Conc. Vol. for 2 Posts (CU YDS) | Length of Each Bar | Size | No. Bars for 1 Post | No. Bars for 2 Posts | Size | No. Bars for 1 Post | No. Bars for 2 Posts |
| 2' - 6" | 4' - 6" | 0.82 | 1.64 | 4' - 2" | 6 | 16 | 32 | 3 | 6 | 12 |
| 2' - 6" | 5' - 0" | 0.91 | 1.82 | 4' - 8" | 6 | 16 | 32 | 3 | 7 | 14 |
| 2' - 6" | 5' - 6" | 1.00 | 2.00 | 5' - 2" | 6 | 16 | 32 | 3 | 8 | 16 |
| 2' - 6" | 6' - 0" | 1.09 | 2.18 | 5' - 8" | 6 | 16 | 32 | 3 | 8 | 16 |
| 2' - 6" | 6' - 6" | 1.18 | 2.36 | 6' - 2" | 6 | 16 | 32 | 3 | 9 | 18 |
| 2' - 6" | 7' - 0" | 1.27 | 2.55 | 6' - 8" | 6 | 16 | 32 | 3 | 9 | 18 |
| 2' - 6" | 7' - 6" | 1.36 | 2.73 | 7' - 2" | 6 | 16 | 32 | 3 | 10 | 20 |
| 2' - 6" | 8' - 0" | 1.45 | 2.91 | 7' - 8" | 6 | 16 | 32 | 3 | 11 | 22 |
| 2' - 6" | 8' - 6" | 1.55 | 3.09 | 8' - 2" | 6 | 16 | 32 | 3 | 11 | 22 |
| 2' - 6" | 9' - 0" | 1.64 | 3.27 | 8' - 8" | 6 | 16 | 32 | 3 | 12 | 24 |
| 2' - 6" | 9' - 6" | 1.73 | 3.45 | 9' - 2" | 6 | 16 | 32 | 3 | 12 | 24 |
| 2' - 6" | 10' - 0" | 1.82 | 3.64 | 9' - 8" | 6 | 16 | 32 | 3 | 13 | 26 |
| 2' - 6" | 10' - 6" | 1.91 | 3.82 | 10' - 2" | 6 | 16 | 32 | 3 | 14 | 28 |
| 2' - 6" | 11' - 0" | 2.00 | 4.00 | 10' - 8" | 6 | 16 | 32 | 3 | 14 | 28 |
| 2' - 6" | 11' - 6" | 2.09 | 4.18 | 11' - 2" | 6 | 16 | 32 | 3 | 15 | 30 |
| 2' - 6" | 12' - 0" | 2.18 | 4.36 | 11' - 8" | 6 | 16 | 32 | 3 | 15 | 30 |
| 2' - 6" | 12' - 6" | 2.27 | 4.55 | 12' - 2" | 6 | 16 | 32 | 3 | 16 | 32 |
| 2' - 6" | 13' - 0" | 2.36 | 4.73 | 12' - 8" | 6 | 16 | 32 | 3 | 17 | 34 |
| 2' - 6" | 13' - 6" | 2.45 | 4.91 | 13' - 2" | 6 | 16 | 32 | 3 | 17 | 34 |
| 2' - 6" | 14' - 0" | 2.55 | 5.09 | 13' - 8" | 6 | 16 | 32 | 3 | 18 | 36 |
| 2' - 6" | 14' - 6" | 2.64 | 5.27 | 14' - 2" | 6 | 16 | 32 | 3 | 18 | 36 |
| 2' - 6" | 15' - 0" | 2.73 | 5.45 | 14' - 8" | 6 | 16 | 32 | 3 | 19 | 38 |
| 2' - 6" | 15' - 6" | 2.82 | 5.64 | 15' - 2" | 6 | 16 | 32 | 3 | 20 | 40 |
| 2' - 6" | 16' - 0" | 2.91 | 5.82 | 15' - 8" | 6 | 16 | 32 | 3 | 20 | 40 |
| 2' - 6" | 16' - 6" | 3.00 | 6.00 | 16' - 2" | 6 | 16 | 32 | 3 | 21 | 42 |
| 2' - 6" | 17' - 0" | 3.09 | 6.18 | 16' - 8" | 6 | 16 | 32 | 3 | 21 | 42 |
| 2' - 6" | 17' - 6" | 3.18 | 6.36 | 17' - 2" | 6 | 16 | 32 | 3 | 22 | 44 |
| 2' - 6" | 18' - 0" | 3.27 | 6.54 | 17' - 8" | 6 | 16 | 32 | 3 | 23 | 46 |
| 2' - 6" | 18' - 6" | 3.36 | 6.73 | 18' - 2" | 6 | 16 | 32 | 3 | 23 | 46 |
| 2' - 6" | 19' - 0" | 3.45 | 6.91 | 18' - 8" | 6 | 16 | 32 | 3 | 24 | 48 |
| 2' - 6" | 19' - 6" | 3.55 | 7.09 | 19' - 2" | 6 | 16 | 32 | 3 | 24 | 48 |
| 2' - 6" | 20' - 0" | 3.64 | 7.27 | 19' - 8" | 6 | 16 | 32 | 3 | 25 | 50 |

NOTES:

1. Use Grade 60 reinforcing steel.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

10-3-13

REVISIONS

| DATE | CHANGE |
|---|---|
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

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ENGINEER
NORTH DAKOTA

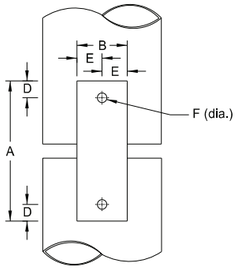
08/05/24

Preliminary Plans

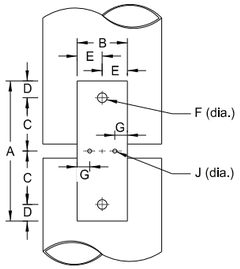
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# Hinge Plate, Fuse Plate and Foundation Details for Standard Pipe

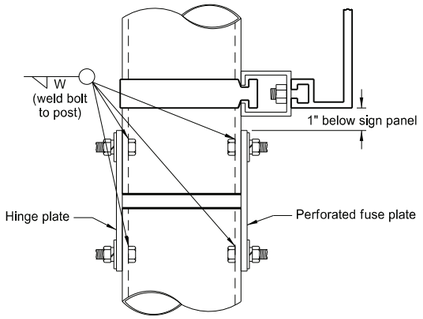
D-754-6



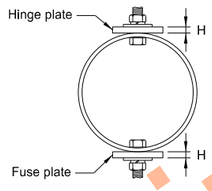

Hinge Plate



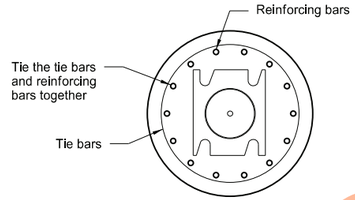

Perforated Fuse Plate




Side View

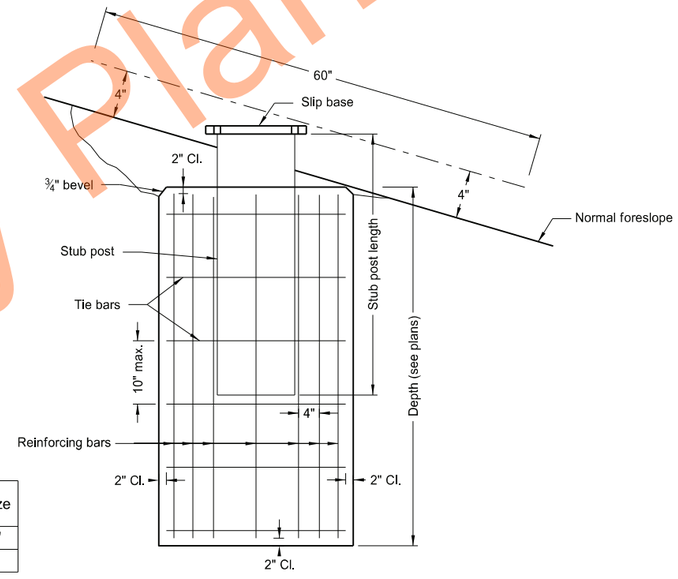



Top View




Top View

See standard drawing D-754-5 for size, number, and length of rebar. Use 3 bolt base plate for Type D.




Foundation

Front View

Foundation detail for breakaway base with stub post connection.

| Foundation diameter | Post Size |
|---|---|
| 1'-4" | 3½"-4" |
| 1'-9" | 5"-6" |

Notes:
Fuse Joint Cuts - For steel posts cut after galvanizing, either galvanize cut after fabrication, or treat cut surface in accordance with ASTM A780. Aluminum posts need no treatment.

Use standard drawings D-754-2, D-754-3 and D-754-4 for information on breakaway base details.

Maintain the 4" vertical height and 60" diameter horizontal clearance of the break-away base at each post location.

Assembly Procedure:
1. Assemble hinge plate to post with bolts and one flat washer and lock washer under nut.

2. Tighten all bolts the maximum possible with 12" to 15" wrench.

| Round Metal Posts | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dimensions | | | | Properties | | | |
| Nominal dia. in. | Outside dia. in. | Inside dia. in. | Wall Thickness in. | Weight per Foot Pound | Moment of Inertia in.⁴ | Cross Sec. Area in.² | Section Diameter in.² |
| Steel | | | | | | | |
| 3½ | 4.000 | 3.548 | .226 | 9.11 | 4.788 | 2.680 | 2.394 |
| 4 | 4.500 | 4.026 | .237 | 10.79 | 7.233 | 3.174 | 3.215 |
| 5 | 5.563 | 5.047 | .258 | 14.62 | 15.16 | 4.300 | 5.449 |
| 6 | 6.625 | 6.065 | .280 | 18.97 | 28.14 | 5.581 | 8.495 |
| Aluminum | | | | | | | |
| 3½ | 4.000 | 3.548 | .226 | 3.151 | 4.788 | 2.680 | 2.394 |
| 4 | 4.500 | 4.026 | .237 | 3.733 | 7.232 | 3.174 | 3.214 |
| 5 | 5.563 | 5.047 | .258 | 5.057 | 15.16 | 4.300 | 5.451 |
| 6 | 6.625 | 6.065 | .280 | 6.564 | 28.14 | 5.581 | 8.496 |

| Nominal Pipe Size dia. | Fuse and Hinge Plate Data | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bolt Size | A | B | C | D | E | F | G | H | I | J |
| 3½" | ½"ø x 1½" | 5" | 1¾" | 1 11/16" | 13/16" | ⅞" | 9/16" | 15/32" | ¼" | 13/32" | 7/16" |
| 4" | ⅝"ø x 1½" | 5¾" | 2" | 1⅞" | 1" | 1" | 11/16" | 17/32" | ⅜" | 15/32" | 9/16" |
| 5" | ⅝"ø x 1¾" | 5¾" | 2" | 1⅞" | 1" | 1" | 11/16" | 9/16" | ½" | 7/16" | ⅝" |
| 6" | ¾"ø x 2¼" | 6¼" | 2¼" | 2" | 1⅛" | 1⅛" | 13/16" | ⅝" | ½" | ½" | ⅝" |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 2-28-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

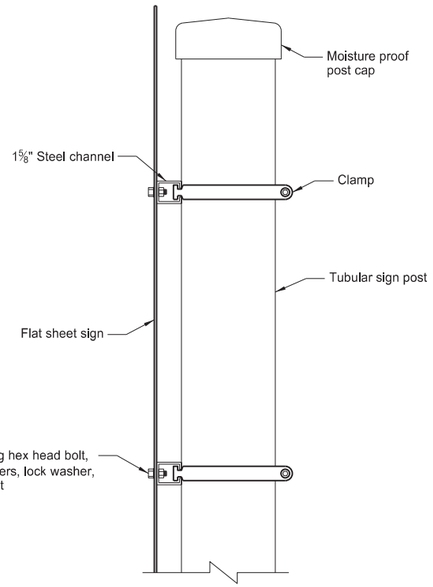
KIRK J. HOFFT
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/05/24

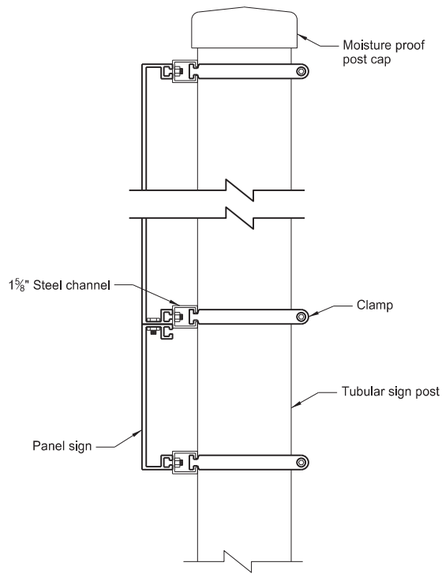
Preliminary Plans

# PIPE SUPPORT AND SIGN MOUNTING DETAILS

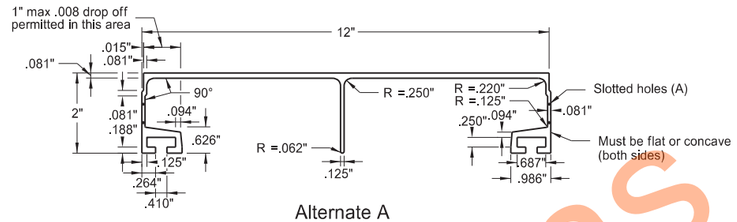
D-754-7



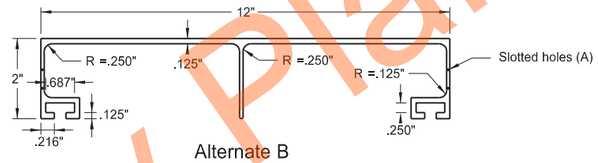

Side View



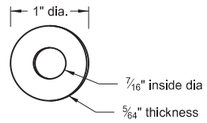

Side View




Alternate A
12" Extruded Panel




Alternate B
12" Extruded Panel



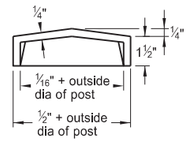

Flat Washer Detail



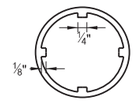

Slotted Hole Detail




6" Extruded Panel




Side View




Top View

## Aluminum Panel Details

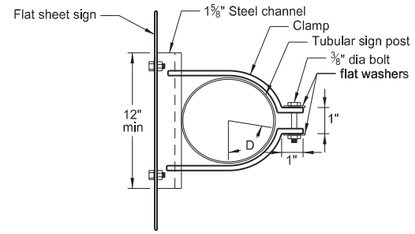
(A) Punch slotted holes in aluminum panels at 1'-0" on center, space from end as listed below:

| | |
|---|---|
| 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.

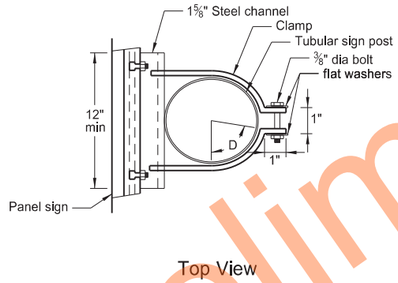
## Post Cap Detail

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



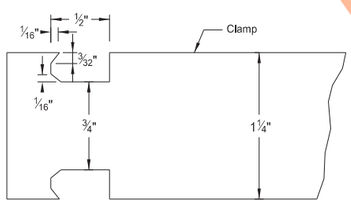

Top View

## Flat Sheet Sign Clamp Mounting Details

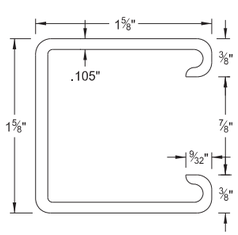



Top View

## 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 |
| 08-30-18 | Updated to active voice, defined bolt & washer for fastening sign. |
| 08-29-19 | New Design Engineer PE Stamp. |
| 10-19-22 | Added washers to clamp. |

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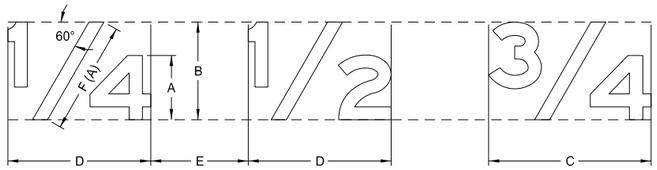
10/20/22

Preliminary Plans

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

# LETTER AND ARROW DETAILS

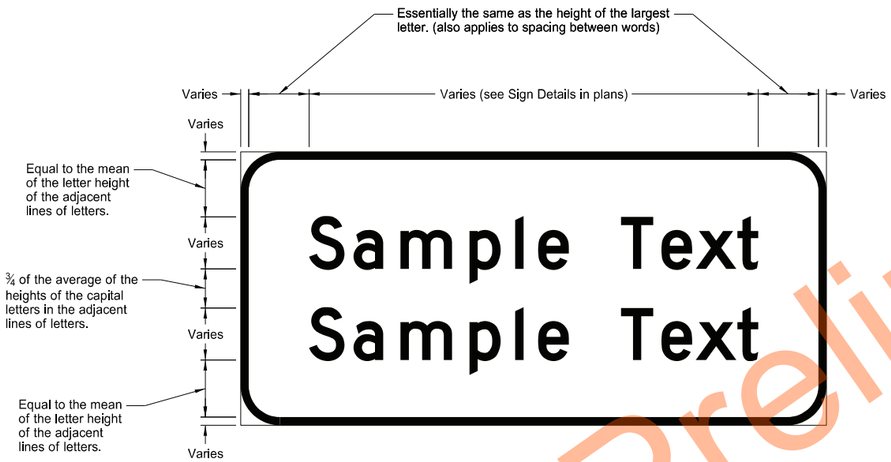
D-754-9



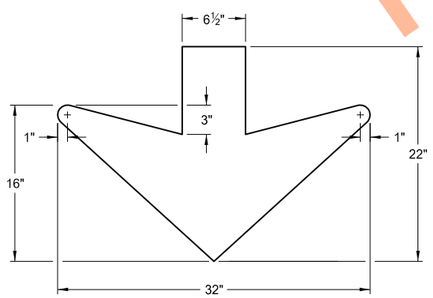

DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

| SYMBOL | TITLE | RATIO TO HEIGHT OF CAPITAL OR UPPER CASE |
|---|---|---|
| A | Letter height | 1.0 of capital or upper case |
| B | Fraction height | 1.5 X A |
| C | Fraction width | 2.5 X A |
| D | Fraction width | 2 X A |
| E | Space to next character | 1 to 1.5 X A |
| F(A) | Length of diagonal | 1.75 X A |

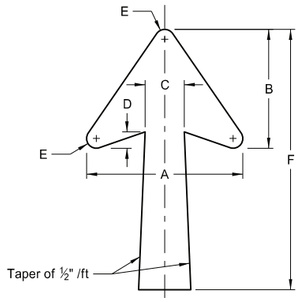
(A) Center diagonal stroke of fraction optically.



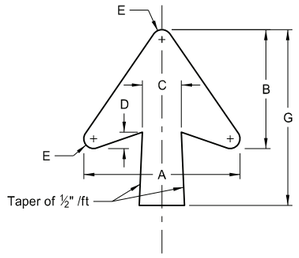

TYPICAL SPACING




DOWN ARROW




TYPE A

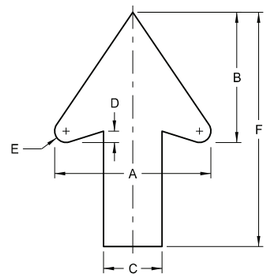



TYPE B

| DESIGNATION | LETTER SIZE (Upper Case) | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|
| ND_6IN | 6" | 12" | 9.125" | 3" | 1" | 0.625" | 20" | 13.5" |
| ND_8IN | 8" | 15.125" | 11.563" | 3.75" | 1.313" | 0.813" | 25" | 17" |
| ND_10IN | 10" | 18.25" | 14" | 4.5" | 1.5" | 0.75" | 30" | 20" |
| ND_12IN | 12" | | | | | | | |
| ND_13IN | 13.3" | | | | | | | |
| ND_16IN | 16" | 22.25" | 17" | 5.375" | 1.75" | 1" | 35" | 25" |
| ND_20IN | 20" | | | | | | | |

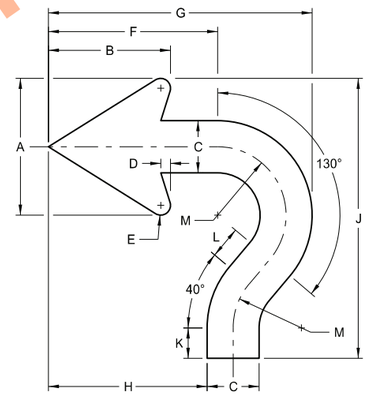
NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

NOTE: Measure rotation angle of arrows counterclockwise from positions shown in details.

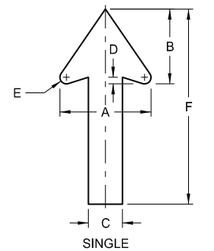



TYPE D

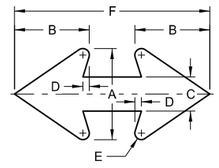
| DESIGNATION | LETTER SIZE (Upper Case) | A | B | C | D | E | F |
|---|---|---|---|---|---|---|---|
| ND_2IN | 2" | 2" | 1.625" | 0.75" | 0.125" | 0.125" | 3" |
| ND_4IN | 4" | 4" | 3.313" | 1.5" | 0.25" | 0.25" | 6" |
| ND_6IN | 6" | 6" | 4.875" | 2.25" | 0.375" | 0.375" | 9" |
| ND_8IN | 8" | 8" | 6.625" | 3" | 0.5" | 0.5" | 12" |
| ND_10IN | 10" | 10" | 8.375" | 3.75" | 0.75" | 0.75" | 15" |
| ND_12IN | 12" | 12" | 10" | 4.5" | 0.875" | 0.875" | 18" |




ROUNDABOUT




SINGLE




DOUBLE

SPECIAL

| DESIGNATION | A | B | C | D | E | F | USES |
|---|---|---|---|---|---|---|---|
| ND_0.75IN | 2" | 1.625" | 0.75" | 0.125" | 0.125" | 7.75" | Parking Signs (Regulatory) |
| ND_2.625IN | 7" | 5.75" | 2.625" | 0.5" | 0.5" | 15" | Frontage Road Signs |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DESIGNATION | LETTER SIZE (Upper Case) | A | B | C | D | E | F | G | H | J | K | L | M | |
| ND_6IN | 6" | 5.25" | 4.688" | 2" | 0.375" | 0.375" | 6.5" | 10.125" | 6.094" | 10.75" | 1.168" | 1.25" | 2.625" | |
| ND_8IN | 8" | 7" | 5.75" | 2.625" | 0.5" | 0.5" | 8.688" | 13.5" | 8.166" | 14.333" | 1.557" | 1.667" | 3.5" | |

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-3-11

REVISIONS

| DATE | CHANGE |
|---|---|
| 7-8-14 | Revised gore sign and added 4" D & D arrow |
| 5-4-16 | Revised Distance & Destination and Typical Spacing details |
| 4-23-18 | Revised arrow details |
| 8-30-18 | Updated notes to active volce. |
| 8-29-19 | New Design Engr PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

KIRK J. HOFF
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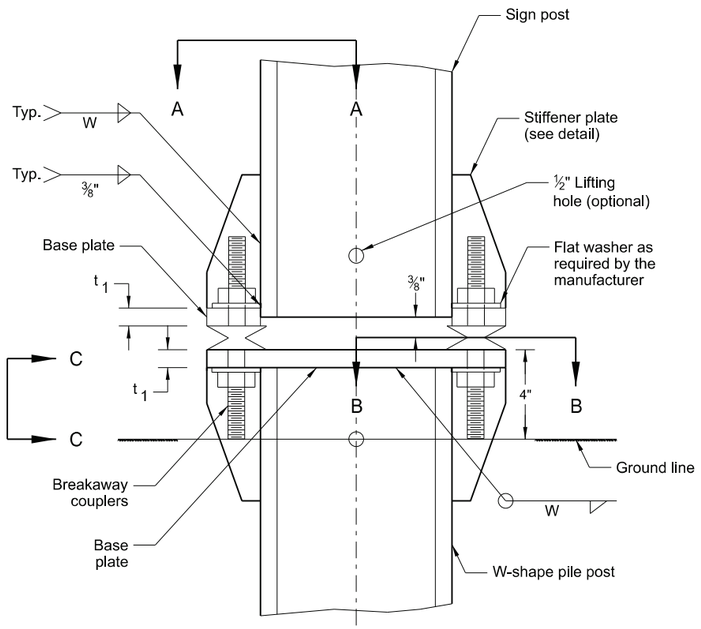
08/05/24

Preliminary Plans

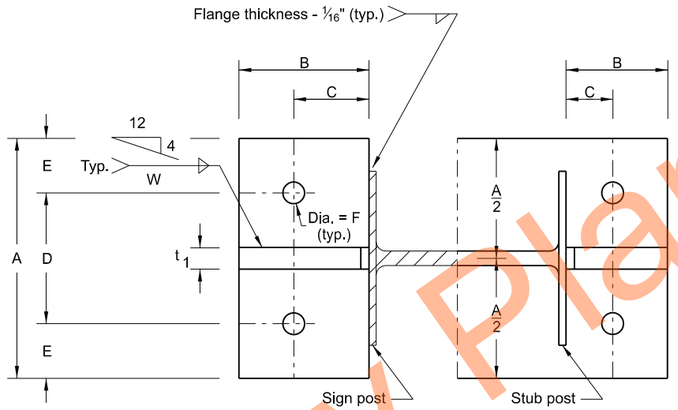
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# Breakaway Coupler System
# Structural Details
# for W-Shape Supports

D-754-12




Sign Post and Stub Post
Elevation

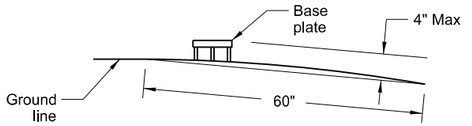



Section A - A
(See Table for Dimensions)

Section B - B

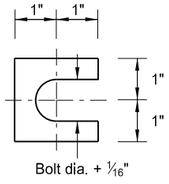
Notes:

1. Use either the breakaway base system shown on standard D-754-13 or a breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.
2. Use structural steel conforming to Sec. 894.03 B.6 and high strength bolts conforming to ASTM - A325. Refer to "Sign Summary" sheet for specific data on each individual sign installation.
3. Use manufacturer's recommendations for assembly procedures.



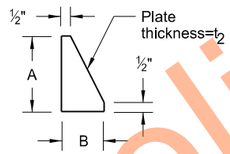

Section C - C

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



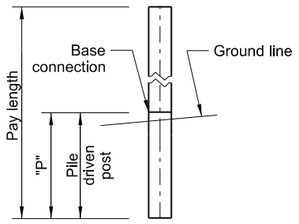

Shim Detail

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Fabricate shims from brass shim stock or strip conforming to ASTM B36.




Stiffener Plate Detail
(See Table for Dimensions)

Sections shown are for installations on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.




W-Shape - Pile Footing

| W-Shape Post & Pile Size | Base Connection Data | | | | | | | | | | Footing Data |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bolt Size | A | B | C | D | E | $t_1$ | $t_2$ | W | F | W-Shape Pile Post "P" |
| W4X13 | ¾" x 5¼" | 6" | 2½" | 1½" | 3½" | 1¼" | 1" | ½" | ¼" | 13/16" | 14' |
| W5X16 | | | | | | | | | | | 14' |
| W6X20 | ⅞" x 5¼" | 8" | 3" | 1¾" | 4" | 2" | 1¼" | ½" | ¼" | 15/16" | 14' |
| W8X24 | | | | | | | | | | | 14' |
| W8X28 | 1" x 5¼" | 8" | 3" | 2" | 4" | 2" | 1½" | ¾" | 5/16" | 1 1/16" | 14' |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 10-4-2013 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-8-14 | Revised notes 2 and 3. |
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

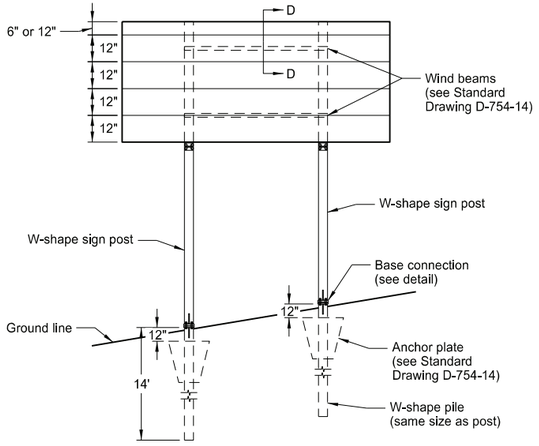
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
08/05/24

Preliminary Plans

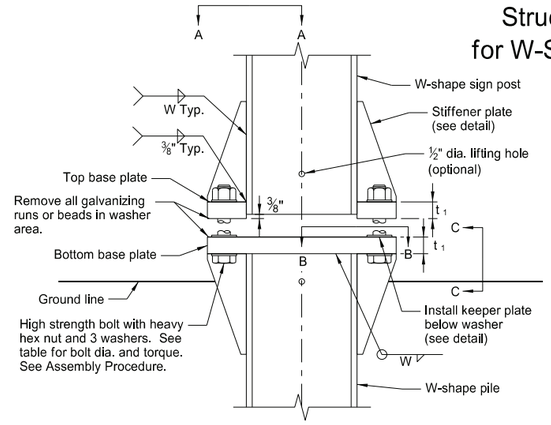
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# Breakaway System Structural Details for W-Shape Supports

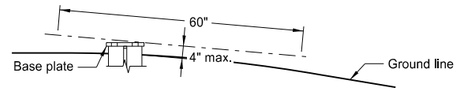
D-754-13




## Typical Panel Mounting on W-shape Sign Posts

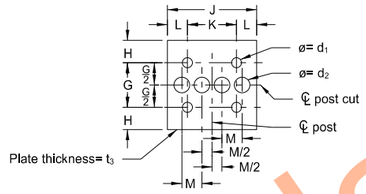



## Base Connection Detail

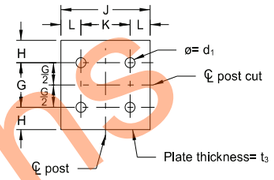



## Section C-C Stub Height Requirements

Maximum projection of base plate limits are defined as a line 4" parallel to any chord, which is perpendicular to, or aligned radially to, the center line of the highway and has the chord's end points on the ground surface on opposite sides of the stub post.




## Perforated Fuse Plate




## Hinge Plate

Notes:

Use structural steel conforming to Section 894.03 B.6 of the Standard Specifications and high strength bolts conforming to ASTM A325.

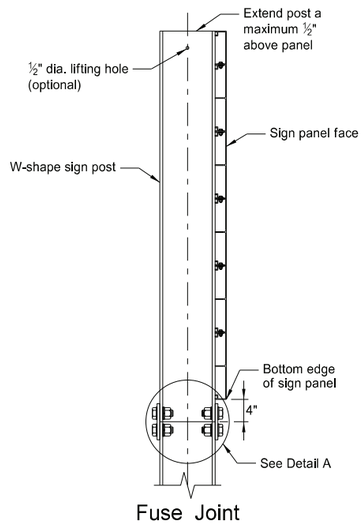
Refer to Sign Summary sheet for specific data on individual sign installation.

Install perforated fuse plate on side of post facing traffic.

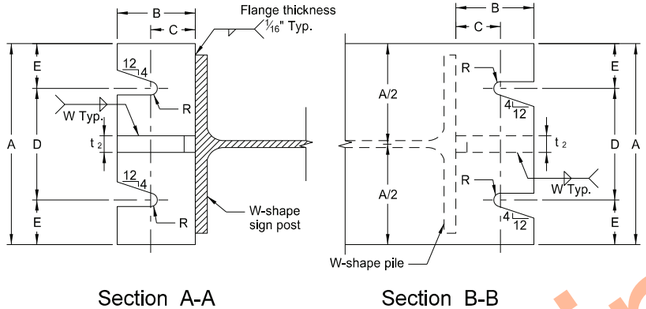
Saw cut posts. Shear or flame cut plates using a mechanically guided cutting torch in accordance with Section 754.04 D.4.b of the Standard Specifications. Prepare edge in accordance with Section 754.04 D.4.c of the Standard Specifications.

Assembly Procedure:

1. Assemble base plates with bolts and one flat washer between top base plate and keeper plate.
2. Shim as required to plumb post.
3. Tighten all base connection bolts the maximum possible with 12" to 15" wrench to bed washers and shims and clean bolt threads.
4. Loosen each bolt in turn and retighten in systematic order to the prescribed torque (see table).
5. Assemble perforated fuse and hinge plates to post with bolts and one flat washer and lock washer under nut.



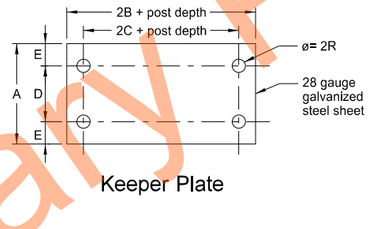

## Fuse Joint (Side View)



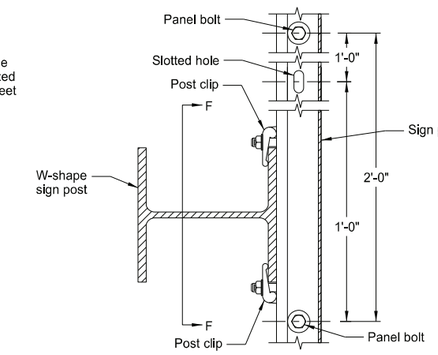

## Section A-A

## Section B-B

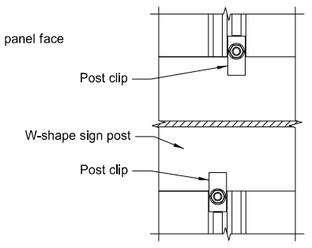
Sections shown for installations on right shoulder. Reverse plate slot bevels for installations on left shoulder.




## Keeper Plate

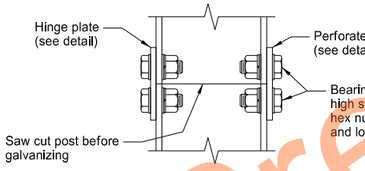



## Section E-E

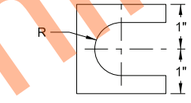



## Section F-F

Install post clips on both sides of each post at each panel joint indicated.

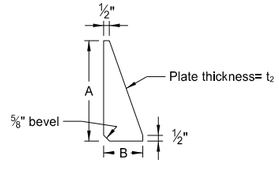



## Detail A

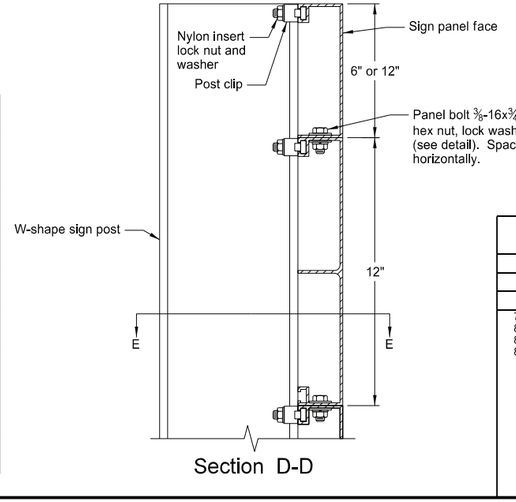



## Shim Detail

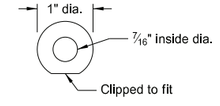
Furnish 2 each .012"± thick and 2 each .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.




## Stiffener Plate




## Section D-D




## Flat Washer Detail

Thickness = 5/64"

| W-Shape Post and Pile Size | Base Connection Dimensions | | | | | | | | | | Fuse and Hinge Plate Dimensions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bolt Size and Torque | A | B | C | D | E | $t_1$ | $t_2$ | W | R | G | H | J | K | L | M | $d_1$ | $d_2$ | $t_3$ | Bolt dia. |
| W4x13 | ¾" ø x 3½" Torque = 600 in-lb | 6" | 2½" | 1½" | 3½" | 1¼" | 1" | ½" | ¼" | 13/32" | 2" | 1¼" | 4" | 2¼" | ⅞" | 1" | 11/16" | ¾" | ⅜" | ⅝" |
| W5x16 | ¾" ø x 3½" Torque = 600 in-lb | 6" | 2½" | 1½" | 3½" | 1¼" | 1" | ½" | ¼" | 13/32" | 2½" | 1¼" | 5" | 2¾" | 1⅛" | 1⅛" | 13/16" | ⅞" | ⅜" | ¾" |
| W6x20 | ⅞" ø x 4¼" Torque = 800 in-lb | 8" | 3" | 1¾" | 4" | 2" | 1¼" | ½" | ¼" | 15/32" | 2½" | 1¼" | 6" | 3½" | 1¼" | 1⅜" | 13/16" | 1⅛" | ⅜" | ¾" |
| W8x24 | ⅞" ø x 4¼" Torque = 800 in-lb | 8" | 3" | 1¾" | 4" | 2" | 1¼" | ½" | ¼" | 15/32" | 2½" | 1½" | 6½" | 3½" | 1½" | 1½" | 15/16" | 1¼" | ½" | ⅞" |
| W8x28 | 1" ø x 5" Torque = 1000 in-lb | 8" | 3" | 2" | 4" | 2" | 1½" | ¾" | 5/16" | 17/32" | 2½" | 1½" | 6½" | 3½" | 1½" | 1⅝" | 1⅛" | 1⅛" | ½" | 1" |
| W8x31 | 1⅛" ø x 5" Torque = 1200 in-lb | 9" | 3½" | 2" | 5" | 2" | 1½" | ¾" | 5/16" | 19/32" | 3" | 1¾" | 8" | 5½" | 1¼" | 2" | 1⅛" | 1½" | ½" | 1" |
| W10x39 | 1⅛" ø x 5" Torque = 1200 in-lb | 9" | 3½" | 2" | 5" | 2" | 1½" | ¾" | 5/16" | 19/32" | 3" | 1¾" | 8" | 5½" | 1¼" | 1⅞" | 1⅜" | 1⅜" | ½" | 1⅛" |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 2-28-14 | |
| REVISIONS | |
| DATE | CHANGE |
| 7-18-14 | Revised first note. |
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

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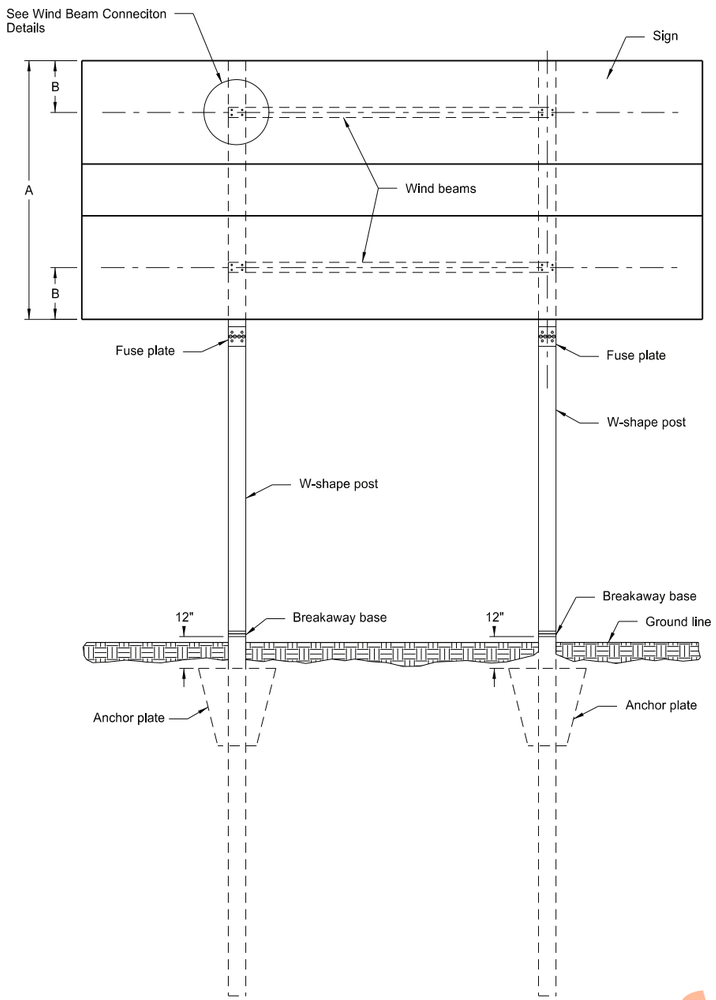
08/05/24

Preliminary Plans

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

# WIND BEAMS AND ANCHOR PLATES FOR W-SHAPE SUPPORTS

D-754-14



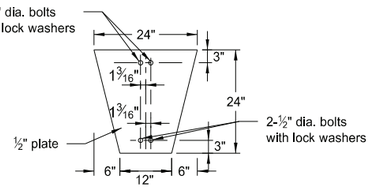

## ASSEMBLY DETAIL FOR WIND BEAMS AND ANCHOR PLATES

Notes:

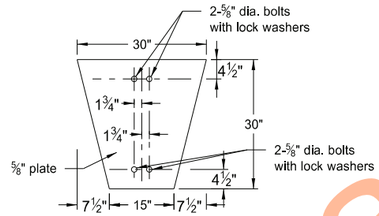
Calculate the B distance using the formula, B=A/4.

Use wind beam conforming to Section 894.03 B.6 of the Standard Specifications.

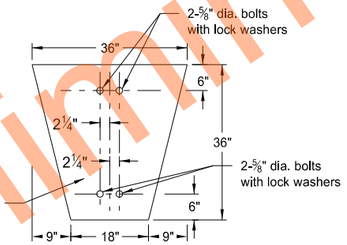
Use bolts conforming to ASTM A307 and galvanized according to ASTM A153.




W4-13 & W5-16

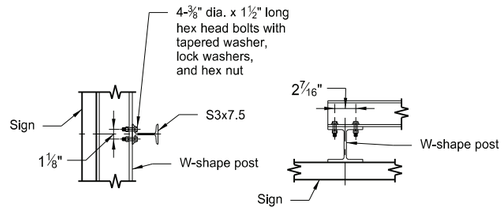



W6-20, W8-24 & W8-28



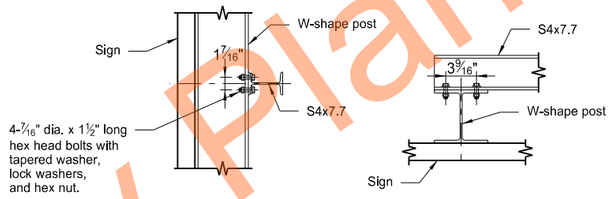

W8-31 & W10-39

## ANCHOR PLATE DETAILS



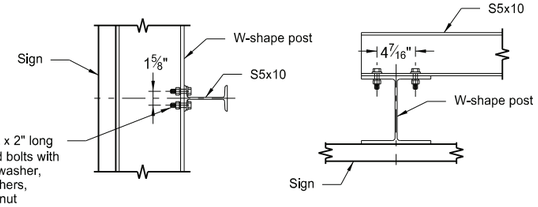

End View Top View

W4-13 & W5-16



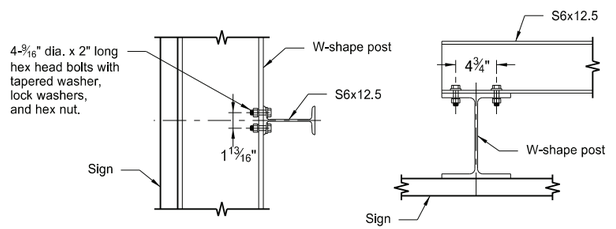

End View Top View

W6-20, W8-24 and W8-28




End View Top View

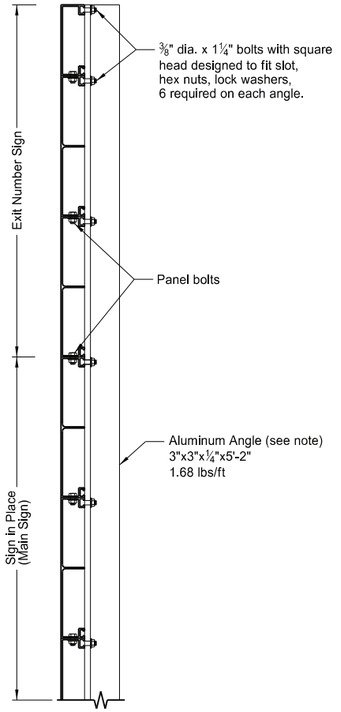
W8-31




End View Top View

W10-39

## WIND BEAM CONNECTION DETAILS




## ASSEMBLY DETAIL FOR EXIT NUMBER SIGNS

Note: Use two aluminum angles on each sign. Vary distance between angles dependent on post spacing of sign in place. Place angles as near as possible to posts. The Engineer will determine exact location.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-3-13

REVISIONS

| DATE | CHANGE |
|---|---|
| 7-8-14 | Revised second note. |
| 8-30-18 | Updated notes to active voice. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

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

08/05/24

Preliminary Plans

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

# PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

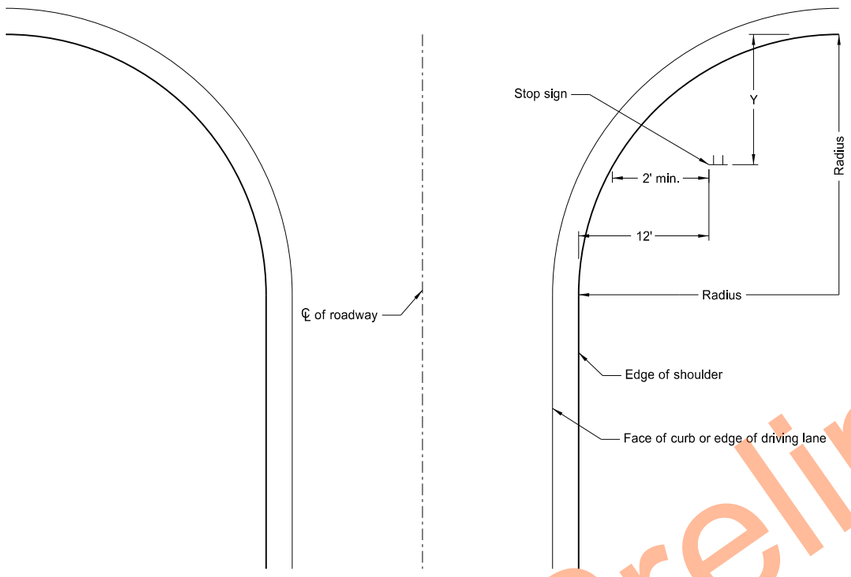
Notes:

1. Curbed Roadways: Use a 3' clearance from face of the curb except where right of way or sidewalk width is limited; Use a minimum 2' clearance. Increase the horizontal clearance if required to maintain a minimum sidewalk clear width of 4' from the sign support, not including any attached curb.
2. Minimum vertical clearance: Provide at least 5' measured from the bottom of the sign to the edge of the driving lane or auxiliary lane at the side of the road in rural districts. Provide at least 7' clearance to the bottom of the sign, where parking or pedestrian movements occur.

   Install signs on expressways a minimum height of 7'.

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

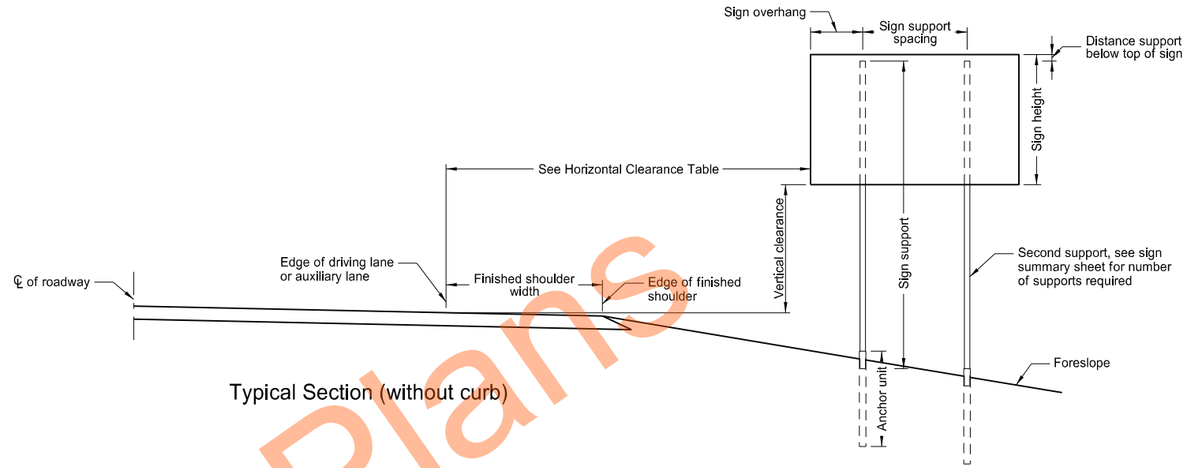
   Maximum vertical clearance is 6" greater than the minimum vertical clearance.
3. Offset signs: Use a vertical clearance of 5' above the edge of the driving lane for signs placed 30 feet or more from the edge of the traveled way.
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.




Stop Sign Location
Wide Throat Intersection

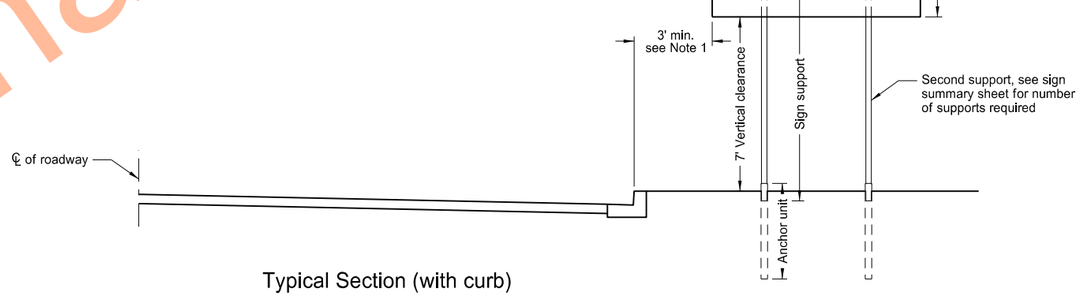
Use layout for the placement of "Stop" signs.

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



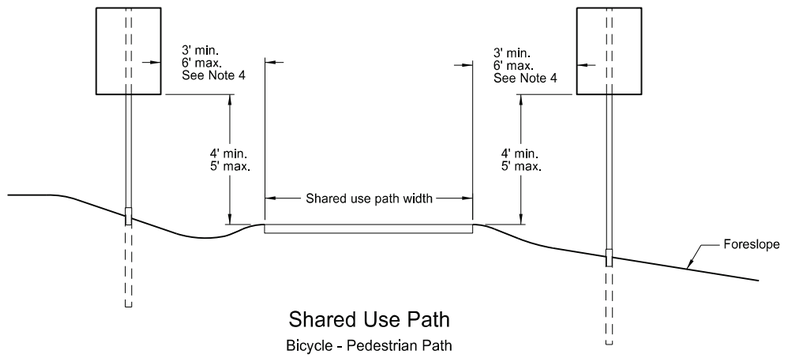

Typical Section (without curb)

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




Typical Section (with curb)

Residential or Business District




Shared Use Path

Bicycle - Pedestrian Path

Preliminary Plans

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

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

Kirk J. Hoff

08/05/24

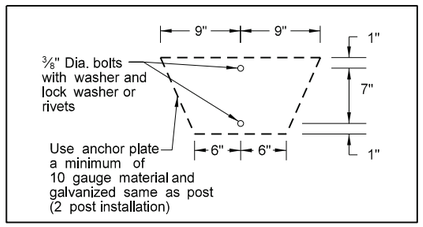
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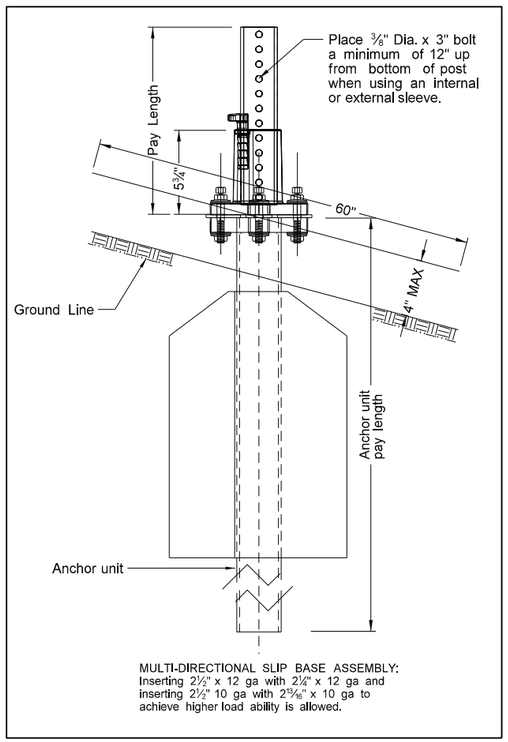
# Mounting Details Perforated Tube

D-754-24

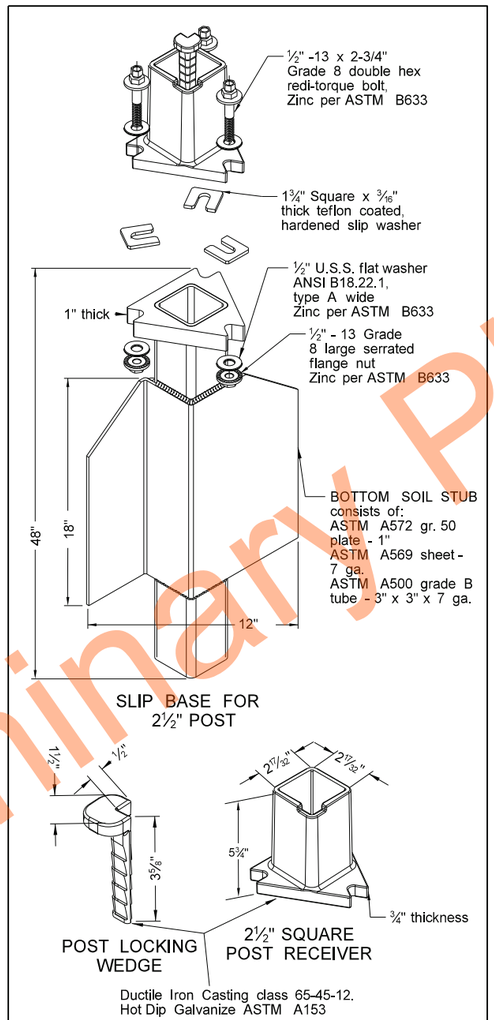
| Number of Posts | Telescoping Perforated Tube: Post Size In. | Wall Thick-ness Gauge | Sleeve Size In. | Wall Thick-ness Gauge | Slip Base | Anchor Size Without Slip Base In. | Anchor Wall Thick-ness Gauge |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 12 | | | No | 2¼ | 12 |
| 1 | 2¼ | 12 | | | No | 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 2 15/16" x 10 ga to achieve higher load ability is allowed.

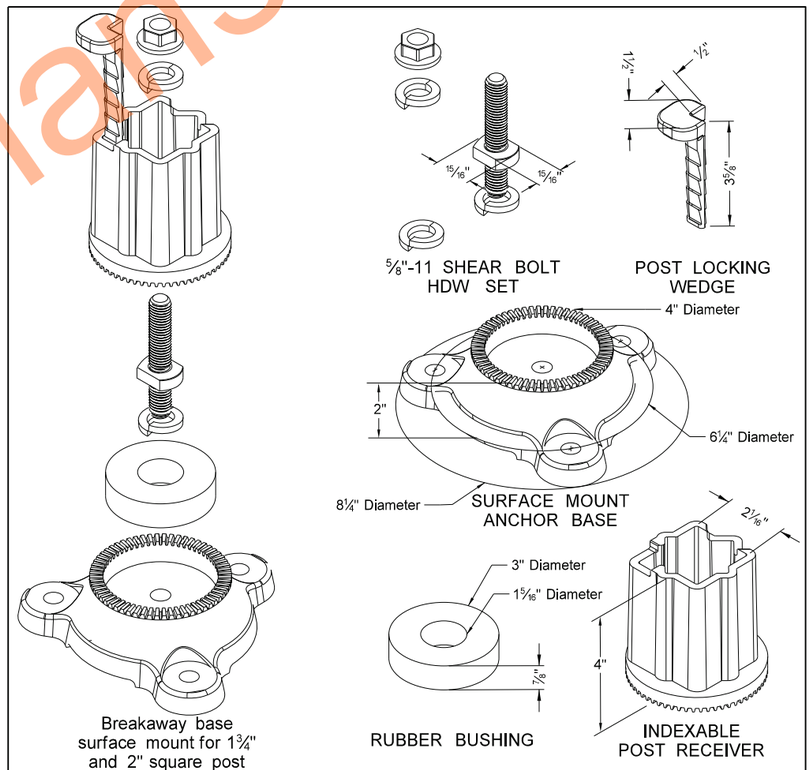



| Properties of Telescoping Perforated Tubes: Tube Size In. | Wall Thickness in. | U.S. Standard Gauge | Weight Per Foot Lbs. | Moment of Inertia In.⁴ | Cross Sect. Area In.² | Section Modulud In.³ |
|---|---|---|---|---|---|---|
| 1½ x 1½ | 0.105 | 12 | 1.702 | 0.129 | 0.380 | 0.172 |
| 2 x 2 | 0.105 | 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 3/16" size 10 gauge is shown as 2.19" size on the plans; The 2½" size is shown as 2.51" size on the plans.

NOTE:

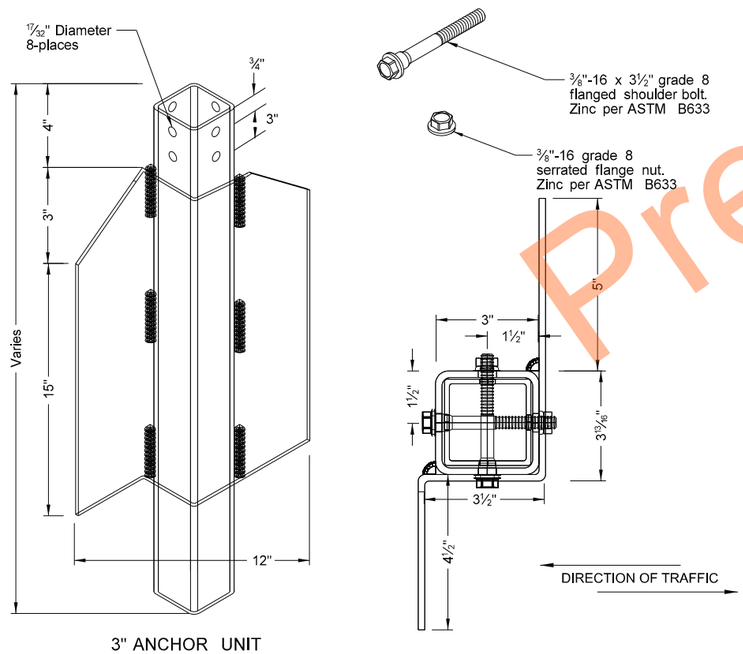
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless otherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum 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. |
| 8-29-19 | New Design Engineer PE Stamp. |
| 8-05-24 | Electronic Stamp/Signature. |

KIRK J. HOFF
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PE-4683
ENGINEER
NORTH DAKOTA

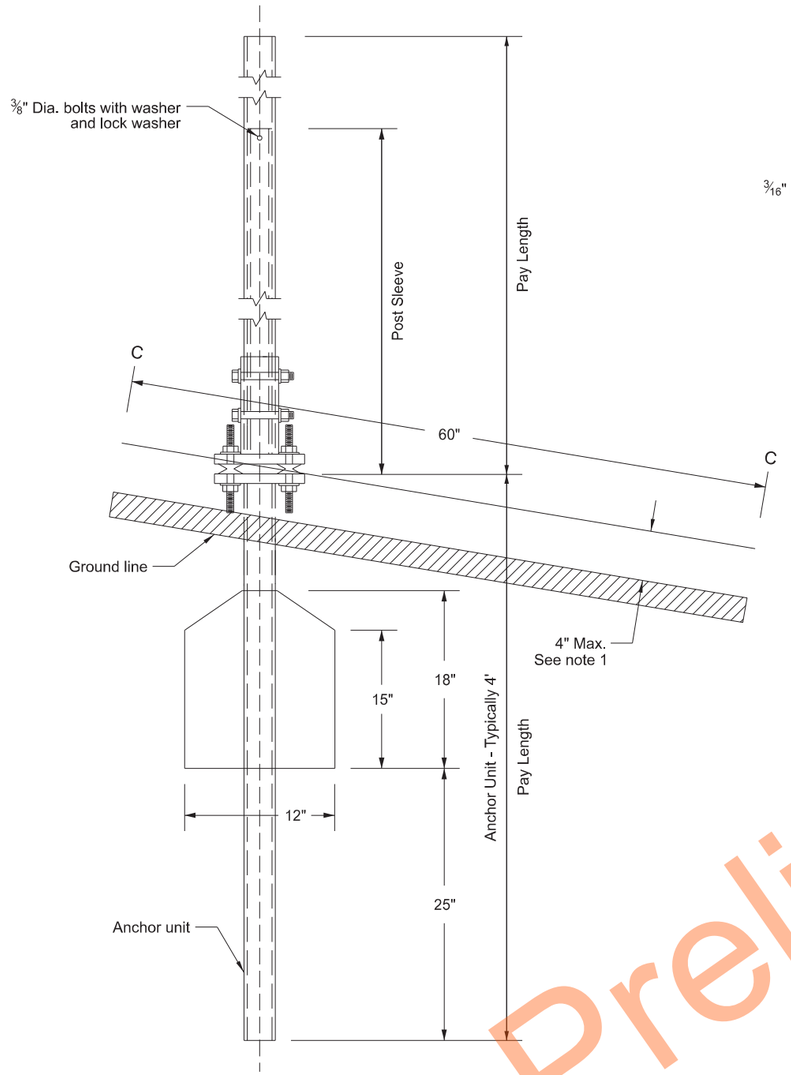
08/05/24

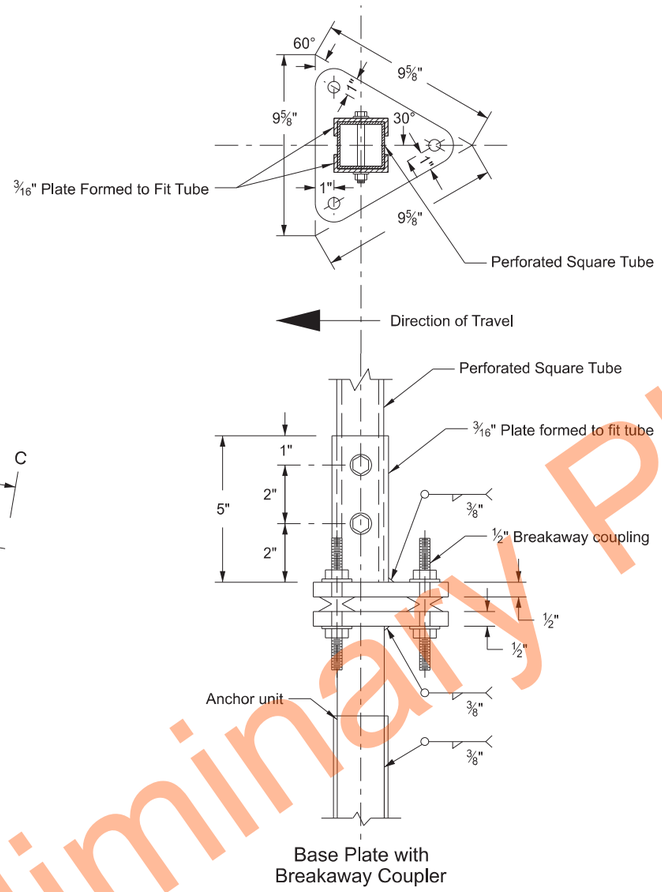
Preliminary Plans

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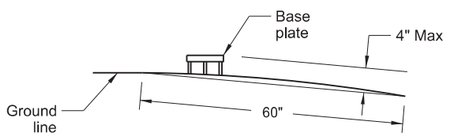
# Breakaway Coupler System for Perforated Tubes

D-754-24A



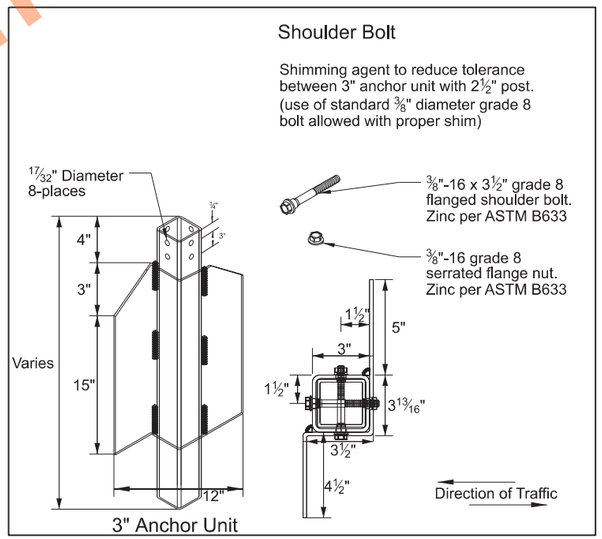




Base Plate with Breakaway Coupler




Section C-C

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




3" Anchor Unit

Notes:

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

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

(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

(C) - 3" anchor unit

Preliminary Plans

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-3-2013

REVISIONS

| DATE | CHANGE |
|---|---|
| 08-30-18 | Updated notes to active voice. |
| 08-30-19 | New Design Engr PE Stamp. |
| 08-05-24 | Electronic Stamp/Signature. |
| 07-22-25 | Corrected "typo" in C-C note. |

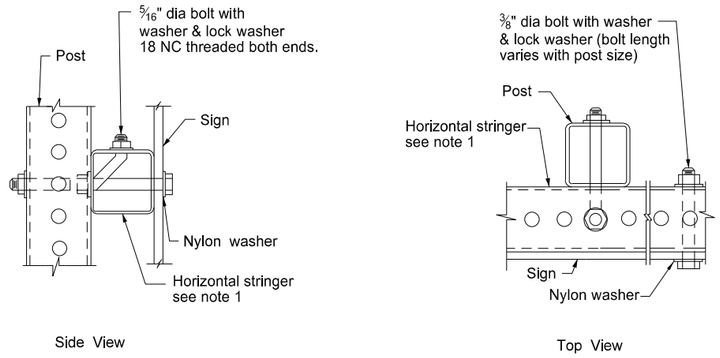
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

07/22/25

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

# Mounting Details Perforated Tube

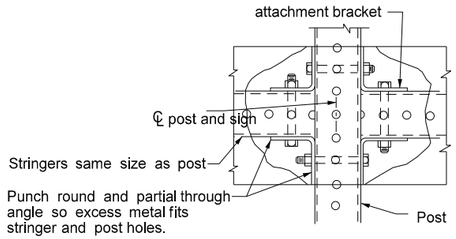
D-754-25




Side View

Top View

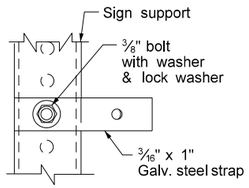
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



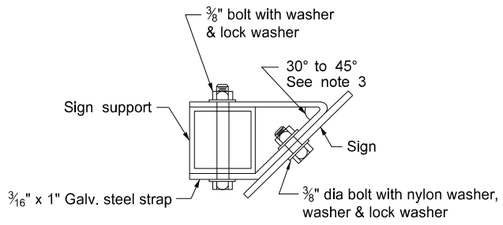

STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

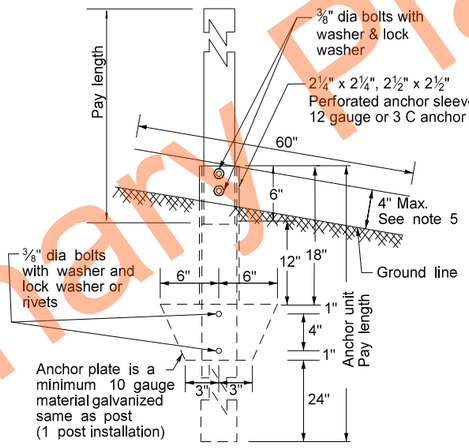



Side View




Top View

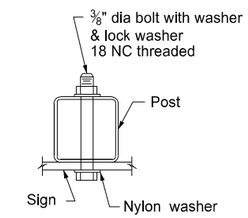
STRAP DETAIL



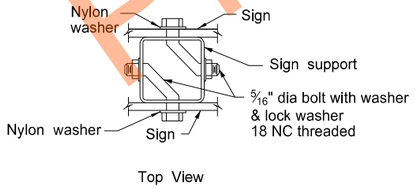

ANCHOR UNIT AND POST ASSEMBLY

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

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

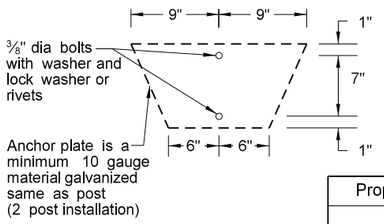



BOLT MOUNTING




Top View

BACK TO BACK MOUNTING




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

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

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

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

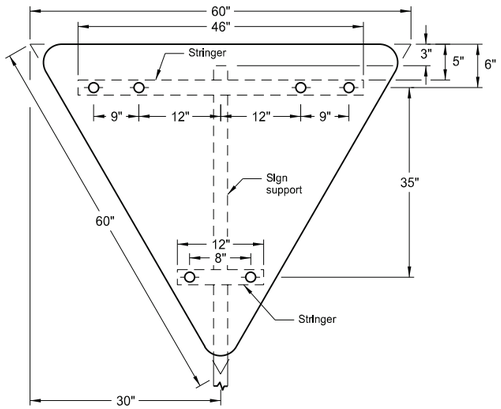
08/05/24

Preliminary Plans

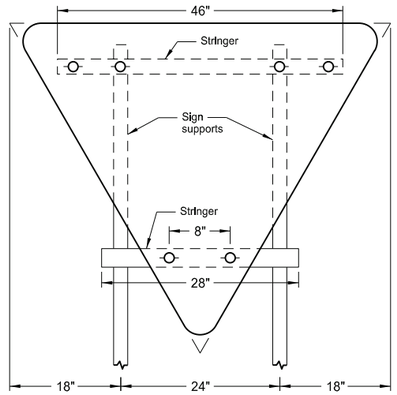
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# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

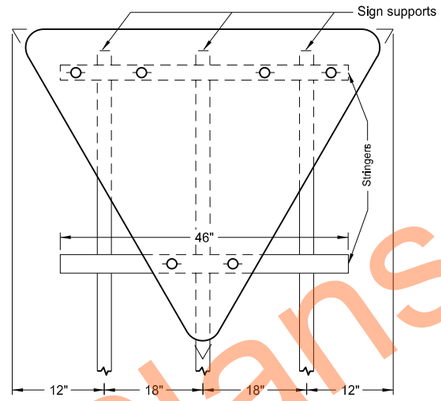
D-754-27




1 Post




2 Posts

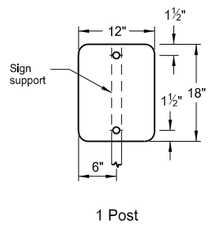



3 Posts

Assembly No. 6

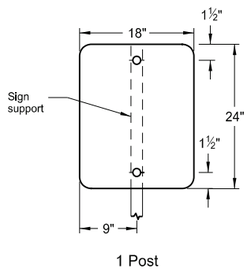
Notes:

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.



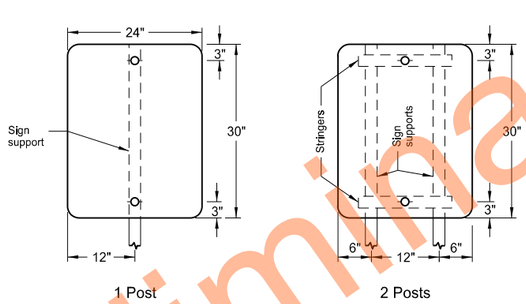

1 Post

Assembly No. 7




1 Post

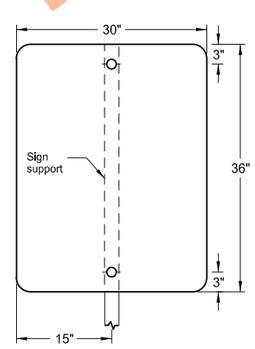
Assembly No. 8



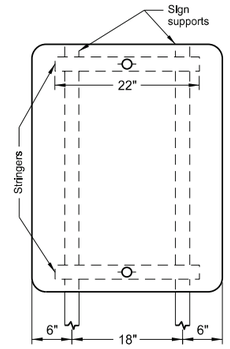

1 Post

2 Posts

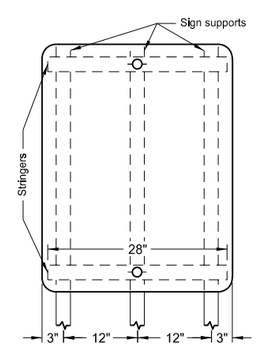
Assembly No. 9




1 Post

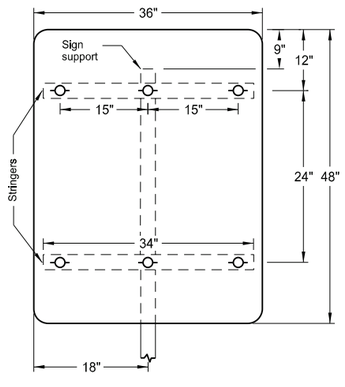



2 Posts

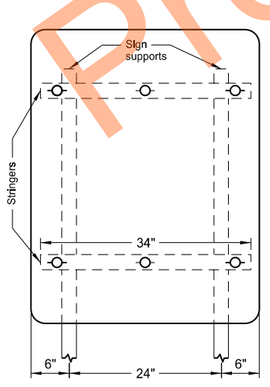



3 Posts

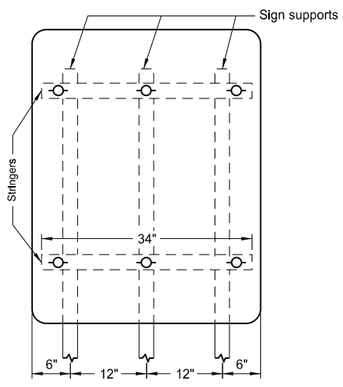
Assembly No. 10




1 Post




2 Posts




3 Posts

Assembly No. 11

Preliminary Plans

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

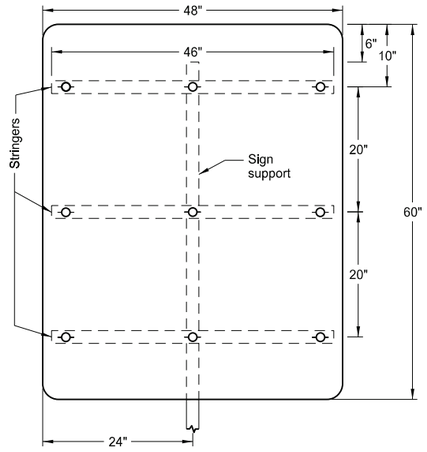
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/06/24

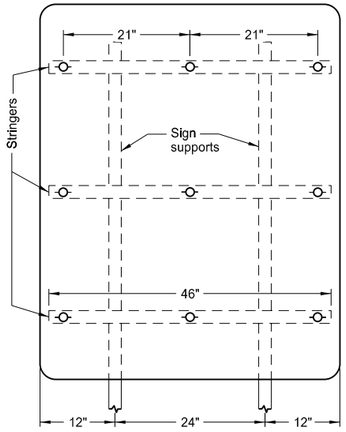
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D-754-28

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

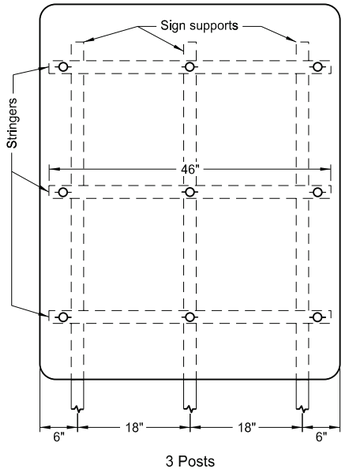



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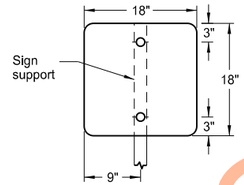



2 Posts

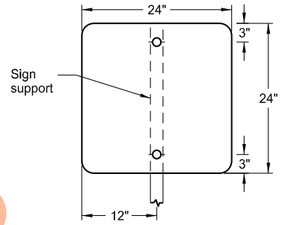
Assembly No. 12



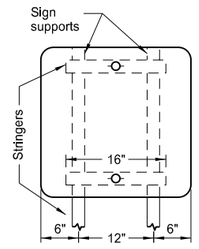

3 Posts




1 Post

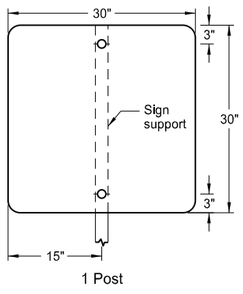



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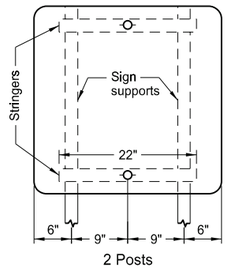



2 Posts

Assembly No. 14

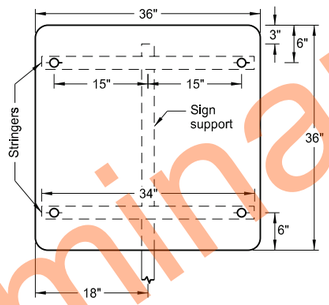



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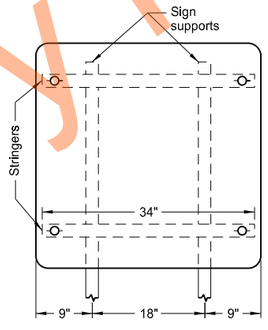



2 Posts

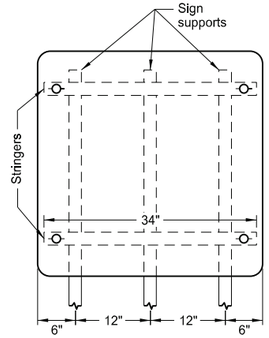
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1 Post

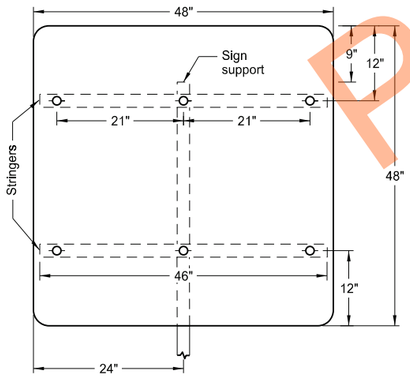



2 Posts

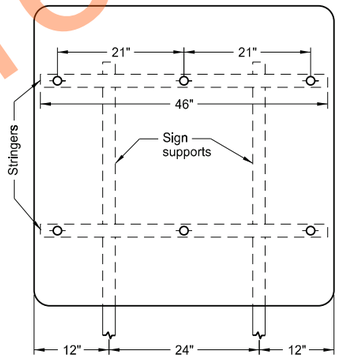



3 Posts

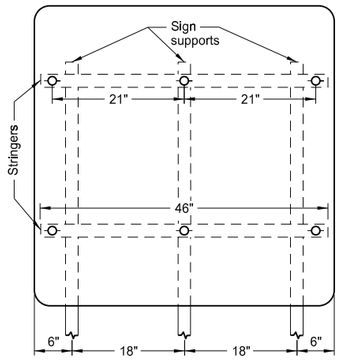
Assembly No. 16




1 Post




2 Posts




3 Posts

Assembly No. 17

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 to active voice & changed Assembly 16 post spacing. |
| 8-30-19 | New Design Engineer PE Stamp. |
| 8-06-24 | Electronic Stamp/Signature. |

KIRK J. HOFF
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PROFESSIONAL
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ENGINEER
NORTH DAKOTA

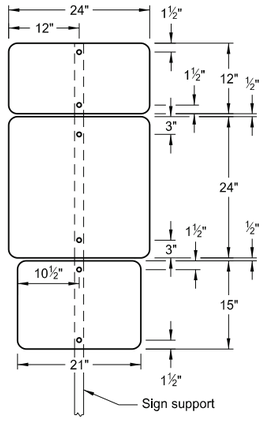
08/06/24

Preliminary Plans

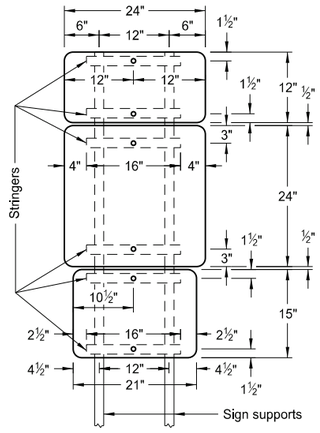
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# SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-53

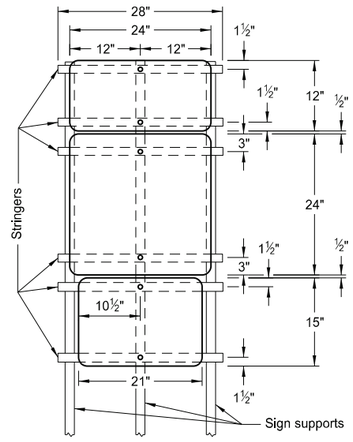



1 Post

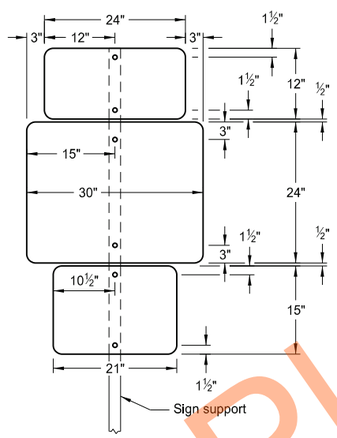



2 Posts

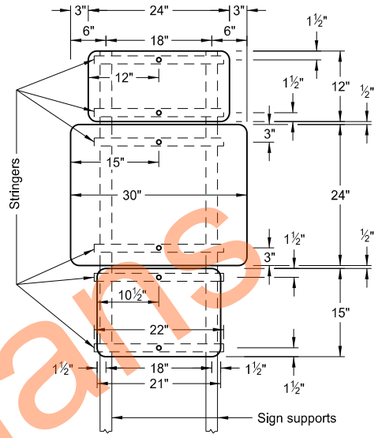
ASSEMBLY NO. 379




3 Posts

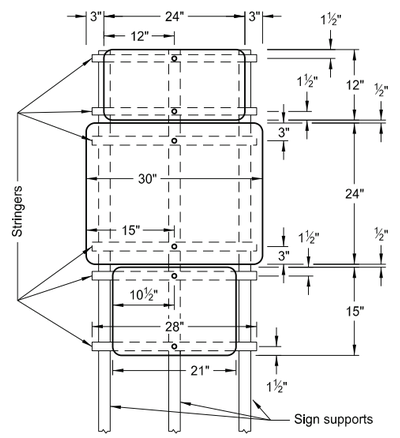



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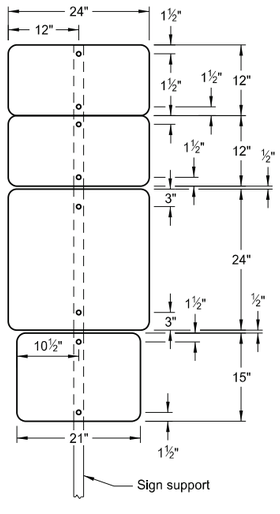



2 Posts

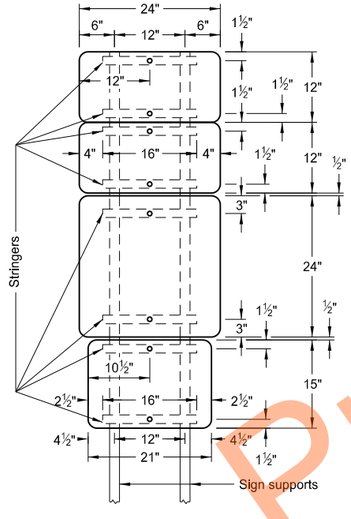
ASSEMBLY NO. 380




3 Posts

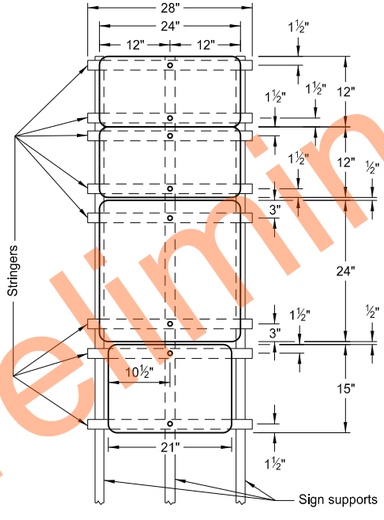



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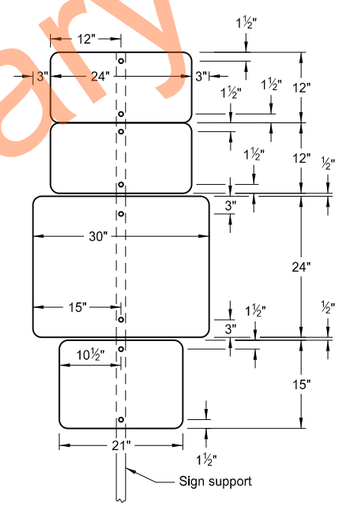



2 Posts

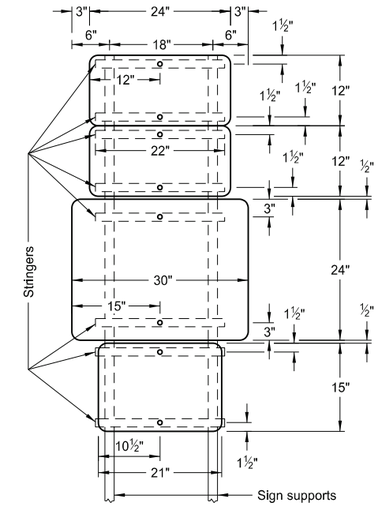
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3 Posts

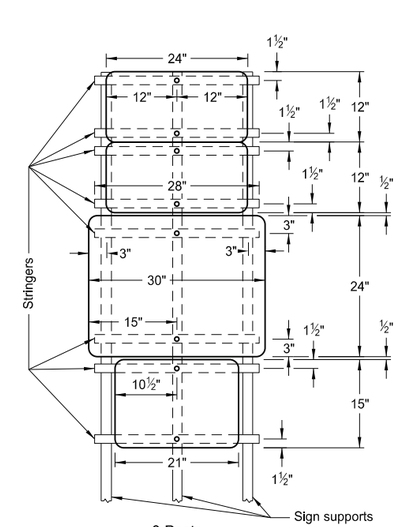



1 Post




2 Posts

ASSEMBLY NO. 382




3 Posts

Preliminary Plans

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-22-12 | |
| REVISIONS | |
| DATE | CHANGE |
| 8-30-18 | Updated notes to active voice. |
| 9-04-19 | New Design Engineer PE Stamp. |
| 8-07-24 | Electronic Stamp/Signature. |

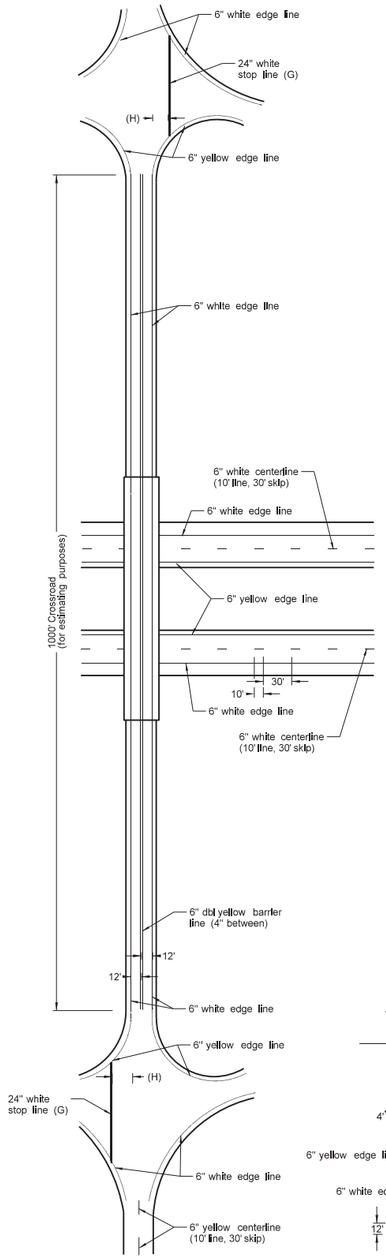
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/07/24

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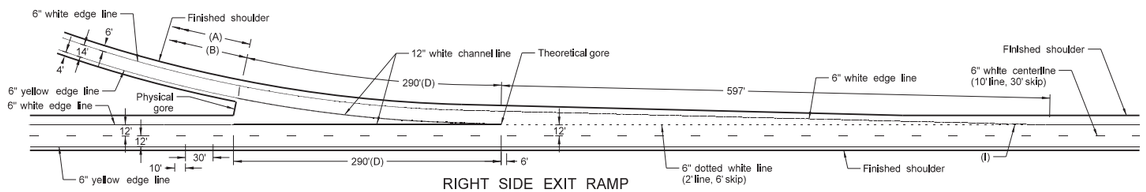
# INTERSTATE PAVEMENT MARKING
# 4 LANE DIVIDED HIGHWAY

D-762-2

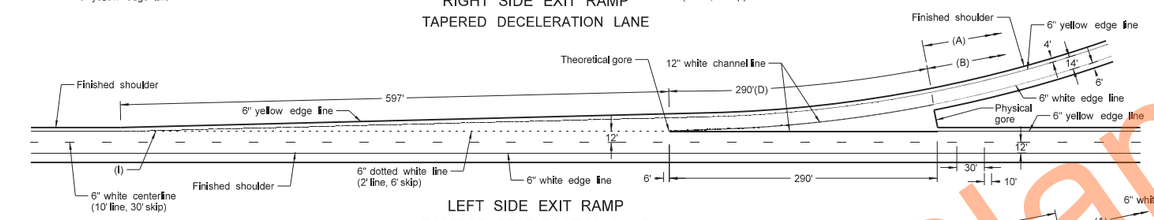



CROSS-ROAD & STRUCTURE

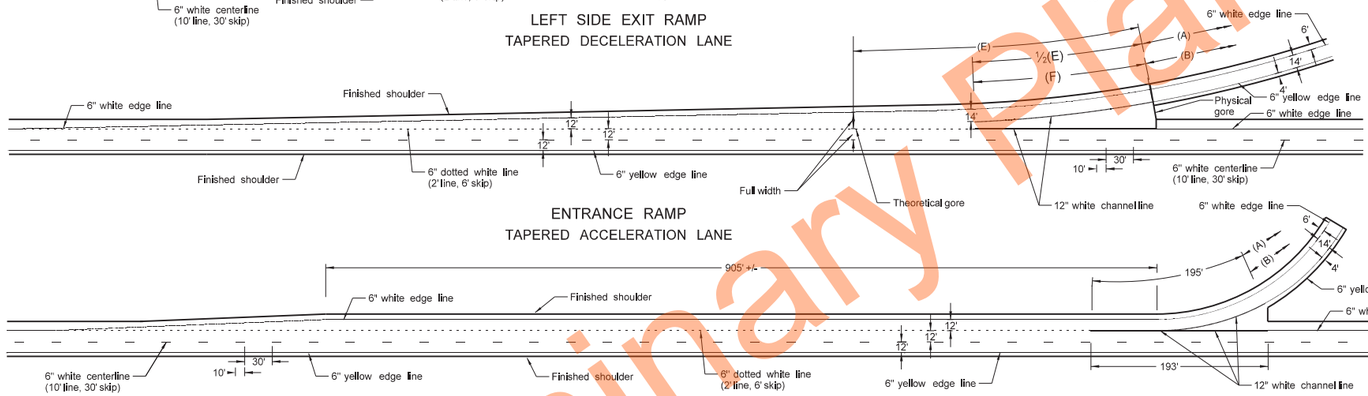
Engineer will determine length striped.



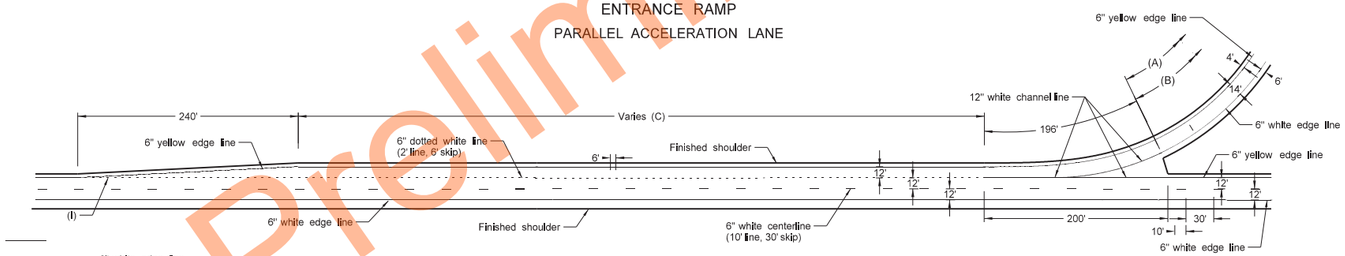

RIGHT SIDE EXIT RAMP
TAPERED DECELERATION LANE



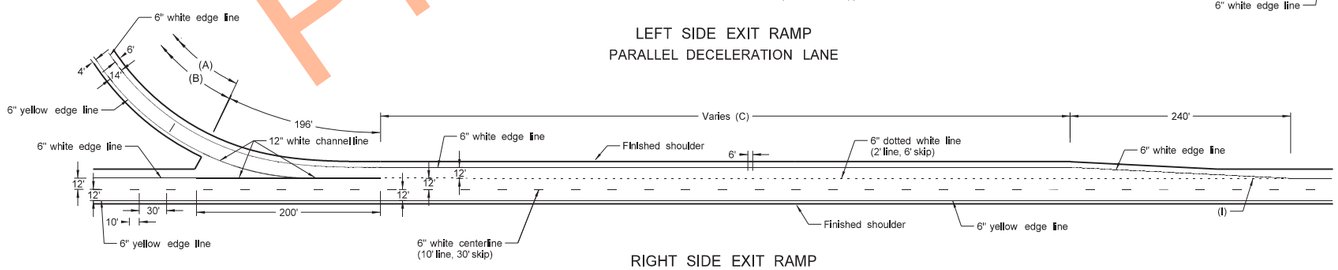

LEFT SIDE EXIT RAMP
TAPERED DECELERATION LANE




ENTRANCE RAMP
TAPERED ACCELERATION LANE




LEFT SIDE EXIT RAMP
PARALLEL DECELERATION LANE




RIGHT SIDE EXIT RAMP
PARALLEL DECELERATION LANE

NOTE:

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

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

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

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

(C) Assume "varies" equals 790' for purpose of estimate. Place pavement marking from beginning of taper to the 12" line.
(D) Beginning of physical gore to theoretical gore.
(E) If the distace is less than 350' extend the 12" channel line to the theoretical gore, otherwise use 195'.
(F) Use 195' for estimating purposes.
(G) Not required for gravel surface crossroad approaches.
(H) 4' minimum, 15' maximum from nearest edge of intersection traveled way.
(I) Extend dotted line until it touches the edgeline.

| BASIS OF ESTIMATE | | |
|---|---|---|
| LOCATION | ITEM | |
| Right or Left Side Exit Ramp TAPERED | 12" White channel line | 580 LF |
| | 24" White stop line | 60 LF |
| | 6" White dotted line | 148 LF |
| | 6" White edge line | 1115 LF |
| | 6" Yellow edge line | 1075 LF |
| Entrance Ramp TAPERED | 12" White channel line | 390 LF |
| | 6" White dotted line | 258 LF |
| | 6" White edge line | 1270 LF |
| | 6" Yellow edge line | 1075 LF |
| Right or Left Side Exit Ramp PARALLEL | 12" White channel line | 396 LF |
| | 24" White stop line | 60 LF |
| | 6" White dotted line (C) | 258 LF |
| | 6" White edge line | 1115 LF |
| | 6" Yellow edge line | 1075 LF |
| Entrance Ramp PARALLEL | 12" White channel line | 388 LF |
| | 6" White dotted line | 283 LF |
| | 6" White edge line | 1275 LF |
| | 6" Yellow edge line | 1075 LF |
| Main Line (Both Roadways) | 6" White lane line, 10' line, 30' skip | 2640 LF/MI |
| | 6" White edge line | 10,560 LF/MI |
| | 6" Yellow edge line | 10,560 LF/MI |
| Cross Road | 6" White edge line | 2000 LF |
| | 6" Dbl yellow barrier line (4" between) | 2000 LF |

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 8-3-11 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-17-17 | Updated to active voice |
| 10-25-19 | Replaced 2' Max dim with Note (I) |
| 11-05-21 | Revised labels |
| 11-22-23 | Revised pvmt marking widths |
| 1-17-24 | Revised wide pvmt marking width |

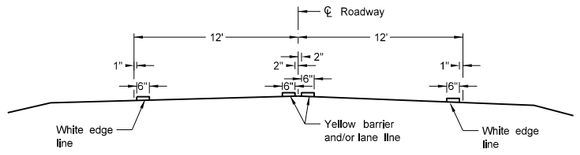
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
01/17/24
ENGINEER
NORTH DAKOTA

Preliminary Plans

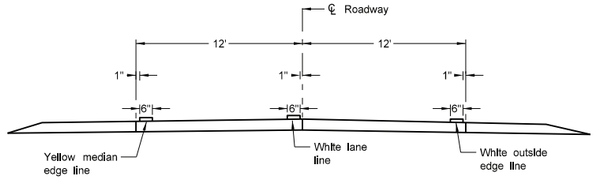
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# PAVEMENT MARKING

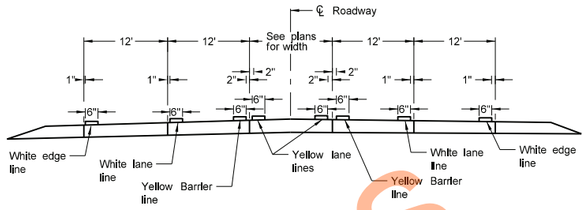
D-762-4



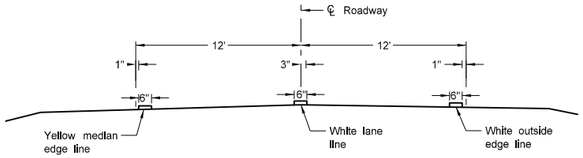

Two Lane Two Way
RURAL ROADWAY



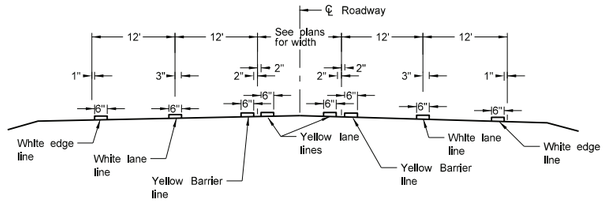

Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



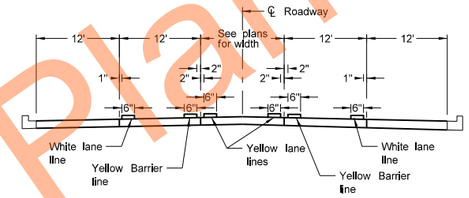

RURAL FIVE LANE ROADWAY
Concrete Section



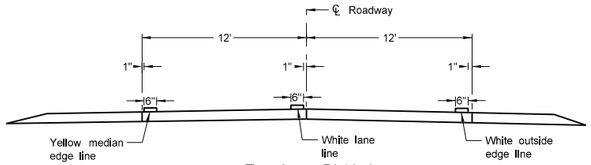

Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphat Section



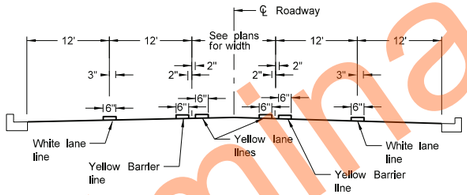

RURAL FIVE LANE ROADWAY
Asphalt Section



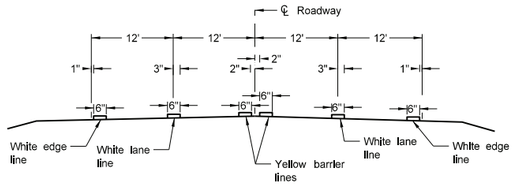

URBAN FIVE LANE SECTION
Concrete Section



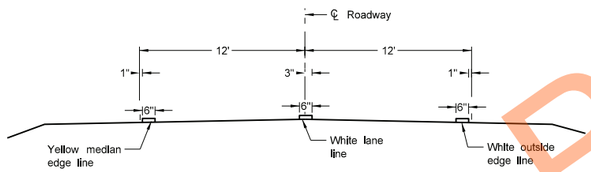

Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



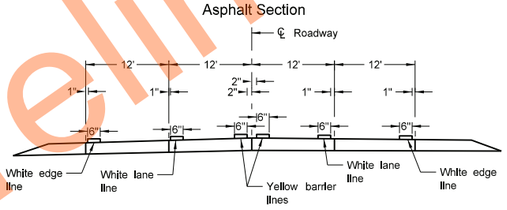

URBAN FIVE LANE SECTION
Asphalt Section



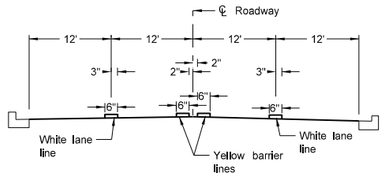

RURAL FOUR LANE ROADWAY
Asphalt Section



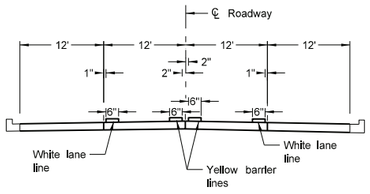

Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



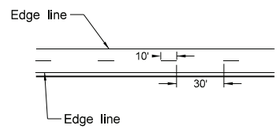

RURAL FOUR LANE ROADWAY
Concrete Section




URBAN FOUR LANE SECTION
Asphalt Section




URBAN FOUR LANE SECTION
Concrete Section




CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NOTES:

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

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

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

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

Preliminary Plans

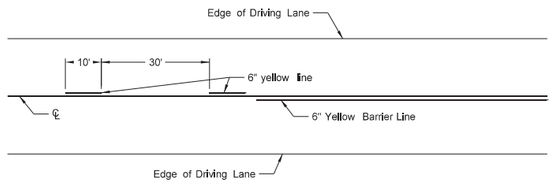
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 12-1-10 | |
| REVISIONS | |
| DATE | CHANGE |
| 10-17-17 | Updated to active voice. |
| 08-27-19 | New Design Engineer PE Stamp. |
| 11-22-23 | Revised pavement marking widths. |
| 07-09-24 | Modified Note 1. |

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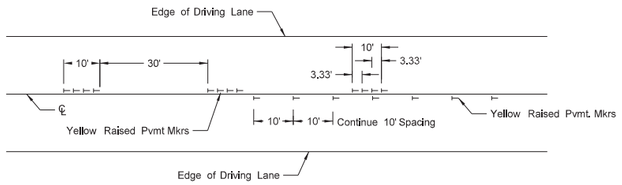
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# SHORT-TERM PAVEMENT MARKING

D-762-11

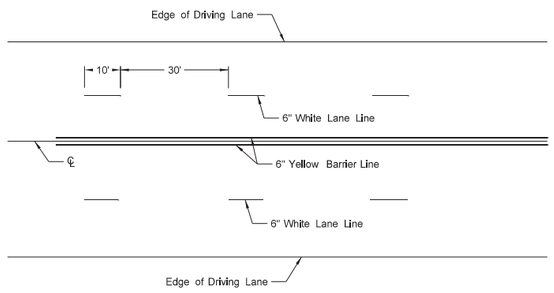



Painted or Tape Lines

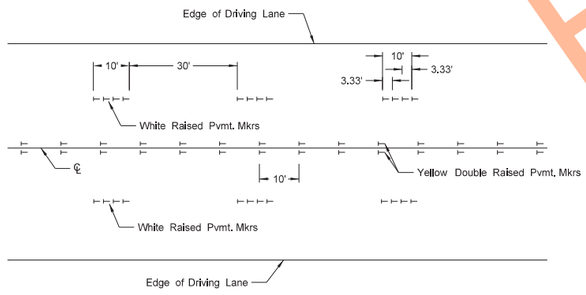



Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

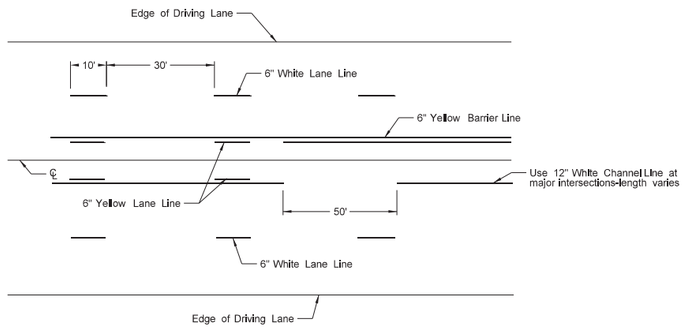



Painted or Tape Lines

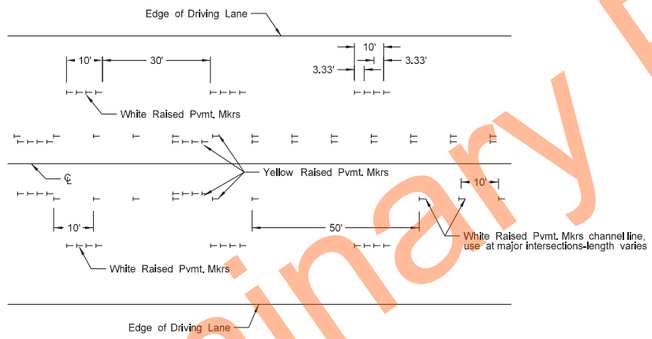



Raised Pavement Markers

FOUR LANE ROADWAY

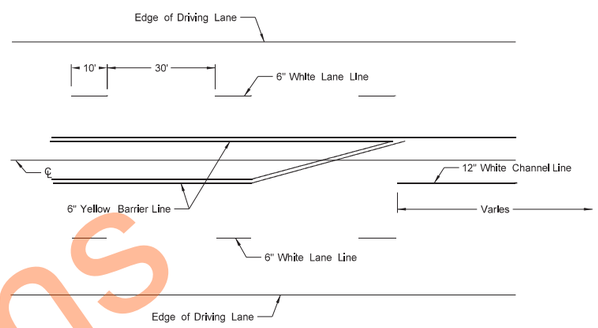



Painted or Tape Lines

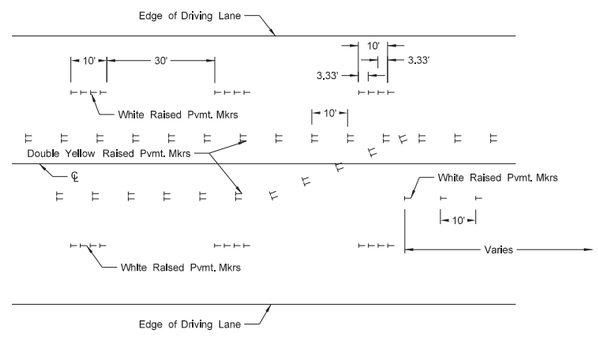



Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN




Painted or Tape Lines




Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

Preliminary Plans

NOTES:

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

12-1-10

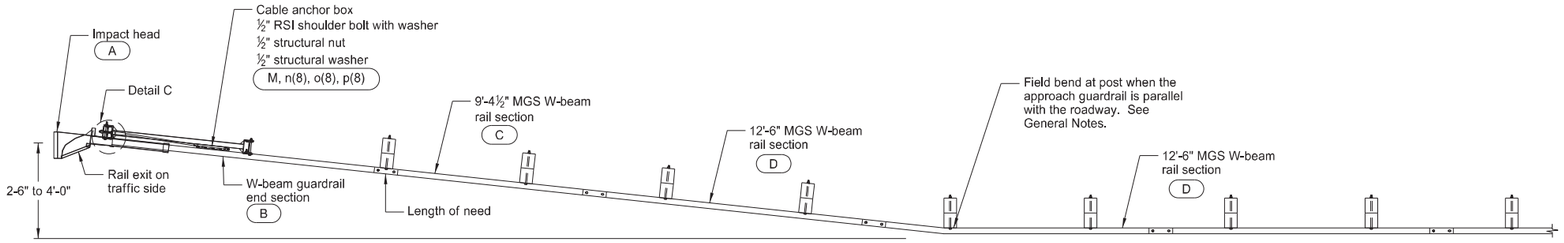
REVISIONS

| DATE | CHANGE |
|---|---|
| 3-29-16 | Re-numbered to be D-762-11 (previously was D-762-6) |
| 10-17-17 | Updated to active voice. |
| 8-27-19 | New Design Engineer PE Stamp. |
| 11-22-23 | Revised pavement marking widths. |
| 1-17-24 | Revised wide pvmt marking width. |

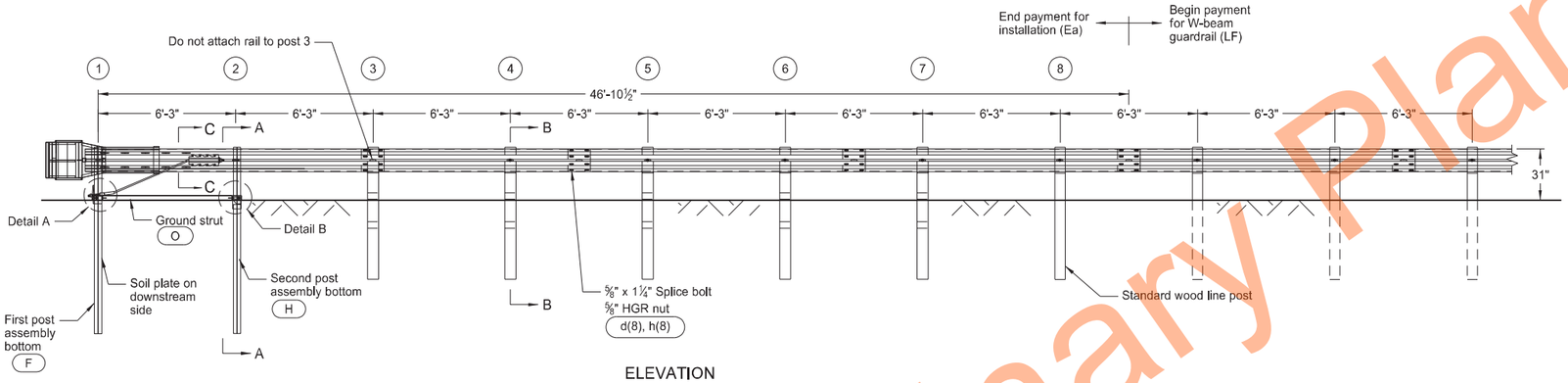
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PROFESSIONAL
PE-4683
01/17/24
ENGINEER
NORTH DAKOTA

# MGS FLARED ENERGY ABSORBING TERMINAL - WOOD POST

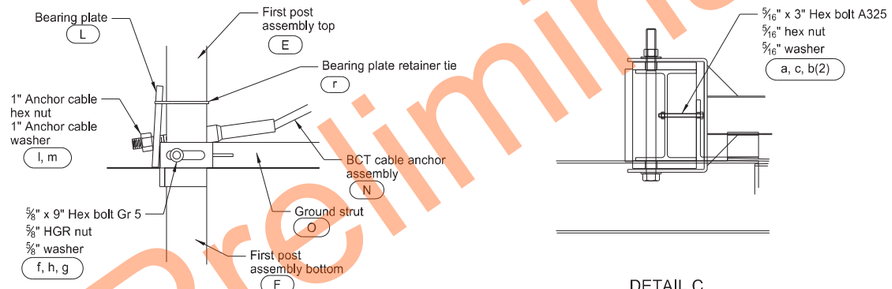
D-764-38




PLAN



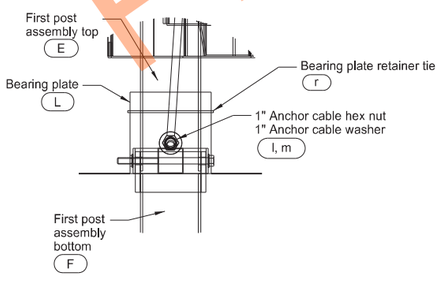

ELEVATION




SIDE VIEW

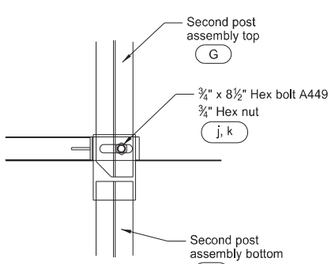



DETAIL C
Post 1 (Impact Head connection)




FRONT VIEW

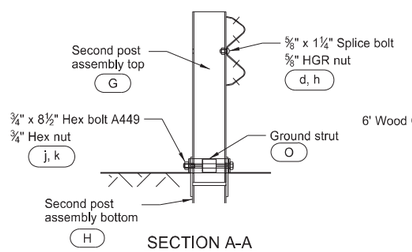
DETAIL A
Post 1



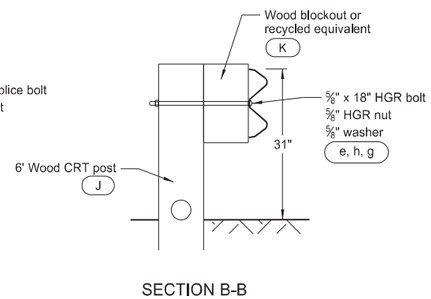

DETAIL B
Post 2

| ITEM | ITEM NO. | BILL OF MATERIALS | QTY |
|---|---|---|---|
| A | F3000 | IMPACT HEAD | 1 |
| B | SF1303 | W-BEAM GUARDRAIL END SECTION, 12 Ga | 1 |
| C | G12025 | 9'-4½" MGS W-BEAM RAIL SECTION, 12 Ga | 1 |
| D | G1203A | 12'-6" MGS W-BEAM RAIL SECTION, 12 Ga | 2 |
| E | UHP1A | FIRST POST ASSEMBLY TOP | 1 |
| F | HP1B | FIRST POST ASSEMBLY BOTTOM | 1 |
| G | UHP2A | SECOND POST ASSEMBLY TOP | 1 |
| H | HP2B | SECOND POST ASSEMBLY BOTTOM | 1 |
| J | UP671 | WOOD CRT POST | 5 |
| K | P675 | WOOD BLOCKOUT OR RECYCLE EQUIVALENT | 5 |
| L | E750 | BEARING PLATE | 1 |
| M | S760 | CABLE ANCHOR BOX | 1 |
| N | E770 | BCT CABLE ANCHOR ASSEMBLY | 1 |
| O | S785 | GROUND STRUT HINGED POST | 1 |
| | | HARDWARE | |
| a | B5160304A | ⅝" x 3" HEX BOLT A325 | 2 |
| b | W0516 | ⅝" WASHER | 4 |
| c | N0516 | ⅝" HEX NUT | 2 |
| d | B580122 | ⅝" Dia x 1¼" SPLICE BOLT | 33 |
| e | B581802 | ⅝" Dia X 18" HGR BOLT | 5 |
| f | B580904A | ⅝" Dia x 9" HEX BOLT GRD 5 | 1 |
| g | W050 | ⅝" WASHER | 7 |
| h | N050 | ⅝" Dia HGR NUT | 39 |
| j | B340854A | ¾" Dia x 8½" HEX BOLT GRD A449 | 1 |
| k | N030 | ¾" Dia HEX NUT | 1 |
| l | N100 | 1" ANCHOR CABLE HEX NUT | 2 |
| m | W100 | 1" ANCHOR CABLE WASHER | 2 |
| n | SB12A | ½" RSI SHOULDER BOLT WITH WASHER | 8 |
| o | N012A | ½" STRUCTURAL NUT | 8 |
| p | W012A | ½" STRUCTURAL WASHER | 8 |
| r | CT-100ST | BEARING PLATE RETAINER TIE | 1 |

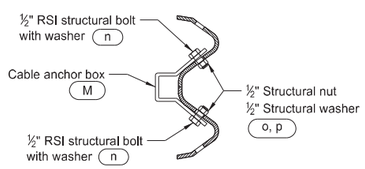
NOTE: Standard wood line post, block, and associated hardware not included in Bill of Materials Table.




SECTION A-A
Post 2




SECTION B-B
Posts 3 through 7




SECTION C-C

GENERAL NOTES:

1. Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
2. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail is flared at 16:1 to 10:1, ensure the Flared Energy Absorbing Terminal has only the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, ensure the Flared Energy Absorbing Terminal is turned parallel to the roadway.
4. Site grade as necessary to ensure the lower sections of the posts do not protrude more than 4" above the ground (measured along a 5' cord).
5. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
6. Install the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent cable from twisting when tightening nuts.
7. "Toe nail" the wood blockouts to the rectangular wood posts with two 20 penny galvanized nails to prevent them from turning when the wood shrinks.

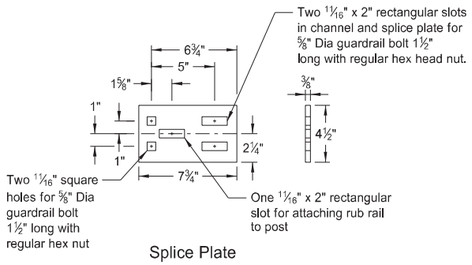
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12-02-20 | Updated notes to active voice. |

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12 02 2020

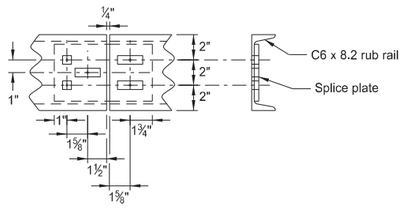
Preliminary Plans

# MGS W-BEAM GUARDRAIL GENERAL DETAILS

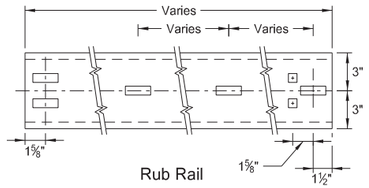
D-764-40



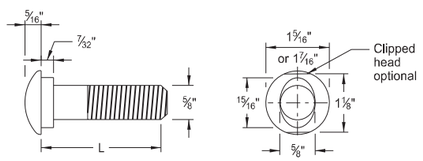

Splice Plate



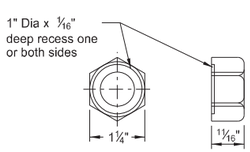

Splice Detail



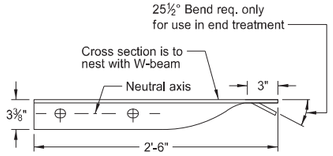

C6x8.2 RUB RAIL AND SPLICE PLATE

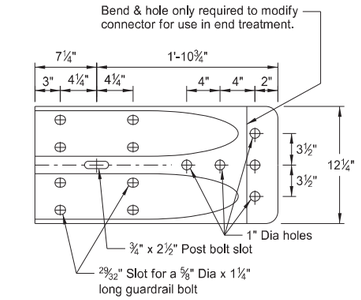



| 5/8" Diameter Guardrail Bolt | |
|---|---|
| L | Thread Length |
| 1 1/4" | Full length thread |
| 2" | 1 3/4" Min thread length |
| 9 1/2" | 4" Min thread length |
| 18" | 4" Min thread length |
| 20" | 4" Min thread length |
| 22" | 4" Min thread length |
| 25" | 4" Min thread length |

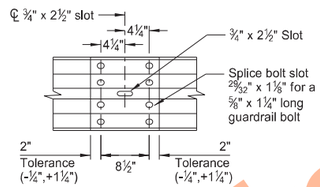



5/8" GUARDRAIL BOLT & RECESS NUT



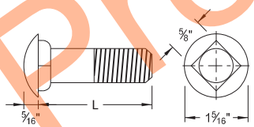




W BEAM TERMINAL CONNECTOR




SPLICE DETAIL

NOTE: Do not install center bolt in the 3/4" x 2 1/2" slot at mid span splices.

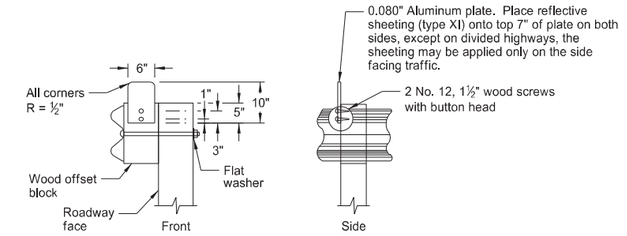



| 5/8" Diameter Carriage Bolt | |
|---|---|
| L | Thread Length |
| 1 1/2" | Full length thread |
| 3" | 1 1/2" Min thread length |
| 11" | 1 3/4" Min thread length |
| 13" | 1 3/4" Min thread length |



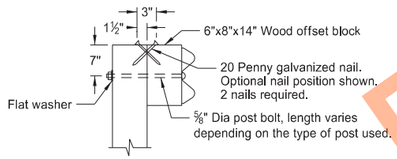
5/8" Dia hex nut

5/8" CARRIAGE BOLT & NUT

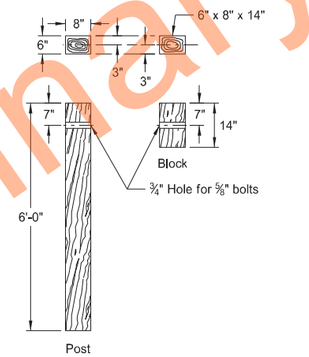



REFLECTORIZED PLATE DETAIL

NOTE: Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.

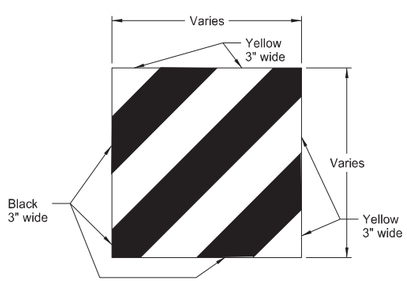



TYPICAL WOOD POST ATTACHMENT DETAIL

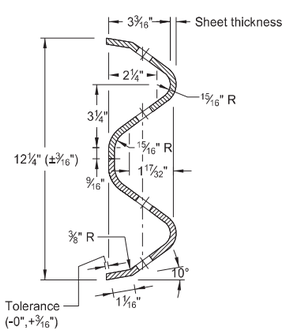



6" x 8" WOOD POST & BLOCK

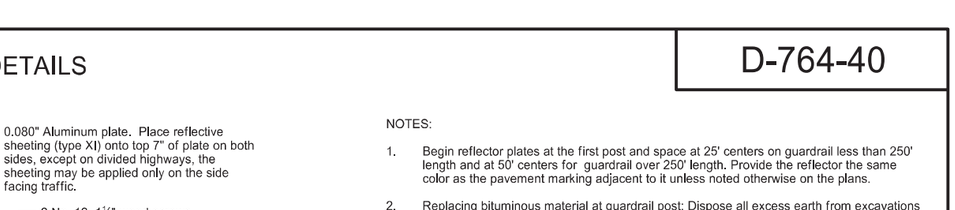
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



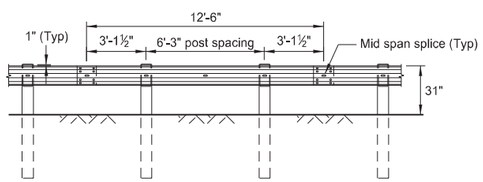

IMPACT HEAD OBJECT MARKER




W-BEAM CROSS SECTION




STANDARD MGS GUARDRAIL PANEL




STANDARD MGS GUARDRAIL SYSTEM

NOTES:

1. Begin reflector plates at the first post and space at 25' centers on guardrail less than 250' length and at 50' centers for guardrail over 250' length. Provide the reflector the same color as the pavement marking adjacent to it unless noted otherwise on the plans.
2. Replacing bituminous material at guardrail post: Dispose all excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material wherever guardrail is installed after mat has been laid. Cost of excavation and replacing of bituminous material to be included in the price bid for other items.
3. Fit the Object Marker within the vertical edges of the Impact Plate. Provide type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply the sheeting to 0.100 Aluminum sheeting meeting the requirements of Section 894.01.A. Attach the Object Marker to the Impact Head Plate with rivets or other attachment device. Ensure the rivets or attachment device are non-rust. Slope the stripes downward toward the roadway side.
4. Guardrail installation height tolerance = ±1".

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12-02-20 | Updated clipped head to optional |

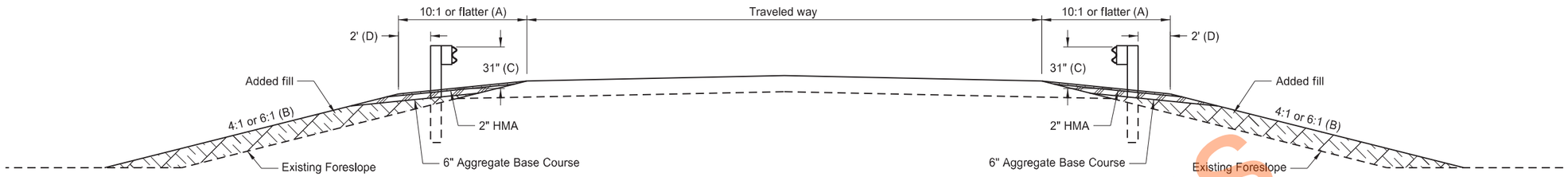
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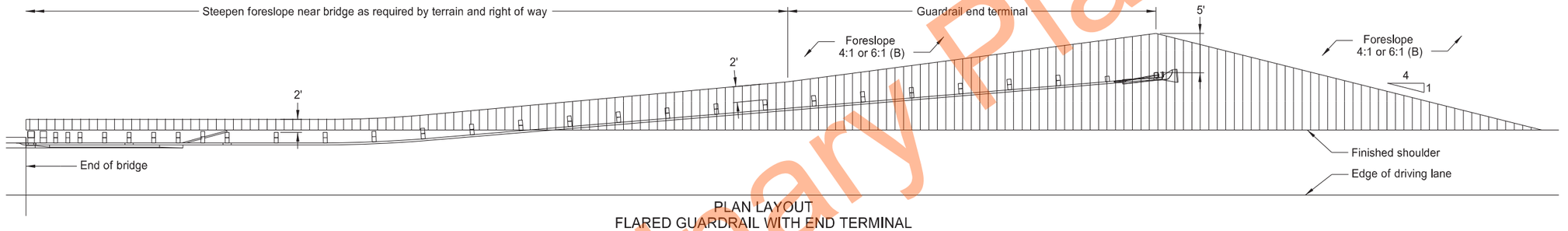
Preliminary Plans

D-764-48

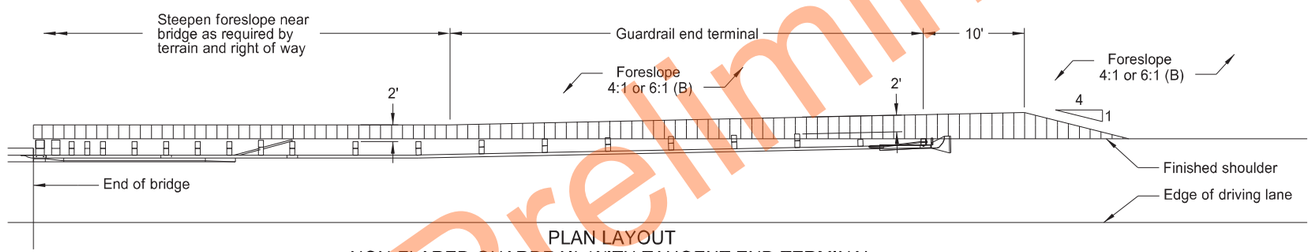
# TYPICAL GRADING AT BRIDGE ENDS WITH MGS W-BEAM GUARDRAIL



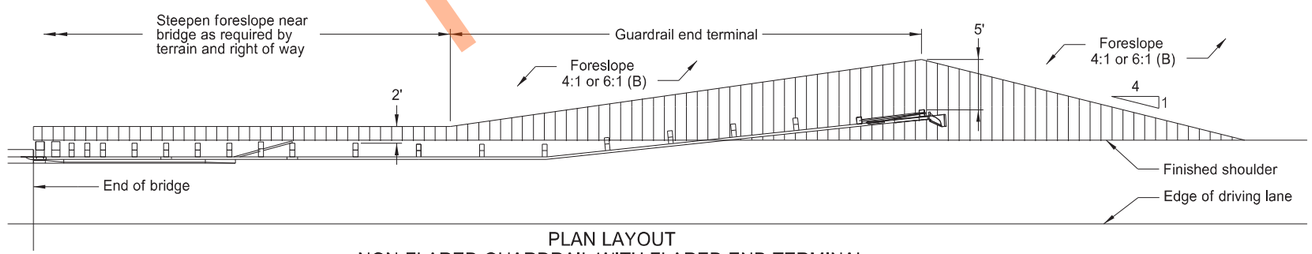

TYPICAL SECTION




PLAN LAYOUT
FLARED GUARDRAIL WITH END TERMINAL




PLAN LAYOUT
NON-FLARED GUARDRAIL WITH TANGENT END TERMINAL




PLAN LAYOUT
NON-FLARED GUARDRAIL WITH FLARED END TERMINAL

NOTES:

(A) Use slope flatter than 10:1 when required to provide proper guardrail height.

(B) When normal foreslope is 4:1, use added fill slope of 4:1. When normal foreslope is 6:1, use added fill slope of 6:1.

(C) Measure from top of guardrail to top of surfacing at front face of guardrail.

(D) Vary dimension at end terminals per Plan Layouts shown on this sheet.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12/02/20 | Updated notes to active voice. |

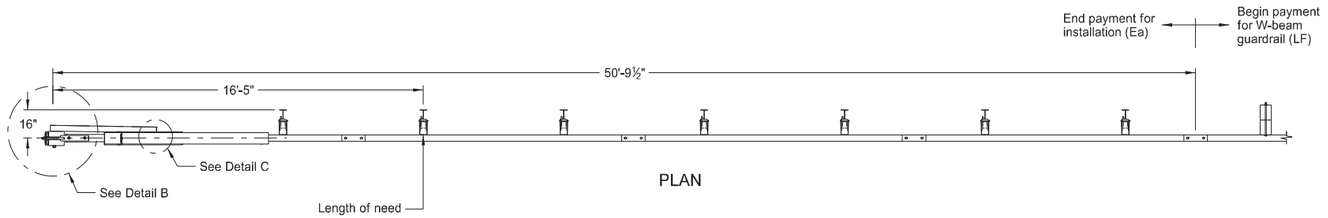
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# MASH SOFTSTOP END TERMINAL - STEEL POST

**D-764-50**

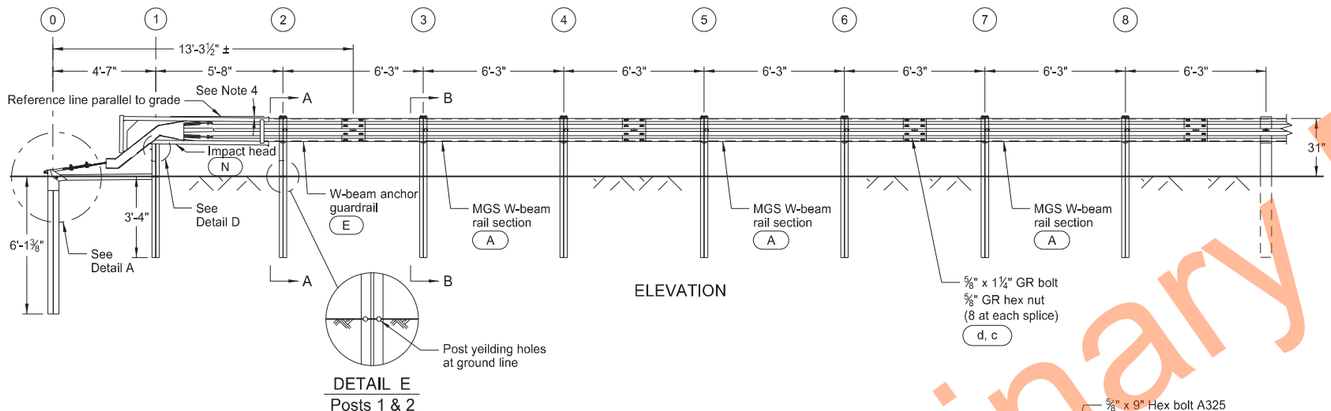



PLAN

GENERAL NOTES:

1. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
2. Flare the SoftStop at a rate of 25:1 or flatter.
3. Do not curve the guardrail within the SoftStop under any circumstances.
4. If necessary, install the SoftStop impact head parallel to the grade line or with an upward tilt. See softstop assembly manual for specific details.

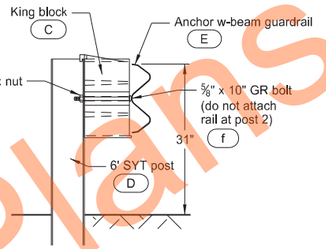
| ITEM | ITEM NO. | BILL OF MATERIALS | QTY |
|---|---|---|---|
| A | 000011 | 12 / 12'-6" / 3'-1½" / S MGS W-BEAM RAIL SECTION | 3 |
| B | 000533 | 6'-0" STEEL POST W6 x 8,5 | 6 |
| C | 006777 | KING BLOCK 4" X 7½" X 1'-2" | 7 |
| D | 015000 | 6'-0" SYT POST / 8,5 / 31" GR HT | 1 |
| E | 015200 | SFST - ANCHOR GUARDRAIL 12'-6" | 1 |
| F | 015201 | SFST - ANCHOR ANGLE | 2 |
| G | 015202 | SFST - ANGLE STRUT | 1 |
| H | 015203 | SFST - POST #1 SYTP | 1 |
| J | 015204 | SFST - ANCHOR PADDLE | 1 |
| K | 015205 | SFST - POST #0 | 1 |
| L | 015206 | SFST - PLATE WASHER | 1 |
| M | 015207 | SFST - KEEPER PLATE | 1 |
| N | 015208 | SFST - IMPACT HEAD | 1 |
| | | HARDWARE | |
| a | 003240 | 5/16" ROUND WASHER WIDE | 6 |
| b | 003245 | 5/16" HEX NUT | 3 |
| c | 003340 | 5/8" GR HEX NUT | 41 |
| d | 003360 | 5/8" x 1¼" GR BOLT | 32 |
| e | 003391 | 5/8" x 1¾" HEX BOLT A325 | 1 |
| f | 003500 | 5/8" x 10" GR BOLT A307 | 7 |
| g | 003701 | ¾" ROUND WASHER F436 | 4 |
| h | 003704 | ¾" HVY HEX NUT A563 DH | 2 |
| j | 003717 | ¾" x 2½" HEX BOLT A325 | 2 |
| k | 003908 | 1" HVY HEX NUT A563 DH | 1 |
| l | 004372 | 5/8" WASHER F436 | 4 |
| m | 004489 | 5/8" x 9" HEX BOLT A325 | 1 |
| n | 004902 | 1" ROUND WASHER F436 | 1 |
| o | 105285 | 5/16" x 2½" HEX BOLT GRD 5 | 2 |
| p | 105286 | 5/16" x 1½" HEX BOLT GRD 5 | 1 |



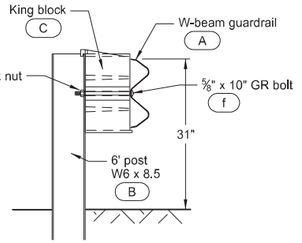

ELEVATION



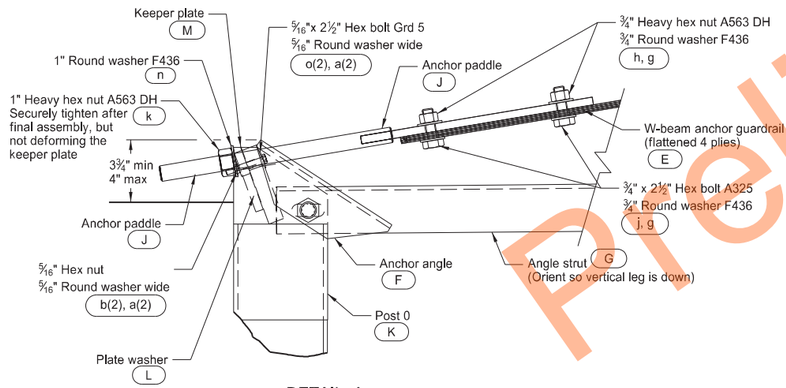

DETAIL E
Posts 1 & 2



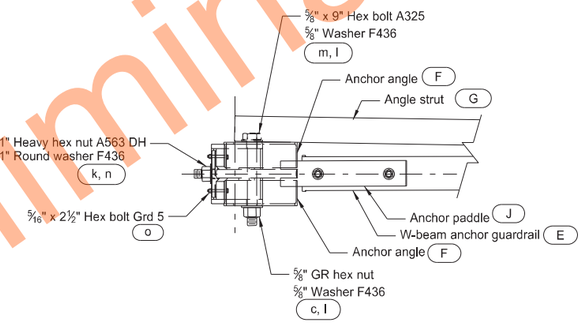

SECTION A-A
Post 2



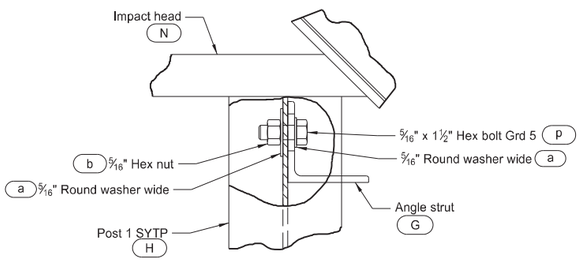

SECTION B-B
Posts 3 through 8



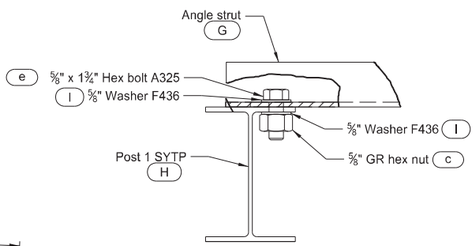

DETAIL A
Post 0



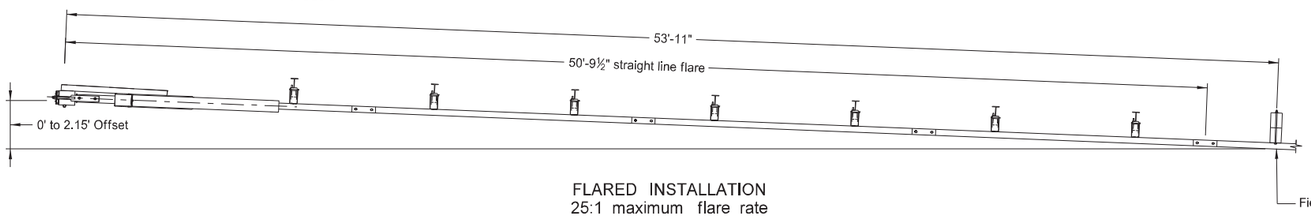

DETAIL B
Post 0




DETAIL D
Post 1




DETAIL C
Post 1
(shown near ground)




FLARED INSTALLATION
25:1 maximum flare rate

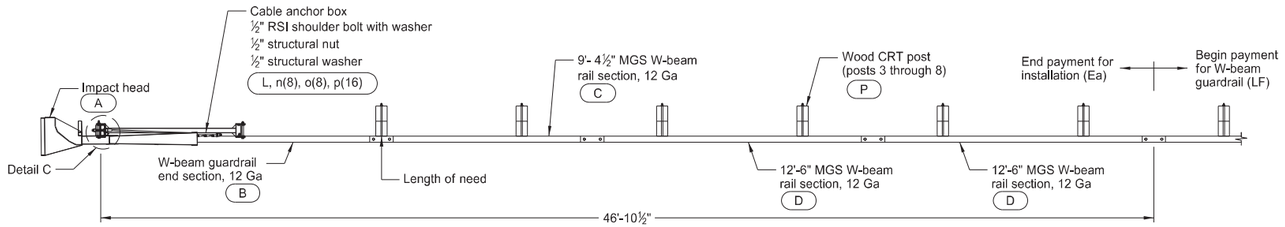
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12-02-20 | Updated notes to active voice. |

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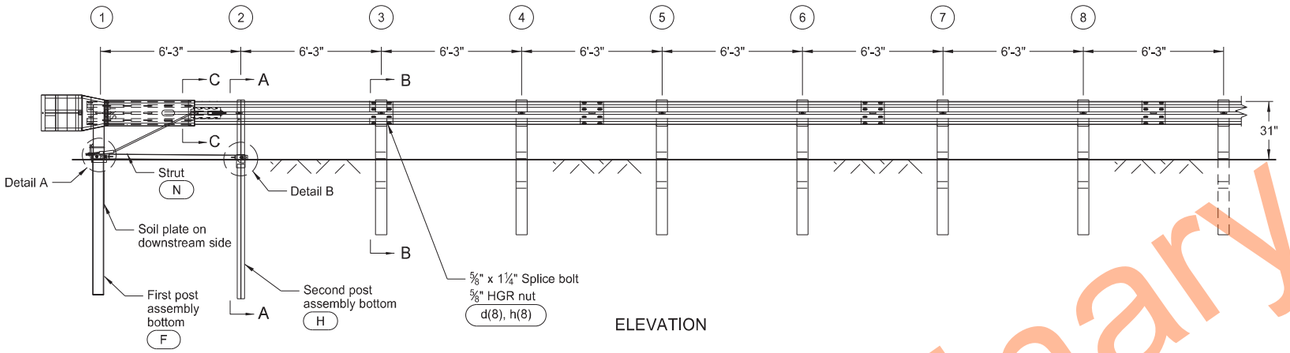
Preliminary Plans

# MASH SEQUENTIAL KINKING TERMINAL - WOOD POST

D-764-51




PLAN

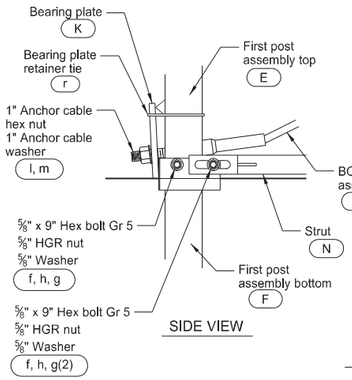



ELEVATION

GENERAL NOTES:

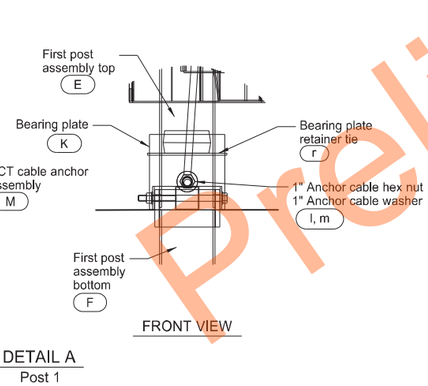
1. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
2. Flare the MSKT at a rate of up to 25:1, as needed to prevent the impact head from encroaching on the shoulder.
3. Site grade as necessary to ensure the lower sections of posts do not protrude more than 4" above the ground (measured along a 5' cord).
4. Install the lower section of the hinged posts without the upper post attached. If the post is placed in a drilled hole, compact the backfill material to prevent settlement.
5. Install breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
6. "Toe nail" the wood blockouts to the rectangular wood posts at post 3 through post 8 with two 20 penny galvanized nails to prevent them from turning when the wood warps.

| ITEM | ITEM NO. | BILL OF MATERIALS | QTY |
|---|---|---|---|
| A | MS3000 | IMPACT HEAD | 1 |
| B | SF1303 | W-BEAM GUARDRAIL END SECTION, 12 Ga | 1 |
| C | G12025 | 9'-4½" MGS W-BEAM RAIL SECTION, 12 Ga | 1 |
| D | G1203A | 12'-6" MGS W-BEAM RAIL SECTION, 12 Ga | 2 |
| E | MTPHP1A | FIRST POST ASSEMBLY TOP (6" X 6" X⅛" Tube) | 1 |
| F | MTPHP1B | FIRST POST ASSEMBLY BOTTOM (6' W6X15) | 1 |
| G | UHP2A | SECOND POST ASSEMBLY TOP | 1 |
| H | HP2B | SECOND POST ASSEMBLY BOTTOM | 1 |
| K | E750 | BEARING PLATE | 1 |
| L | S760 | CABLE ANCHOR BOX | 1 |
| M | E770 | BCT CABLE ANCHOR ASSEMBLY | 1 |
| N | MS785 | STRUT | 1 |
| P | UP671 | 6' WOOD CRT POST | 6 |
| R | P675 | WOOD BLOCKOUT OR RECYCLED EQUIVALENT | 6 |
| HARDWARE | | | |
| a | B5160104A | 5/16" x 1" HEX BOLT GR 5 | 2 |
| b | W0516 | 5/16" WASHER | 4 |
| c | N0516 | 5/16" HEX NUT | 2 |
| d | B580122 | ⅝" Dia x 1¼" SPLICE BOLT | 33 |
| e | B581802 | ⅝" Dia x 18" HGR BOLT (POSTS 3 THRU 8) | 6 |
| f | B580904A | ⅝" x 9" HEX BOLT GR 5 | 2 |
| g | W050 | ⅝" WASHER | 9 |
| h | N050 | ⅝" Dia HGR NUT | 35 |
| j | B340854A | ¾" Dia x 8½" HEX BOLT GRD A449 | 1 |
| k | N030 | ¾" Dia HEX NUT | 1 |
| l | N100 | 1" ANCHOR CABLE HEX NUT | 2 |
| m | W100 | 1" ANCHOR CABLE WASHER | 2 |
| n | SB12A | ½" RSI SHOULDER BOLT WITH WASHER | 8 |
| o | N012A | ½" STRUCTURAL NUT | 8 |
| p | W012A | ½" STRUCTURAL WASHER | 8 |
| r | CT-100ST | BEARING PLATE RETAINER TIE | 1 |

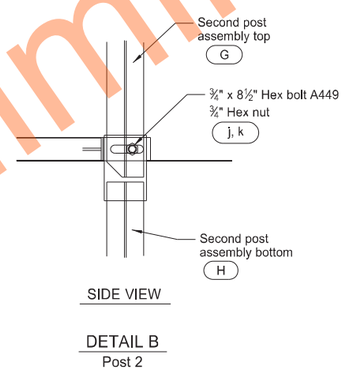



SIDE VIEW

DETAIL A
Post 1

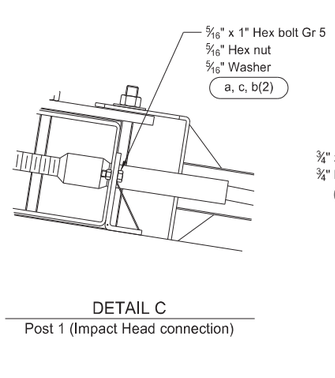



FRONT VIEW

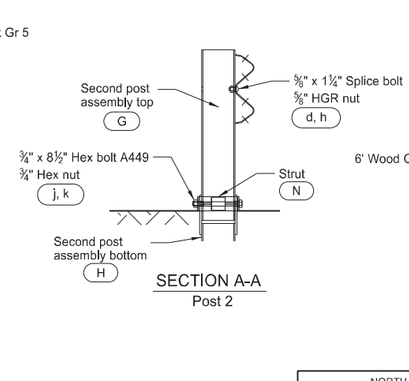



SIDE VIEW

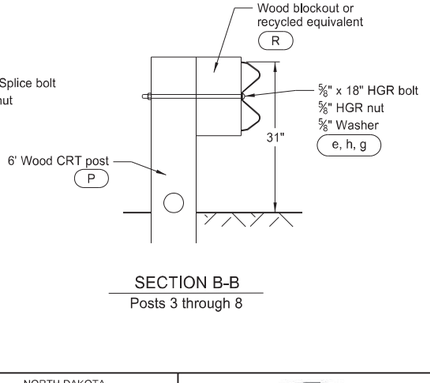
DETAIL B
Post 2



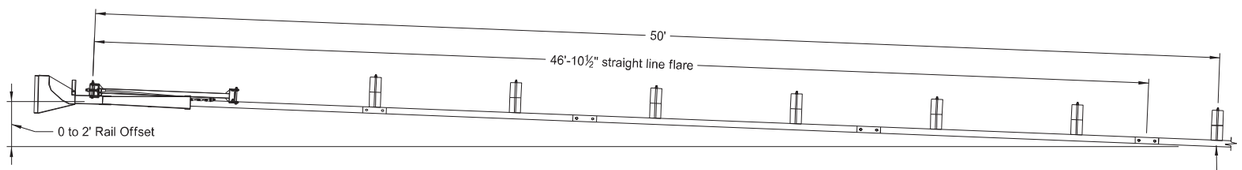

DETAIL C
Post 1 (Impact Head connection)



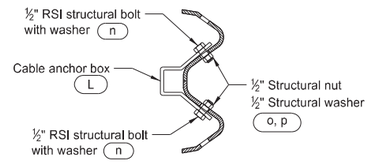

SECTION A-A
Post 2




SECTION B-B
Posts 3 through 8




FLARED INSTALLATION
25:1 maximum flare rate




SECTION C-C

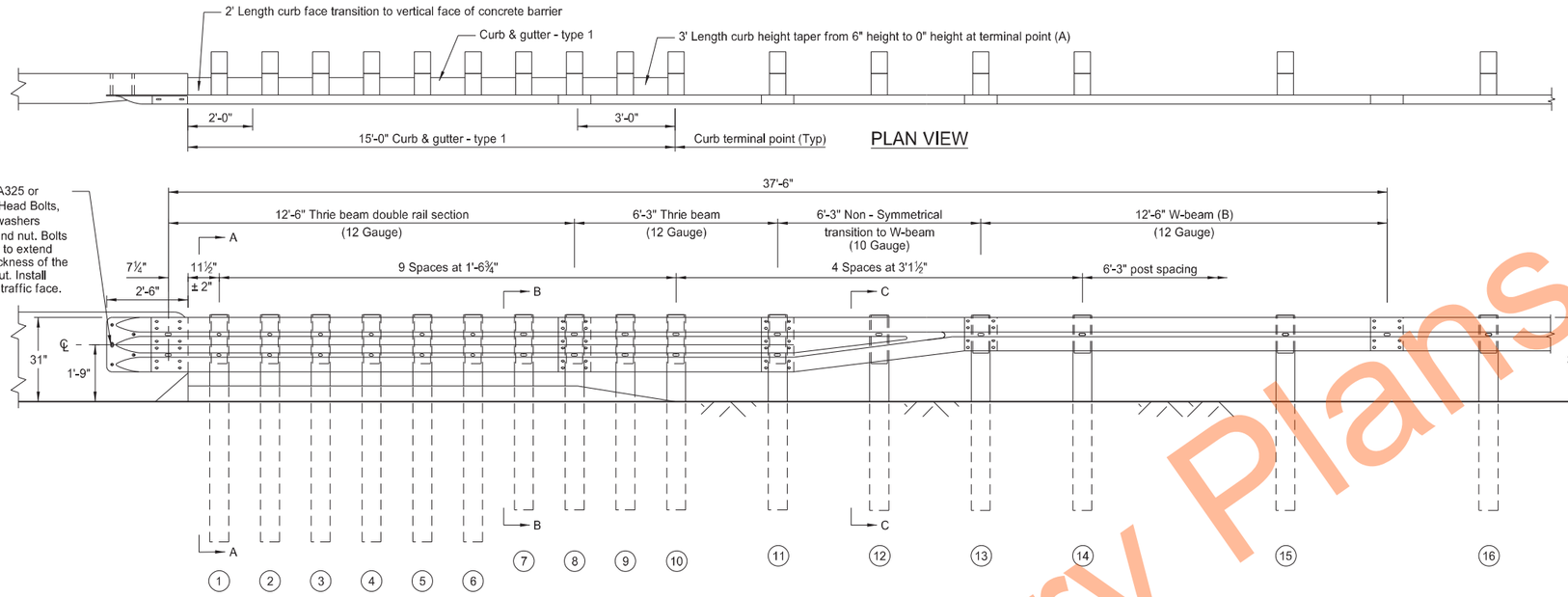
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12-02-20 | Updated notes to active voice. |

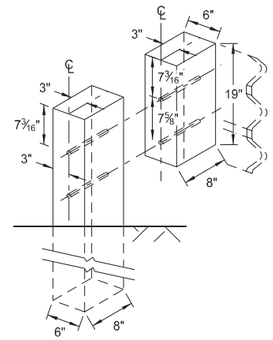
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12 02 2020

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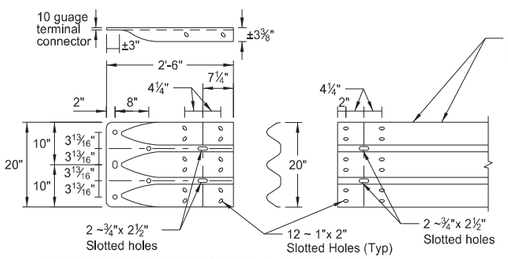
# MGS W-BEAM TRANSITION WITH APPROACH CURB TO CONCRETE SINGLE SLOPE OR JERSEY BARRIER

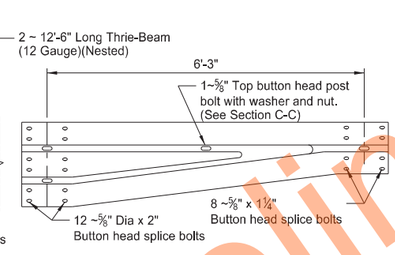
D-764-60

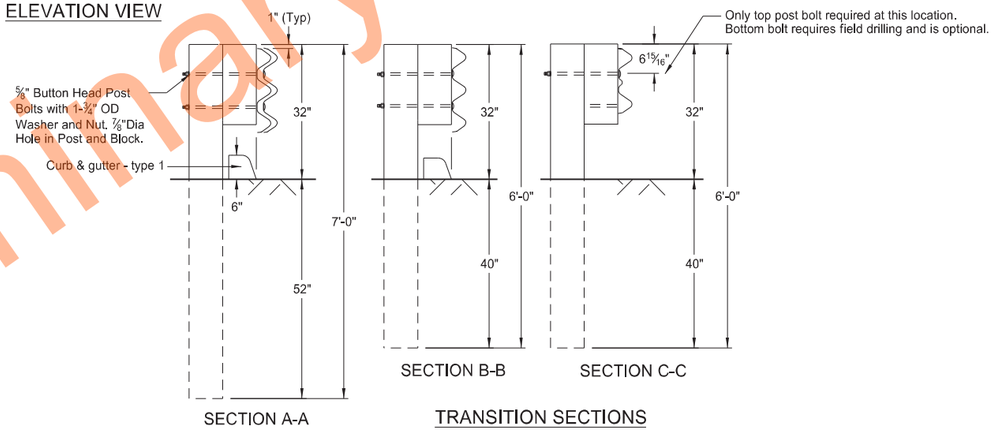


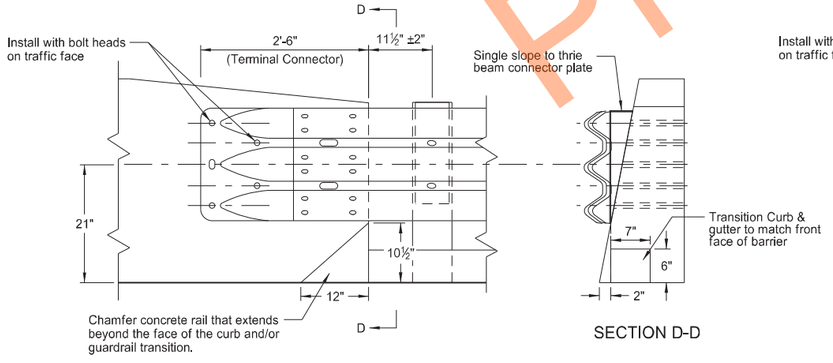



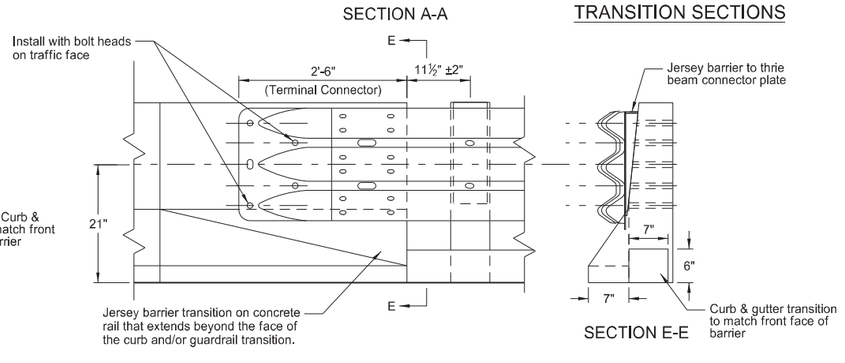

| TRANSITION POST AND TIMBER BLOCKOUT SIZING | | |
|---|---|---|
| POST NO. | POST SIZE | BLOCKOUT SIZE |
| 1-6 | 6" X 8" X 7'-0" long | 6" X 8" X 19" |
| 7-12 | 6" X 8" X 6'-0" long | 6" X 8" X 19" |
| 13-16 | 6" X 8" X 6'-0" long | 6" X 8" X 14" |




(A) Where curb is required to continue past 15' length, taper the curb down to 3" height at the terminal point shown above, instead of 0" height. Use 3" height curb between posts 10 and 16.

(B) Install 12'-6" length W-beam double rail section at location where curb extends past 15' length.

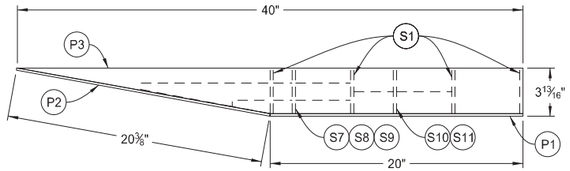
| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12-02-20 | Updated notes to active voice. |

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Preliminary Plans

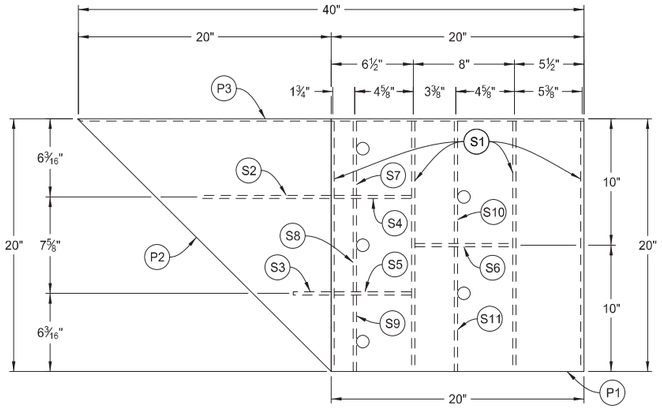
# SINGLE SLOPE TO THRIE BEAM CONNECTOR PLATE DETAILS

D-764-61

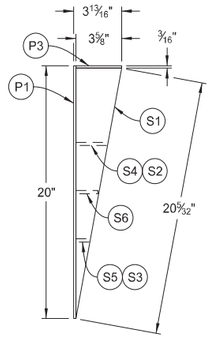



PLAN

NOTE: Assembly Detail is shown for guardrail installation on right hand side of entrance end of bridge barrier. Mirror for opposite side installation.

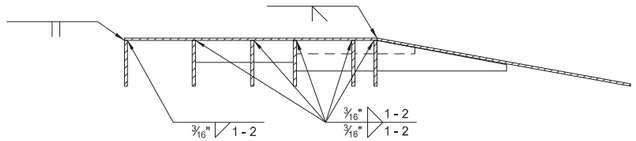



ELEVATION

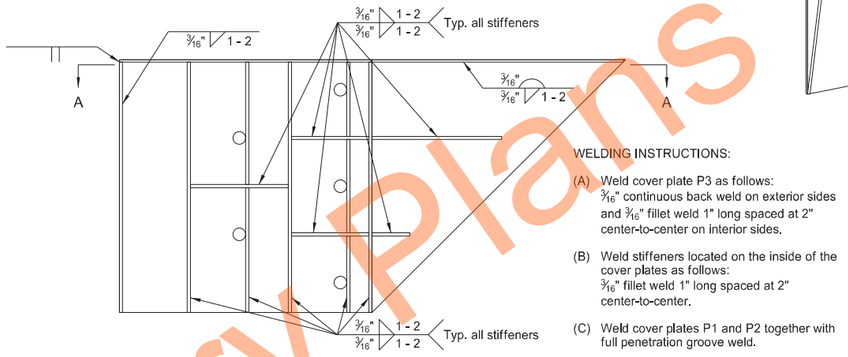



END

ASSEMBLY DETAIL
(Front View)




SECTION A-A




ELEVATION

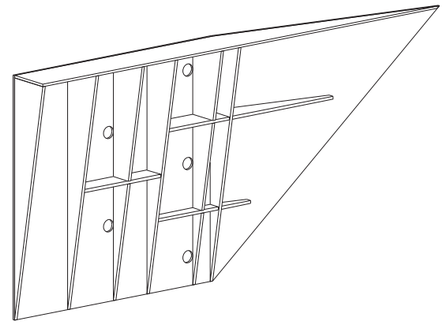
WELDING INSTRUCTIONS:

(A) Weld cover plate P3 as follows: 3/16" continuous back weld on exterior sides and 3/16" fillet weld 1" long spaced at 2" center-to-center on interior sides.

(B) Weld stiffeners located on the inside of the cover plates as follows: 3/16" fillet weld 1" long spaced at 2" center-to-center.

(C) Weld cover plates P1 and P2 together with full penetration groove weld.

WELDING DETAIL
(Back View)



PICTORIAL DRAWING
(Showing Back of Connector Plate)

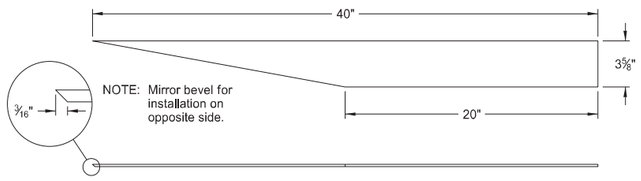



PLATE P3
Quantity: 1

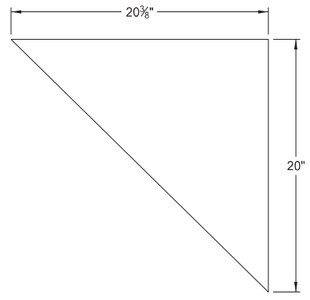



PLATE P2
Quantity: 1

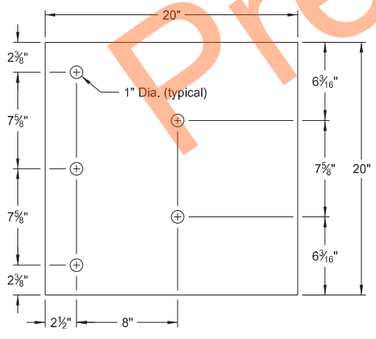
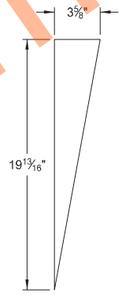



PLATE P1
Quantity: 1

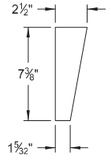
COVER PLATES



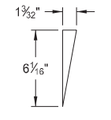

TYPE S7
Quantity: 1




TYPE S1
Quantity: 4

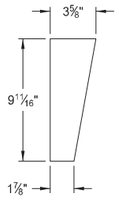



TYPE S8
Quantity: 1

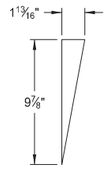



TYPE S9
Quantity: 1

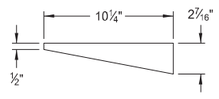
VERTICAL PLATES



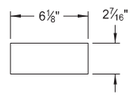

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Quantity: 1



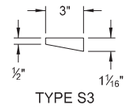

TYPE S11
Quantity: 1



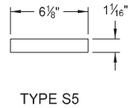

TYPE S2
Quantity: 1



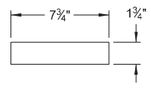

TYPE S4
Quantity: 1




TYPE S3
Quantity: 1




TYPE S5
Quantity: 1




TYPE S6
Quantity: 1

HORIZONTAL PLATES

STIFFENER PLATES

NOTES:

1. Fabricate cover plates P1, P2, and P3 from 3/16" thick ASTM A36 Grade structural steel.
2. Fabricate stiffener plates from 1/4" thick ASTM A36 Grade structural steel.
3. Galvanize connector plate in accordance with AASHTO M111.

| NORTH DAKOTA DEPARTMENT OF TRANSPORTATION | |
|---|---|
| 7-14-17 | |
| REVISIONS | |
| DATE | CHANGE |
| 12-02-20 | Updated notes to active voice. |

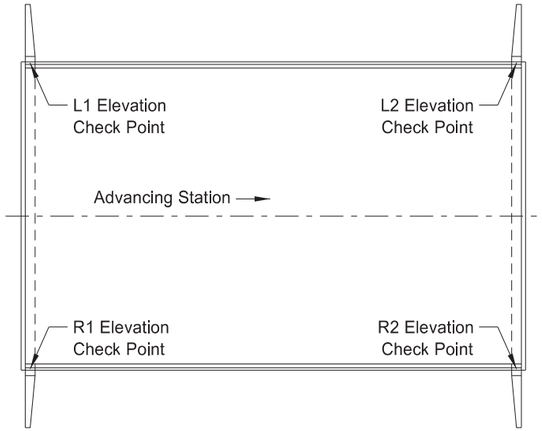
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

Preliminary Plans

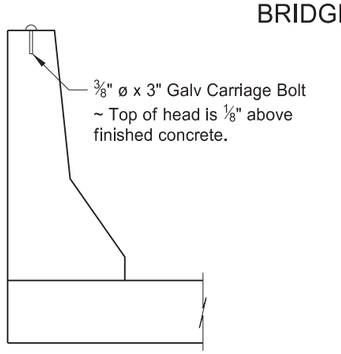
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# BRIDGE BENCH MARKS

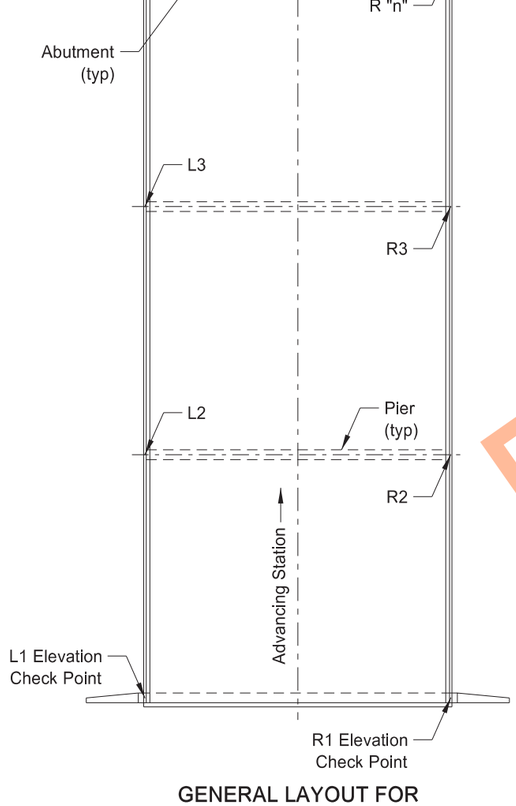
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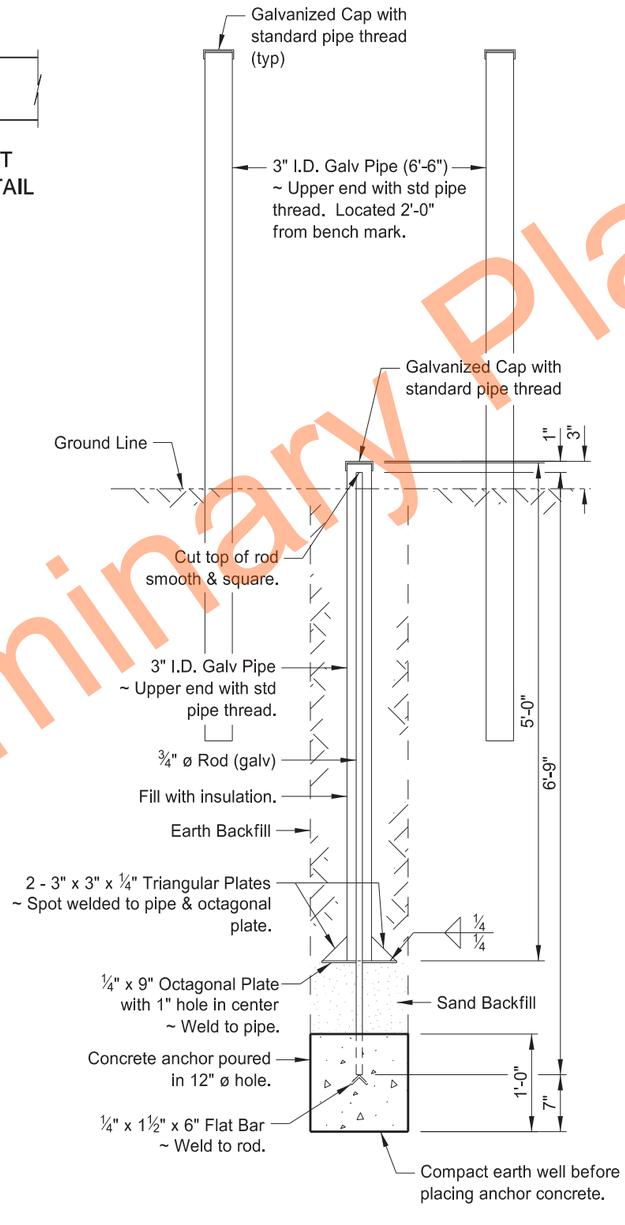

GENERAL LAYOUT FOR
SINGLE SPAN




CHECK POINT
LOCATION DETAIL




GENERAL LAYOUT FOR
MULTIPLE SPAN




BENCH MARK DETAIL

## NOTES:

Install elevation check points in the top of the concrete barriers at the locations shown in the General Layout view. Install the checkpoints in the barriers over each substructure unit at each bridge location. Use 3/8" diameter x 3" long galvanized carriage bolts set with the top of the bolt head projected 1/8" above the top of the finished concrete.

Set two bench marks as shown in the Bench Mark Detail at each bridge location. Locate the bench marks diagonally from one another at opposite corners of each bridge. Set the bench marks near the Right of Way line at least 300 feet from the nearest point of the structure. Extend two of the galvanized steel pipes 4'-0" above ground and paint with white paint suitable for painting over galvanized steel surfaces.

The Project Engineer will run a set of levels to determine the elevation of the bridge bench marks and elevation check points immediately after completion of the bridge. List the elevation of Bench Mark #1 as elevation 1,000, or as the actual surveyed elevation. The Project Engineer will record the information of SFN 13420 and submit to the Bridge Engineer.

Galvanize all metal parts per Section 854 after fabrication.

At the time of installation, coat the threads with synthetic grease containing teflon. Screw the cap to a snug fit.

Include the cost of furnishing and installing two bridge bench marks and the number of elevation check points required for one structure in the price bid for each set of Bridge Bench Marks.

Preliminary Plans

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
09/14/11
REVISIONS

| DATE | CHANGE |
|---|---|
| 09/03/19 | UPDATED SIGNATURE |
| 02/23/24 | Updated Signature<br>Revised notes & updated<br>to active voice |

REGISTERED PROFESSIONAL ENGINEER
JASON R.
THORENSON
PE - 5048
DATE
02/23/24
NORTH DAKOTA