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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

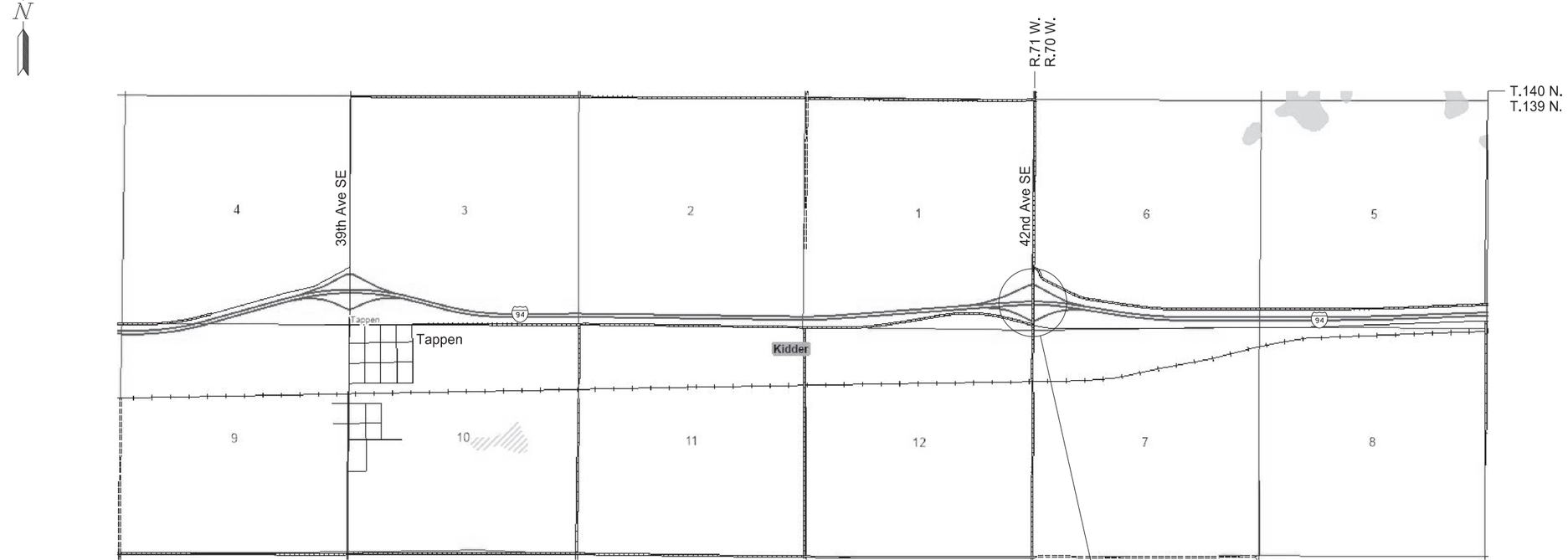
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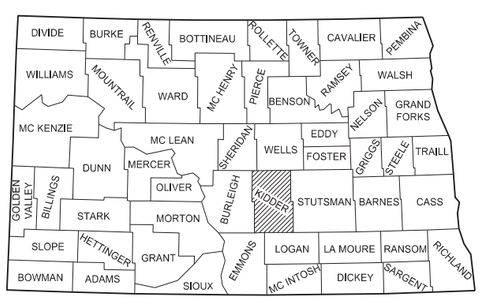
Kidder County
I-94/PETTIBONE INTERCHANGE

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
10/20/26

BRIDGE DIVISION

REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE
10/20/26
NORTH DAKOTA

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75	1 - 2	Wetland Impacts
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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
SP 547(24)	Utility Coordination
SP 642(24)	Pile Dynamic Analyzer (PDA) Testing and Analysis
SP 676(24)	E-ticketing (Mandatory)

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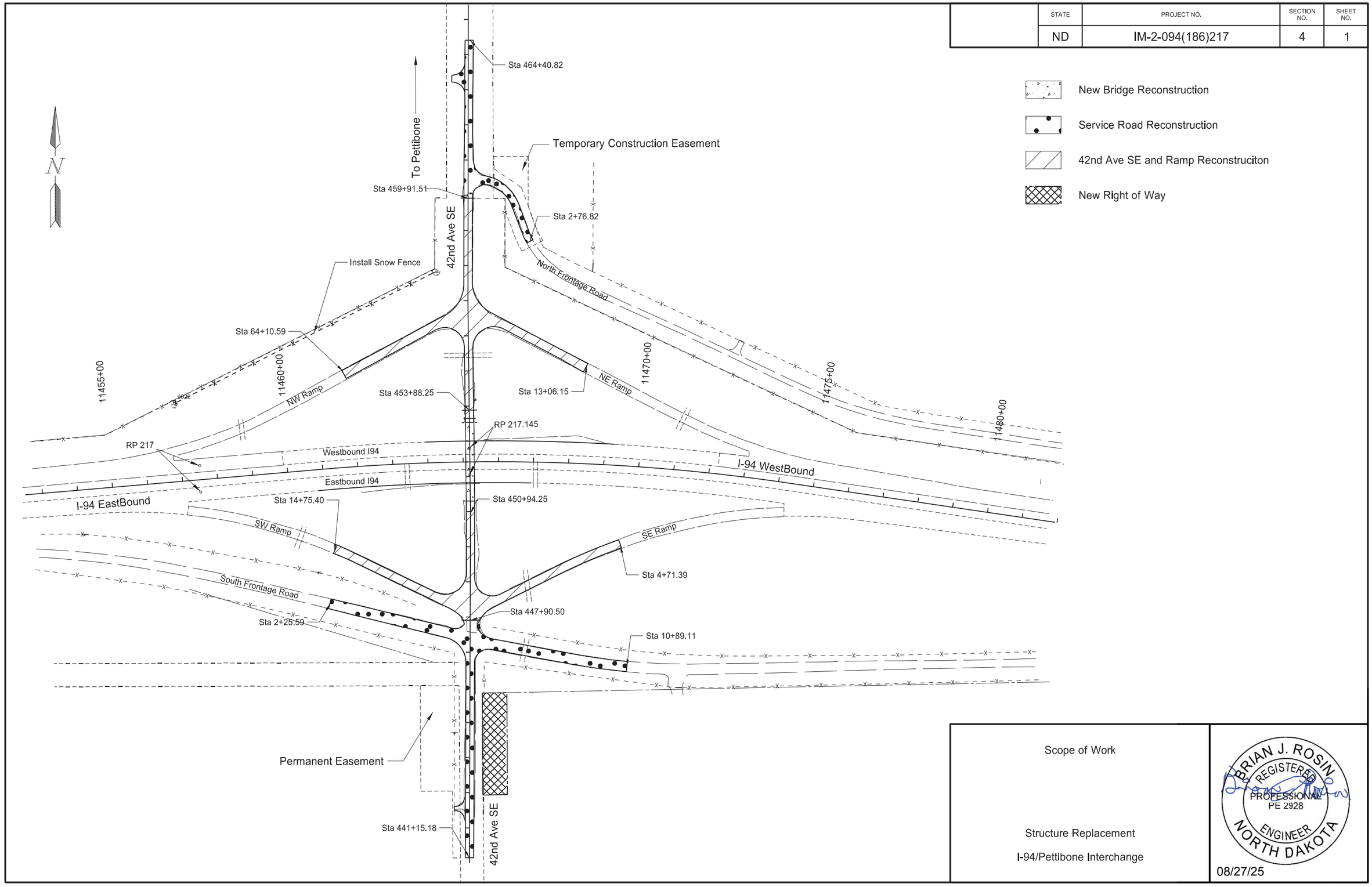
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New Bridge Reconstruction

Service Road Reconstruction

42nd Ave SE and Ramp Reconstruciton

New Right of Way

Scope of Work

Structure Replacement

I-94/Pettibone Interchange

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PE 2928
ENGINEER
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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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ENGINEER
NORTH DAKOTA
07/14/26

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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.

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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.

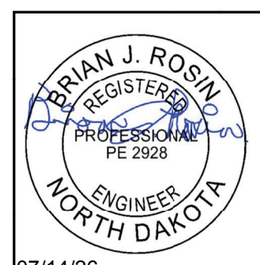
Protect the traveling public with proper traffic control and traffic safety measures during the jacking or boring process (while extending the pipe through the undisturbed fill) without disrupting traffic, or damaging roadway grade and surface.

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.



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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.

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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."

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* 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* 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.

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

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

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

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

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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/Alignment	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

Basis of Estimate

Structure Replacement

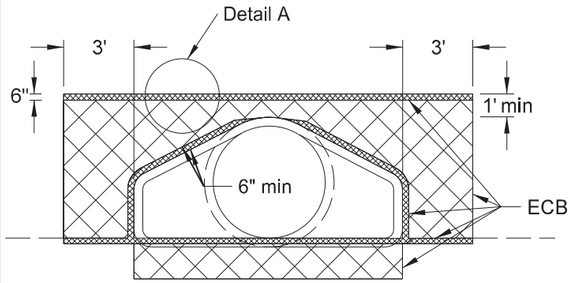
I-94/Pettibone Interchange

BRIAN J. ROSIN REGISTERED PROFESSIONAL PE 2928 ENGINEER NORTH DAKOTA

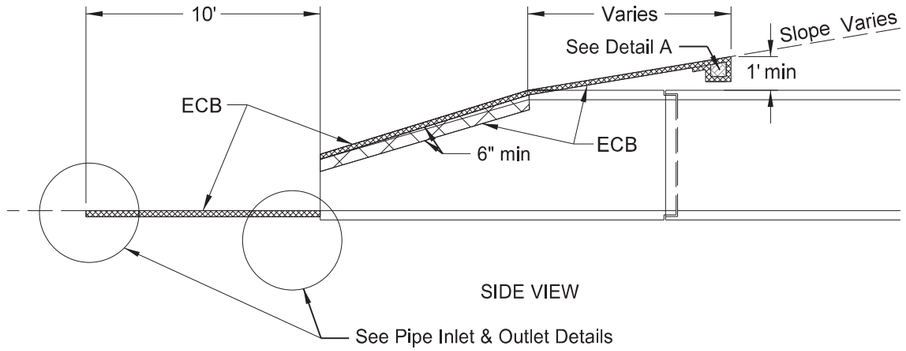
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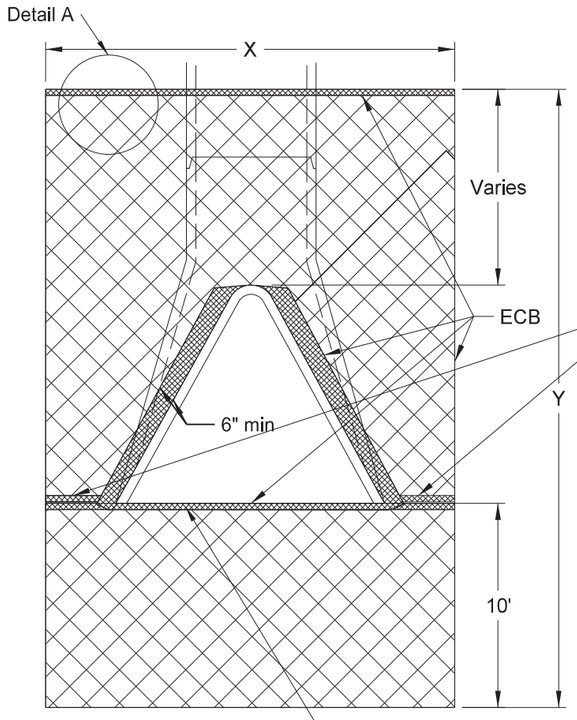
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	20	1



FRONT VIEW

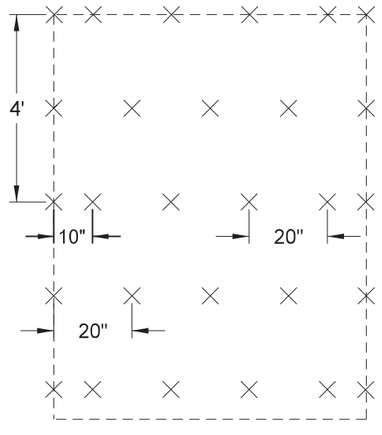


SIDE VIEW



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.

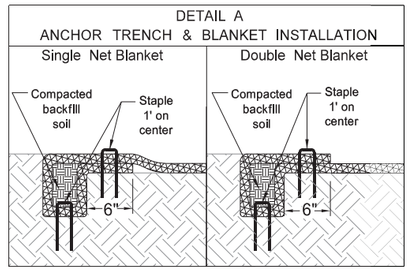


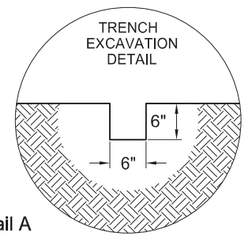
STAPLE PATTERN

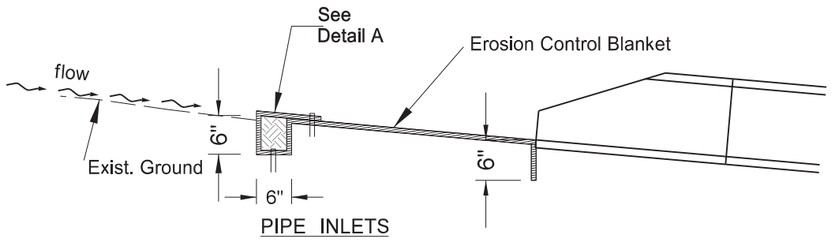
Erosion Control Blanket (ECB)								
Location to be protected	Culvert Type Appr/CL	Pipe Diam (Inch)	No	Unit Quantity	Total Quantity			
					Type 1	Type 2	Type 3	Type 4
Station				(SY)	(SY)	(SY)	(SY)	(SY)
7+98 (FR_S)	Appr	30	2	25		50		
1+68 (Align_SE_Ramp	CL	30	2	25		50		
455+23 (OFL)	CL	30	2	25		50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

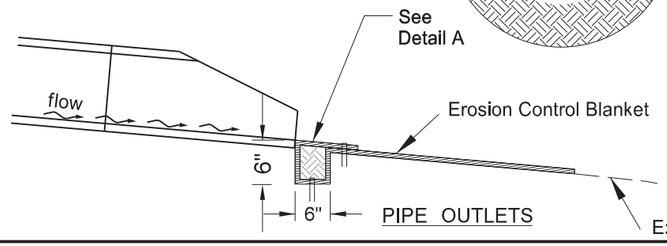
CENTERLINE CULVERTS											
DIA	X	Y	Surface area to be protected	ECB	DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY	In	Ft	Ft	SF	SY
24	10.5	19.6	193.1	22	24	10.5	17.6	172.1	20
27	11.0	20.0	204.3	23	27	11.0	18.0	182.3	21
30	11.6	20.5	218.3	25	30	11.6	18.5	195.1	22
36	12.7	21.2	242.1	27	36	12.7	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

BRIAN J. ROSIN
REGISTERED
PROFESSIONAL
PE 2928
ENGINEER
NORTH DAKOTA

04/21/25

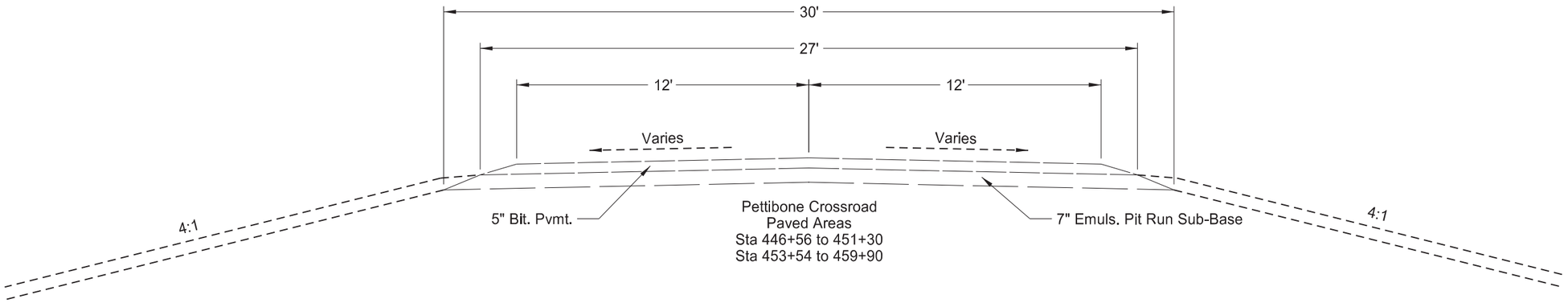
Erosion Control at Culvert Flared End Sections

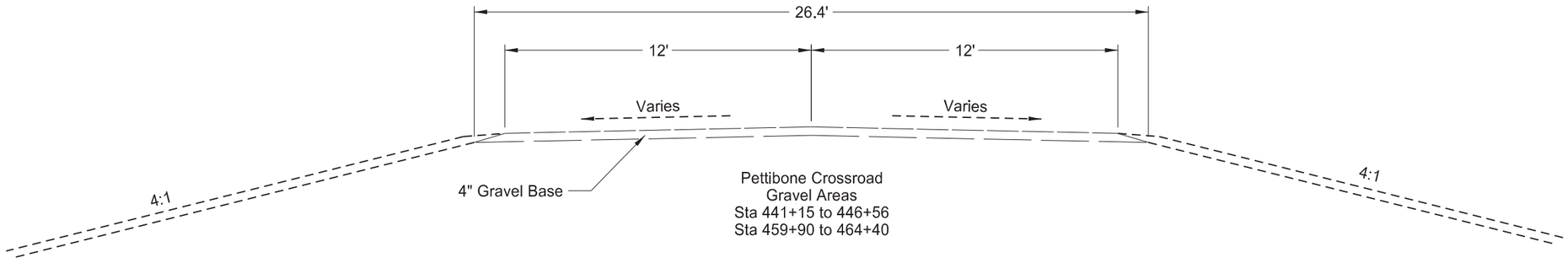
Structure Replacement

I-94/Pettibone Interchange

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





Typical Section

Existing Crossroad

Structure Replacement

I-94/Pettibone Interchage

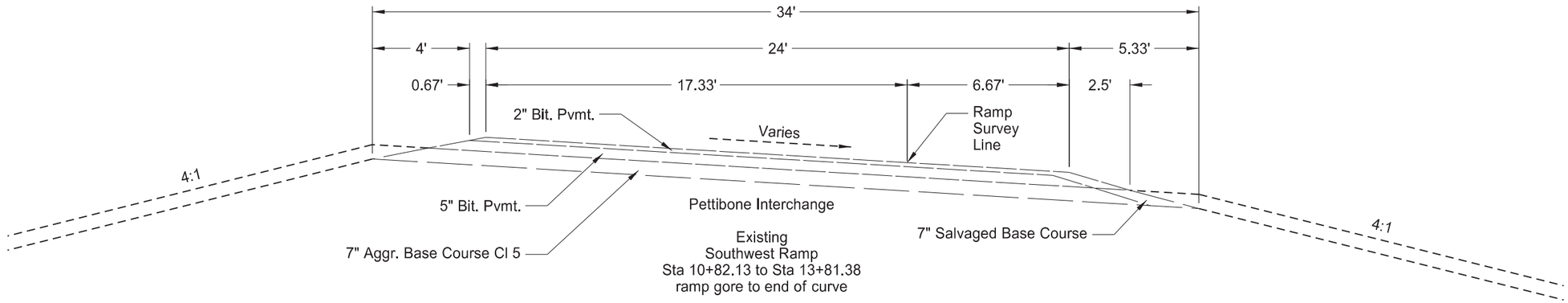
BRIAN J. ROSIN
REGISTERED
PROFESSIONAL
PE 2928
ENGINEER
NORTH DAKOTA

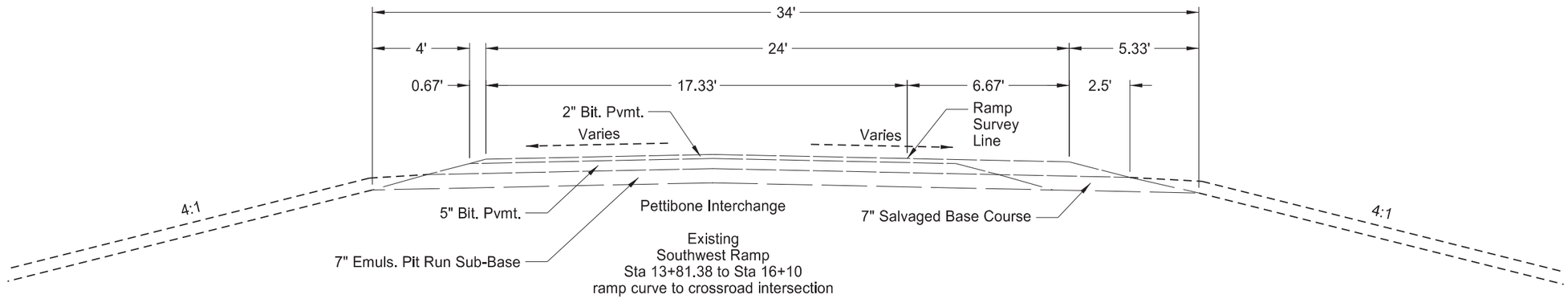
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	30	2





Typical Sections

Existing SW & SE Ramp

Structure Replacement

I-94/Pettibone Interchange

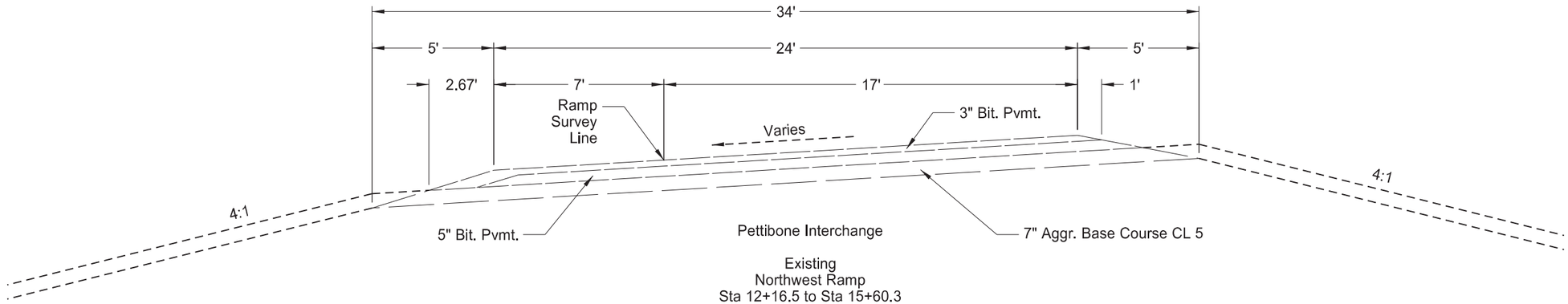
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PE 2928
ENGINEER
NORTH DAKOTA

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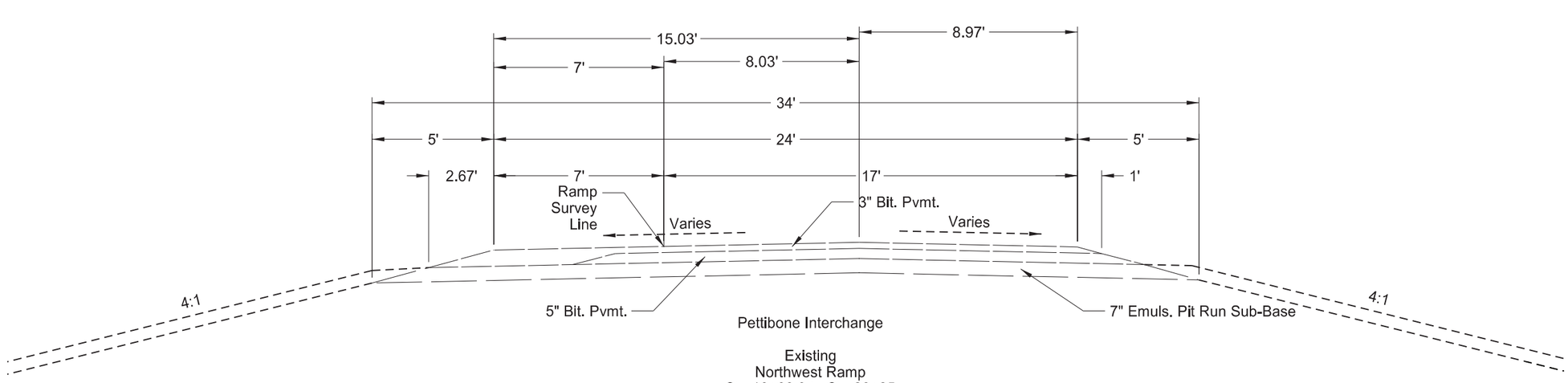
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	30	3



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

Typical Section

Existing NE & NW Ramps

Structure Replacement

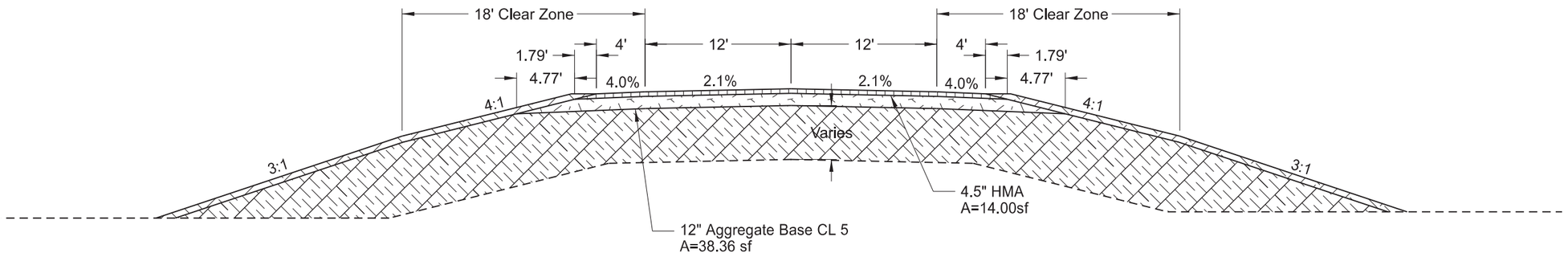
I-94/ Pettibone Interchange

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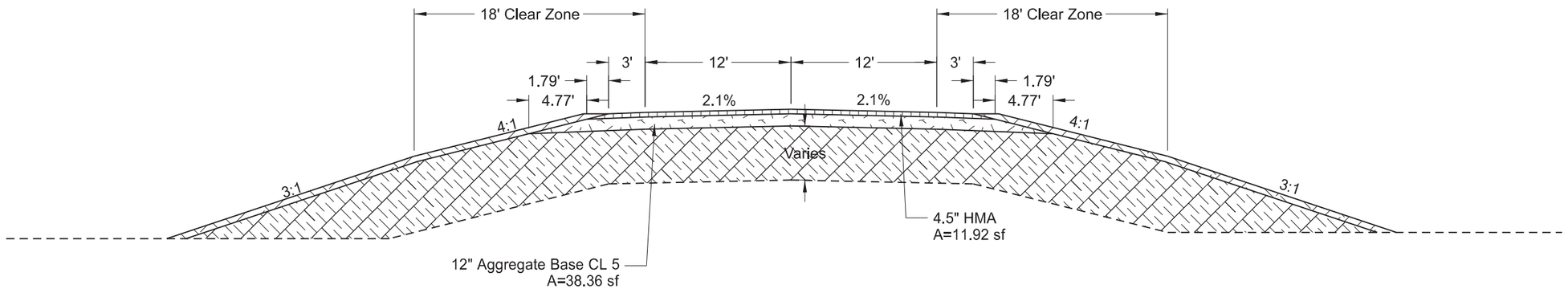
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	30	4



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



Sta. 457+45 to 459+90

Typical Section

Proposed Crossroad

Structure Replacement

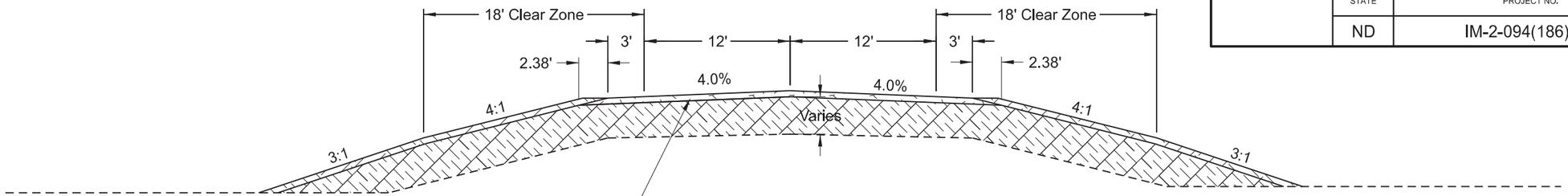
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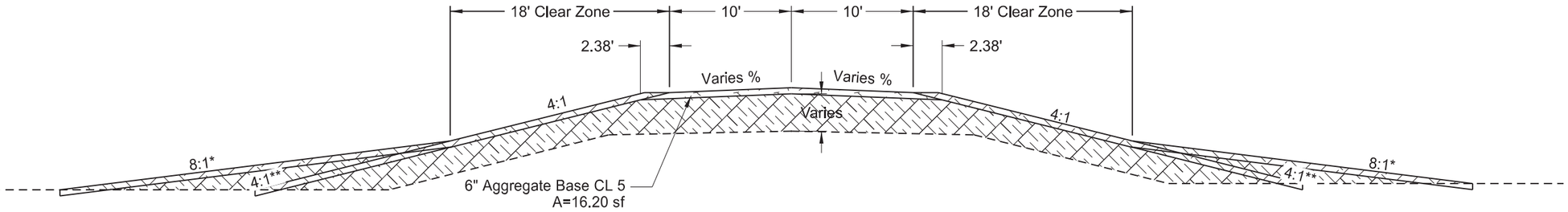
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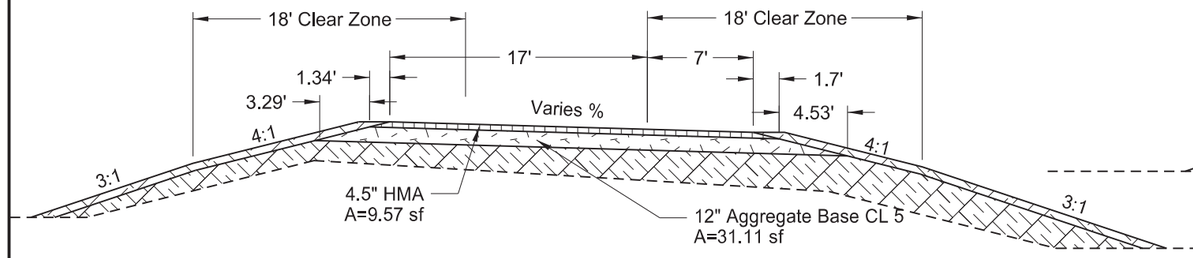
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	ND	IM-2-094(186)217	30	5



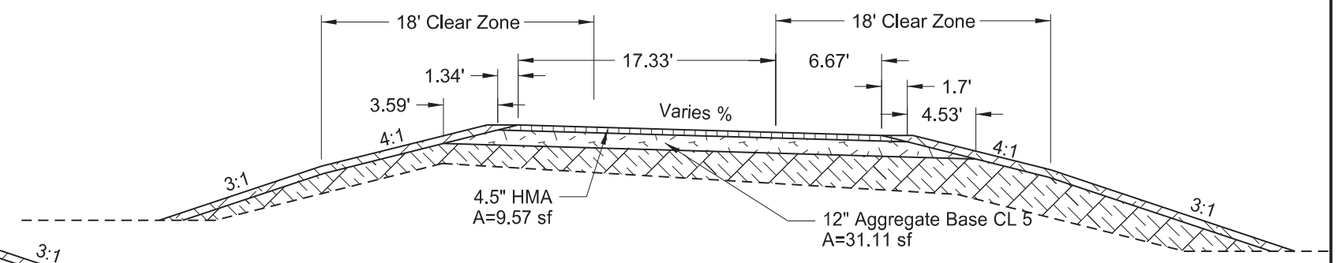
Sta. 2+25 to 10+89 (Align_FR_S)
Sta. 441+15 to 447+90 (OFL)
Sta. 459+90 to 464+41 (OFL)



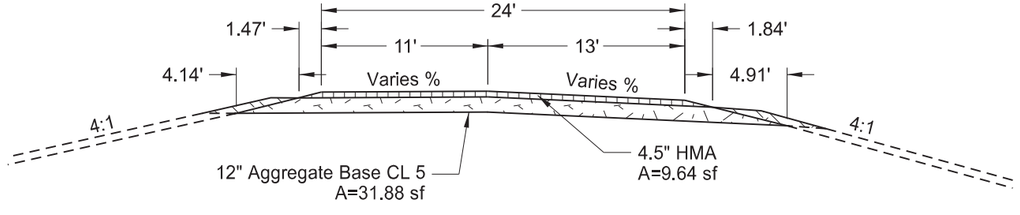
* Sta. 0+15 to 1+70 (Align_FR_N)
** Sta. 1+70 to 2+77 (Align_FR_N)



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

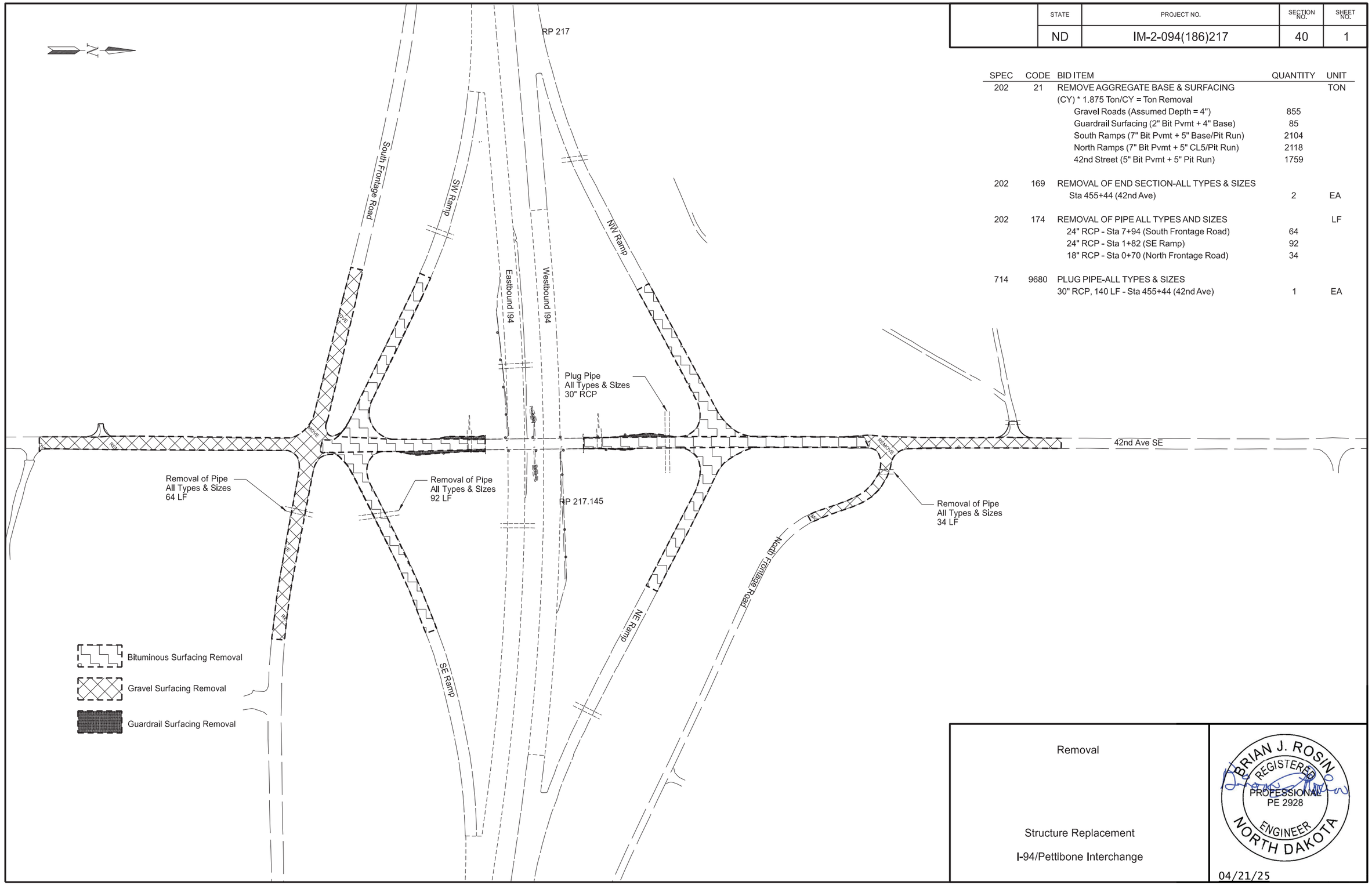
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	40	1

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



Removal

Structure Replacement

I-94/Pettibone Interchange

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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)									
				50-YEAR DATA				100-YEAR DATA	
STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	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.

REGISTERED PROFESSIONAL ENGINEER
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PE-29092
DATE
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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

Allowable Pipe List

Structure Replacement

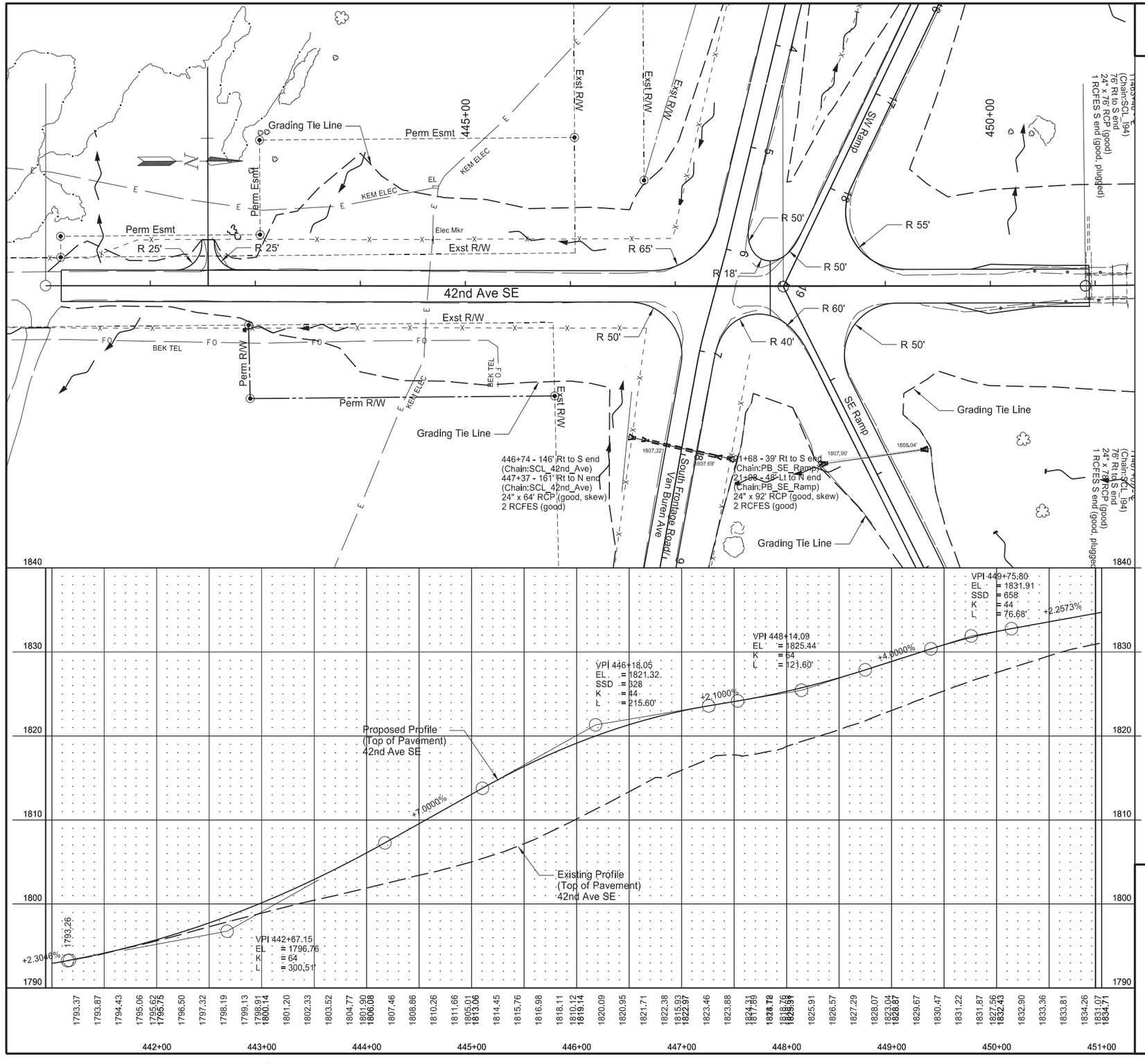
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	60	1



Plan & Profile

42nd_OFL
Sta. 441+00 to 451+00

Structure Replacement

I-94/Pettibone Interchange

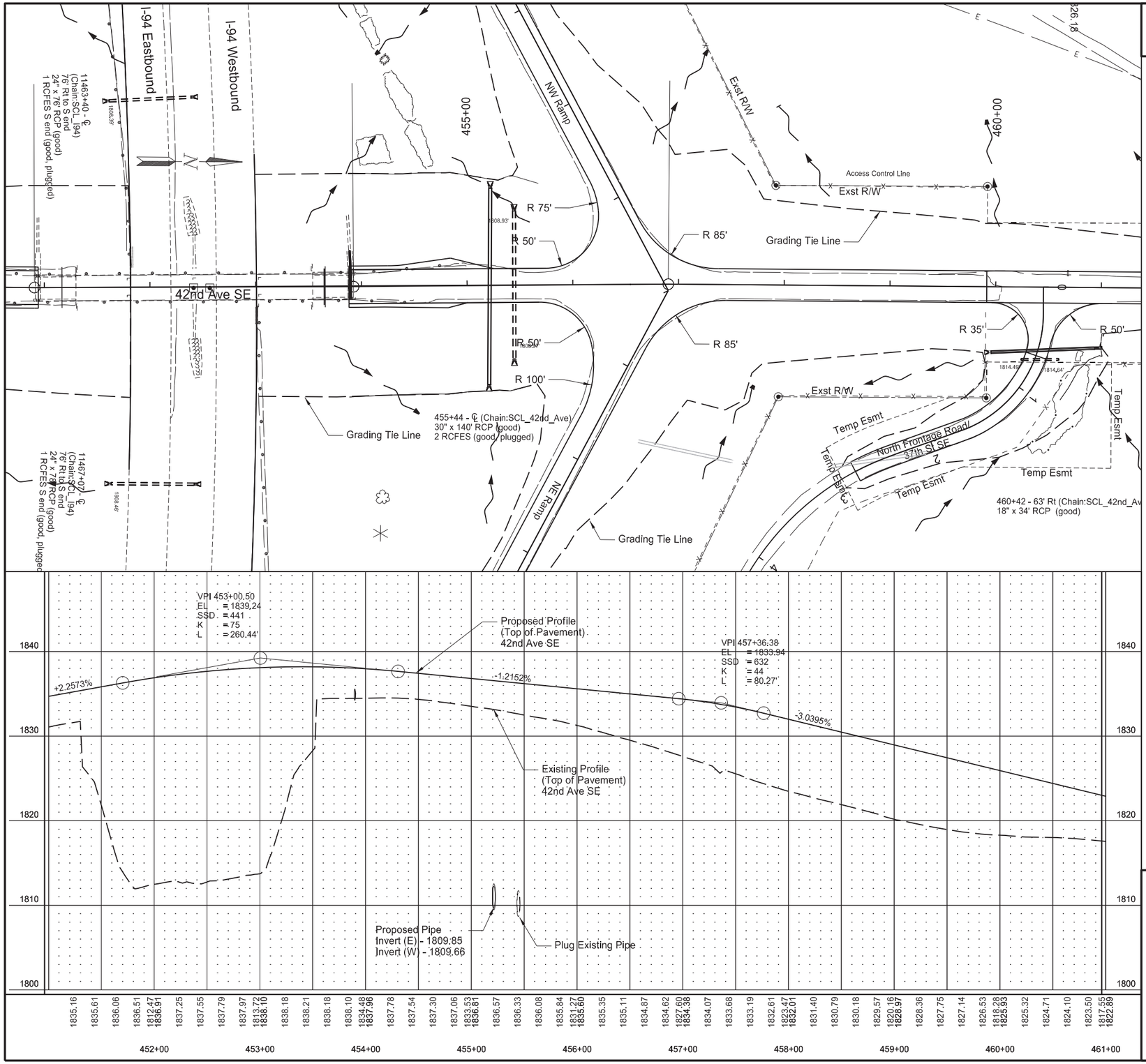
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	60	2



Plan & Profile

42nd_OFL
Sta. 451+00 to 461+00

Structure Replacement

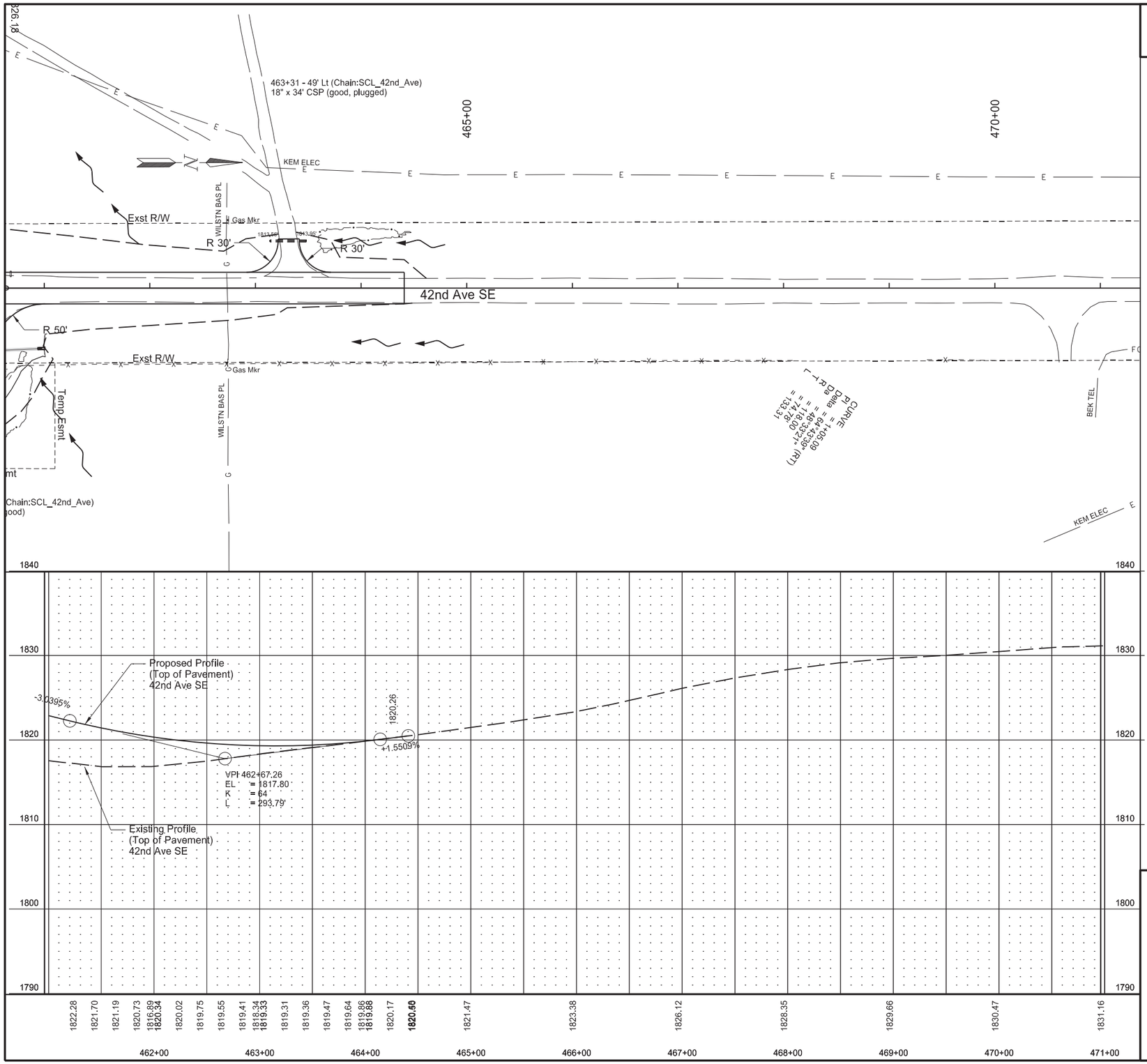
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	60	3



Plan & Profile

42nd_OFL
Sta. 461+00 to 471+00

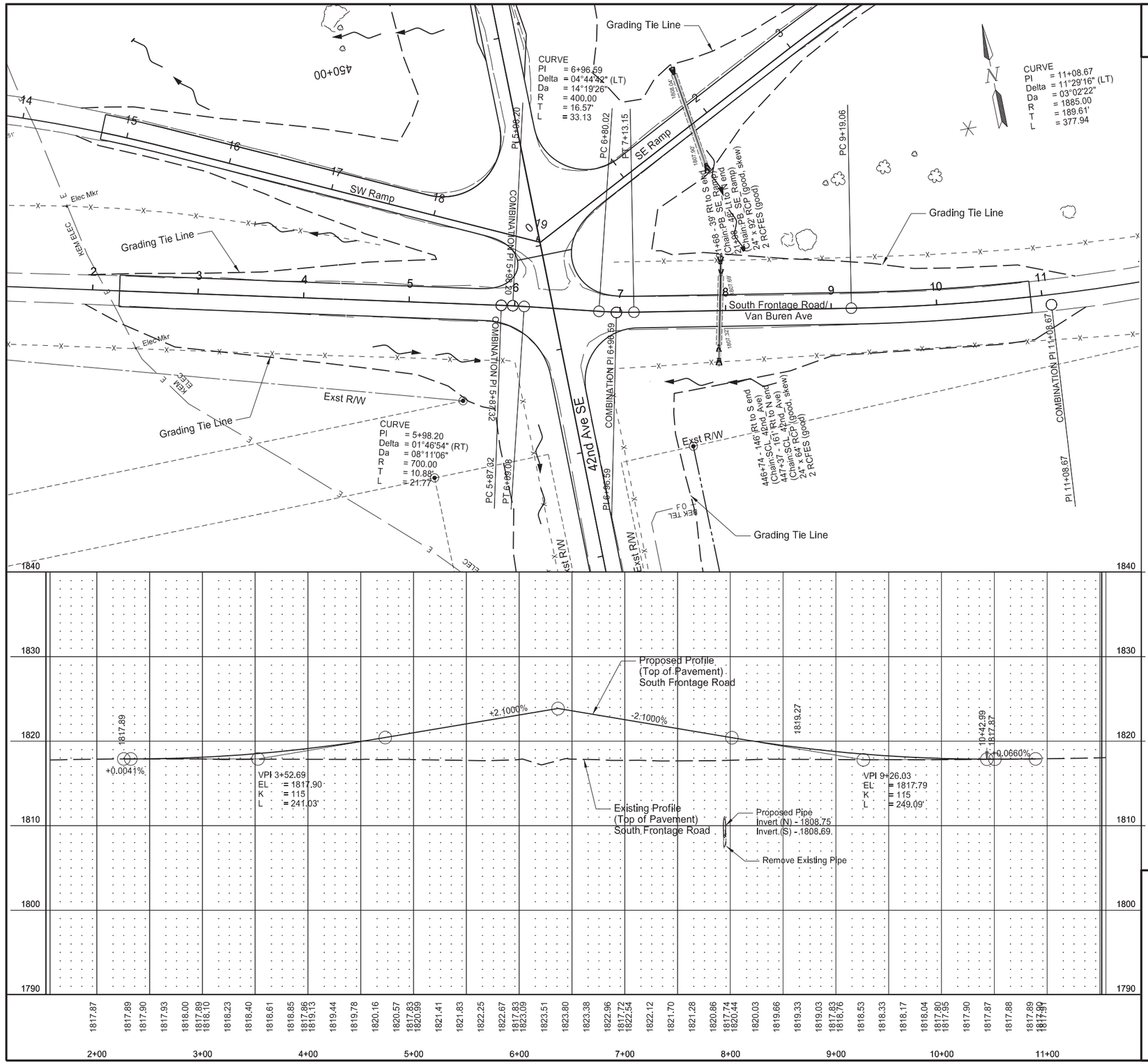
Structure Replacement

I-94/Pettibone Interchange

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



Plan & Profile

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

Structure Replacement

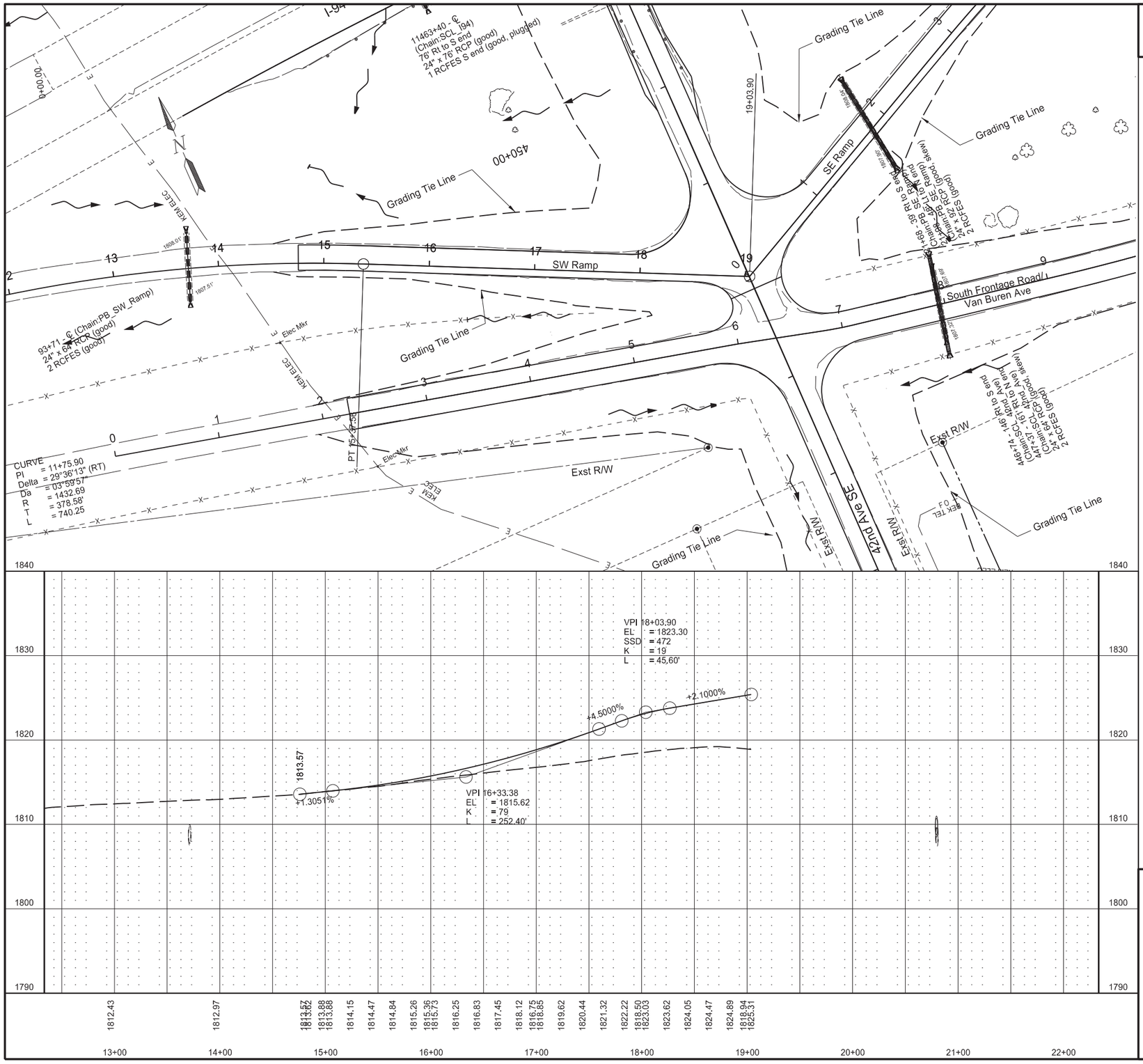
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ND	IM-2-094(186)217	60	5



Plan & Profile

SW Ramp
Sta. 13+00 to 22+00

Structure Replacement

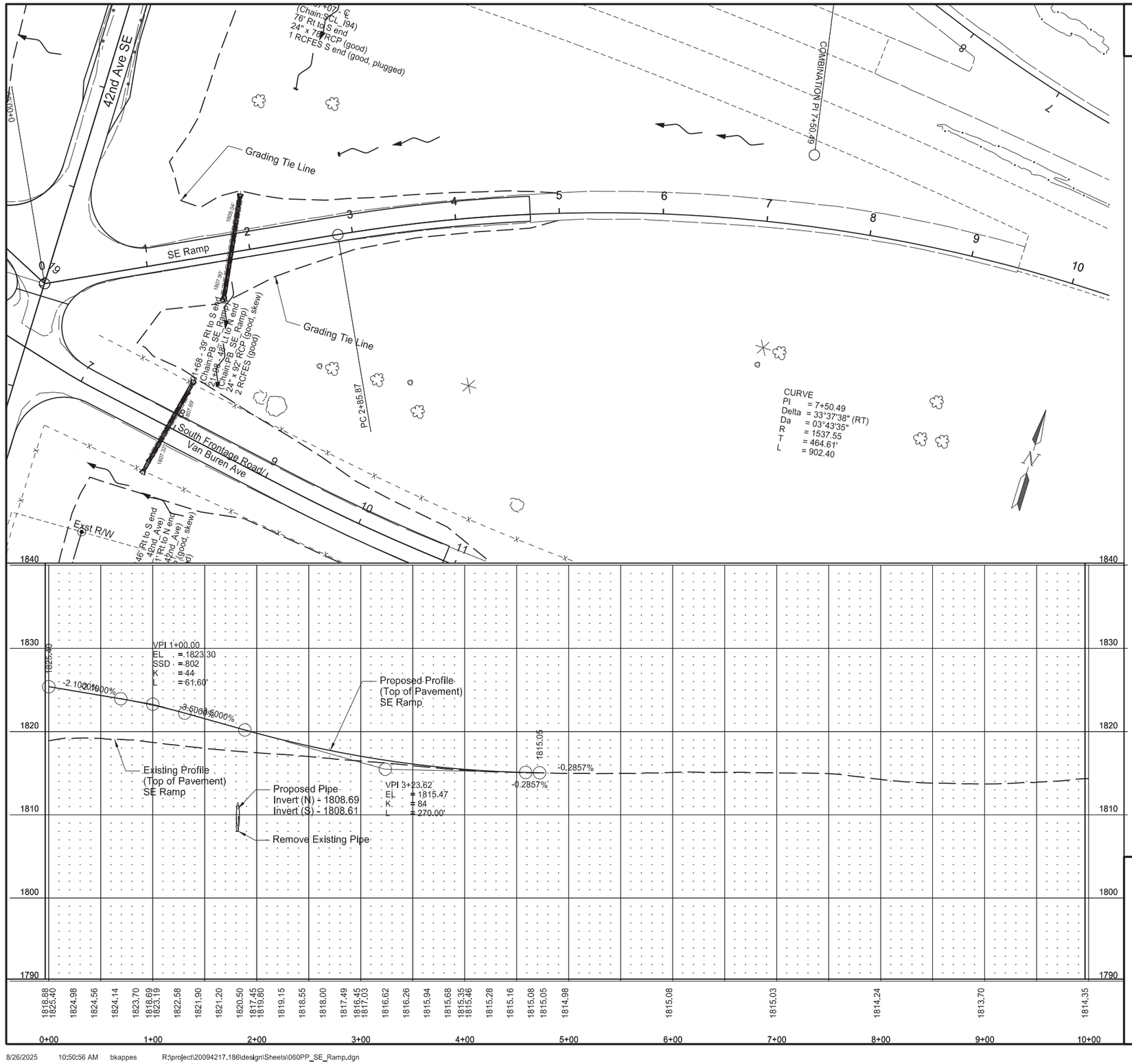
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ND	IM-2-094(186)217	60	6



Plan & Profile

SE Ramp
Sta. 0+00 to 10+00

Structure Replacement

I-94/Pettibone Interchange

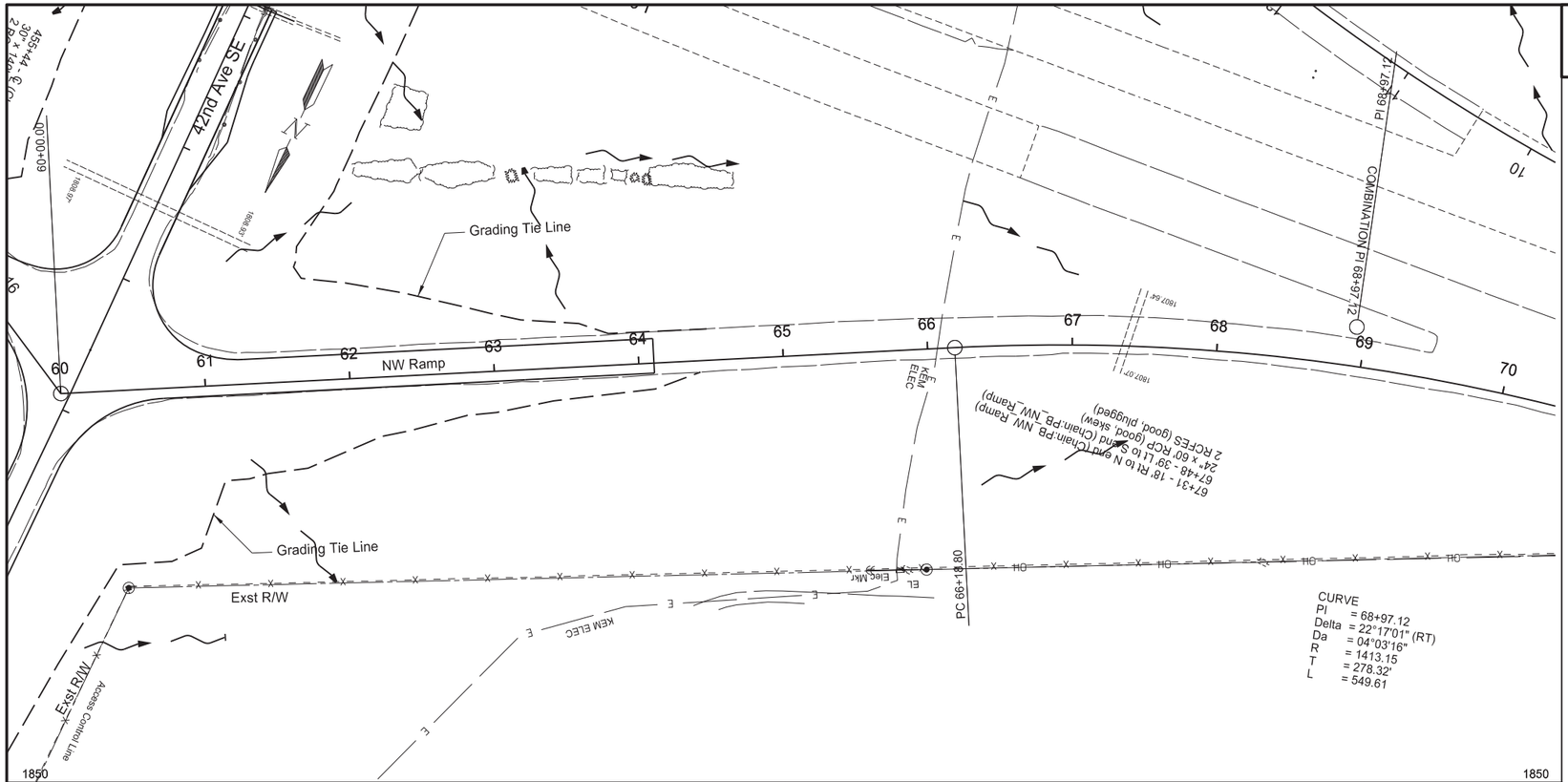
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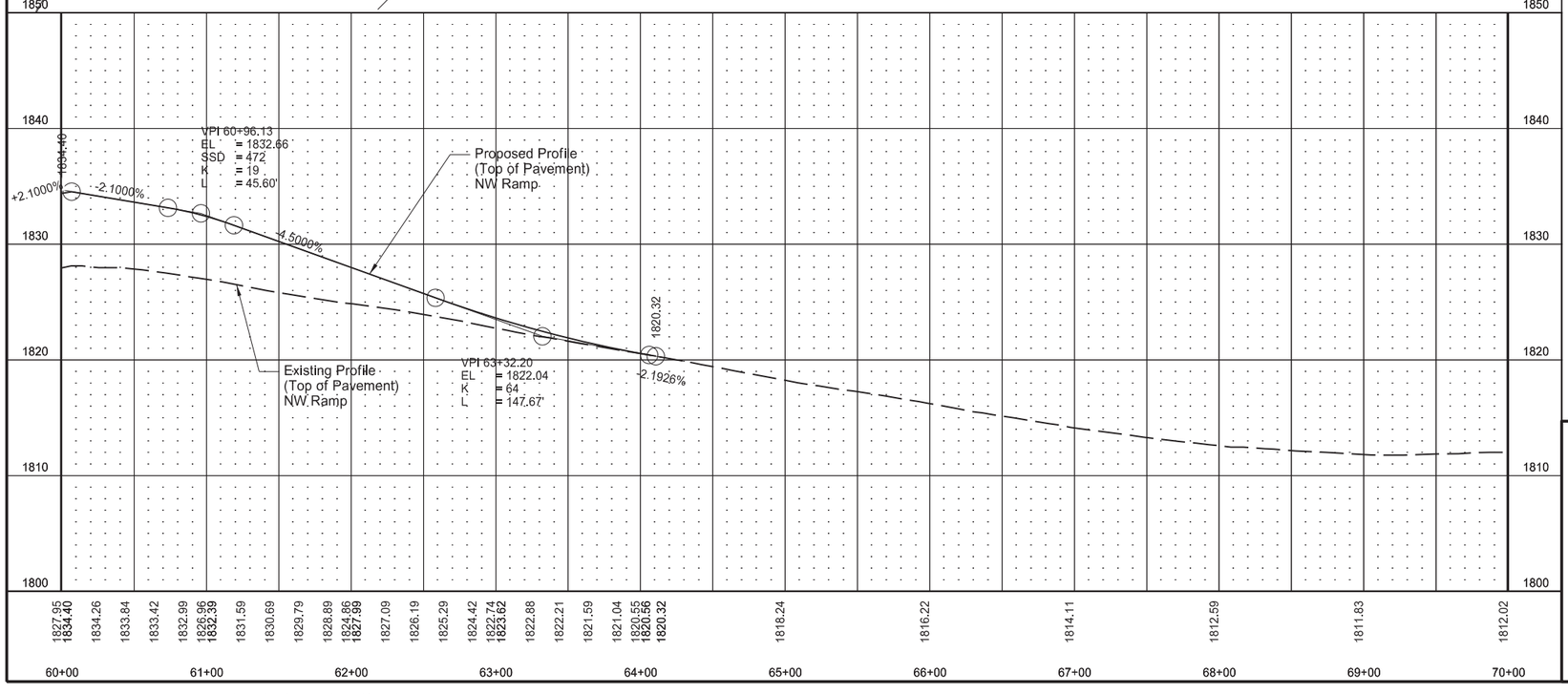
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	60	7





Plan & Profile

NW Ramp
Sta. 60+00 to 70+00

Structure Replacement

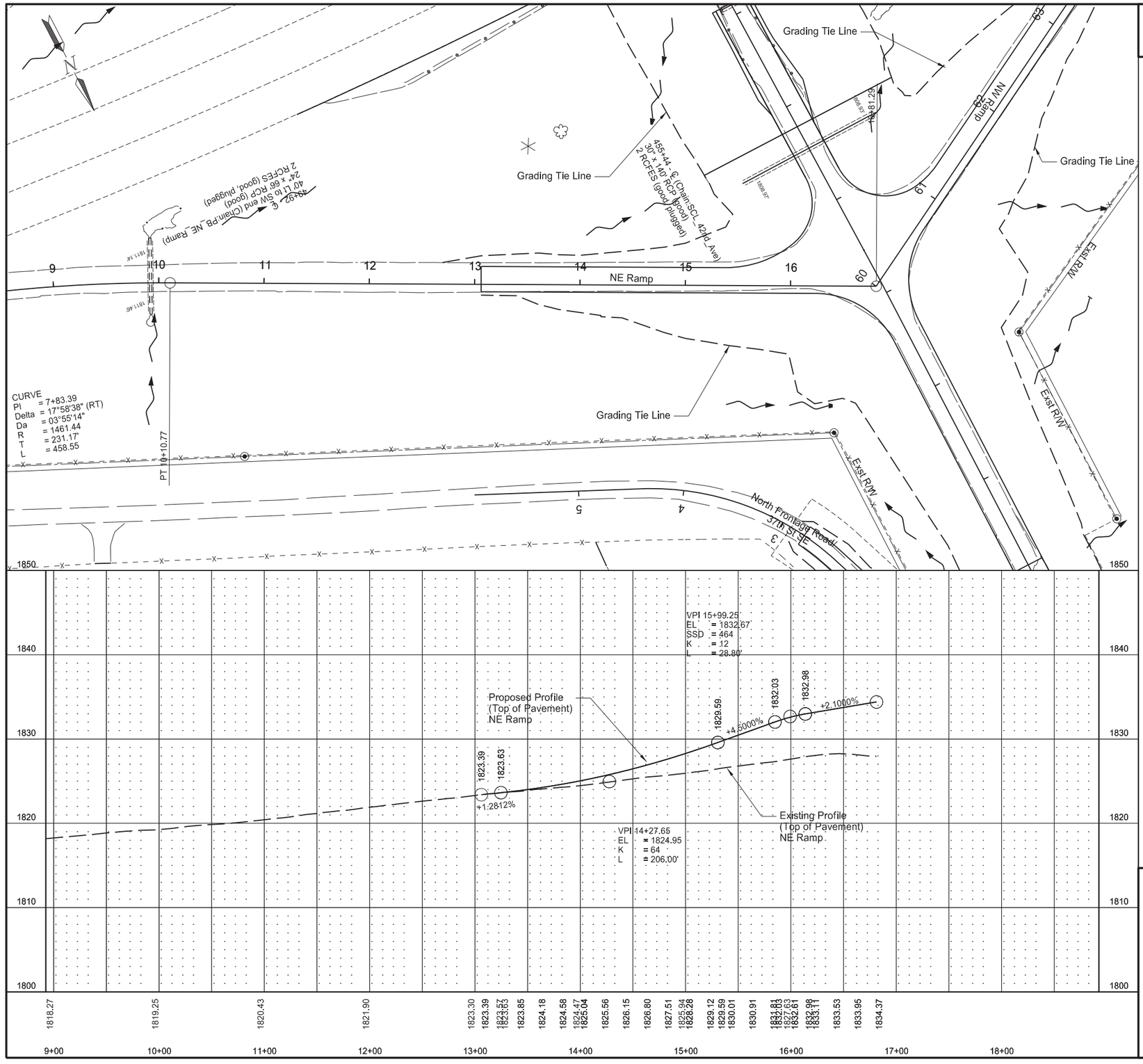
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ND	IM-2-094(186)217	60	8



Plan & Profile

NE Ramp
Sta. 9+00 to 16+81.29

Structure Replacement

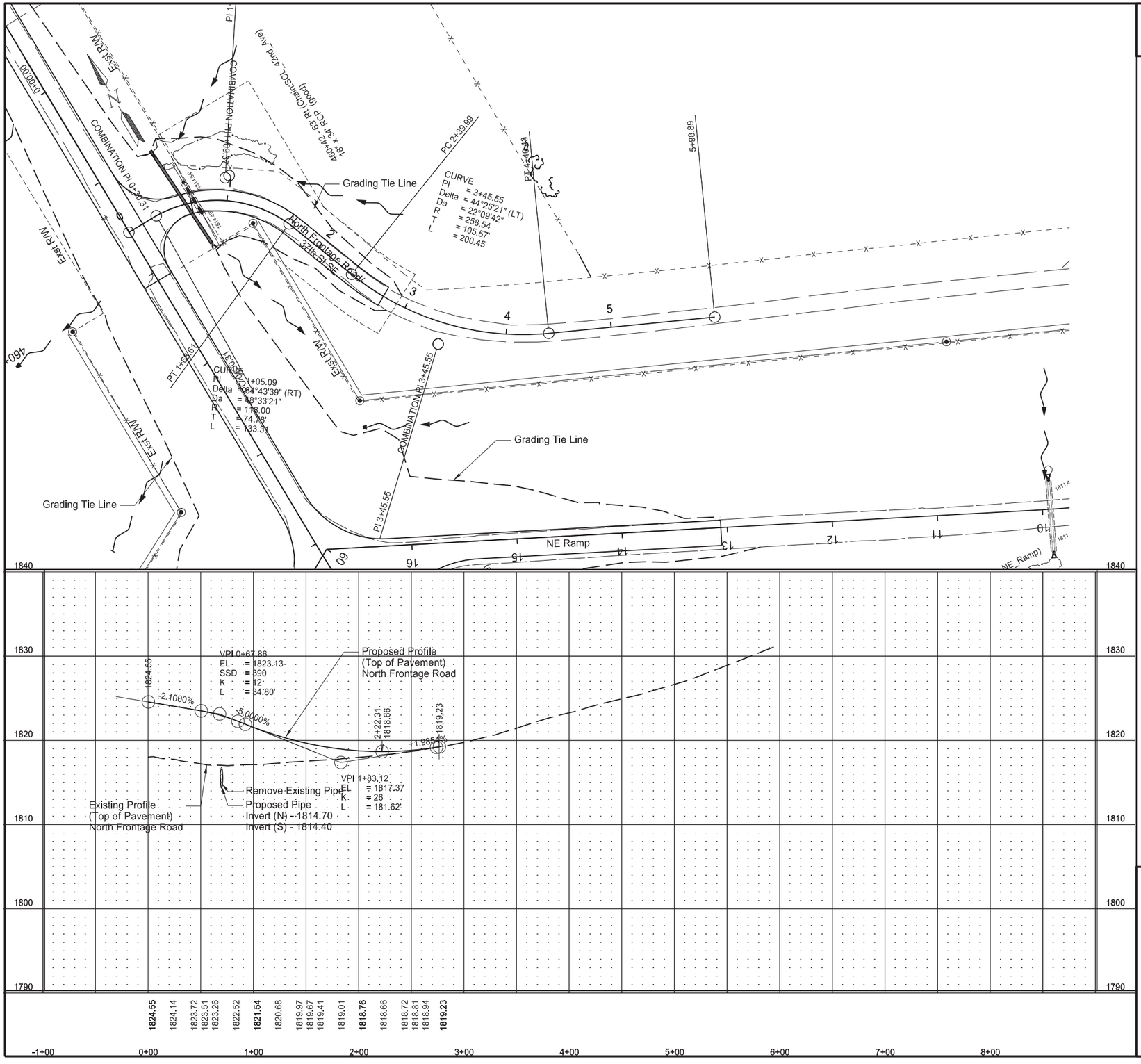
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	ND	IM-2-094(186)217	60	9



Plan & Profile

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

Structure Replacement

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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

Wetland Table

Structure Replacement

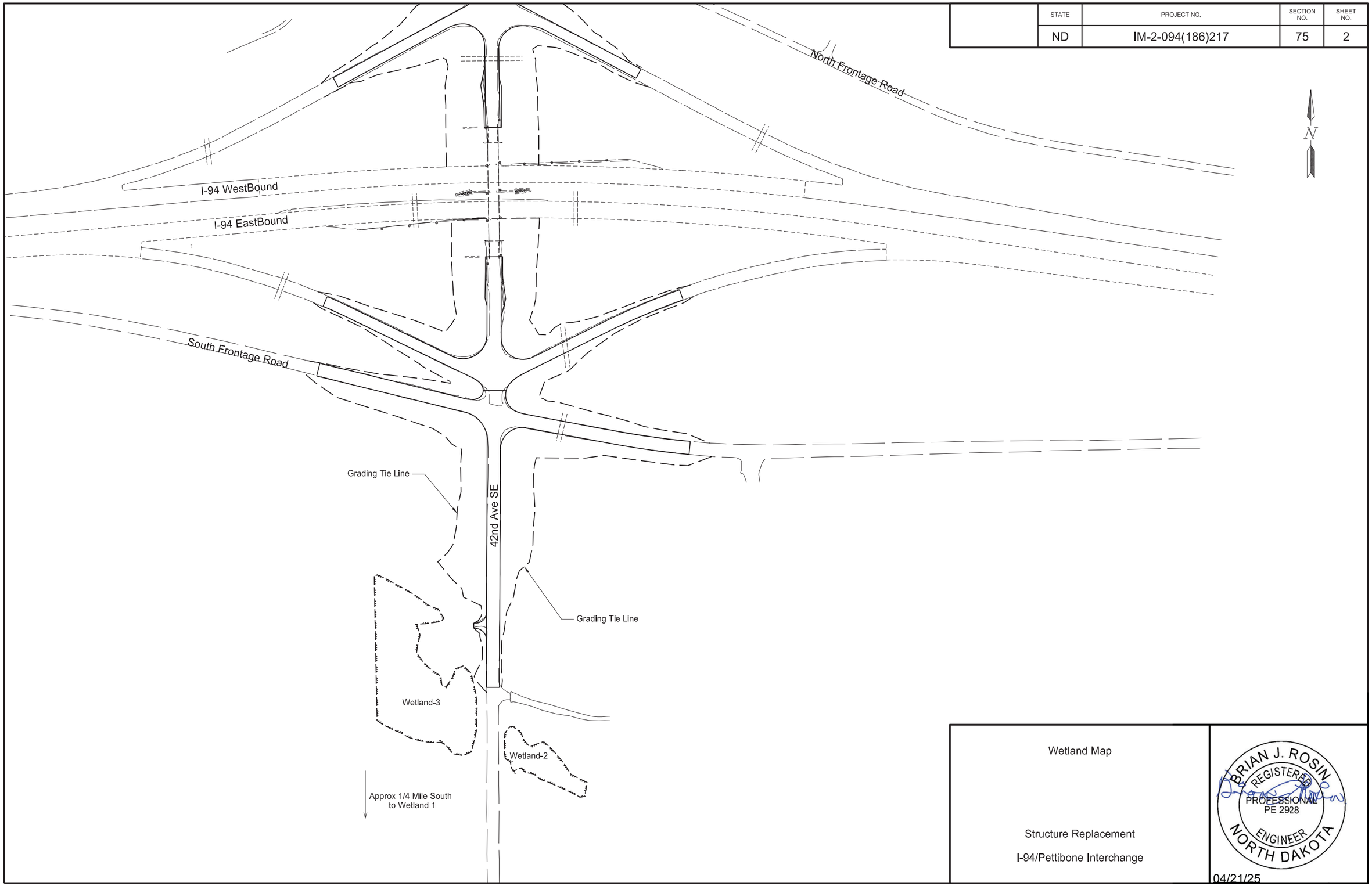
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	75	2



Wetland Map

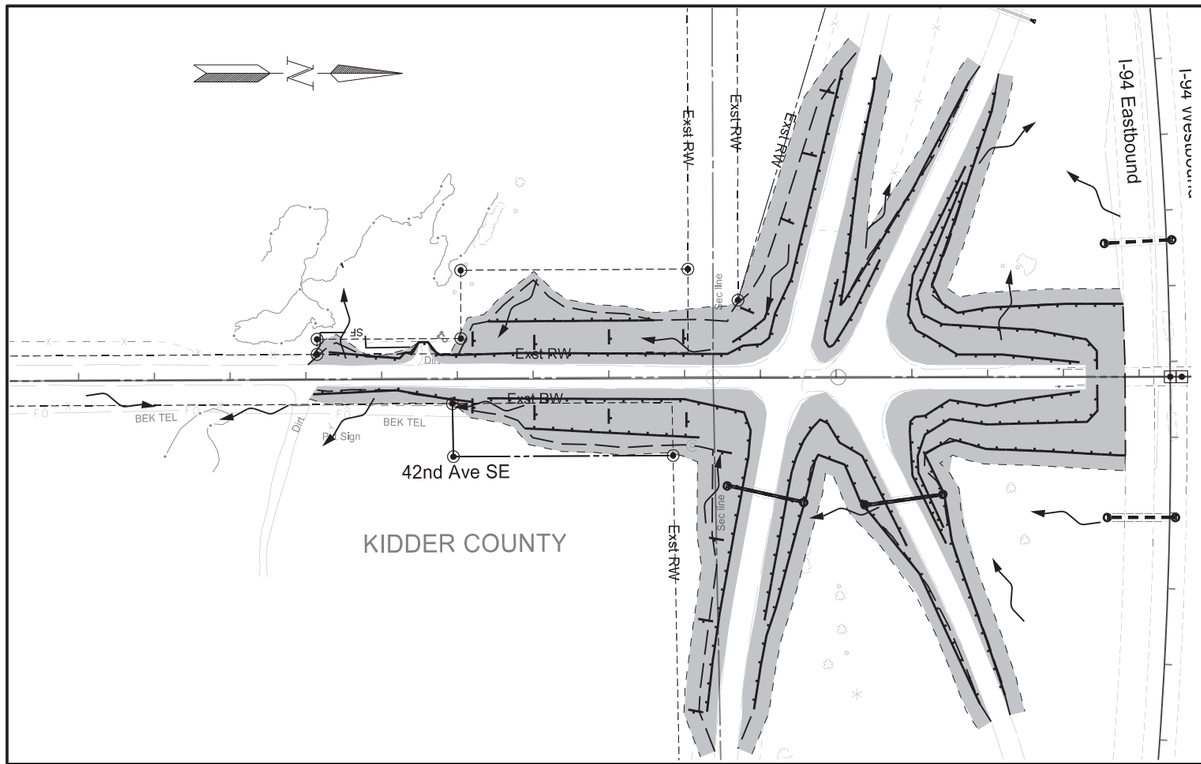
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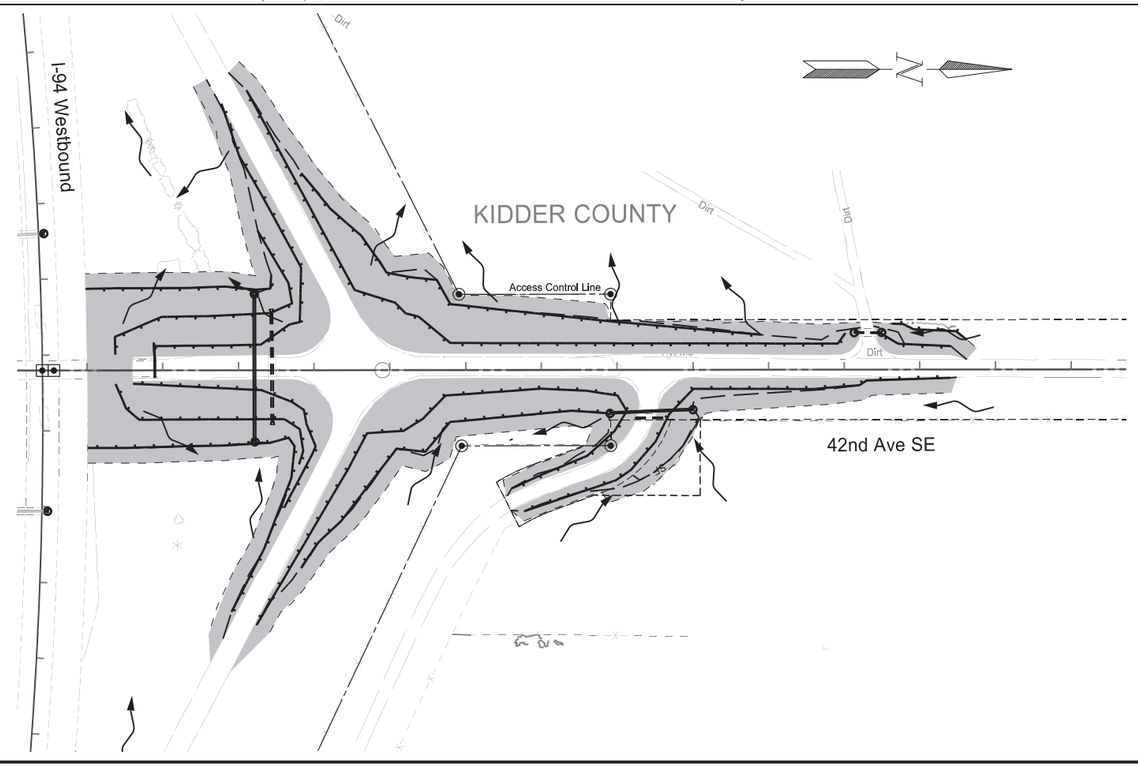
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	76	1

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

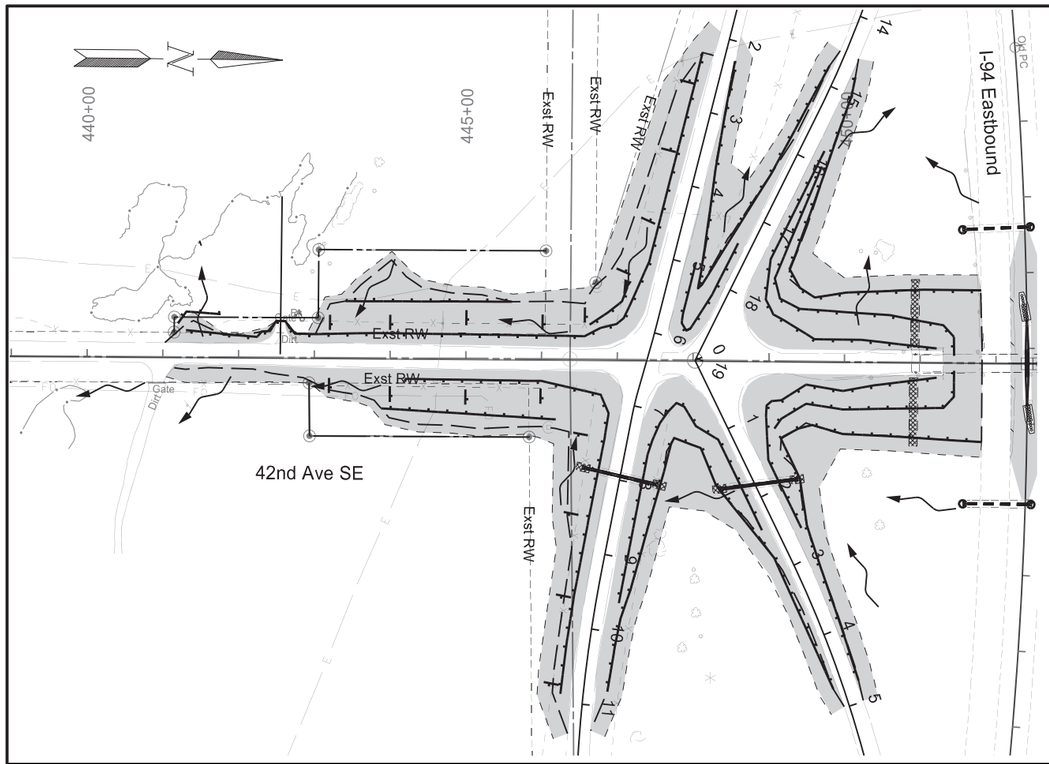
Structure Replacement

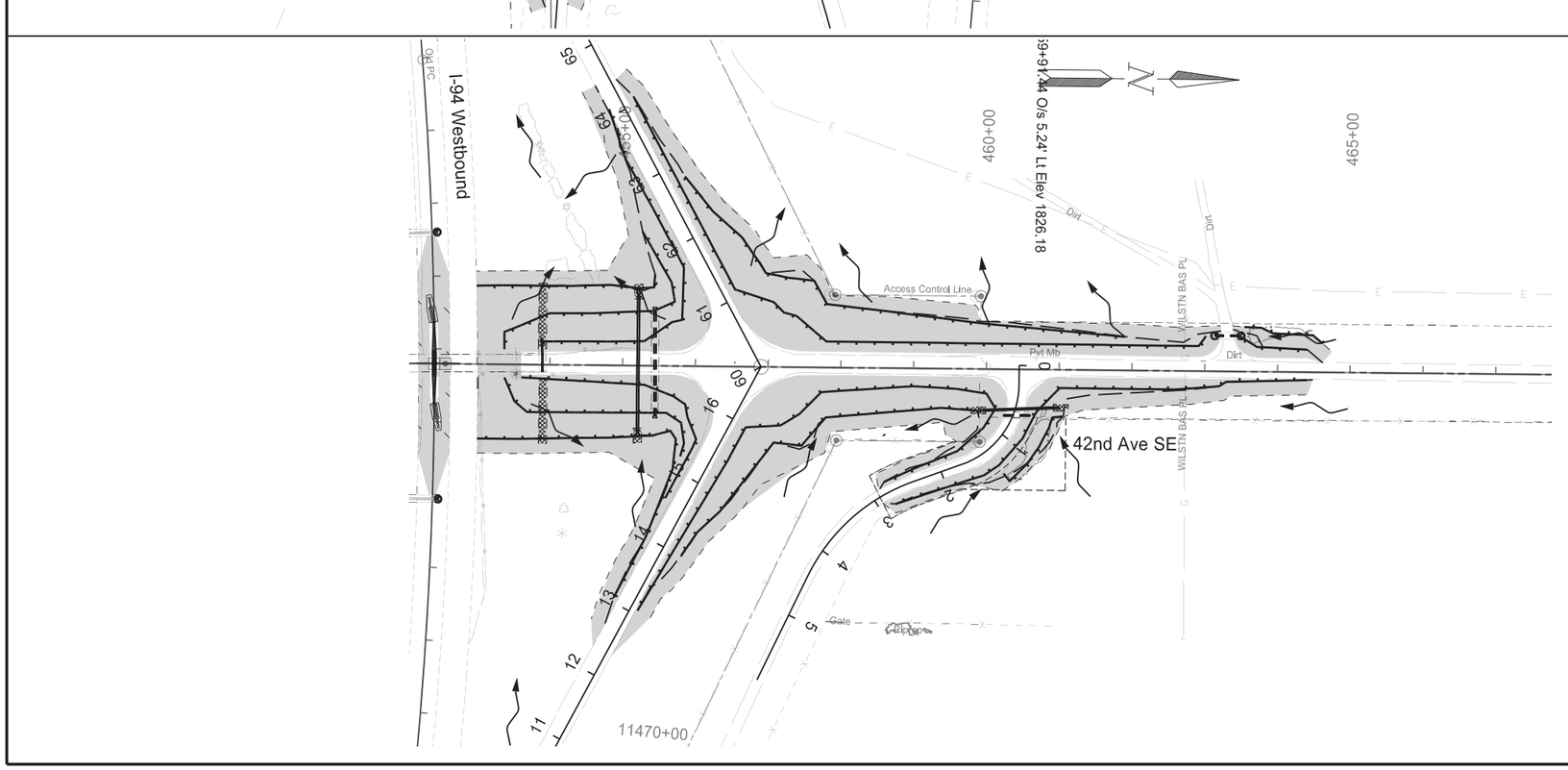
I-94/Pettibone Interchange

BRIAN J. ROSIN
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ENGINEER
NORTH DAKOTA

04/21/25

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





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	77	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	200	SEEDING CLASS II		ACRE
		SW Quadrant	1.90	
		SE Quadrant	2.23	
		West Side Between Ramps	2.26	
		East Side Between Ramps	2.07	
		NW Quadrant	1.47	
		NE Quadrant	1.58	
253	301	BONDED FIBER MATRIX		ACRE
		SW Quadrant	1.90	
		SE Quadrant	2.23	
		West Side Between Ramps	2.26	
		East Side Between Ramps	2.07	
		NW Quadrant	1.47	
		NE Quadrant	1.58	
255	102	ECB TYPE 2		SY
		7+98 (FR_S)	50	
		1+68 (Align_SE_Ramp	50	
		455+23 (OFL)	50	
		0-58 (FR_N)	40	
255	202	TRM TYPE 2		SY
		450+96 Lt & Rt	220	
		455+21 LT & RT	220	
261	112	FIBER ROLLS 12IN		LF
		SW Quadrant	2350	
		SE Quadrant	2335	
		West Side Between Ramps	2605	
		East Side Between Ramps	2515	
		NW Quadrant	1940	
		NE Quadrant	2115	

12" Fiber Rolls

TRM Type 2

Permanent Seeding & Bonded Fiber Matrix

ECB Type 2

Permanent Erosion Control

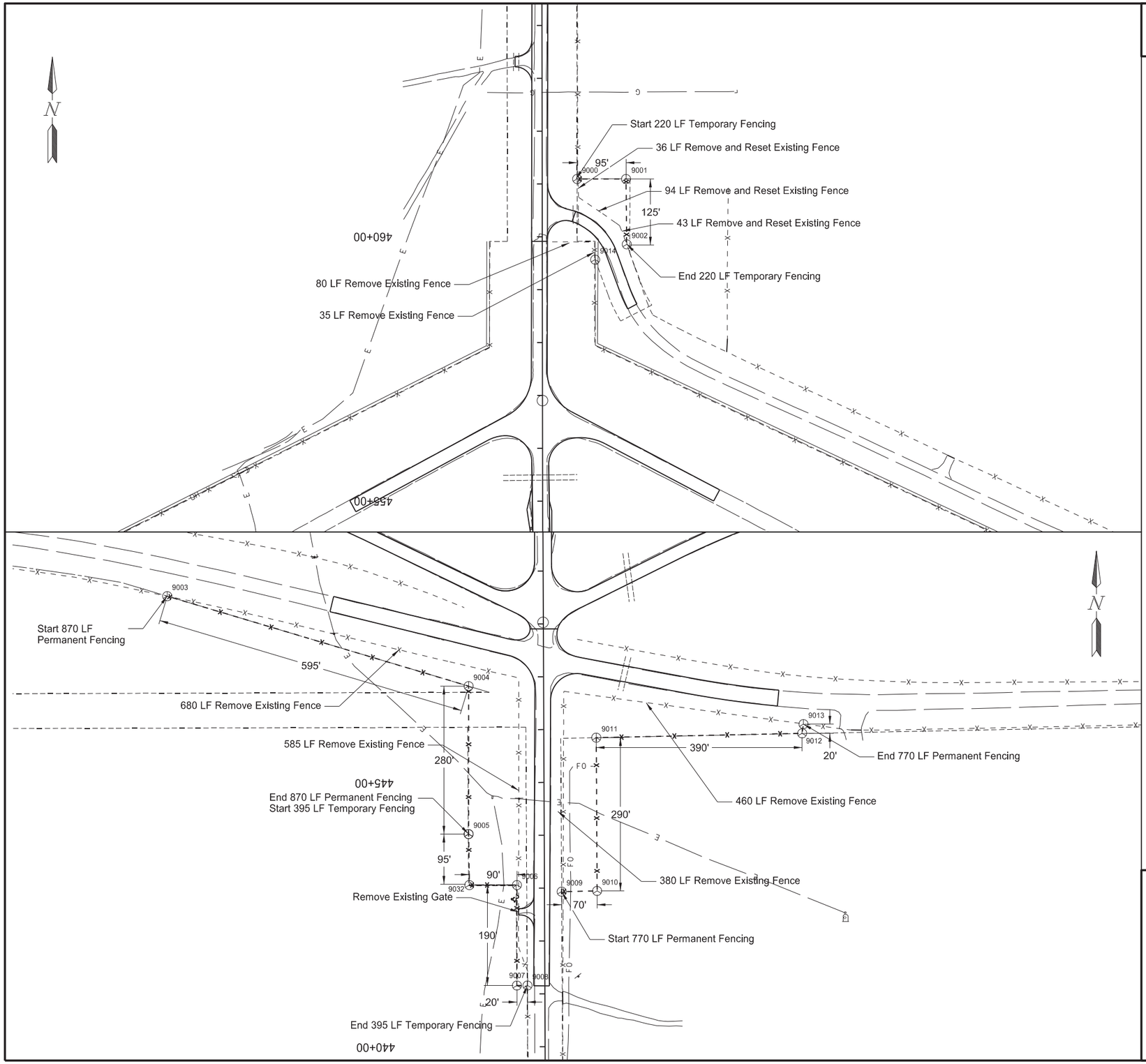
Structure Replacement

I-94/Pettibone Interchange

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04/21/25

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



	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

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

	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

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

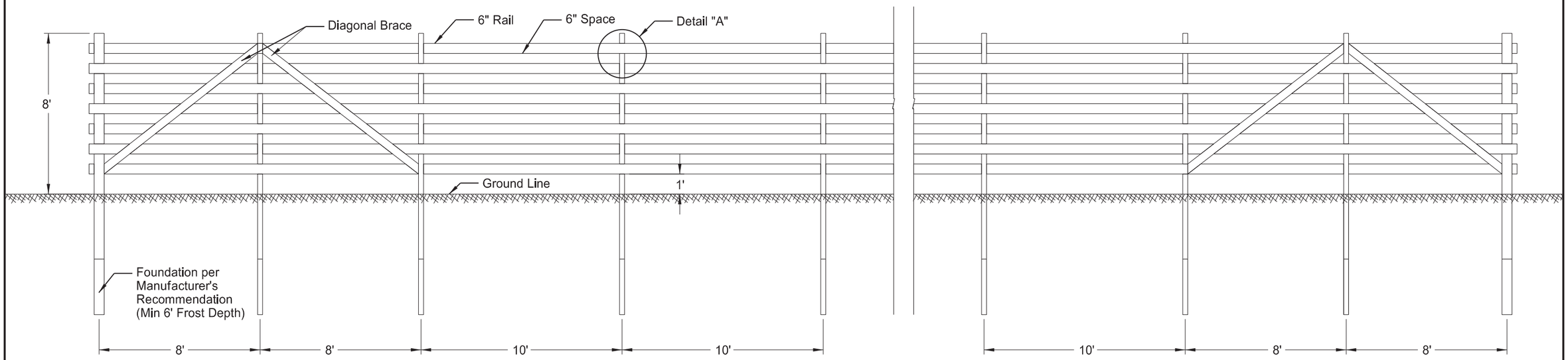
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NORTH DAKOTA

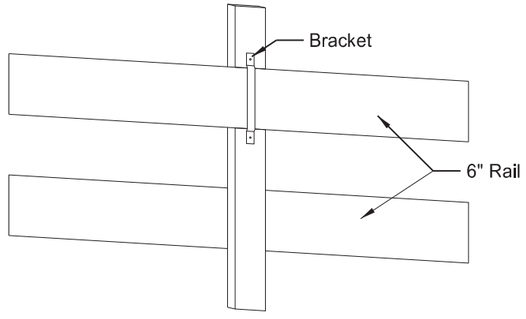
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	80	3





Detail "A"

Snow Fence Detail

Structure Replacement

I-94/Pettibone Interchange

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ENGINEER
NORTH DAKOTA

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 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 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'

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

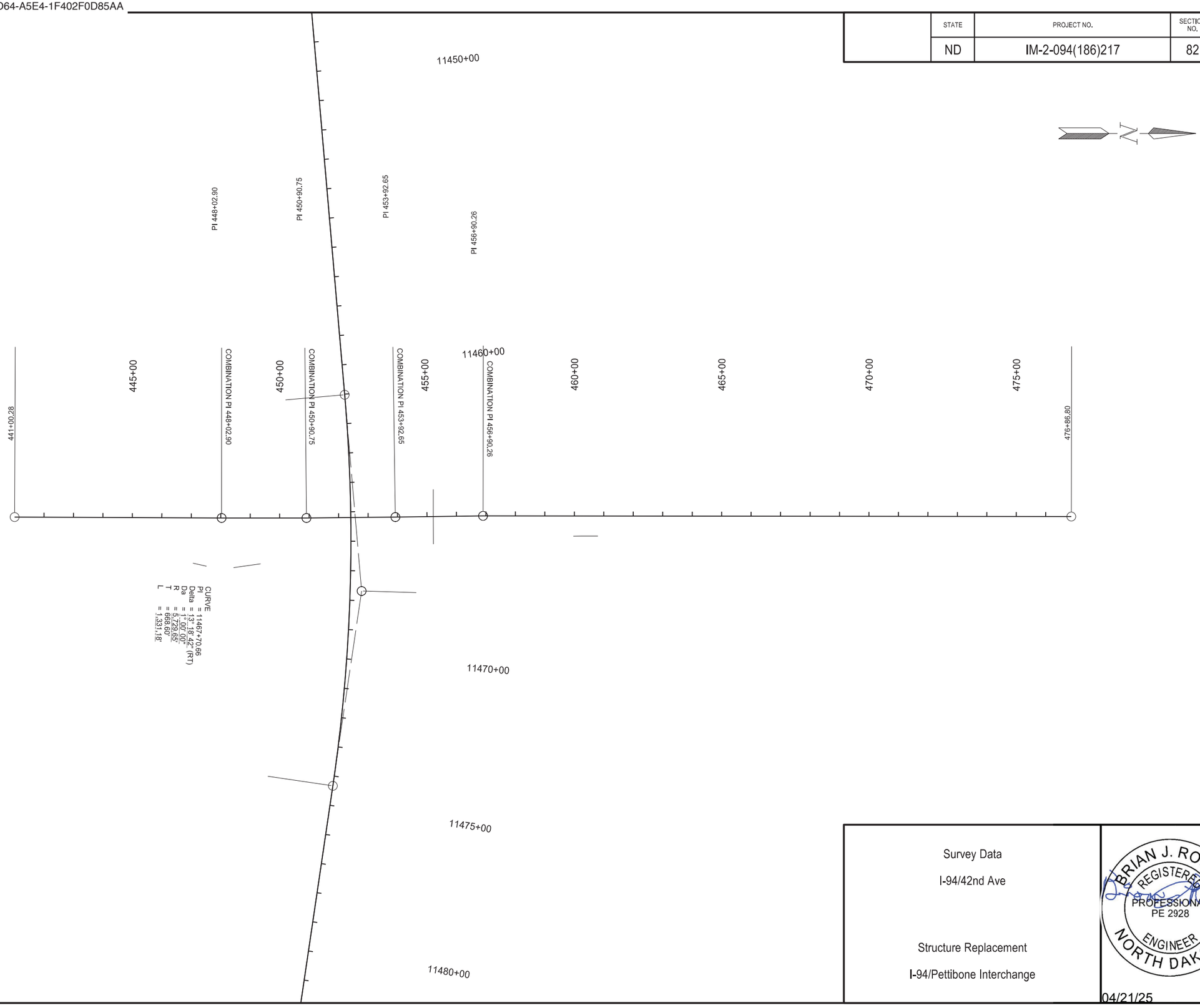
REGISTERED PROFESSIONAL LAND SURVEYOR
STEFAN JOHNSON
LS-10169
DATE
NORTH DAKOTA
3/15/23
03/02/23

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



Survey Data

I-94/42nd Ave

Structure Replacement

I-94/Pettibone Interchange

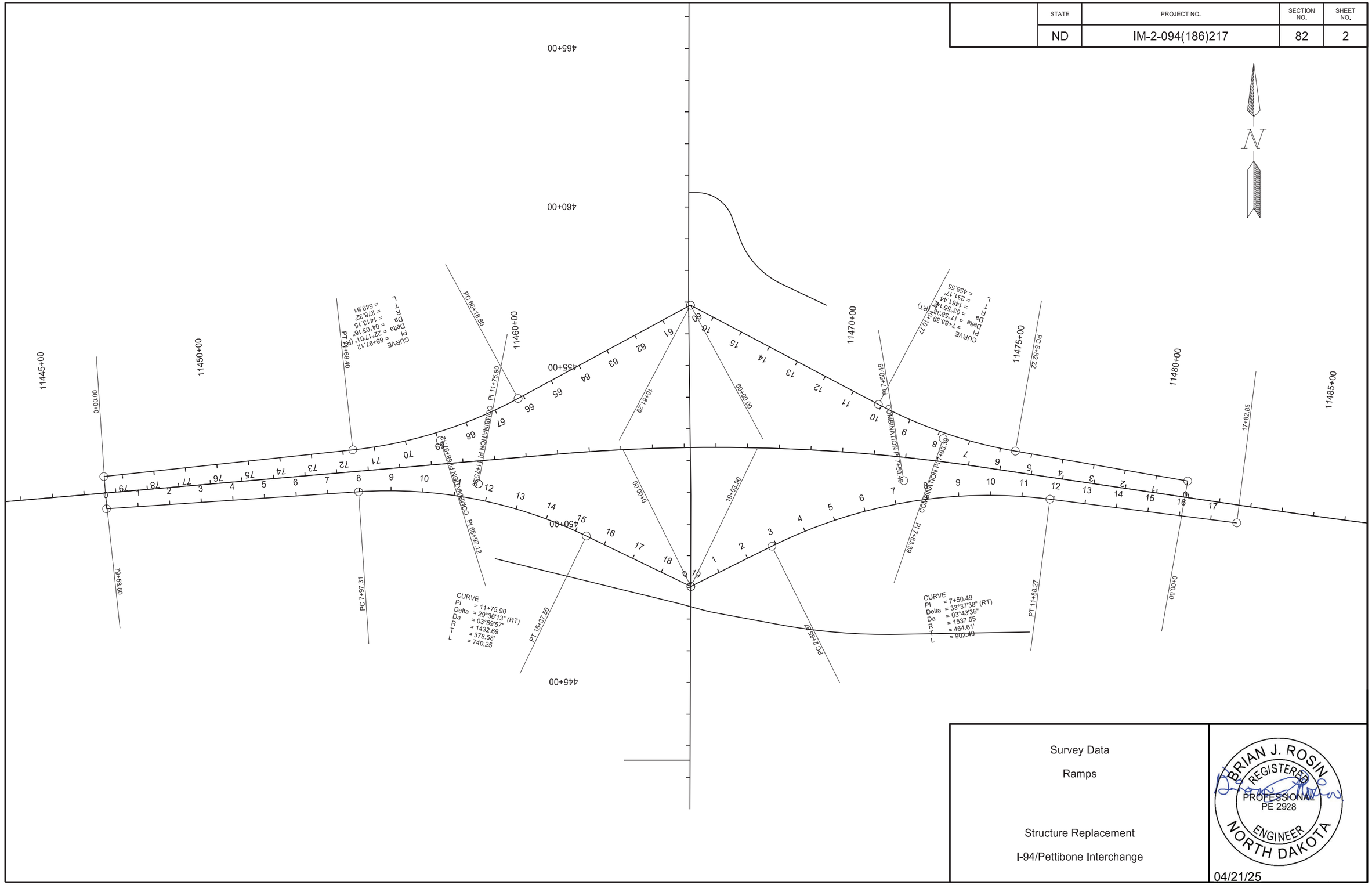
BRIAN J. ROSIN
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PE 2928
ENGINEER
NORTH DAKOTA

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

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



Survey Data

Ramps

Structure Replacement

I-94/Pettibone Interchange

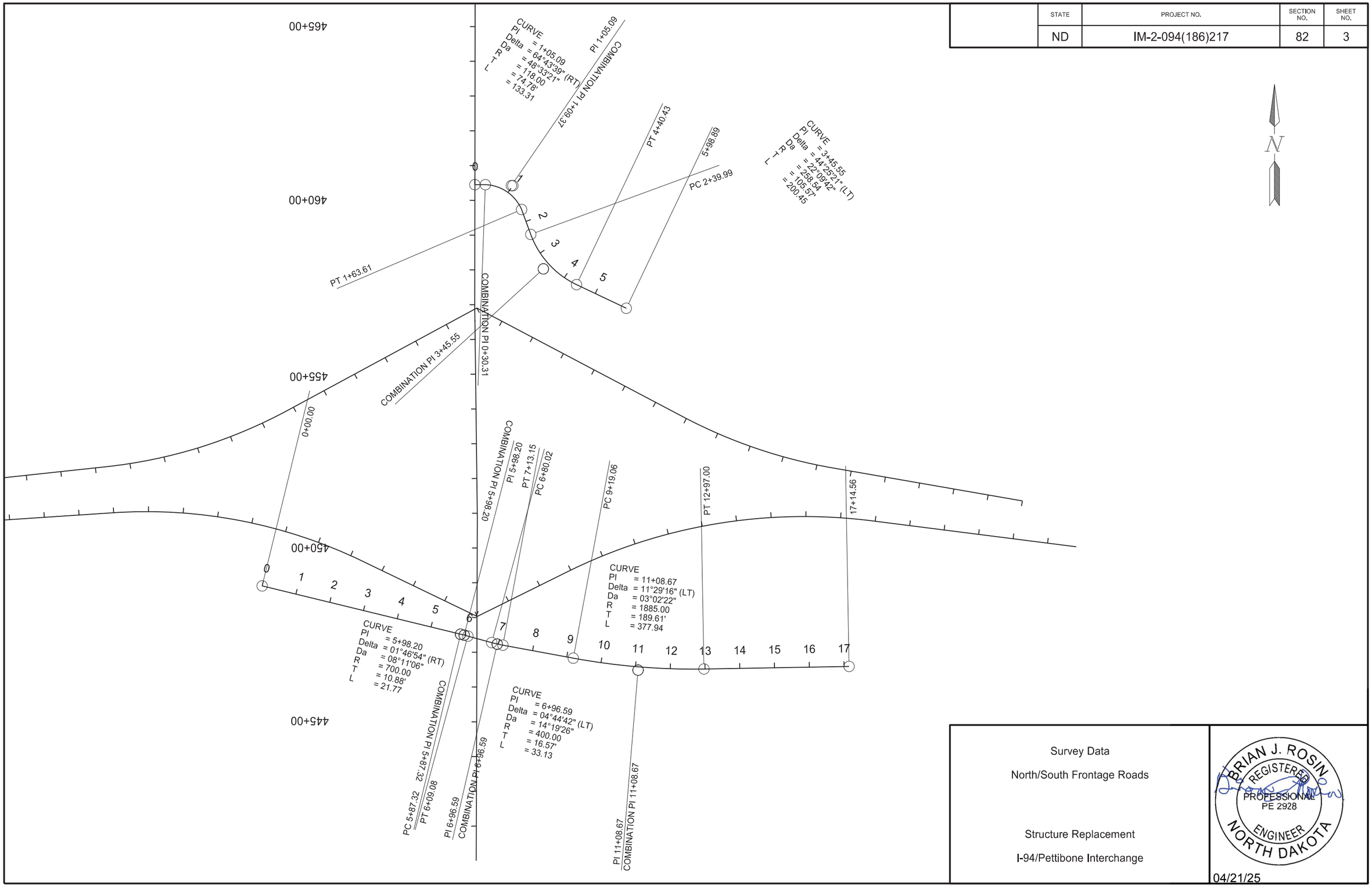
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	82	3



Survey Data

North/South Frontage Roads

Structure Replacement

I-94/Pettibone Interchange

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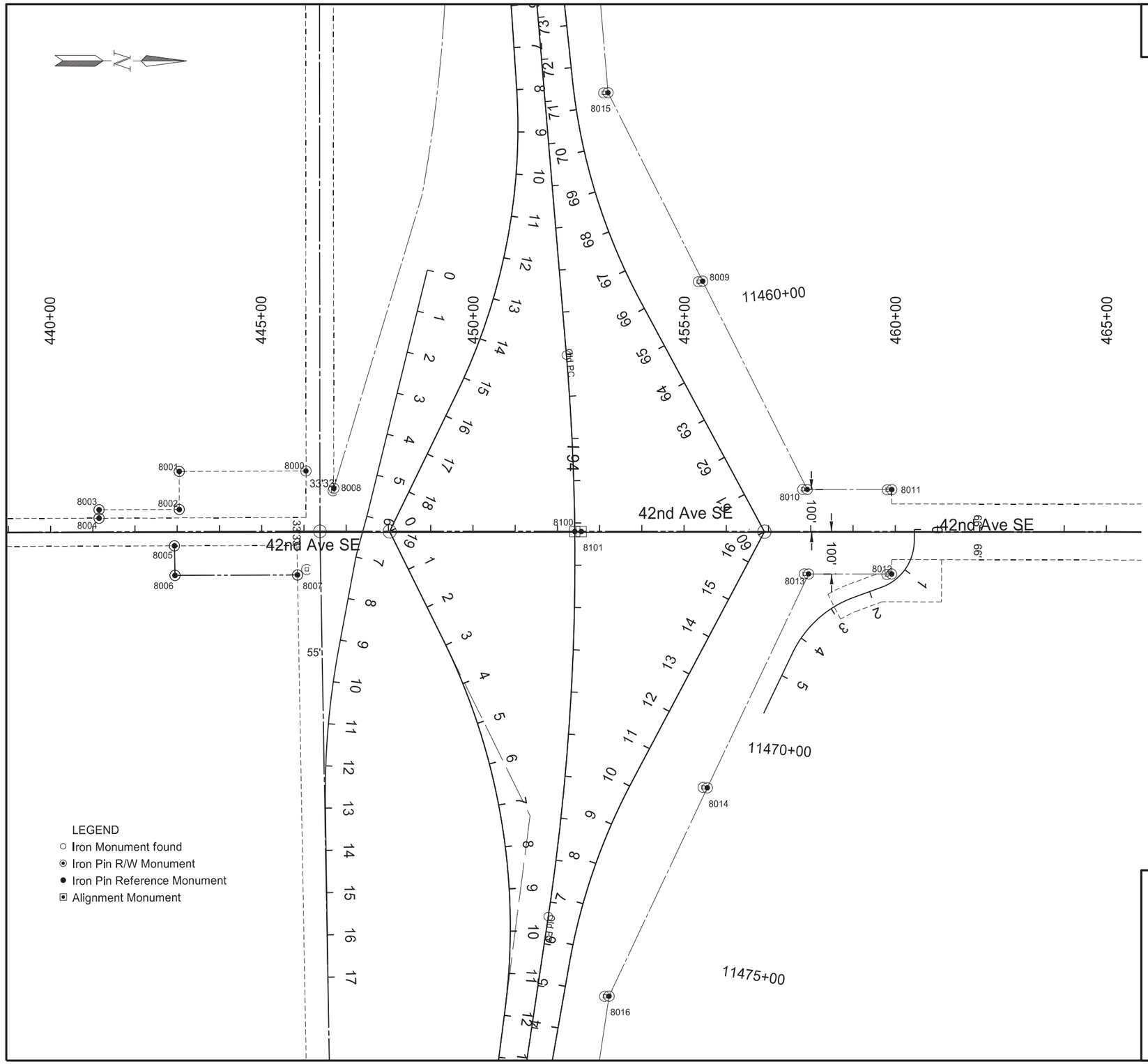
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	82	4

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



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

R/W Monuments & Alignment Monuments

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	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/

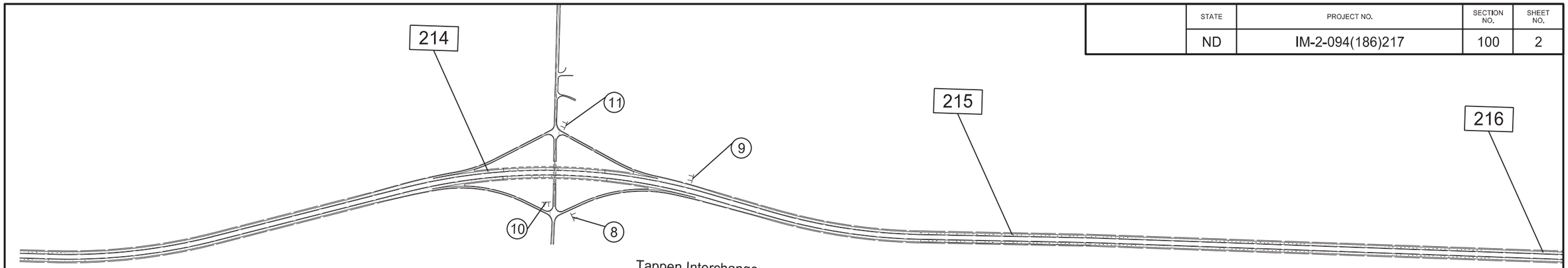
BRIAN J. ROSIN
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08/27/25

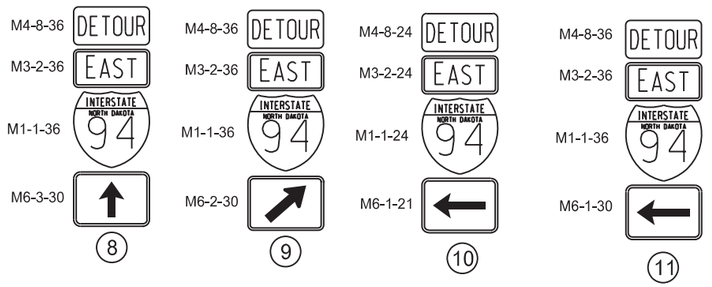
Traffic Control Devices List

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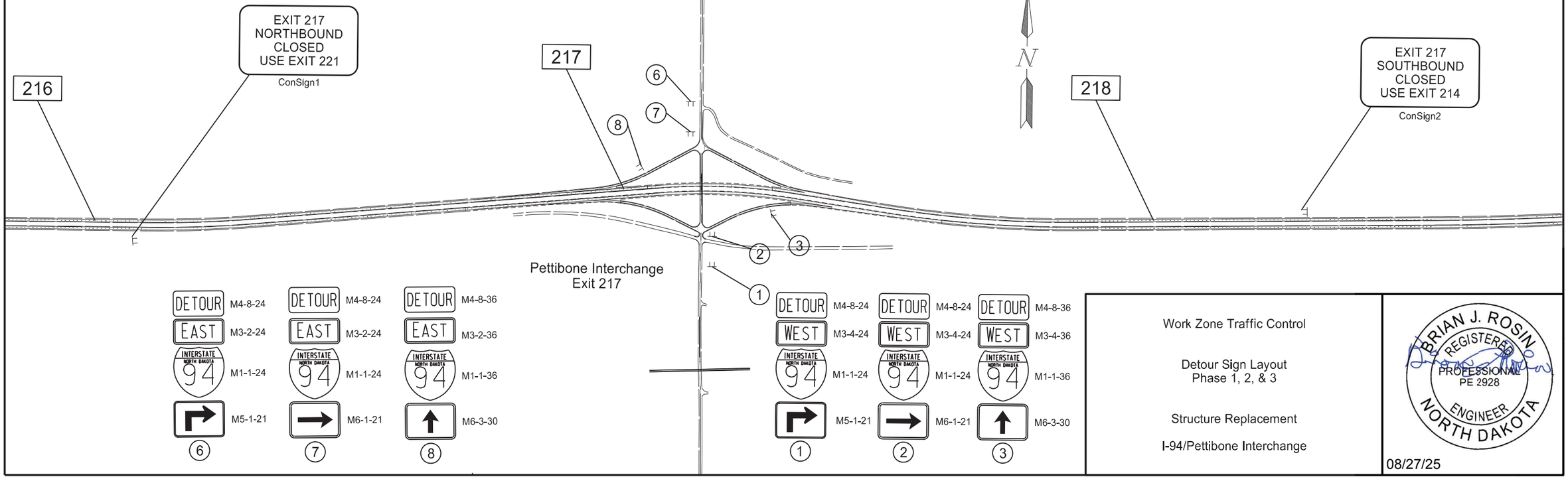
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	100	2



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

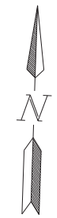
BRIAN J. ROSIN
REGISTERED
PROFESSIONAL
PE 2928
ENGINEER
NORTH DAKOTA

08/27/25

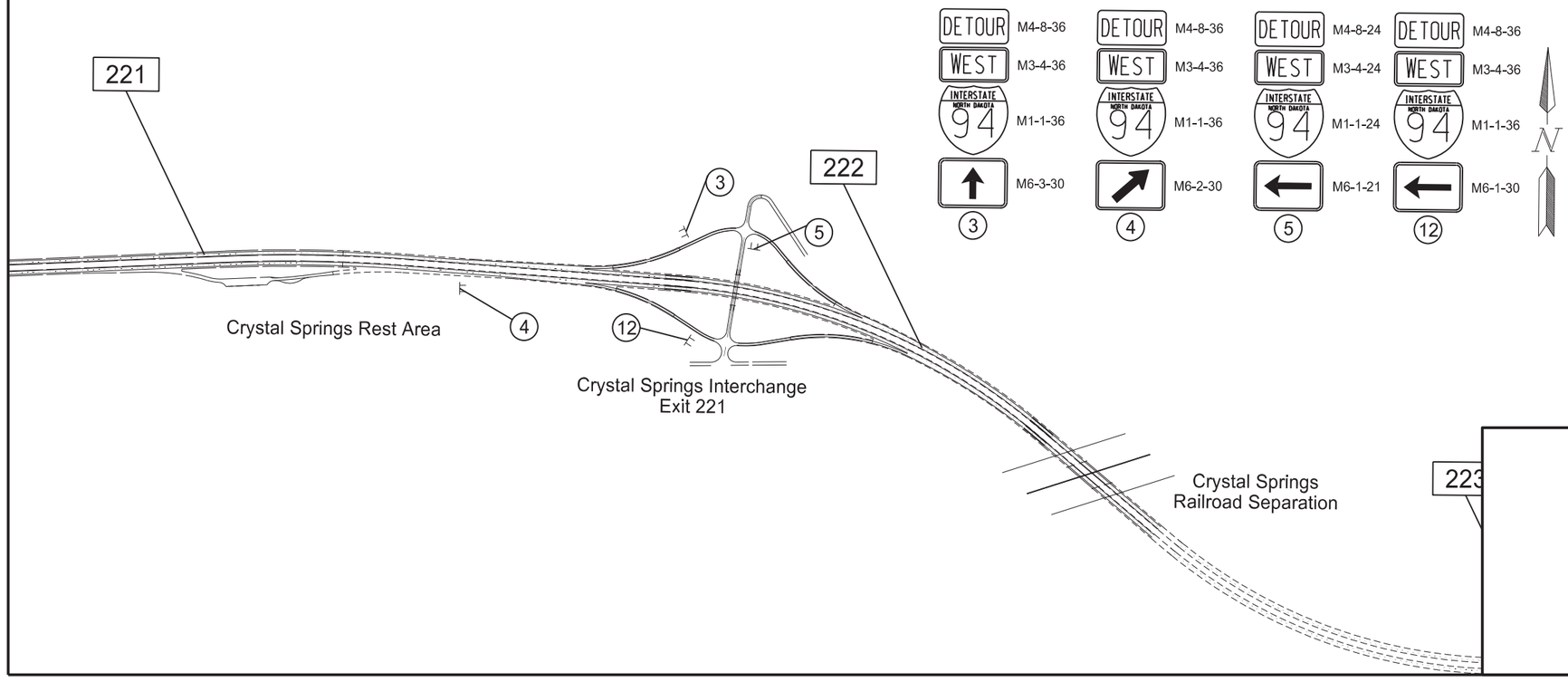
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	100	3





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



Work Zone Traffic Control

Detour Sign Layout
Phase 1, 2, & 3

Structure Replacement

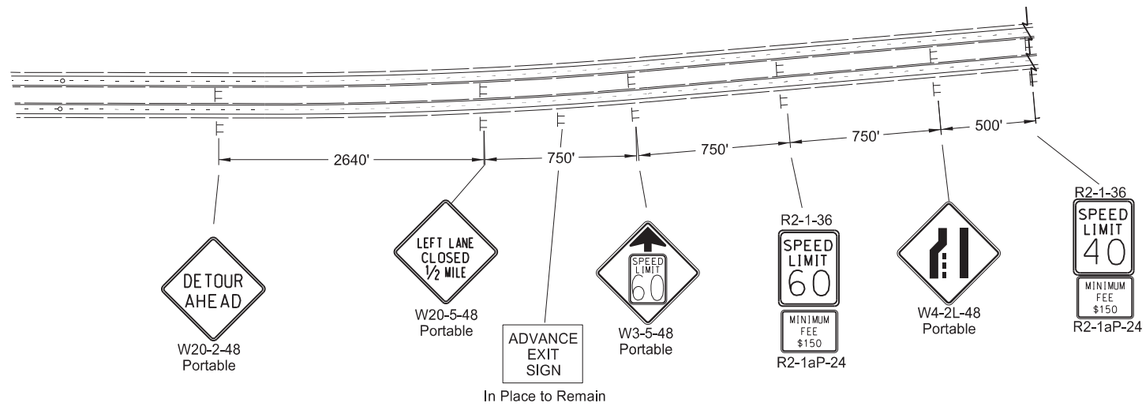
I-94/Pettibone Interchange

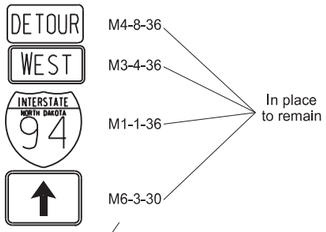


08/27/25

Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	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



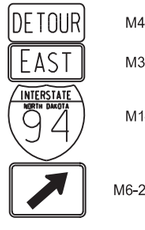










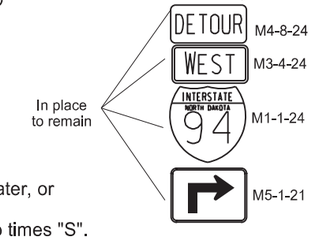




















ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 mph to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

Work Zone Traffic Control

Signing Layout
South Ramps
Phase 1 - Interstate Closure Ramp Detour

Structure Replacement

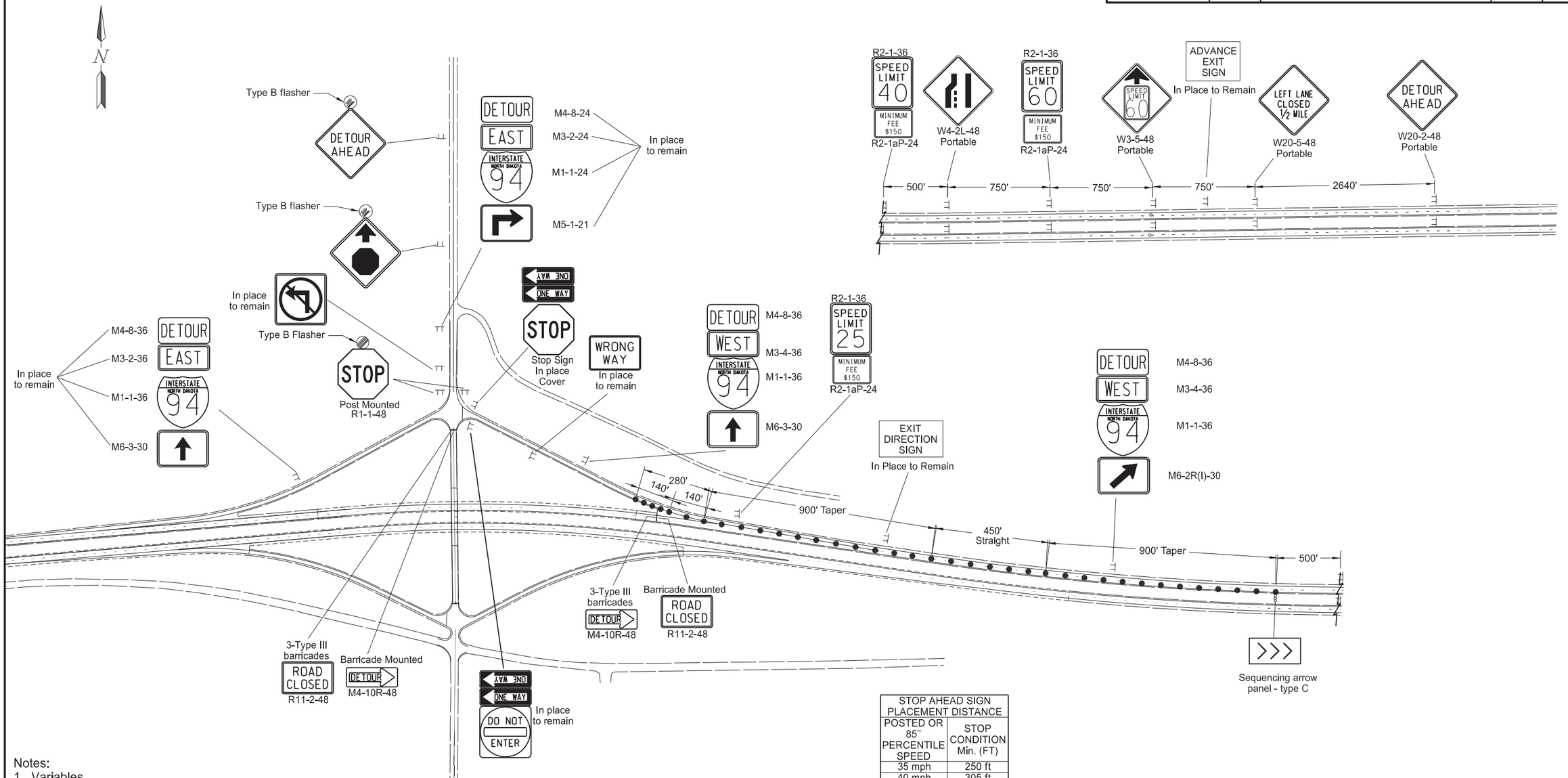
I-94/Pettibone Interchange



08/27/25

Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	100	5



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

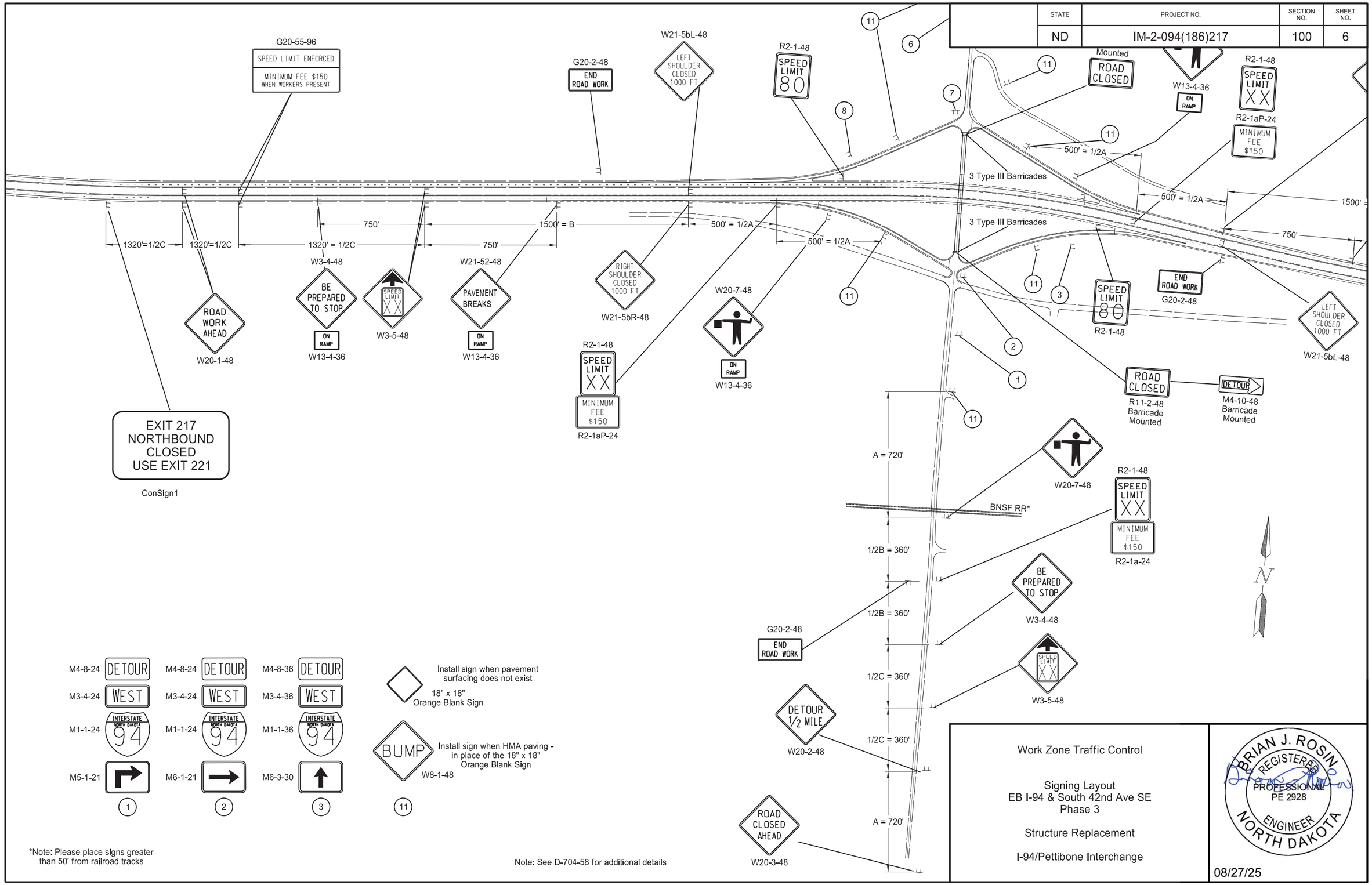
I-94/Pettibone Interchange

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PE 2928
ENGINEER
NORTH DAKOTA

08/27/25

Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	100	6



M4-8-24 DETOUR / M3-4-24 WEST / M1-1-24 INTERSTATE NORTH DAKOTA 94 / M5-1-21 — (1)

M4-8-24 DETOUR / M3-4-24 WEST / M1-1-24 INTERSTATE NORTH DAKOTA 94 / M6-1-21 — (2)

M4-8-36 DETOUR / M3-4-36 WEST / M1-1-36 INTERSTATE NORTH DAKOTA 94 / M6-3-30 — (3)

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)

*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

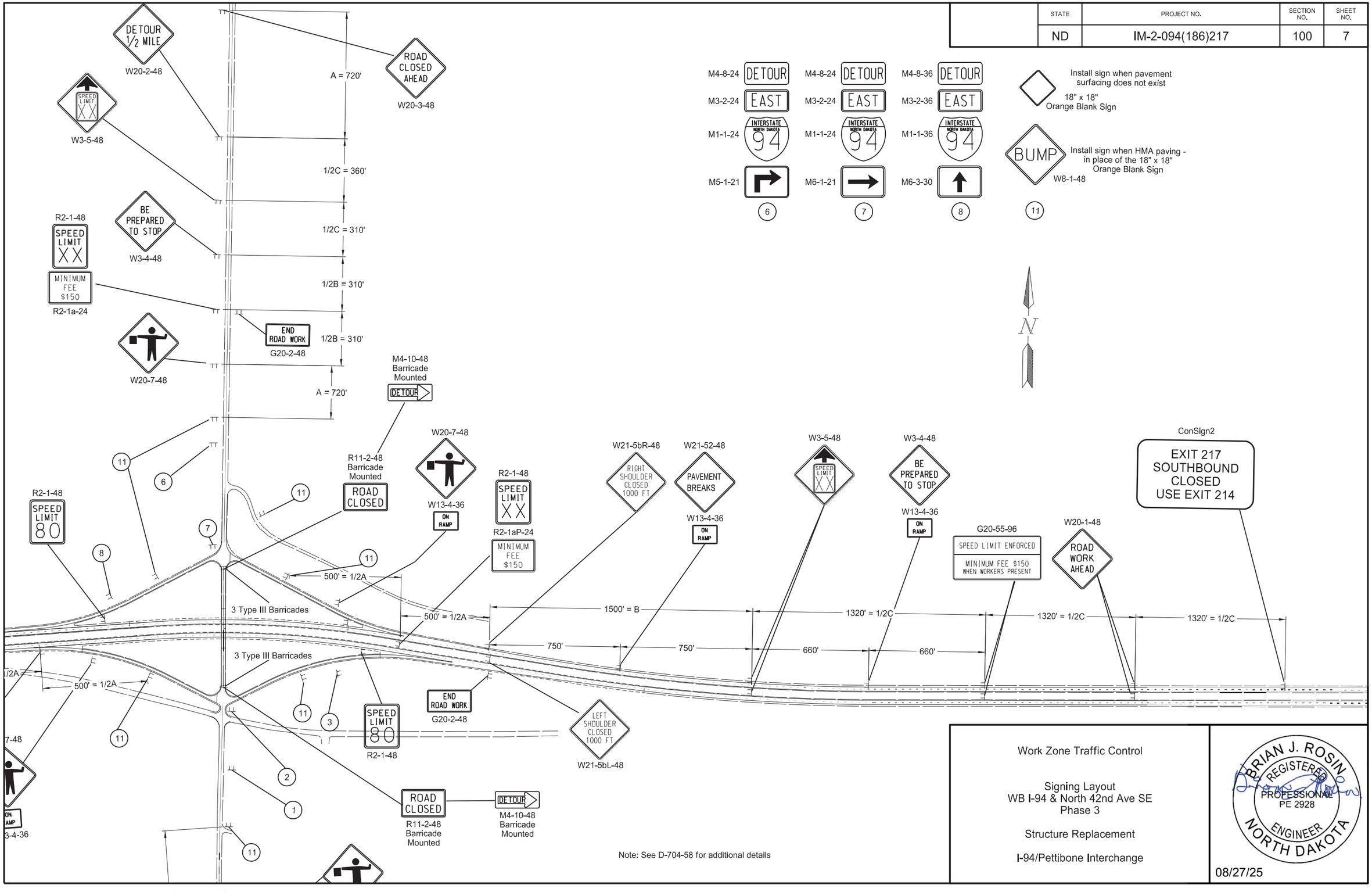
I-94/Pettibone Interchange

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ENGINEER
NORTH DAKOTA

08/27/25

Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	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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PROFESSIONAL
PE 2928
ENGINEER
NORTH DAKOTA

08/27/25

Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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)

N

Type III Barricade

Type III Barricade

R2-1-48 SPEED TIMIL XX MINIMUM FEE $150 R2-1aP-24

Flagger

11

1/2A = 360'

1/2A = 360'

W20-7-48

W3-5-48 SPEED LIMIT XX

W20-4-48 ONE LANE ROAD AHEAD

W20-1-48 ROAD WORK AHEAD

1/2B = 360'

1/2B = 360'

C = 720'

END ROAD WORK G20-2-48

3 - Type III Barricades

Type III Barricades

3 - Type III Barricades

100'

100'

100'

100'

100'

Flagger

1/2A=360'

1/2A=360'

1/2B = 360'

C = 720'

Type III Barricade

Note: See D-704-15 for additional details

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

Work Zone Traffic Control

Signing Layout
Frontage Roads
Phase 3

Structure Replacement

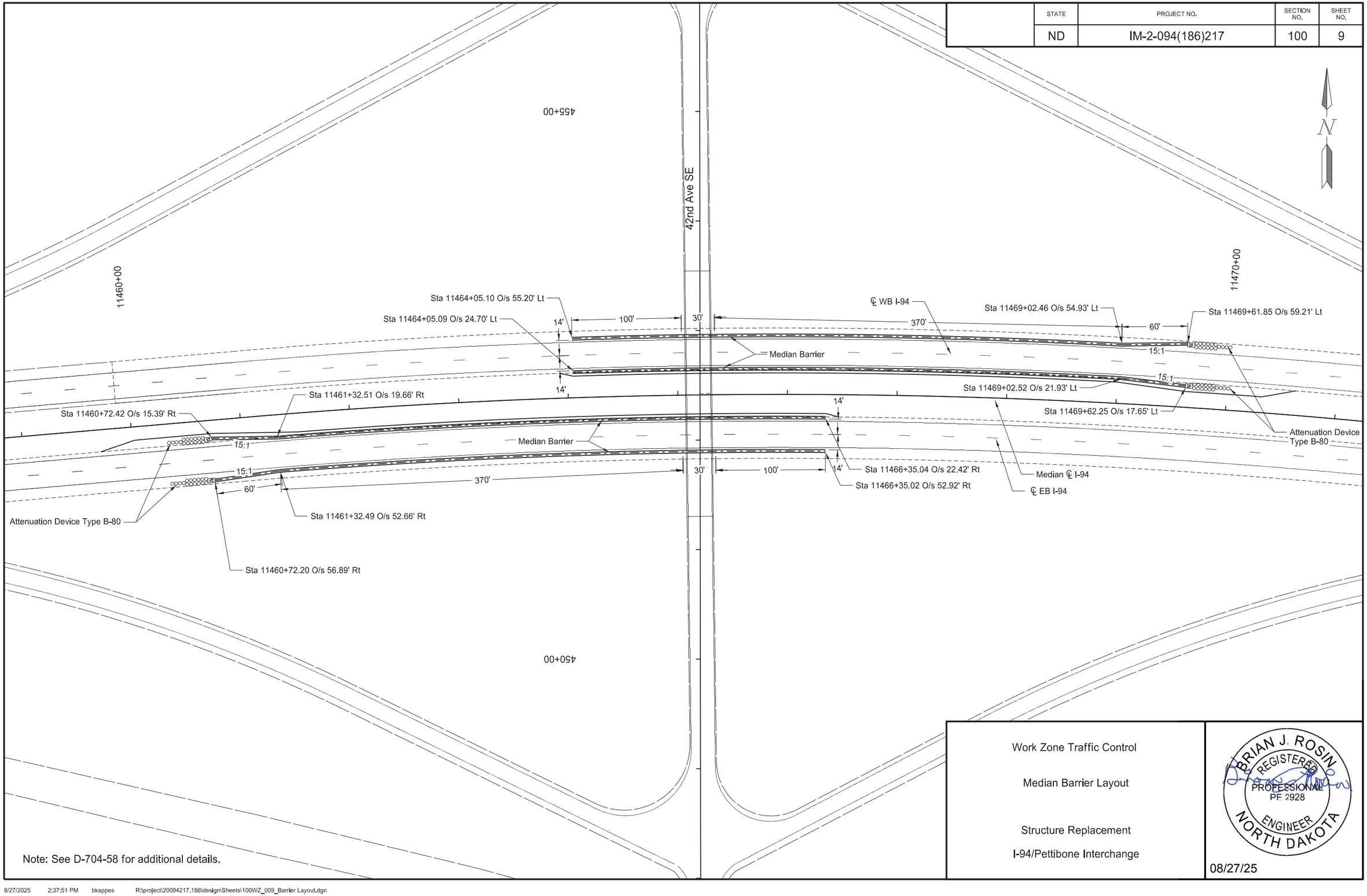
I-94/Pettibone Interchange

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08/27/25

Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	100	9



Note: See D-704-58 for additional details.

Work Zone Traffic Control

Median Barrier Layout

Structure Replacement

I-94/Pettibone Interchange

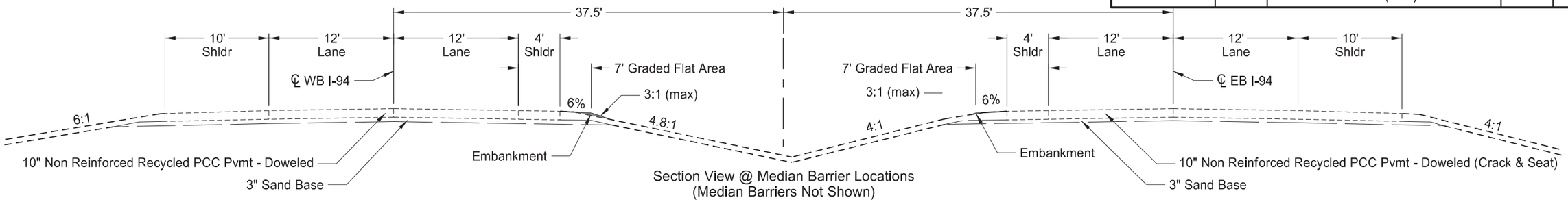
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ENGINEER
NORTH DAKOTA

08/27/25

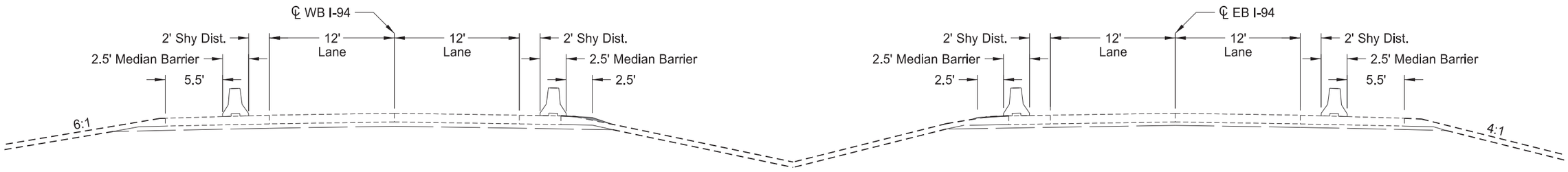
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Docusign Envelope ID: 46BA3E55-5641-45E6-9F1F-33BCB2AC0E6A

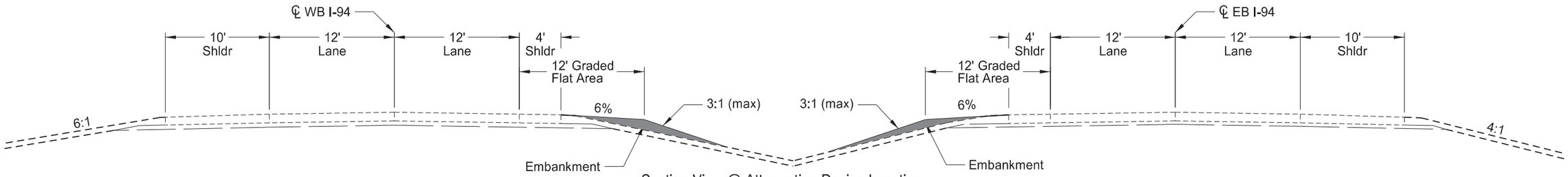
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	100	10



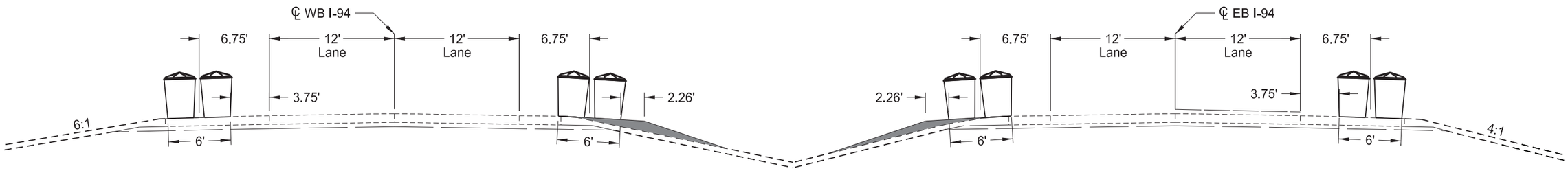
Section View @ Median Barrier Locations
(Median Barriers Not Shown)



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
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PROFESSIONAL
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ENGINEER
NORTH DAKOTA

08/27/25

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

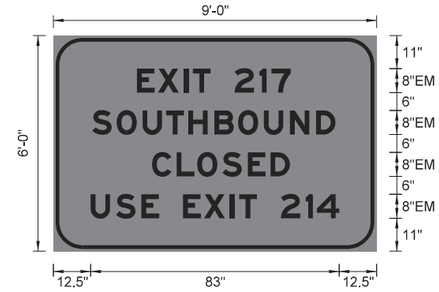
PANEL STYLE: ND_Const_Detour.ssl

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.ssl

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											

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**	

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

Sign Summary
Perforated Tube

Pettibone Interchange

I-94

8/13/24 2:19:41PM

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**	

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
ONE WAY ONE WAY
R6-1R -36
R5-1 -48
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
M5-2R-21
EAST
INTERSTATE NORTH DAKOTA 94
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 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
Sta 446+72-160' Rt
Remove

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

N

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 R2-2P-24 Sign 3

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
M1-1-24 INTERSTATE NORTH DAKOTA 94
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 458+74 Rt
Reset sign from Sta 460+08 Rt
on new support
WEIGHT LIMIT 6 TONS PER AXLE 50,000 LBS MAX

460+00

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

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
M1-1-24 INTERSTATE NORTH DAKOTA 94
M6-1L-21

Sta 454+67 Rt
Remove
WEST
INTERSTATE NORTH DAKOTA 94

Sta 455+68 Rt
Remove

Sta 52+95 Rt
Pettibone 19 Sign 2

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

Sta 457+47 Lt
Remove

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

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

Signing Layout

Pettibone Interchange North

I-94

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

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

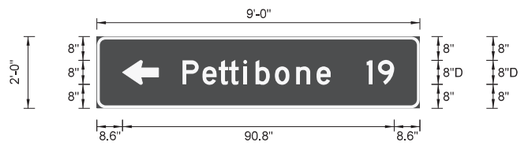
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	110	5

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

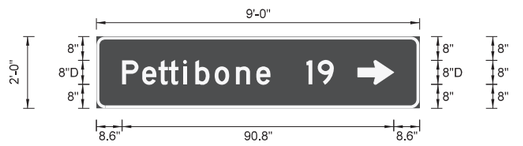
LETTER POSITION (X)																				LENGTH	SIZE	SERIES
P	e	t	t	i	b	o	n	e												49.6	8/6	D 2000
28.6	35.3	40.7	44.2	49	53	59.5	66.6	73.5														
1	9																			9.2	8	D 2000
90.2	93.9																					

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																					

Sign Details

Pettibone Interchange

I-94

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

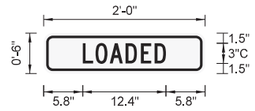
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	110	6

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

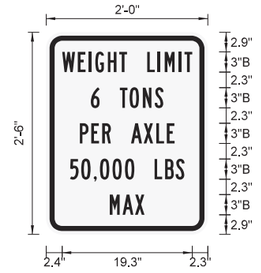
PANEL STYLE: ND_Reg_24_Small.ssl

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																		

Sign Details

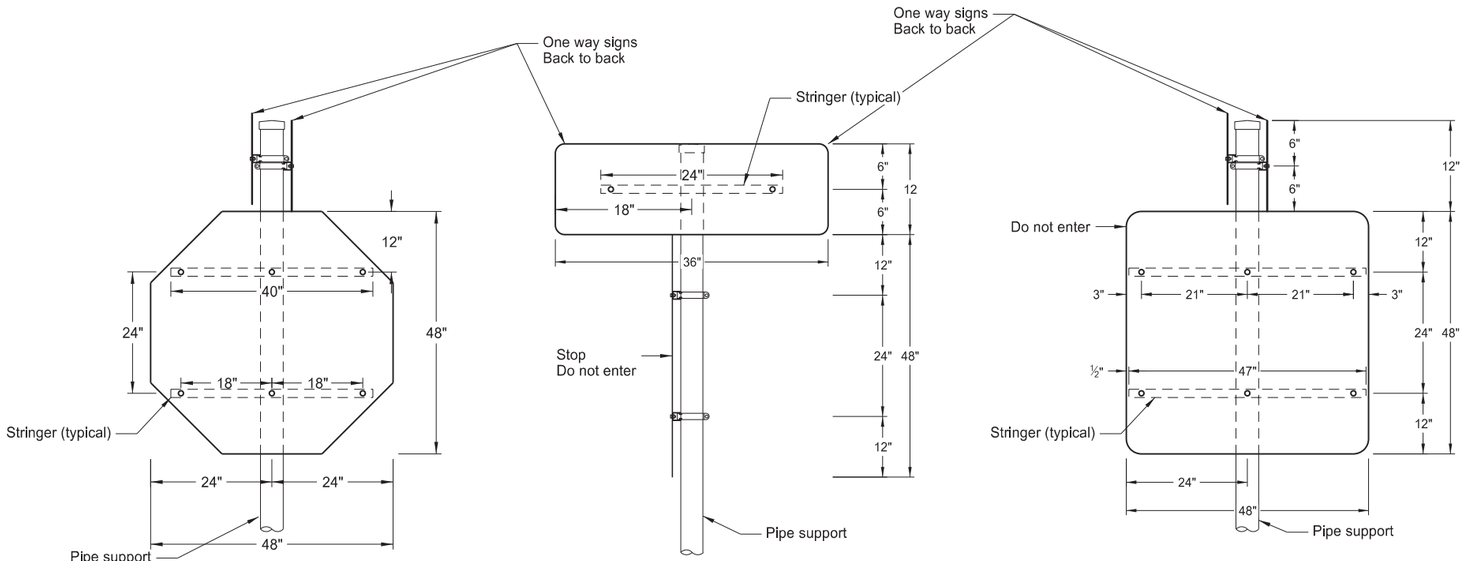
Pettibone Interchange

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)

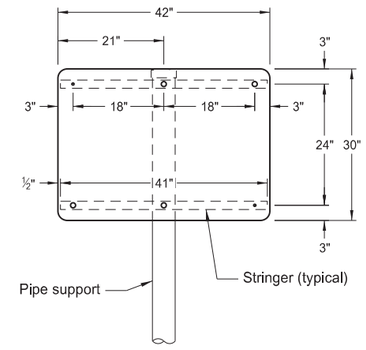
Sta 98+90 Rt

Pay Area: 19 Sq Ft

Special Assembly B
(Round Steel Pipe)

Sta 97+73 Lt

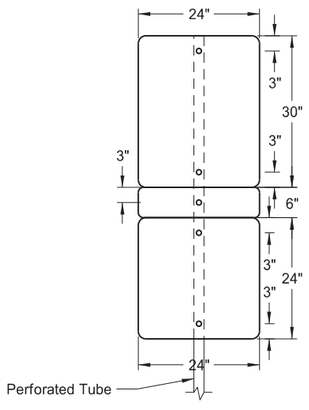
Pay Area: 22 Sq Ft



Special Assembly C
(Round Steel Pipe)

Sta 95+22 Lt

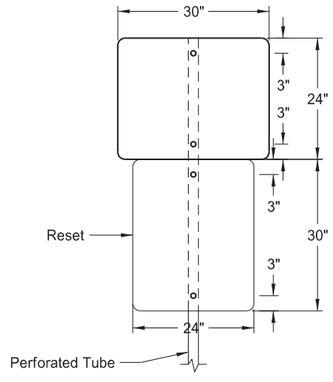
Pay Area: 18 Sq Ft



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

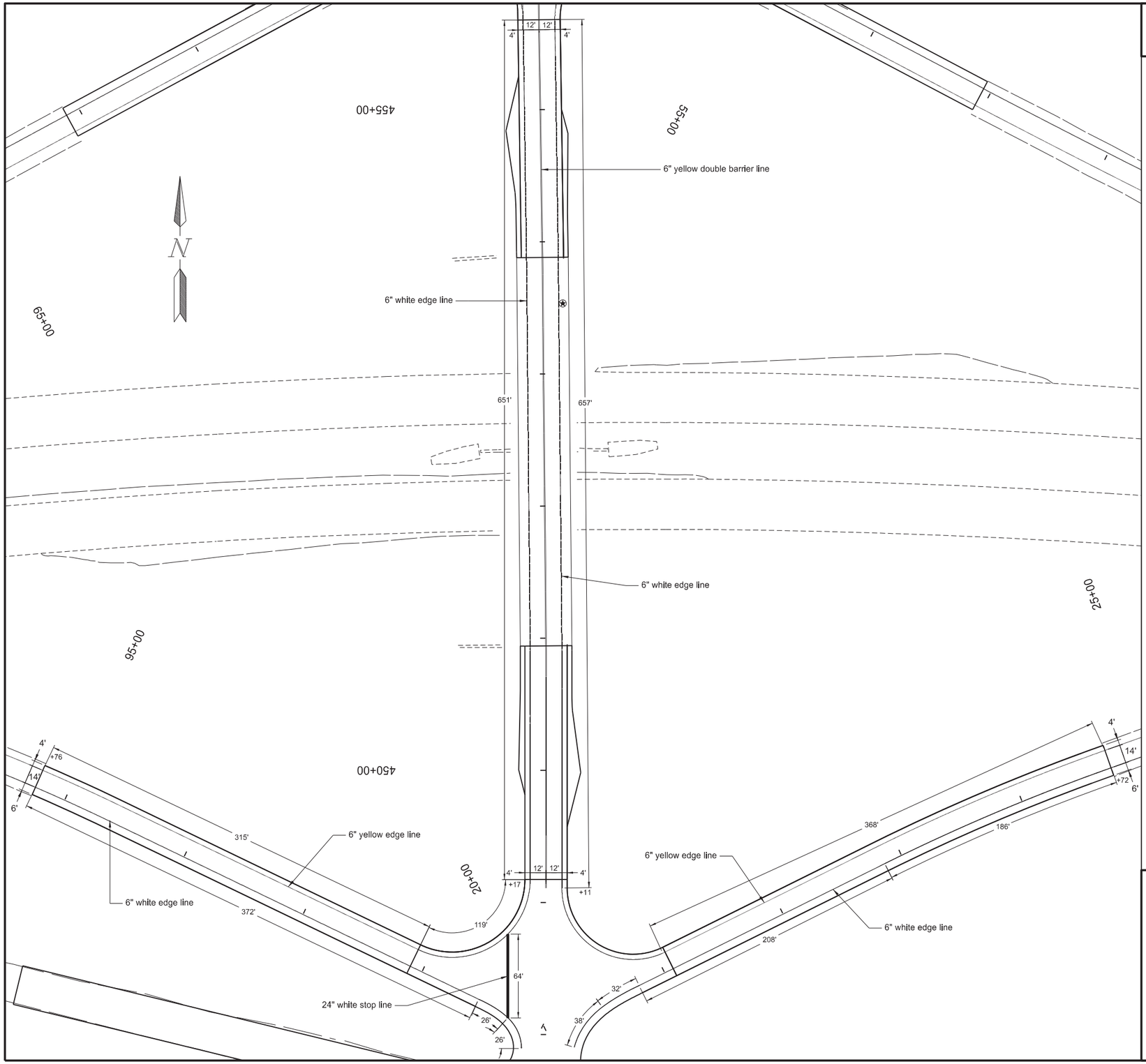
Sign Assemblies

Pettibone Interchange

I-94

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	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

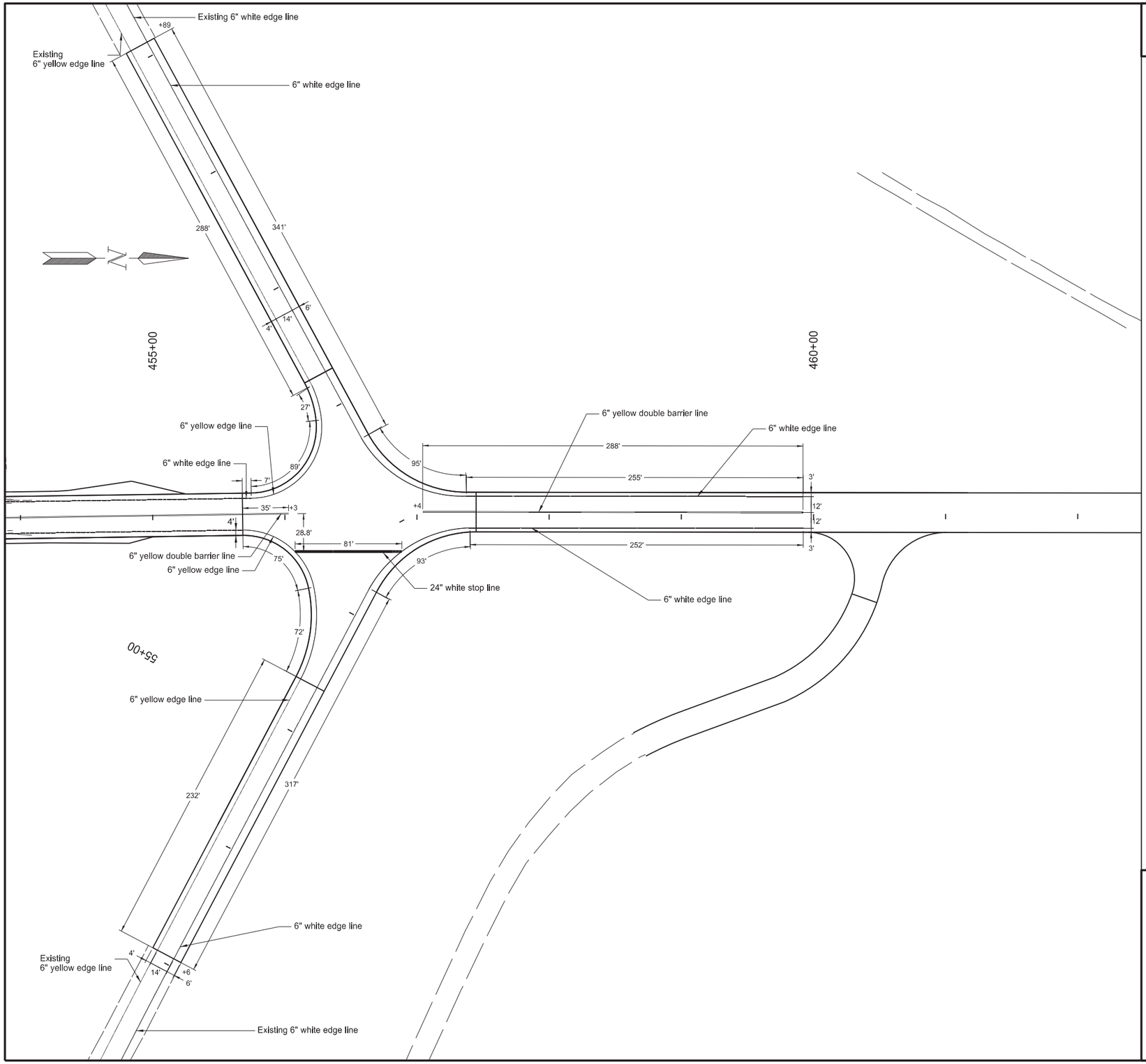
Pettibone Interchange
South & Overpass

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



	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

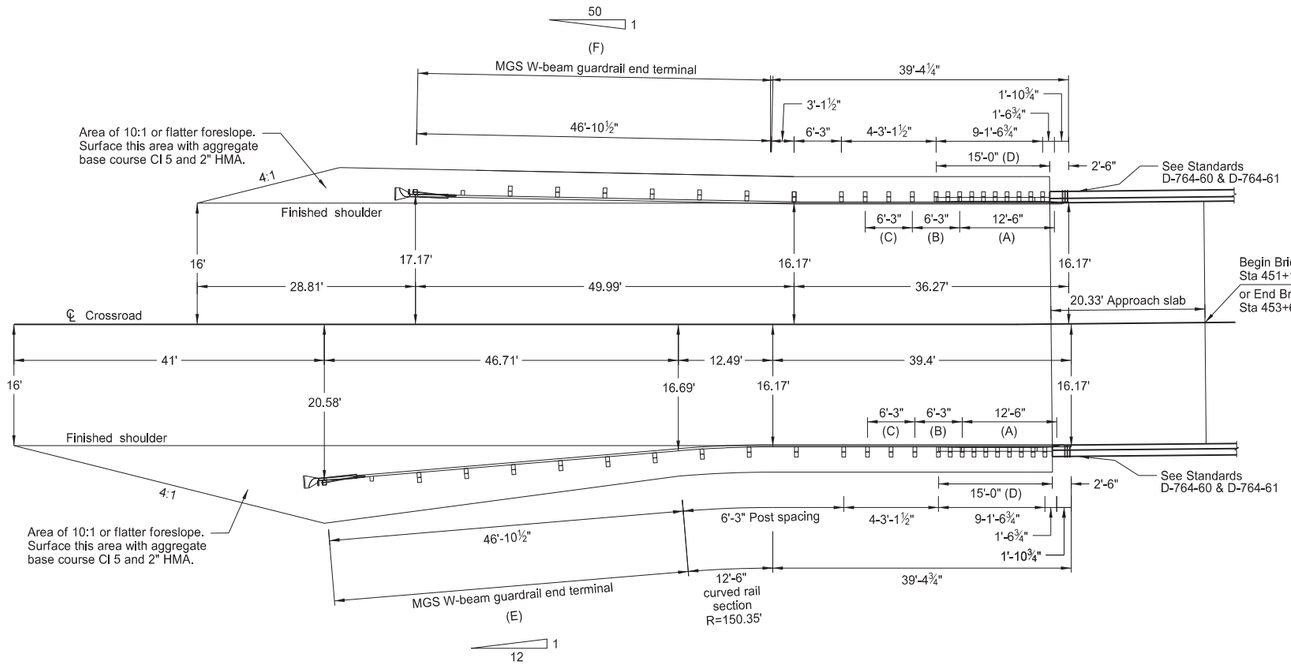
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE
08/29/25
NORTH DAKOTA

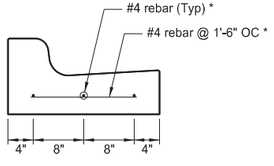
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Docusign Envelope ID: 7C780DC8-9CA1-450F-A030-3512CB44C496

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





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

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

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

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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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	

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Thrie/MGS W-Beam Guardrail Quantities

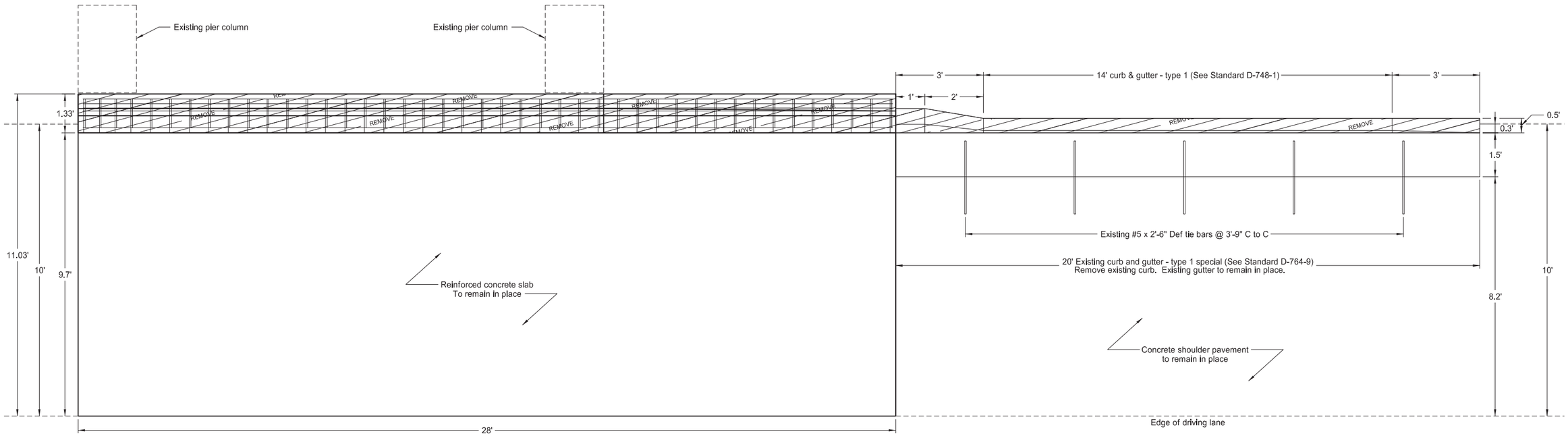
Pettibone Interchange Crossroad
RP 217.146

I-94

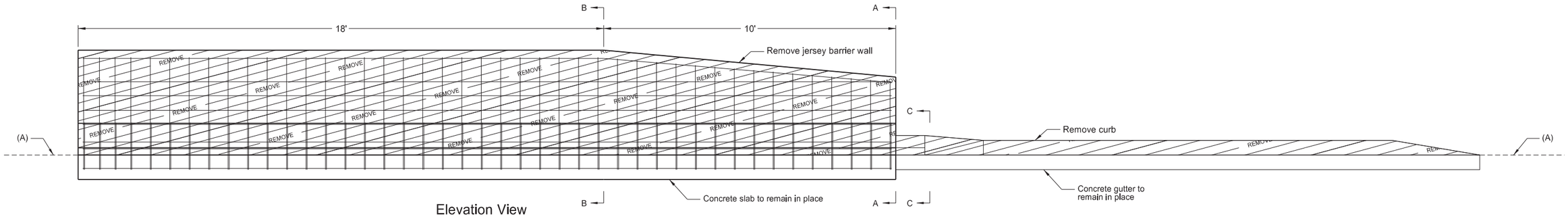
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Plan View

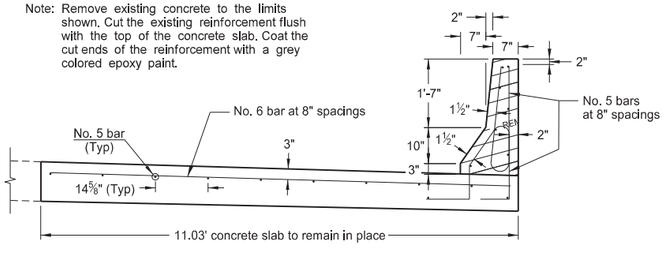


Elevation View

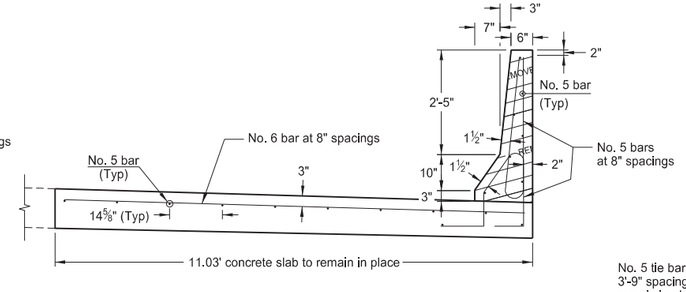
Facing South for Eastbound Roadway
Facing North for Westbound Roadway

(A) Finished shoulder

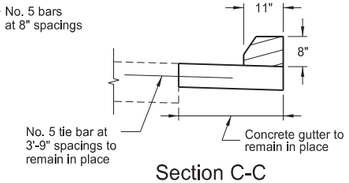
Note: Remove existing concrete to the limits shown. Cut the existing reinforcement flush with the top of the concrete slab. Coat the cut ends of the reinforcement with a grey colored epoxy paint.



Section A-A



Section B-B



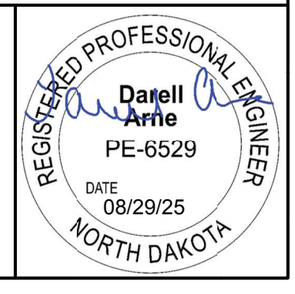
Section C-C

Removal of Concrete

Outside Pier Protection

Pettibone Interchange
RP 217.146

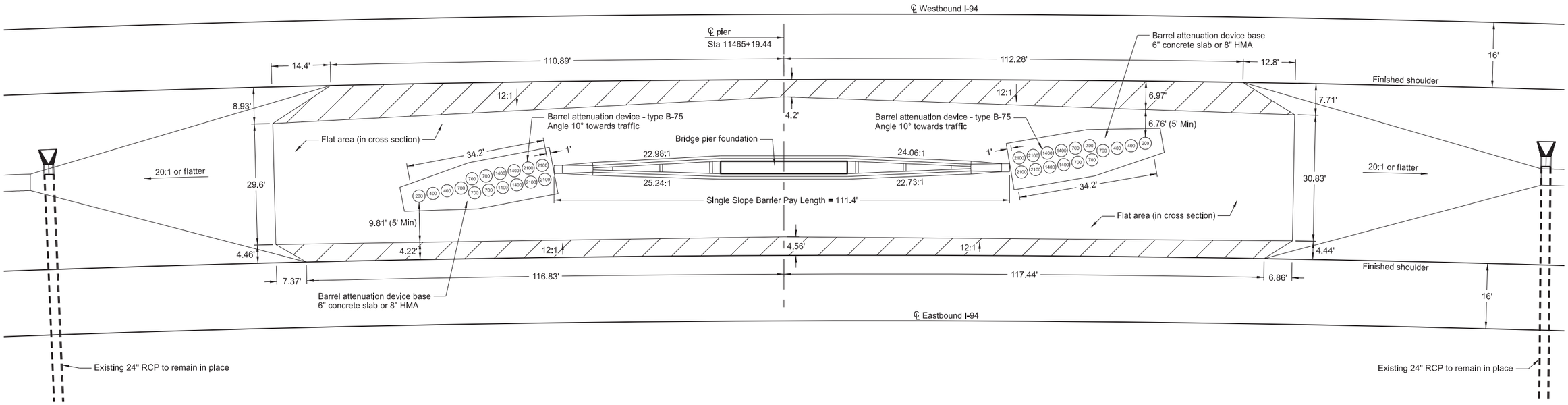
Eastbound and Westbound I-94



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

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

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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

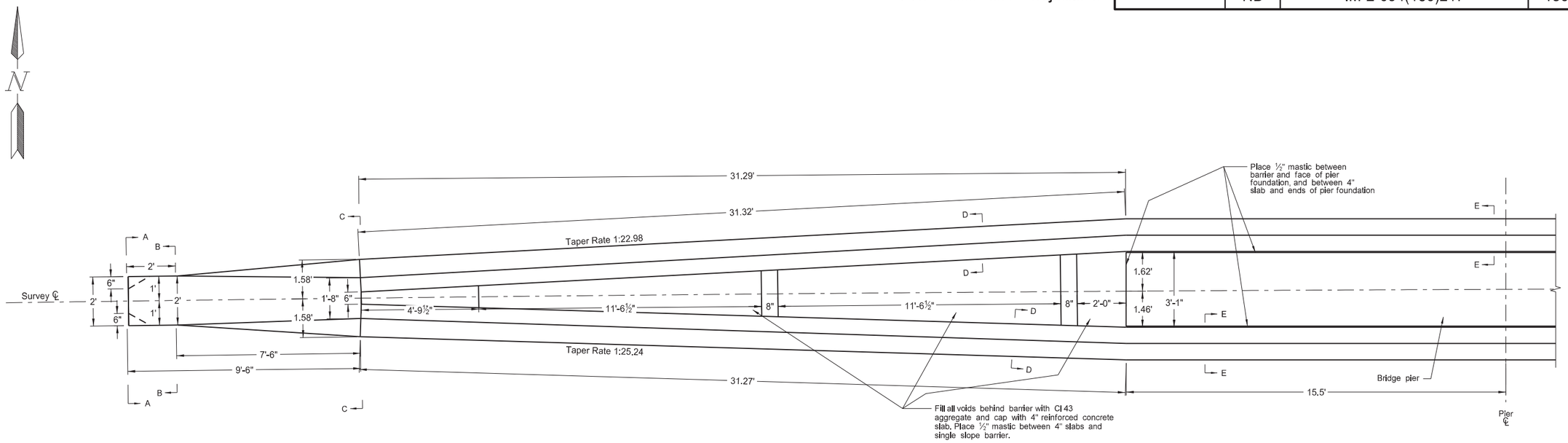
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

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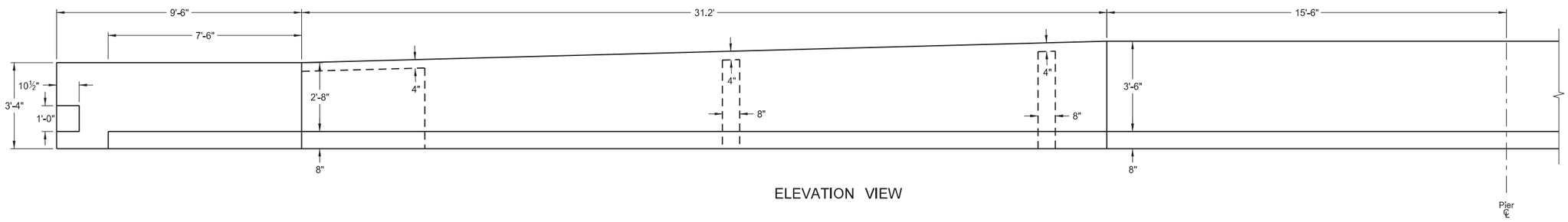
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

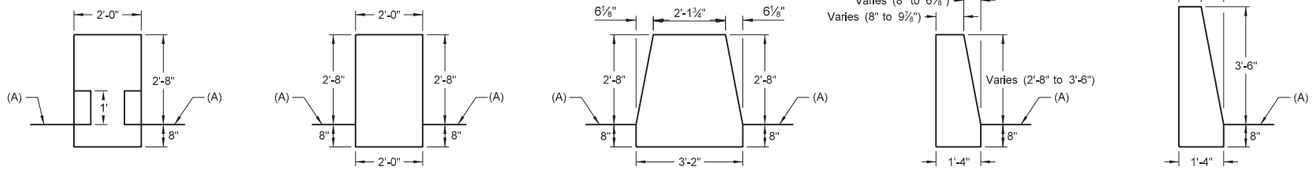
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	130	5



PLAN VIEW



ELEVATION VIEW



(A) Finished surface

Single Slope Barrier Details

Median Pier Protection

Pettibone Interchange
RP 217.146

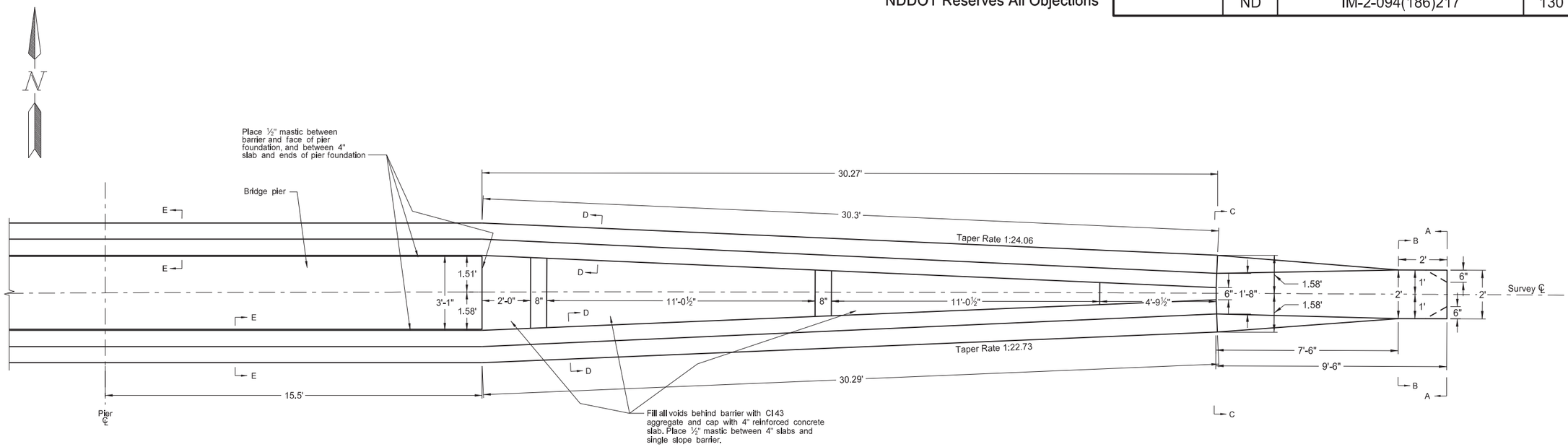
I-94

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DATE 08/29/25
NORTH DAKOTA

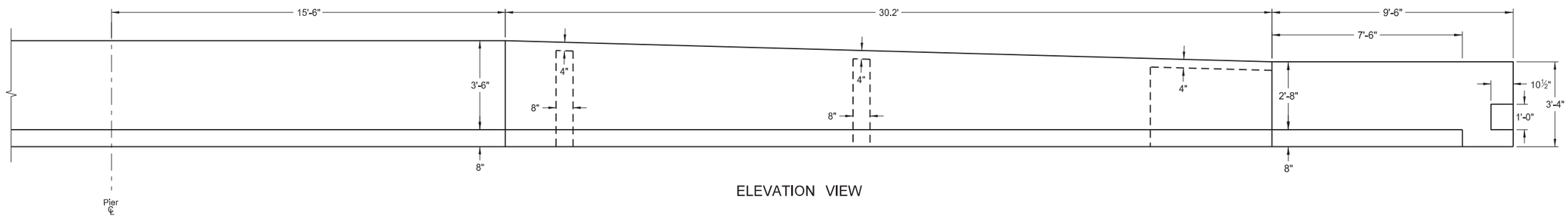
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

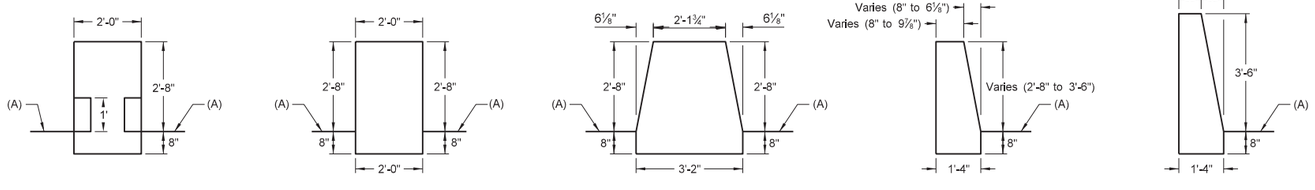
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	130	6



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

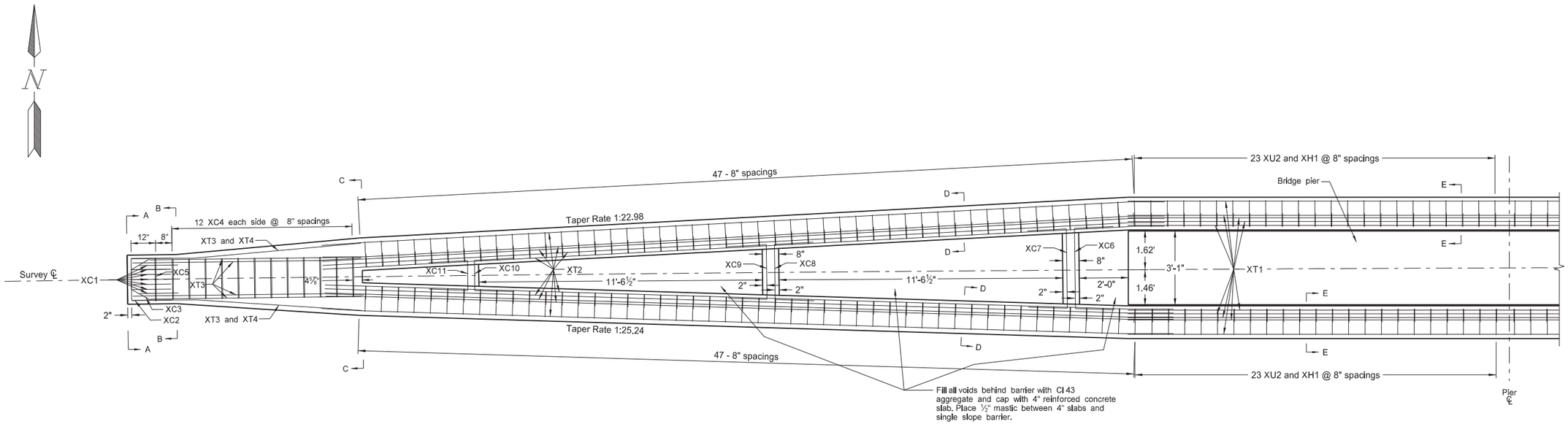
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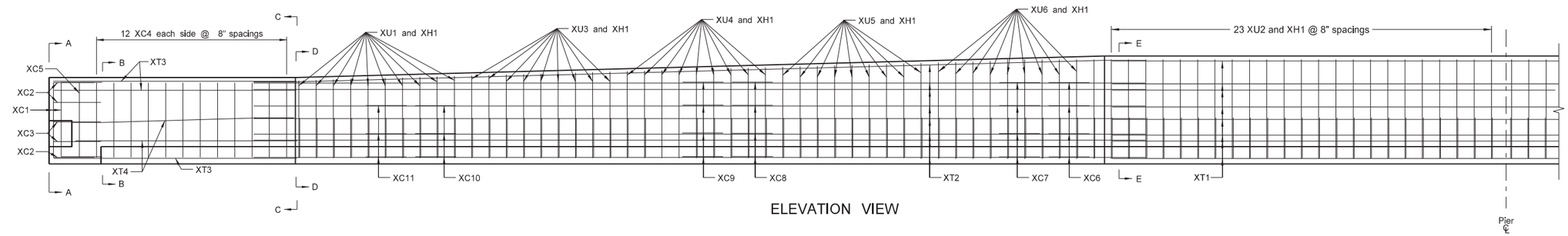
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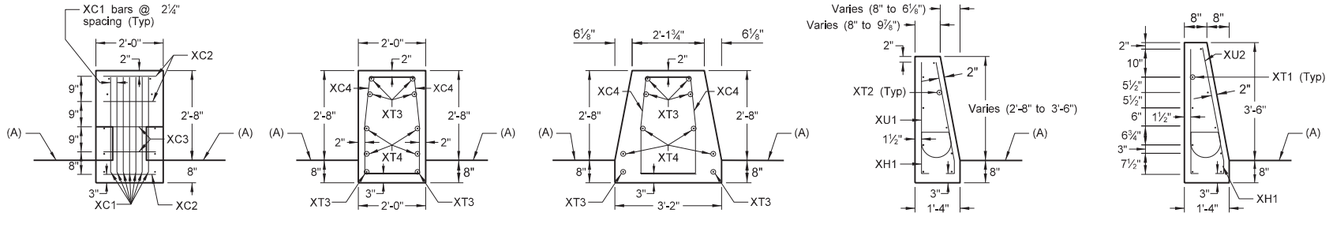
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	130	7



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
Reinforcing Steel Layout

Median Pier Protection

Pettibone Interchange
RP 217.146

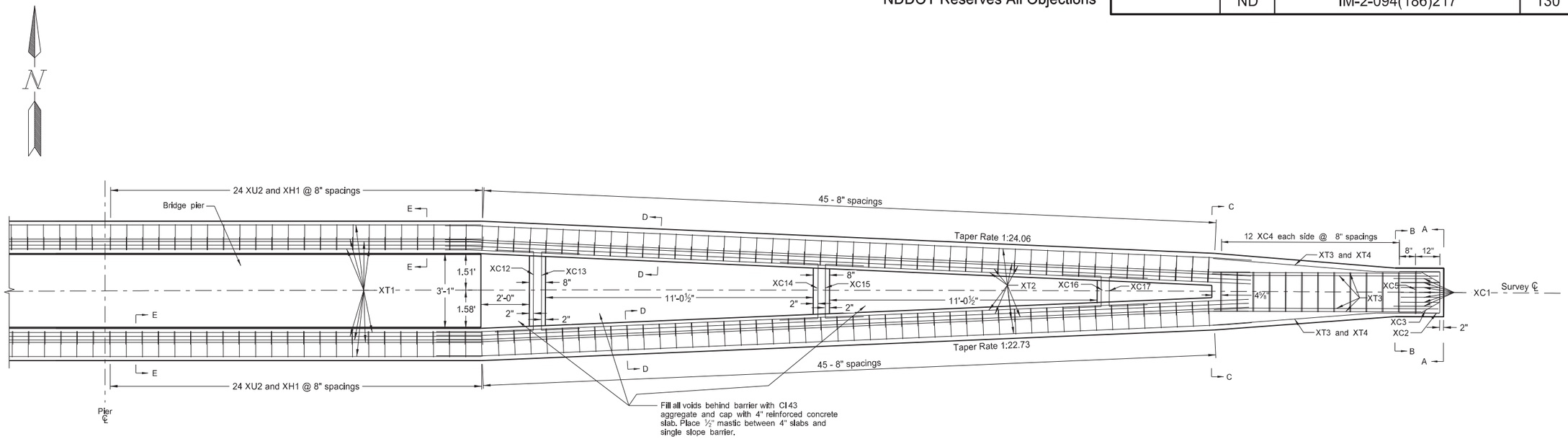
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Darell Arne
PE-6529
DATE 08/29/25
NORTH DAKOTA

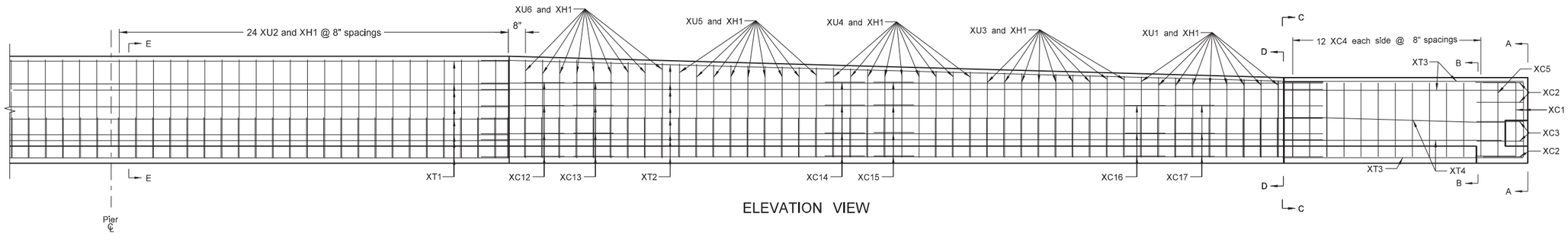
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23 U.S.C. § 407 Documents
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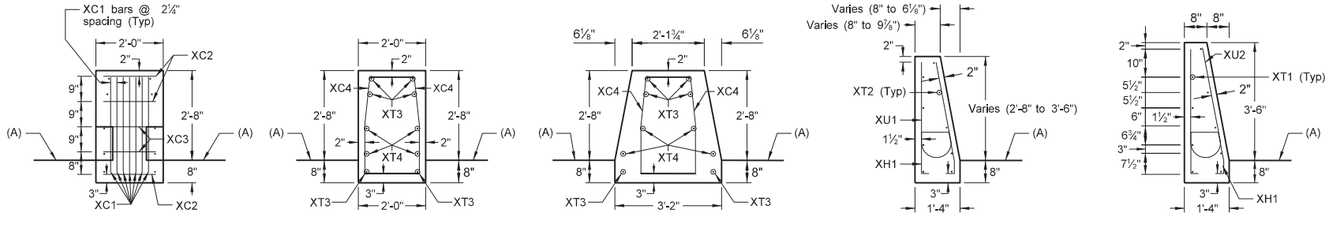
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	130	8



PLAN VIEW



ELEVATION VIEW



Single Slope Barrier Details
Reinforcing Steel Layout

Median Pier Protection

Pettibone Interchange
RP 217.146

I-94

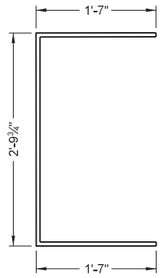
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PE-6529
DATE 08/29/25
NORTH DAKOTA

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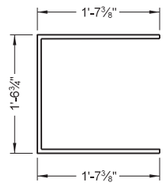
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23 U.S.C. § 407 Documents
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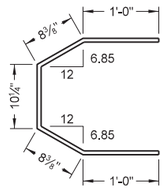
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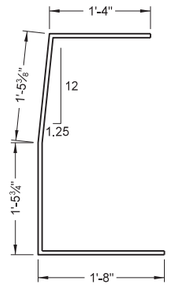
XC1



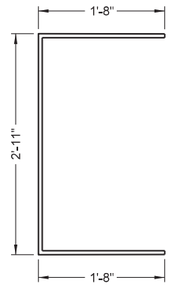
XC2



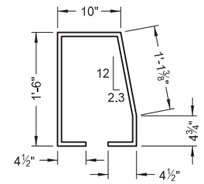
XC3



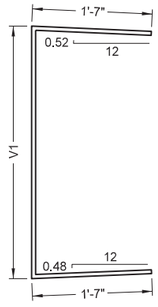
XC4



XC5

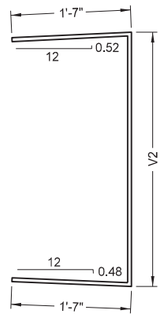


XH1



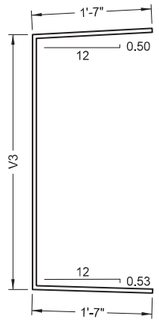
XC7, XC9, XC11

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



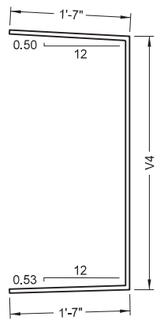
XC6, XC8, XC10

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



XC12, XC14, XC16

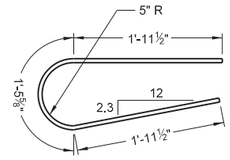
XC12, XC14, XC16	
MARK	V3 DIMENSION
XC12	3'-4¼"
XC14	2'-4¼"
XC16	1'-4⅜"



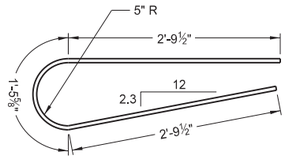
XC13, XC15, XC17

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

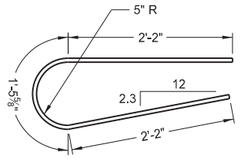
BENT BAR DETAILS



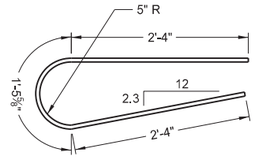
XU1



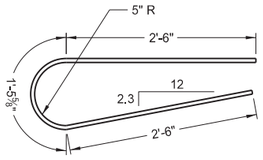
XU2



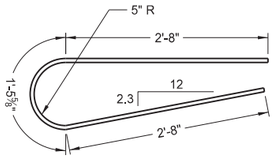
XU3



XU4



XU5

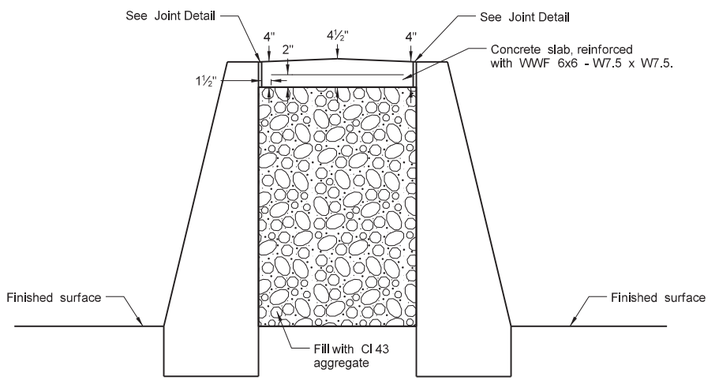


XU6

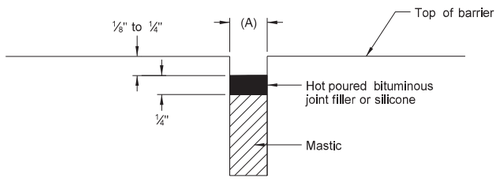
BAR LIST				
MARK	SIZE	NO.	LENGTH	SHAPE
XC1	6	14	5'-11¾"	BENT
XC2	5	6	4'-9½"	BENT
XC3	5	4	4'-3"	BENT
XC4	5	48	5'-11⅛"	BENT
XC5	5	4	6'-3"	BENT
XC6	5	4	6'-6⅜"	BENT
XC7	5	4	6'-6⅛"	BENT
XC8	5	4	5'-6¼"	BENT
XC9	5	4	5'-6"	BENT
XC10	5	3	4'-6⅛"	BENT
XC11	5	3	4'-5⅞"	BENT
XC12	5	4	6'-6¼"	BENT
XC13	5	4	6'-6"	BENT
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

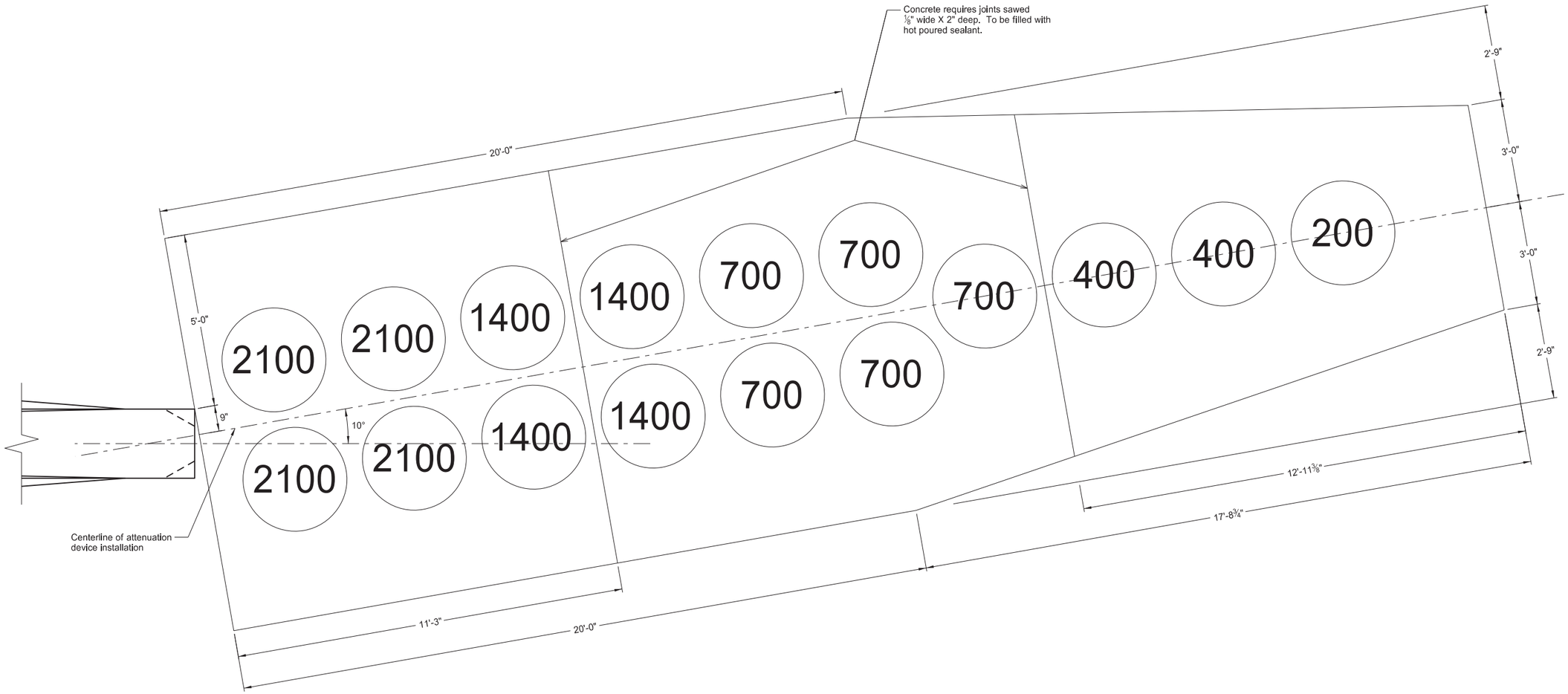
I-94

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

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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

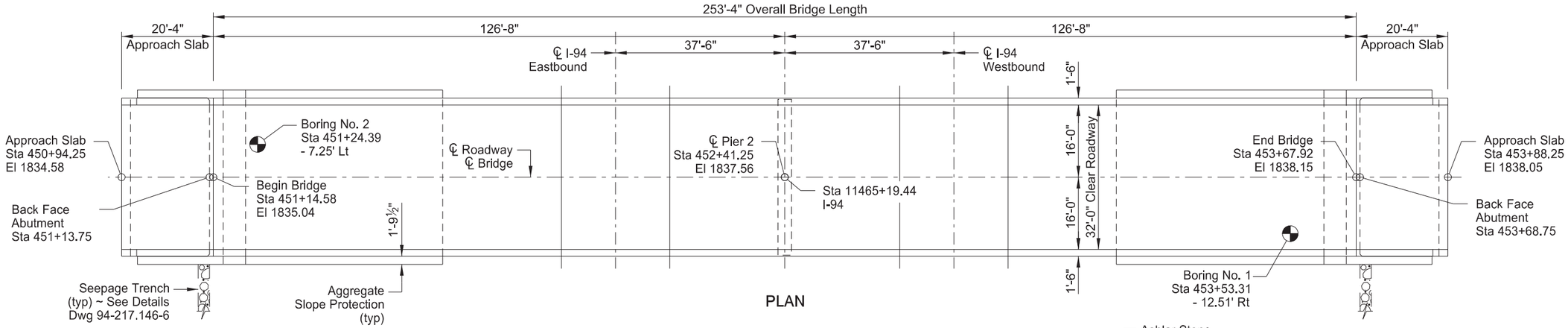
I-94

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

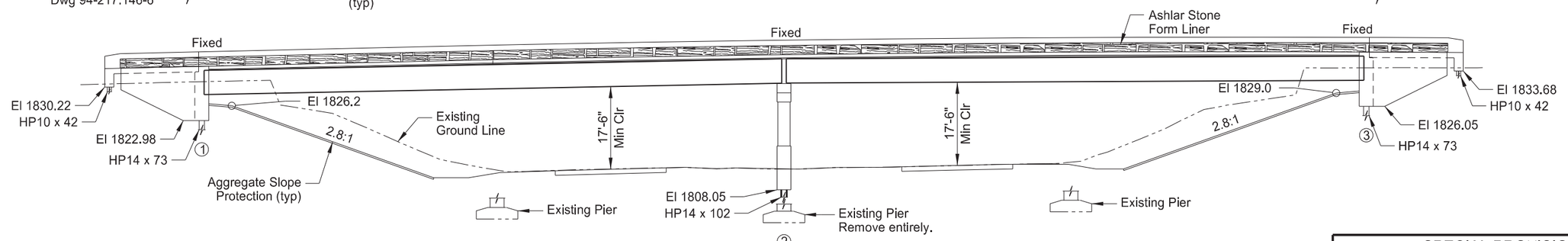
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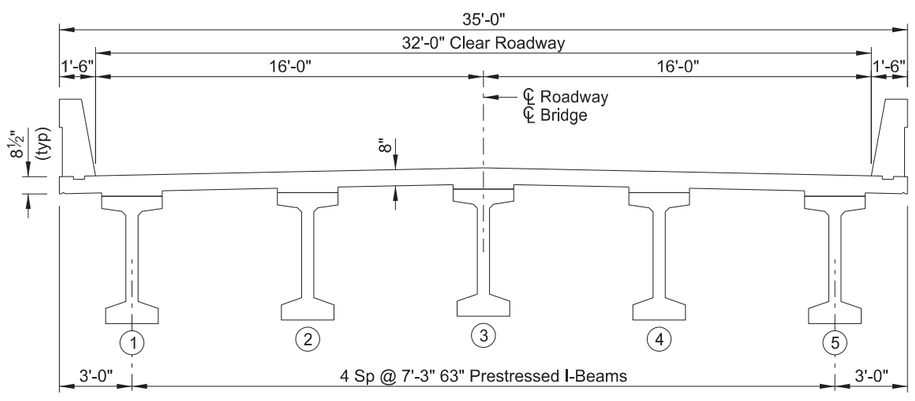
BRIDGE CODE		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
X781		ND	IM-2-094(186)217	170	1



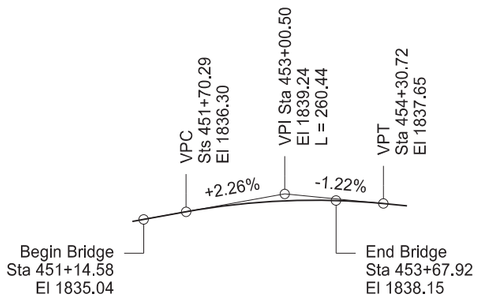
PLAN



ELEVATION



TYPICAL SECTION



VERTICAL CURVE DATA

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

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

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 10/20/26
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
10/20/26

DRAWING NO. 94-217.146-1

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23 U.S.C. § 407 Documents
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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.



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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 Minimum Operating Energy = 32,000 foot-pounds
Abutment Piling:	Minimum Ram Weight = 5,500 lbs Minimum Operating Energy = 53,000 foot-pounds
Pier Piling:	Minimum Ram Weight = 6,500 lbs 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.

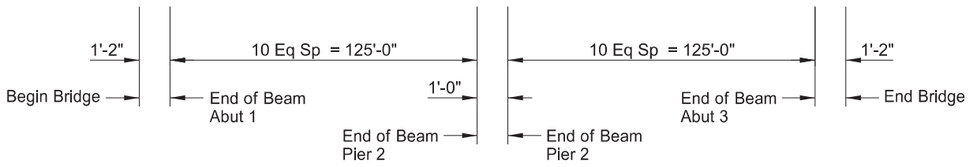


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23 U.S.C. § 407 Documents
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	CL BEAM 1	CL BEAM 2	CL BEAM 3	CL BEAM 4	CL BEAM 5
	1834.74	1834.89	1835.04	1834.89	1834.74
	1834.76	1834.92	1835.07	1834.92	1834.76
	1835.10	1835.25	1835.40	1835.25	1835.10
	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
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	1837.85	1838.00	1838.15	1838.00	1837.85

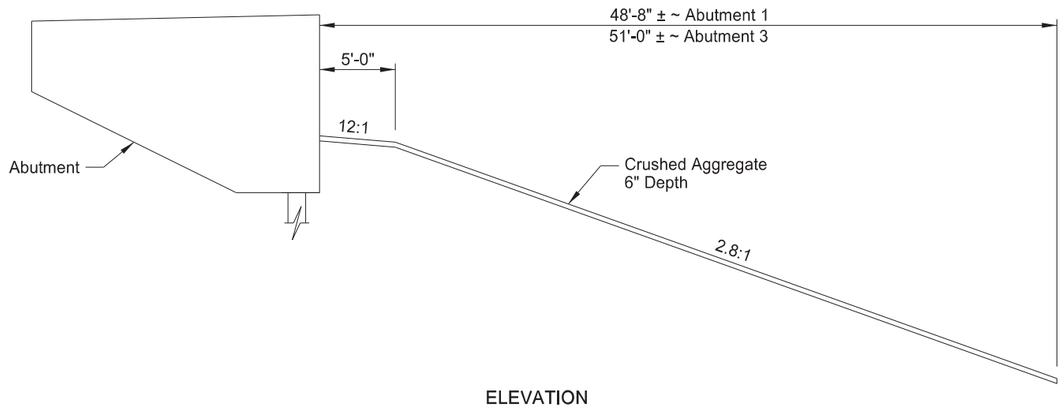


Beam 1 is the west beam.

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

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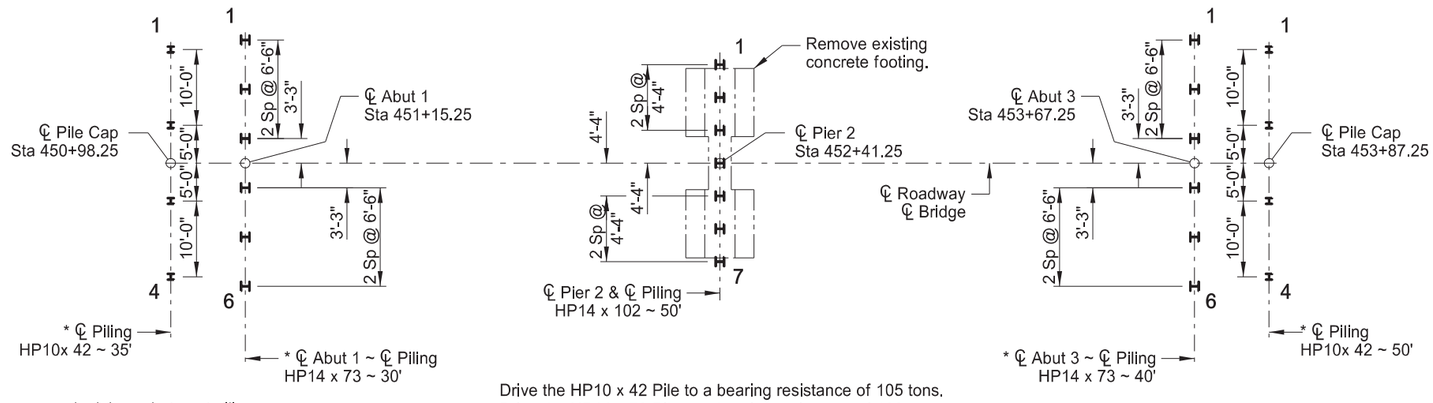
SCREED ELEVATIONS, BID ITEM QUANTITIES & SLOPE PROTECTION DETAIL

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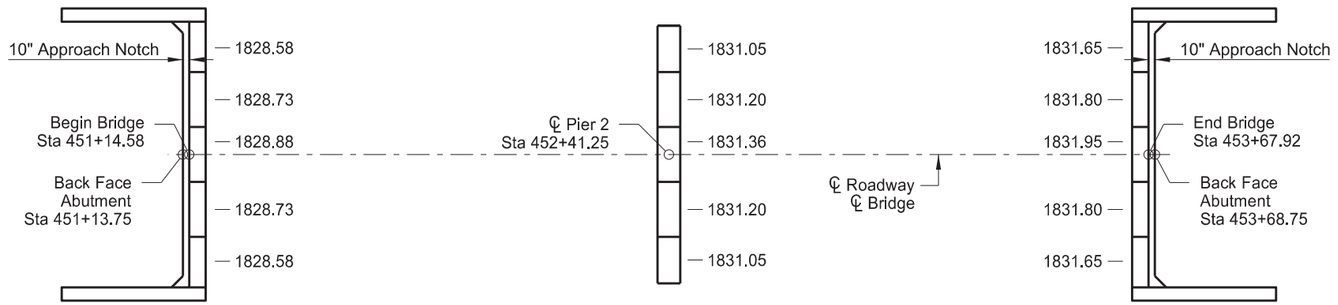
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* Do not drive approach slab or abutment piling until all constructed embankment is in place.

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
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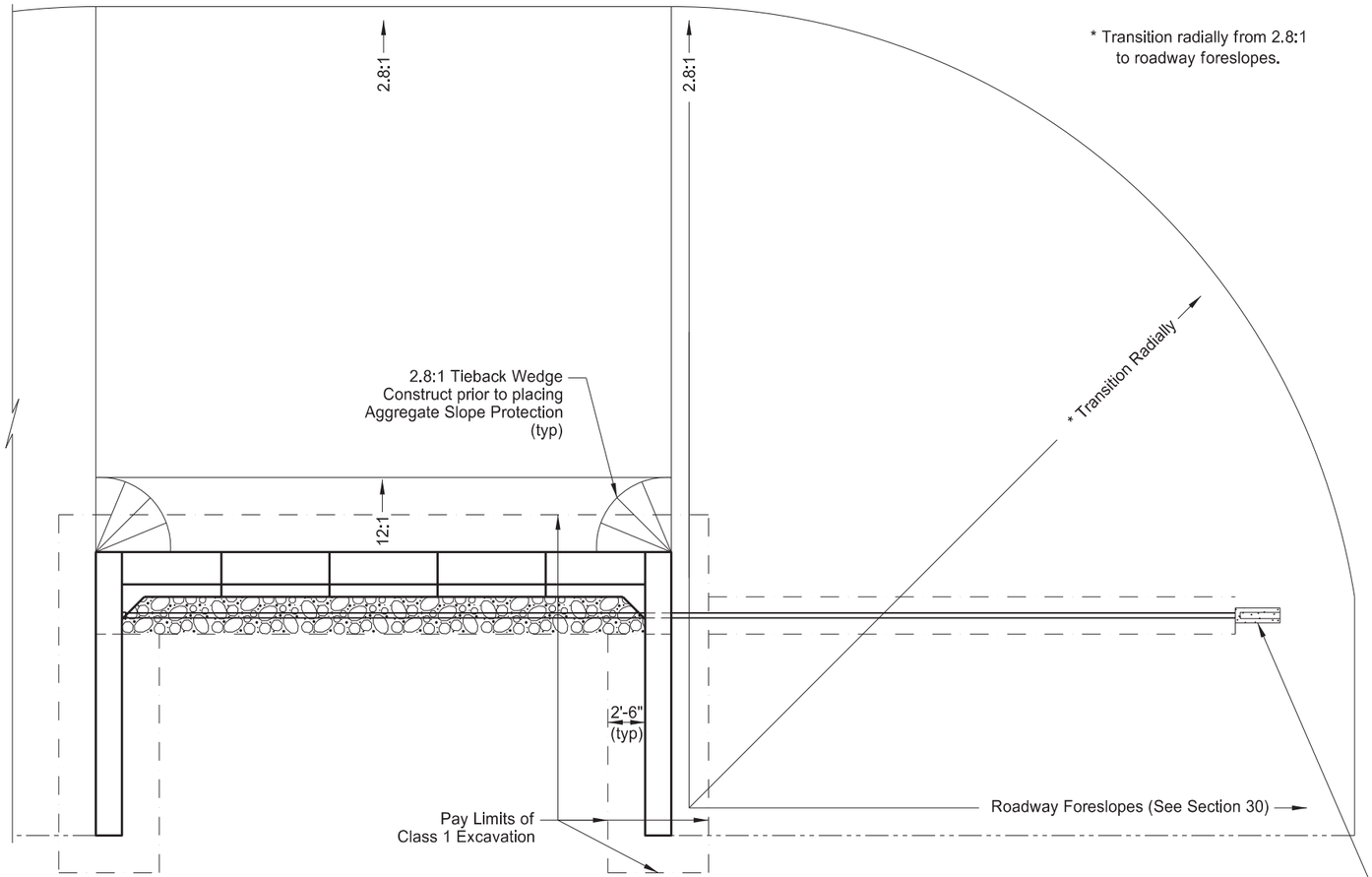
PILING LAYOUT &
BEARING ELEVATIONS

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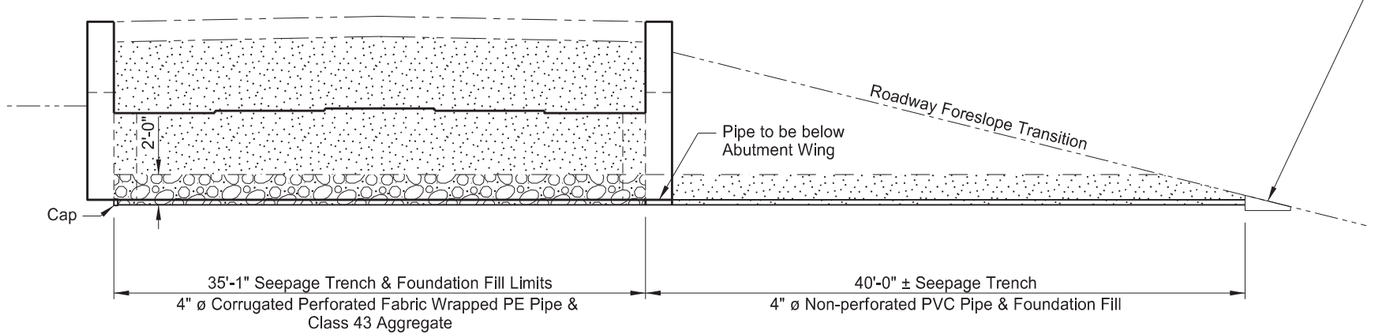
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ABUTMENT PLAN

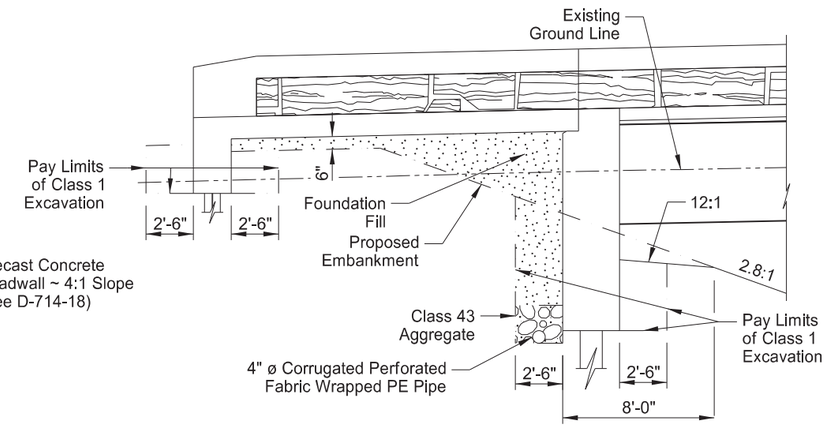


BACK FACE OF ABUTMENT

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

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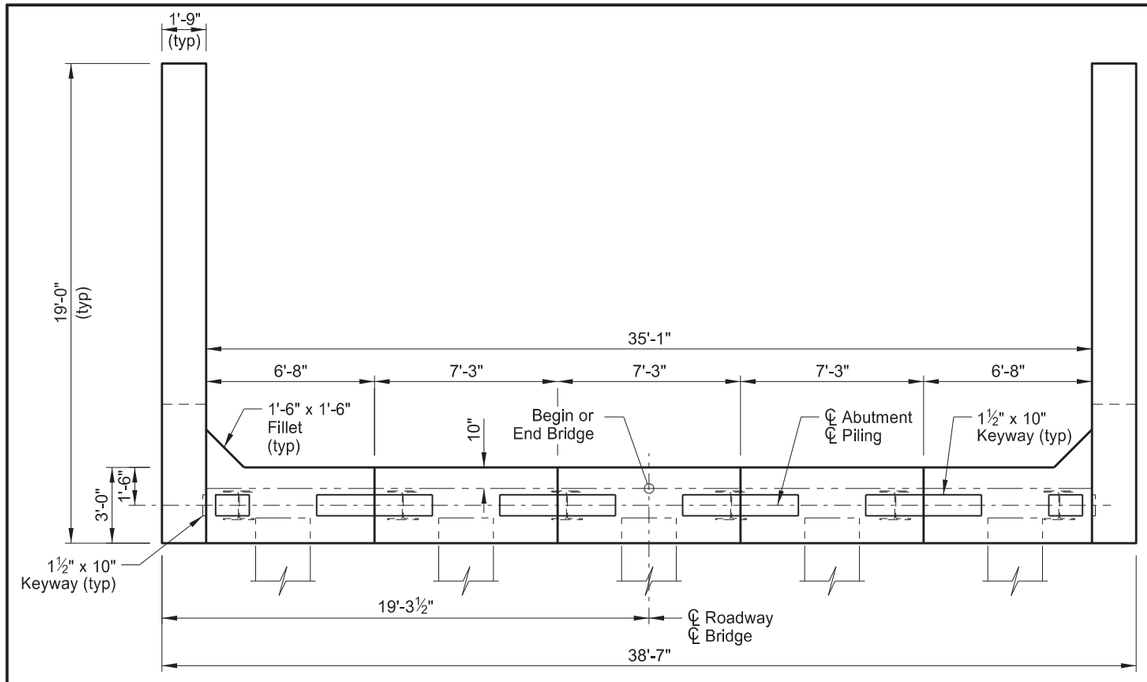
ABUTMENT UNDERDRAIN & EXCAVATION DETAILS

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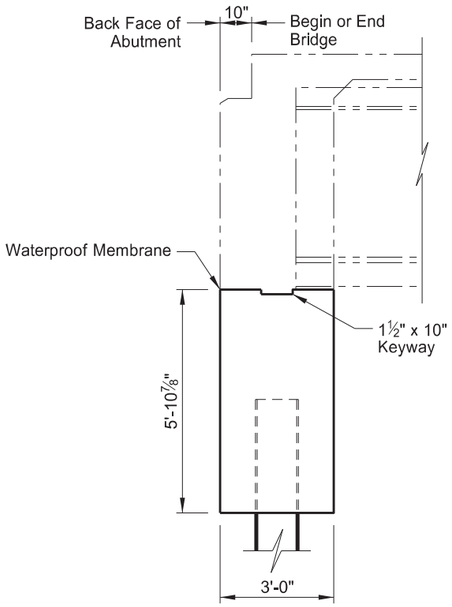
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23 U.S.C. § 407 Documents
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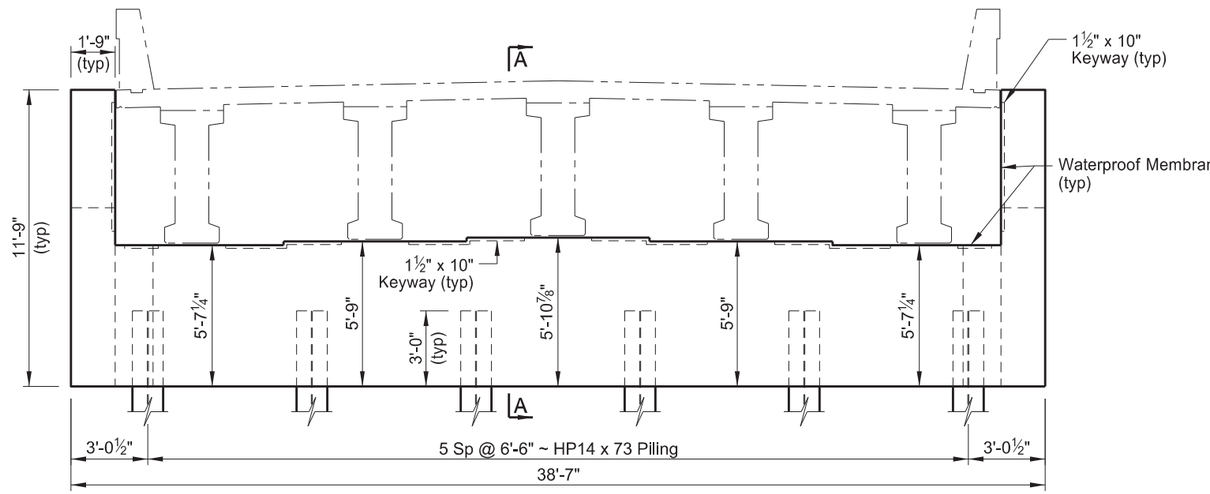
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	7



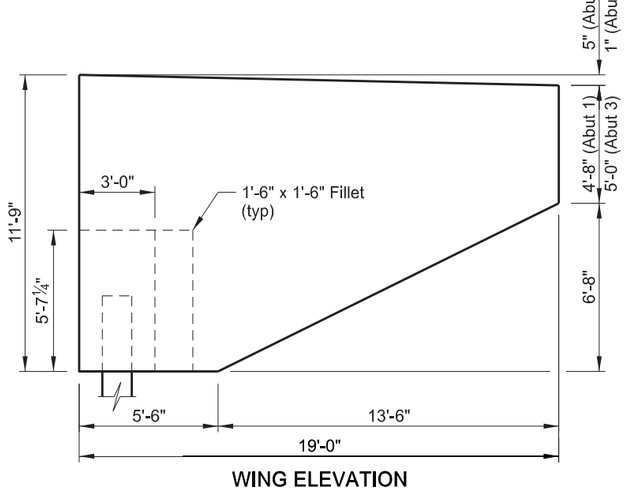
PLAN



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.

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PE-8211
DATE 10/20/26
NORTH DAKOTA

QUANTITIES

SEE DWG 94-217.146-9

I-94/PETTIBONE INTERCHANGE

(SHOWING DIMENSIONS)

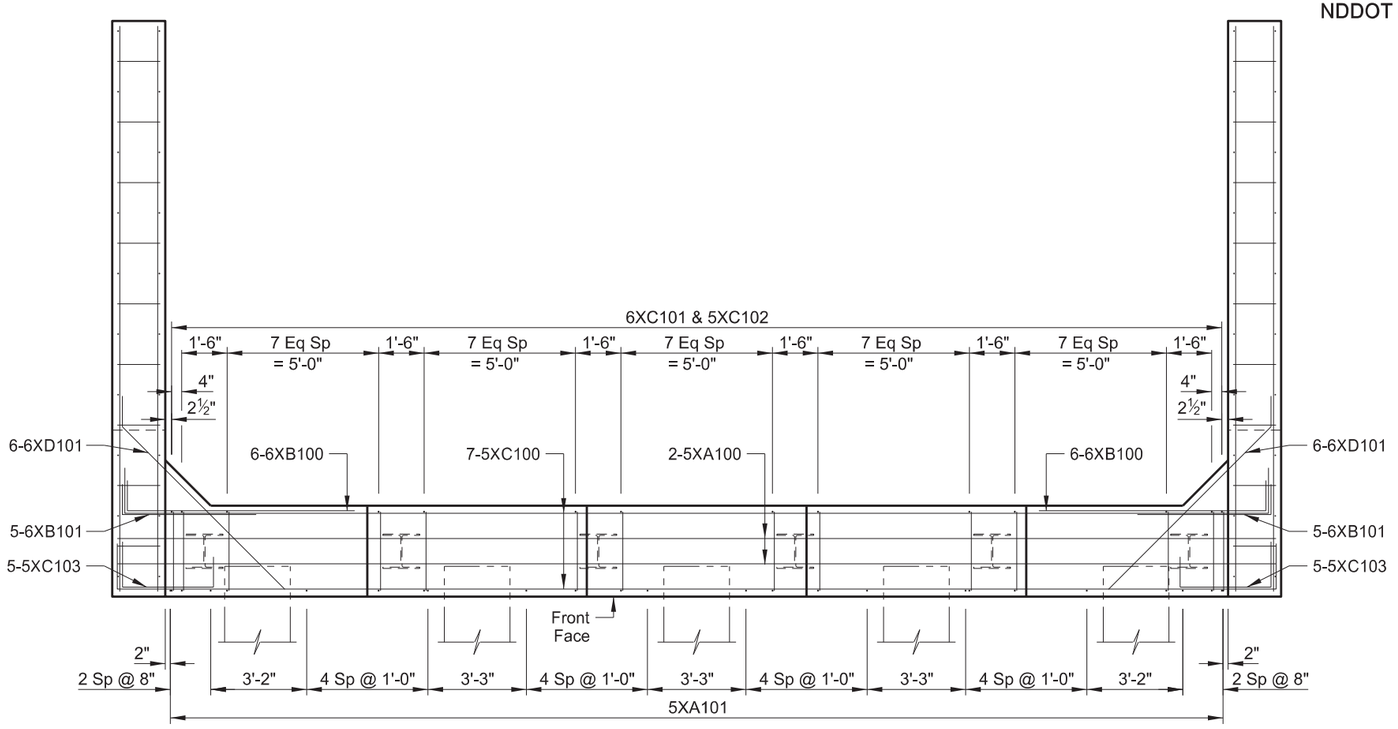
ABUTMENT DETAILS

DRAWING NO. 94-217.146-7

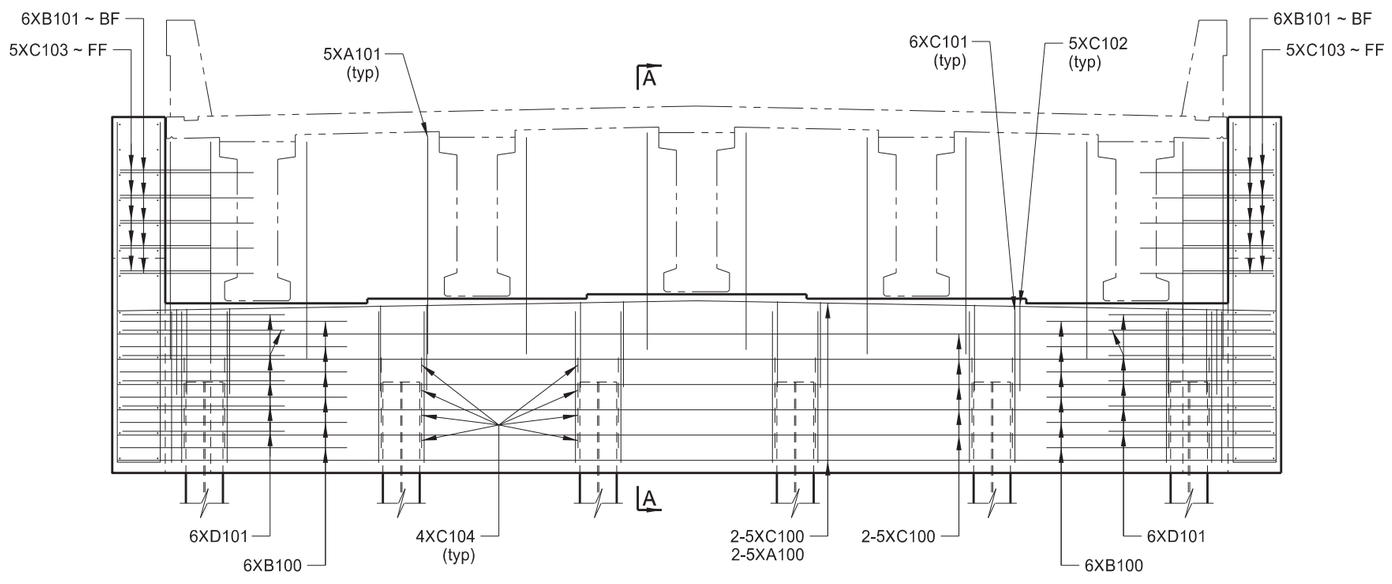
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

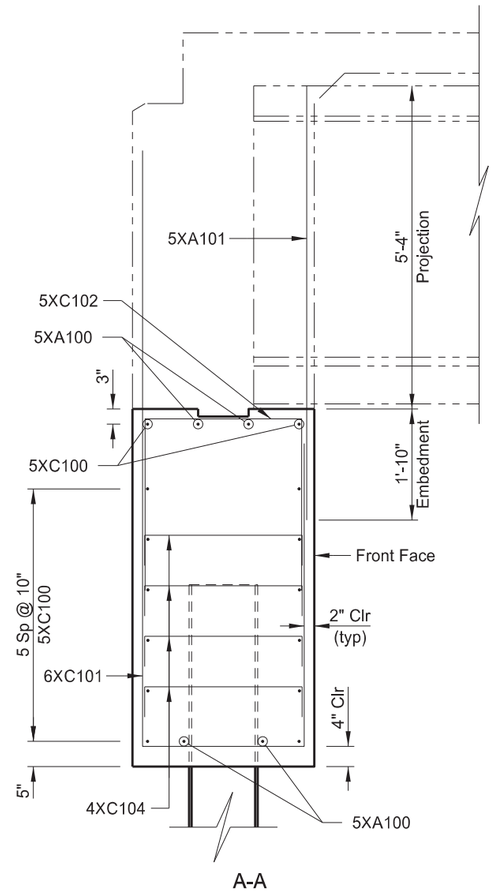
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	8



PLAN



ELEVATION



A-A

NOTES:

See Dwg 94-217.149-9
for Wingwall Reinforcement.

NOMECLATURE:

FF = Front Face
BF = Back Face



QUANTITIES

SEE DWG 94-217.146-9

I-94/PETTIBONE INTERCHANGE

(SHOWING REINFORCING)

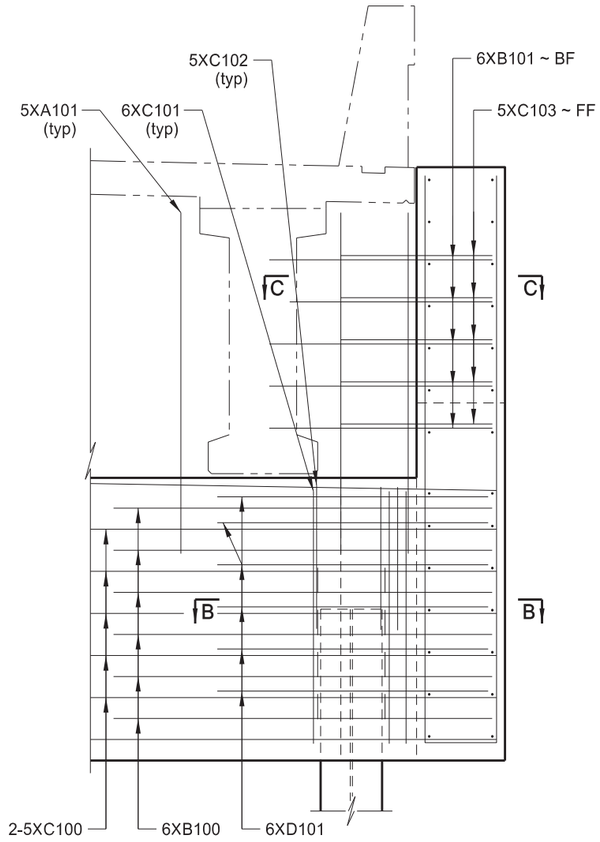
ABUTMENT DETAILS

DRAWING NO.	94-217.146-8

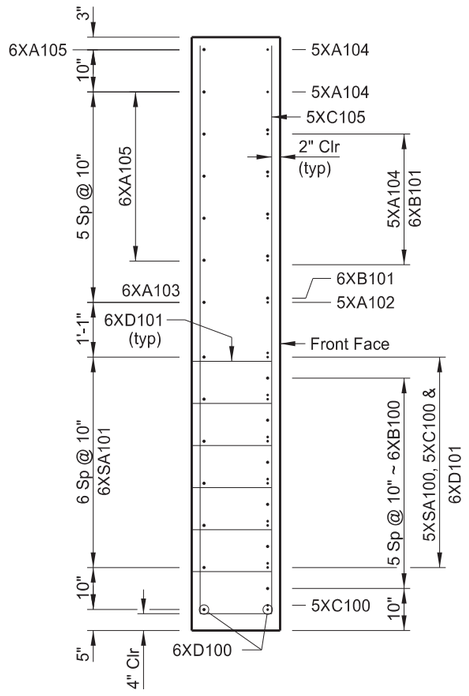
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

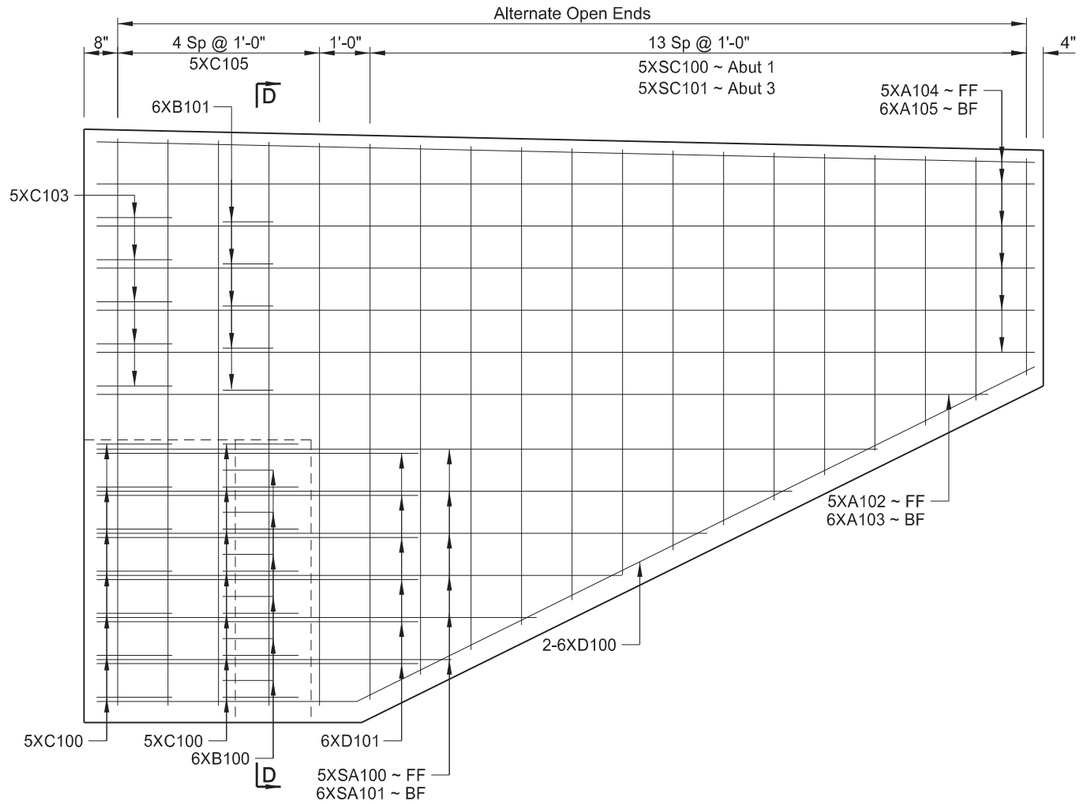
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	9



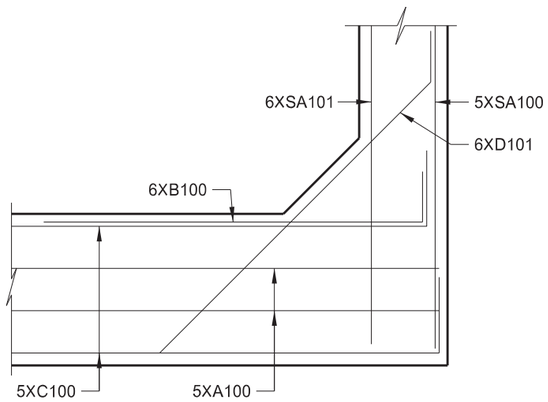
PARTIAL ELEVATION



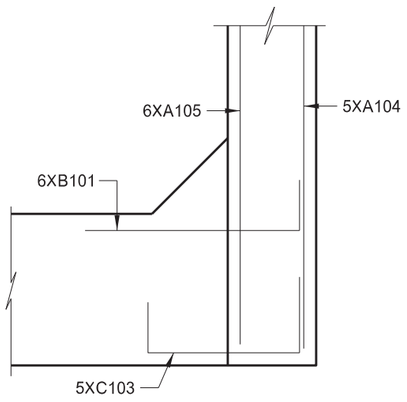
D-D



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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PE-8211
DATE 10/20/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

(SHOWING REINFORCING)

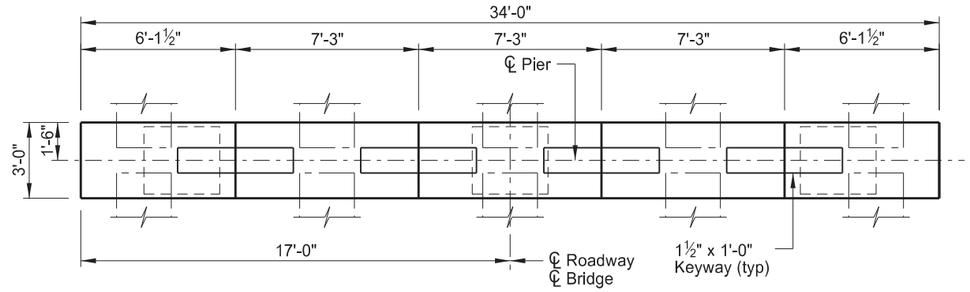
ABUTMENT DETAILS

DRAWING NO. 94-217.146-9

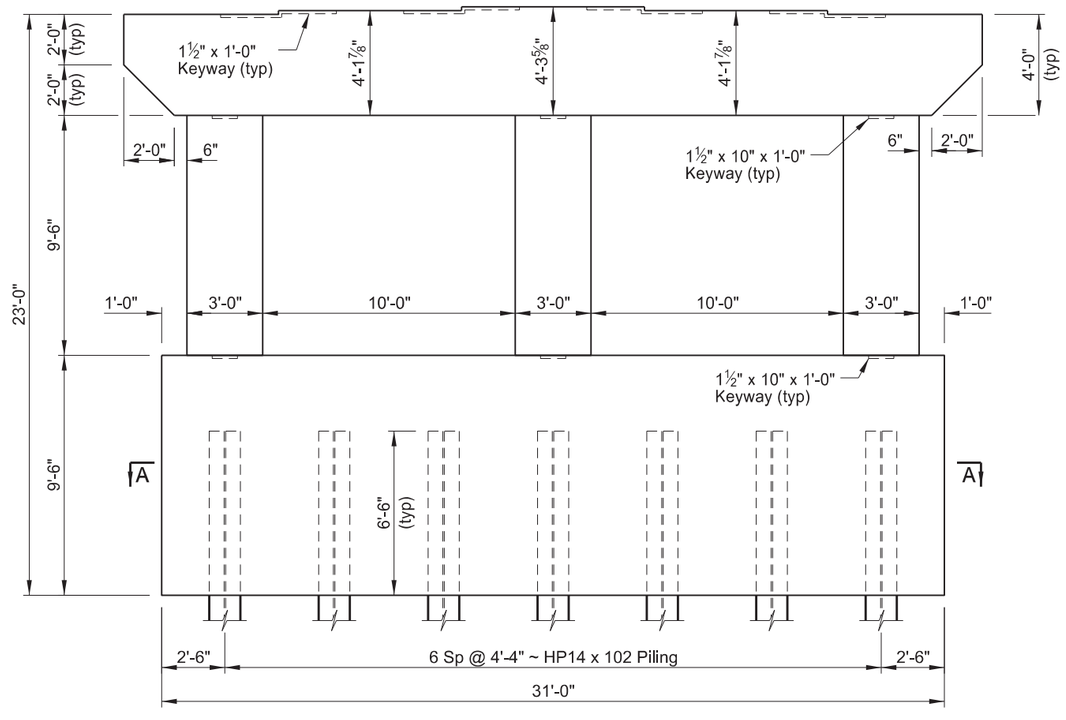
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23 U.S.C. § 407 Documents
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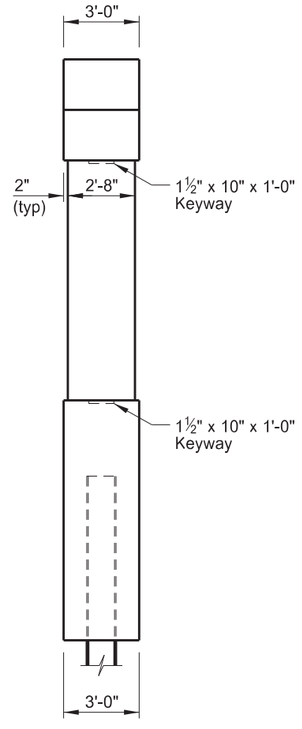
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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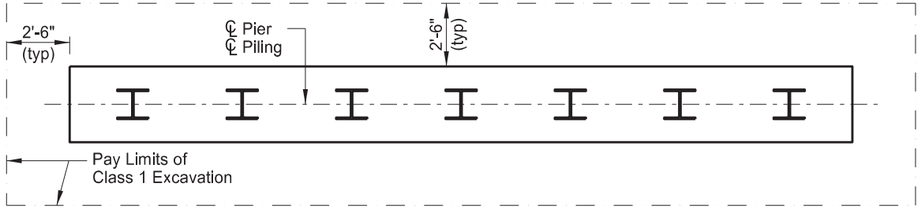
PLAN



ELEVATION



END VIEW



A-A

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

QUANTITIES

SEE DWG 94-217.146-11

I-94/PETTIBONE INTERCHANGE

(SHOWING DIMENSIONS)

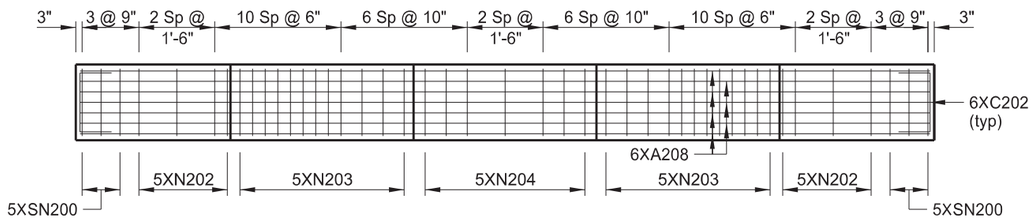
PIER DETAILS

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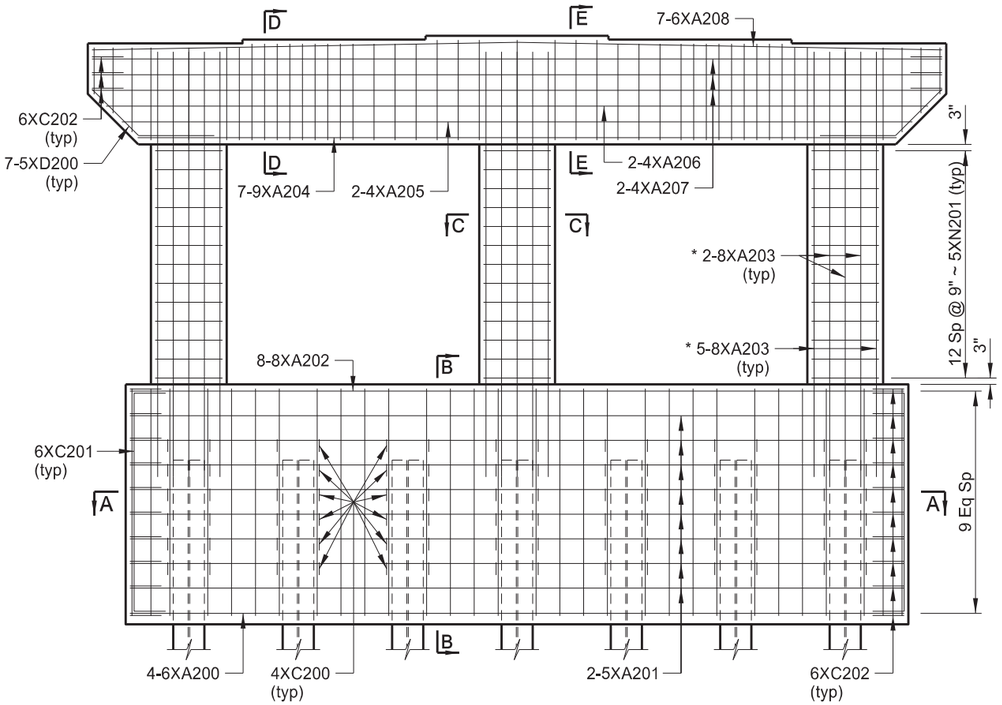
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23 U.S.C. § 407 Documents
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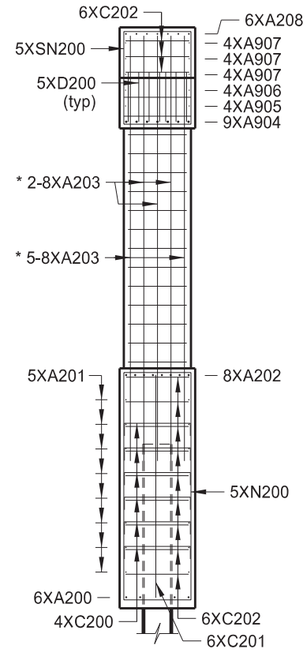
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	11



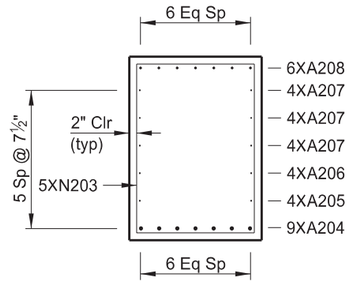
PLAN



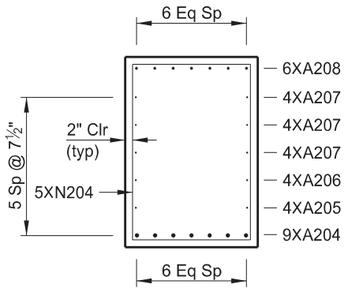
ELEVATION



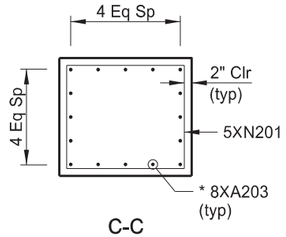
END VIEW



D-D

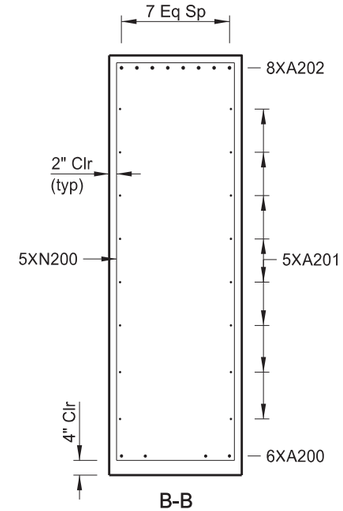


E-E

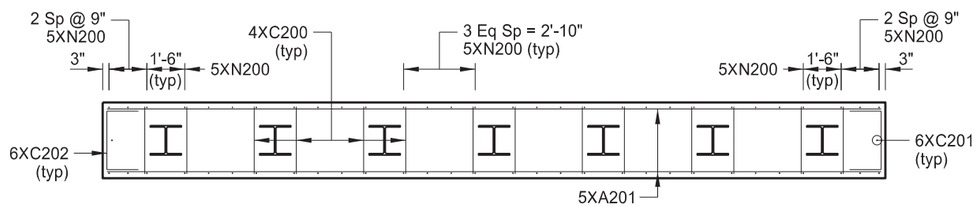


C-C

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



B-B



A-A

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PE-8211
DATE 10/20/26
NORTH DAKOTA

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

I-94/PETTIBONE INTERCHANGE

(SHOWING REINFORCING)

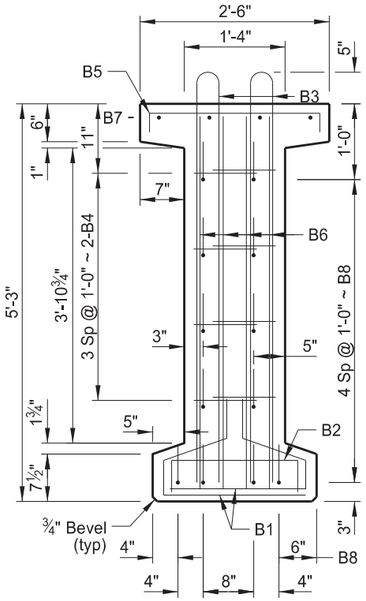
PIER DETAILS

DRAWING NO.	94-217.146-11

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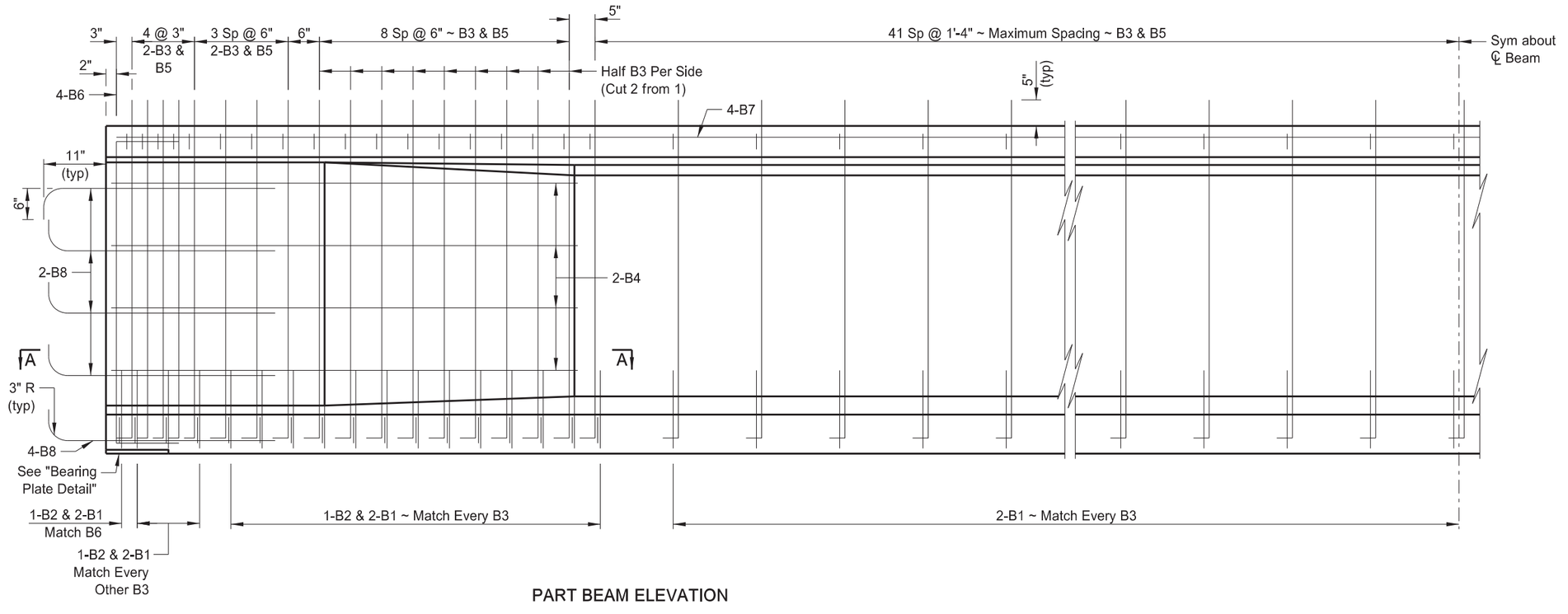
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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

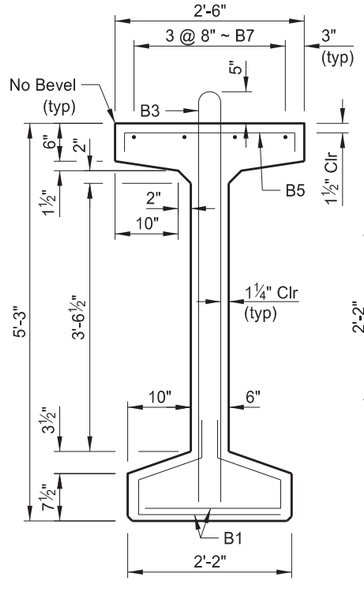


(DETAILS NOT SHOWN ARE SAME AS "SECTION @ ℄")

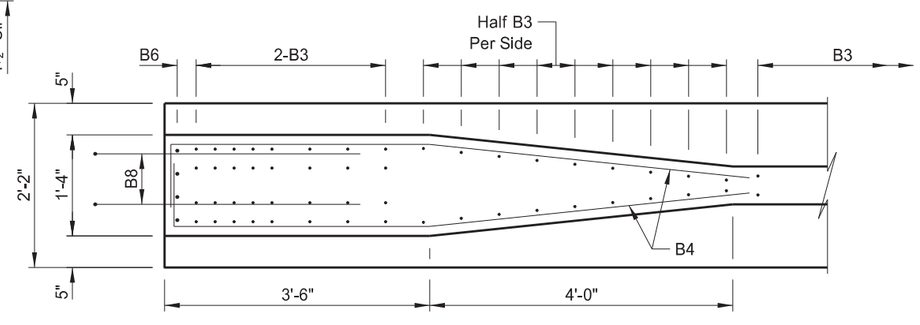
END VIEW



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

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DATE 10/20/26
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I-94/PETTIBONE INTERCHANGE

125'-0" BEAM LENGTH

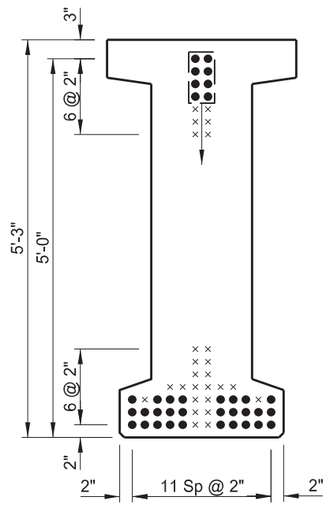
PRE-TENSIONED 63" PRESTRESSED I-BEAM

DRAWING NO.	94-217.146-12

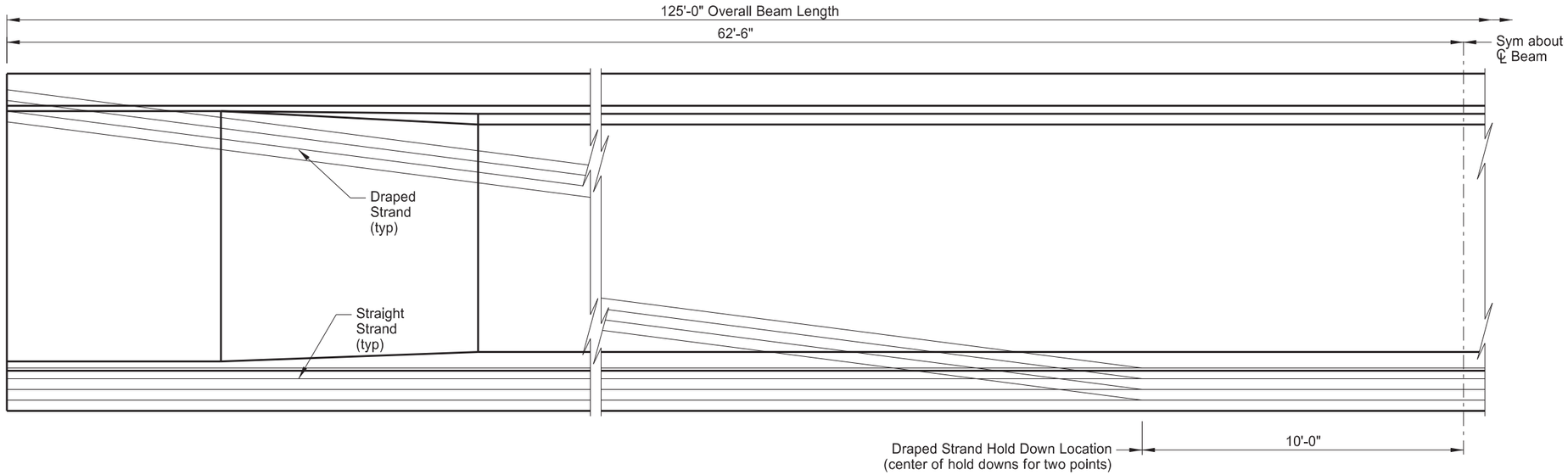
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

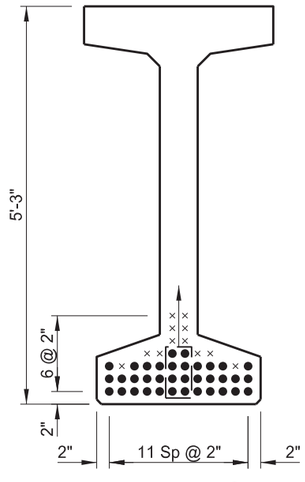
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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END VIEW



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

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PE-8211
DATE 10/20/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

125'-0" BEAM LENGTH

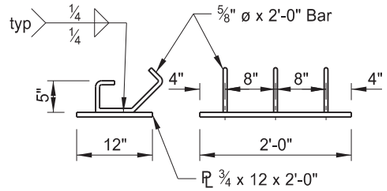
PRE-TENSIONED 63" PRESTRESSED I-BEAM

DRAWING NO. 94-217.146-13

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

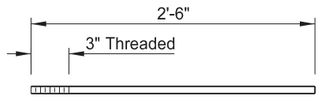
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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(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:

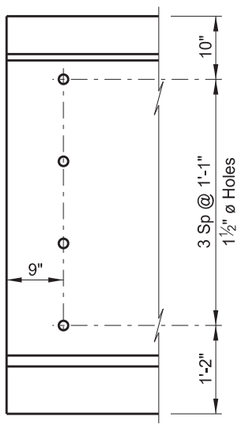
Provide holes and inserts in the beams at the locations shown to accommodate the diaphragm bars. Provide 6AT500 bars threaded to fit the inserts. Use galvanized, epoxy-coated, stainless steel, or non-metallic material for holes and inserts. See Slab Layout for diaphragm location details and required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

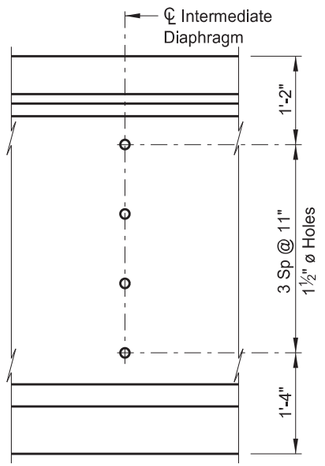
Minor changes to the shape of the beam and to the reinforcing steel may be made to accommodate the forms of various Contractors and their construction methods with the approval of the Engineer.



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

ELEVATION

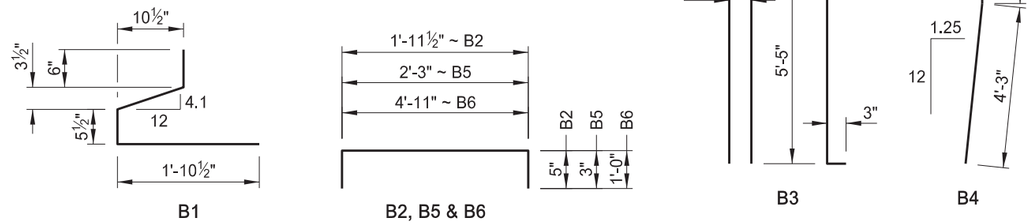
BEAM END DETAIL



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

ELEVATION

INTERMEDIATE DIAPHRAGM DETAIL



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"



I-94/PETTIBONE INTERCHANGE

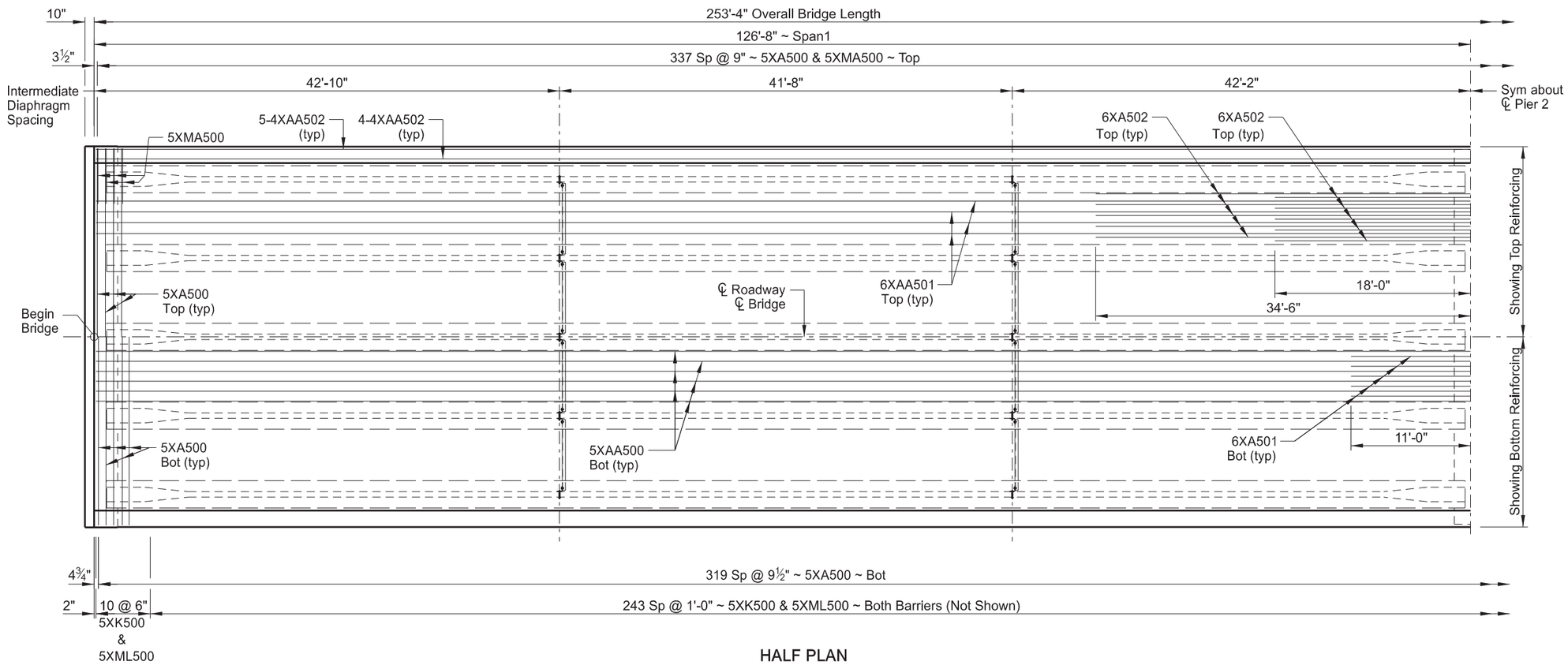
PRE-TENSIONED 63" PRESTRESSED I-BEAM

DRAWING NO. 94-217.146-14

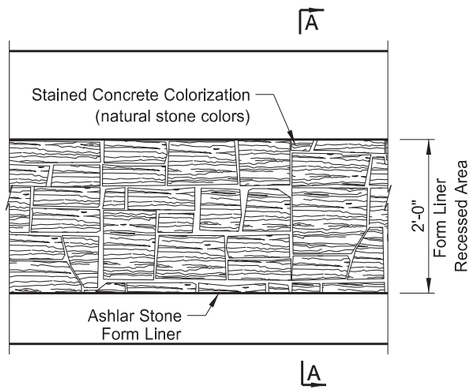
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23 U.S.C. § 407 Documents
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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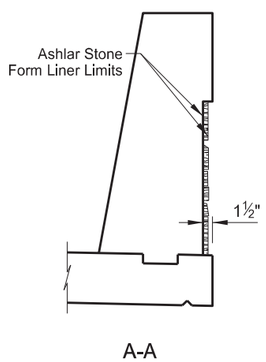


HALF PLAN



(SHOWING FORM LINER ~ BACK FACE)

BARRIER ELEVATION



A-A

PROFESSIONAL ENGINEER
REGISTERED
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

QUANTITIES

SEE DWG 94-217.146-18

I-94/PETTIBONE INTERCHANGE

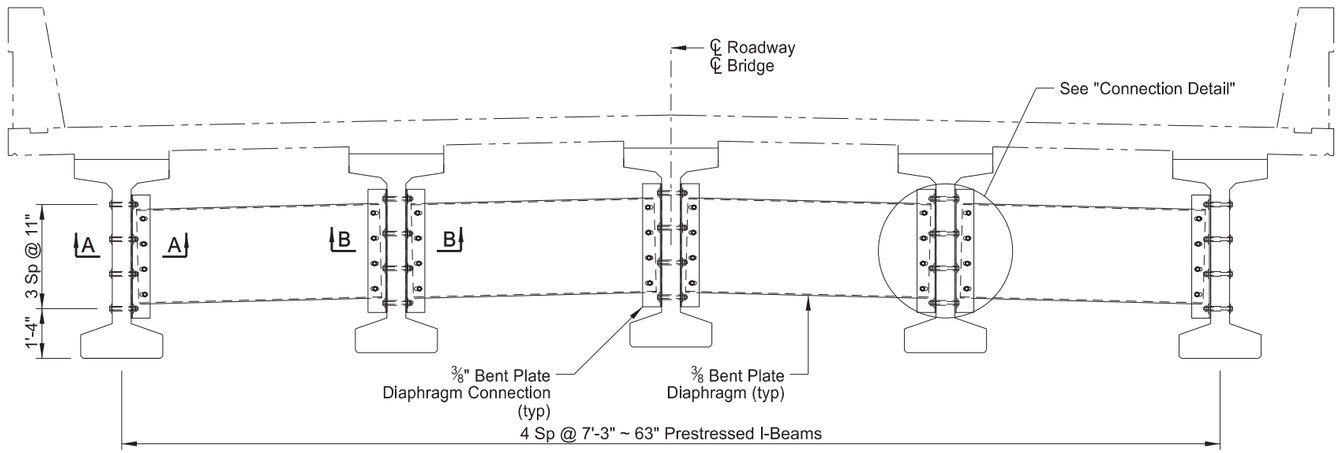
HALF SLAB LAYOUT

DRAWING NO. 94-217.146-15

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	170	16



ELEVATION

NOTES:

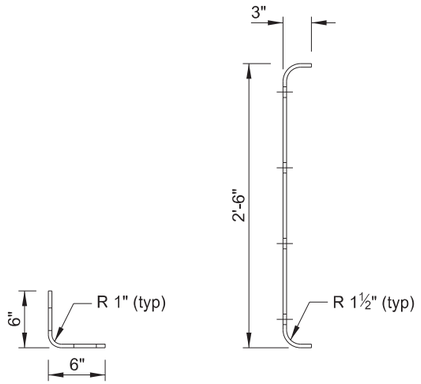
Use AASHTO M270 Grade 36 structural steel

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

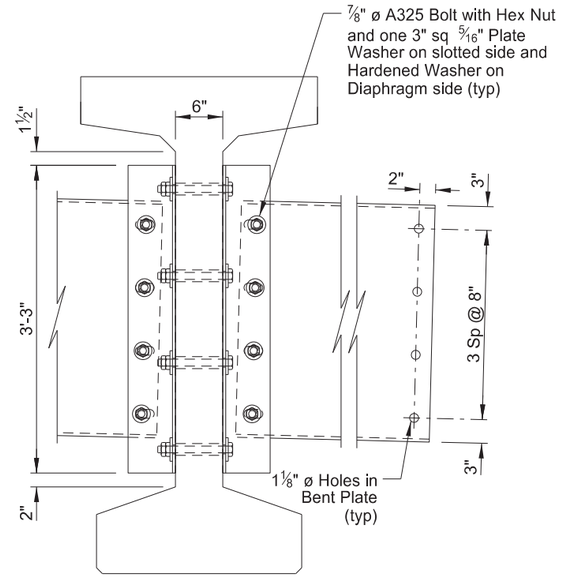
Install diaphragms between adjacent girders in conjunction with girder erection

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

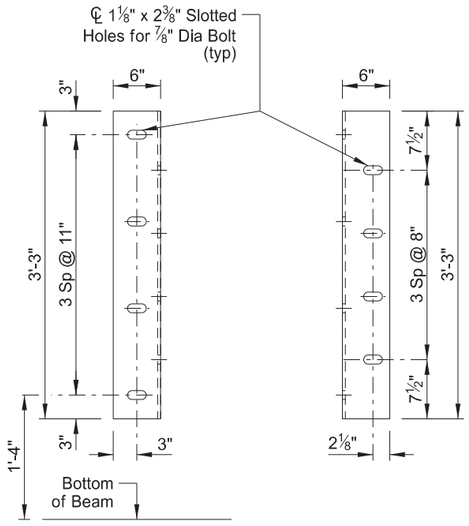


DIAPHRAGM CONNECTION
⅜" BENT PLATE

DIAPHRAGM
⅜" BENT PLATE

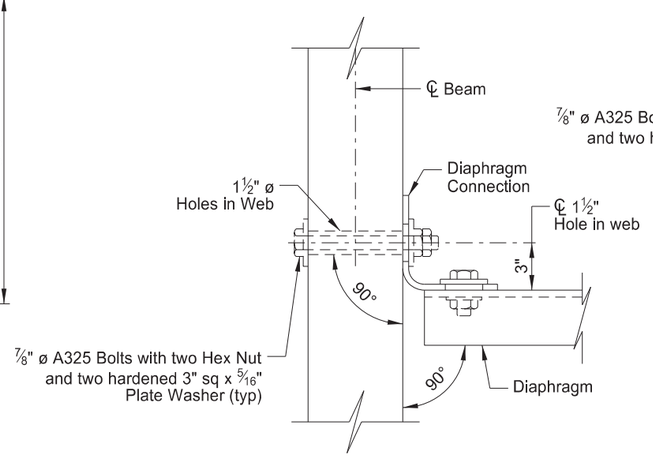


CONNECTION DETAIL

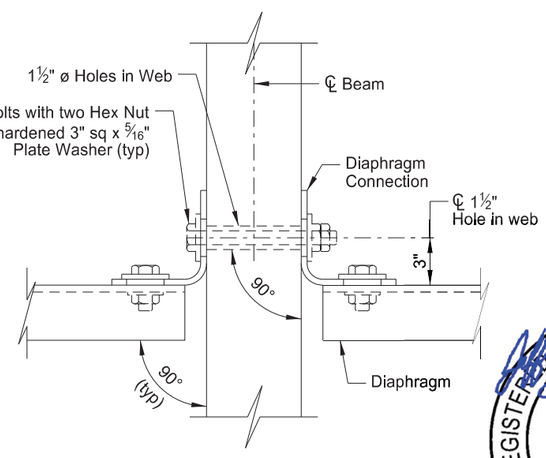


(BEAM FACE) (DIAPHRAGM FACE)

DIAPHRAGM CONNECTION
⅜" x 12" BENT PLATE



SECTION A-A



SECTION B-B

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

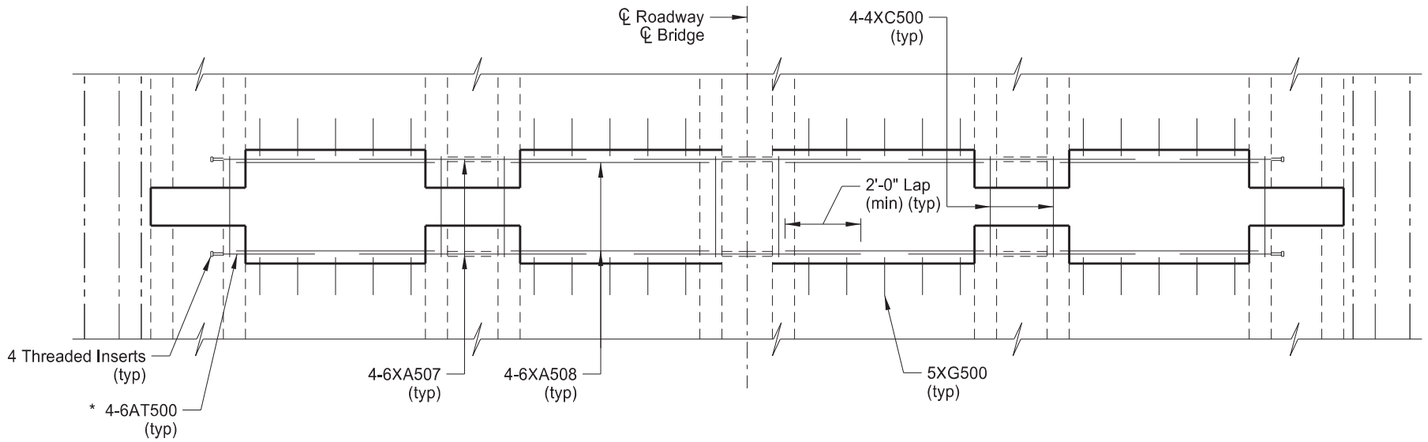
INTERMEDIATE
DIAPHRAGM DETAILS

DRAWING NO. 94-217.146-16

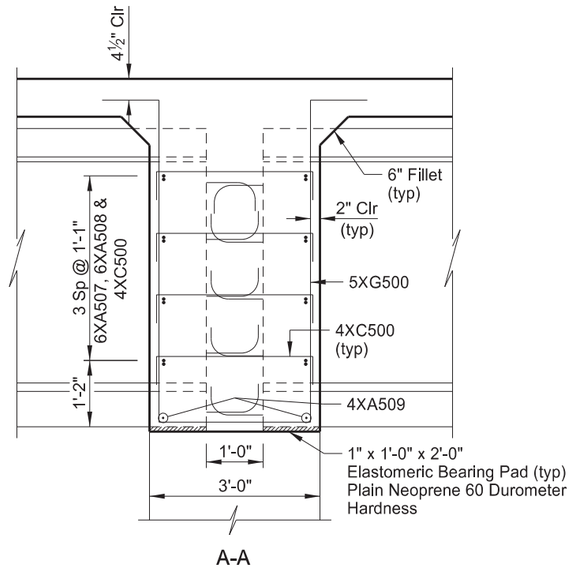
Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

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

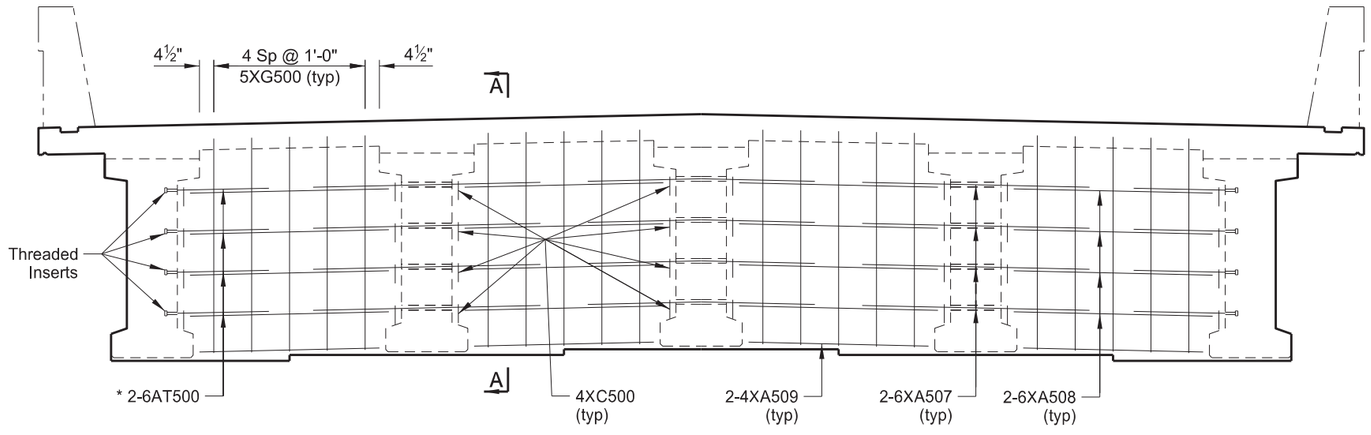
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	17



PLAN



A-A



ELEVATION

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

QUANTITIES

SEE DWG 94-217.146-19

I-94/PETTIBONE INTERCHANGE

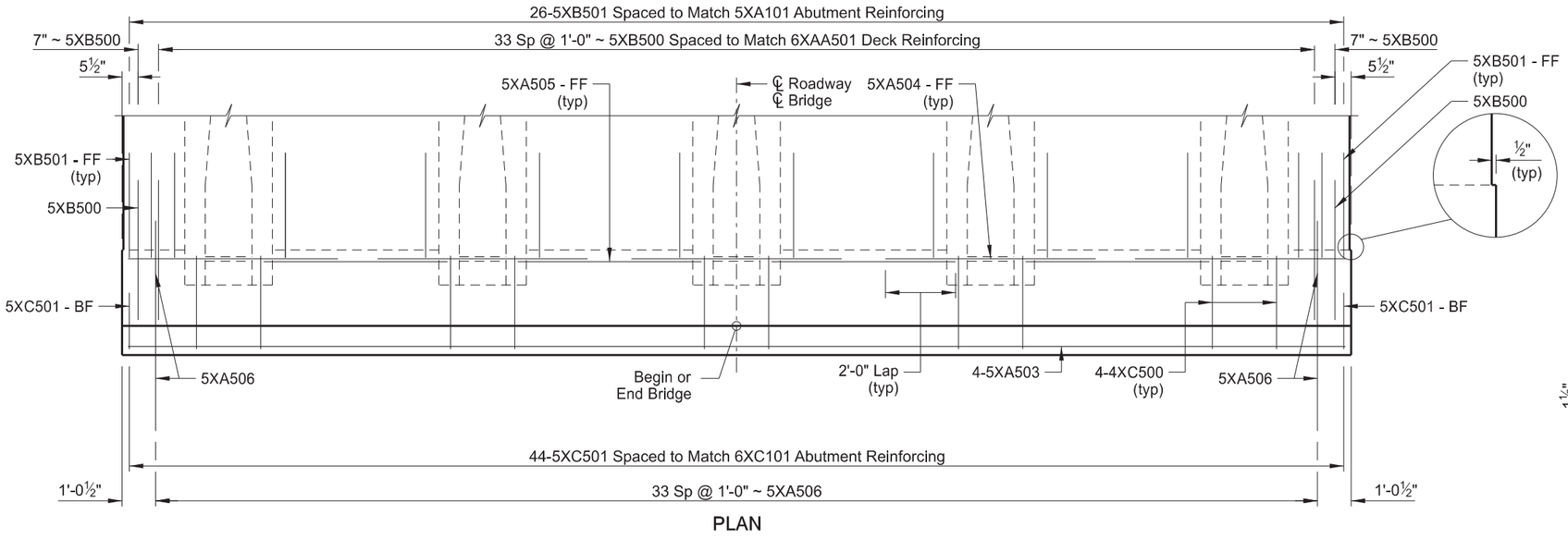
PIER DIAPHRAGM DETAILS

DRAWING NO. 94-217.146-17

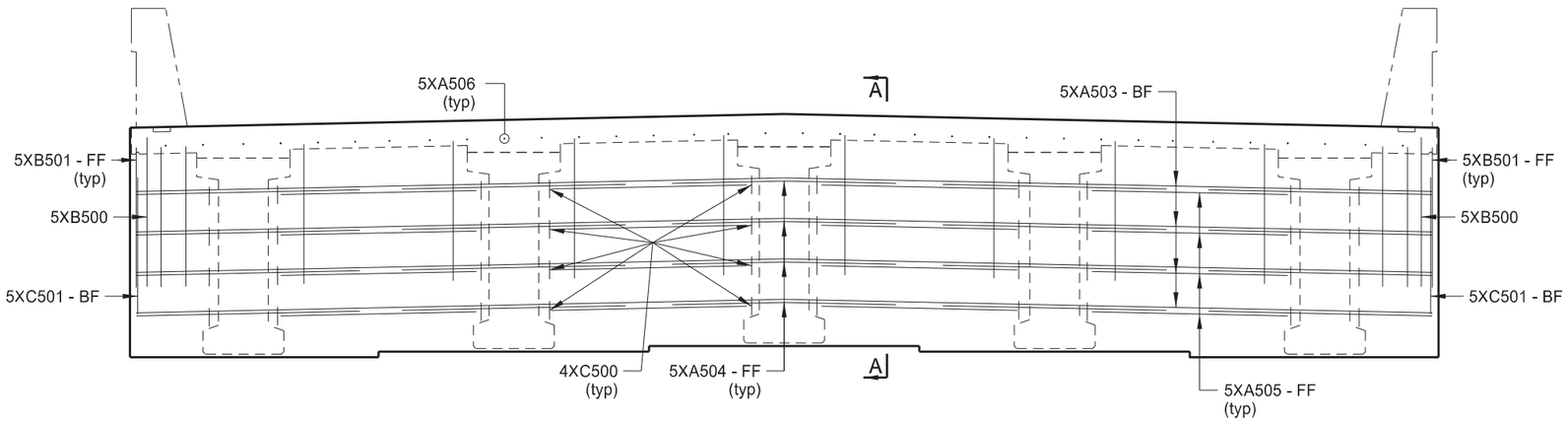
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23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	18

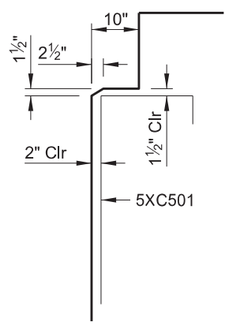


PLAN

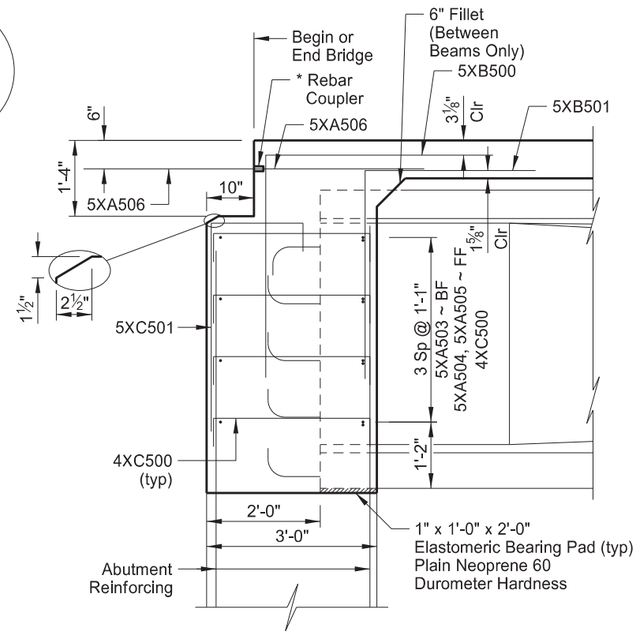


(APPROACH NOTCH NOT SHOWN)

ELEVATION



APPROACH NOTCH DETAIL



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.

NOMENCLATURE:

FF = Front Face
BF = Back Face



QUANTITIES

SEE DWG 94-217.146-19

I-94/PETTIBONE INTERCHANGE

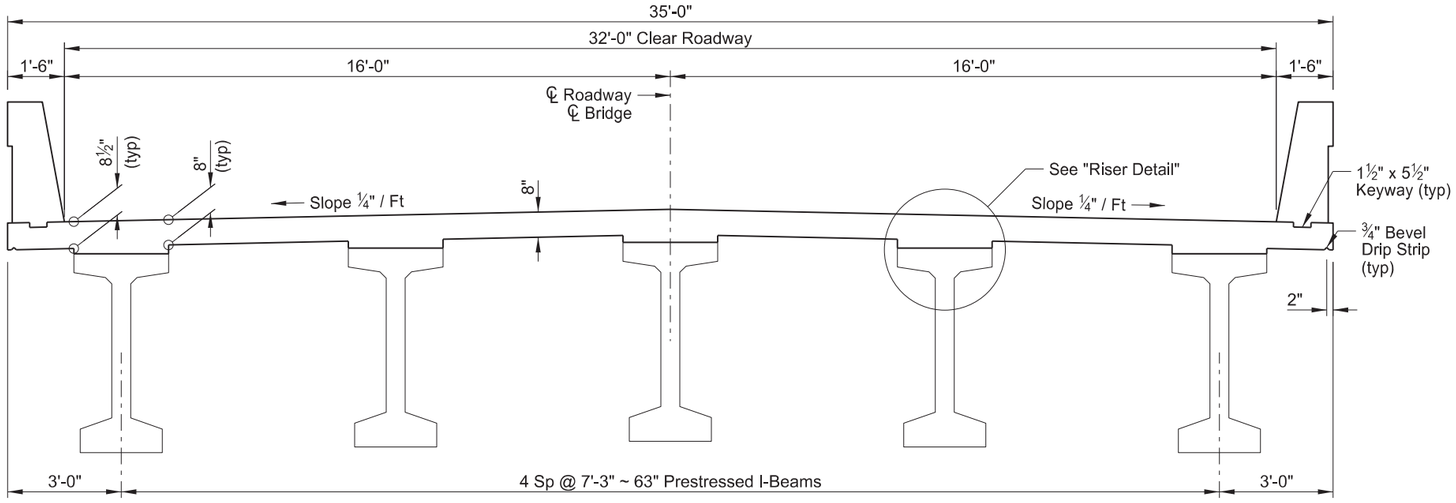
ENDWALL DETAILS

DRAWING NO. 94-217.146-18

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

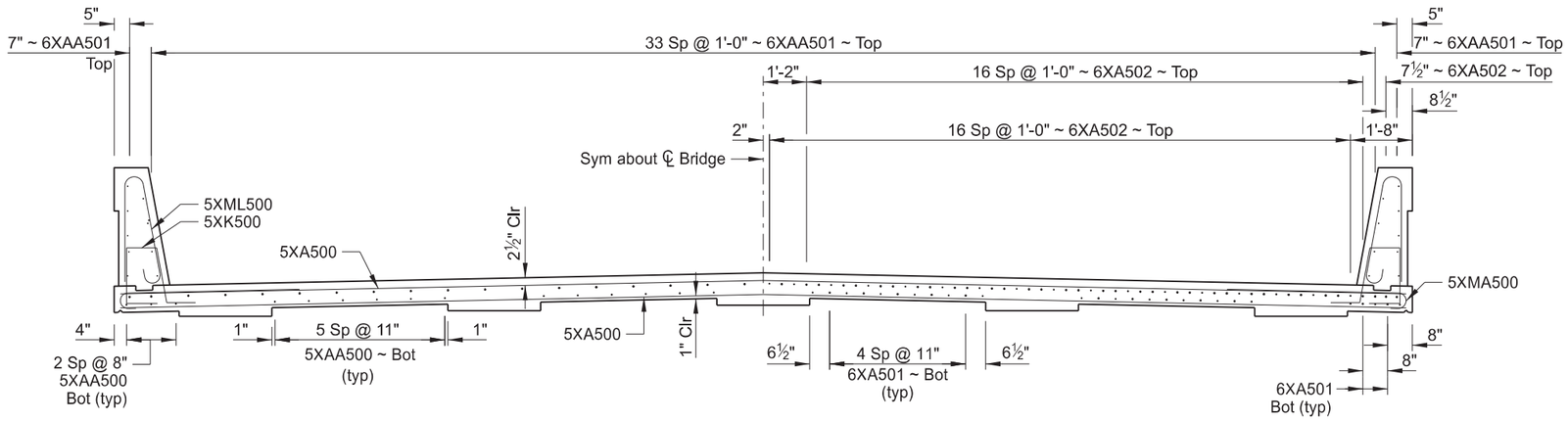
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	19



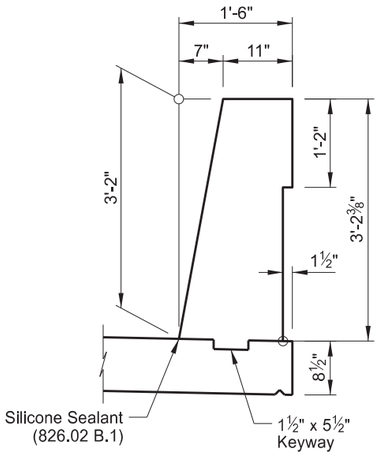
(SHOWING DIMENSIONS)

SLAB SECTION

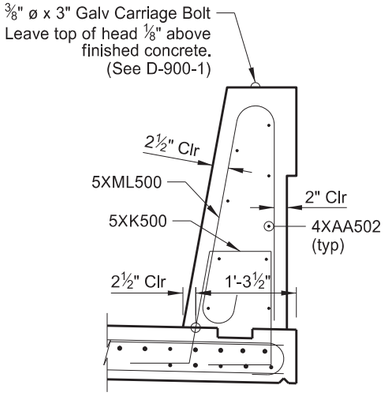


(SHOWING REINFORCING BETWEEN SUPPORTS) (SHOWING REINFORCING OVER PIERS)

SLAB SECTION

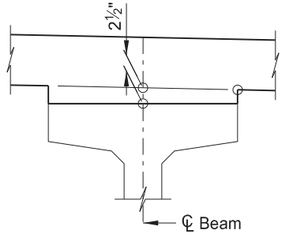


SHOWING DIMENSIONS



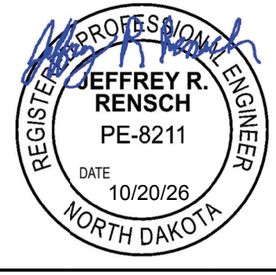
SHOWING REINFORCING

BARRIER DETAIL



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.



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

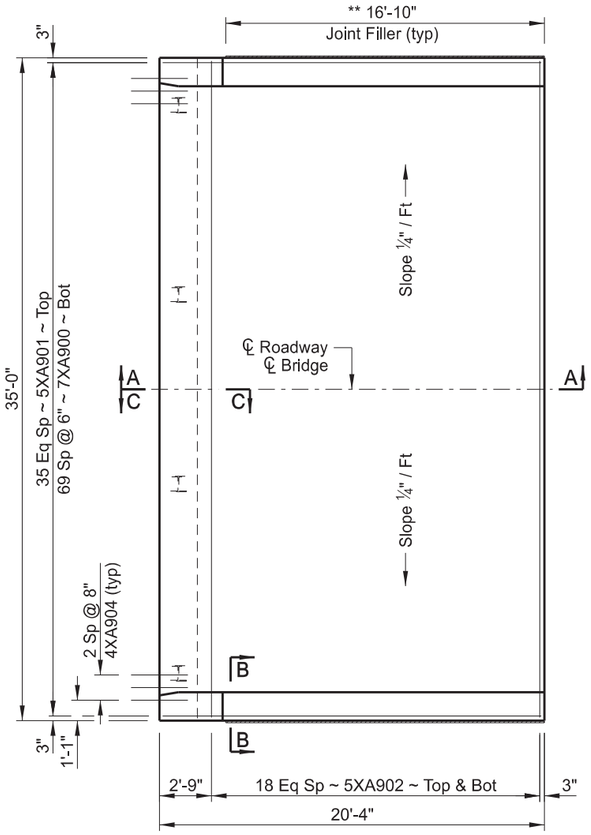
DRAWING NO.	94-217.146-19

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

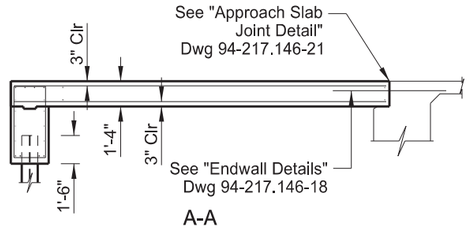
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

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

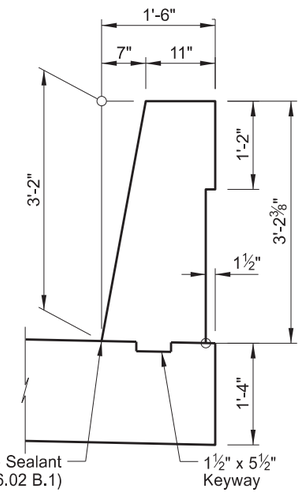
** ½" x 16" Pref Exp Joint Filler
Place between approach
slab & abutment wing (typ).



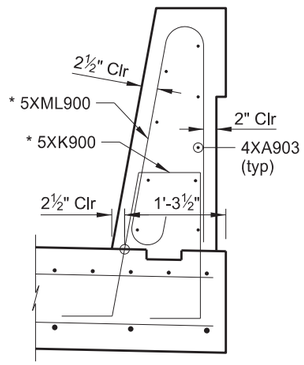
PLAN



A-A

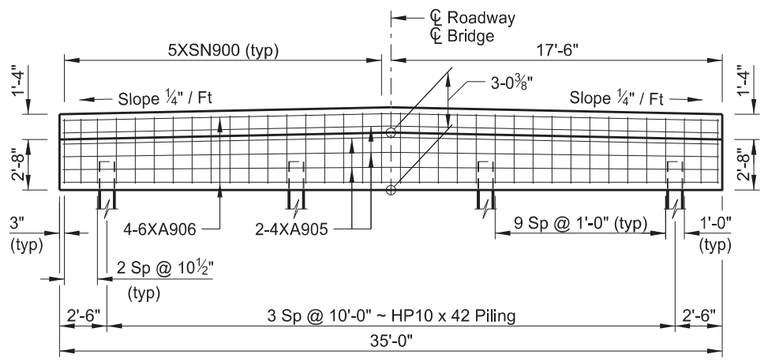


SHOWING DIMENSIONS



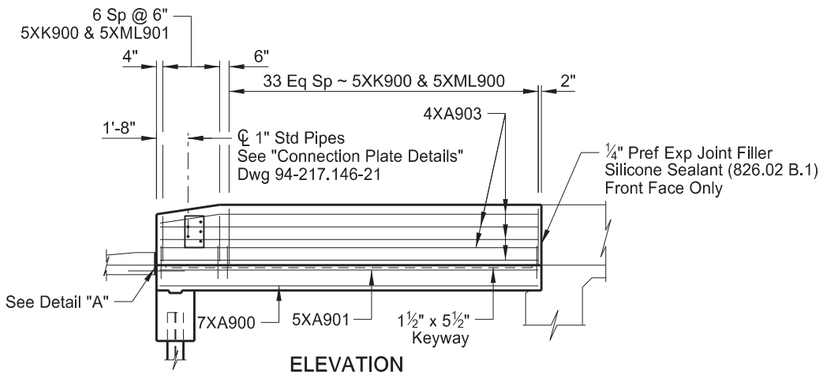
SHOWING REINFORCING

B-B

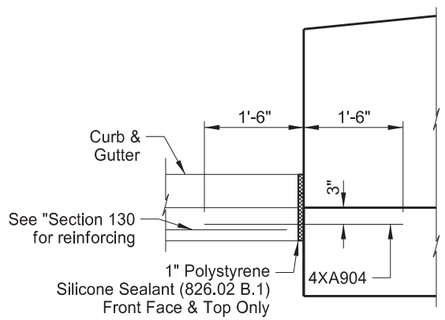


FOOTING ELEVATION

C-C



ELEVATION



DETAIL "A"



QUANTITIES

SEE DWG 94-217.146-21

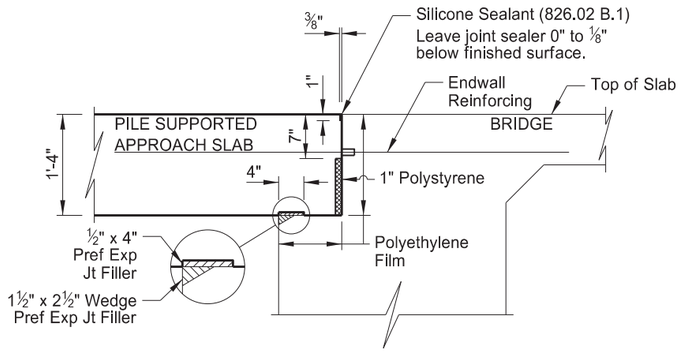
I-94/PETTIBONE INTERCHANGE

APPROACH SLAB DETAILS

DRAWING NO.	94-217.146-20

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	21

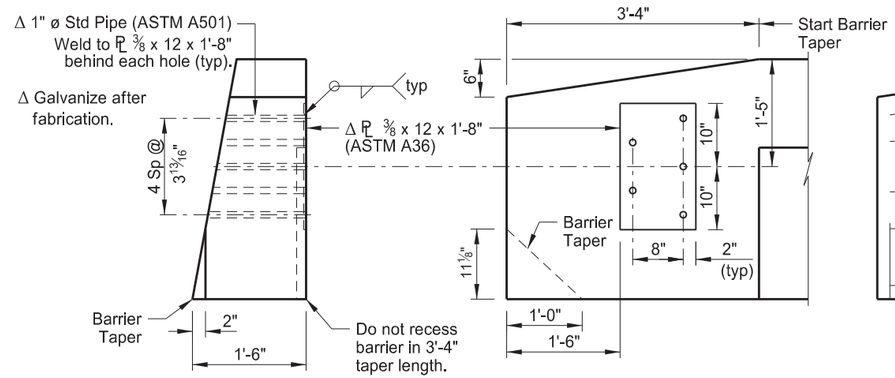


APPROACH SLAB JOINT DETAIL

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

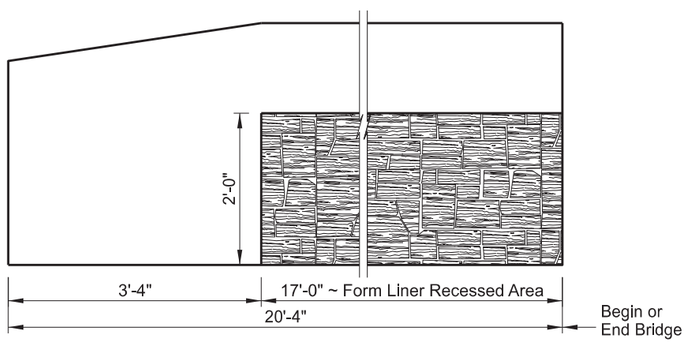


SHOWING DIMENSIONS

SHOWING REINFORCING

(SHOWING BACK FACE)

CONNECTION PLATE DETAILS



(SHOWING FORM LINER ~ BACK FACE)

BARRIER ELEVATION

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
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: 2060353F-1961-84C9-8214-4E7CAFC0E080

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				
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				

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-22

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

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"		

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

JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
REGISTERED PROFESSIONAL ENGINEER
NORTH DAKOTA

I-94/PETTIBONE INTERCHANGE

REINFORCING BAR LIST

DRAWING NO. 94-217.146-23

Docusign Envelope ID: 2060353F-1961-84C9-8214-4E7CAFC0E080

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

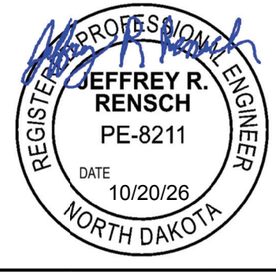
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(186)217	170	24

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



I-94/PETTIBONE INTERCHANGE

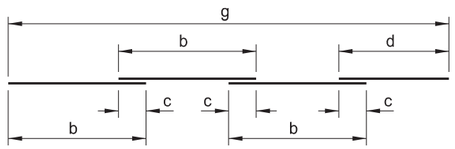
REINFORCING BAR LIST

DRAWING NO.	94-217.146-24

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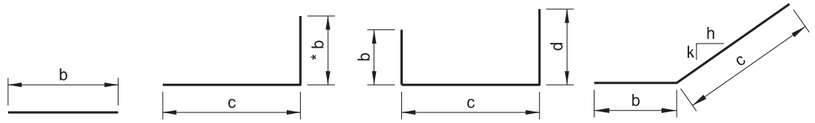
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	170	25

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



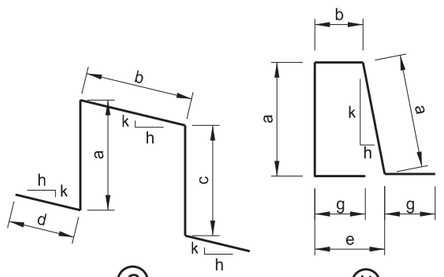
c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d

AA



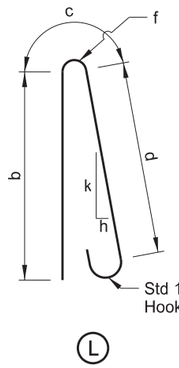
A B C D

* b = Vertical Leg for
XB500 and XB501

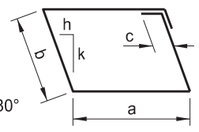


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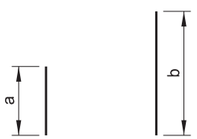
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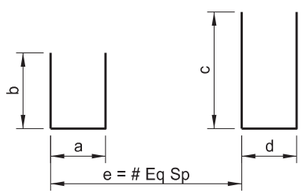
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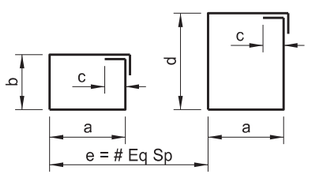
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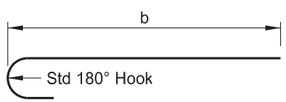
SA



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.

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/20/26
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

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 (20 40 60 80)	MC / PL LL (20 40 60 80) / CLAY FRACTION (%) (20 40 60 80)	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	15 26	
1820	10		A-2-4	SC	342	85	0	19 38	γ_d = 106.8 pcf γ = 126.1 pcf Con-1-22
			A-2-6	SC	343	40	9	18 34	
			A-2-4	SM	344	85	0	19 34	
1810	20		A-6	SC	345	75	28	0	
			A-6	CL	346	85	7	0	
			A-2-4	SM	347	65	8	0	
			A-2-6	SC	348	25	16	0	
			A-2-4	SM	349	15	8	0	
1803.0 ft	29.0 ft		A-1-b	SM	350	65	18	0	
1800	30	Medium Dense Moist Brn Silty Sand.	A-1-b	SP-SM	351	60	14	0	
			A-4	ML	352	60	20	0	
			A-2-4	SM	353	60	38	0	
			A-2-4	SM	354	60	31	0	
1791.0 ft	41.0 ft		A-1-b	SM	355	50	23	0	
1790	40	Dense to Very Dense Moist/Wet Brn Silty/Clayey Sand. Water bearing at 59'.	A-1-b	SP-SM	356	60	35	0	
			A-1-b	SC-SM	357	65	55	0	
			A-1-b	SM	358	65	21	0	
			A-1-b	SW-SM	359	65	24	0	
			A-1-b	SC-SM	360	75	24	0	
1780	50		A-1-b	SM	361	55	16	0	
			A-1-b	SM	362	65		0	
			A-1-b	SM	363	60		0	
			A-2-4	SM	364	65	23	0	
			A-1-b	SM	365	60		0	
1773.0 ft	59.0 ft		A-1-a	SP-SM	366	70	24	0	
1770	60	Dense Gr/Blk/Brn Wet Silty Sand	A-4	ML	367	65	7	0	
			A-4	ML	368	90	3	37	
			A-7-6	CL	369	95	13	28 42	
			A-7-6	CL	370	95		24 47	
			A-6	SC	371	65	22	23 46	γ_d = 94.7 pcf γ = 120.6 pcf UU=2555psf
			A-7-6	CH	372	60		16 29	
1760	70		A-7-6	CL	373	75	14	25 50	γ_d = 94.2 pcf γ = 121.9 pcf UU=1856psf
			A-7-6	CH	374	95			
			A-7-6	CH	375	100	16	24 48	
						10	16	26 54	
1750	80					100	24	25 54	
						5	19		
			A-7-5	MH	376	90	34	33 66	
1740	90								
1730	100								
1728.0 ft	104.0 ft								
1720	110	Soft to Stiff Moist/Wet Gry Silt. Water bearing at 104' ,114', & 124'.							
1710	120								
1700	130								
1698.0 ft	134.0 ft								
1690	140	Very Stiff Moist/Wet Gry Sandy Fat Clay. Water bearing at 136', 146', 154', & 164'.							
1680	150								
1670	160								
1660	170								
1650	180								
1640	190								
1638.0 ft	194.0 ft								
1630	200	Hard Moist Gry Elastic Silt.							
1626.0 ft	206.0 ft								
		Bottom of borehole at 206.0 ft							

NDDOT LOG 11X17 PLAN SHEET - NDDOT_DATATEMP_20180208.GDT - 7/30/24 07:33 - F:\LAB\PROJECTS\GINT\2-094(186)217.GPJ

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	11	
			A-1-b	SP-SM	382	70	24	0	
1800	30	1799.0 ft 32.0 ft	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	
1750	80		A-2-4	SP-SM	392	90	14	0	
1740	90		A-3	SP-SM	393	75	12	0	
1730	100		A-1-b	SM	394	80	24	0	
		1722.0 ft 109.0 ft							
1720	110	Medium Stiff to Stiff Moist Gry Silt. Water bearing at 139'.	A-6	ML	395	90	8	27 39	
1710	120		A-7-5	ML	396	100	5	30 46	
1700	130		A-7-6	CL	397	85		23 46	γ_d = 86.7 pcf γ = 119.1 pcf UU=1358psf
1690	140		A-4	ML	398	80	10	234	
		1682.0 ft 149.0 ft							
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					0	19		
		1652.0 ft 179.0 ft							
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	
		1610.0 ft 221.0 ft							
1610	220		A-7-5	MH	405	100	100	37 74	

Bottom of borehole at 221.0 ft

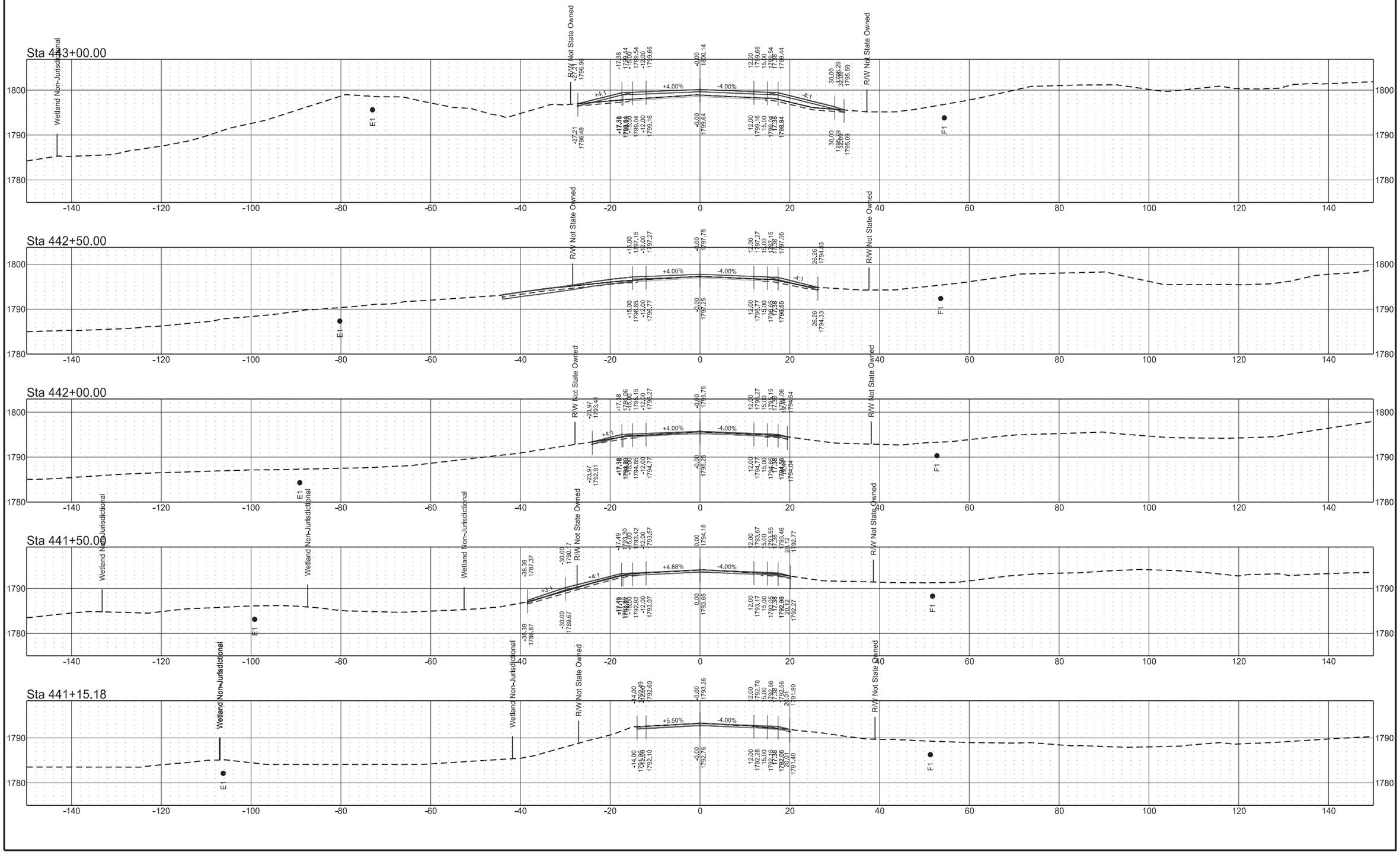
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REGISTERED PROFESSIONAL ENGINEER
COLTER SCHWAGLER
PE-27747
DATE 07/30/24
NORTH DAKOTA

Boring Log 2

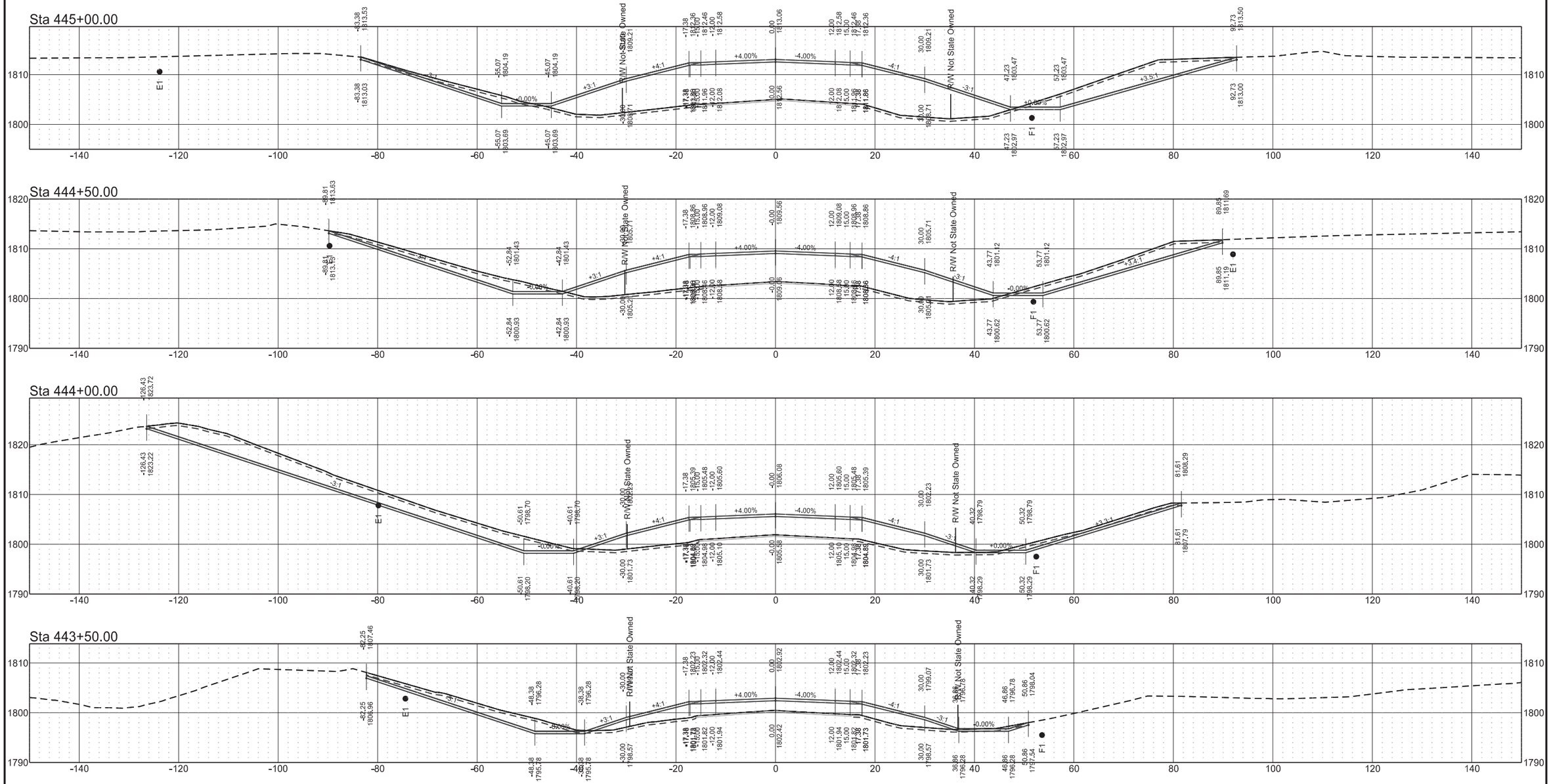
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

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



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

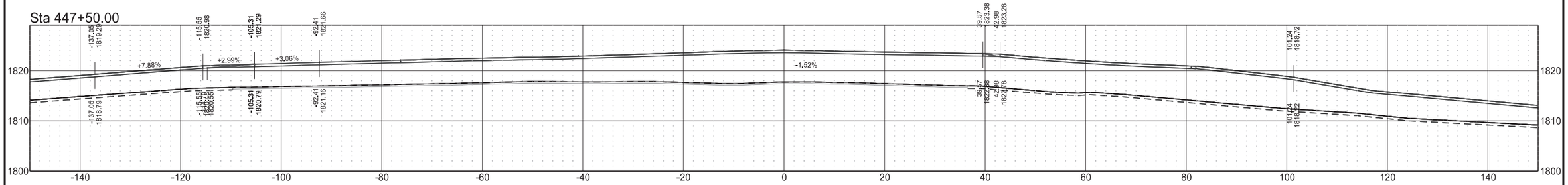
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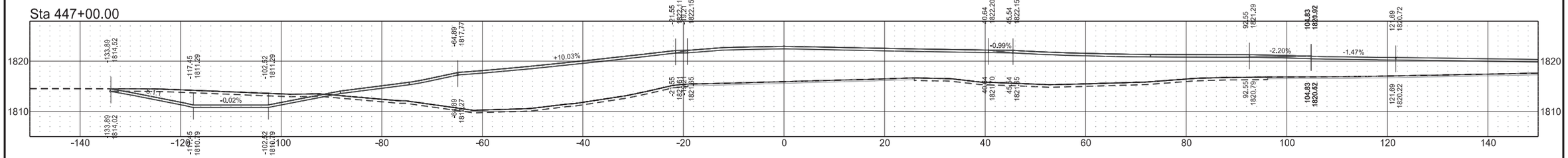
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	3

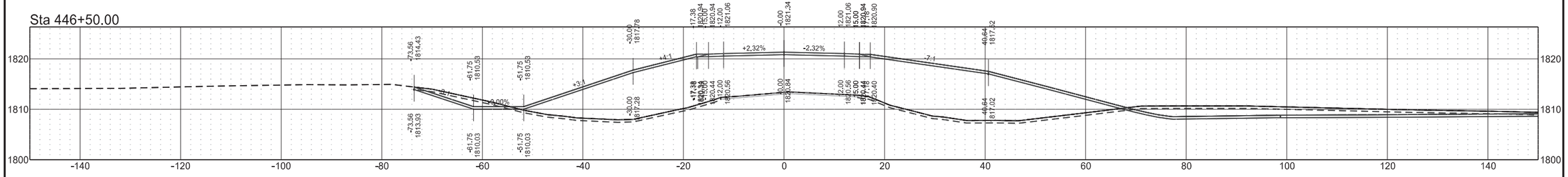
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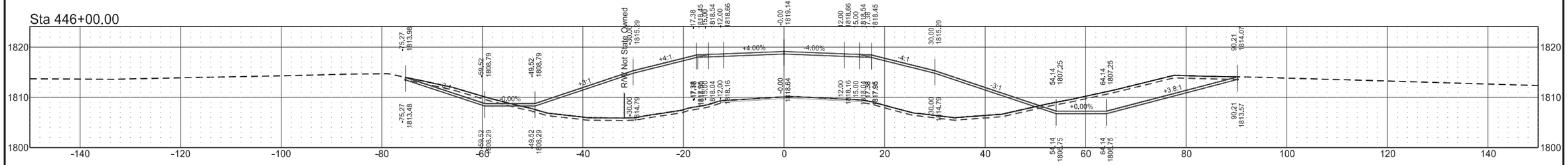
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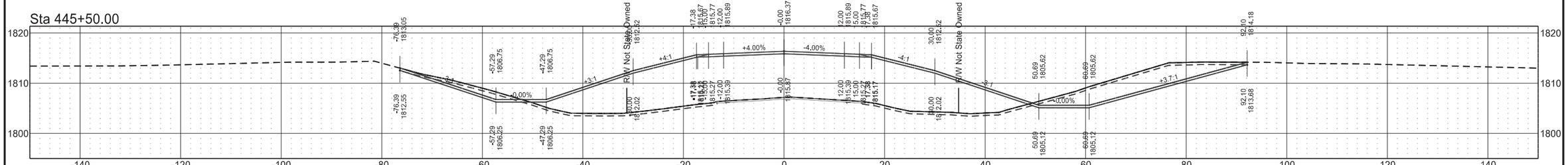
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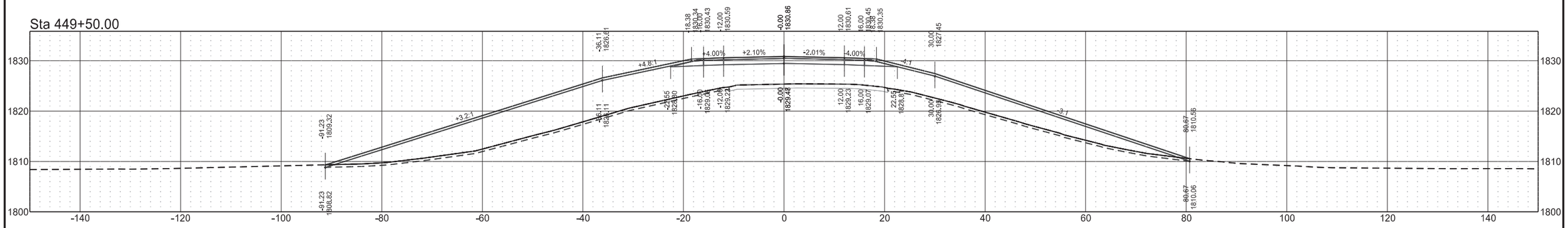
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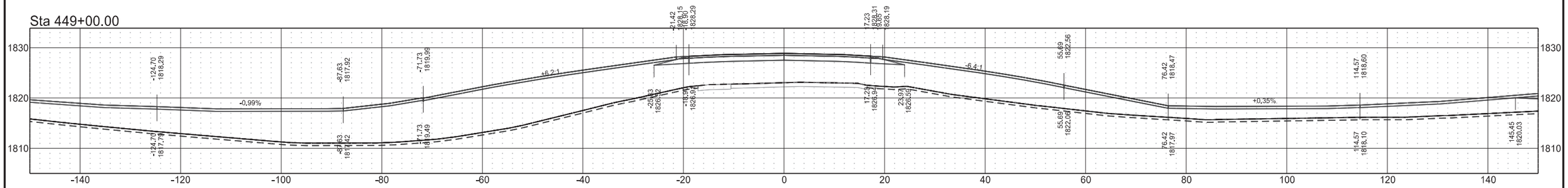
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	4

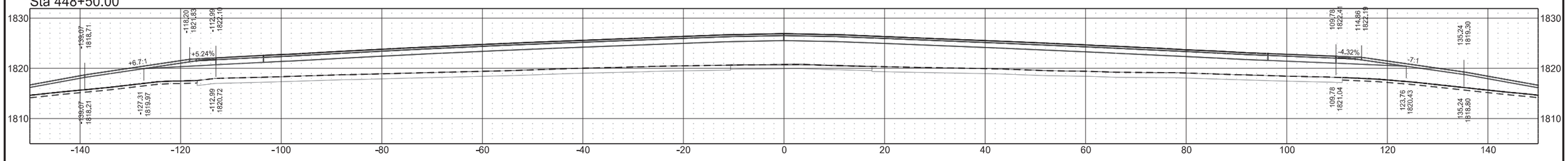
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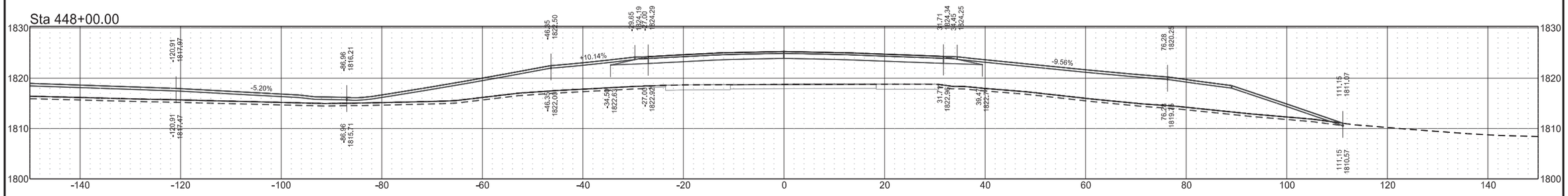
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Sta 448+50.00



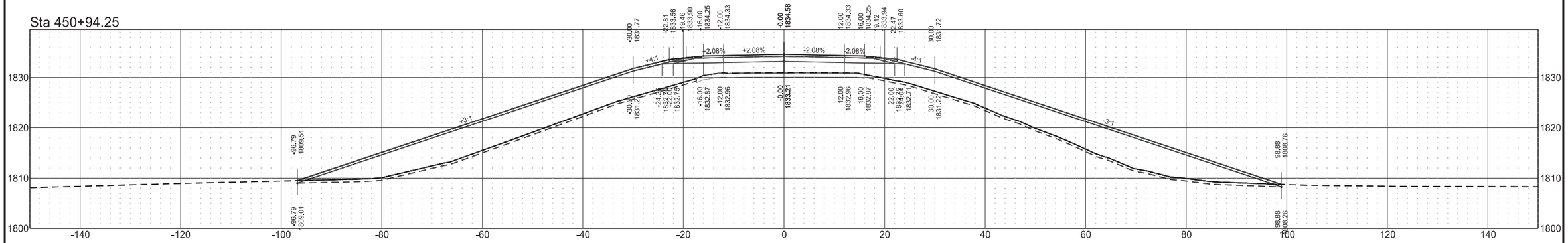
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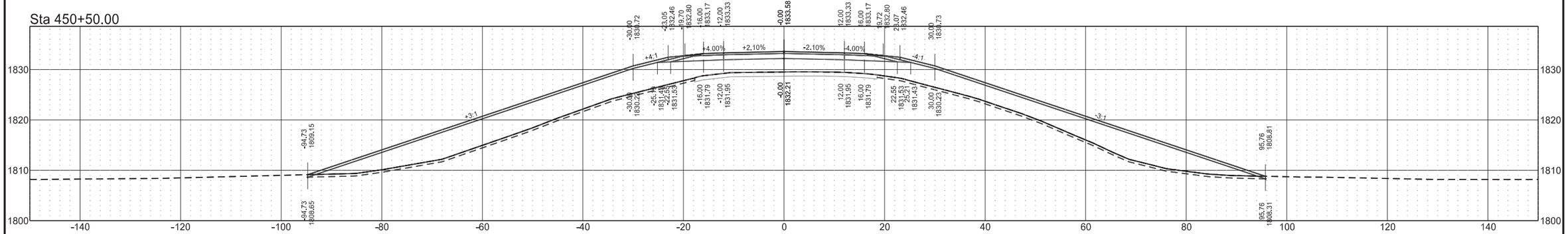
I94/Pettibone Interchange
Cross Sections
42nd Ave (OFL Align)

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	5

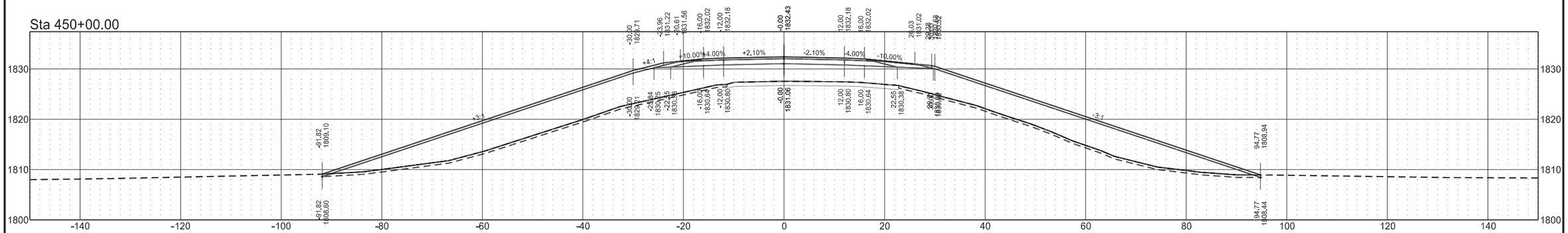
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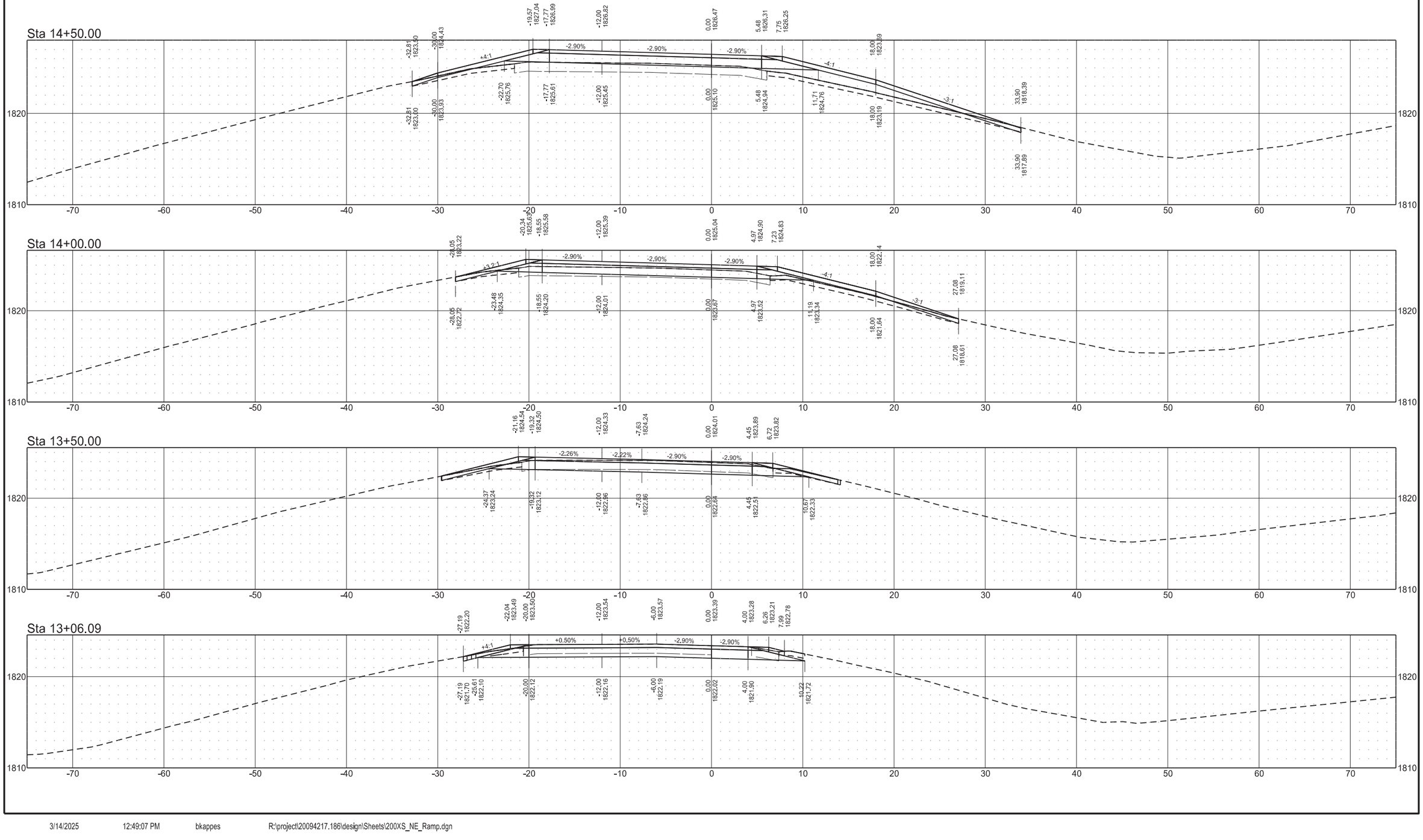


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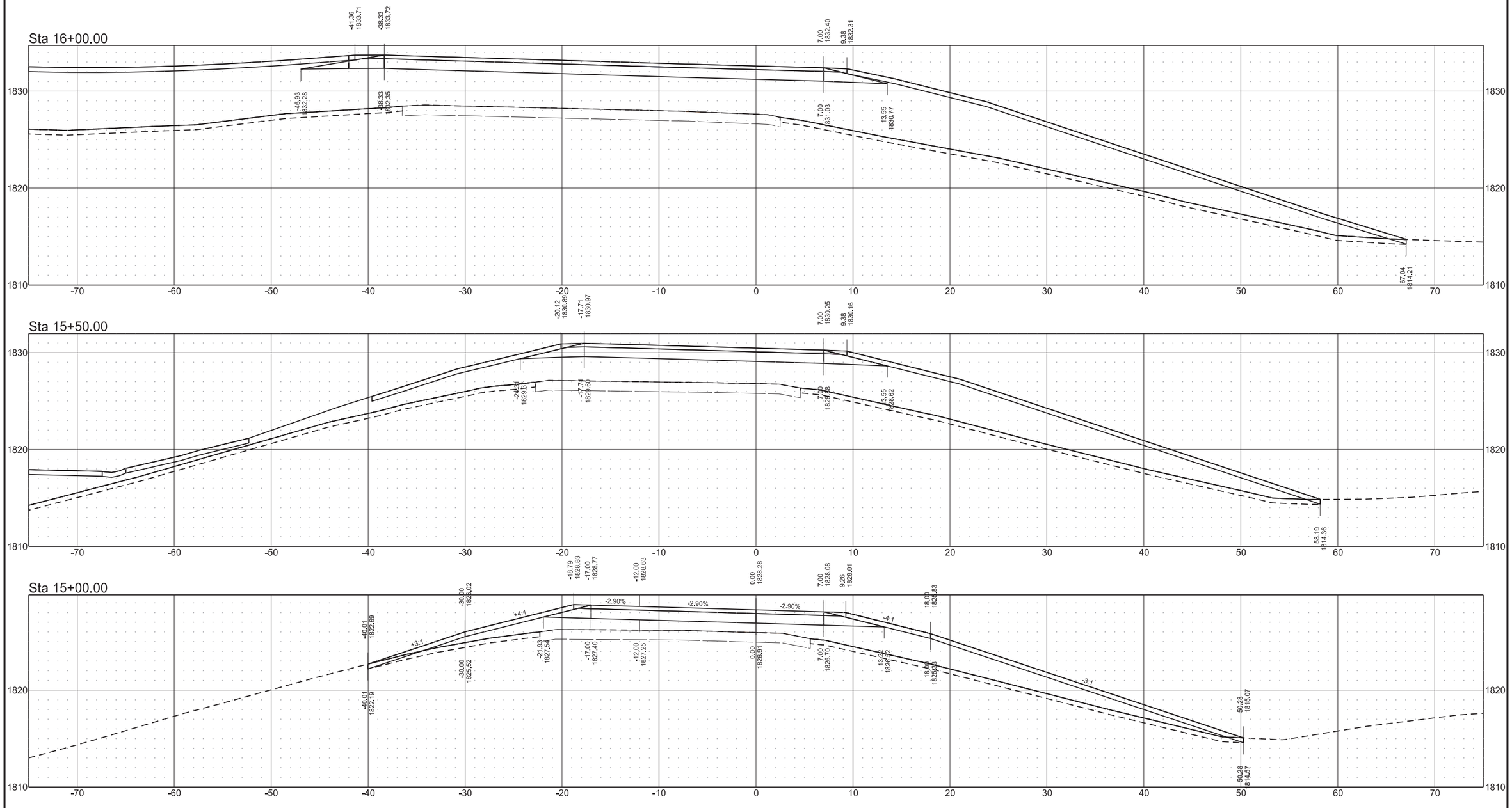
I94/Pettibone Interchange
Cross Sections
NE Ramp

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	6



I94/Pettibone Interchange
Cross Sections
NE Ramp

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	7

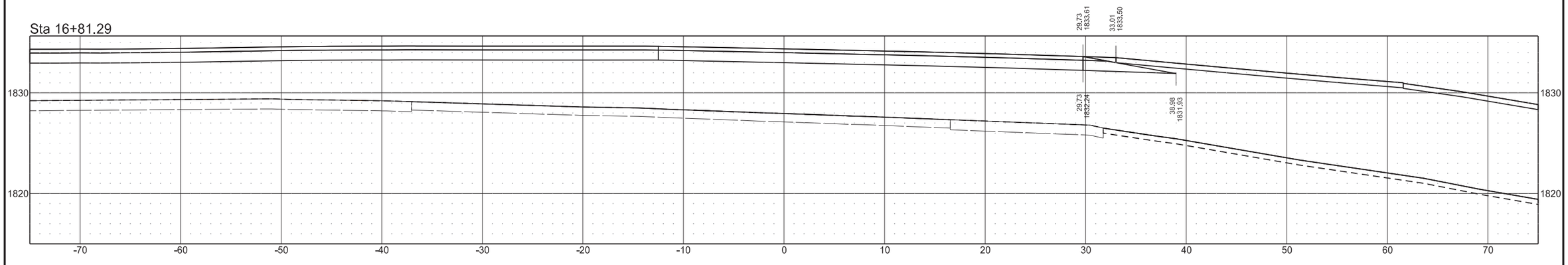


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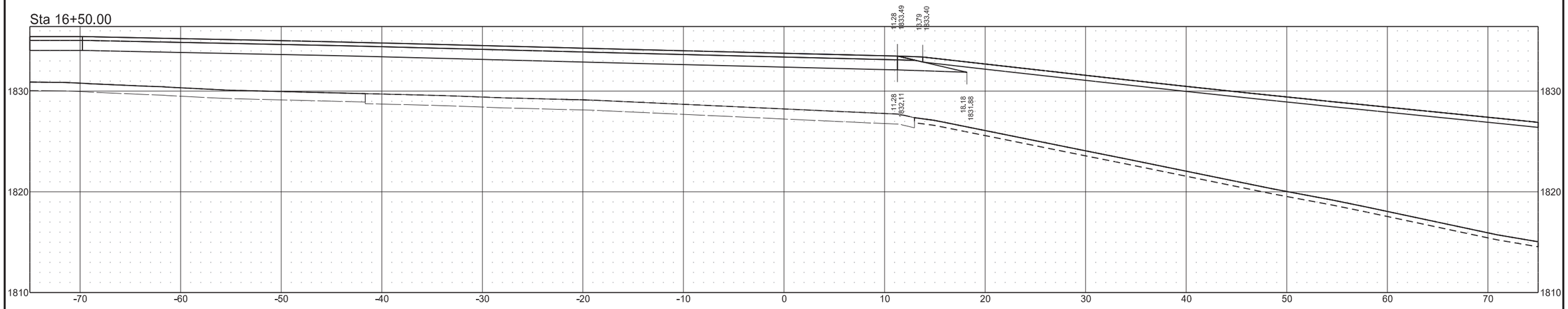
I94/Pettibone Interchange
Cross Sections
NE Ramp

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	8

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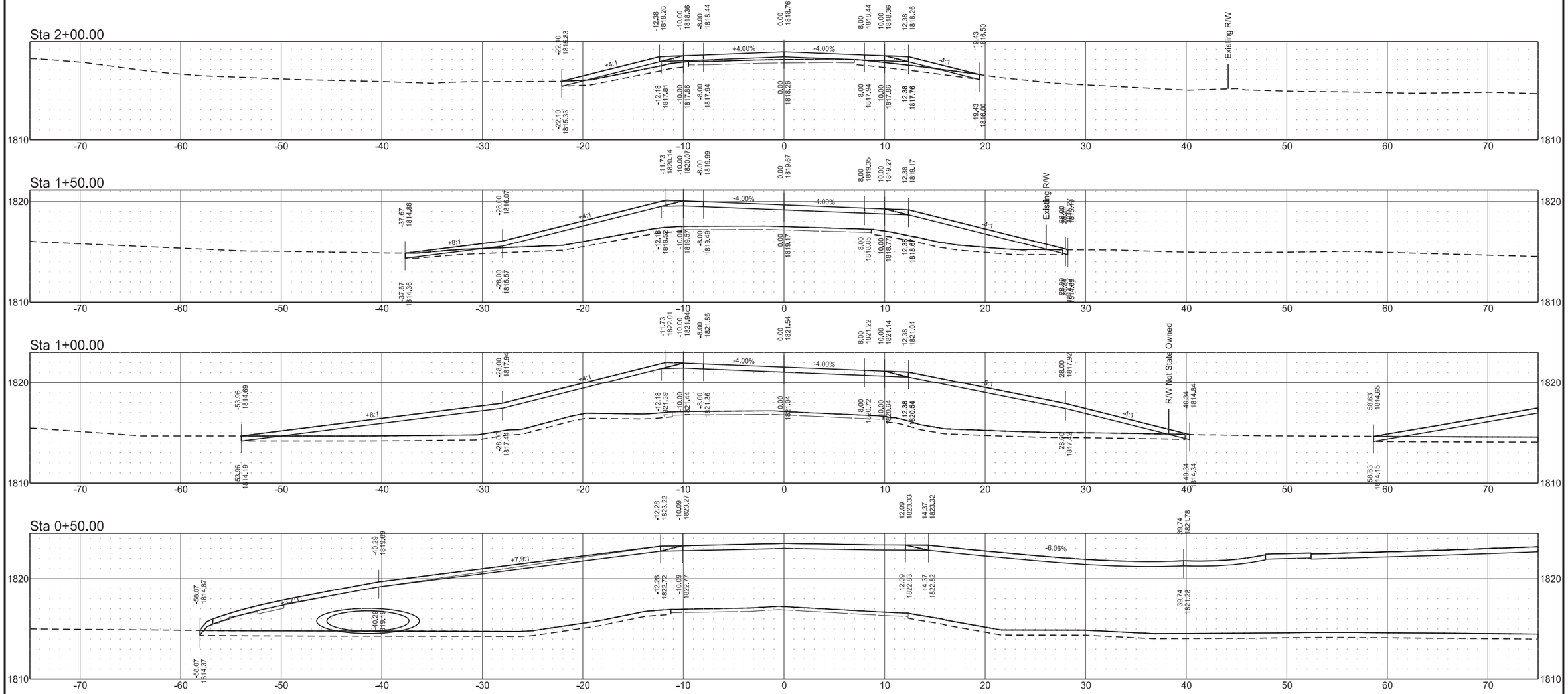
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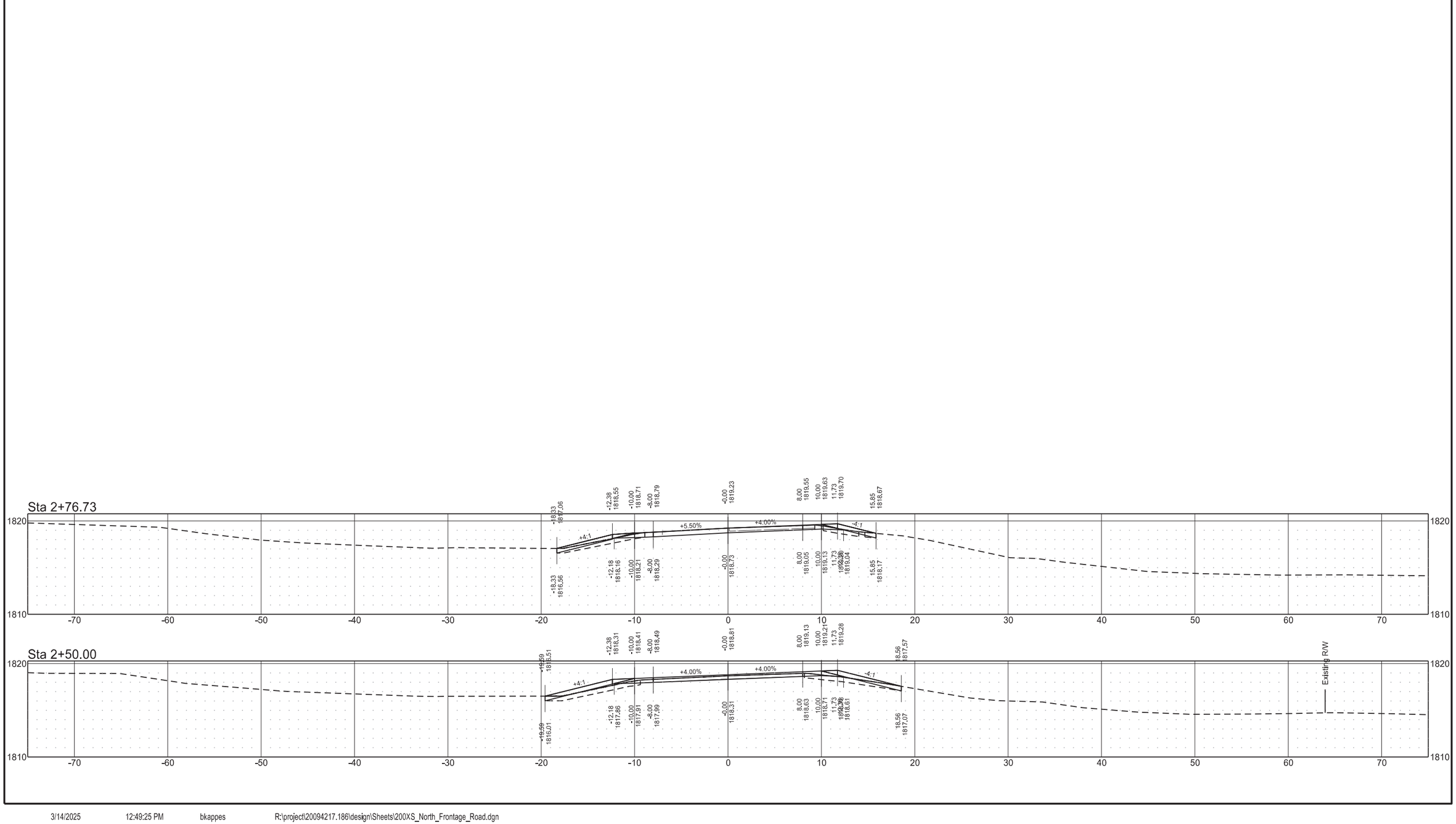
I94/Pettibone Interchange
Cross Sections
North Frontage Road

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	9



I94/Pettibone Interchange
Cross Sections
North Frontage Road

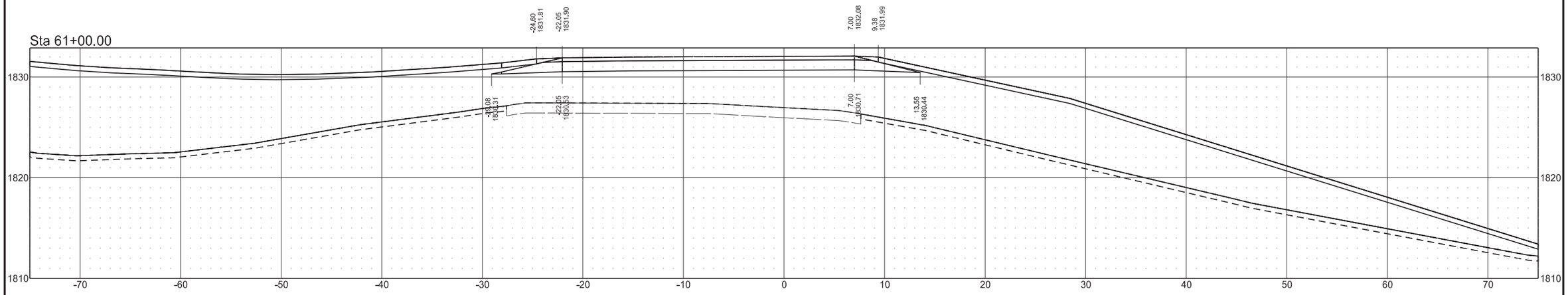
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	ND	IM-2-094(186)217	200	10



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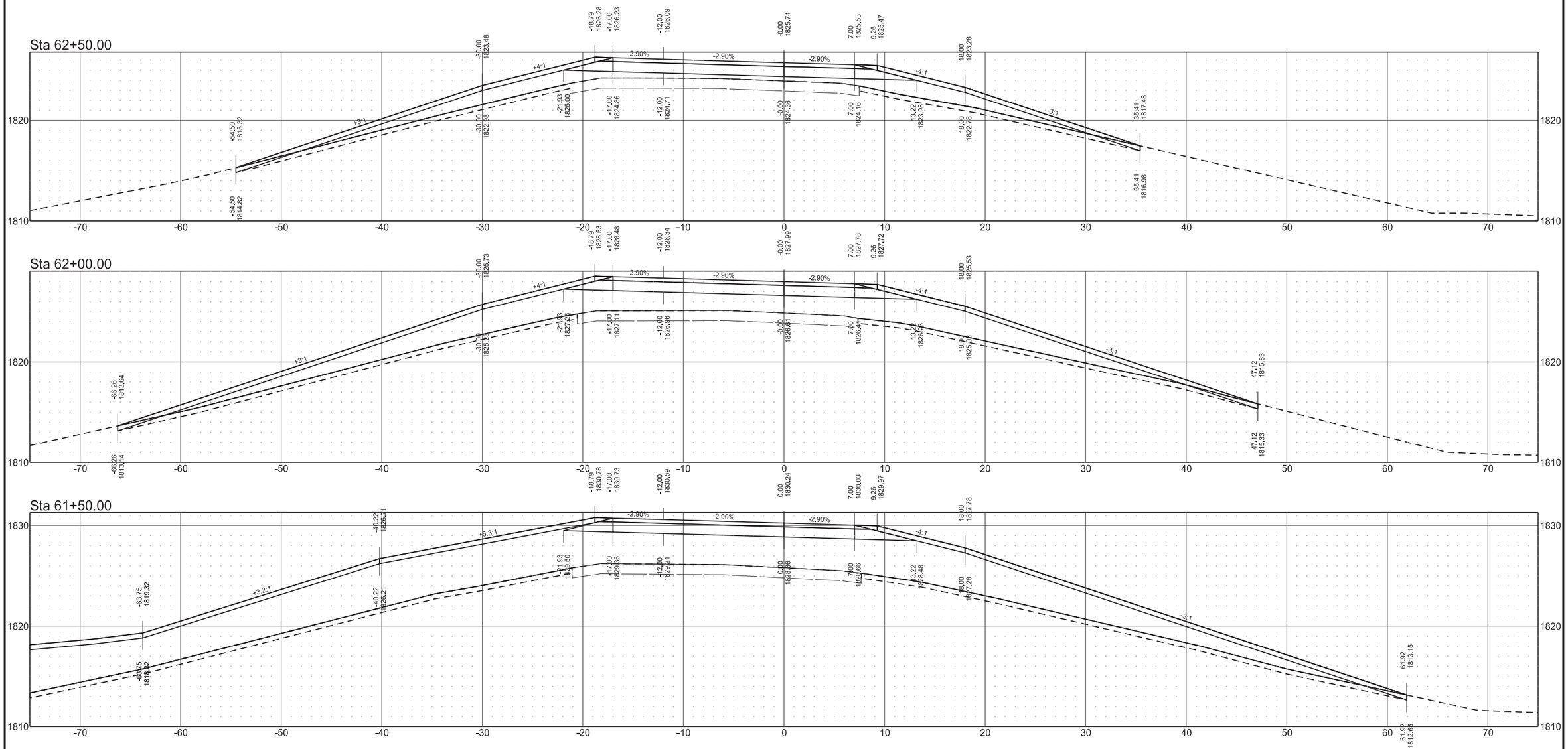
I94/Pettibone Interchange
Cross Sections
NW Ramp

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	11



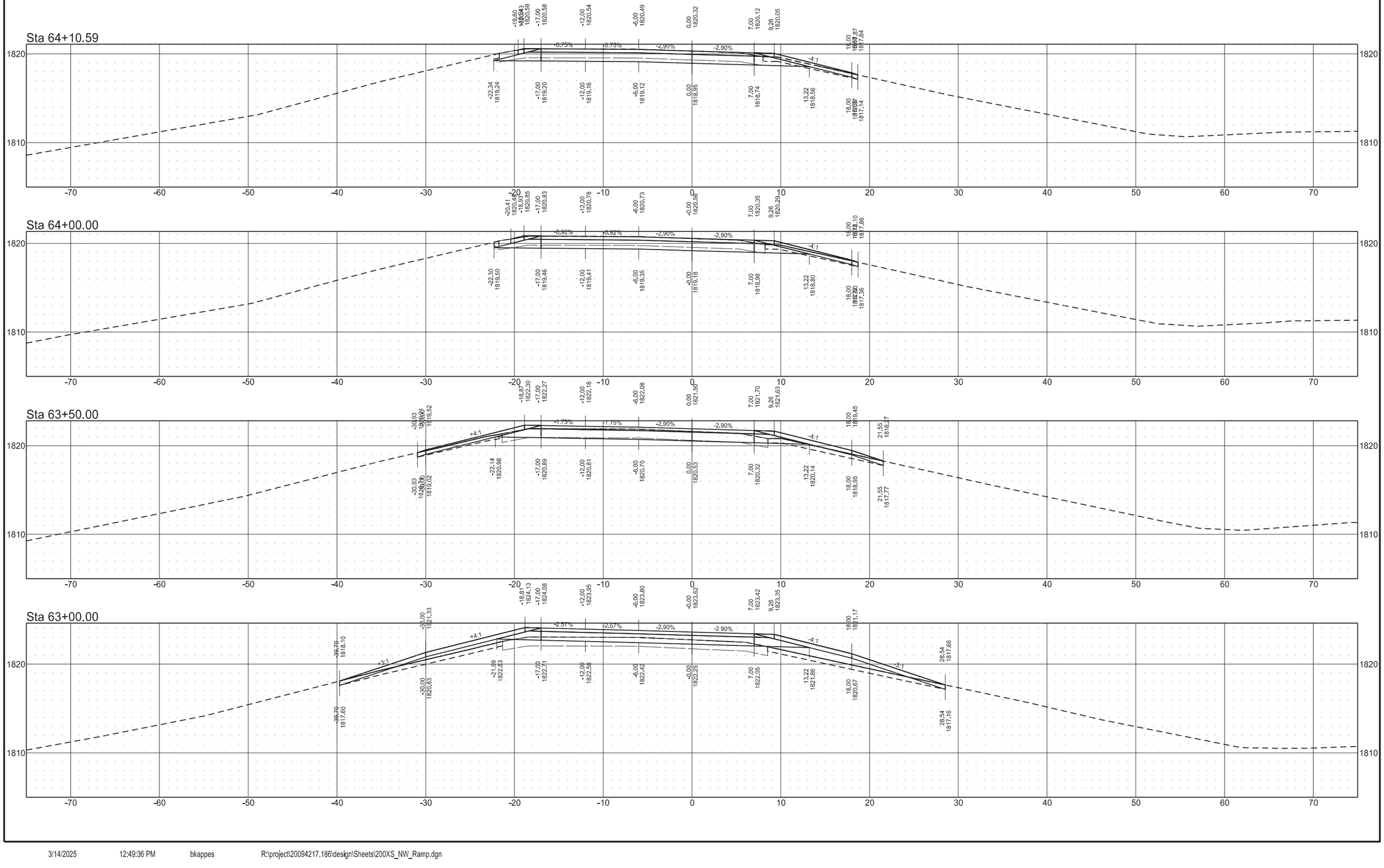
I94/Pettibone Interchange
Cross Sections
NW Ramp

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	ND	IM-2-094(186)217	200	12



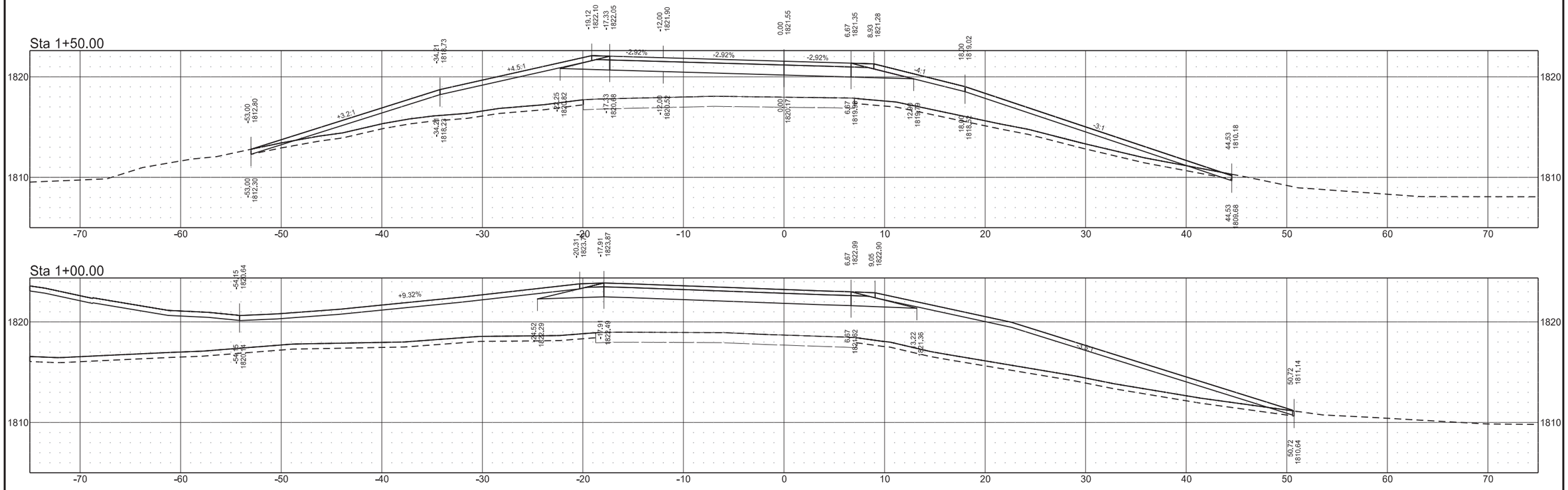
I94/Pettibone Interchange
Cross Sections
NW Ramp

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	13



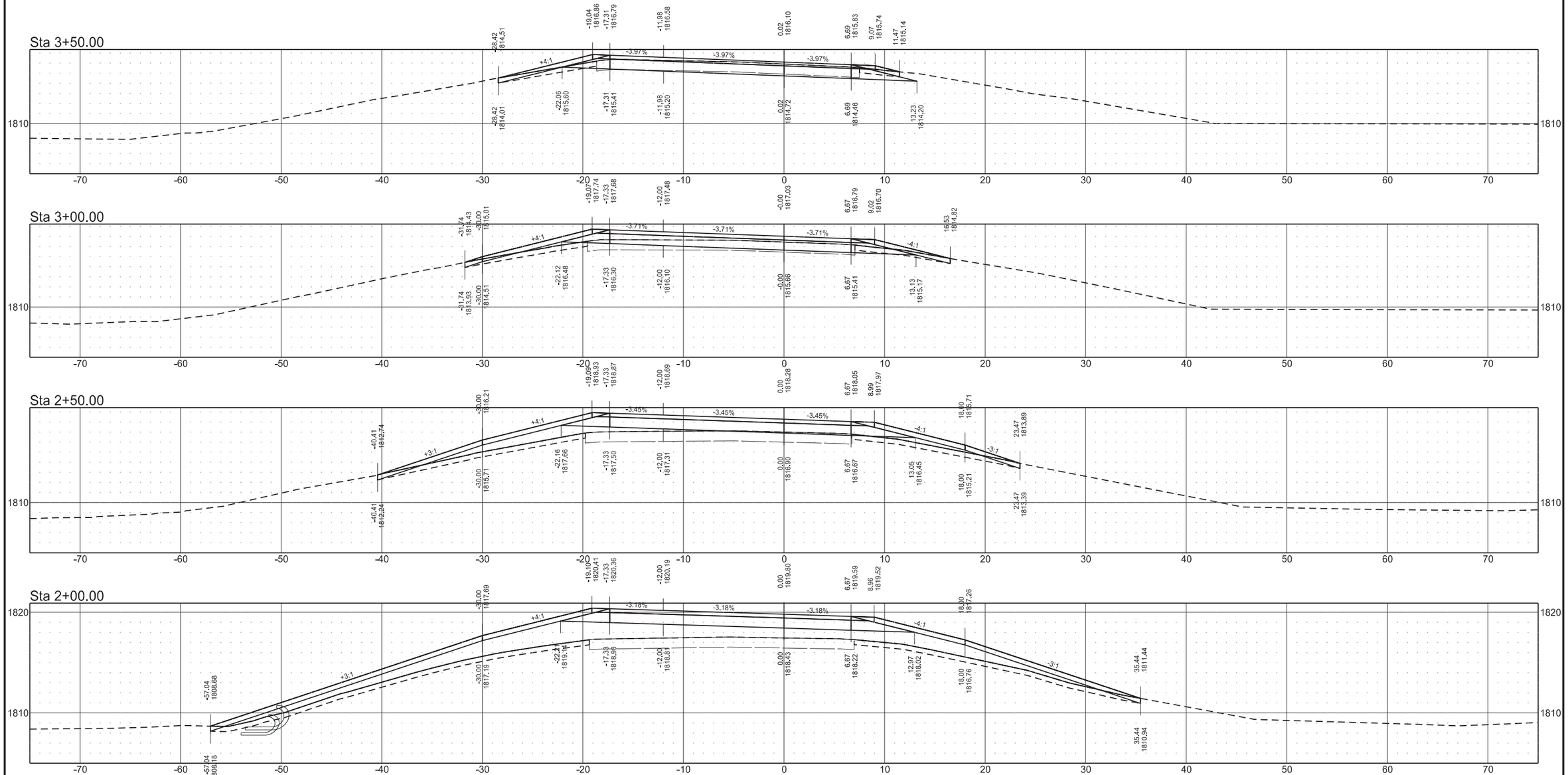
I94/Pettibone Interchange
Cross Sections
SE Ramp

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I94/Pettibone Interchange
Cross Sections
SE Ramp

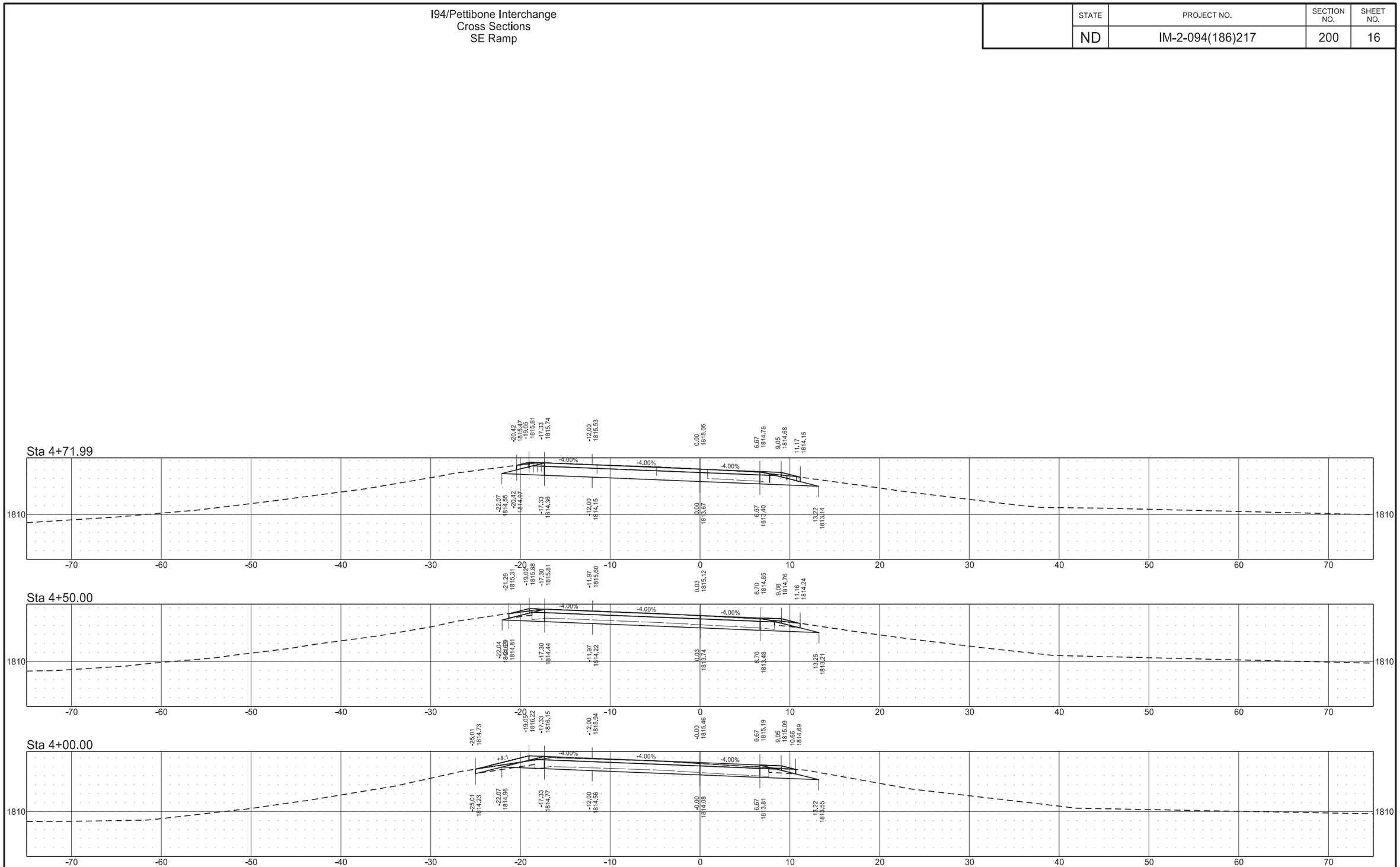
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I94/Pettibone Interchange
Cross Sections
SE Ramp

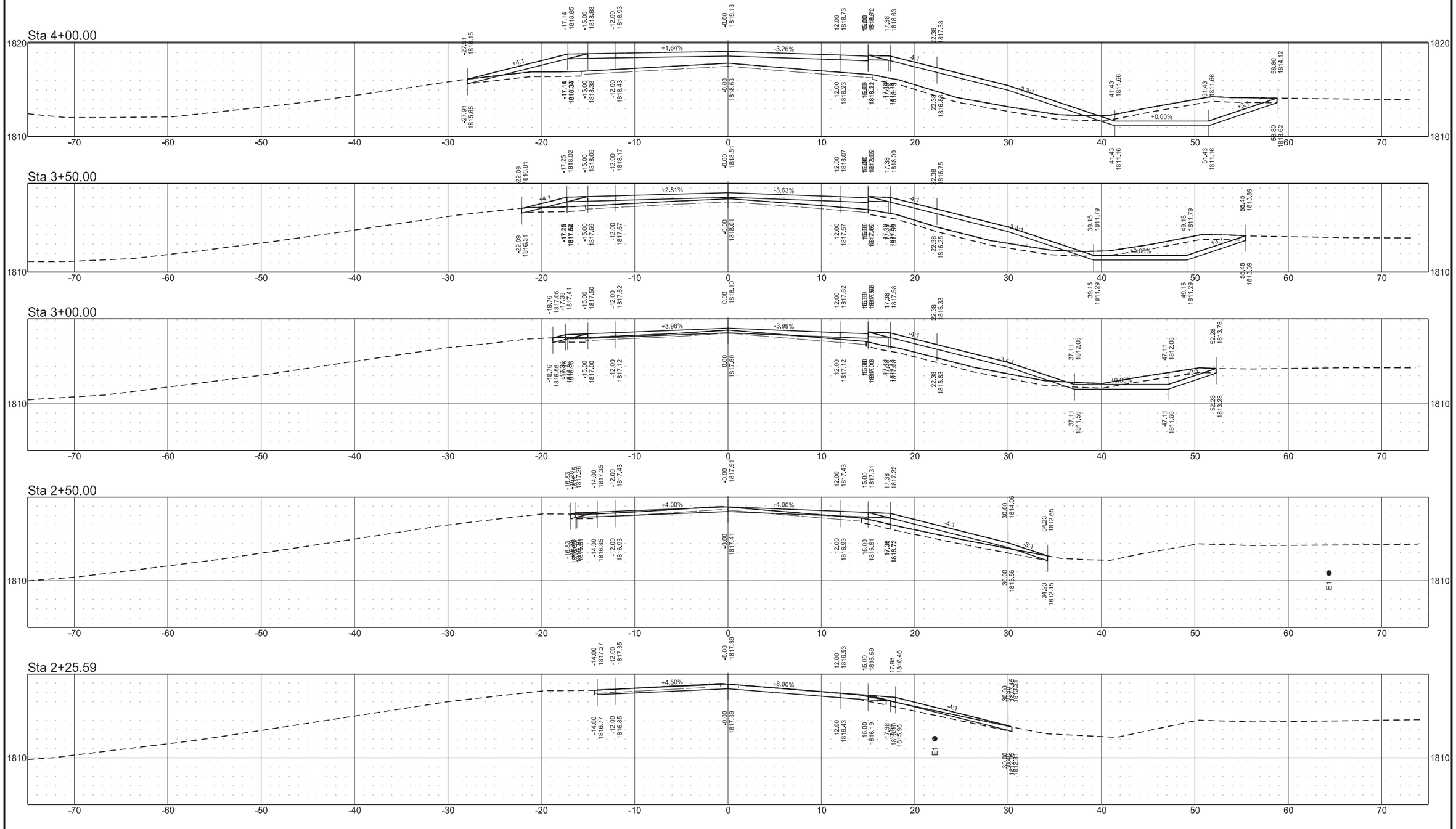
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I94/Pettibone Interchange
Cross Sections
South Frontage Road

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

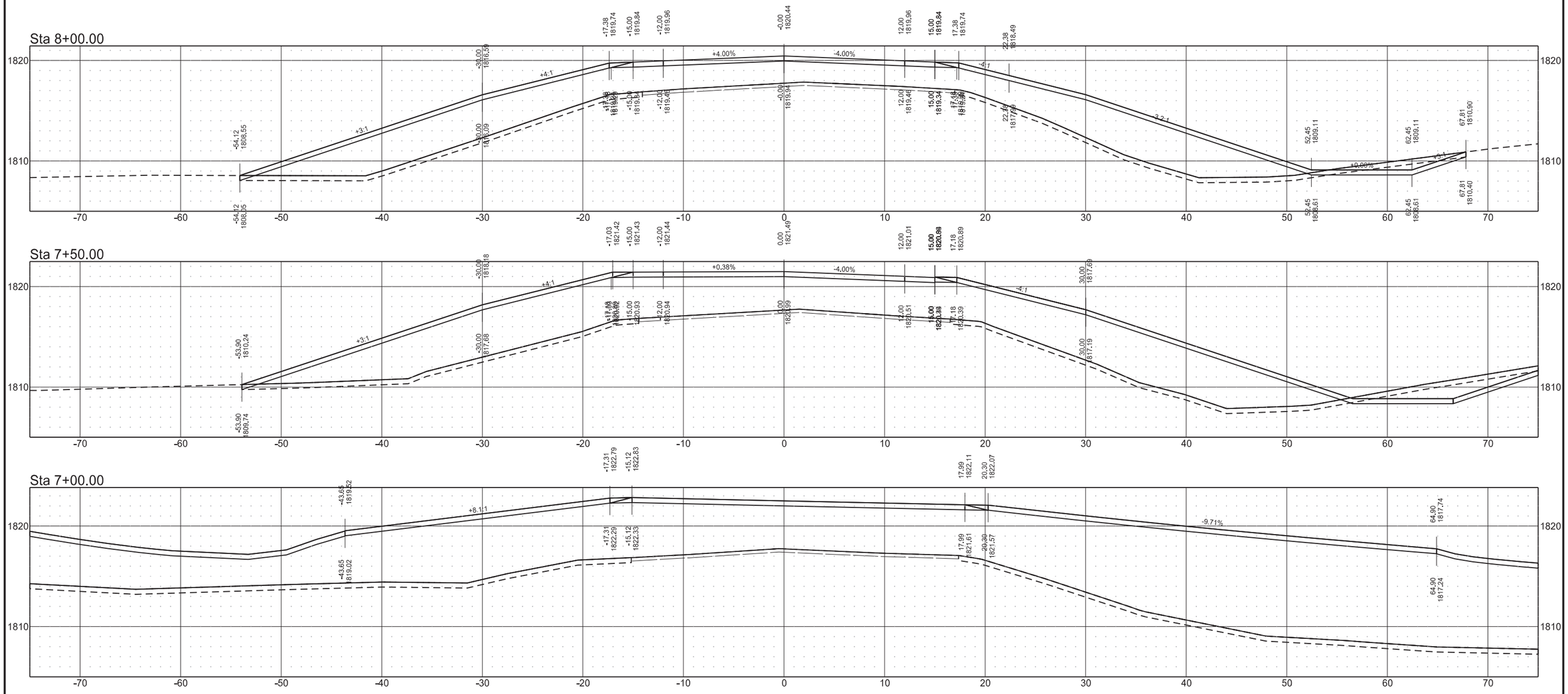


I94/Pettibone Interchange
Cross Sections
South Frontage Road

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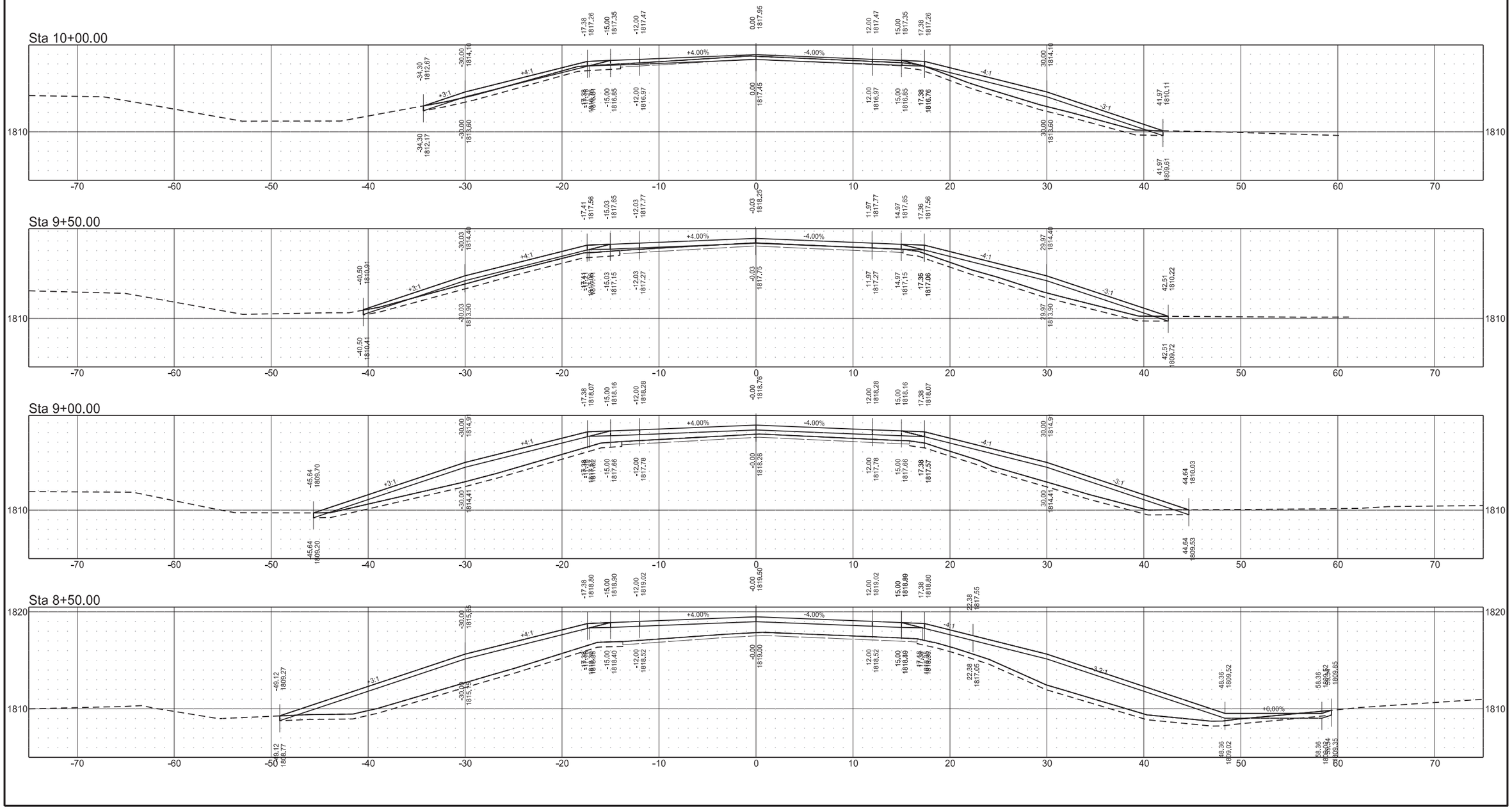
I94/Pettibone Interchange
Cross Sections
South Frontage Road

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	ND	IM-2-094(186)217	200	19



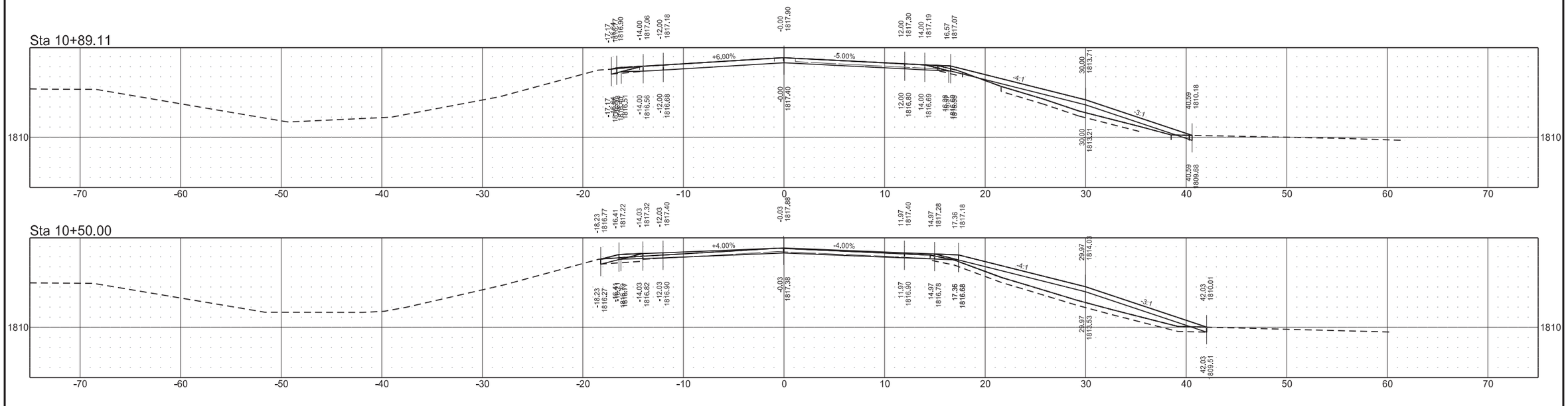
I94/Pettibone Interchange
Cross Sections
South Frontage Road

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	20



I94/Pettibone Interchange
Cross Sections
South Frontage Road

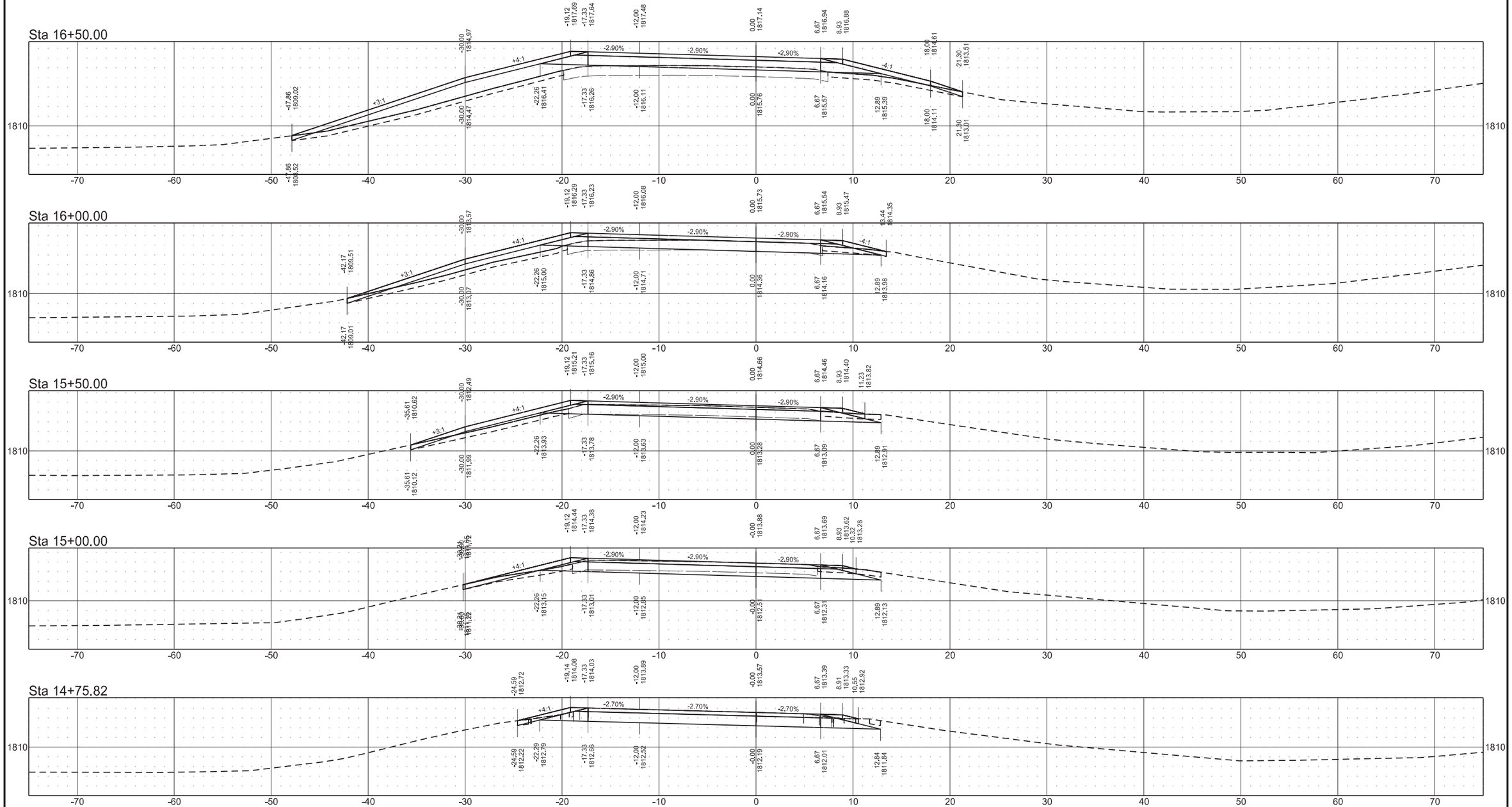
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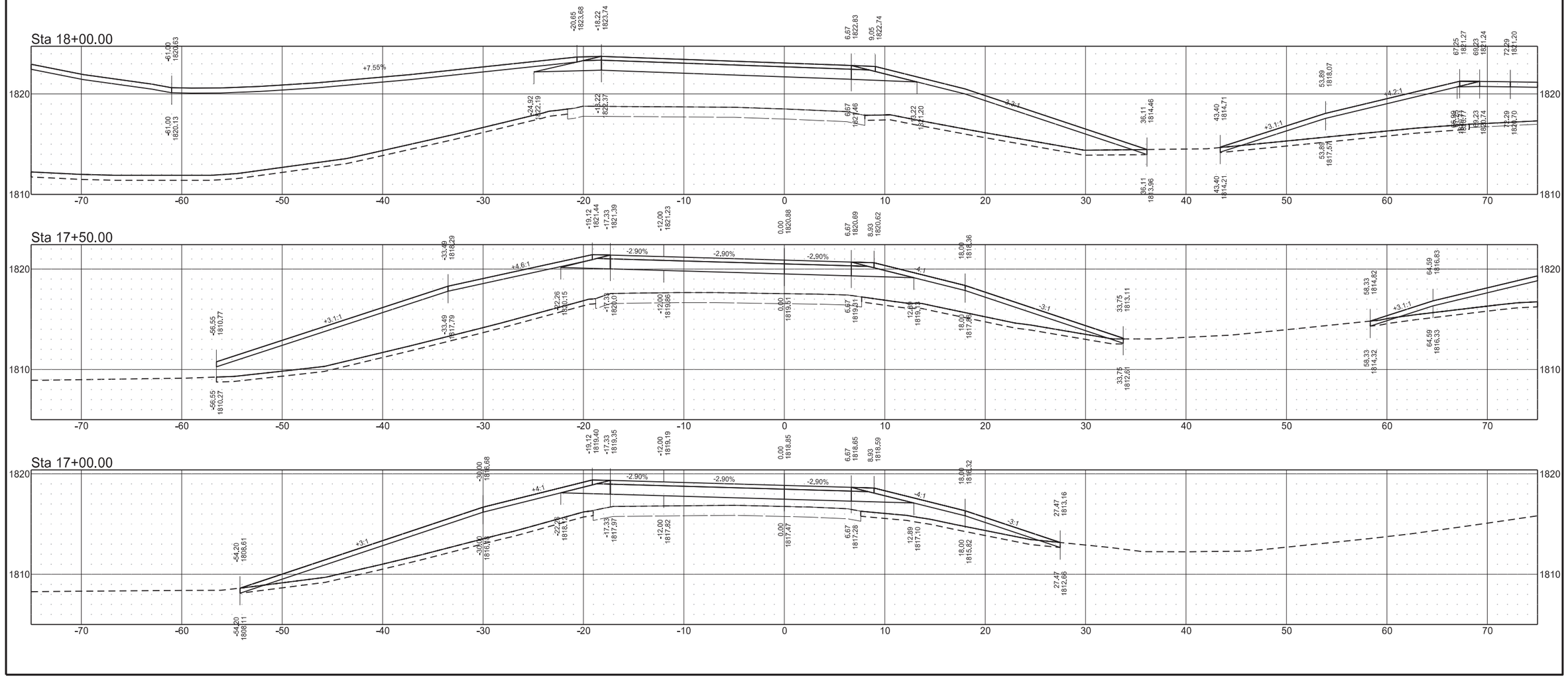
I94/Pettibone Interchange
Cross Sections
SW Ramp

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(186)217	200	22



I94/Pettibone Interchange
Cross Sections
SW Ramp

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



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NDDOT ABBREVIATIONS

?	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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions

KIRK J. HOFF
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PE-4683
04/14/25
ENGINEER
NORTH DAKOTA

Docusign Envelope ID: 60E6D5C0-46BC-49CB-8E0F-CBA6AC9DB3C4

NDDOT ABBREVIATIONS

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions
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08-16-22	General Revisions
04-14-25	General Revisions

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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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION
07-01-14

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NDDOT ABBREVIATIONS

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
04-23-18	General Revisions
09-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions
04-14-25	General Revisions

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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

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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LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

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

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

- 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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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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)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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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)

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
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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

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

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12 18 2020

Cross Section Legend

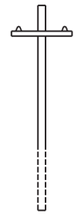
D-101-40

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.



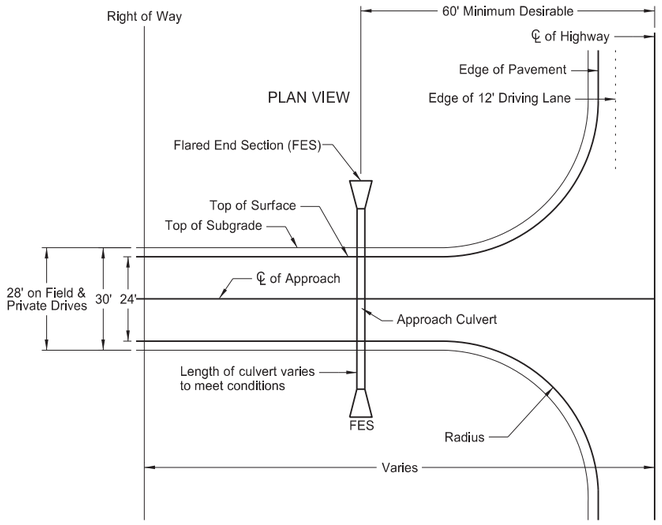
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

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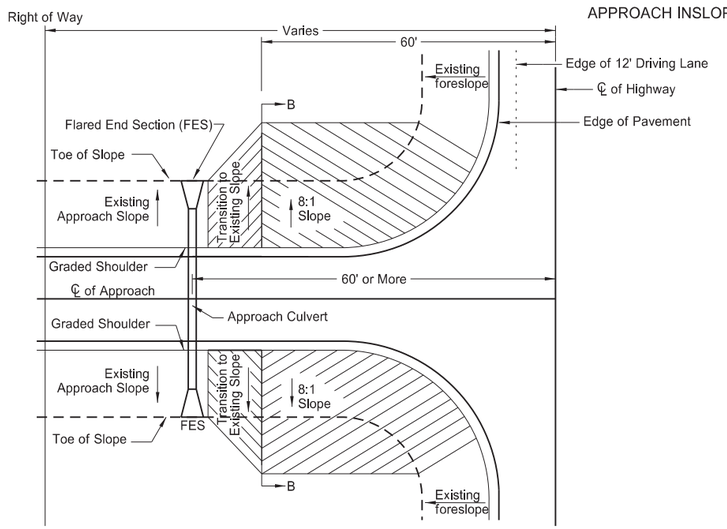
06/14/23

STANDARD RURAL APPROACHES

D-203-8

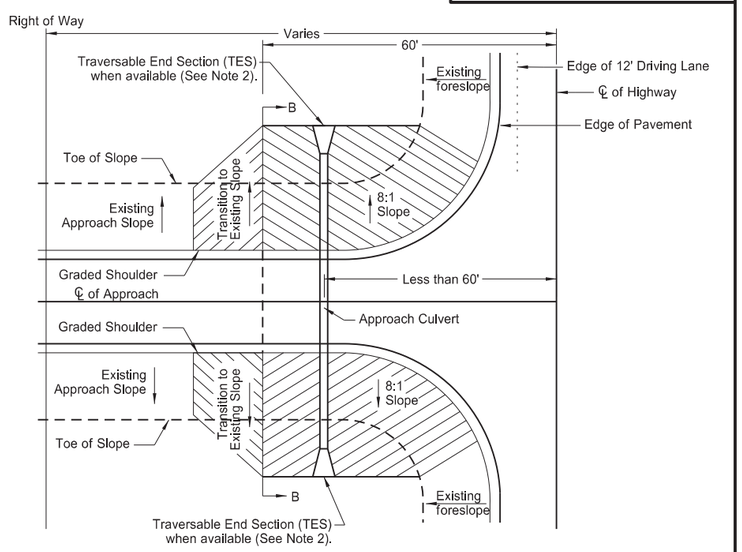


APPROACH INSLOPES



CASE 1

APPROACH PIPE LOCATED
60' OR MORE FROM ℄



CASE 2

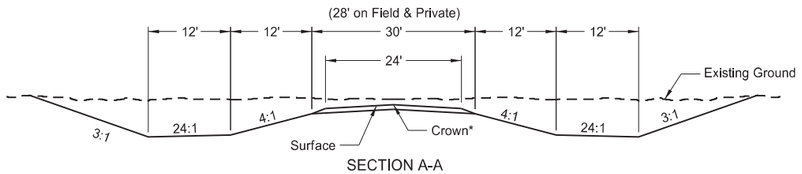
APPROACH PIPE LOCATED
LESS THAN 60' FROM ℄

Approach Pipe Traversable End Sections (TES)

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

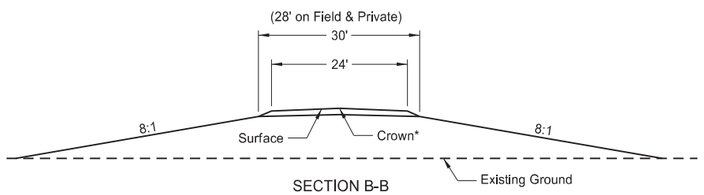
CRITERIA FOR RURAL APPROACH TYPES

	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)

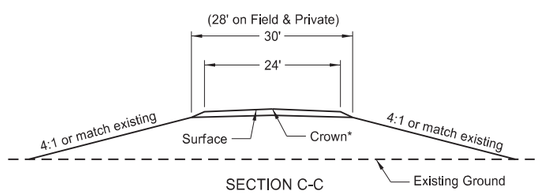


SECTION A-A

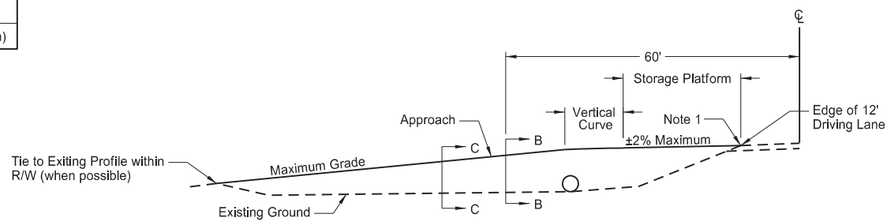
*2.1% crown for paved surface
*3.0% crown for gravel surface



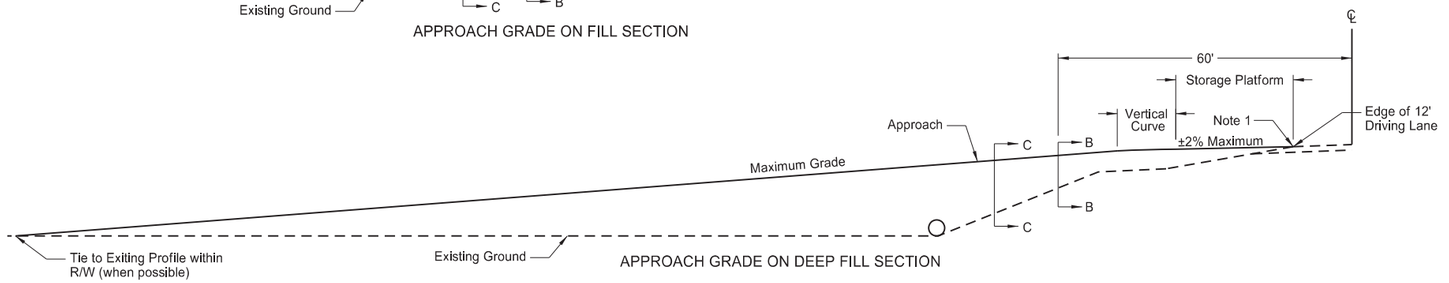
SECTION B-B



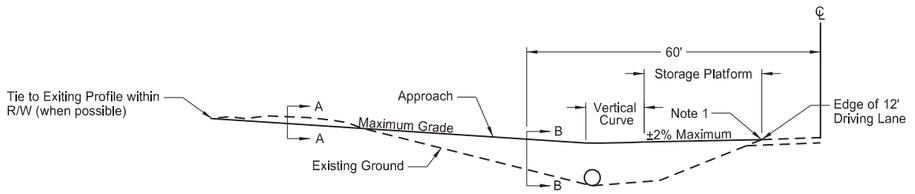
SECTION C-C



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.

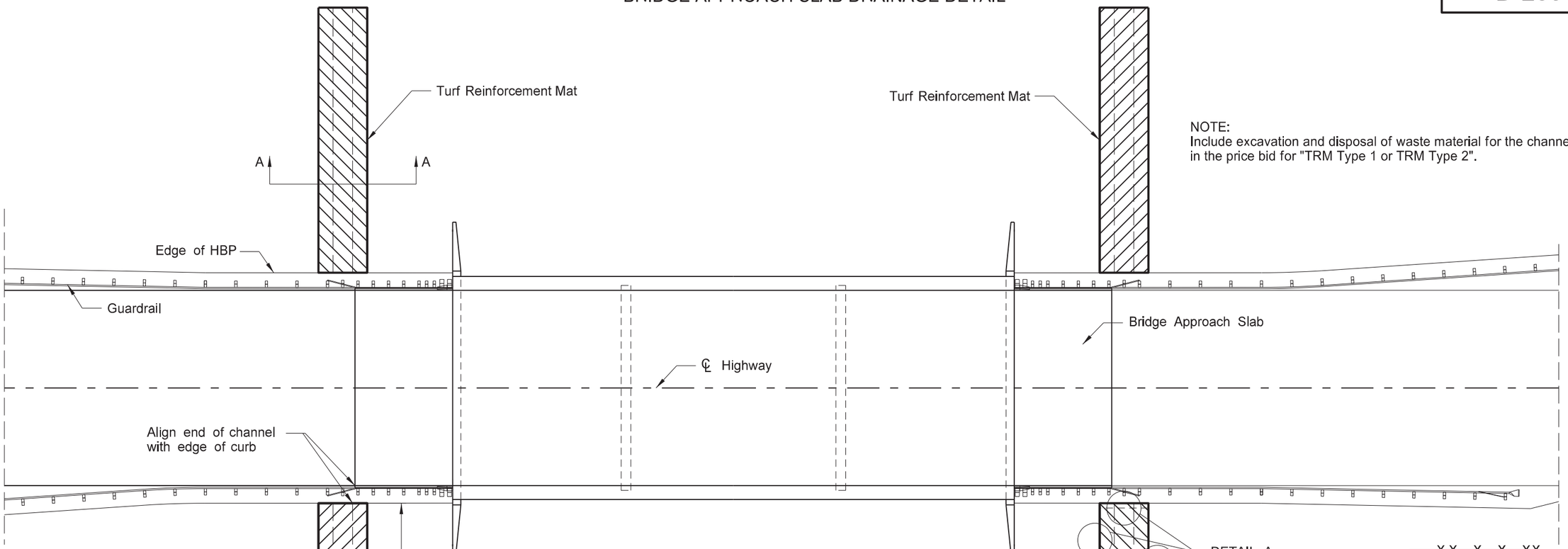
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-25-14	
REVISIONS	
DATE	CHANGE
06-30-17	Revised Radius, Storage Platform, Inslope dimensions, and Note 1
10-25-19 06-29-22	Changed "Inslope" to "Foreslope" Added "TES", Table, and Note 2

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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

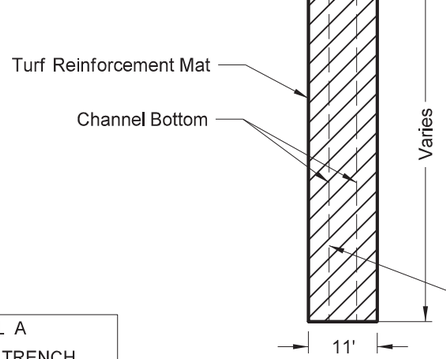
06/29/22

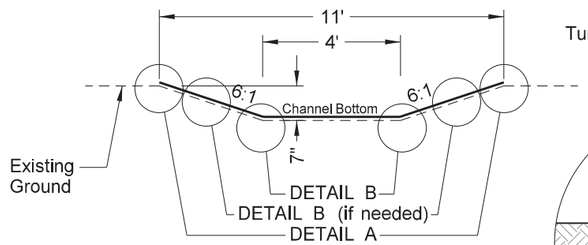
BRIDGE APPROACH SLAB DRAINAGE DETAIL

D-255-1

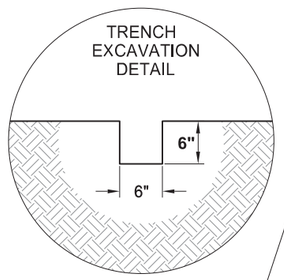


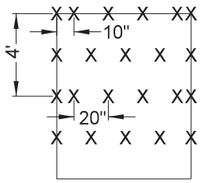
NOTE:
Include excavation and disposal of waste material for the channel in the price bid for "TRM Type 1 or TRM Type 2".



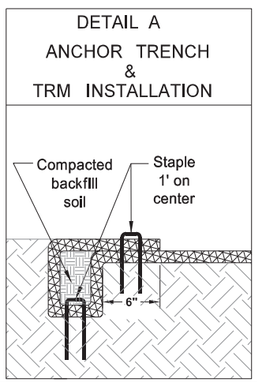


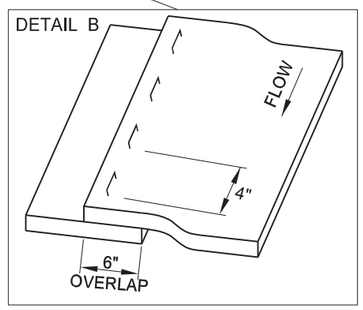
SECTION A-A

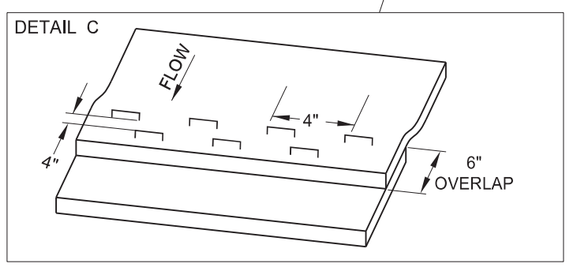




STAPLE PATTERN: 3.8 staples per square yard.







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

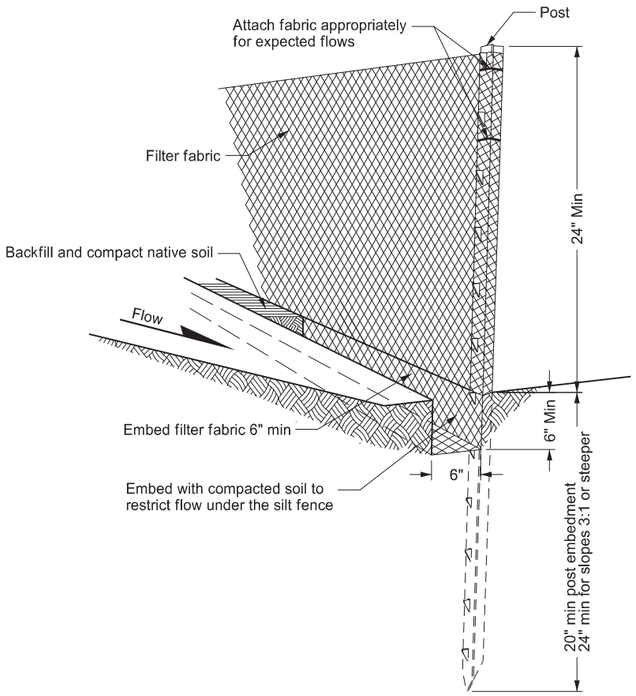
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-4 to D-255-1.
07-27-15	Changed installation details.
08-27-19	New Design Engineer PE Stamp.

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

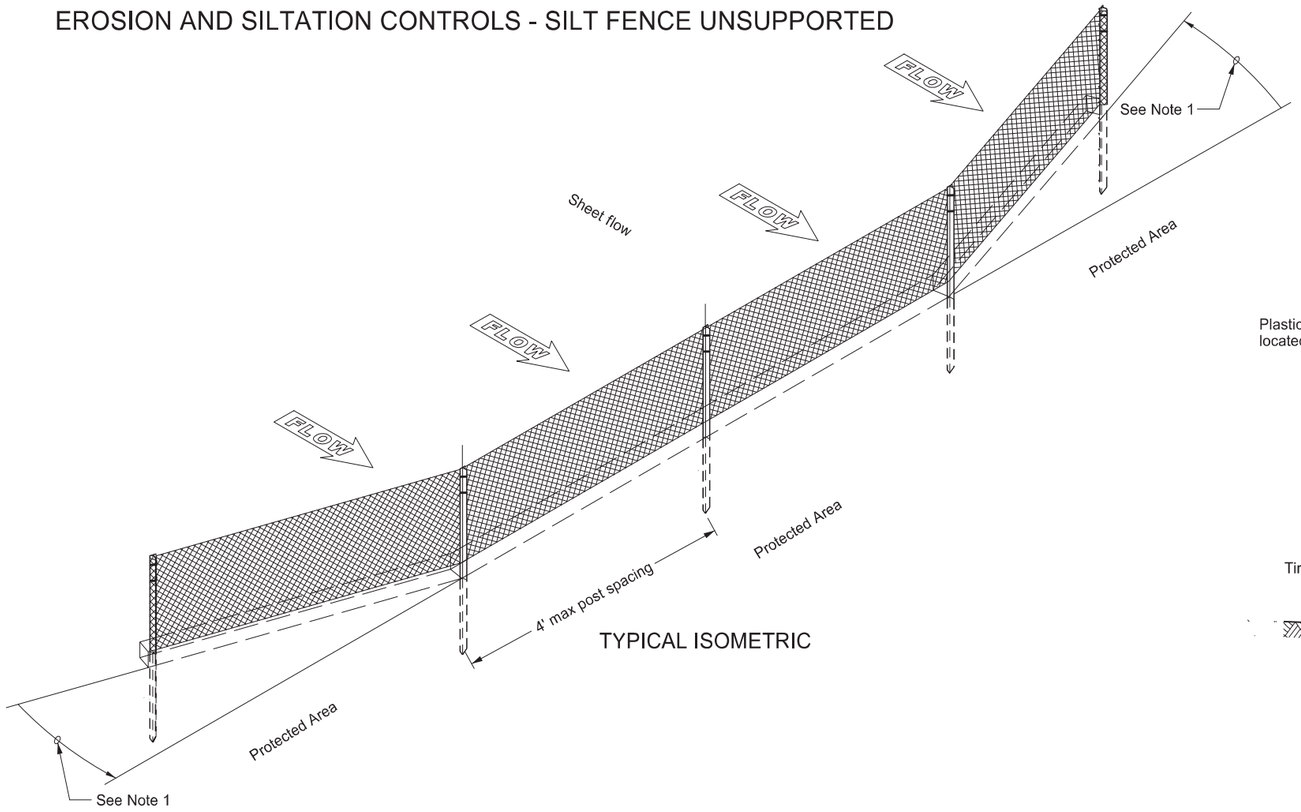
EROSION AND SILTATION CONTROLS - SILT FENCE UNSUPPORTED

D-260-1

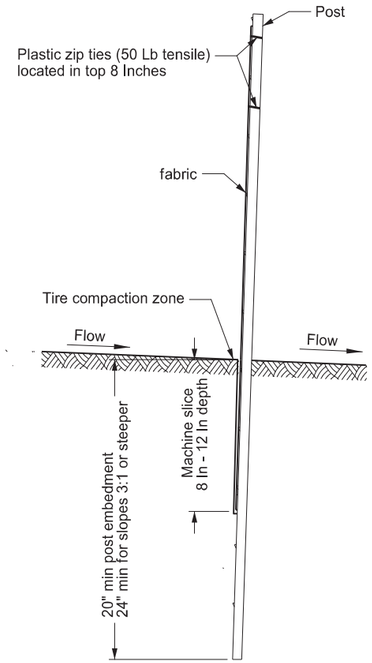


HAND PLACED INSTALLATION DETAIL

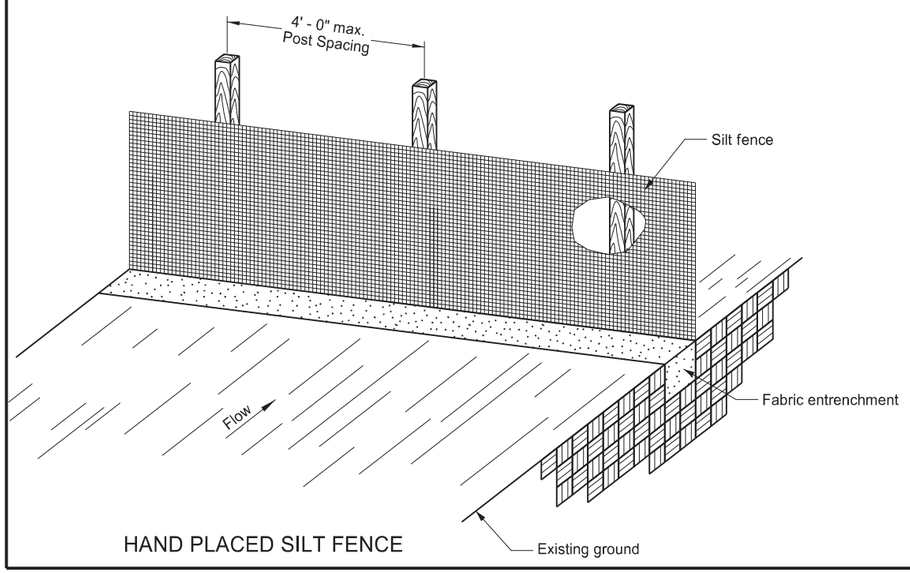
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



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.

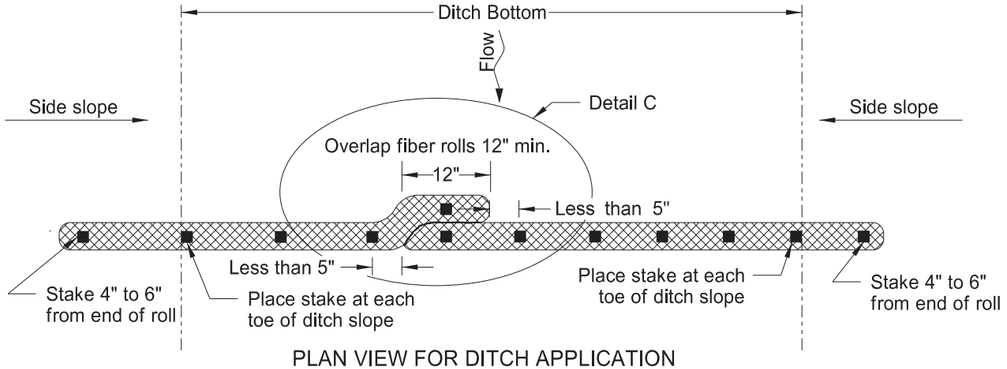
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REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

07/22/25

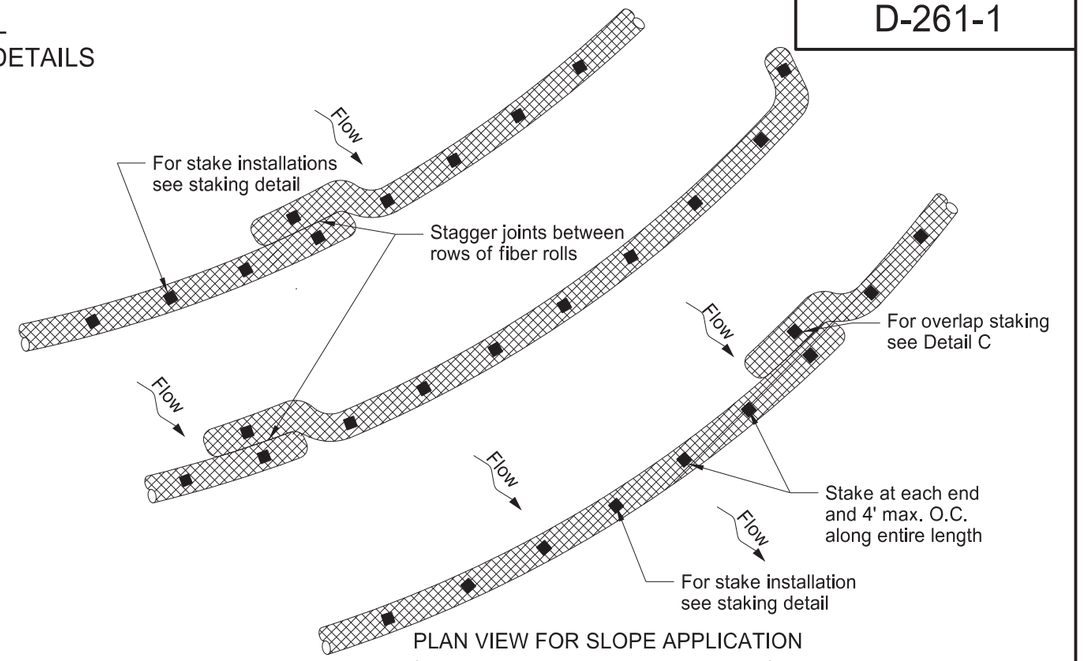
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D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

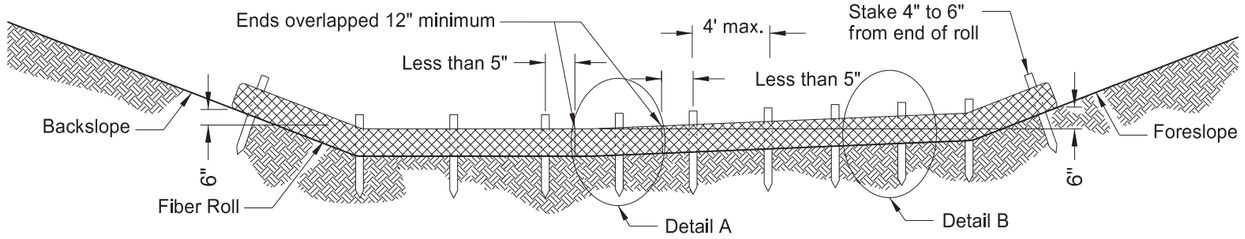


PLAN VIEW FOR DITCH APPLICATION

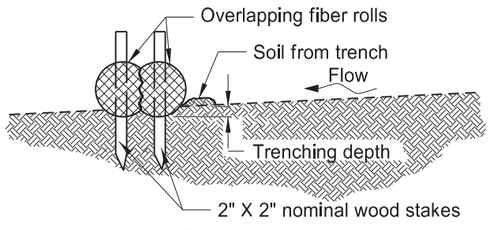


PLAN VIEW FOR SLOPE APPLICATION

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

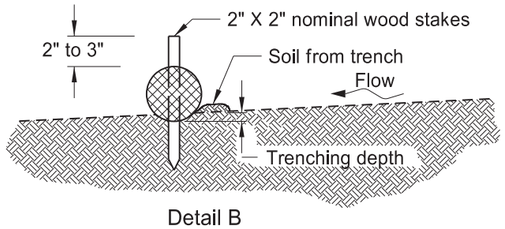


12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



Detail A

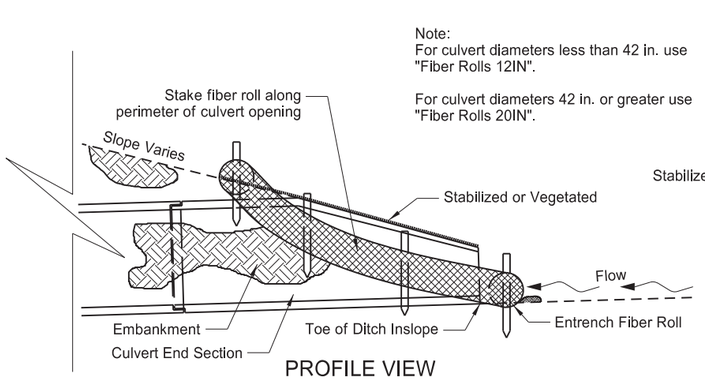
Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

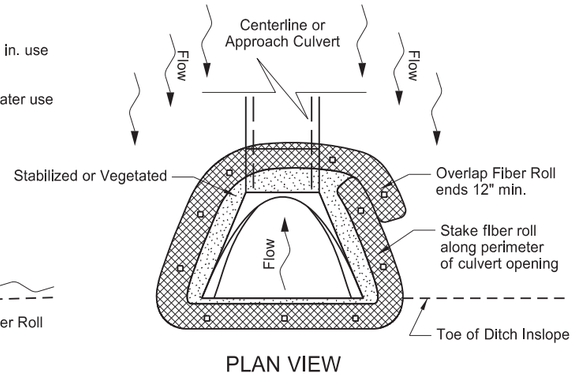
NOTE: Do not allow runoff to run under or around roll.



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

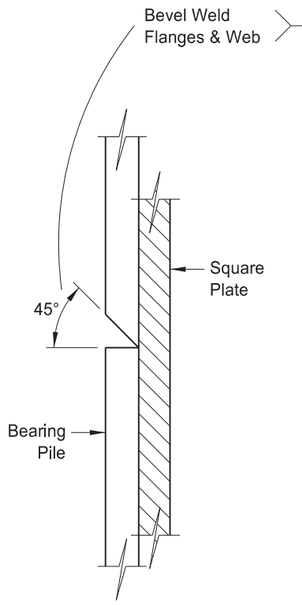
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

03/13/25

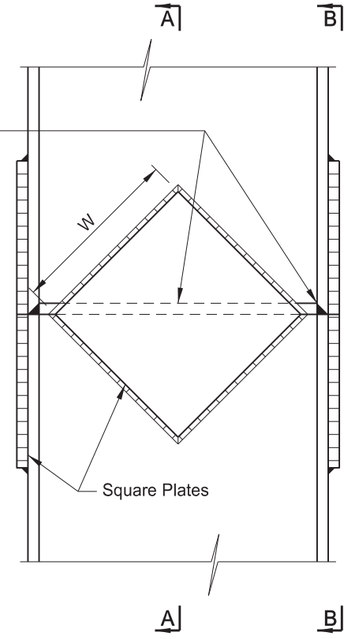
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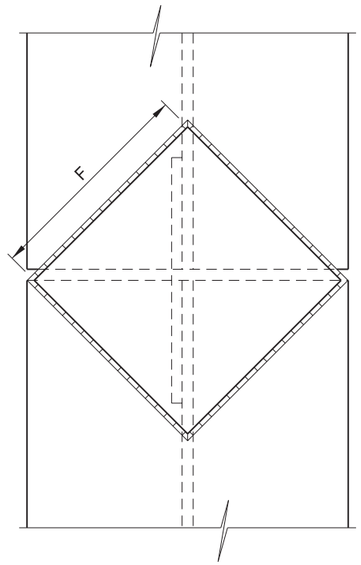
PILE SPLICE DETAILS

D-622-1

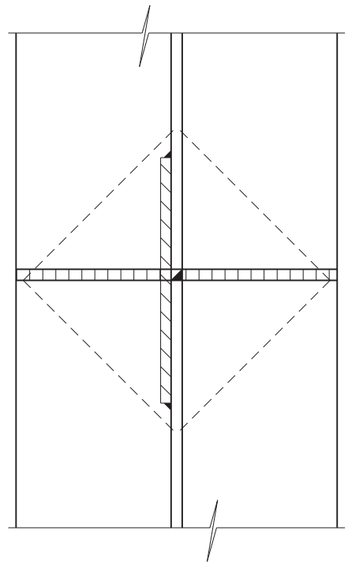


ENLARGED VIEW



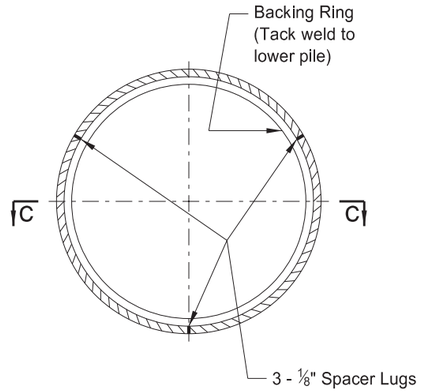


B-B

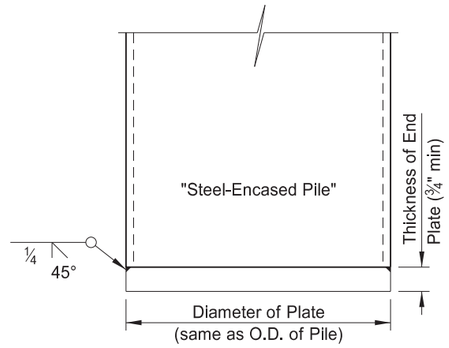


A-A

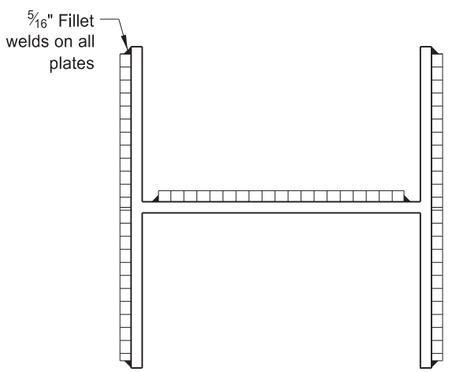
Flame scarf inside of both flanges and one side of web of upper section.



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

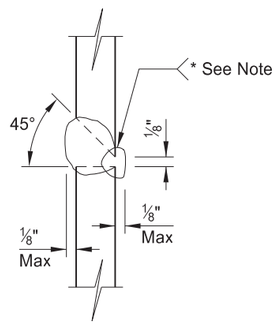


END PLATE DETAIL

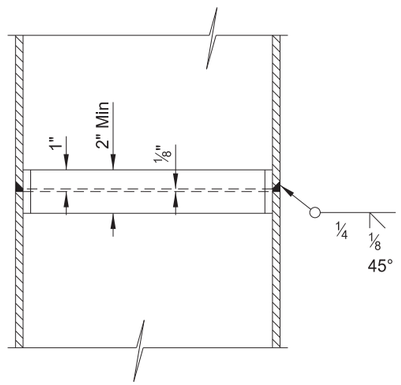


PILE	8"	10"	12"	14"
"F" FLANGE	5"	6½"	8"	10"
"W" WEB	4"	5½"	6½"	8"

H-PILE SPLICE DETAIL

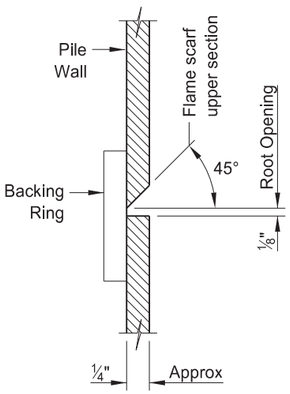


ALTERNATE H-PILE SPLICE DETAIL



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.

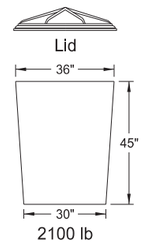
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE
09/03/19 02/23/24	Updated Signature Updated Signature Revised notes & updated to active voice

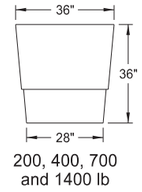
REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE
02/23/24
NORTH DAKOTA

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

ATTENUATION DEVICE

D-704-1

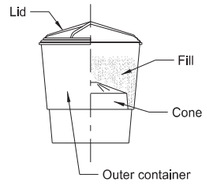




Outer Containers

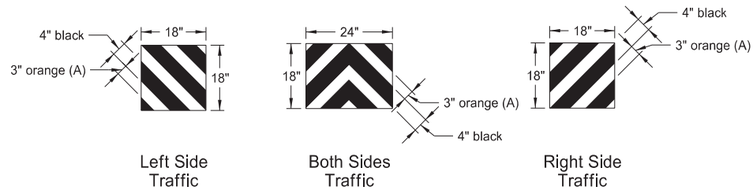


Cones



Typical Assembly

Typical Module
Construction Detail

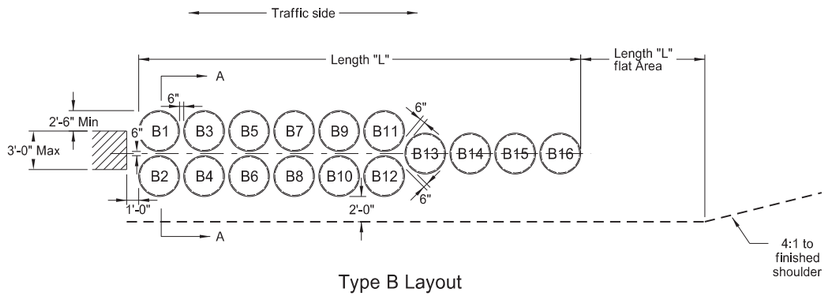


Reflective Sheet Detail

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.

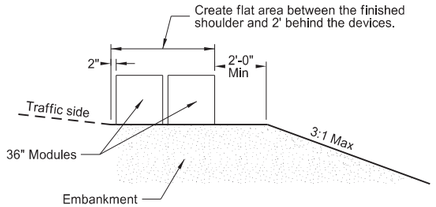
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.

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



Type B Layout

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



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

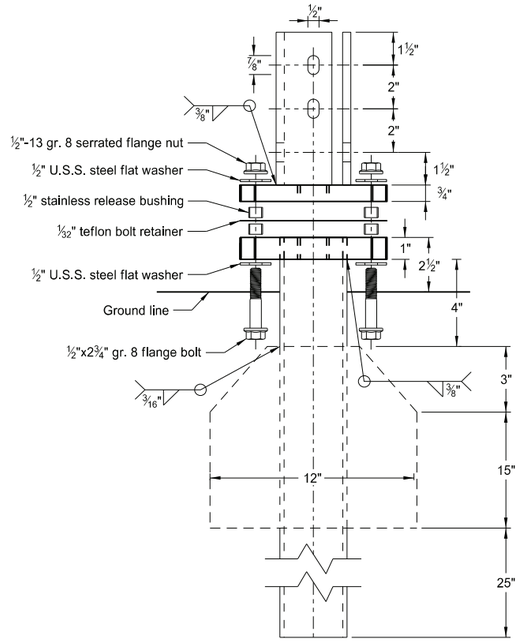
DATE	CHANGE
07-18-14	Revised sheeting in reflective sheet detail
09-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

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06/30/25
ENGINEER
NORTH DAKOTA

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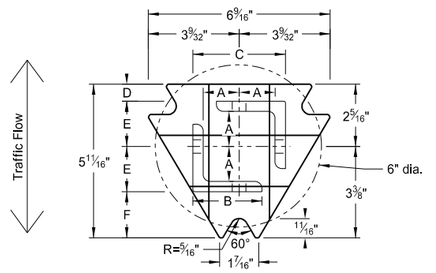
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

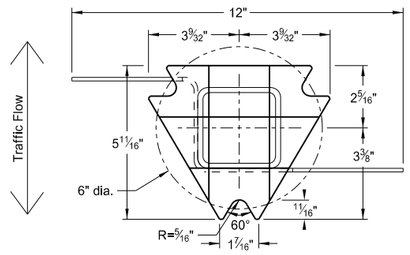


Multi-Directional
Slip Base Assembly

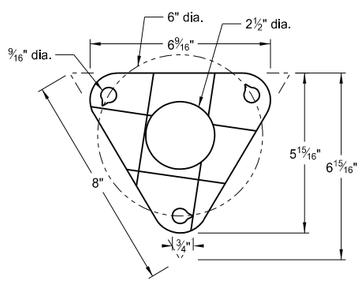
Perforated Tube



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



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.

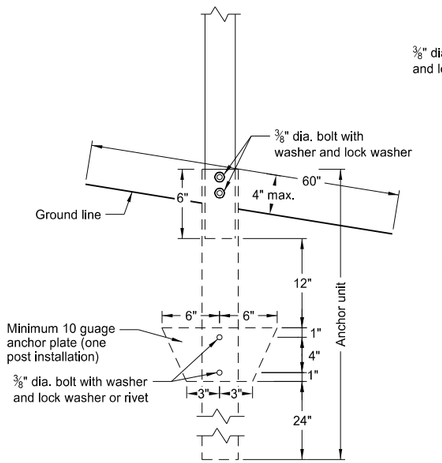
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½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

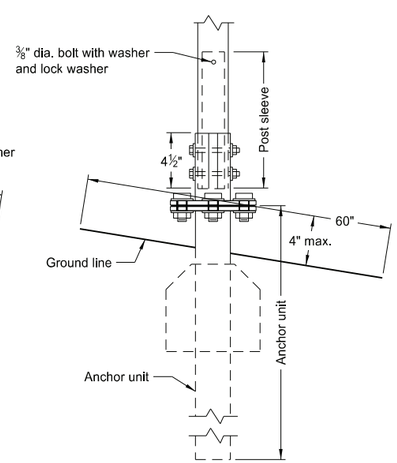
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16"x10 ga.	1 9/64"	2½"	3 1/32"	25/32"	1 33/64"	1 7/8"
2½"x10 ga.	1 9/32"	2½"	3 5/16"	⅝"	1 21/32"	1¾"

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

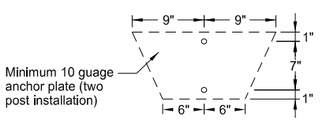
(B) For additional wind load, insert the 2 3/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



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

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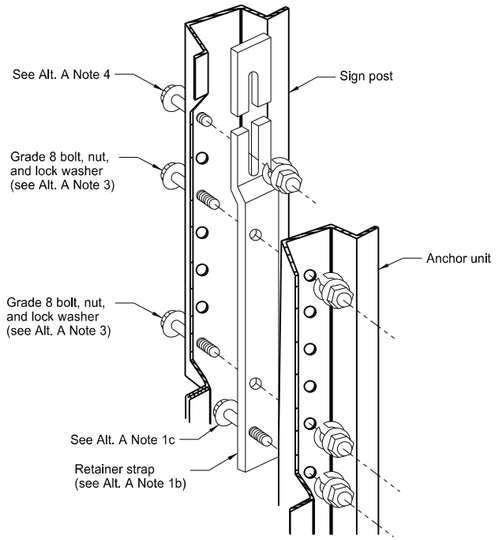
08/01/24

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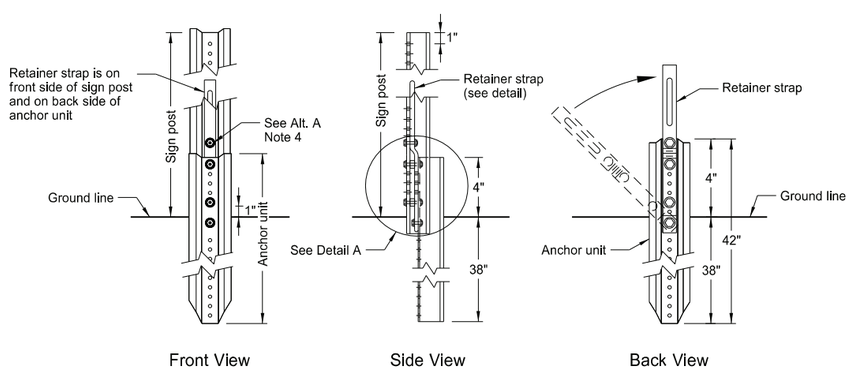
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



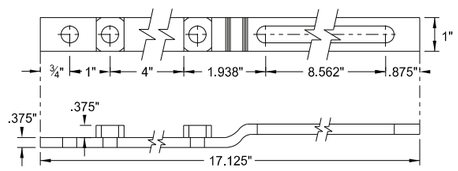
Detail A



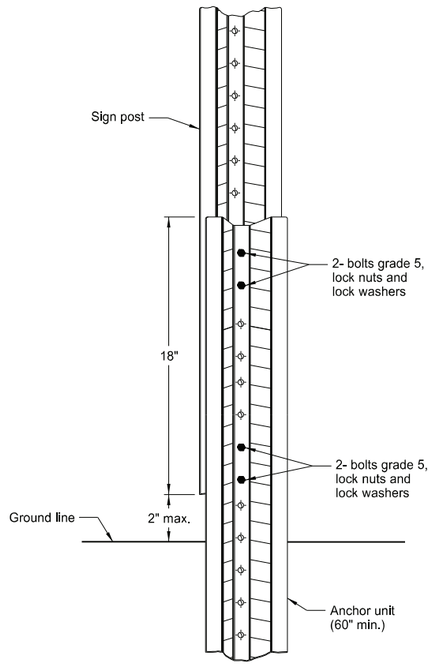
Front View | Side View | Back View

Breakaway U-Channel Detail Alternate A

Install a maximum of 2 posts within 7'.

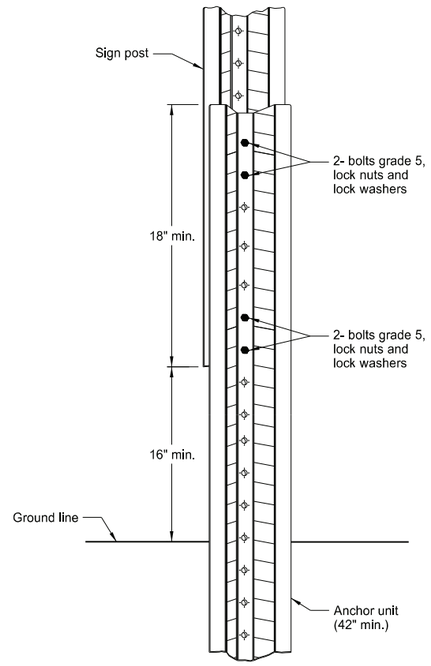


Retainer Strap Detail



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'.

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

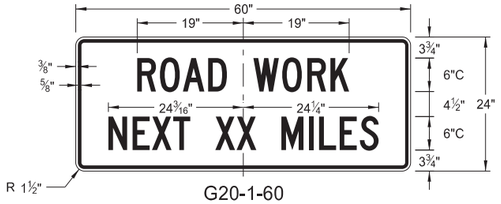
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08/01/24

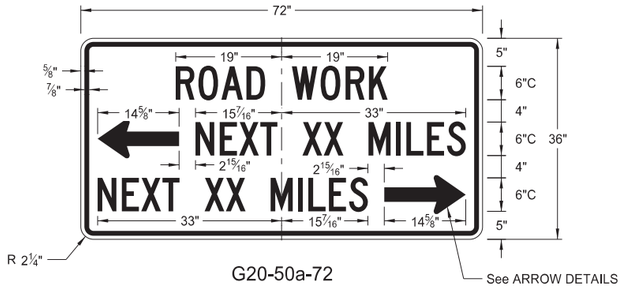
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

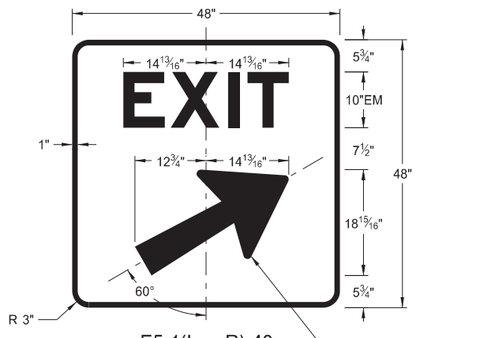
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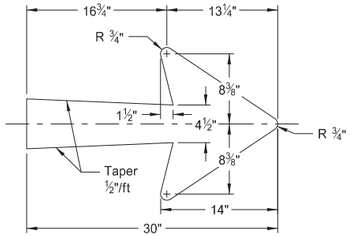
G20-1-60
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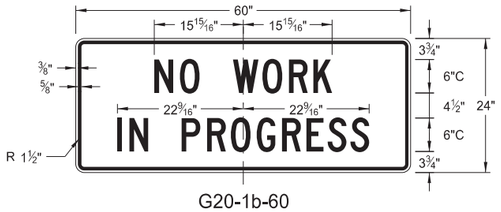
G20-50a-72
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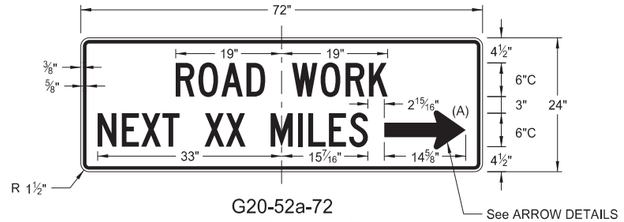
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



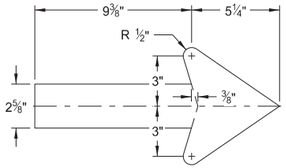
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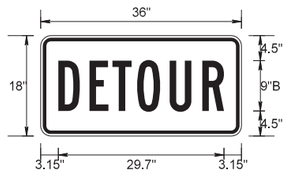
G20-1b-60
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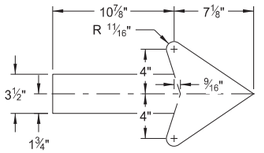
G20-52a-72
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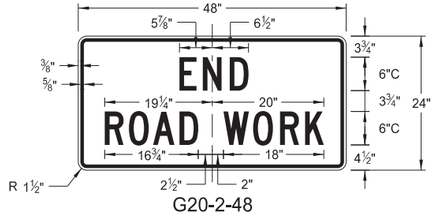
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G20-52a-72



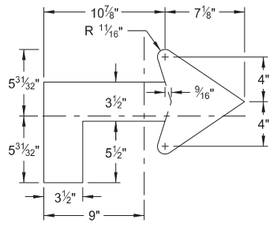
M4-8-36
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Background: orange



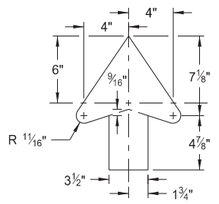
M4-9(L or R)-30
Right or Left



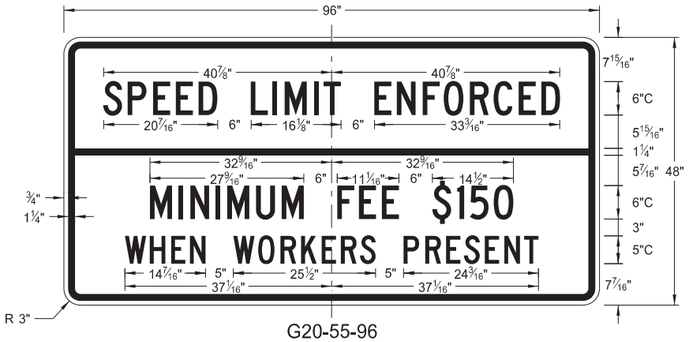
G20-2-48
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Background: orange



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



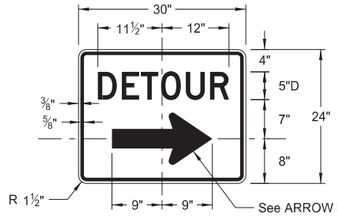
M4-9-30
Straight



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



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



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

ARROW DETAILS

NOTES:

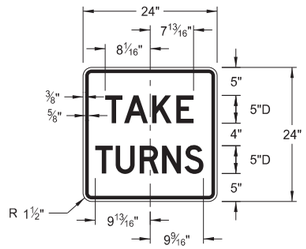
(A) Arrow may be right or left of the legend to indicate construction to the right or left.

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

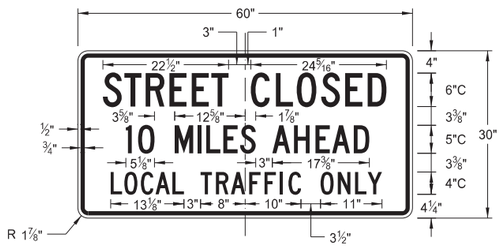
KIRK J. HOFF
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PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

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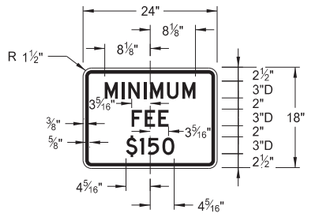
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



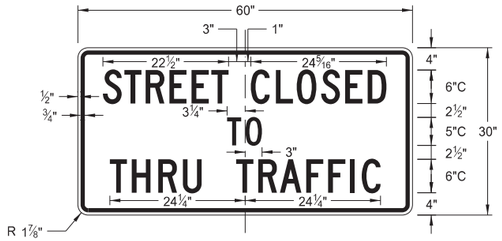
R1-50P-24
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Background: white



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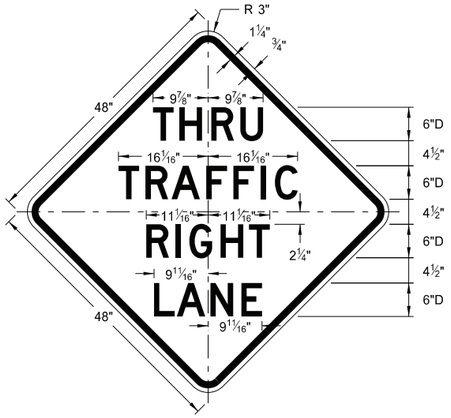
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
08-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp
08-01-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

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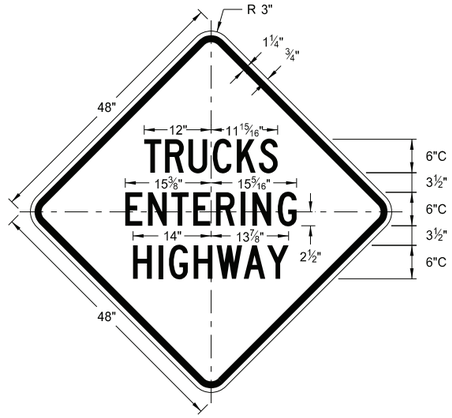
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

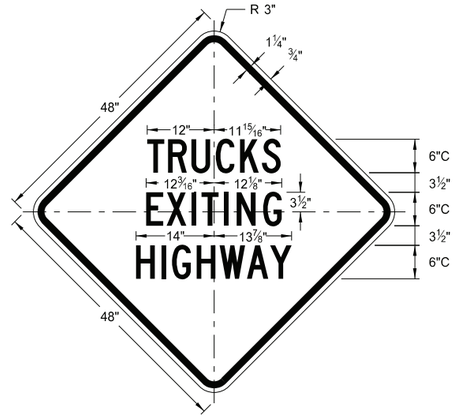
D-704-11



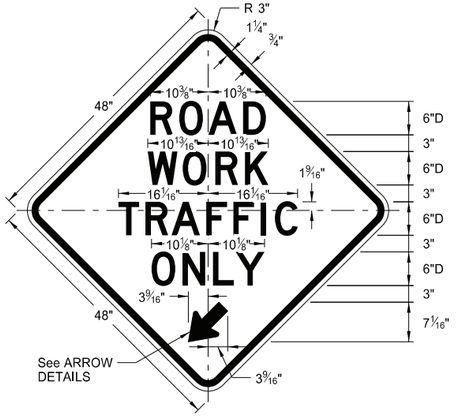
W5-8-48
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Background: orange



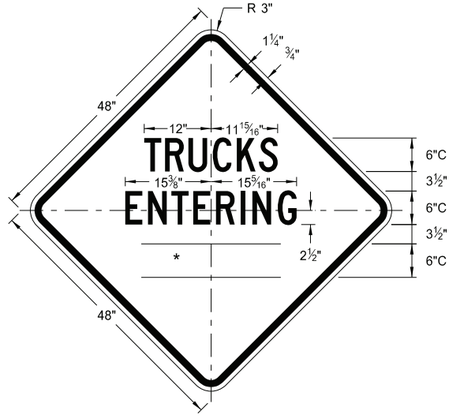
W8-53-48
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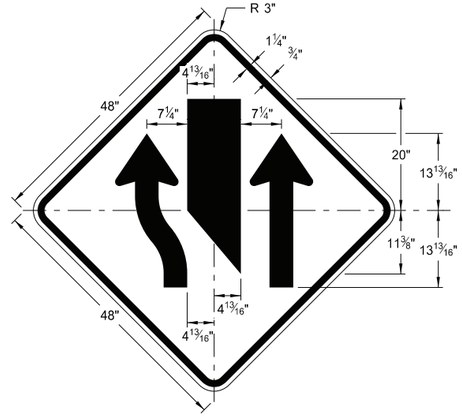
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Background: orange



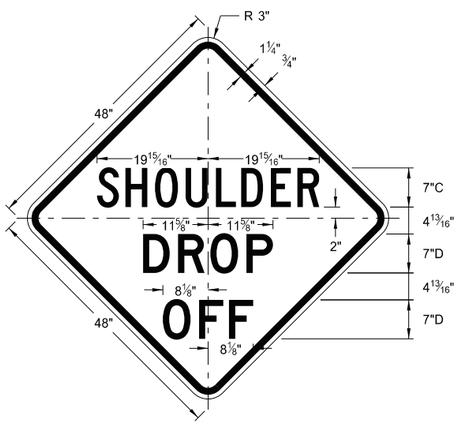
W5-9-48
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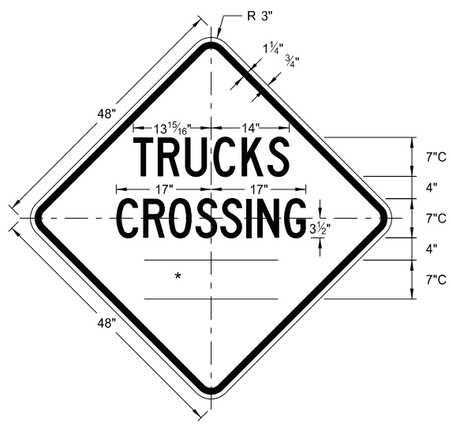
W8-54-48
Legend; black (non-refl)
Background: orange



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



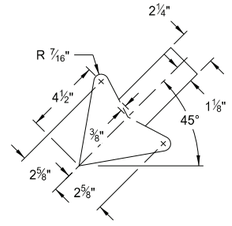
W8-9a-48
Legend: black (non-refl)
Background: orange



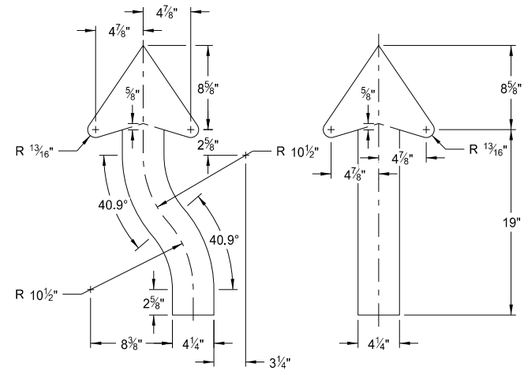
W8-55-48
Legend: black (non-refl)
Background: orange

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

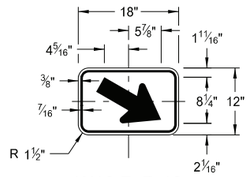
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

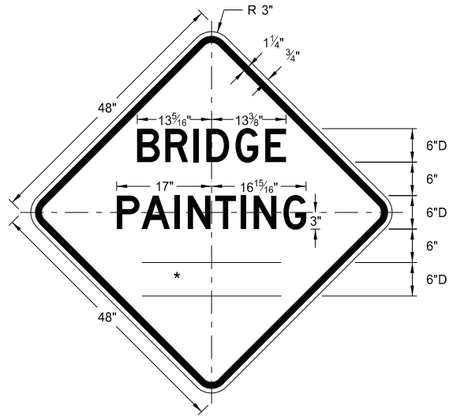
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

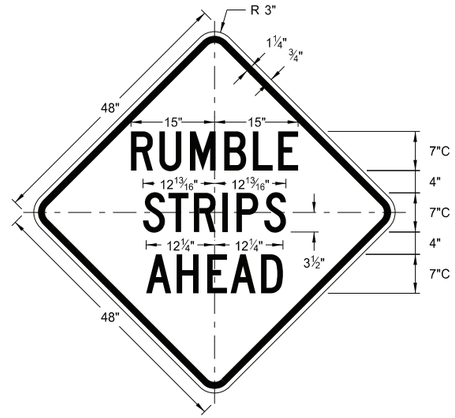
D-704-11A



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



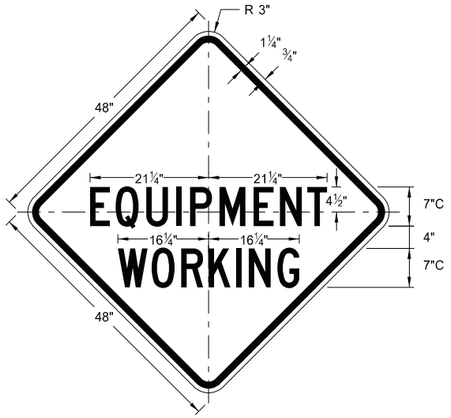
W21-50-48
Legend: black (non-refl)
Background: orange



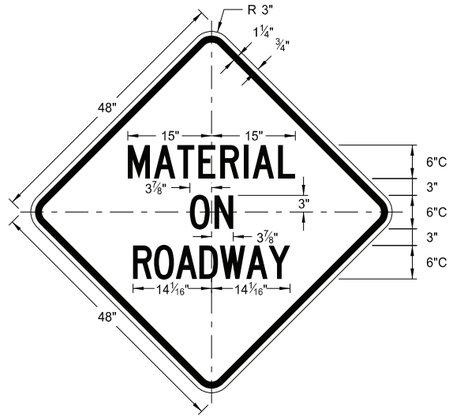
W21-53-48
Legend: black (non-refl)
Background: orange

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

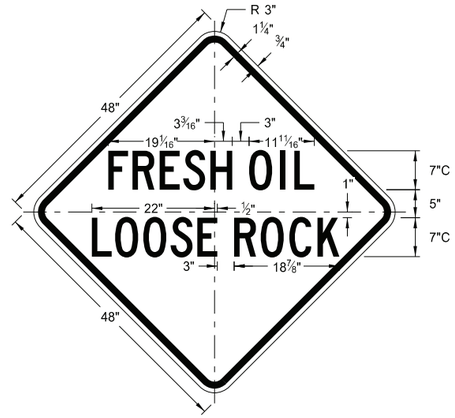
* DISTANCE MESSAGES



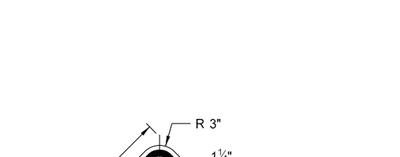
W20-51-48
Legend: black (non-refl)
Background: orange



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

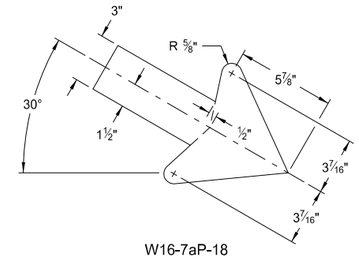


W22-8-48
Legend: black (non-refl)
Background: orange



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

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



W16-7aP-18

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.

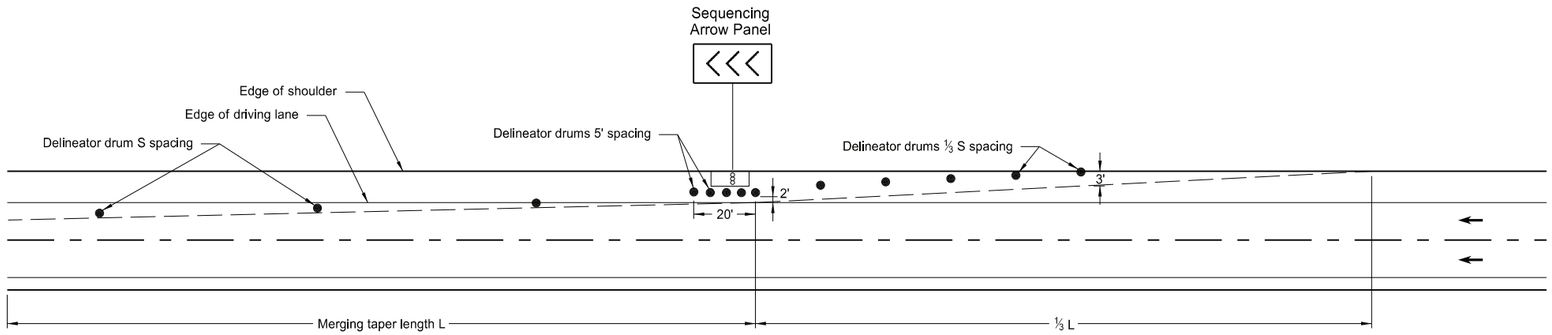
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

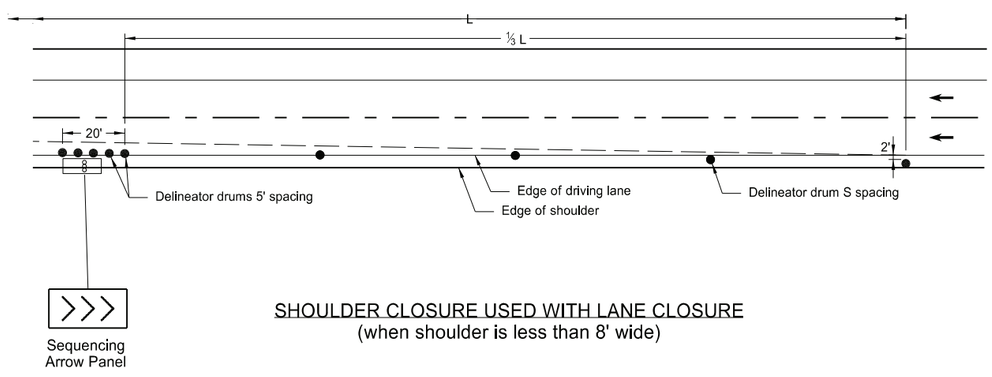
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SHOULDER CLOSURE TAPERS

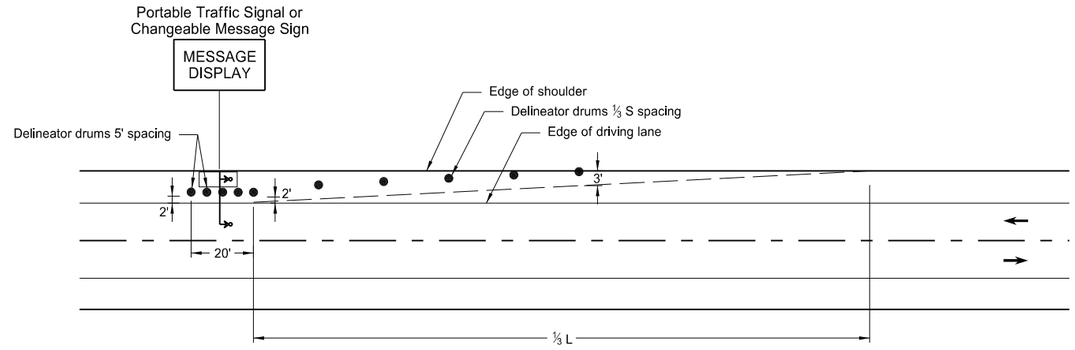
D-704-12



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 ⅓L. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
3. When paved shoulders of 8 foot width or more are closed, use channelizing devices to close shoulder in advance, to delineate beginning of work space, and to direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active volce
10-25-19	Added L dimension to detail
8-01-24	Electronic Stamp/Signature

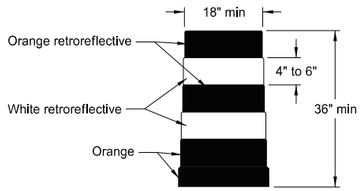
KIRK J. HOFF
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/01/24

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

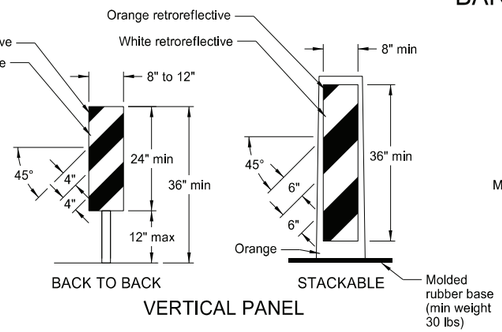
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



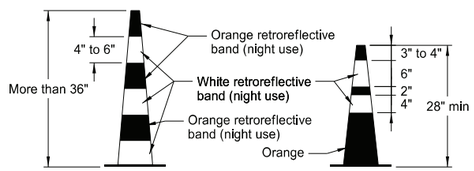
DELINEATOR DRUM

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.



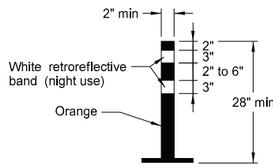
VERTICAL PANEL

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.



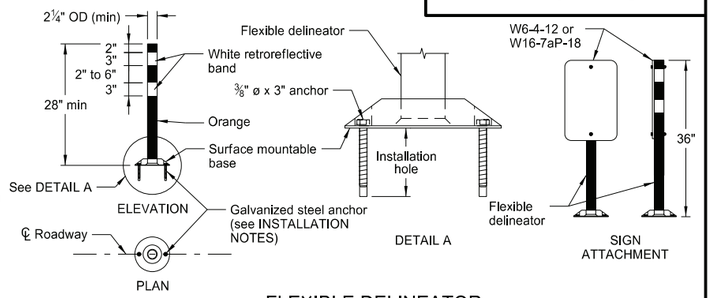
TRAFFIC CONE

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

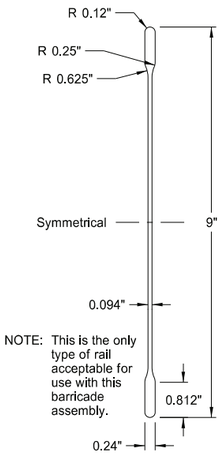
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

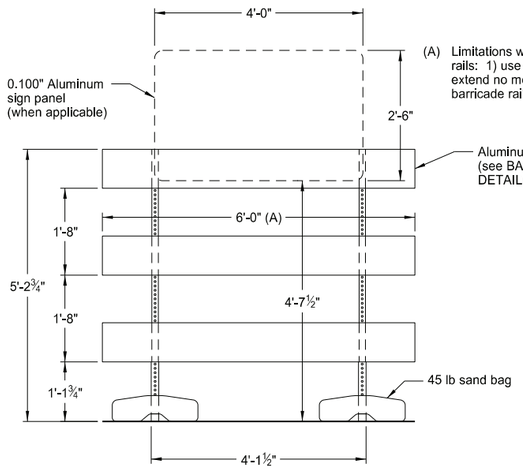
INSTALLATION NOTES:

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.



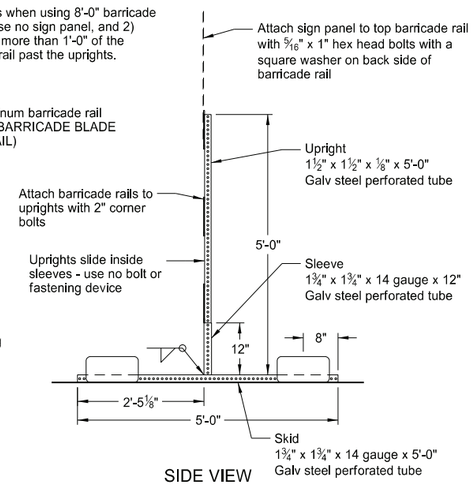
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



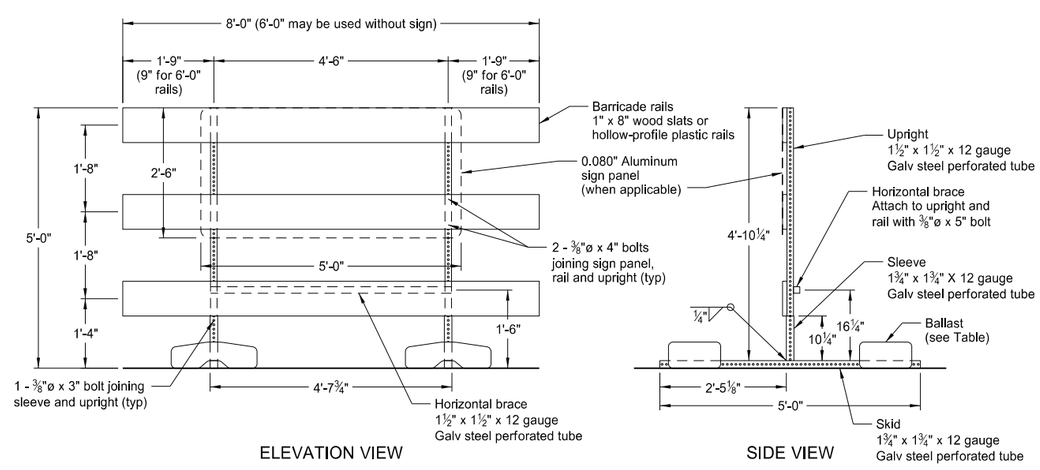
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



SIDE VIEW

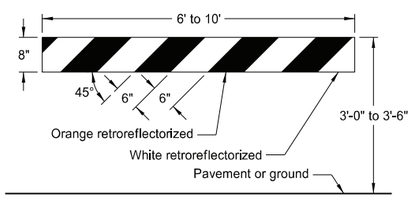
BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



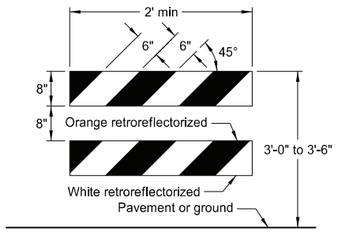
ELEVATION VIEW — SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

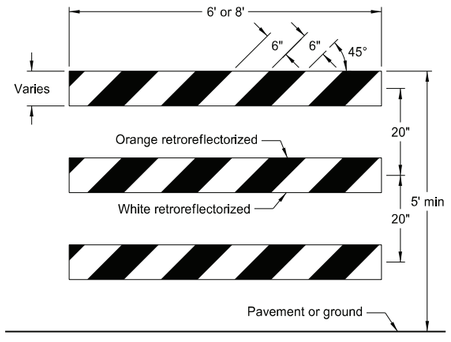
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

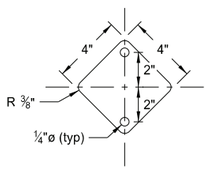


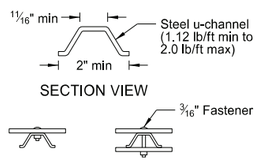
TYPE II BARRICADE

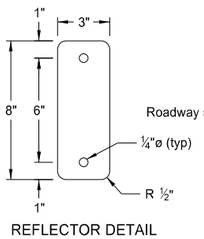


TYPE III BARRICADE

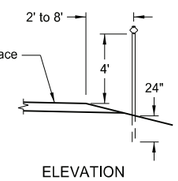
BARRICADE RAIL DETAILS







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
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

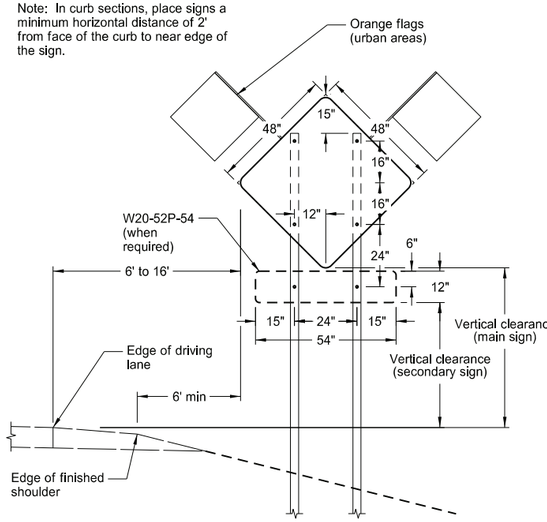
08/01/24

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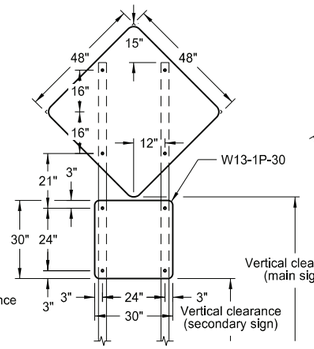
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

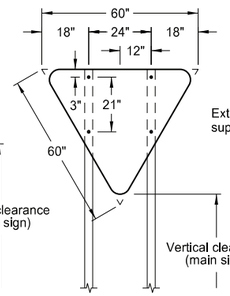
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



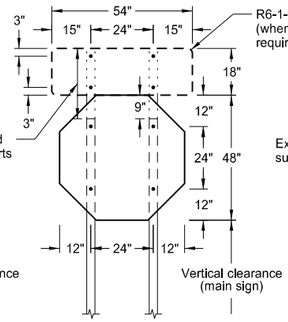
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



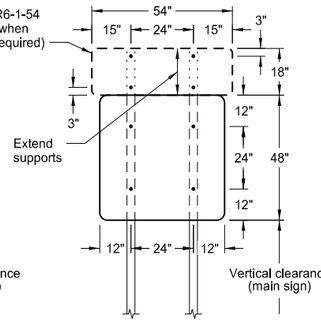
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



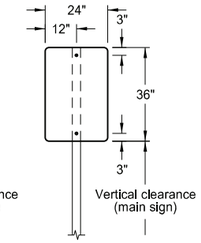
R1-2-60 - YIELD SIGN



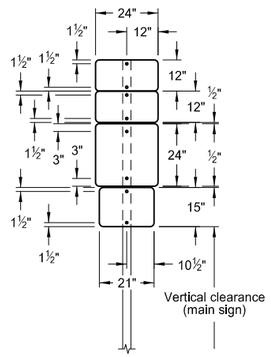
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



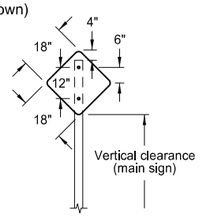
48" x 48" SIGN
(with R6-1-54 sign as required)



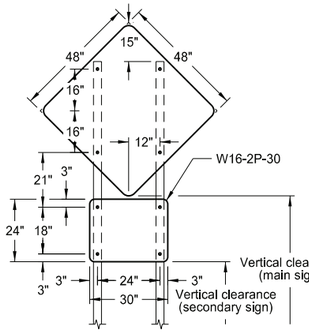
24" x 36" SIGN



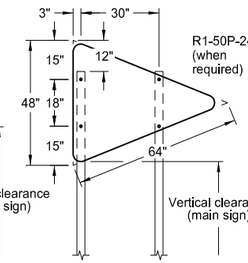
24" x 24"
ROUTE MARKER
ASSEMBLY



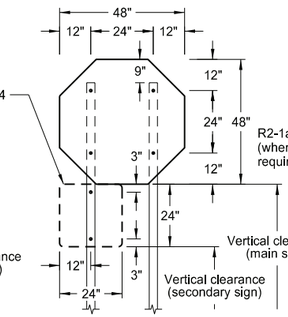
18" x 18"
DIAMOND SIGN



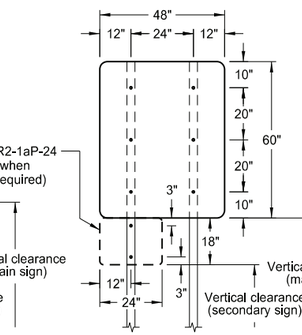
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



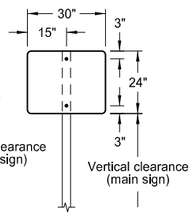
W14-3-64 - PENNANT SIGN



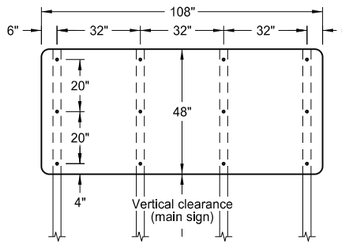
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



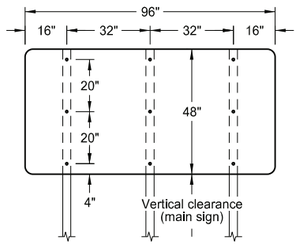
48" x 48" SIGN
(with R2-1aP-24 sign as required)



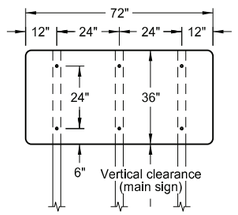
30" x 24" SIGN



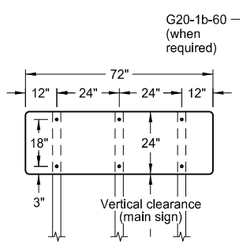
108" x 48" SIGN



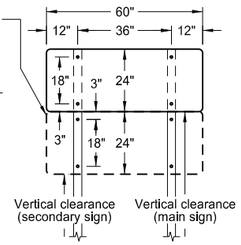
96" x 48" SIGN



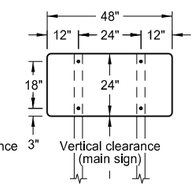
72" x 36" SIGN



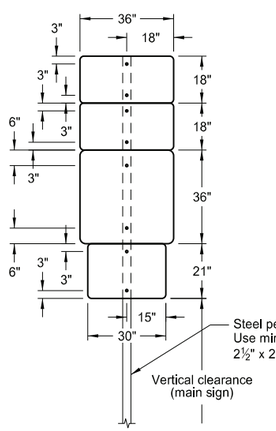
72" x 24" SIGN



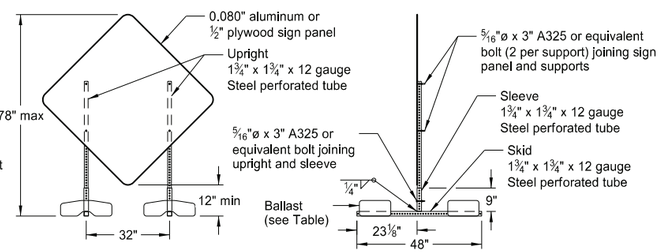
60" x 24" SIGN



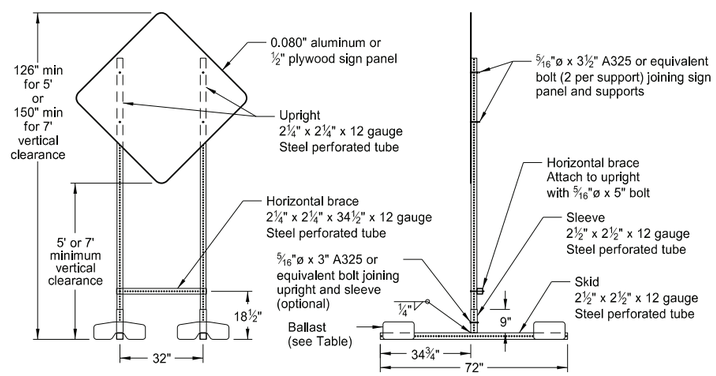
48" x 24" SIGN



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

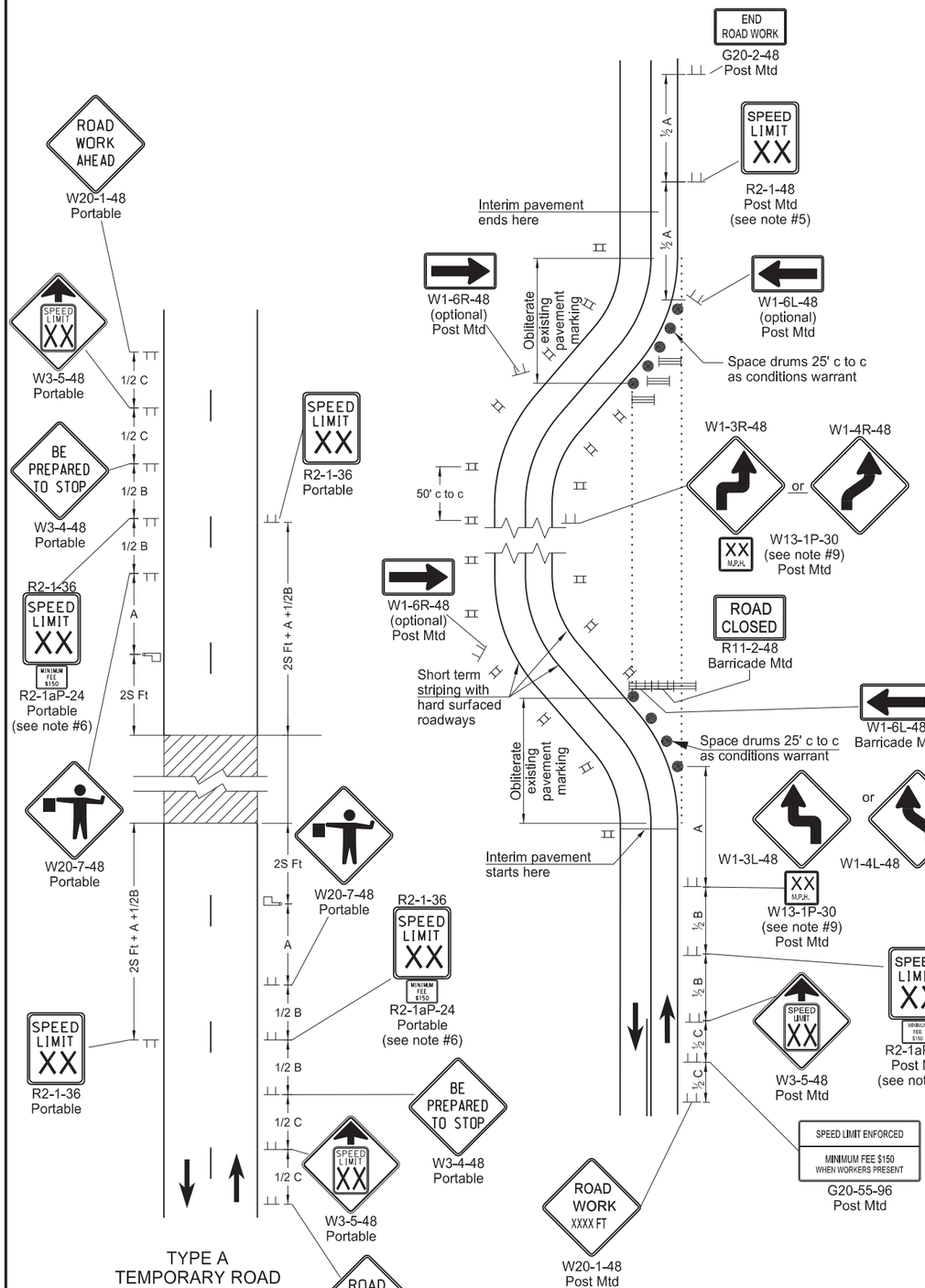
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail
8-01-24	Electronic Stamp/Signature

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

08/01/24

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

ROAD CLOSURE LAYOUTS

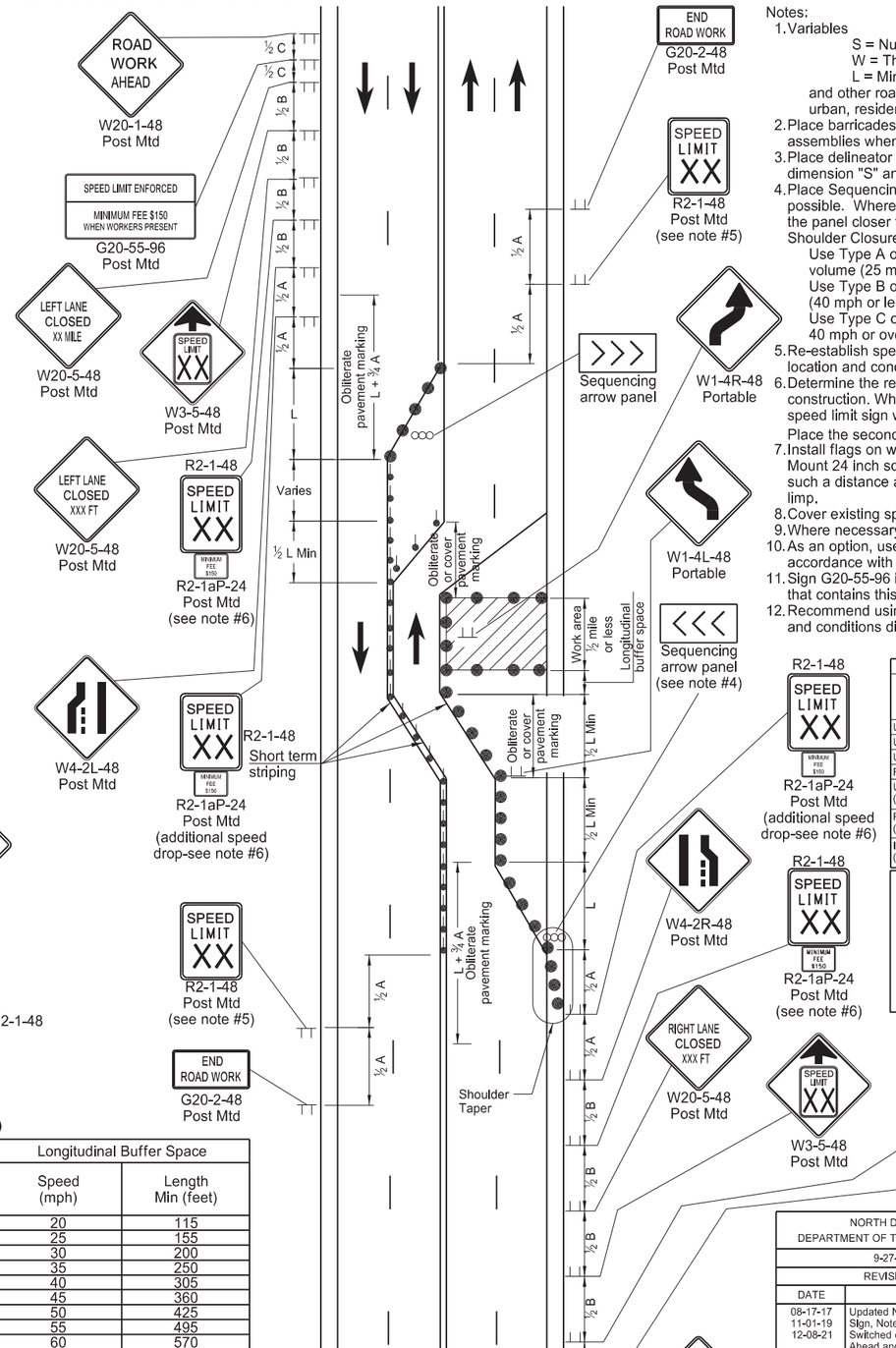


TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.

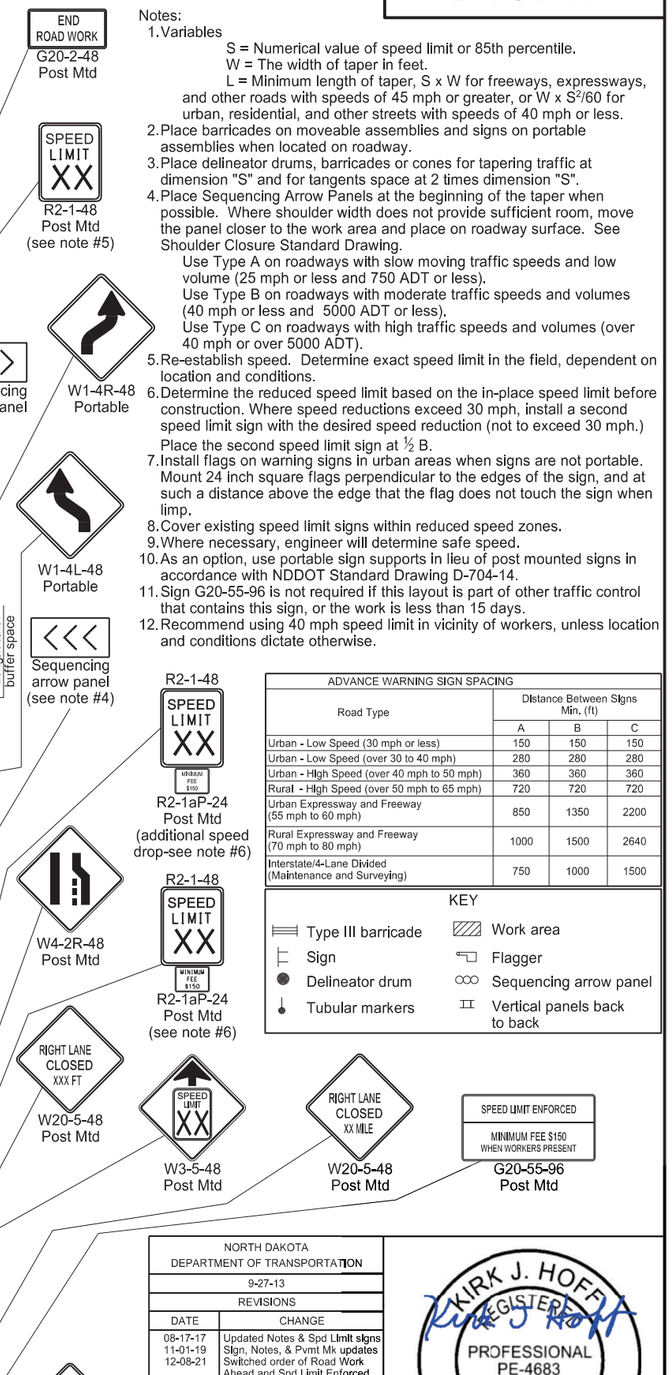
TYPE B
ROAD CLOSURE WITH A DIVERSION

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

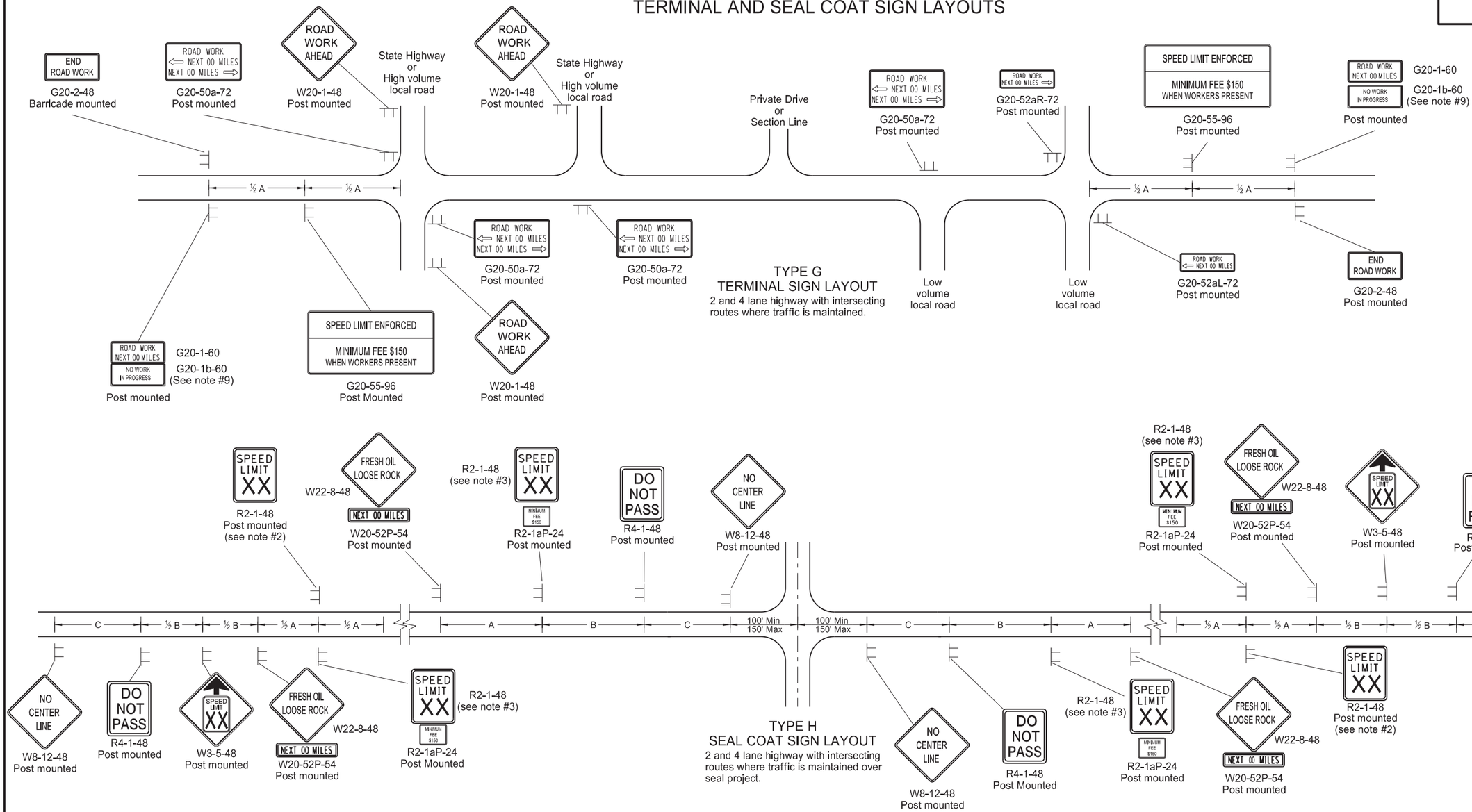
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pvmt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes

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06/30/25
ENGINEER
NORTH DAKOTA

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TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



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

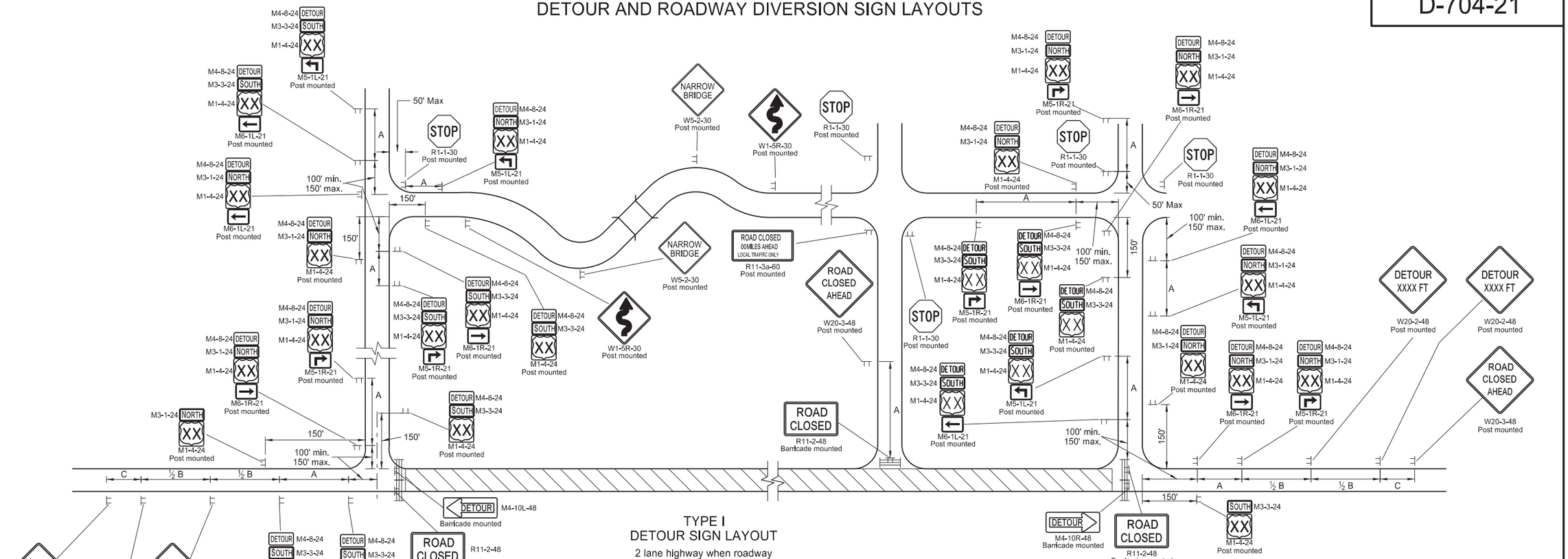
DATE	CHANGE
08-17-17	Updated notes & sign numbers
11-01-19	Updated note & sign
12-08-21	Switched order of Road Work and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes

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ENGINEER
NORTH DAKOTA

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

DETOUR AND ROADWAY DIVERSION SIGN LAYOUTS

D-704-21



TYPE I
DETOUR SIGN LAYOUT

2 lane highway when roadway is closed and detour provided

TYPE J
ROAD CLOSURE WITH A DIVERSION SIGN LAYOUT

2 lane highway with widened section, traffic maintained in both directions.

Use layout when work is less than 5 days or is within a project.

KEY

- Type III barricade
- Work area
- Sign
- Vertical panels back to back
- Delineator drum

Notes:

1. Variables
   S=Numerical value of speed limit or 85th percentile. W=The width of taper.
   L=Minimum length of taper, or S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 / 60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when on roadway.
3. Space delineator drums and vertical panels at dimension "S" for tapering traffic. Space delineator drums, tubular markers and vertical panels at 2 times "S" for tangents.
4. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limits 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.
5. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inches 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.
6. Cover existing speed limit signs within a reduced speed limit zone.
7. Covered (when approved by engineer) or obliterated payment marking measured as Obliteration of Pavement Marking.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. If the tangent between tapers is less than 600', as an option, use sign W24-1-48 in place of double reverse curve signs.
10. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
11. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.

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 & added spd limit
11-01-19	Revised sign #s and note 8
12-08-21	Added Dollars At Work sign
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes

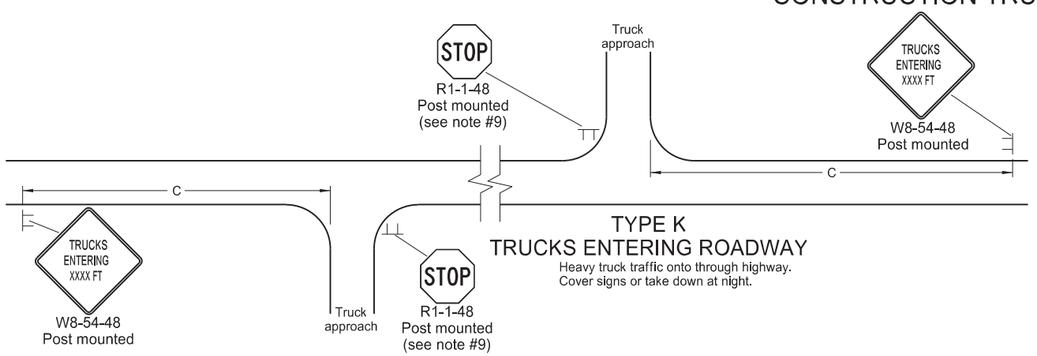
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 06/30/25 ENGINEER NORTH DAKOTA

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

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

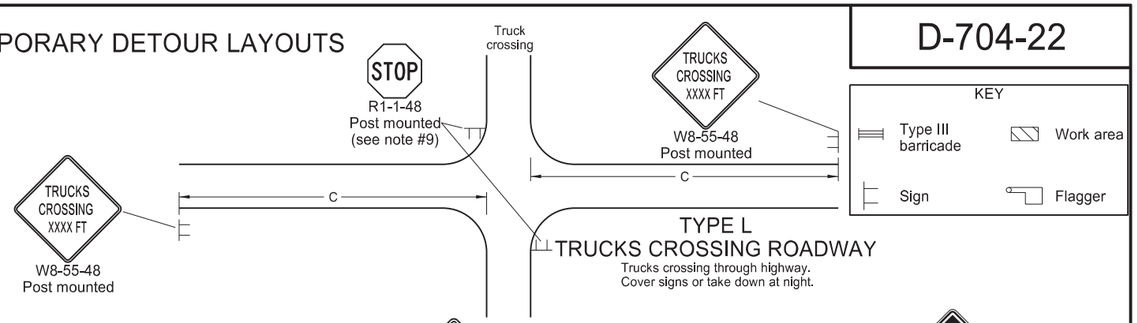
D-704-22

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



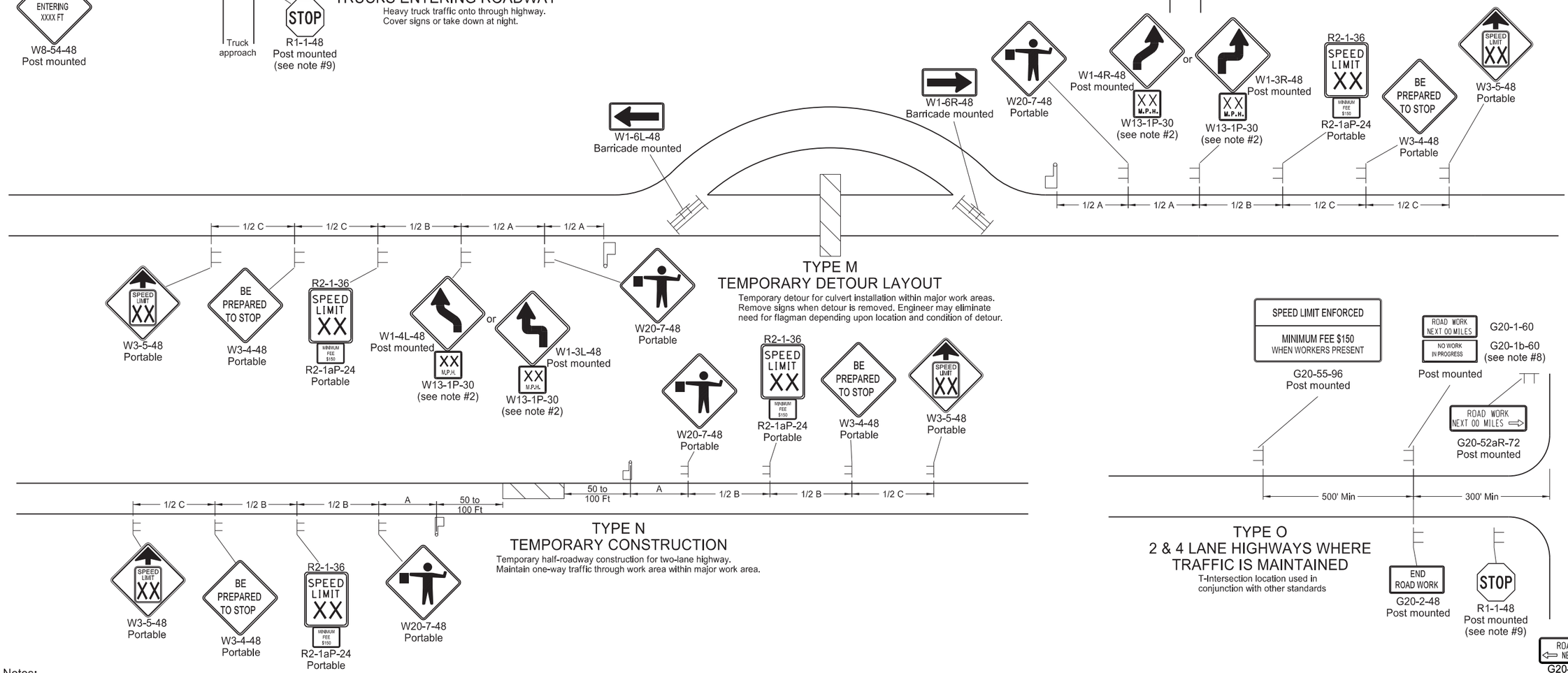
TYPE K
TRUCKS ENTERING ROADWAY

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



TYPE L
TRUCKS CROSSING ROADWAY

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



TYPE M
TEMPORARY DETOUR LAYOUT

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

TYPE N
TEMPORARY CONSTRUCTION

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

TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED

T-Intersection location used in conjunction with other standards

Notes:

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard 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

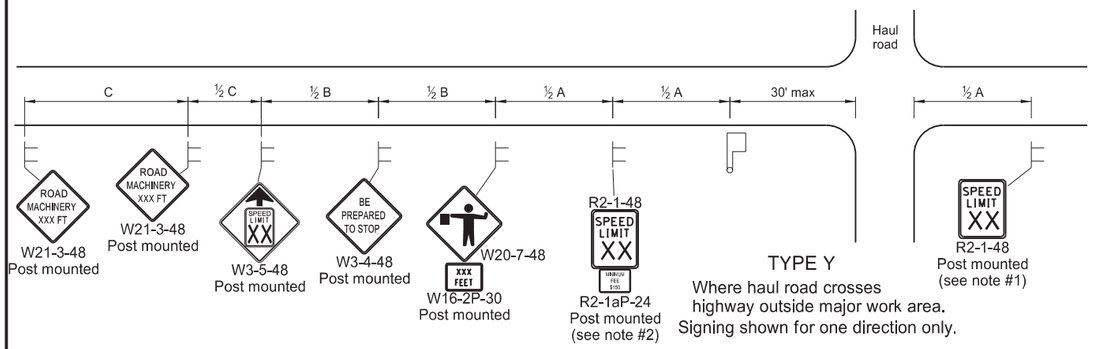
DATE	CHANGE
08-17-17	Update notes & sign numbers
11-01-19	Revised sign numbers & note 7
12-09-21	Added Speed Limit Enforced and Dollars At Work signs
11-29-22	Removed Dollars At Work
06-30-25	Legislative Changes

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

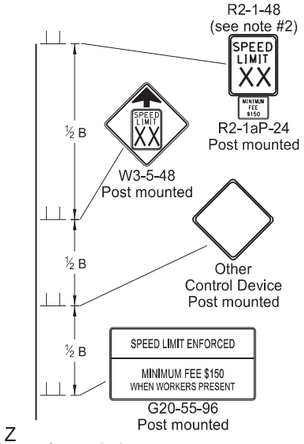
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MISCELLANEOUS SIGN LAYOUTS

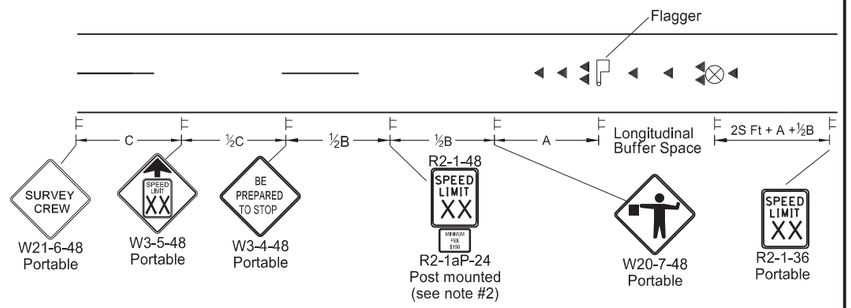
D-704-26



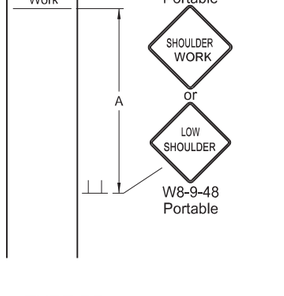
TYPE Y
Where haul road crosses highway outside major work area.
Signing shown for one direction only.



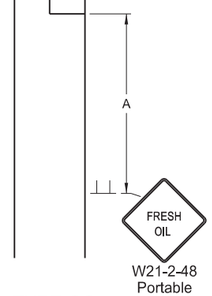
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



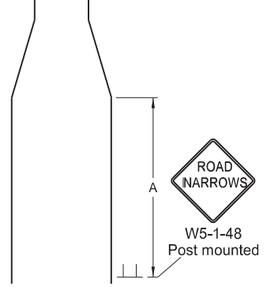
TYPE AA
Where survey crew is used
Signing shown for one direction only.



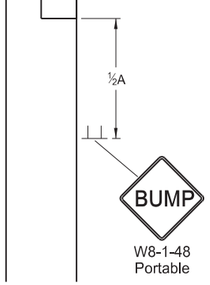
TYPE BB
Within major work area where sign conditions exist



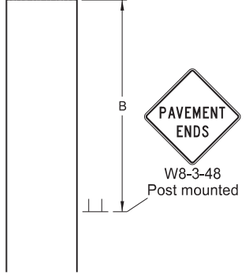
TYPE CC
Where sign conditions exist



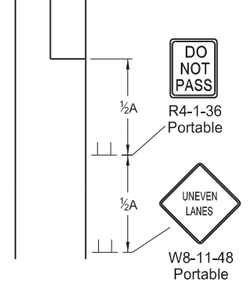
TYPE DD
Where sign conditions exist



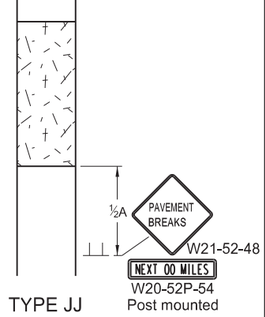
TYPE EE
Where sign conditions exist



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



TYPE GG
Where elevation difference exists between lanes

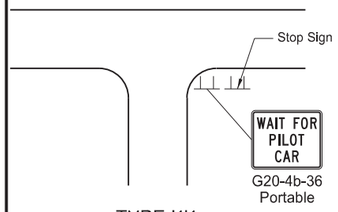


TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.
Signing shown for one direction only.

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

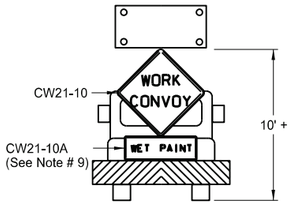
DATE	CHANGE
08-17-17	Added speed limit signs. Updated notes & sign numbers
11-01-19	Revised note 5 & sign numbers
02-23-23	Revised distance & removed signs
06-30-25	Legislative Changes

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

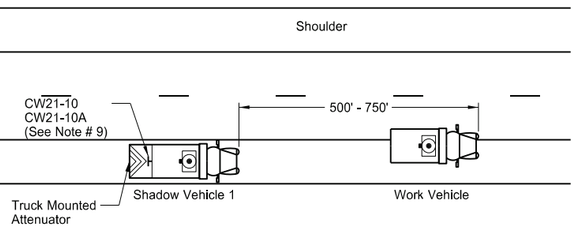
DocuSign Envelope ID: 3284CF4B-204D-426B-8A3F-BDE7624EB5B7

MOBILE OPERATION
(PAVEMENT MARKING)

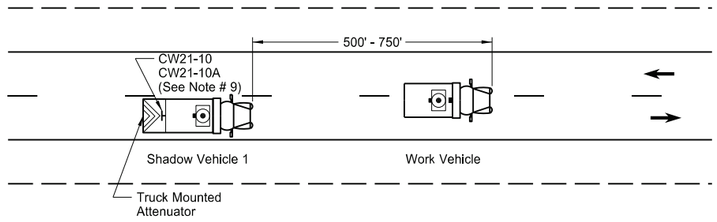
D-704-27



Typical Shadow Vehicle 1
Two-Way Roaday

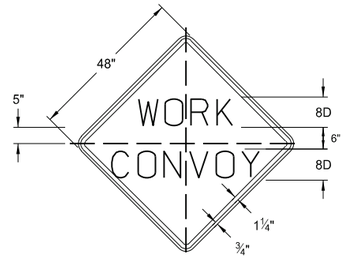


Two-Way Roadway with Paved Shoulders

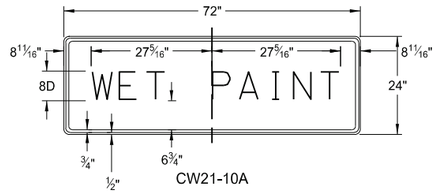


Two-Way Roadway without Paved Shoulders

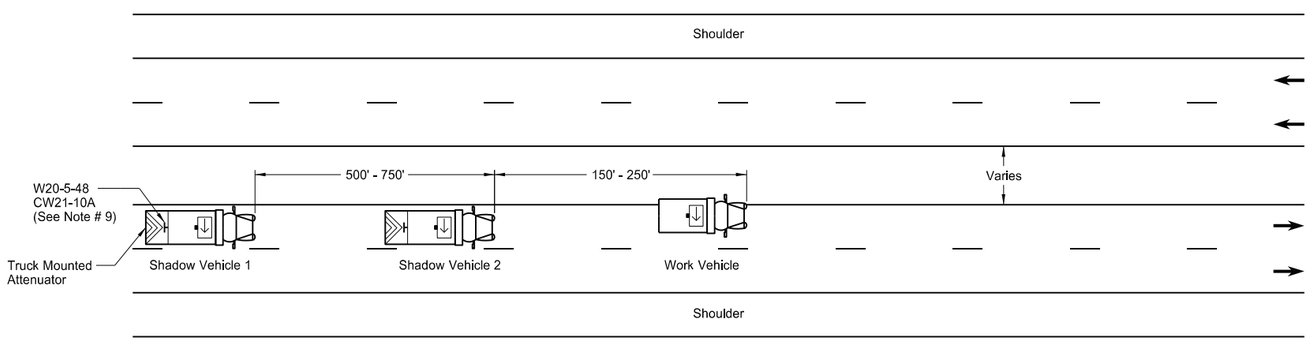
Sign Details



CW21-10

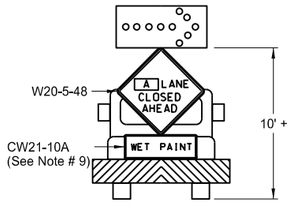


CW21-10A



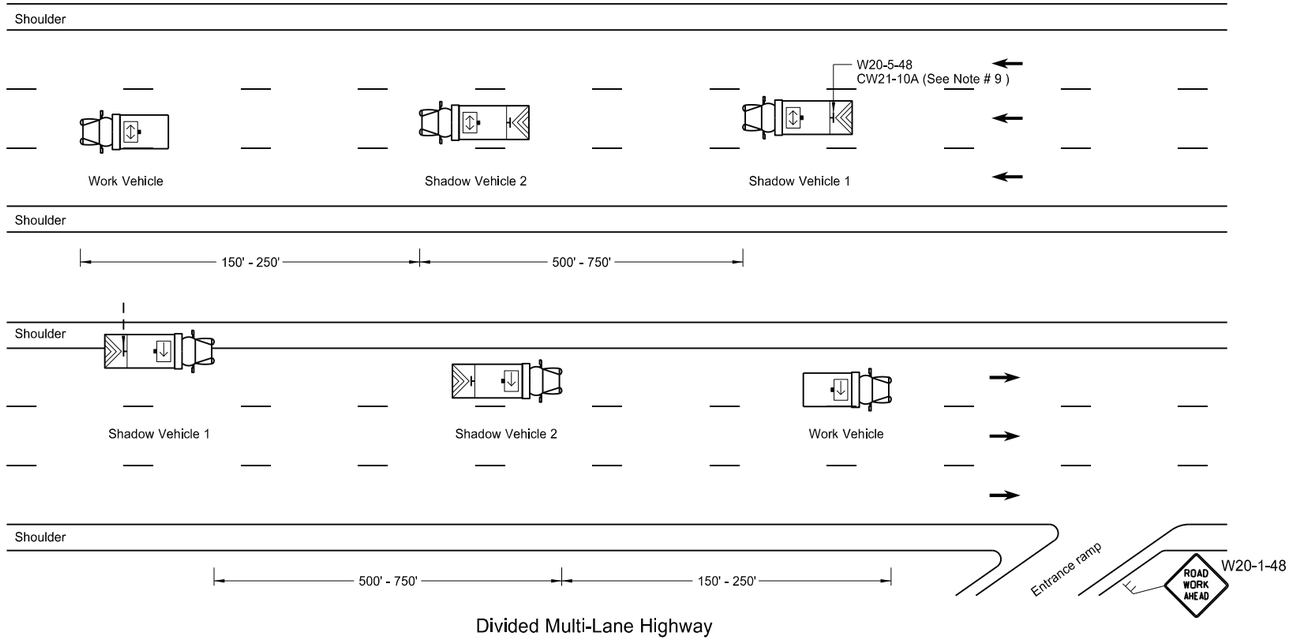
Undivided Multi-Lane Roadway

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.

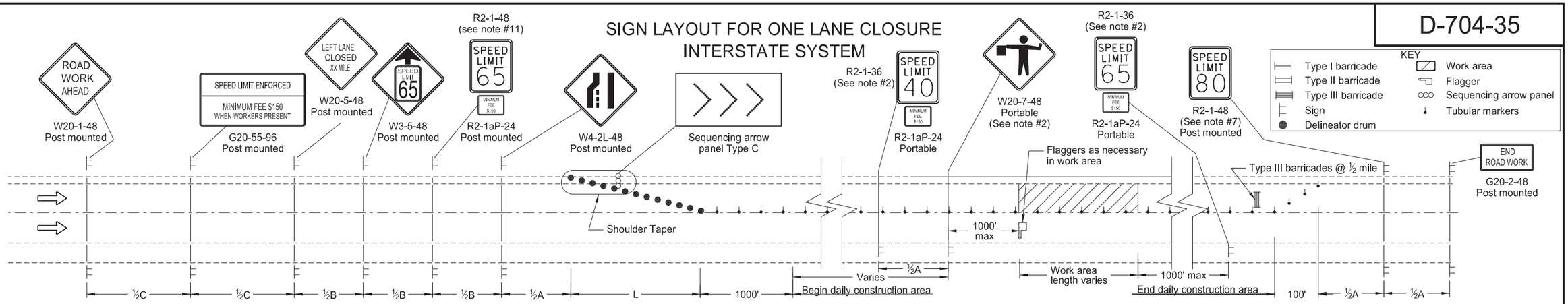
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/02/24

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

D-704-35

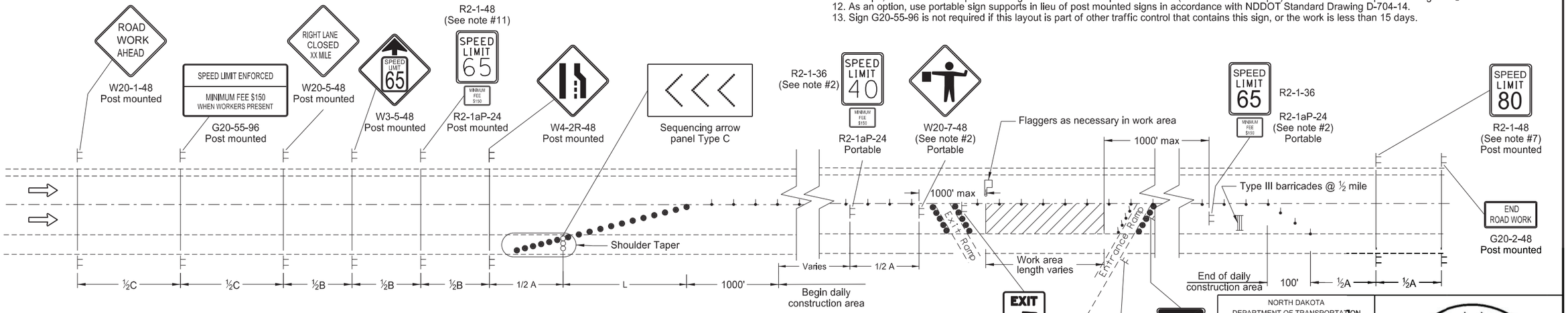
SIGN LAYOUT FOR ONE LANE CLOSURE INTERSTATE SYSTEM



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

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.



RIGHT LANE CLOSED
WORKERS IN WORK AREA

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-7-2012

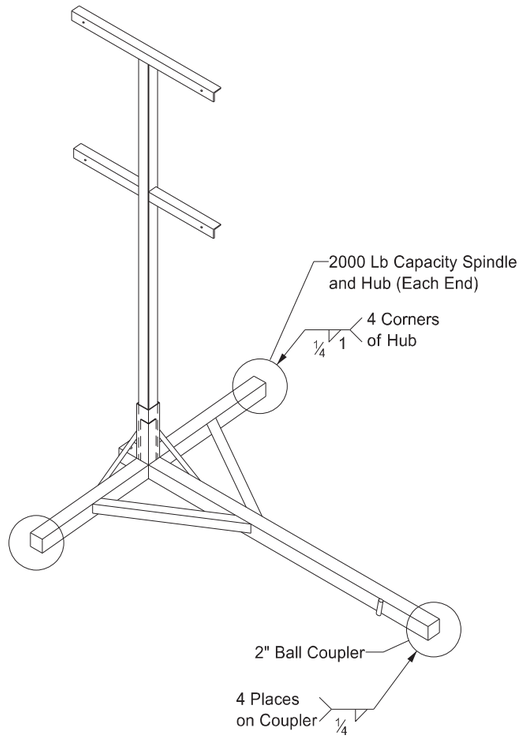
REVISIONS

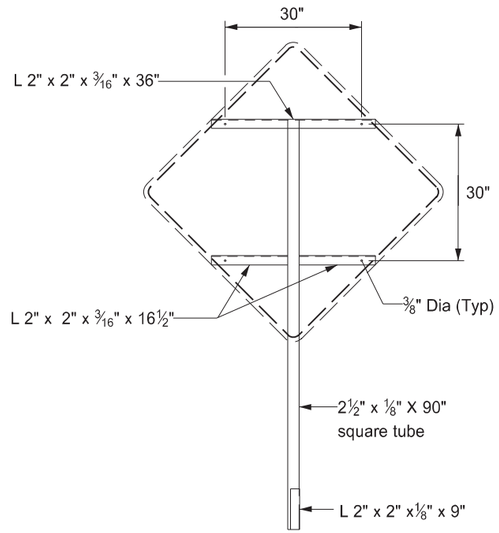
DATE	CHANGE
06-23-14	Revised Note 12
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Moved speed signs & added note
10-17-17	Corrected spelling of "shoulder"
11-01-19	Revised tubular Mrkrs symbols
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced, added Dollars At Work, &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

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

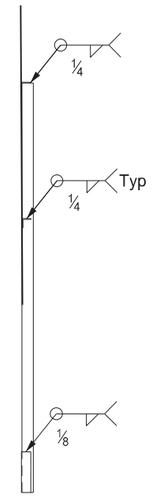
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

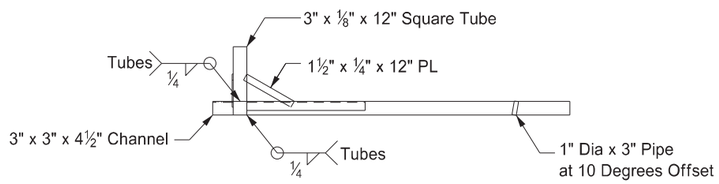


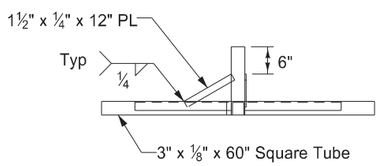
RIGHT

SIGN SUPPORT

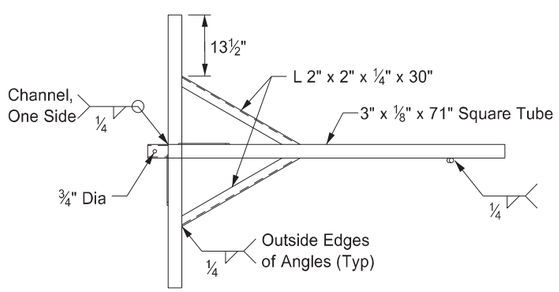
Notes:

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.





RIGHT



TOP

TRAILER

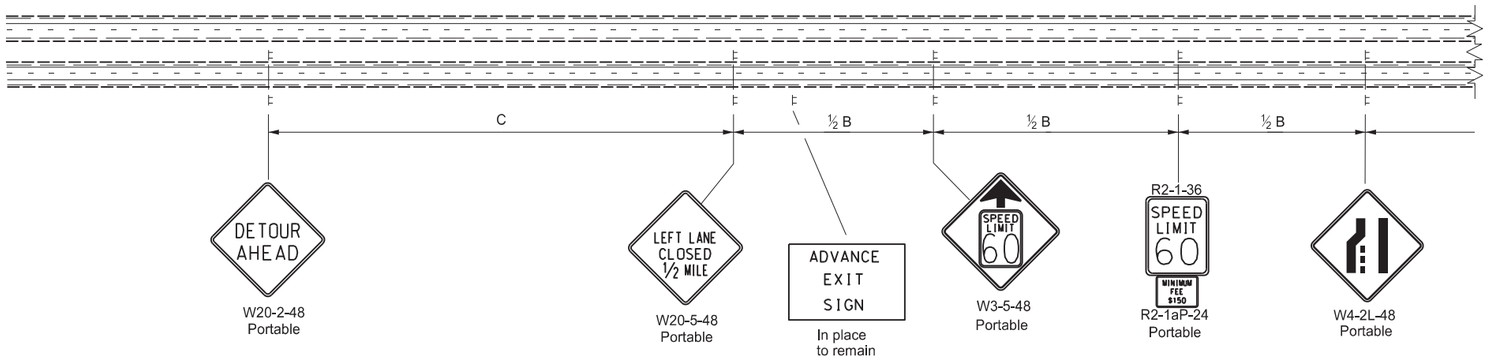
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

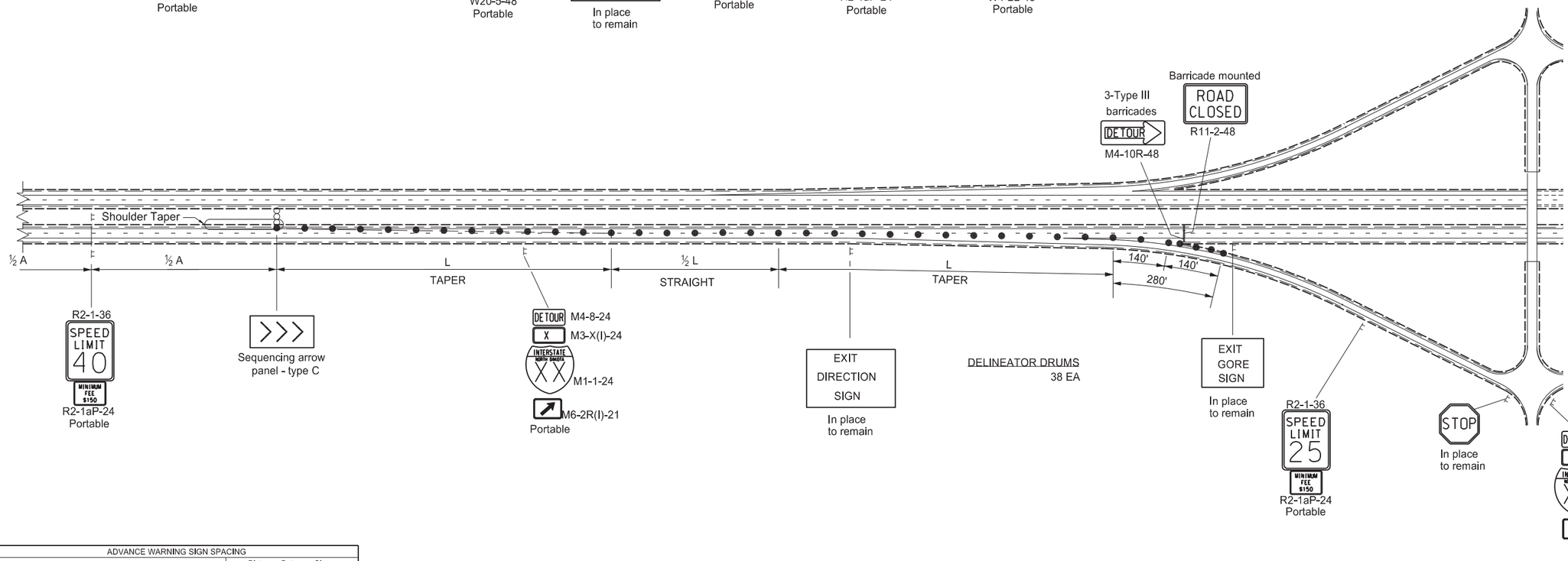
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

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.

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

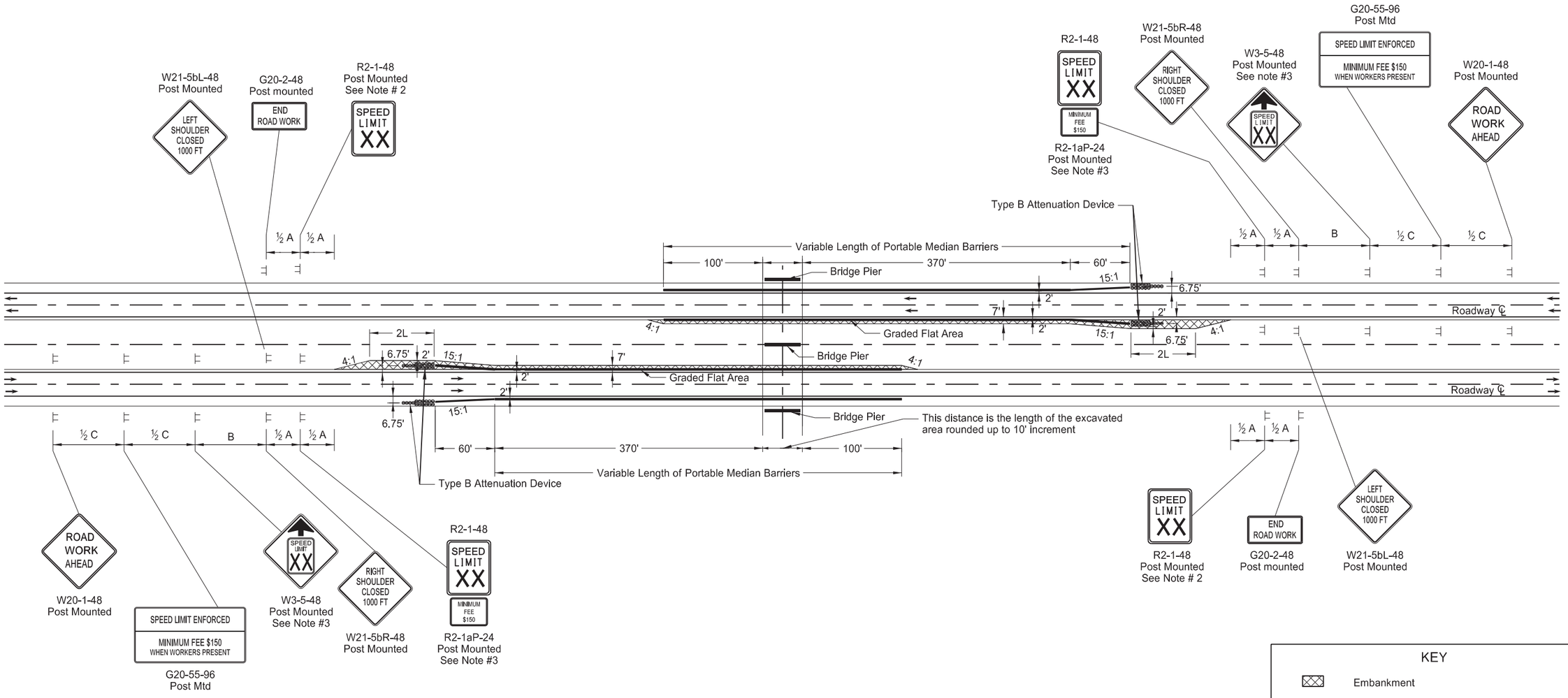
DATE	CHANGE
06-24-14	Updated sign sizes and added mounting type
03-15-16	Removed Do Not Pass signs and updated notes
11-01-19	Revised note, sign #, & del drums
08-02-24	Electronic Stamp/Signature
06-30-25	Legislative Changes

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



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

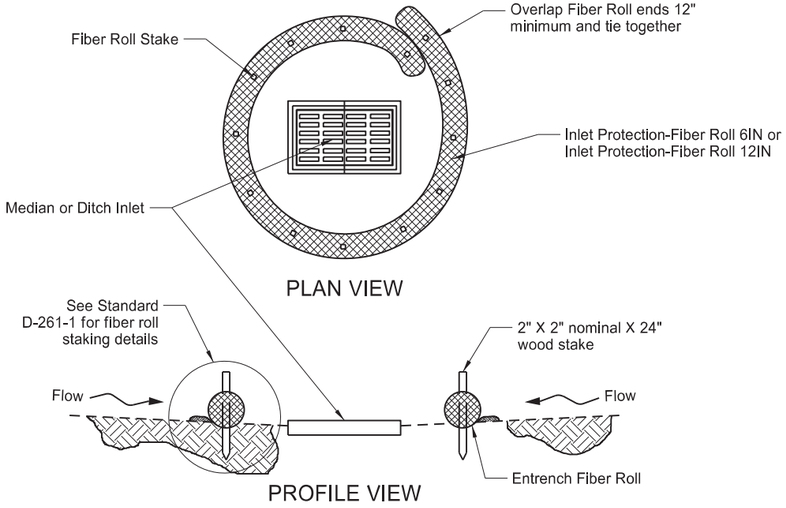
REVISIONS

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

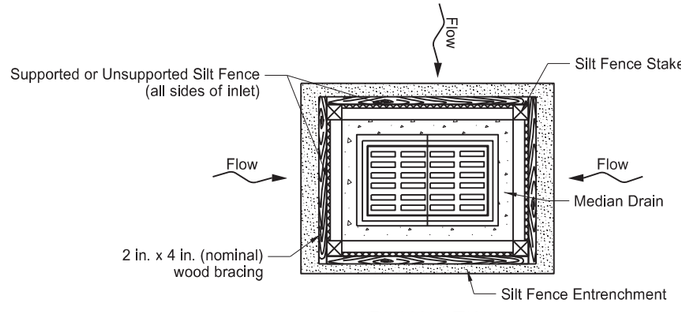
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
06/30/25
ENGINEER
NORTH DAKOTA

EROSION AND SILTATION CONTROLS

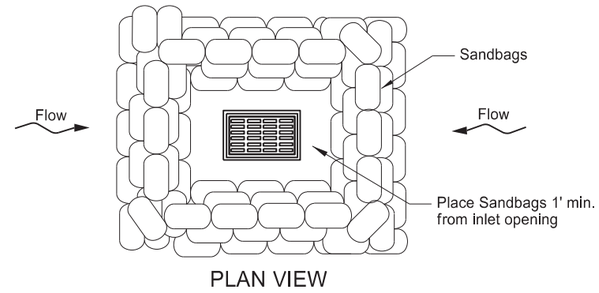
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



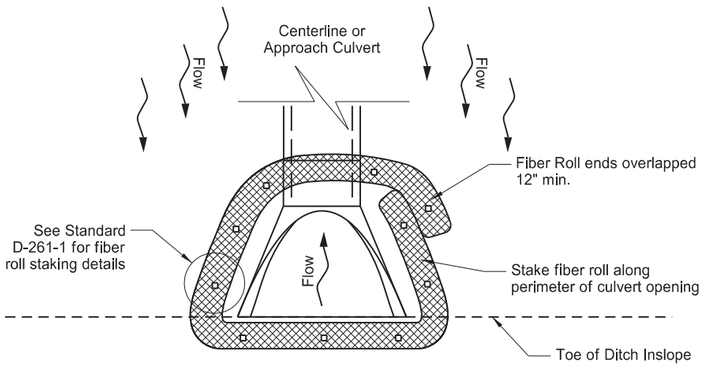
MEDIAN OR DITCH INLET PROTECTION



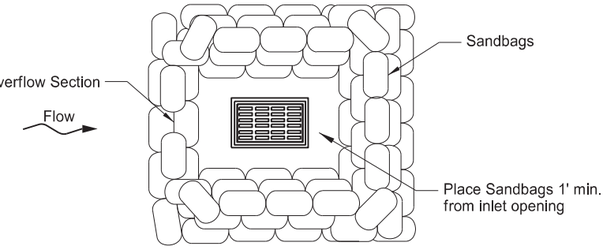
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



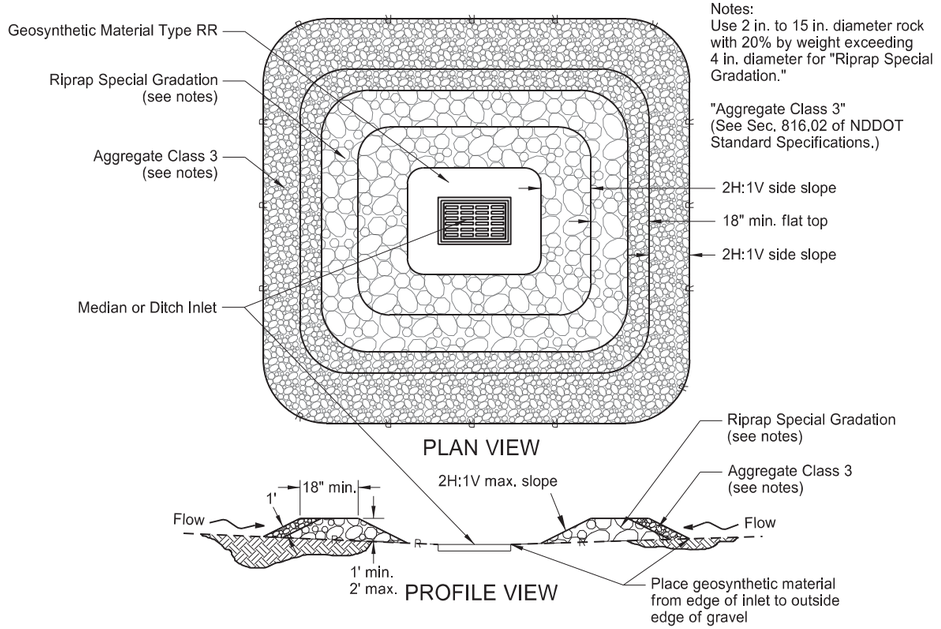
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



SANDBAG PROTECTION (ON SLOPE)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)

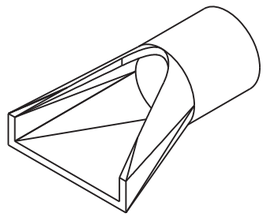
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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

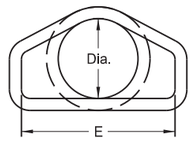
REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

D-714-1

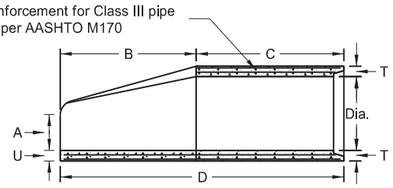
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	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"



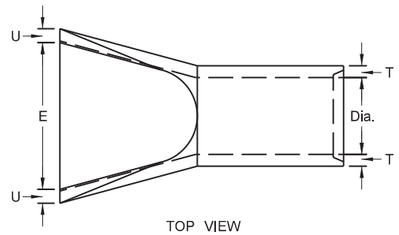
PERSPECTIVE



END VIEW



SIDE VIEW



TOP VIEW

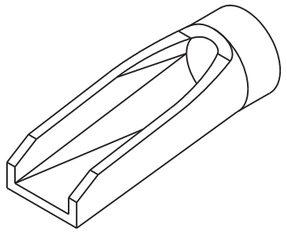
REINFORCED CONCRETE PIPE - FLARED END SECTION

Reinforcement to be equivalent to Class III RCP

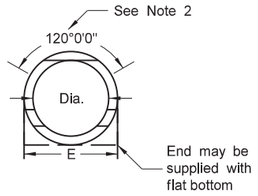
NOTES:

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.

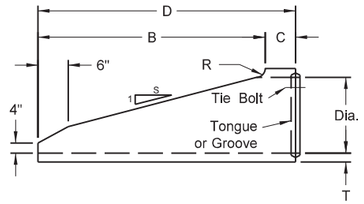
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



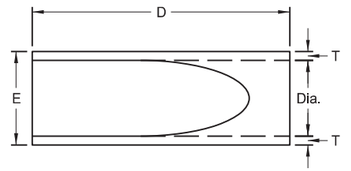
PERSPECTIVE



END VIEW



SIDE VIEW



TOP VIEW

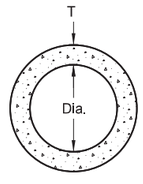
REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION

Reinforcement to be equivalent to Class III RCP

NOTES (Traversable End Section):

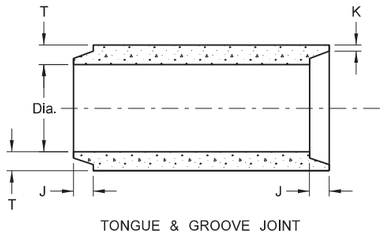
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

All Classifications of Round Concrete Pipe					
Internal Dia. of Pipe in Inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)
Dia	Sq. ft.	Lbs.	In.	In.	In.
12	0.79	92	1⅛-2⅛	¾	2
15	1.23	127	1⅛-2¼	⅞	2¼
18	1.77	168	1⅛-2⅛	1	2½
21	2.40	214	1⅛-3⅛	1⅛	2¾
24	3.14	265	2¼-3¼	1⅛	3
27	3.98	322	2¼-4	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	3¾-4¾	1¾	4½
48	12.57	685	3⅞-4¾	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	2⅞	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	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

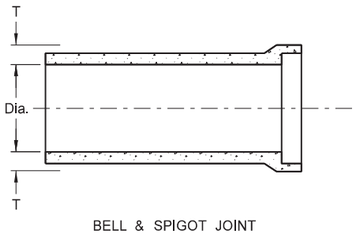


END VIEW

CIRCULAR PIPE

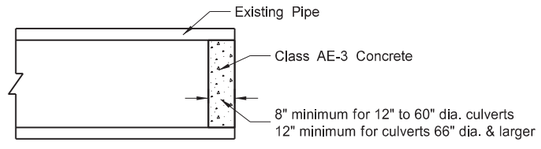


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

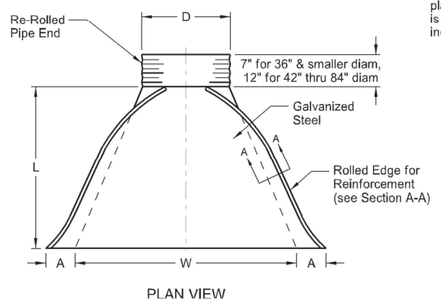
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

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

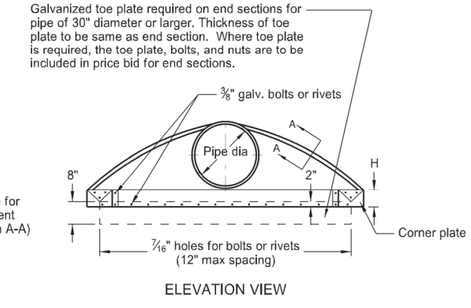
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

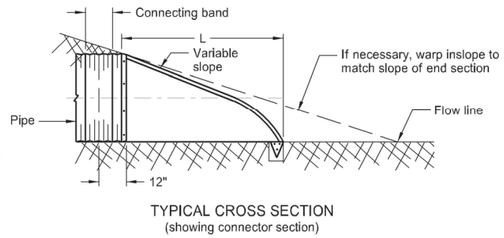
D-714-4



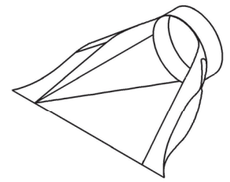
PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

* * PIPE DIA.	GALVANIZED THICKNESS	END SECTION DIMENSIONS					APPROX. SLOPE	BODY
		A	B	H	L	W		
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

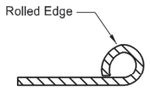
* These sizes have 0.109" sides and 0.138" center panels.

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

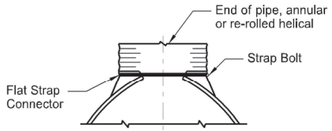
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

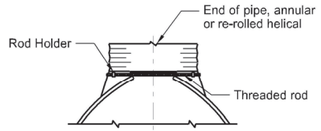
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



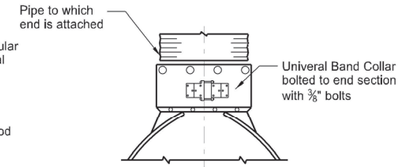
SECTION A-A



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



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

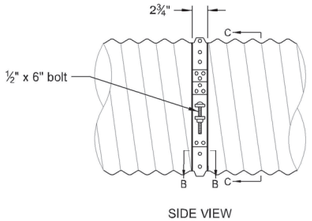


TYPE #3
For all pipe sizes

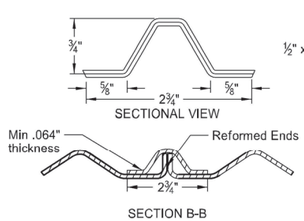
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"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

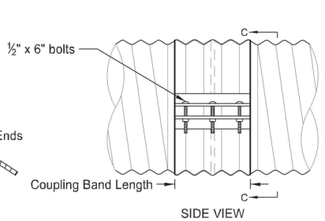


SIDE VIEW

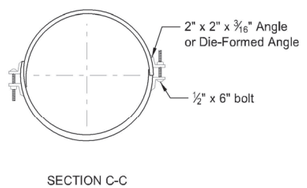


SECTION B-B

HAT BAND FOR FLANGED END PIPE

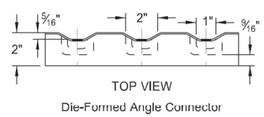


SIDE VIEW

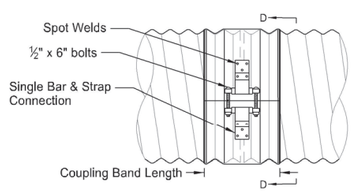


SECTION C-C
Angle Connection

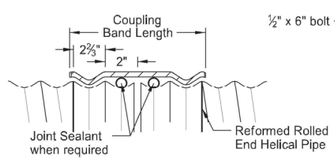
ANNULAR BAND



TOP VIEW
Die-Formed Angle Connector

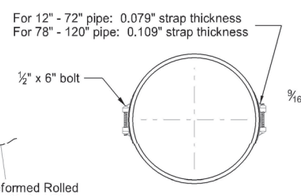


SIDE VIEW

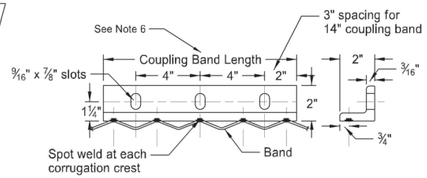


SECTIONAL VIEW

HUGGER COUPLING BAND



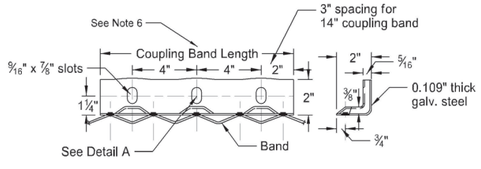
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

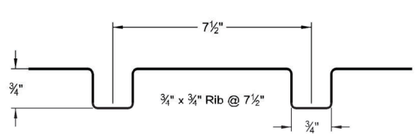
2" x 2" x 3/16" Angle Connector

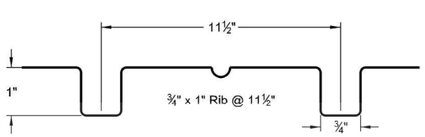


SIDE VIEW

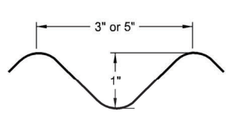
END VIEW

Die-Formed Angle Connector

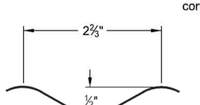




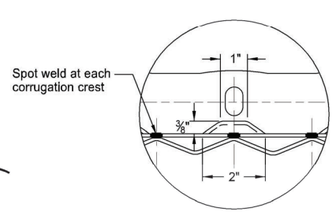
SPIRAL RIB CORRUGATIONS



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

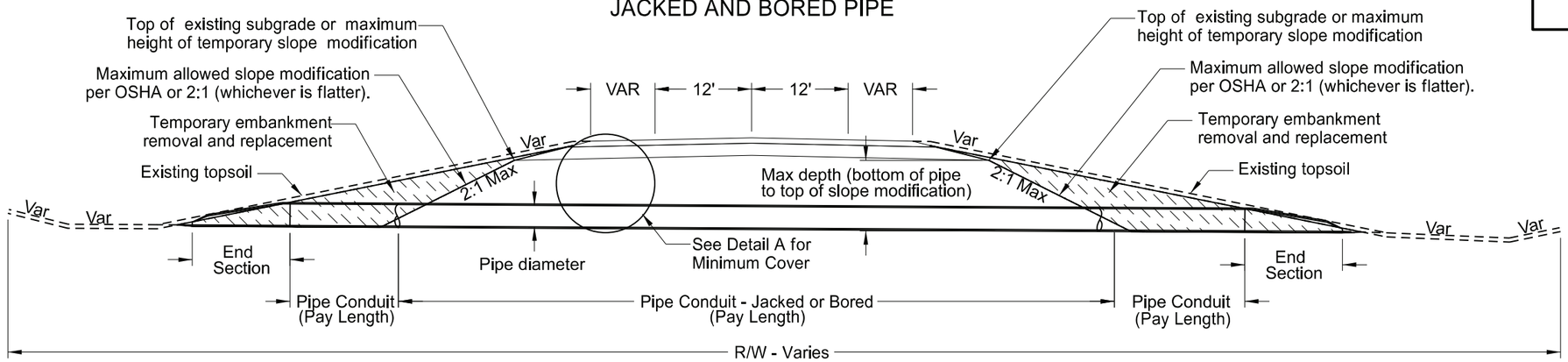
JONATHAN D KETTERLING
REGISTERED
PROFESSIONAL
PE-4684
ENGINEER
NORTH DAKOTA

09/23/22

DocuSign

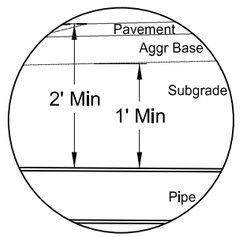
D-714-16

JACKED AND BORED PIPE

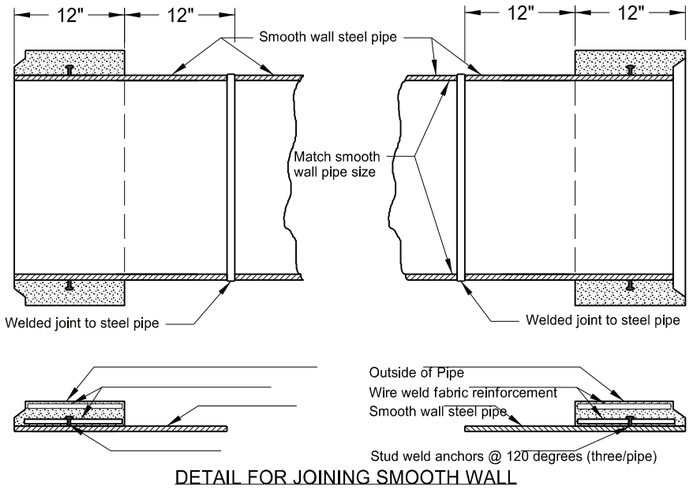


JACKED AND BORED PAY LENGTH

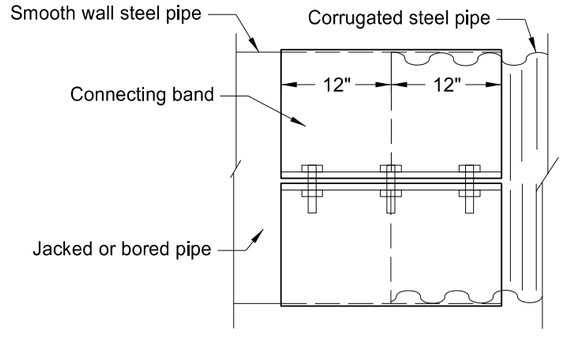
NOTE: This Detail applies to jacked and bored pipe under a roadway embankment. Additional coordination and design are needed for railroad embankments.



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

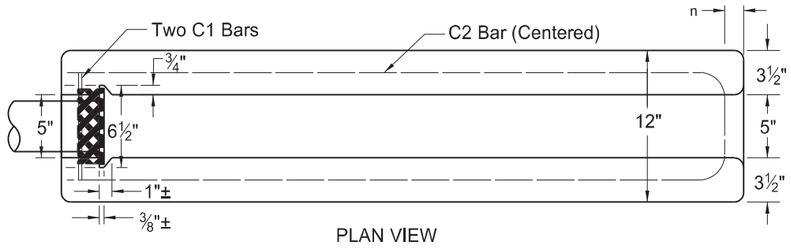
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-15-2022	
REVISIONS	
DATE	CHANGE
08-31-2023	Corrected spelling of corrugated.

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

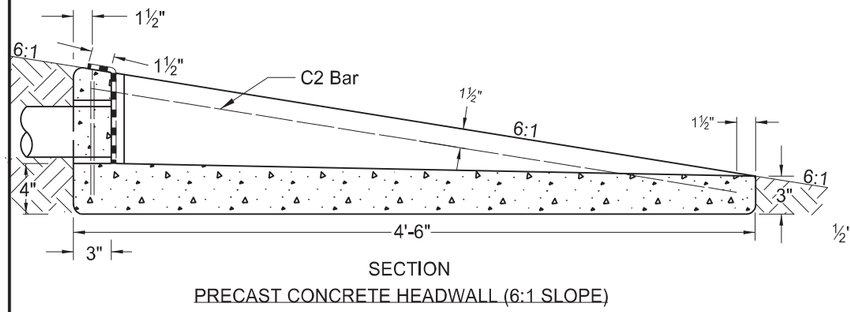
08/31/23

PRECAST CONCRETE HEADWALL DETAILS

D-714-18

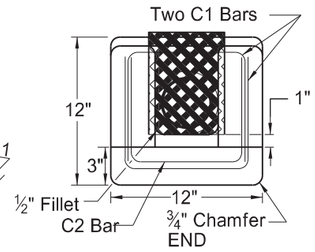


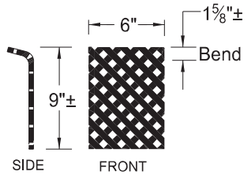
PLAN VIEW



SECTION

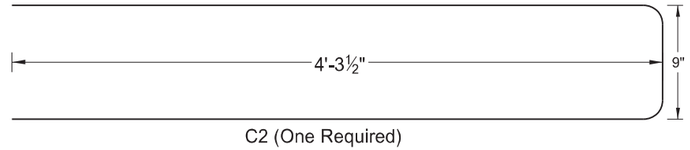
PRECAST CONCRETE HEADWALL (6:1 SLOPE)



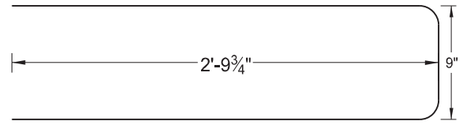


RODENT SCREEN

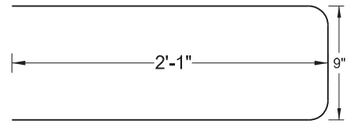
Dimensions are approximate to allow bend and a snug fit in headwall slot



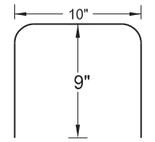
C2 (One Required)



C3 (One Required)

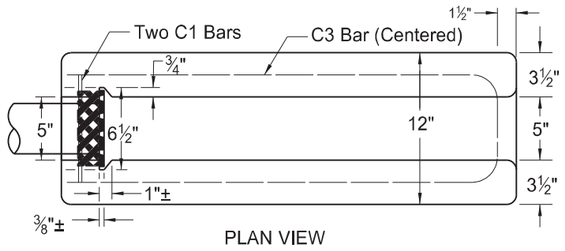


C4 (One Required)

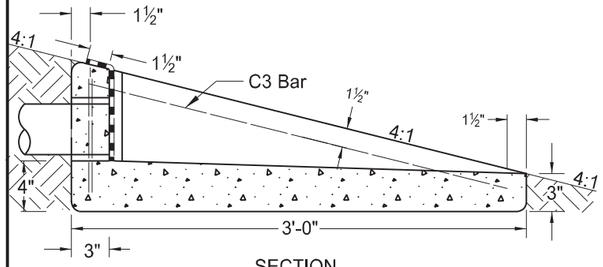


C1 (Two Required)

BENT BAR DETAILS

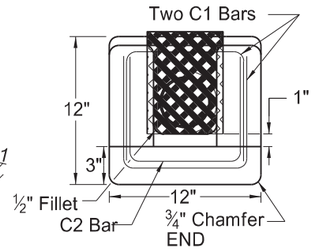


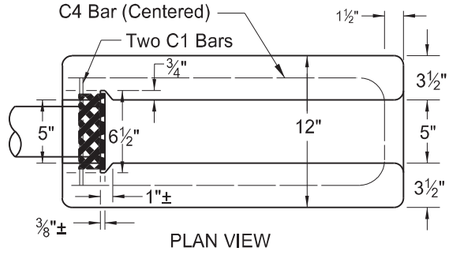
PLAN VIEW



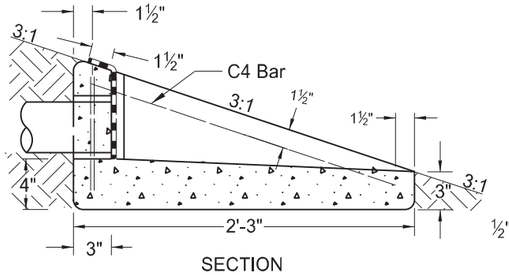
SECTION

PRECAST CONCRETE HEADWALL (4:1 SLOPE)



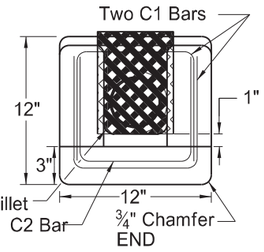


PLAN VIEW



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 Added 4:1 and 3:1 Headwalls

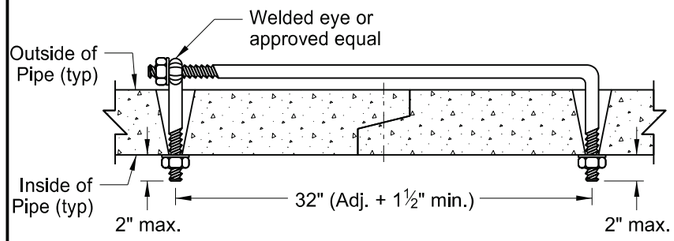
KIRK J. HOFF
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

12 02 2020

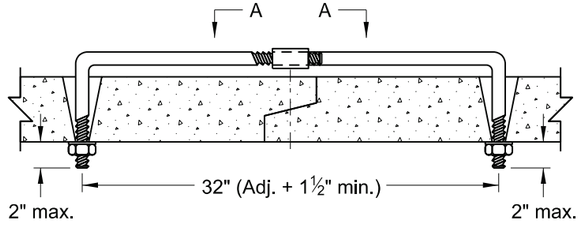
Docusign Envelope ID: 183A3561-9FCE-4D1A-975A-207779A0B2A0

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

D-714-22

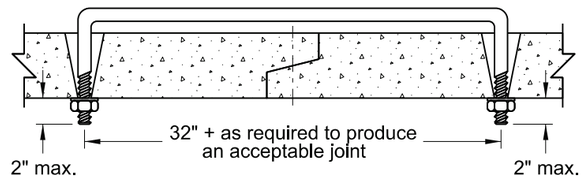


EYE BOLT TIE (PIPES ONLY)

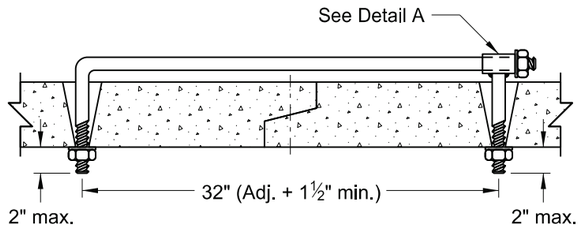


ADJUSTABLE TIE (PIPES ONLY)

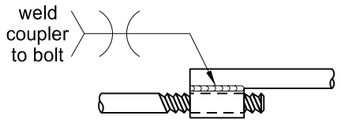
REQUIRED SIZE OF TIE BOLTS		
PIPE SIZE	THREAD ø	XXS PIPE SLEEVE INNER ø
18" - 24"	⅝" SEE NOTE 3	¾"
30" - 66"	¾"	1"
72" - 120"	1"	1¼"
RCB/CATTLE PASS		



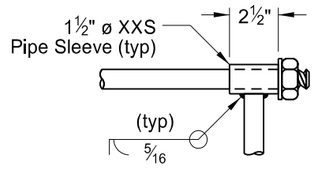
U BOLT TIE (PIPES OR CATTLE PASSES)



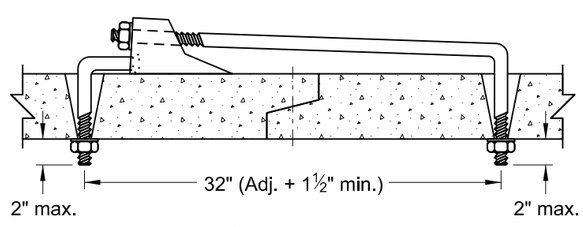
WELDED TIE (PIPES ONLY)



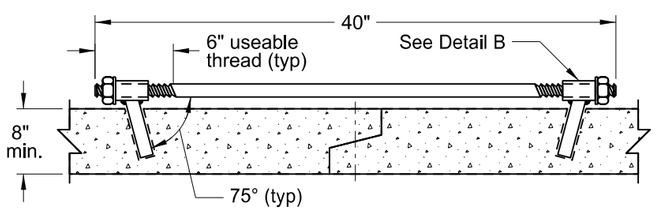
SECTION A-A



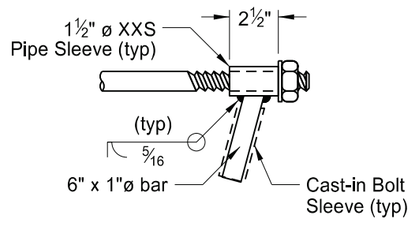
DETAIL A



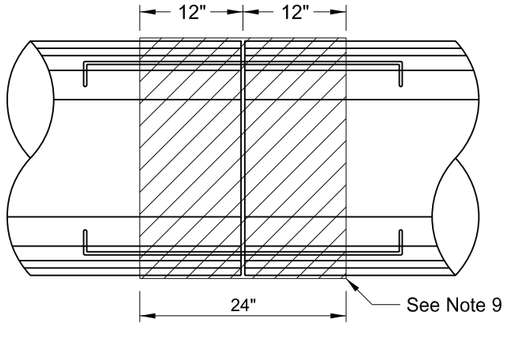
CANOPY TIE (PIPES ONLY)



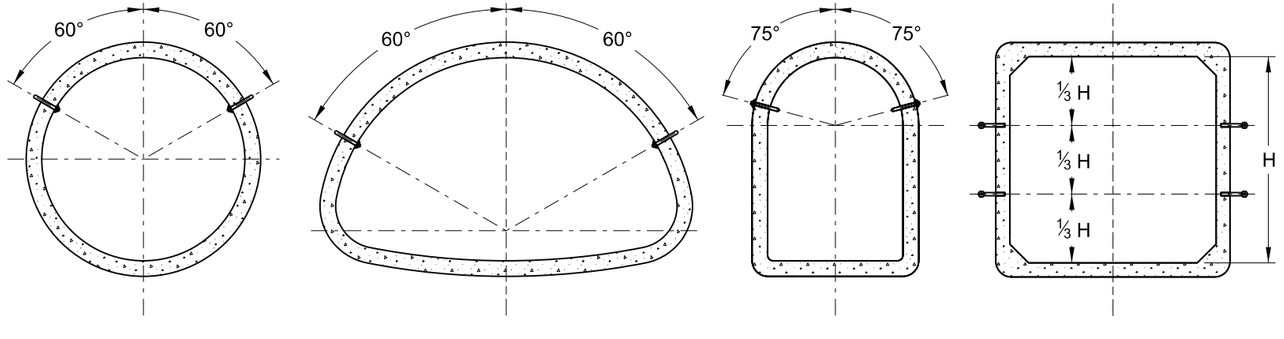
HIDDEN TIE (RCB ONLY)



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

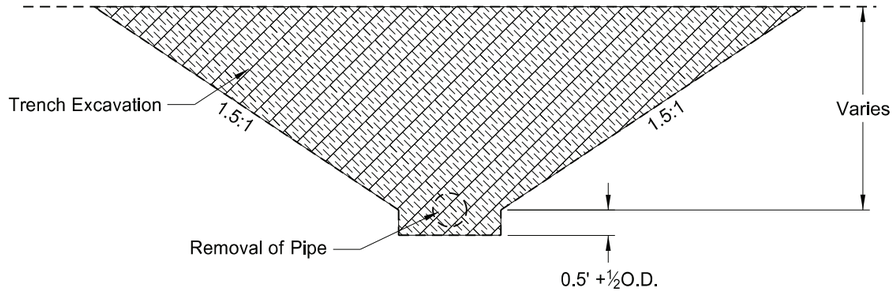
REVISIONS

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

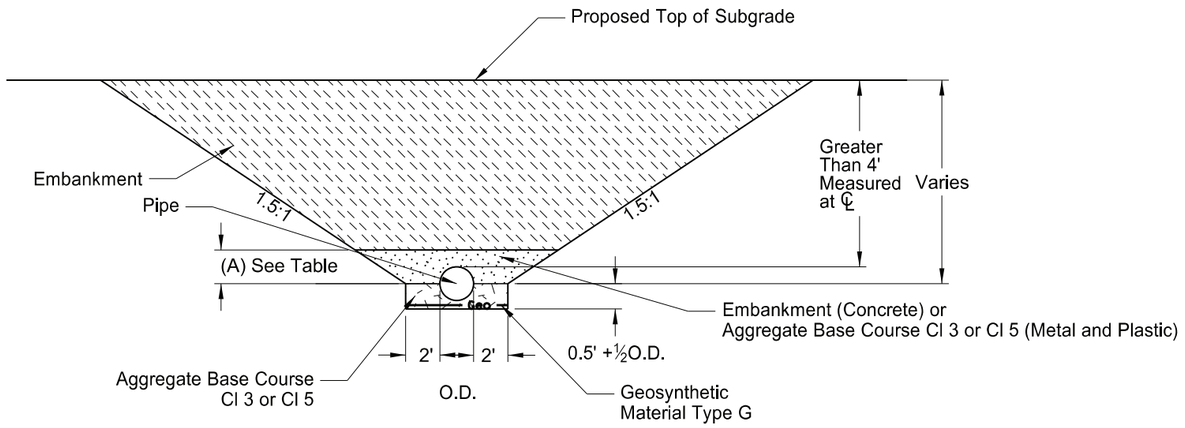
REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE 01/17/25
NORTH DAKOTA

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

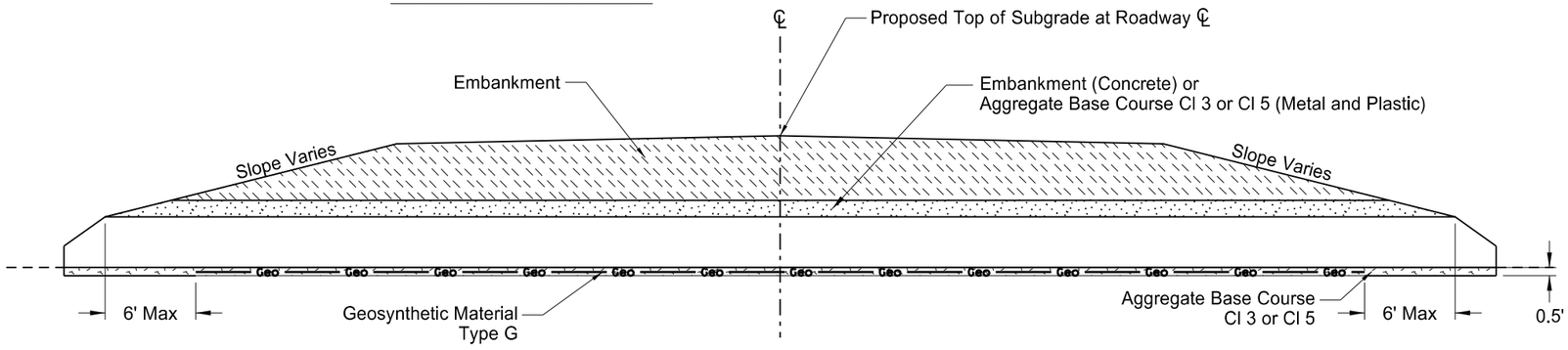
D-714-25



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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-26-13

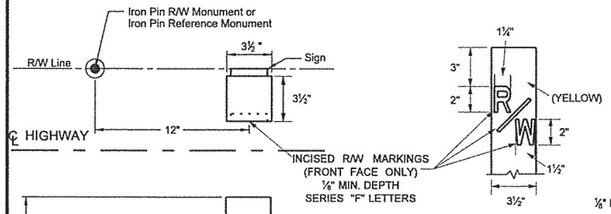
REVISIONS

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 Changed bedding depth

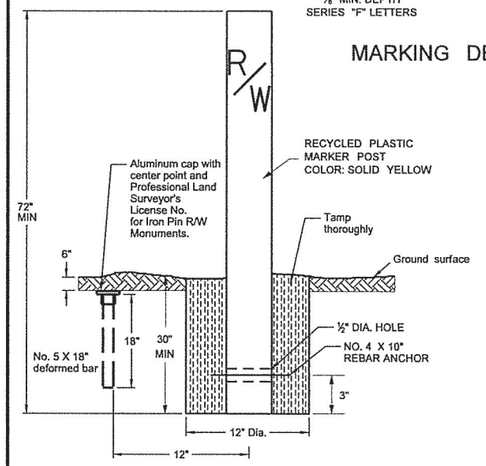
REGISTERED PROFESSIONAL ENGINEER
MATTHEW C KURLE
PE-8777
DATE
05/27/20
NORTH DAKOTA
DocuSign

STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

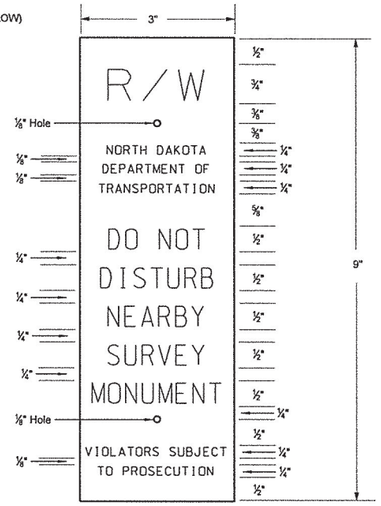
D-720-1



MARKING DETAIL



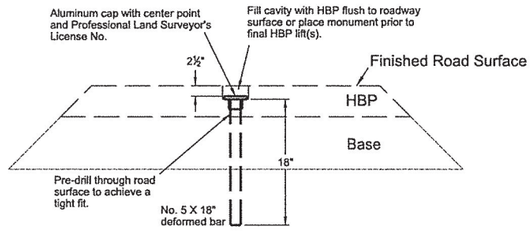
RECYCLED PLASTIC
RIGHT OF WAY MARKER
(WITNESS POST) DETAILS
&
IRON PIN REFERENCE AND R/W
MONUMENT DETAILS



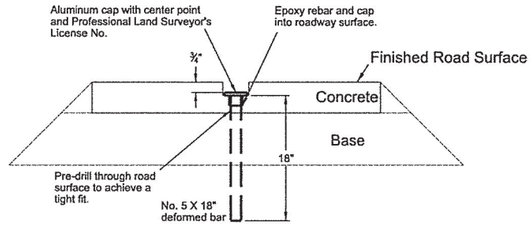
SIGN DETAIL

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.

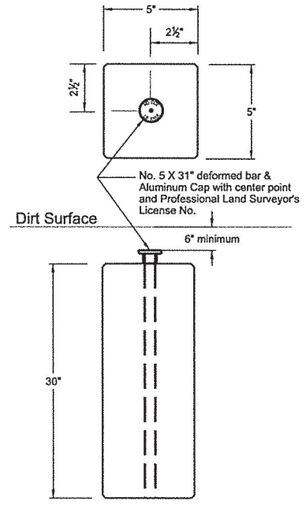
ALIGNMENT MONUMENT DETAILS



IRON PIN
(Within Finished Roadway Surface)



IRON PIN
(Within Finished Roadway Surface)



PRECAST CONCRETE
(Outside Finished Roadway Surface)
(Inside R/W Limits)

NOTES:

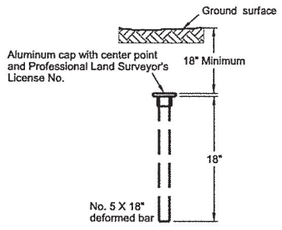
Construct and install Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) according to Section 720 of the Standard Specifications.

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.

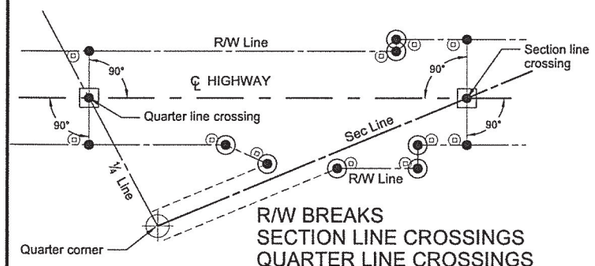
IRON PIN REFERENCE MONUMENT: Place Iron Pins without aluminum caps (No. 5 X 18") as reference monuments on the Right of Way line at section corners, quarter corners, section line crossings, and quarter line crossings.

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.

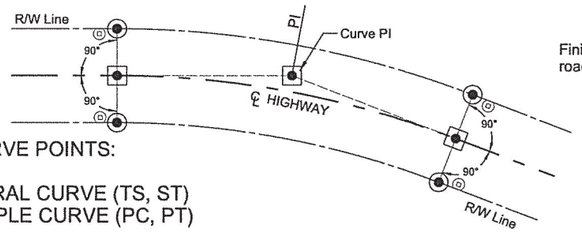


IRON PIN
(Outside Finished Roadway Surface)
(Outside R/W Limits)

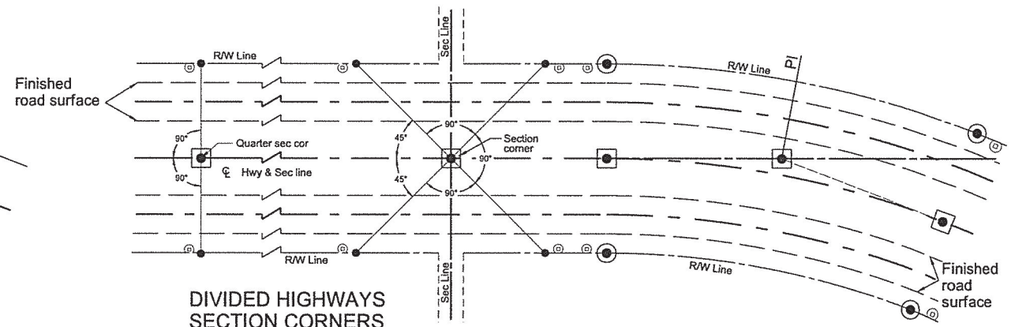
VARIOUS MONUMENT AND MARKER PLACEMENTS



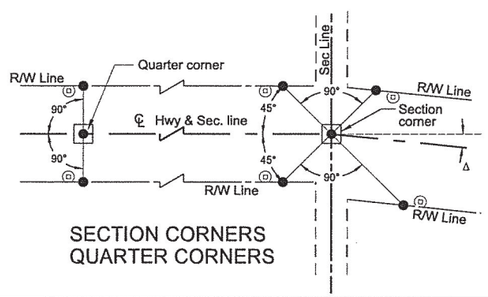
R/W BREAKS
SECTION LINE CROSSINGS
QUARTER LINE CROSSINGS



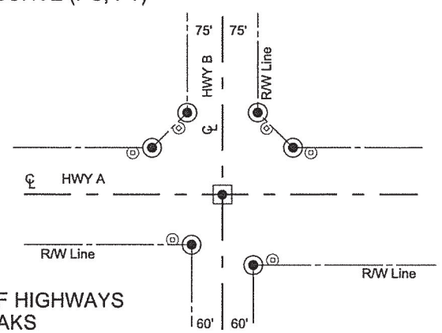
CURVE POINTS:
PI
SPIRAL CURVE (TS, ST)
SIMPLE CURVE (PC, PT)



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.

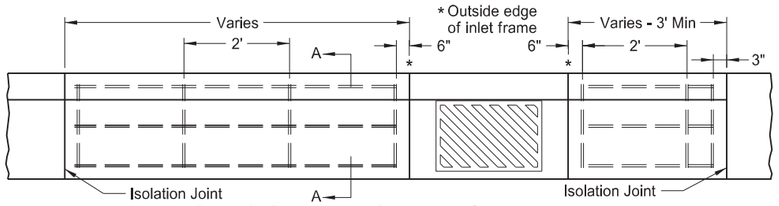
LEGEND
- Iron Pin Reference Monument
- R/W Marker (witness post)
- Alignment Monument
- Iron Pin R/W Monument

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE 4683
8/27/19
ENGINEER
NORTH DAKOTA

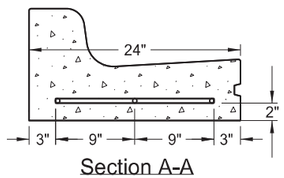
DocuSign Envelope ID: 8071F1C0-4FD3-4297-BAED-6F9FA4C58F28

Curb & Gutter and Valley Gutter

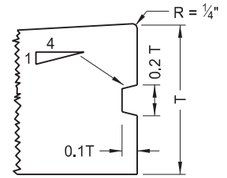
D-748-1



Curb & Gutter Reinforcing at Inlets



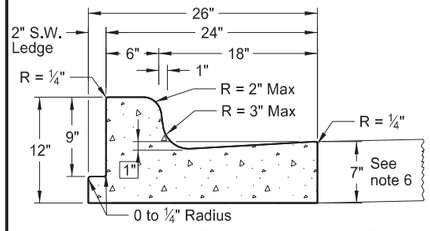
Section A-A



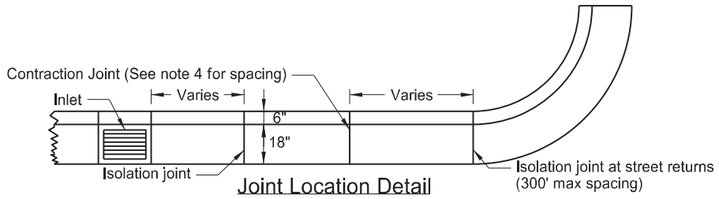
Keyway Detail for Curb & Gutter

(To be used with PCC Pavement and Drives)

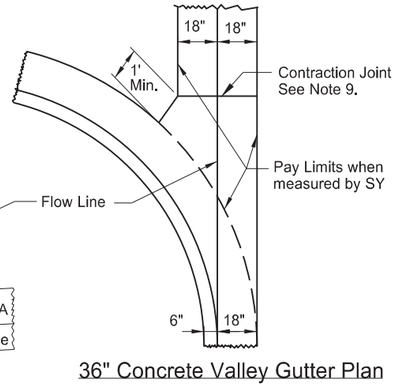
T= Thickness of pavement unless otherwise noted on plans.



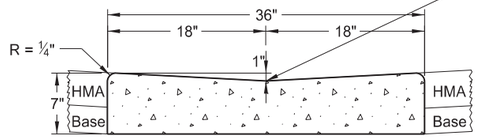
Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median, or Parking Lot. (Sec. A shown. See Sec B for additional details.)



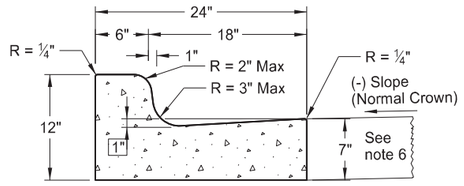
Joint Location Detail



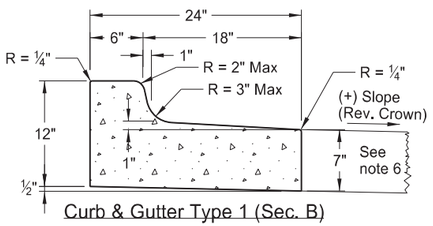
36" Concrete Valley Gutter Plan



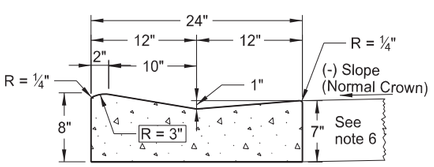
36" Concrete Valley Gutter Detail



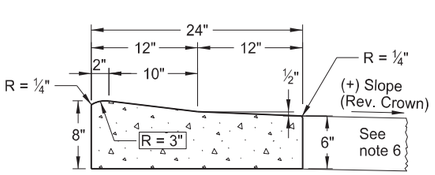
Curb & Gutter Type 1 (Sec. A)



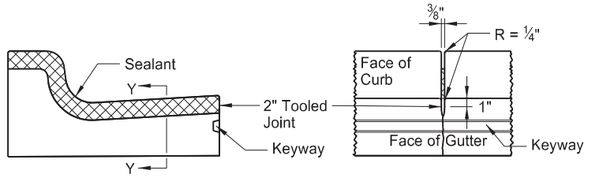
Curb & Gutter Type 1 (Sec. B)



Mountable Curb & Gutter Type 1 (Sec. A)



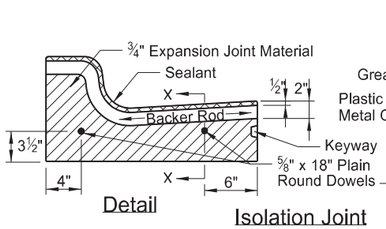
Mountable Curb & Gutter Type 1 (Sec. B)



Detail
(10' Max Spacing)

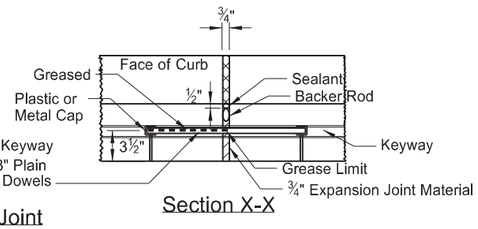
Contraction Joint

Section Y-Y

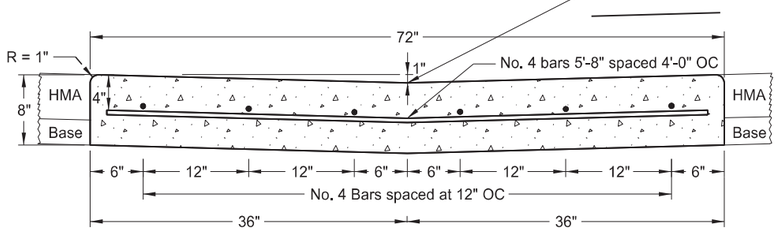


Detail

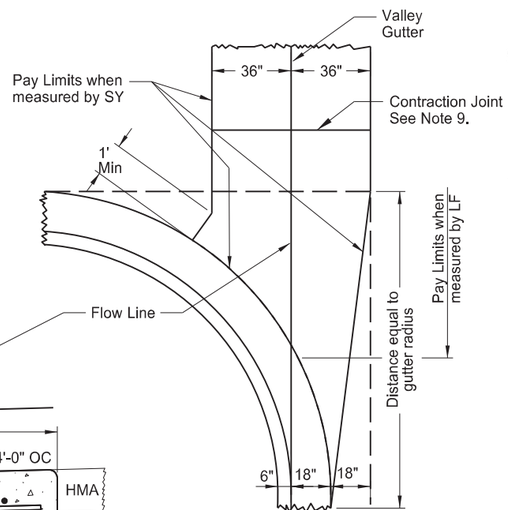
Isolation Joint



Section X-X



72" Concrete Valley Gutter Detail



72" Concrete Valley Gutter Plan

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

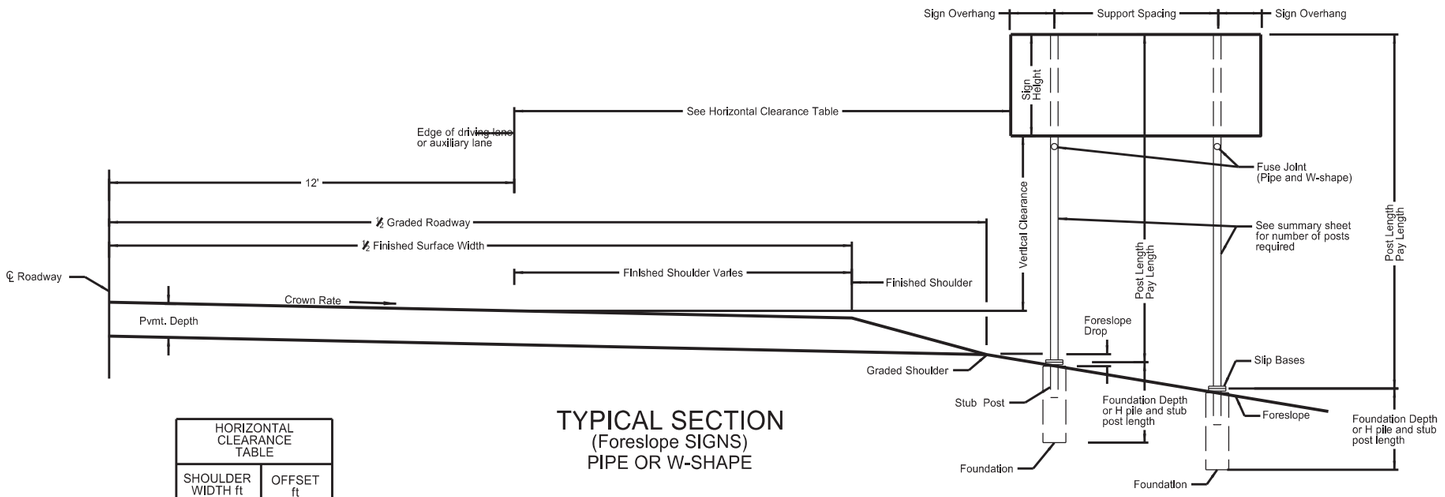
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.
10-30-24	Revised bar size & notes.

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

10/30/24

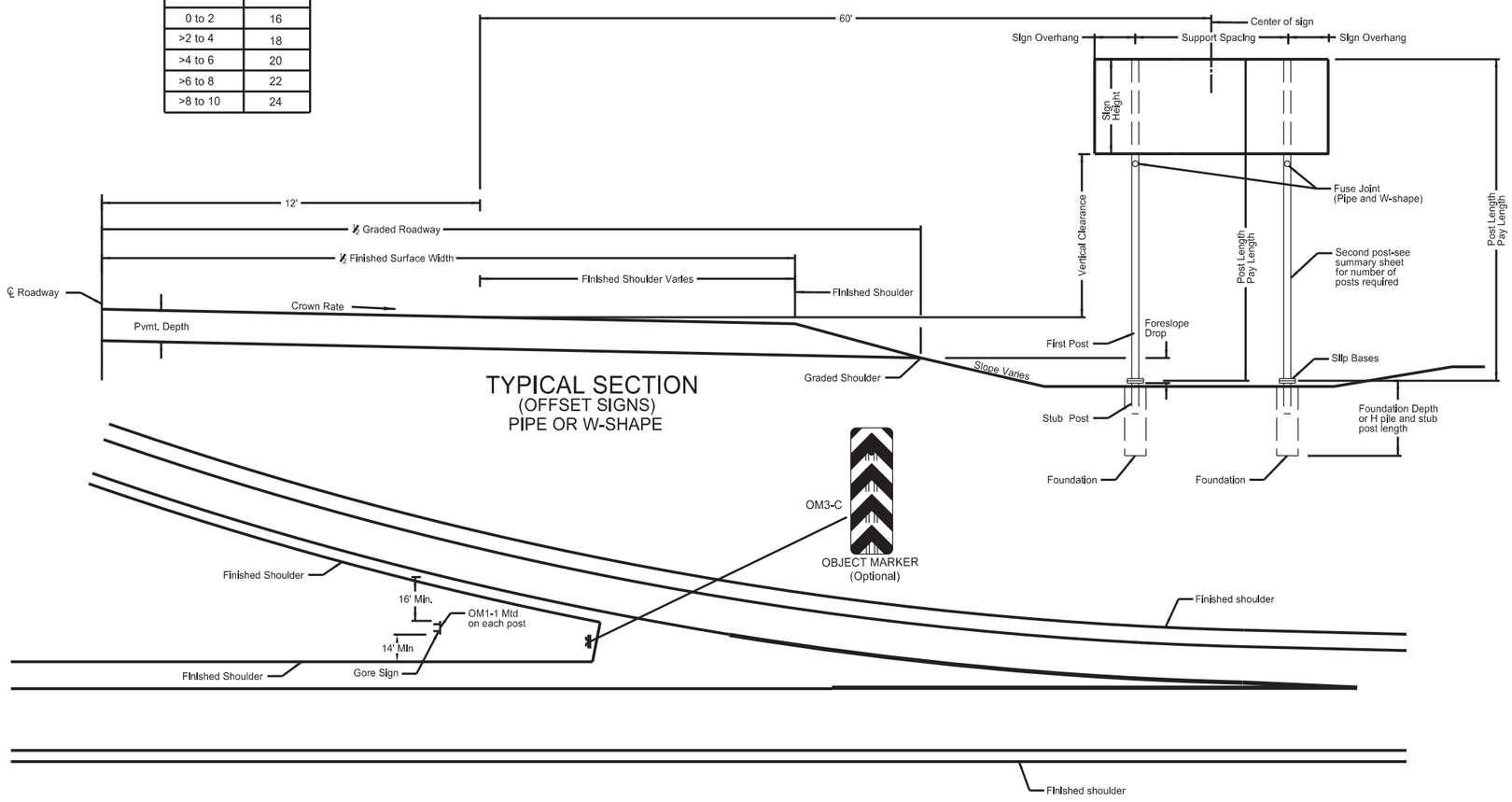
PIPE OR W-SHAPE ASSEMBLY DETAILS

D-754-1



TYPICAL SECTION
(Foreslope SIGNS)
PIPE OR W-SHAPE

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
(OFFSET SIGNS)
PIPE OR W-SHAPE

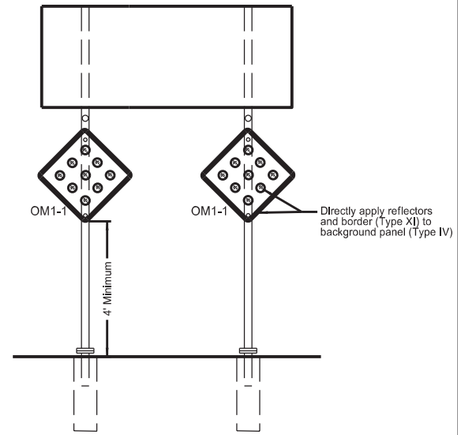
EXIT RAMP
GORE SIGN PLACEMENT

NOTES:

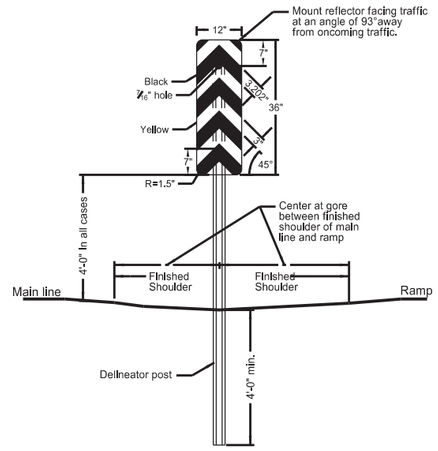
MINIMUM VERTICAL CLEARANCE:
Install signs with a minimum 5 foot vertical clearance from bottom of sign to top edge of the driving lane or auxiliary lane in rural locations. Provide a minimum 7 foot vertical clearance where parking or pedestrian movements occur. Install signs with a minimum 7 foot vertical 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



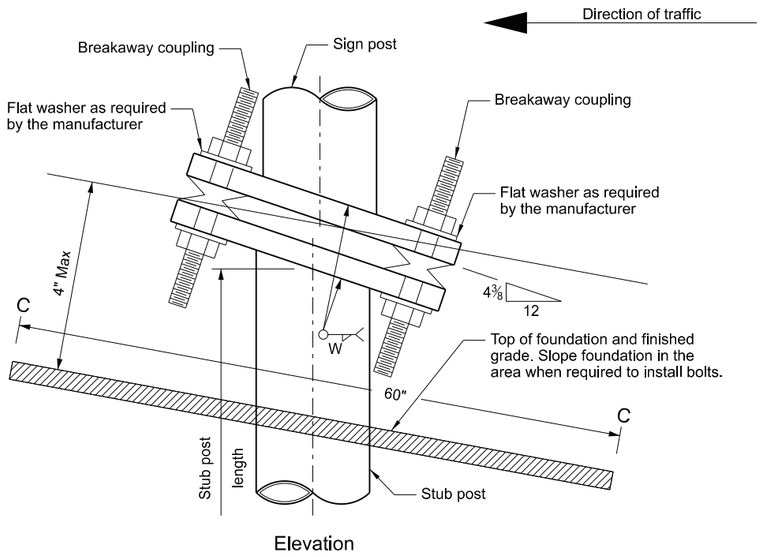
OBJECT MARKER INSTALLATION

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

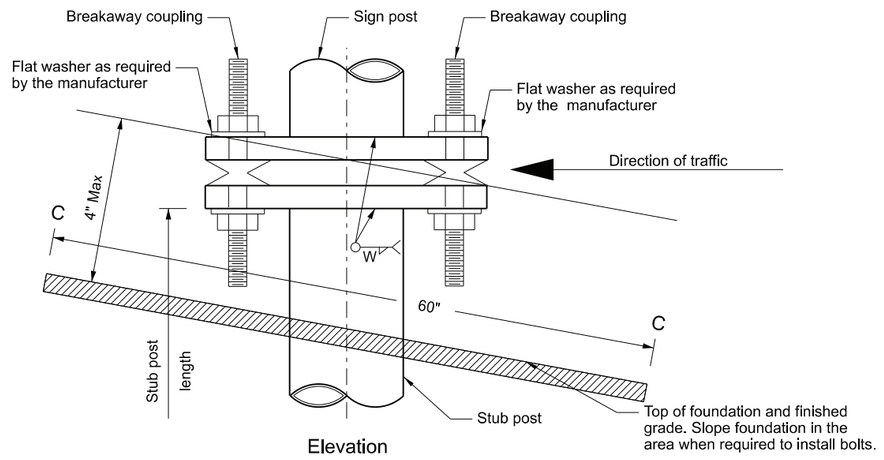
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Elevation

Single Post Sign and Stub Post
Type A

Breakaway Coupler System for Standard Pipe Stub Post

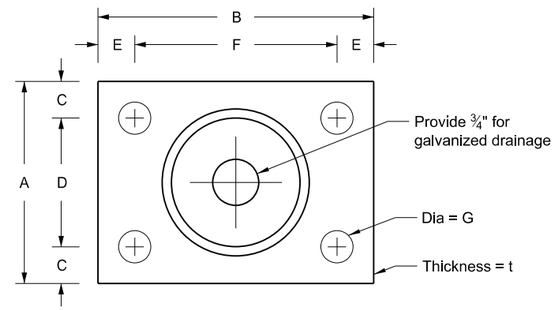


Elevation

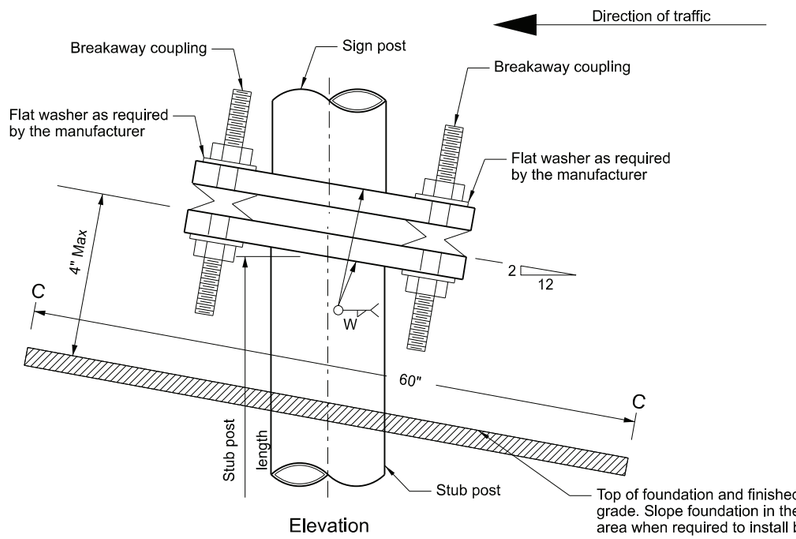
Two or More Post Sign and Stub Post
For two post signs with 8' or more post spacing and all three or more post signs
Type C

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.

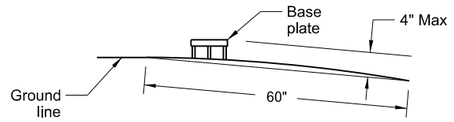


Plan Base Plate



Elevation

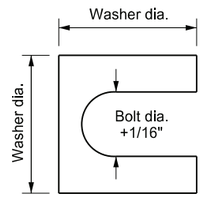
Two Post Sign and Stub Post
For signs with less than 8' post spacing
Type B



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.

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"	1½"	7/16"	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.

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.

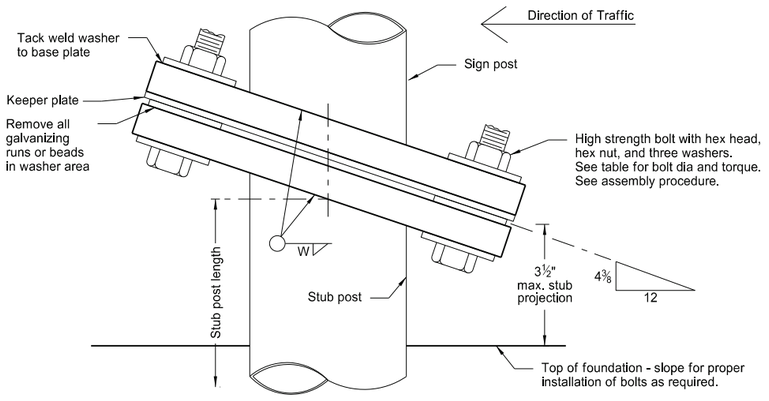
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

08/05/24

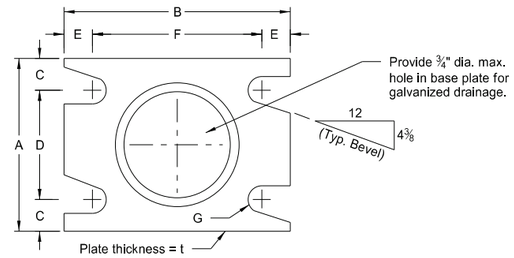
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Breakaway System for Standard Pipe Stub Post

D-754-3



Stub Post Connection - Type A
Elevation View
(Single Post)

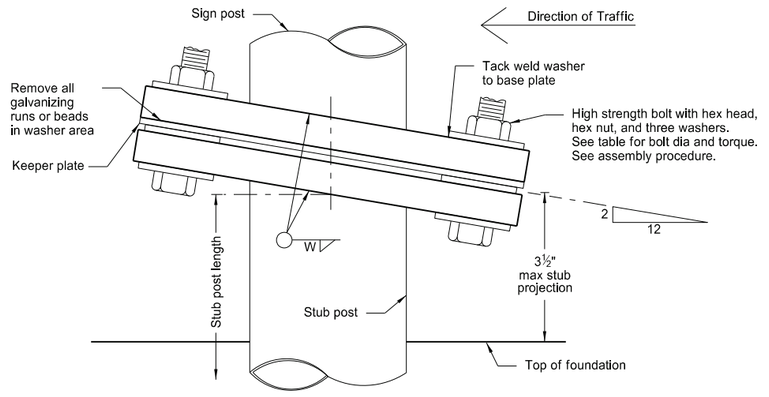


Base Plate Plan View
Place bevel toward roadway on approach side and away on the other side.

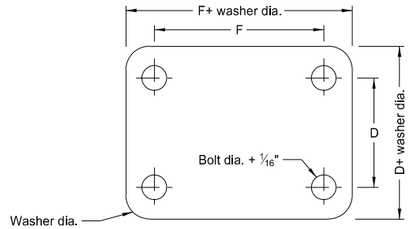
Notes:
Tack weld aluminum base plate washers to the base, when the base plate is aluminum.

Use standard drawing D-754-6 for fuse plate, hinge plate, and foundation details.

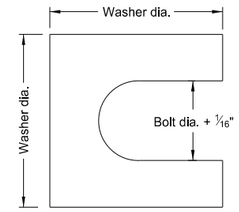
Assembly Procedure:
1. Assemble post to stub with bolts and one flat washer between base plate and keeper plate.
2. Shim as required.
3. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and shims and to clean bolt threads, then loosen.
4. Retighten bolts in a systematic order 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.



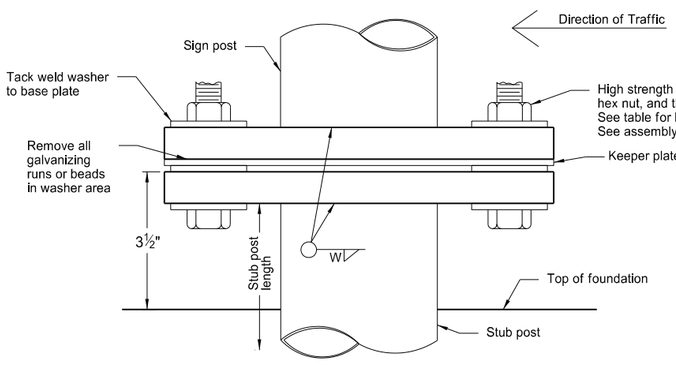
Stub Post Connection - Type B
Elevation View
(Two Posts)



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.



Stub Post Connection - Type C
Elevation View
(Two Posts)

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.

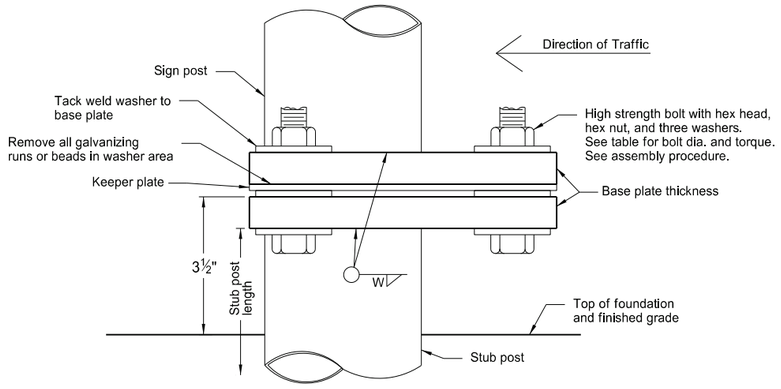
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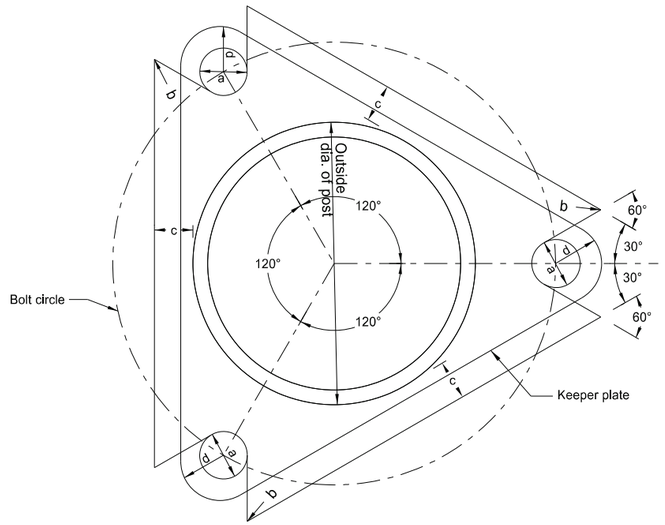
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Multi-Directional Breakaway System for Standard Pipe Stub Post

D-754-4



Stub Post Connection - Type D
Elevation View
(Single Post)

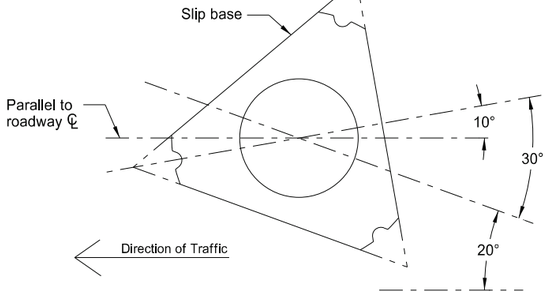


Stub Post Detail
Top View

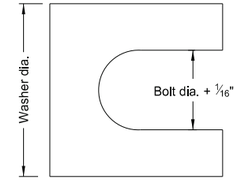
Notes:
Tack weld aluminum base plate washers to the base, when the base plate is fabricated from aluminum.

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.

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.

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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.

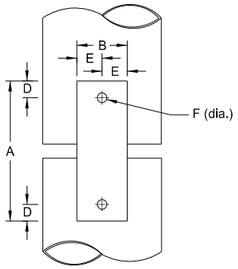
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ENGINEER
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08/05/24

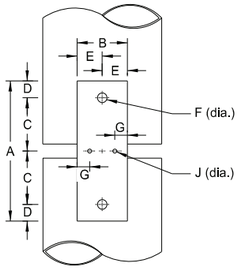
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Hinge Plate, Fuse Plate and Foundation Details for Standard Pipe

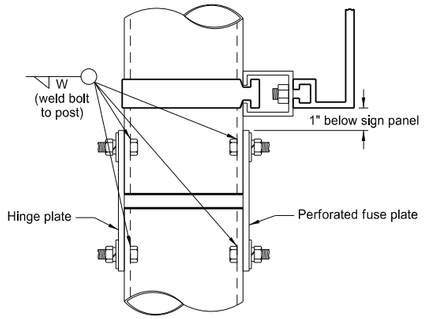
D-754-6



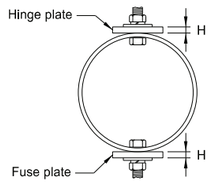
Hinge Plate



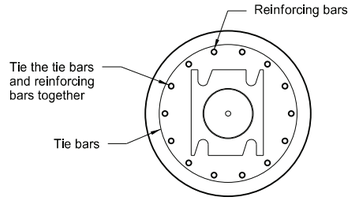
Perforated Fuse Plate



Side View

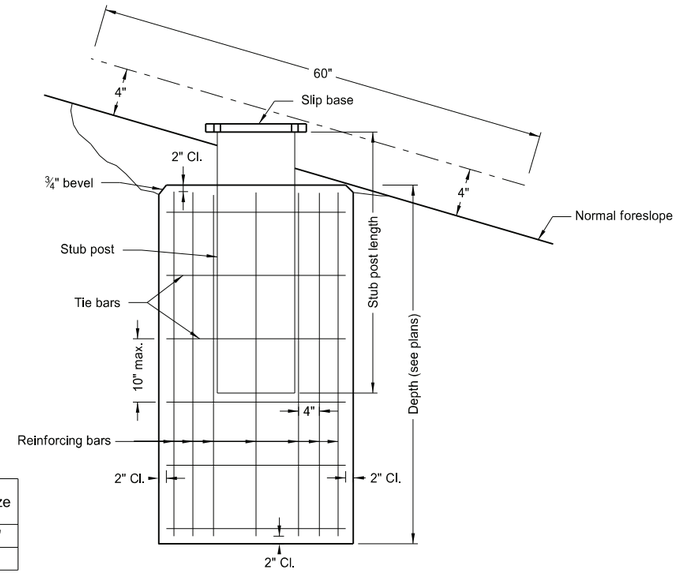


Top View



Top View

See standard drawing D-754-5 for size, number, and length of rebar. Use 3 bolt base plate for Type D.



Foundation diameter	Post Size
1'-4"	3½"-4"
1'-9"	5"-6"

Foundation

Front View

Foundation detail for breakaway base with stub post connection.

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"	1 1/16"	17/32"	⅜"	15/32"	9/16"
5"	⅝"ø x 1¾"	5¾"	2"	1⅞"	1"	1"	1 1/16"	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

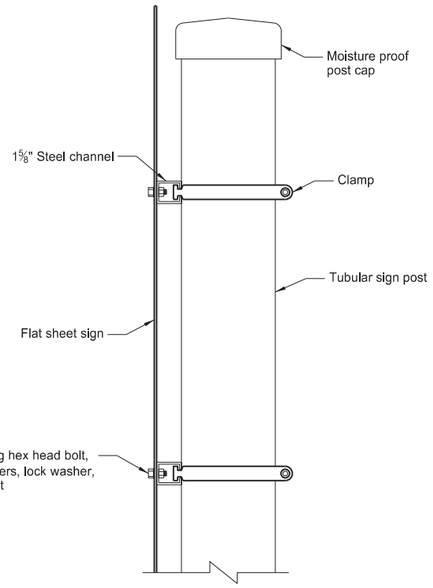
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.

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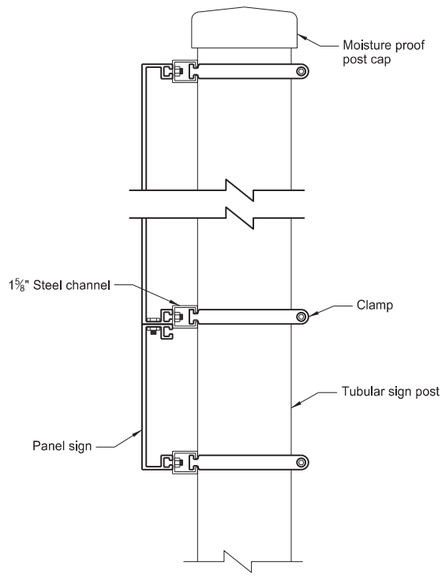
08/05/24

PIPE SUPPORT AND SIGN MOUNTING DETAILS

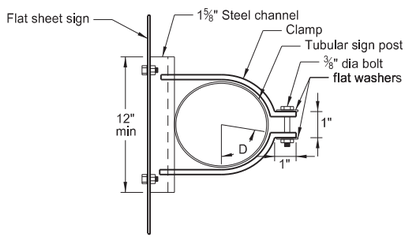
D-754-7



Side View

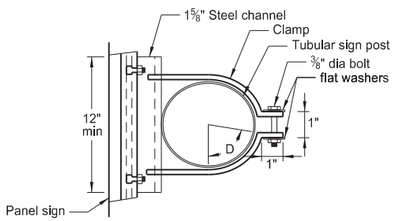


Side View



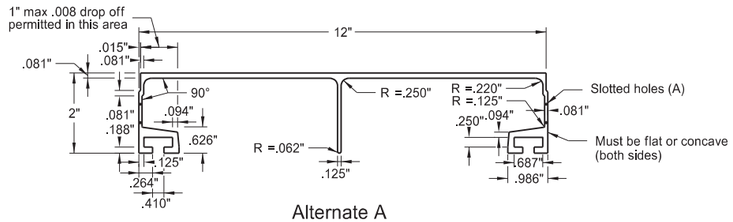
Top View

Flat Sheet Sign Clamp Mounting Details

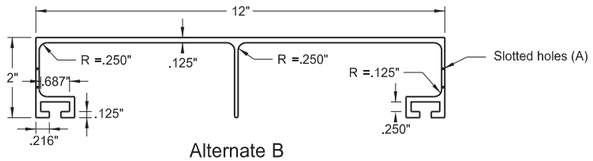


Top View

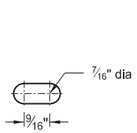
Panel Sign Clamp Mounting Details



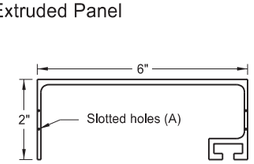
Alternate A
12" Extruded Panel



Alternate B
12" Extruded Panel



Slotted Hole Detail



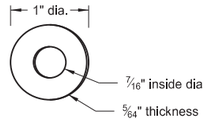
6" Extruded Panel

Aluminum Panel Details

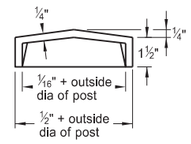
(A) Punch slotted holes in aluminum panels at 1'-0" on center, space from end as listed below:

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

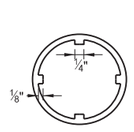
Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



Flat Washer Detail



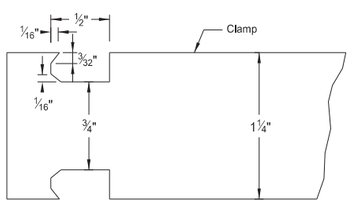
Side View



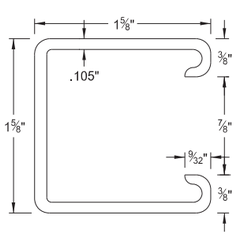
Top View

Post Cap Detail

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



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.

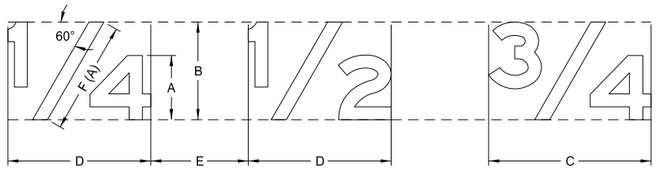
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10/20/22

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LETTER AND ARROW DETAILS

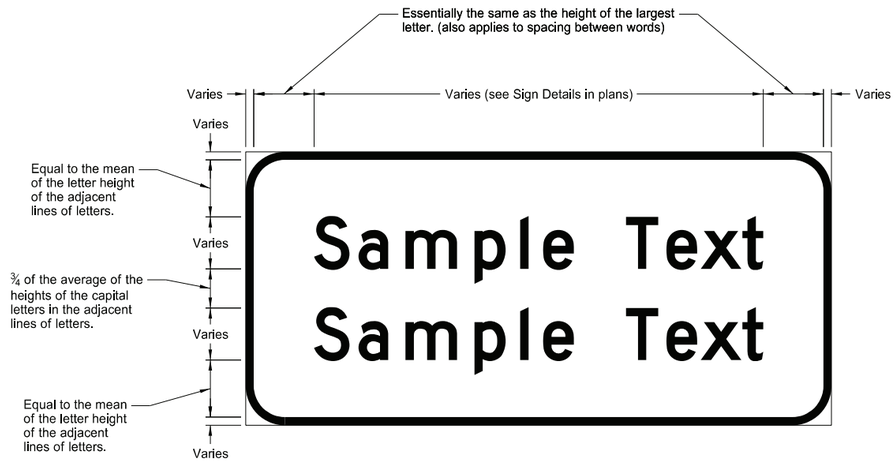
D-754-9



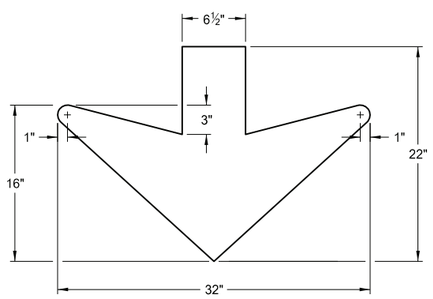
DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

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

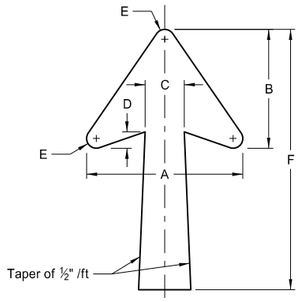
(A) Center diagonal stroke of fraction optically.



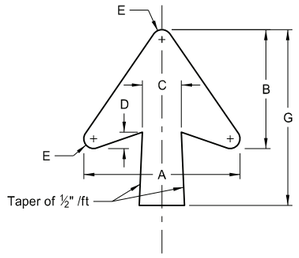
TYPICAL SPACING



DOWN ARROW



TYPE A

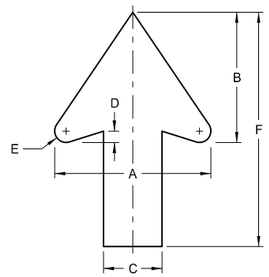


TYPE B

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"							

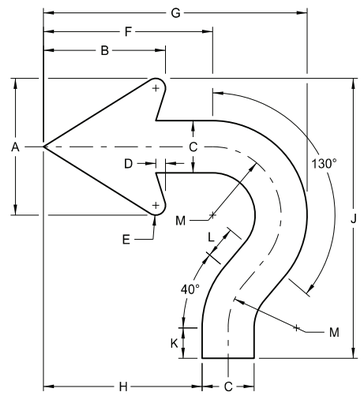
NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

NOTE: Measure rotation angle of arrows counterclockwise from positions shown in details.



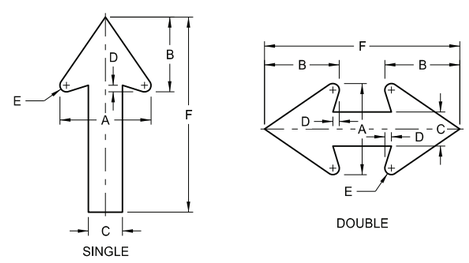
TYPE D

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

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"



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

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 voice.
8-29-19	New Design Engr PE Stamp.
8-05-24	Electronic Stamp/Signature.

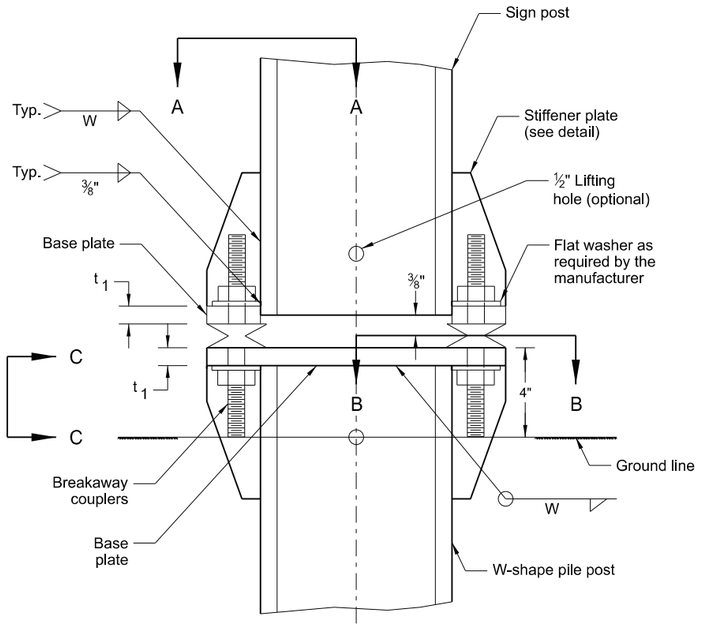
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08/05/24

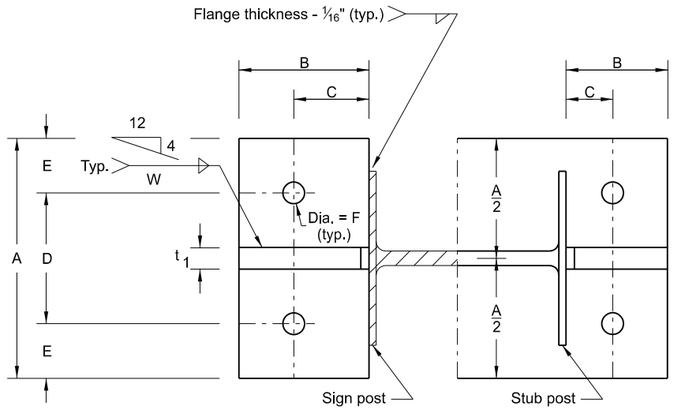
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Breakaway Coupler System
Structural Details
for W-Shape Supports

D-754-12



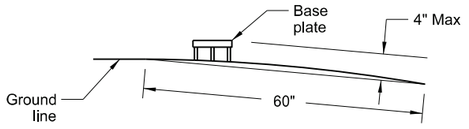
Sign Post and Stub Post
Elevation



Section A - A Section B - B
(See Table for Dimensions)

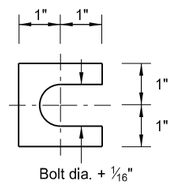
Notes:

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.

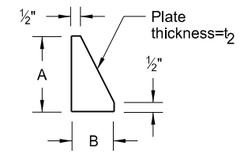


Section C - C

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.



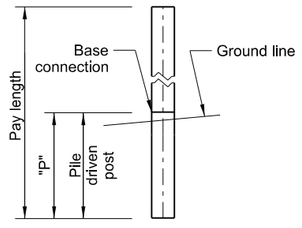
Shim Detail



Stiffener Plate Detail
(See Table for Dimensions)

Furnish 2 - .012"± thick and 2 - .032"± thick shims per post. Fabricate shims from brass shim stock or strip conforming to ASTM B36.

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	3/4" x 5 1/4"	6"	2 1/2"	1 1/2"	3 1/2"	1 1/4"	1"	1/2"	1/4"	13/16"	14'
W5X16											14'
W6X20	7/8" x 5 1/4"	8"	3"	1 3/4"	4"	2"	1 1/4"	1/2"	1/4"	15/16"	14'
W8X24											14'
W8X28	1" x 5 1/4"	8"	3"	2"	4"	2"	1 1/2"	3/4"	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.

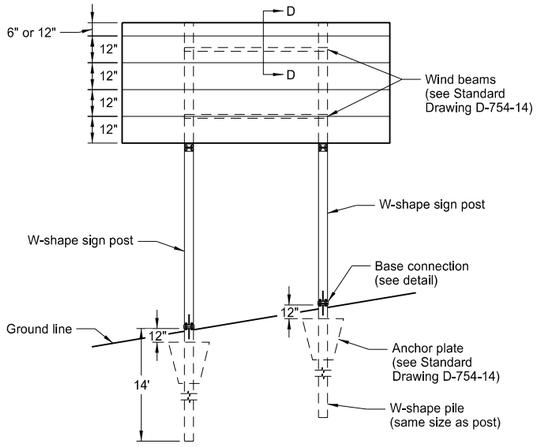
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08/05/24

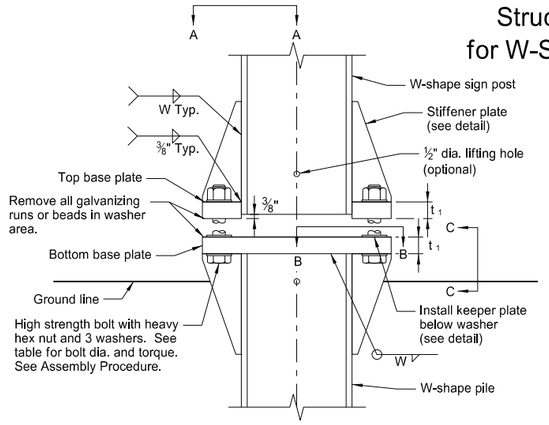
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Breakaway System Structural Details for W-Shape Supports

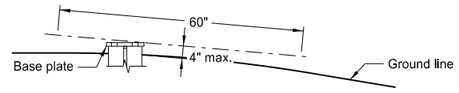
D-754-13



Typical Panel Mounting on W-shape Sign Posts

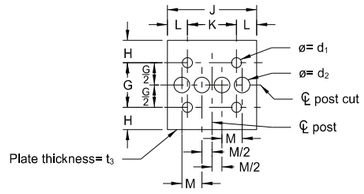


Base Connection Detail

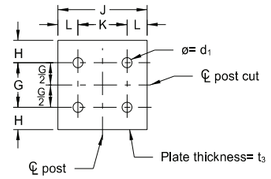


Section C-C Stub Height Requirements

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.

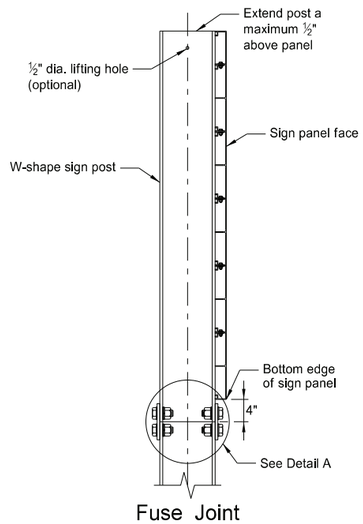
Refer to Sign Summary sheet for specific data on individual sign installation.

Install perforated fuse plate on side of post facing traffic.

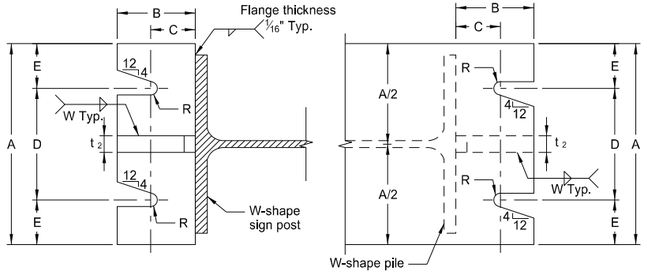
Saw cut posts. Shear or flame cut plates using a mechanically guided cutting torch in accordance with Section 754.04 D.4.b of the Standard Specifications. Prepare edge in accordance with Section 754.04 D.4.c of the Standard Specifications.

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.



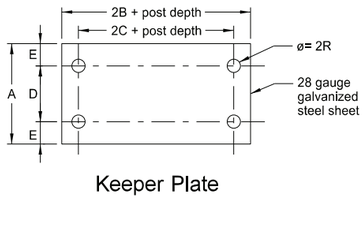
Fuse Joint (Side View)



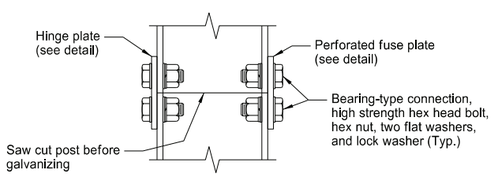
Section A-A

Section B-B

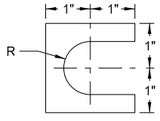
Sections shown for installations on right shoulder. Reverse plate slot bevels for installations on left shoulder.



Keeper Plate

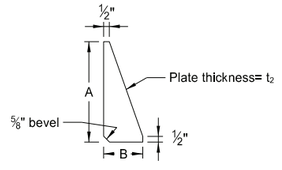


Detail A

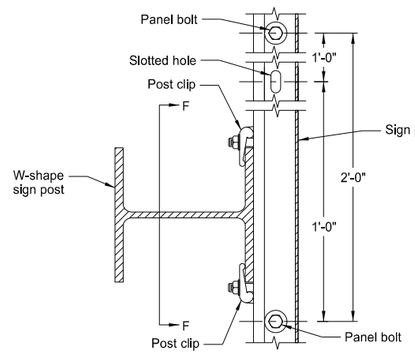


Shim Detail

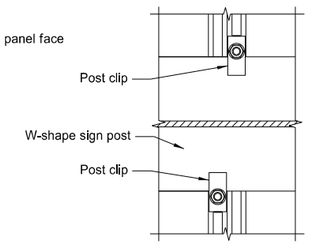
Furnish 2 each .012"± thick and 2 each .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



Stiffener Plate

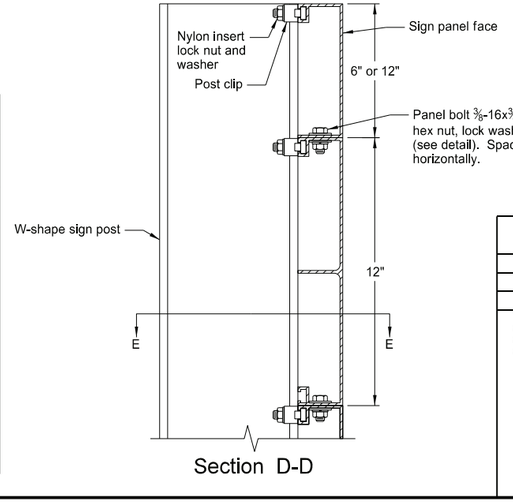


Section E-E

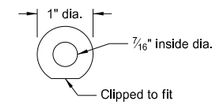


Section F-F

Install post clips on both sides of each post at each panel joint indicated.



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.

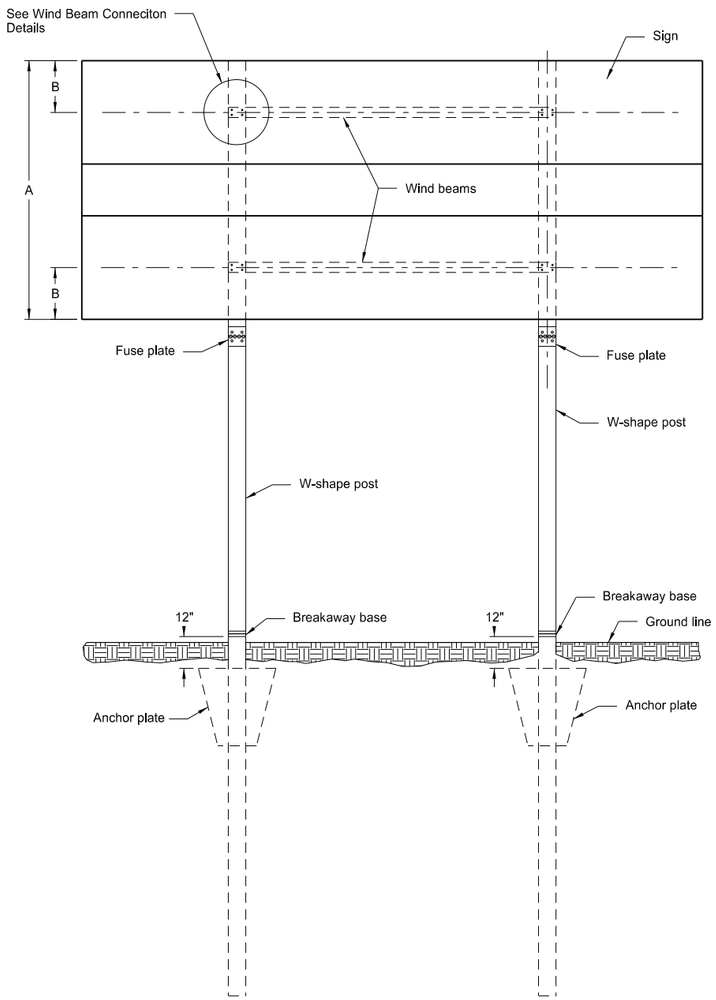
KIRK J. HOFFA REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

08/05/24

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

WIND BEAMS AND ANCHOR PLATES FOR W-SHAPE SUPPORTS

D-754-14



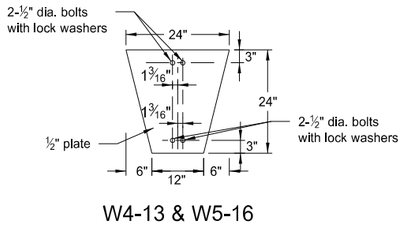
ASSEMBLY DETAIL FOR WIND BEAMS AND ANCHOR PLATES

Notes:

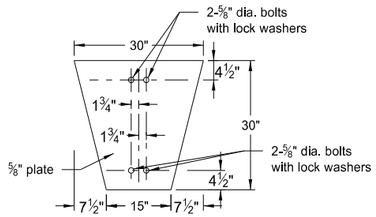
Calculate the B distance using the formula, B=A/4.

Use wind beam conforming to Section 894.03 B.6 of the Standard Specifications.

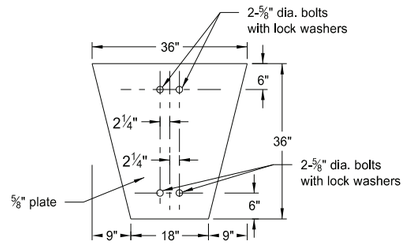
Use bolts conforming to ASTM A307 and galvanized according to ASTM A153.



W4-13 & W5-16

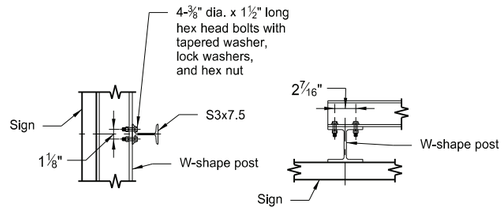


W6-20, W8-24 & W8-28



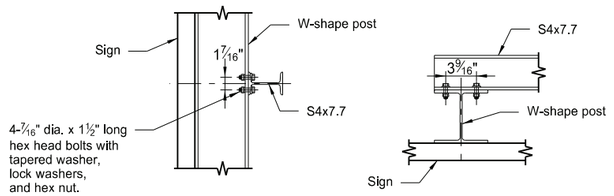
W8-31 & W10-39

ANCHOR PLATE DETAILS



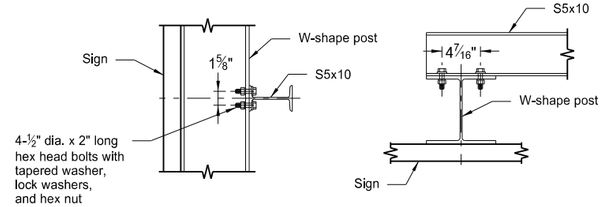
End View Top View

W4-13 & W5-16



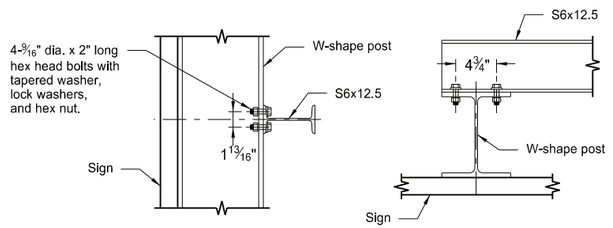
End View Top View

W6-20, W8-24 and W8-28



End View Top View

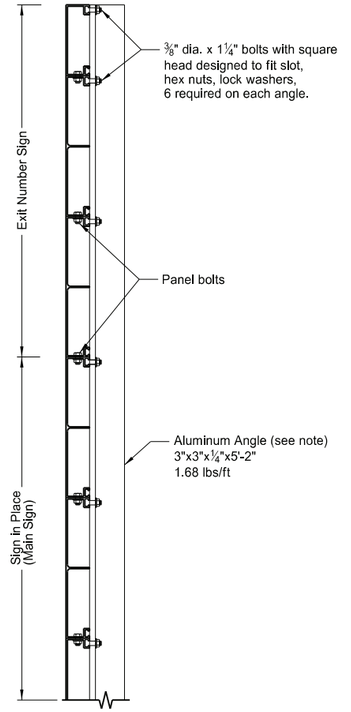
W8-31



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. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/05/24

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PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

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

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

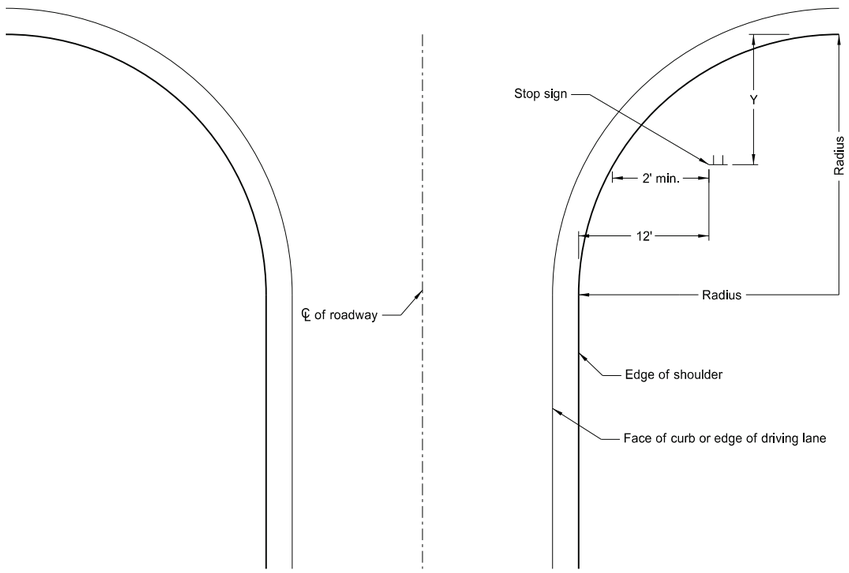
   Install signs on expressways a minimum height of 7'.

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

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

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

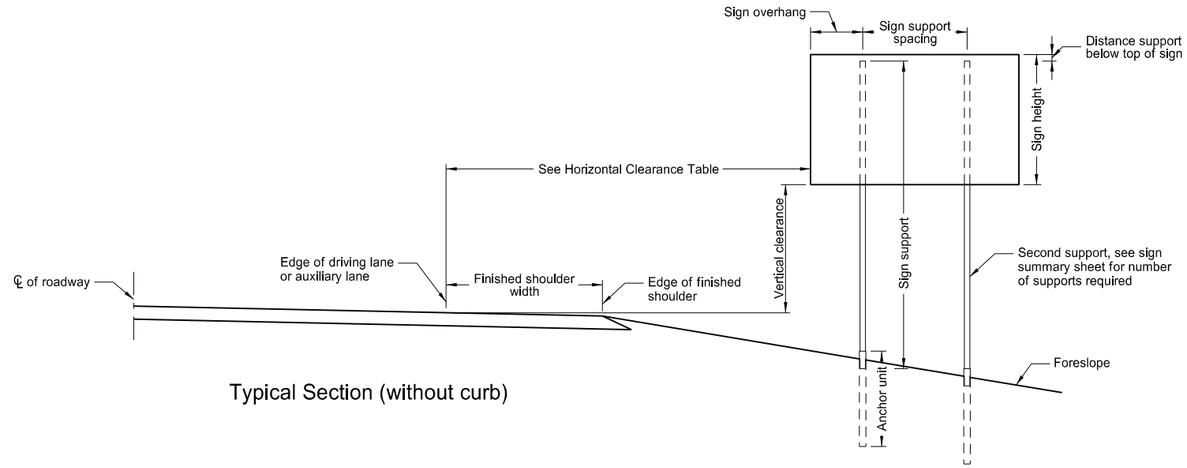
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

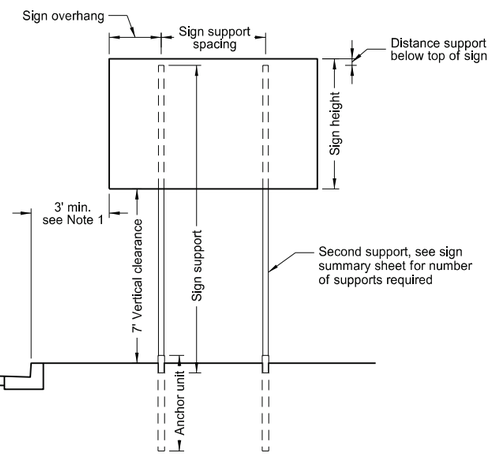
Use layout for the placement of "Stop" signs.

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



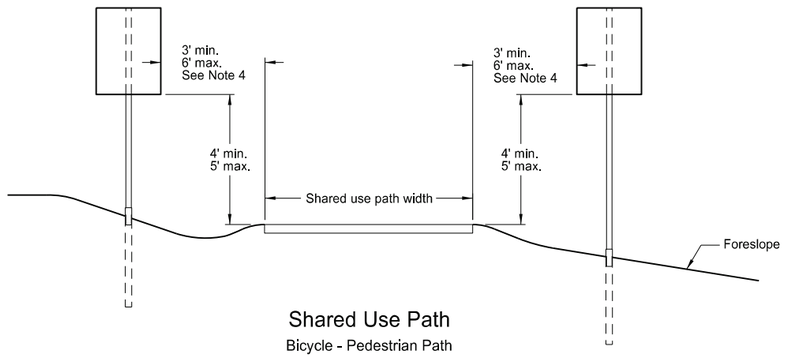
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-8-14	Revised note 2, added note 4.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.

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

08/05/24

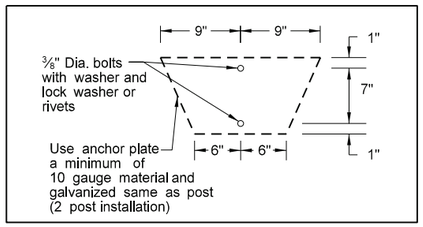
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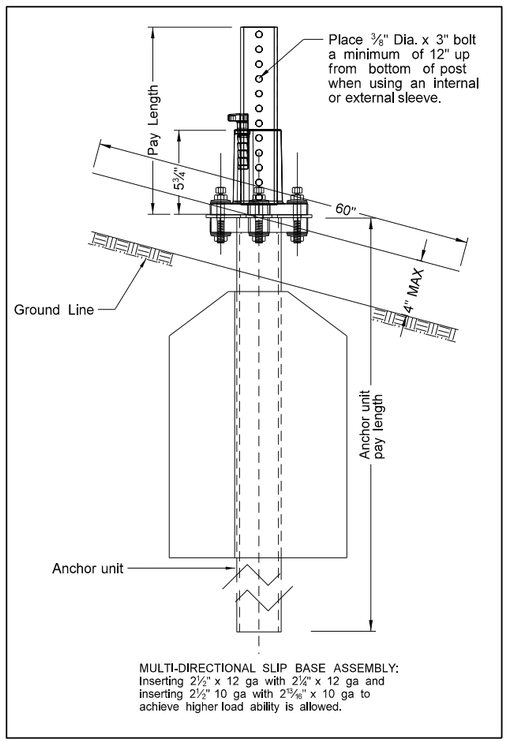
Mounting Details Perforated Tube

D-754-24

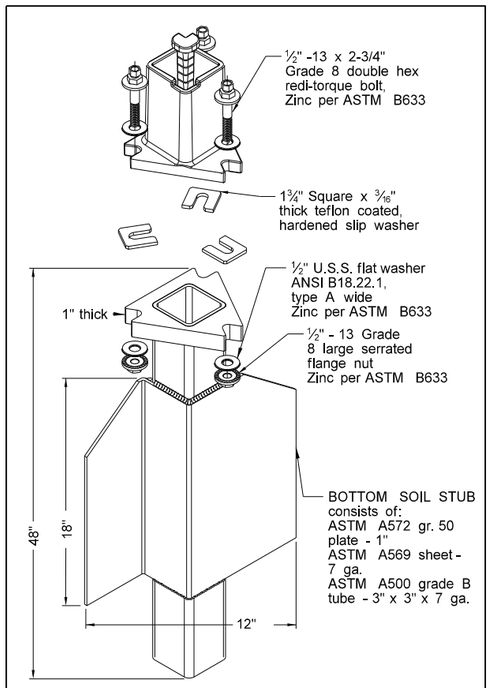
Number of Posts	Telescoping Perforated Tube: Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	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	2⁹⁄₁₆	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.

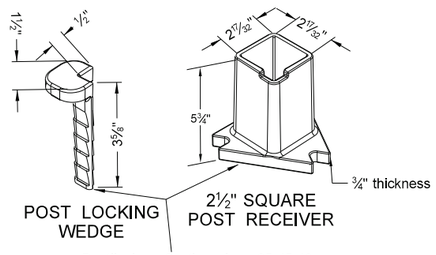


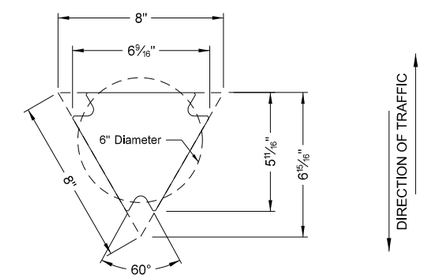


MULTI-DIRECTIONAL SLIP BASE ASSEMBLY: Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2¹⁵⁄₁₆" x 10 ga to achieve higher load ability is allowed.



SLIP BASE FOR 2½" POST





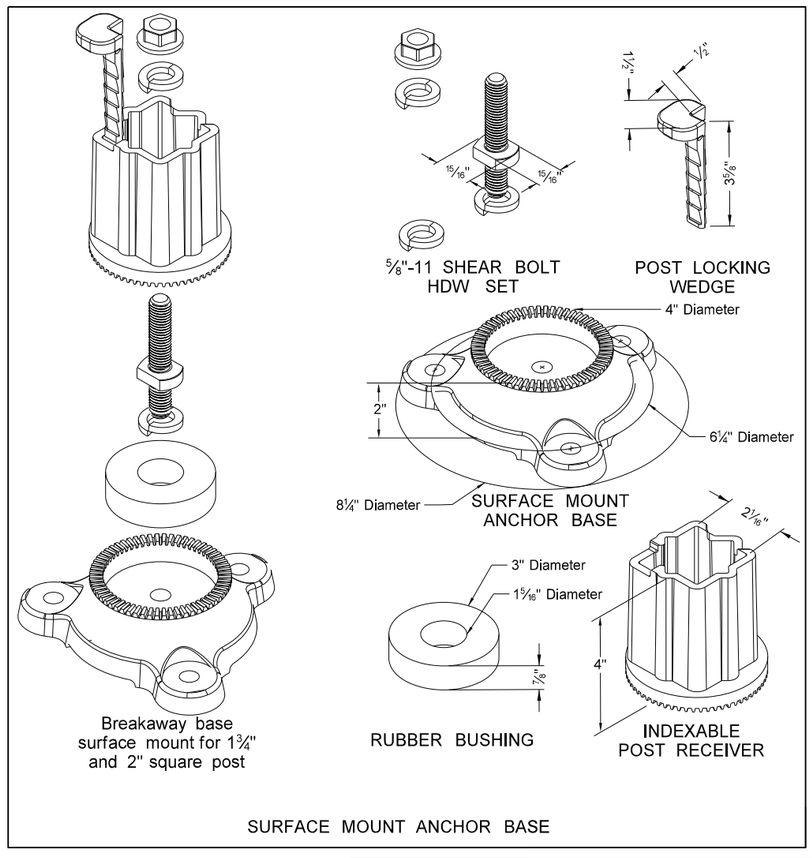
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes: Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³⁄₁₆ x 2³⁄₁₆	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

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:

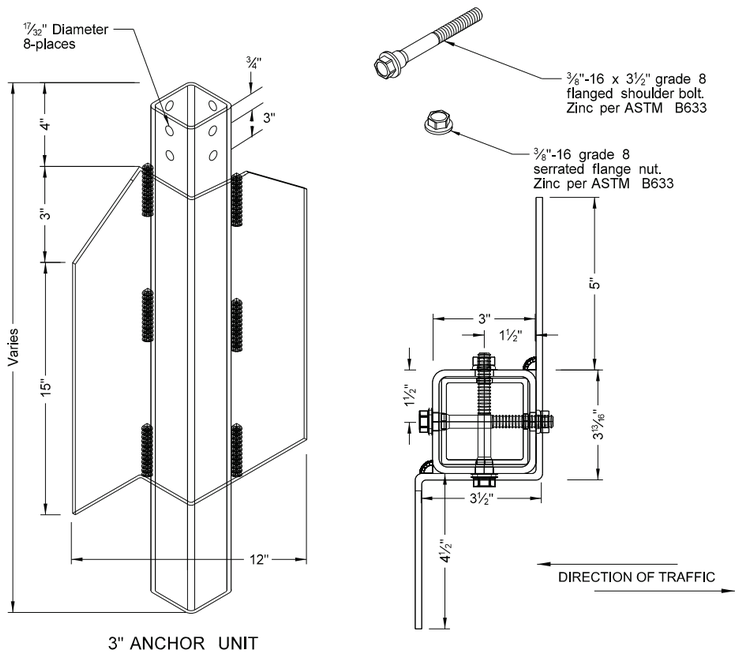
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile 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

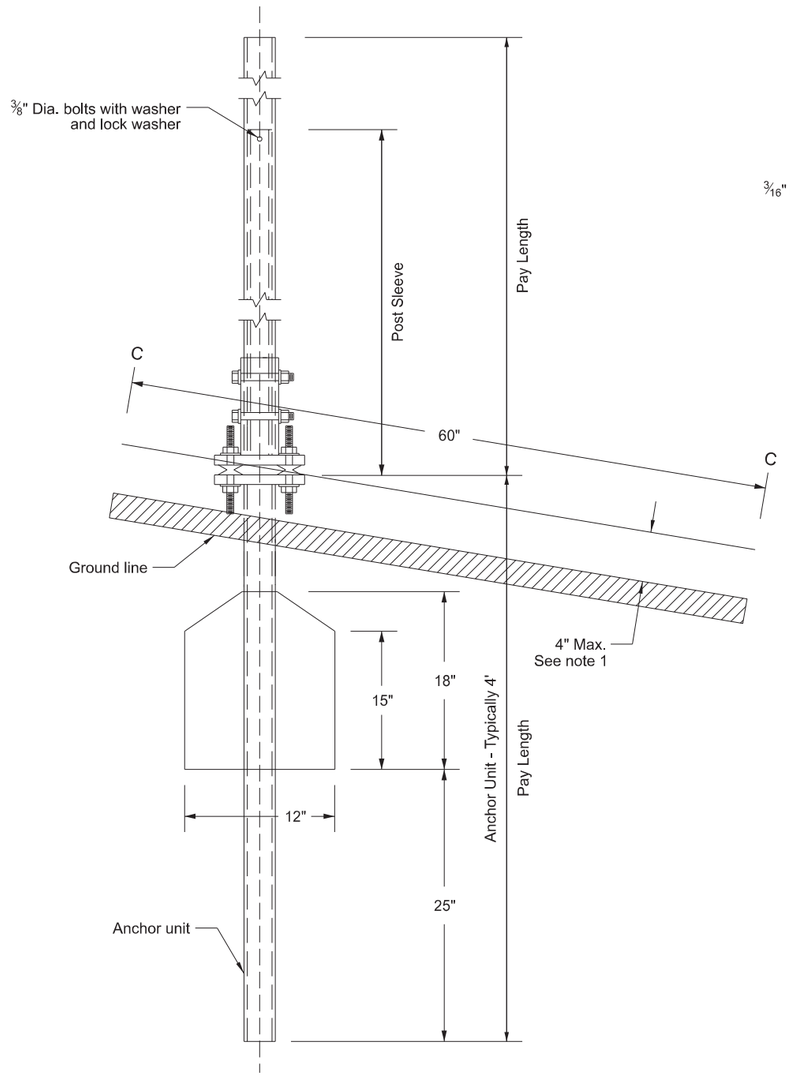
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.
8-05-24	Electronic Stamp/Signature.

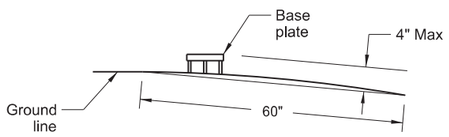
KIRK J. HOFF REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

08/05/24

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D-754-24A

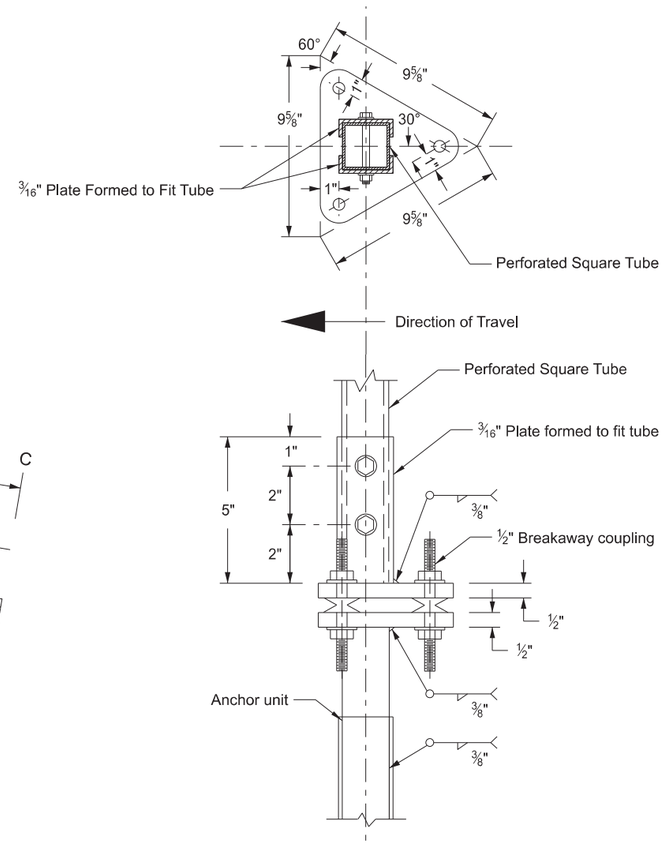




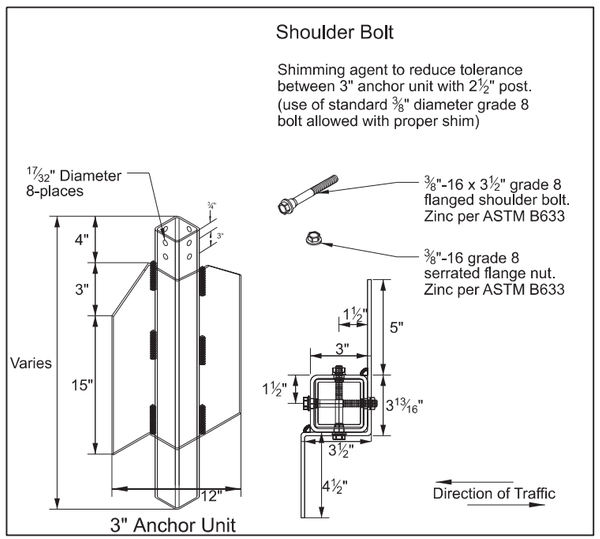
Section C-C

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.

Breakaway Coupler System for Perforated Tubes



Base Plate with Breakaway Coupler



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

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.

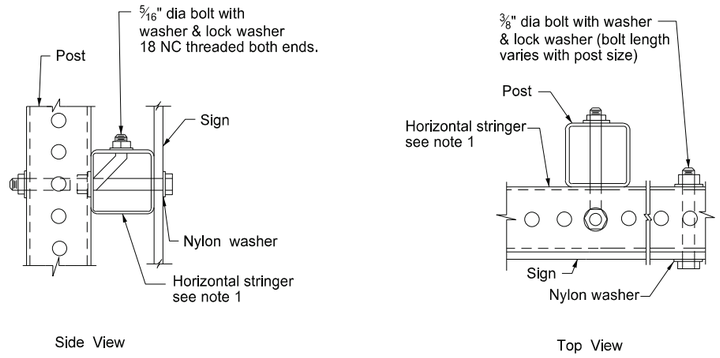
KIRK J. HOFFT REGISTERED PROFESSIONAL PE-4683 ENGINEER NORTH DAKOTA

07/22/25

DocuSign Envelope ID: 3BB6949C-35F3-4834-B8EF-90A4185B6E25

Mounting Details Perforated Tube

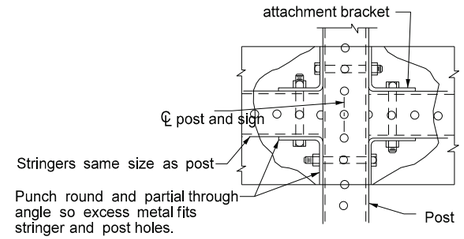
D-754-25



Side View

Top View

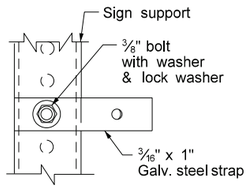
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



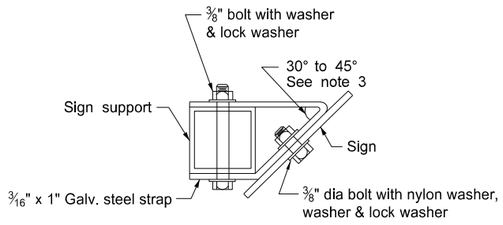
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

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.

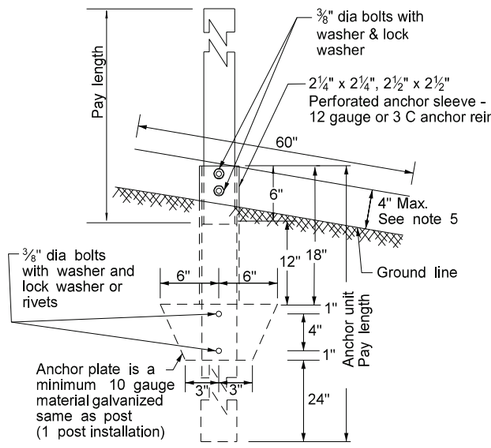


Side View



Top View

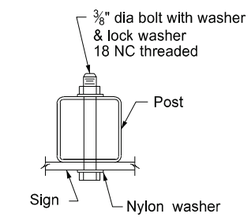
STRAP DETAIL



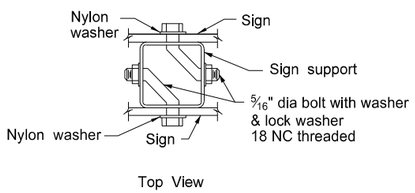
ANCHOR UNIT AND POST ASSEMBLY

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.

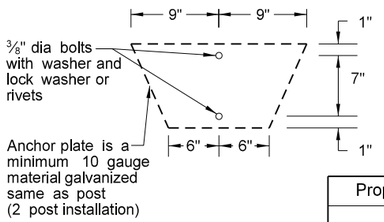


BOLT MOUNTING



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.

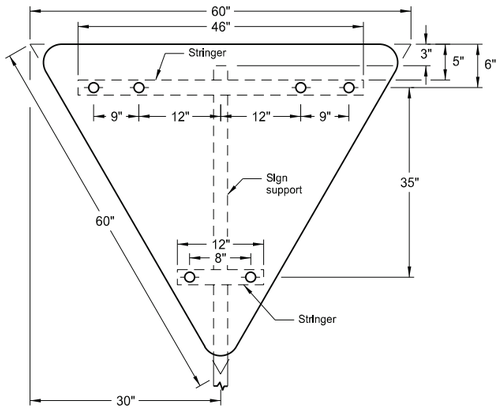
KIRK J. HOFF
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/05/24

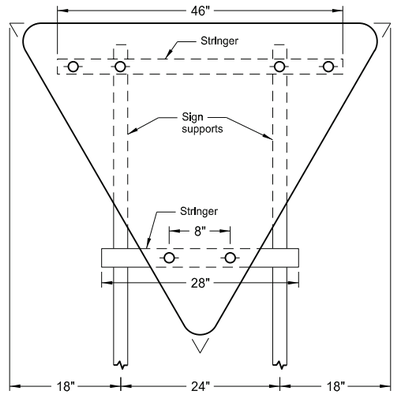
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

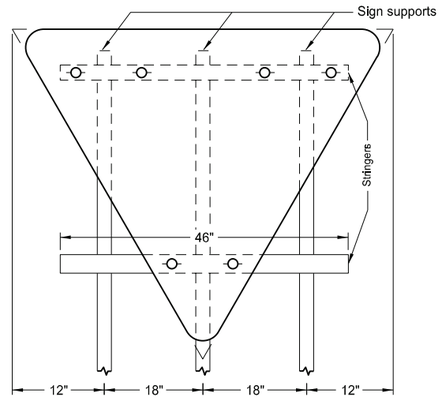
D-754-27



1 Post



2 Posts

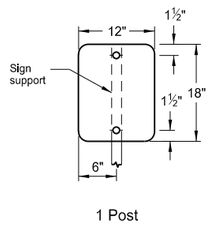


3 Posts

Assembly No. 6

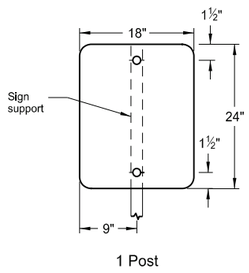
Notes:

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.



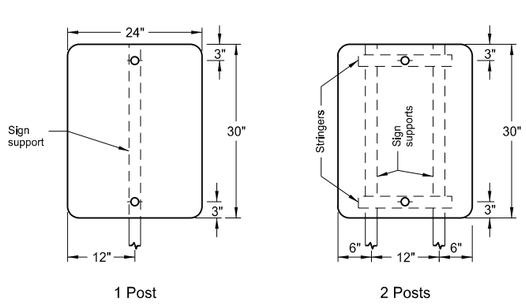
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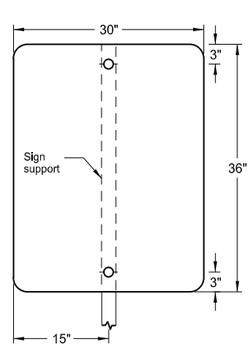
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Assembly No. 8

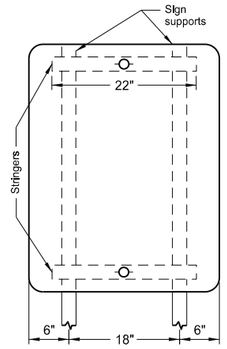


1 Post 2 Posts

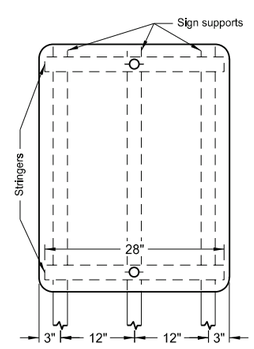
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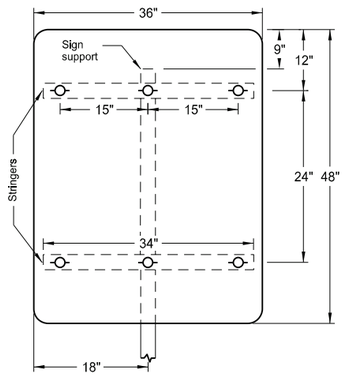


2 Posts

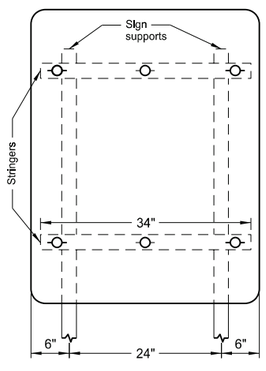


3 Posts

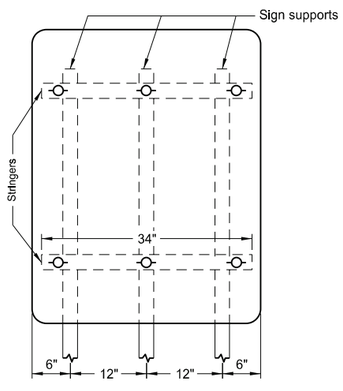
Assembly No. 10



1 Post



2 Posts



3 Posts

Assembly No. 11

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.

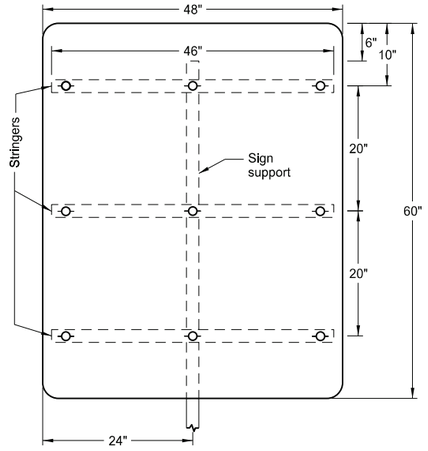
KIRK J. HOFF
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/06/24

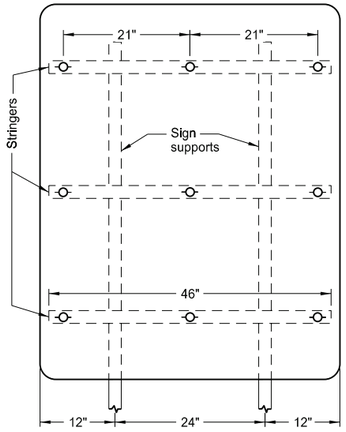
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS

D-754-28

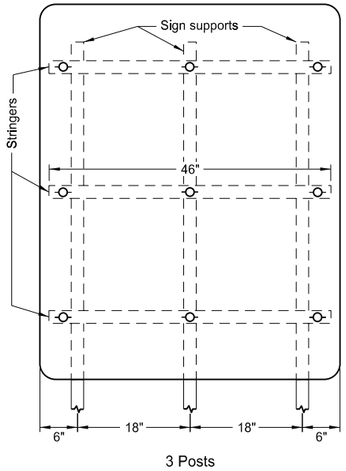


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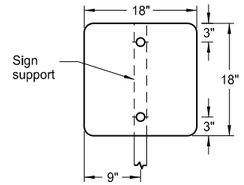


2 Posts

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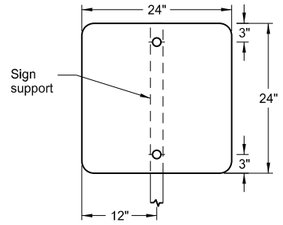


3 Posts

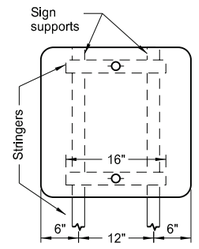


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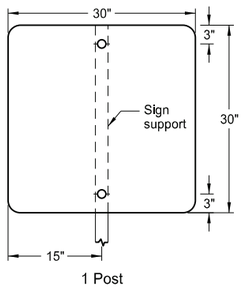


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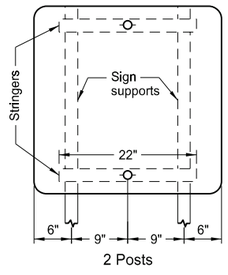


2 Posts

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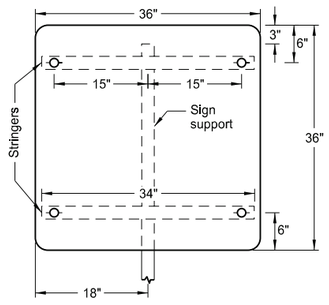


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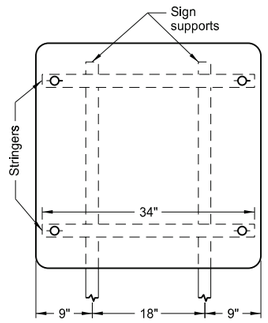


2 Posts

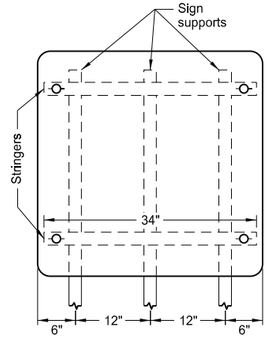
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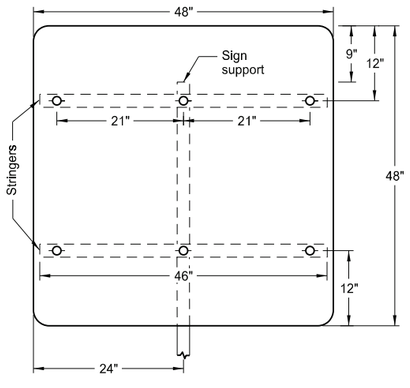


2 Posts

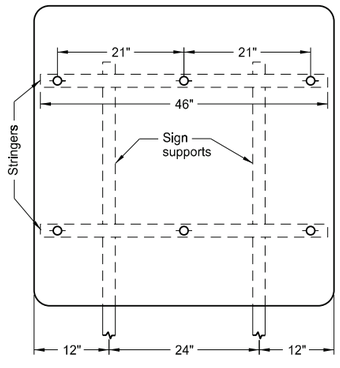


3 Posts

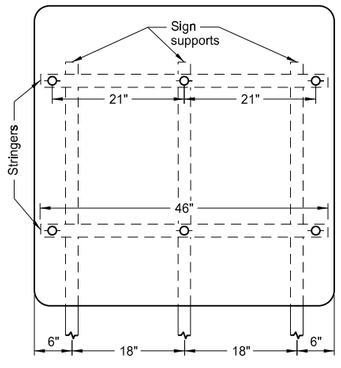
Assembly No. 16



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.

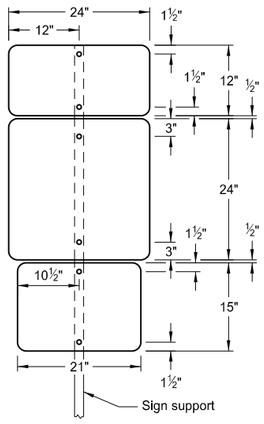
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/06/24

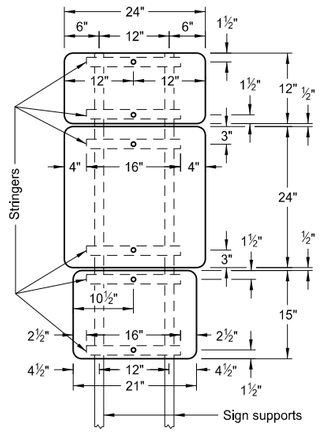
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-53

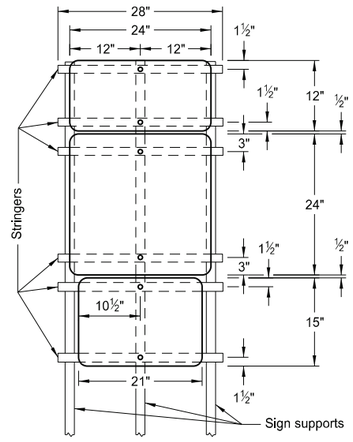


1 Post

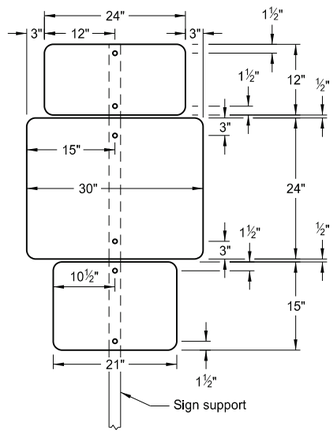


2 Posts

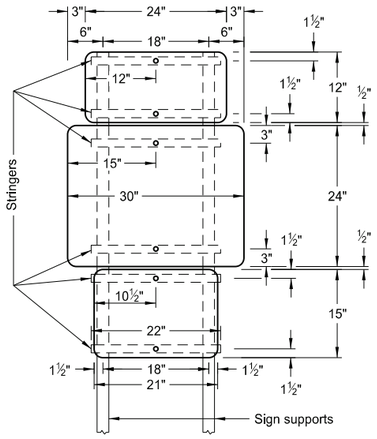
ASSEMBLY NO. 379



3 Posts

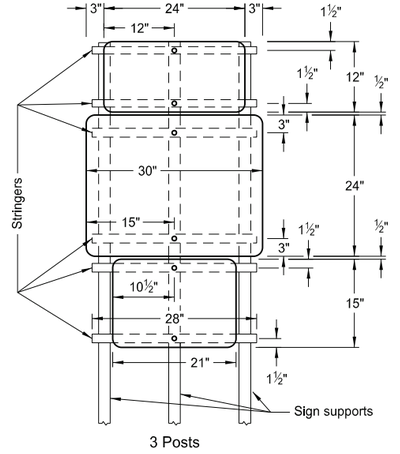


1 Post

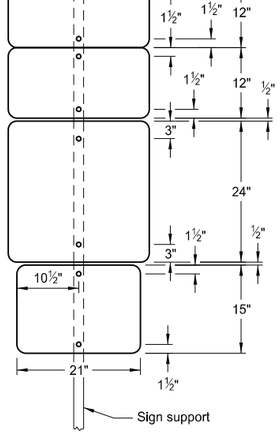


2 Posts

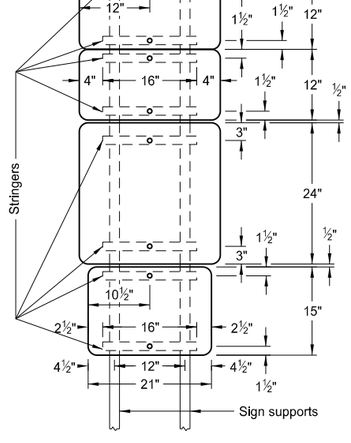
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3 Posts

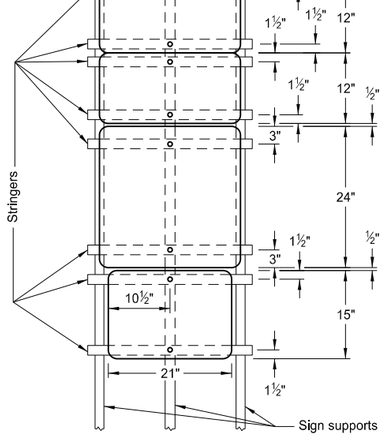


1 Post

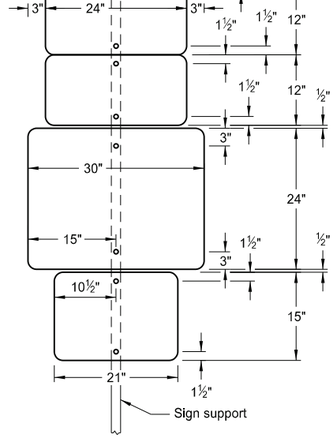


2 Posts

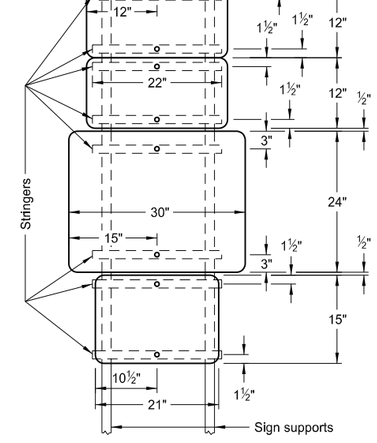
ASSEMBLY NO. 381



3 Posts

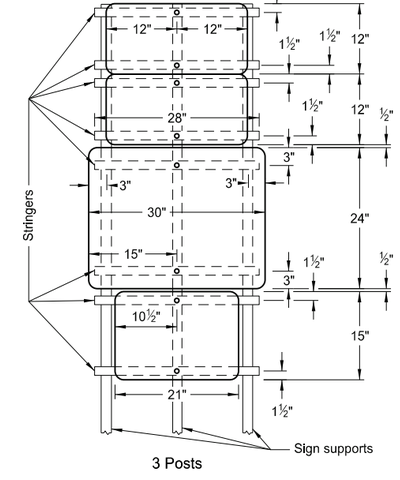


1 Post



2 Posts

ASSEMBLY NO. 382



3 Posts

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.

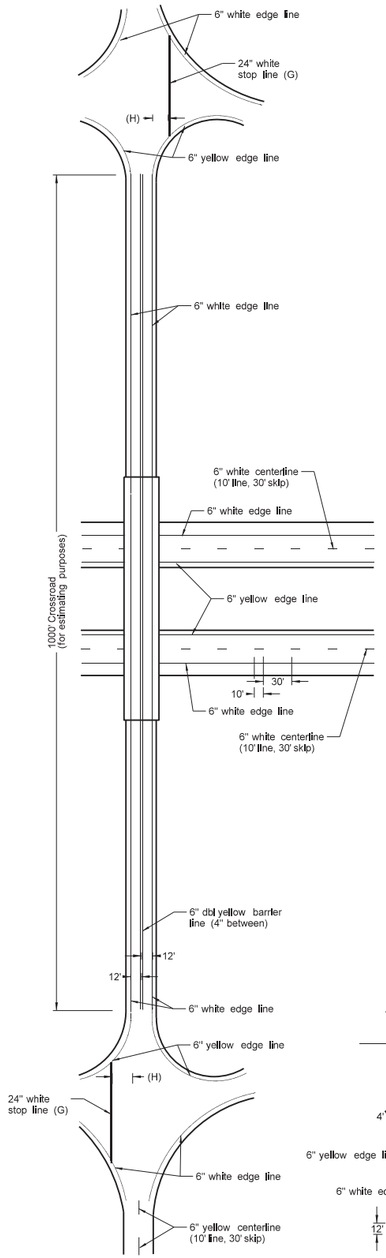
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

08/07/24

DocuSign Envelope ID: 09EA856C-BD61-42B6-B726-BC2420A5CEC1

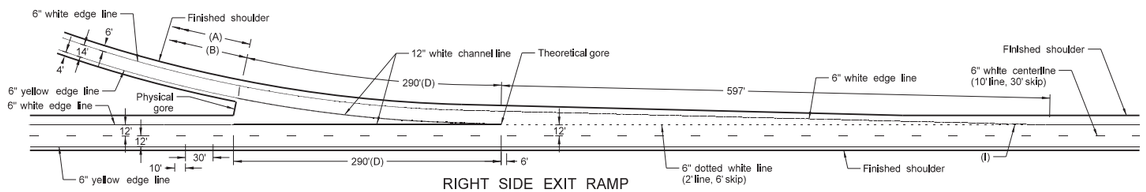
INTERSTATE PAVEMENT MARKING
4 LANE DIVIDED HIGHWAY

D-762-2

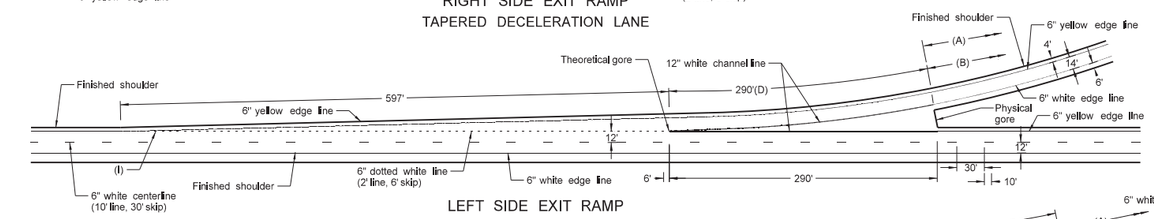


CROSS-ROAD & STRUCTURE

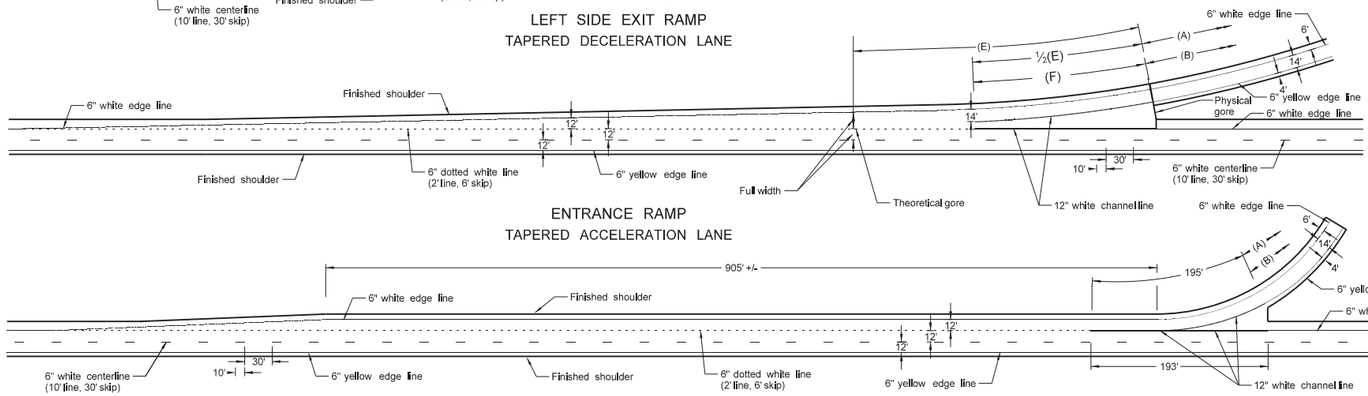
Engineer will determine length striped.



RIGHT SIDE EXIT RAMP
TAPERED DECELERATION LANE

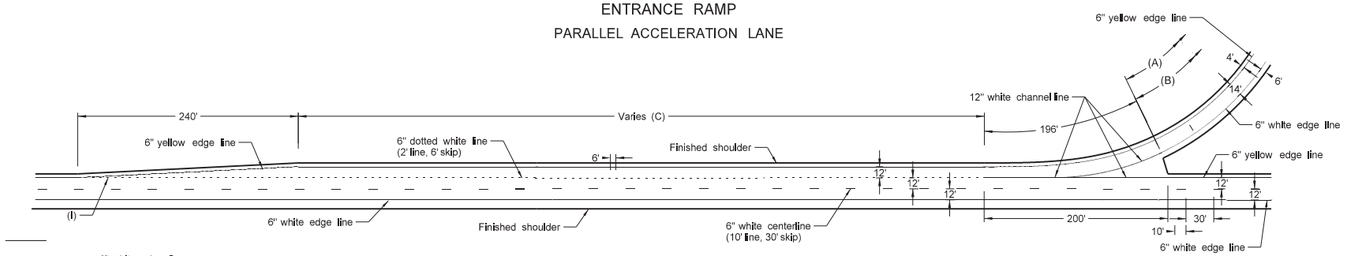


LEFT SIDE EXIT RAMP
TAPERED DECELERATION LANE

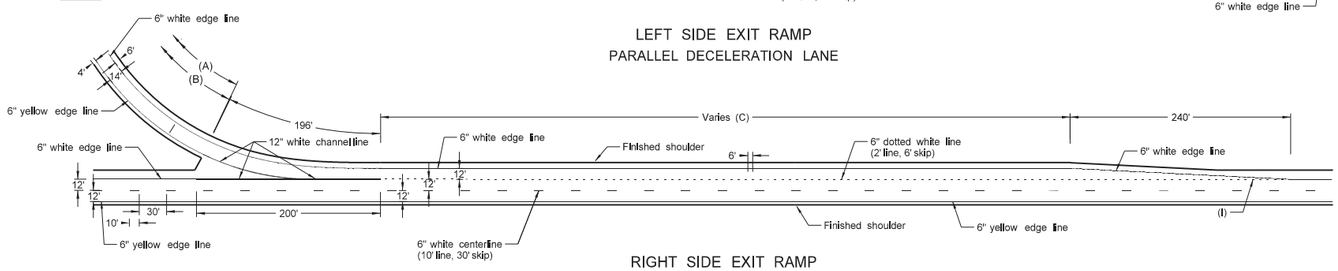


ENTRANCE RAMP
TAPERED ACCELERATION LANE

ENTRANCE RAMP
PARALLEL 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

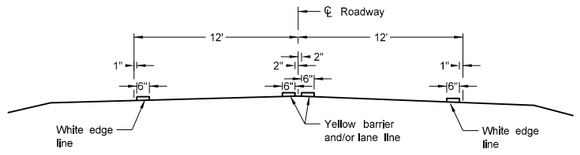
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice
10-25-19	Replaced 2' Max dim with Note (I)
11-05-21	Revised labels
11-22-23	Revised pvmt marking widths
1-17-24	Revised wide pvmt marking width

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
01/17/24
ENGINEER
NORTH DAKOTA

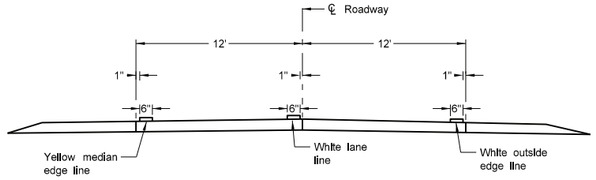
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PAVEMENT MARKING

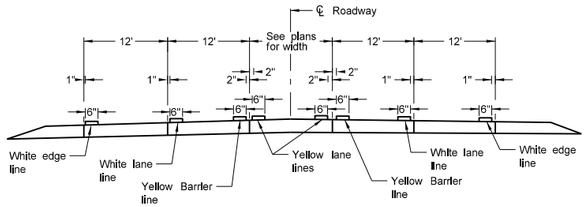
D-762-4



Two Lane Two Way
RURAL ROADWAY



Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



RURAL FIVE LANE ROADWAY
Concrete Section

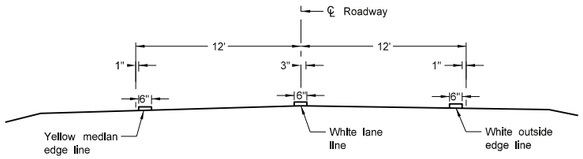
NOTES:

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

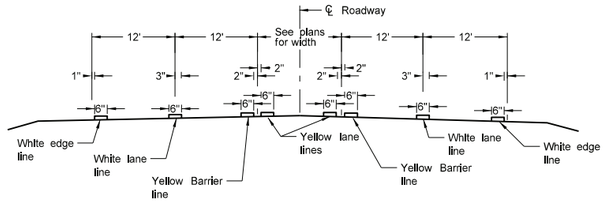
   For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.

2. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph,

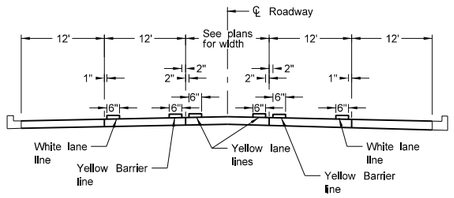
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.



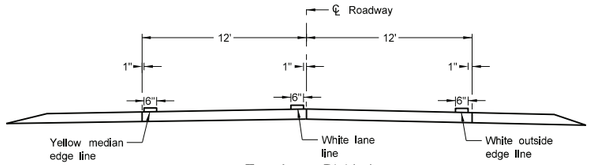
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



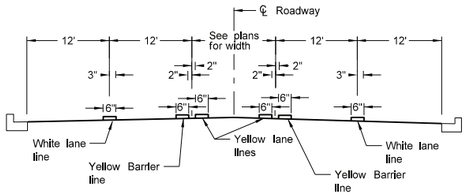
RURAL FIVE LANE ROADWAY
Asphalt Section



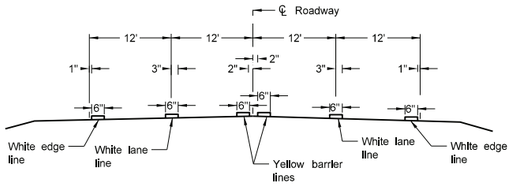
URBAN FIVE LANE SECTION
Concrete Section



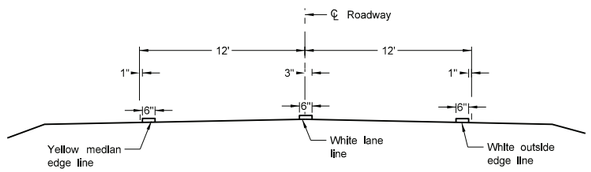
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



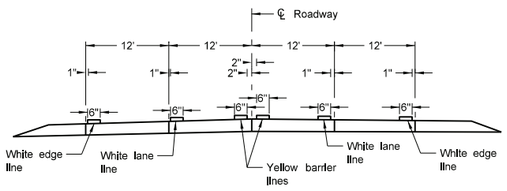
URBAN FIVE LANE SECTION
Asphalt Section



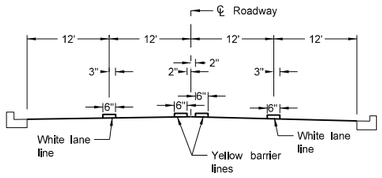
RURAL FOUR LANE ROADWAY
Asphalt Section



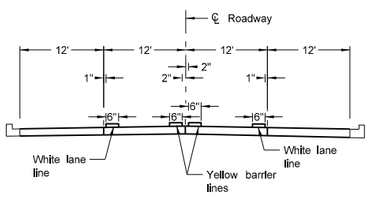
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



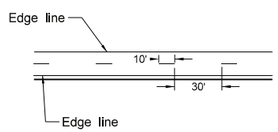
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

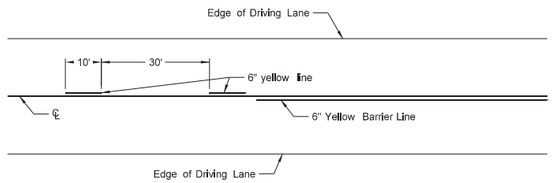
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
07-09-24	Modified Note 1.

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
07/09/24
ENGINEER
NORTH DAKOTA

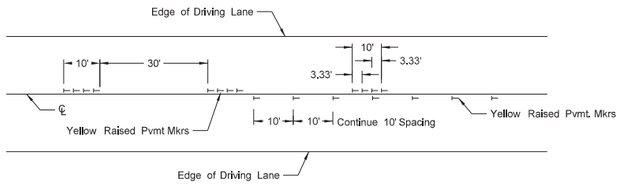
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SHORT-TERM PAVEMENT MARKING

D-762-11

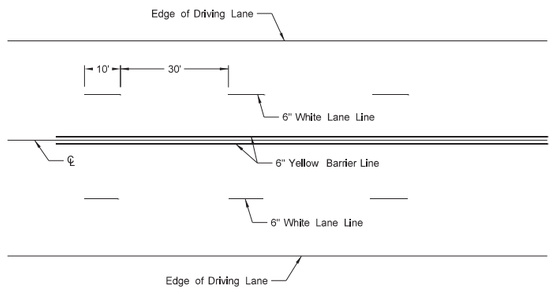


Painted or Tape Lines

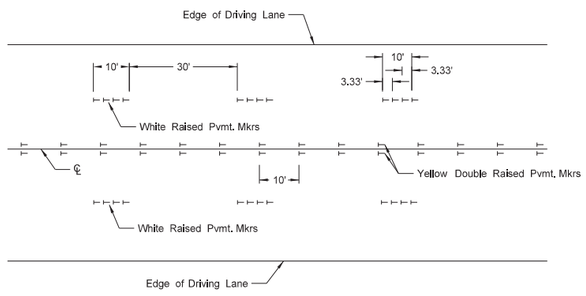


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

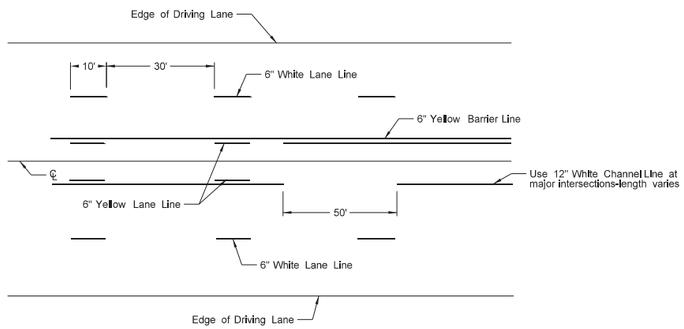


Painted or Tape Lines

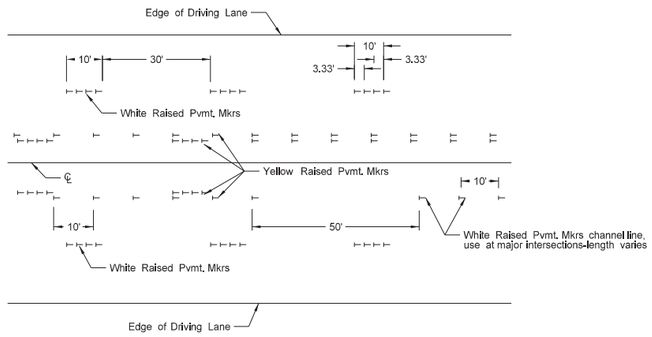


Raised Pavement Markers

FOUR LANE ROADWAY

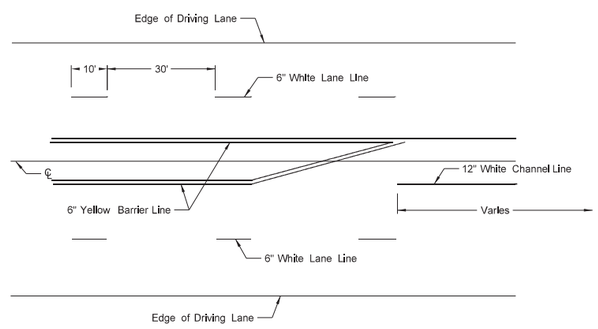


Painted or Tape Lines

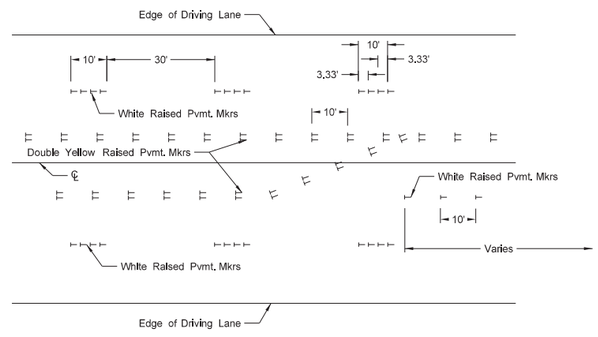


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

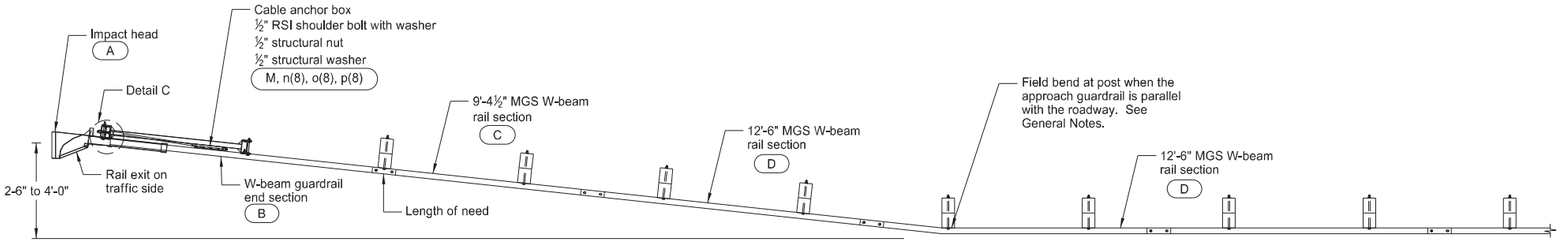
1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top 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.

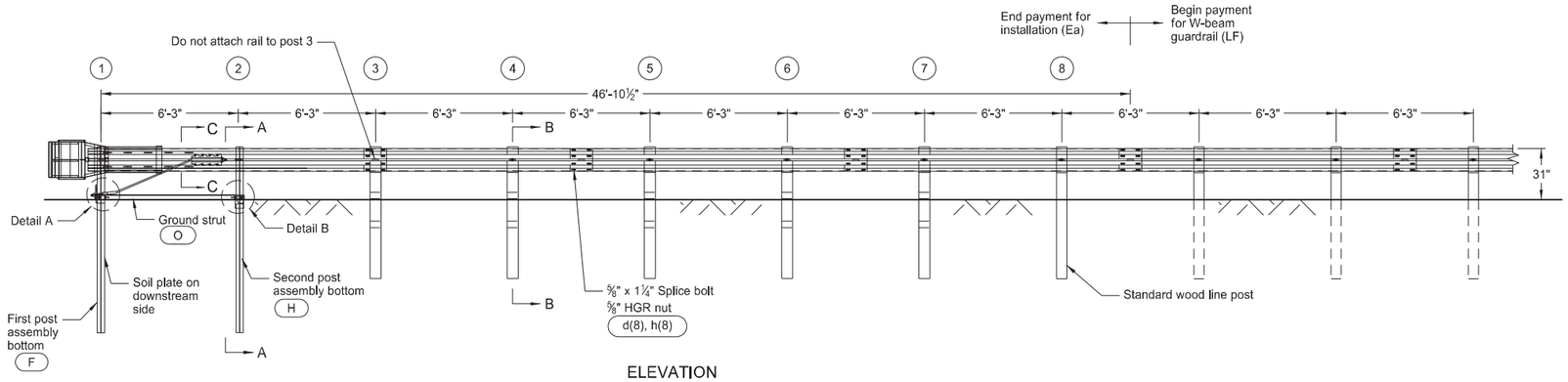
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
01/17/24
ENGINEER
NORTH DAKOTA

MGS FLARED ENERGY ABSORBING TERMINAL - WOOD POST

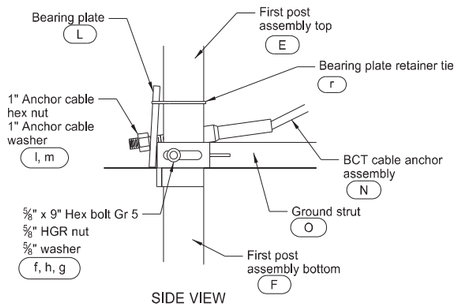
D-764-38



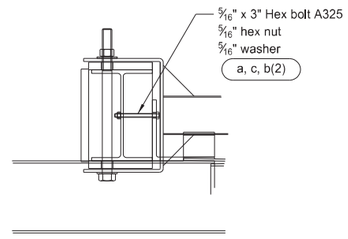
PLAN



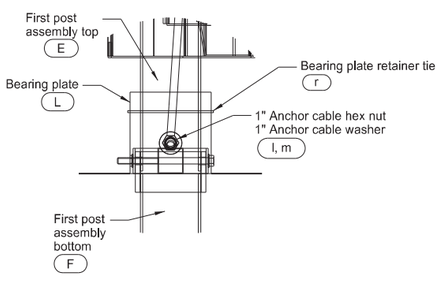
ELEVATION



SIDE VIEW

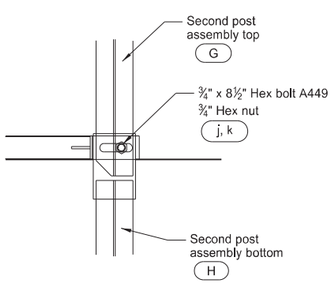


DETAIL C
Post 1 (Impact Head connection)

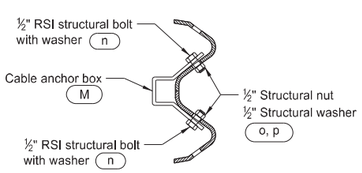


FRONT VIEW

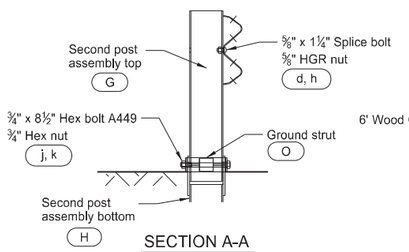
DETAIL A
Post 1



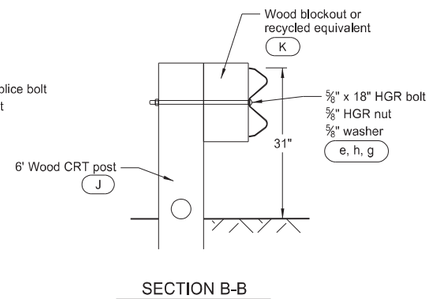
DETAIL B
Post 2



SECTION C-C



SECTION A-A
Post 2



SECTION B-B
Posts 3 through 7

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	5/16" x 3" HEX BOLT A325	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	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.

GENERAL NOTES:

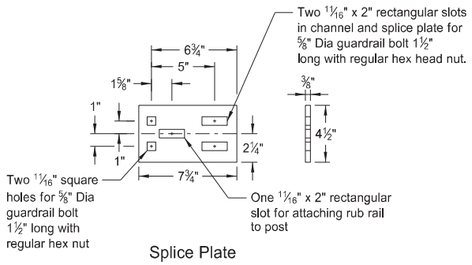
1. Wood posts are required with the Flared Energy Absorbing Terminal except posts 1 and 2.
2. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the Flared Energy Absorbing Terminal when the approach guardrail is parallel with the roadway. When the approach guardrail 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.

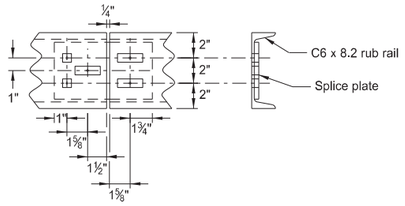
KIRK J. HOFF
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PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
12 02 2020

MGS W-BEAM GUARDRAIL GENERAL DETAILS

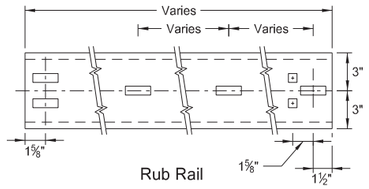
D-764-40



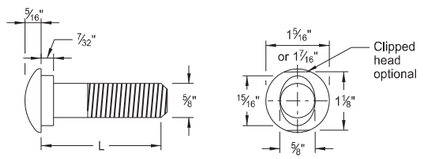
Splice Plate



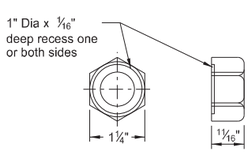
Splice Detail



C6x8.2 RUB RAIL AND SPLICE PLATE

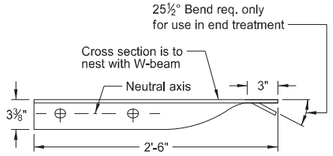


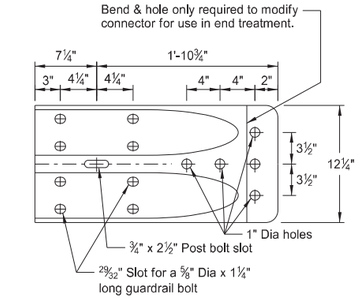
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



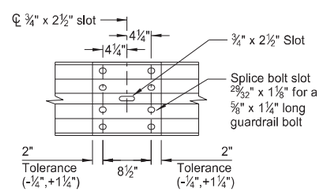
5/8" Dia recess nut

5/8" GUARDRAIL BOLT & RECESS NUT



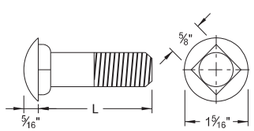


W BEAM TERMINAL CONNECTOR



SPLICE DETAIL

NOTE: Do not install center bolt in the 3/4" x 2 1/2" slot at mid span splices.

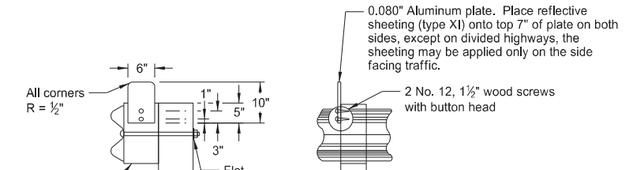


5/8" Diameter Carriage Bolt	
L	Thread Length
1 1/2"	Full length thread
3"	1 1/2" Min thread length
11"	1 3/4" Min thread length
13"	1 3/4" Min thread length



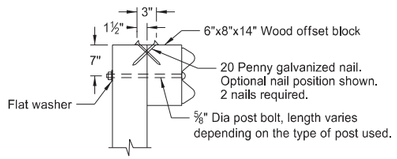
5/8" Dia hex nut

5/8" CARRIAGE BOLT & NUT

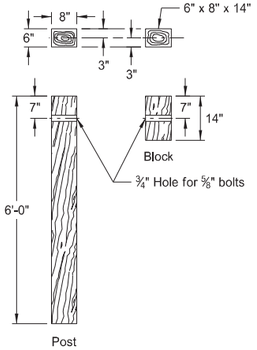


REFLECTORIZED PLATE DETAIL

NOTE: Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.

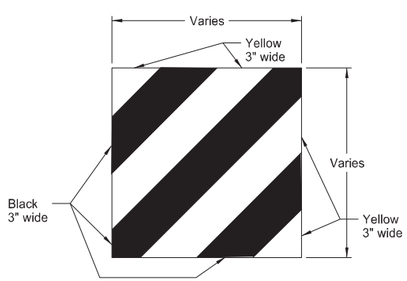


TYPICAL WOOD POST ATTACHMENT DETAIL

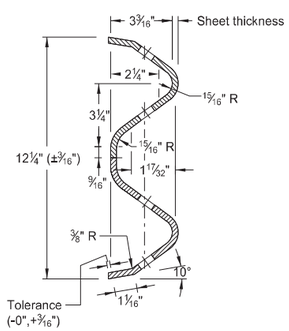


6" x 8" WOOD POST & BLOCK

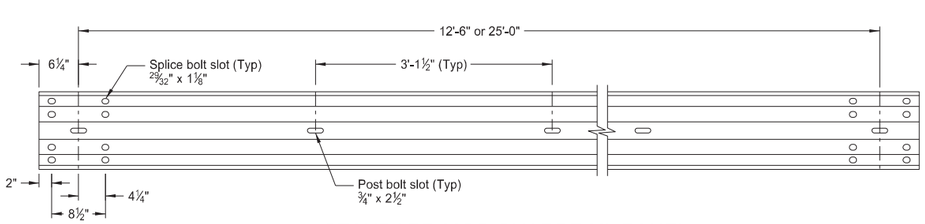
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



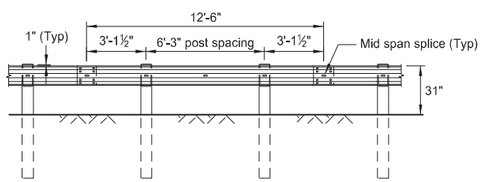
IMPACT HEAD OBJECT MARKER



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

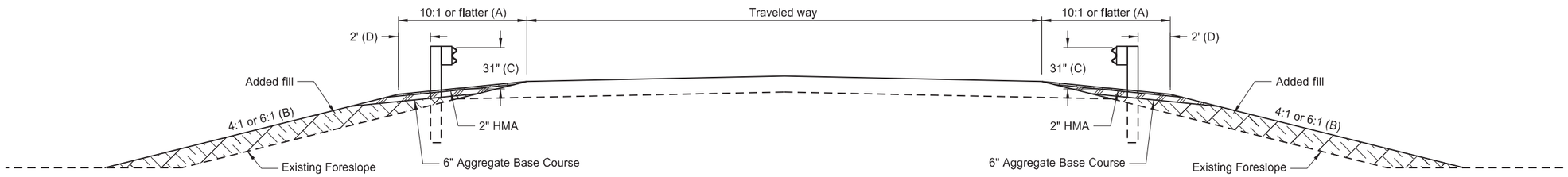
DATE	CHANGE
12-02-20	Updated clipped head to optional

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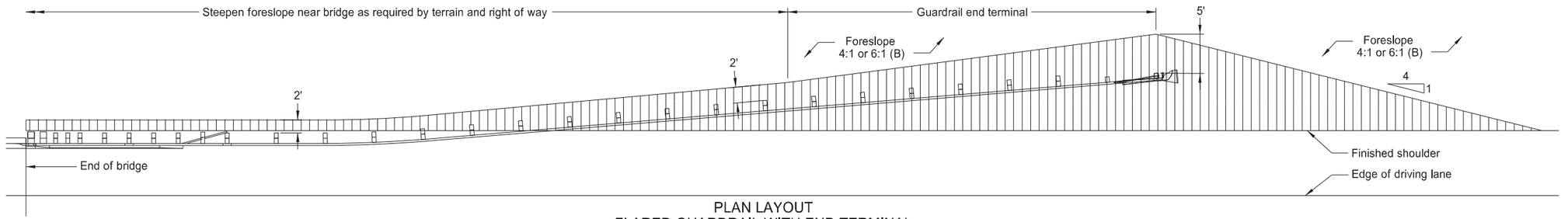
12 02 2020

D-764-48

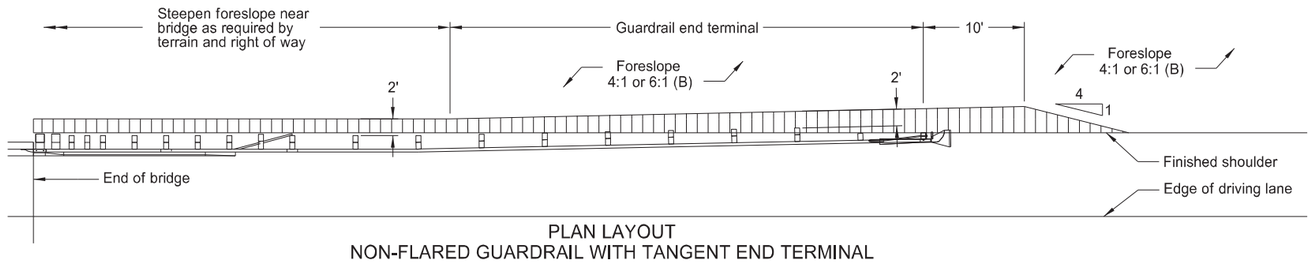
TYPICAL GRADING AT BRIDGE ENDS WITH MGS W-BEAM GUARDRAIL



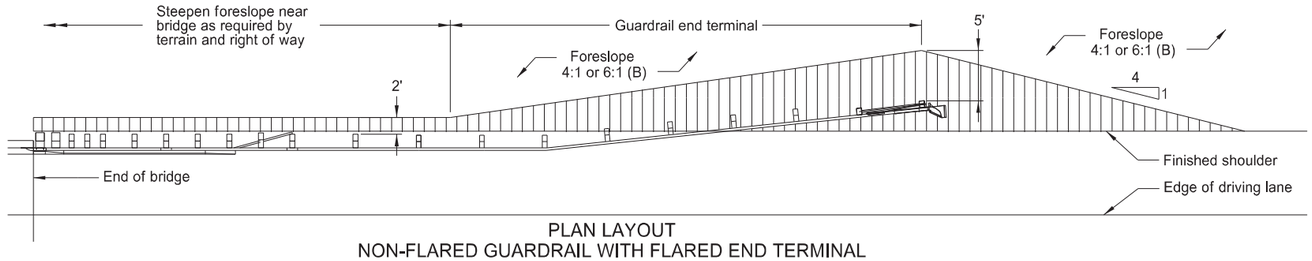
TYPICAL SECTION



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.

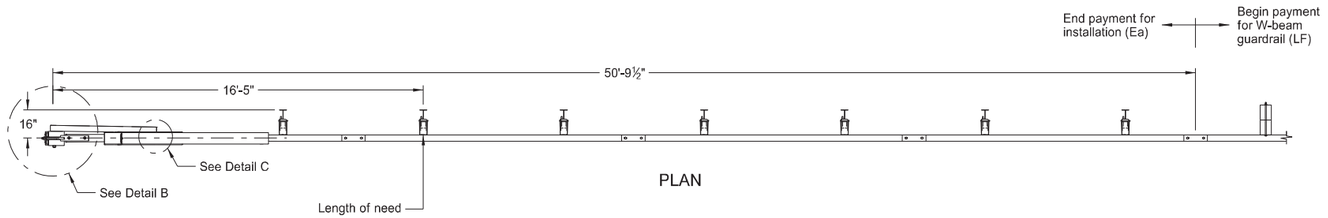
(D) Vary dimension at end terminals per Plan Layouts shown on this sheet.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12/02/20	Updated notes to active voice.

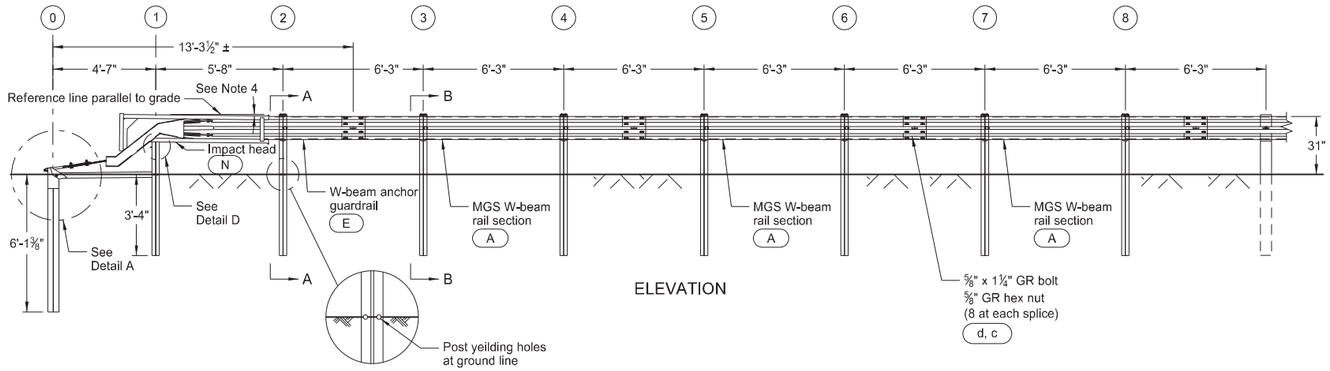
KIRK J. HOFF
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ENGINEER
NORTH DAKOTA
Kirk J Hoff
12 02 2020

MASH SOFTSTOP END TERMINAL - STEEL POST

D-764-50



PLAN

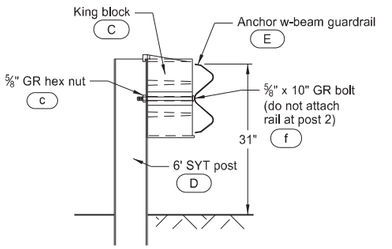


ELEVATION

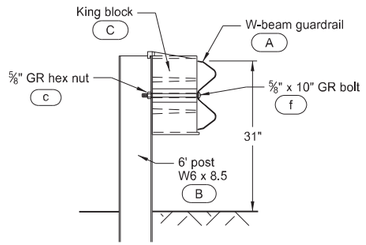
DETAIL E
Posts 1 & 2

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.

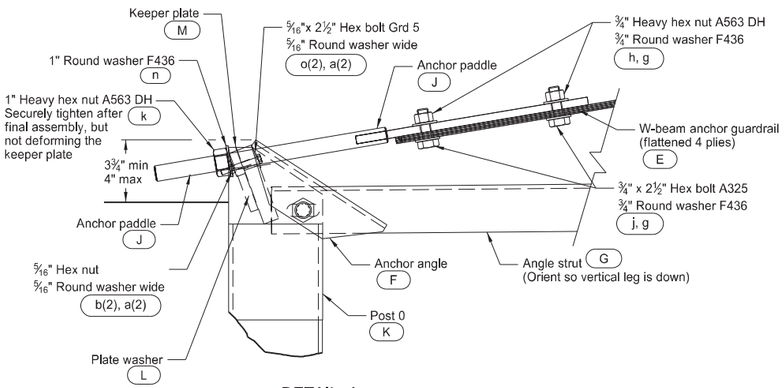


SECTION A-A
Post 2

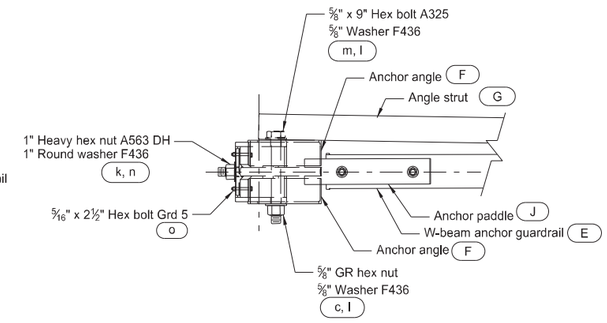


SECTION B-B
Posts 3 through 8

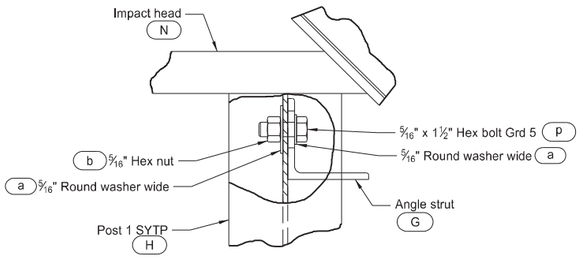
ITEM	ITEM NO.	BILL OF MATERIALS	QTY
A	000011	12 / 12'-6" / 3'-1½" / S MGS W-BEAM RAIL SECTION	3
B	000533	6'-0" STEEL POST W6 x 8.5	6
C	006777	KING BLOCK 4" X 7½" X 1'-2"	7
D	015000	6'-0" SYT POST / 8.5 / 31" GR HT	1
E	015200	SFST - ANCHOR GUARDRAIL 12'-6"	1
F	015201	SFST - ANCHOR ANGLE	2
G	015202	SFST - 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	⅝" GR HEX NUT	41
d	003360	⅝" x 1¼" GR BOLT	32
e	003391	⅝" x 1¾" HEX BOLT A325	1
f	003500	⅝" 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	⅝" WASHER F436	4
m	004489	⅝" 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



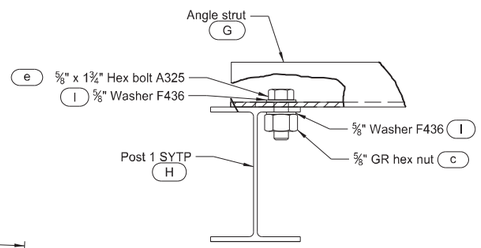
DETAIL A
Post 0



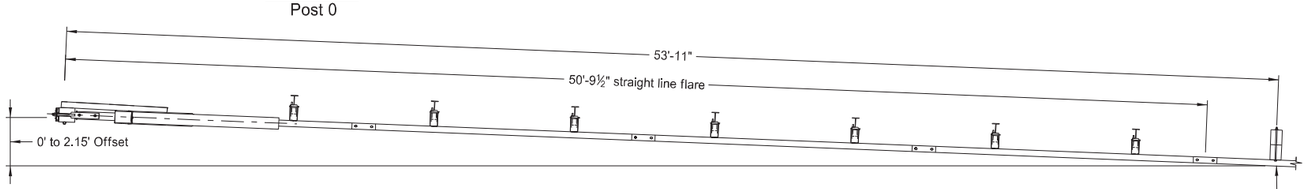
DETAIL B
Post 0



DETAIL D
Post 1



DETAIL C
Post 1
(shown near ground)



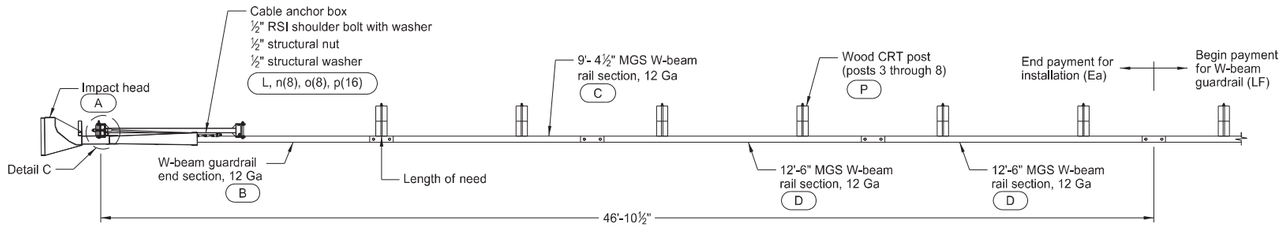
FLARED INSTALLATION
25:1 maximum flare rate

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

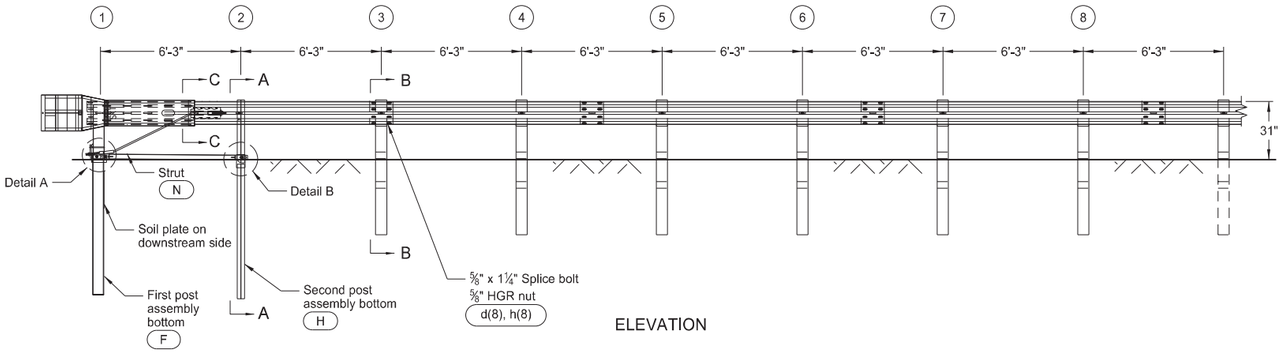
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NORTH DAKOTA
12 02 2020

MASH SEQUENTIAL KINKING TERMINAL - WOOD POST

D-764-51



PLAN

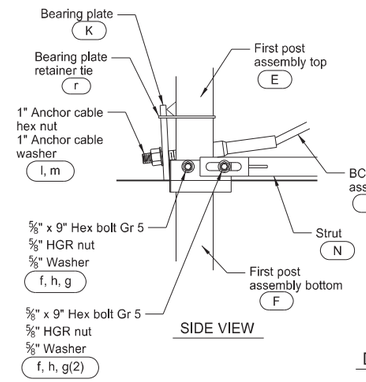


ELEVATION

GENERAL NOTES:

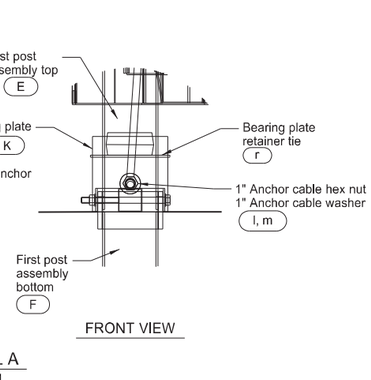
1. Galvanize all bolts, nuts, cable assemblies, cable anchors, and bearing plates.
2. Flare the MSKT at a rate of up to 25:1, as needed to prevent the impact head from encroaching on the shoulder.
3. Site grade as necessary to ensure the lower sections of posts do not protrude more than 4" above the 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

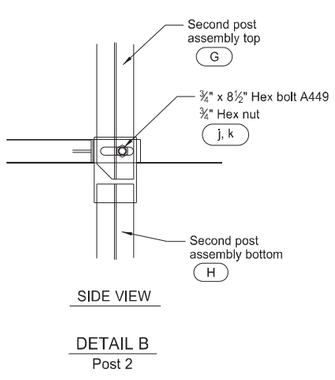


SIDE VIEW

DETAIL A
Post 1

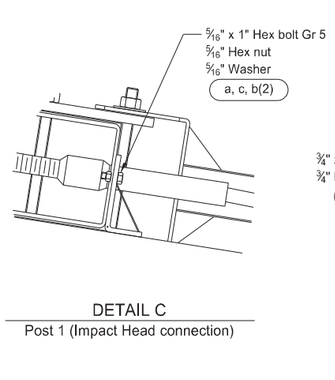


FRONT VIEW

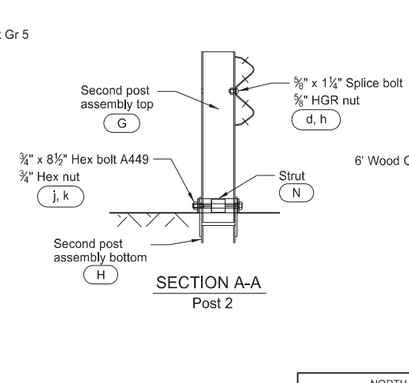


SIDE VIEW

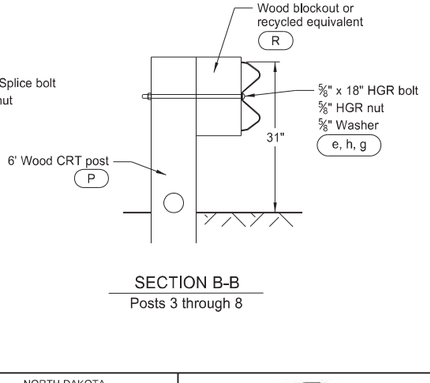
DETAIL B
Post 2



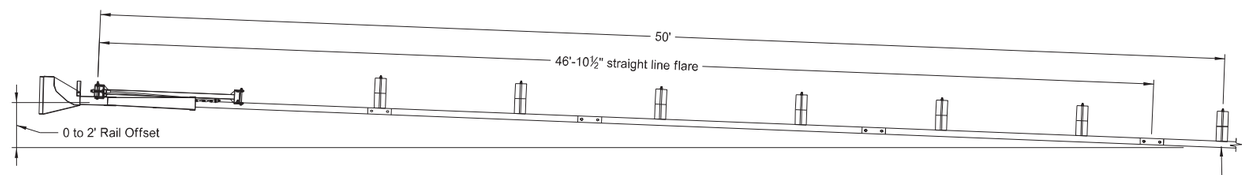
DETAIL C
Post 1 (Impact Head connection)



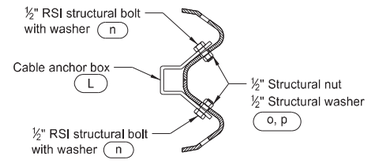
SECTION A-A
Post 2



SECTION B-B
Posts 3 through 8



FLARED INSTALLATION
25:1 maximum flare rate



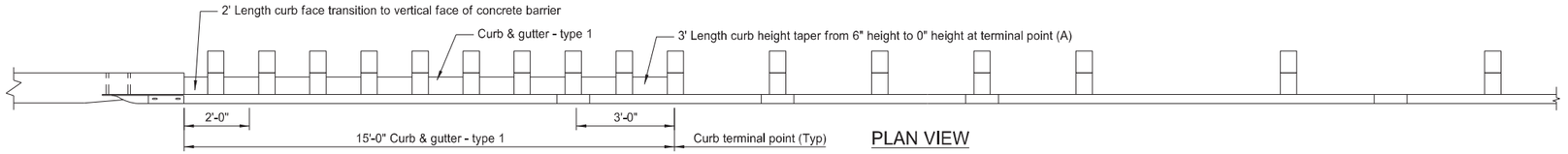
SECTION C-C

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

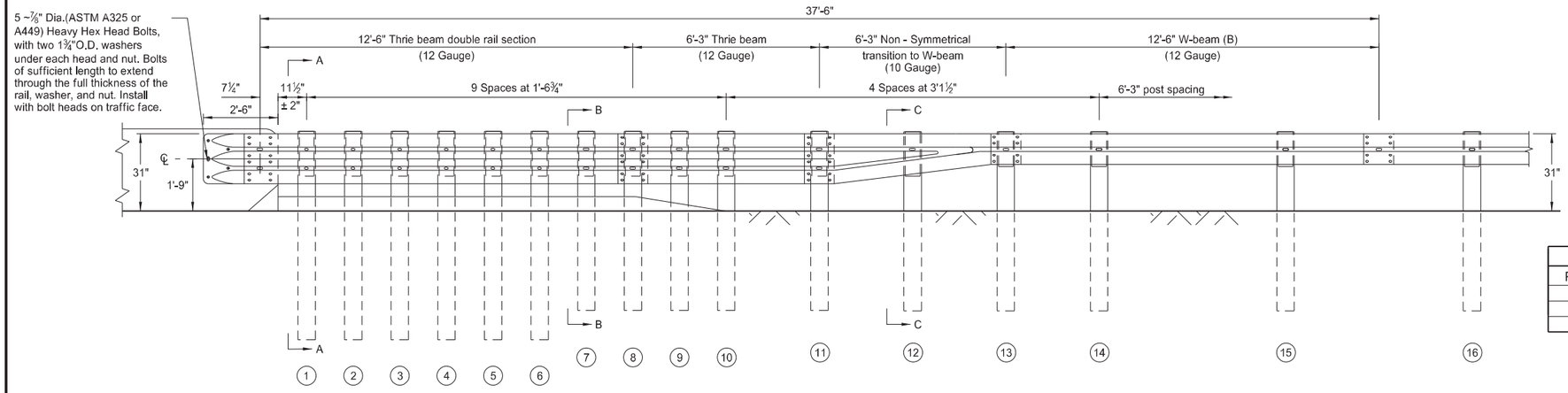
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NORTH DAKOTA
12 02 2020

MGS W-BEAM TRANSITION WITH APPROACH CURB TO CONCRETE SINGLE SLOPE OR JERSEY BARRIER

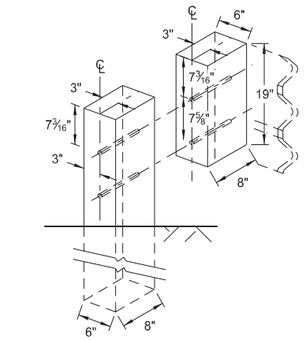
D-764-60



PLAN VIEW

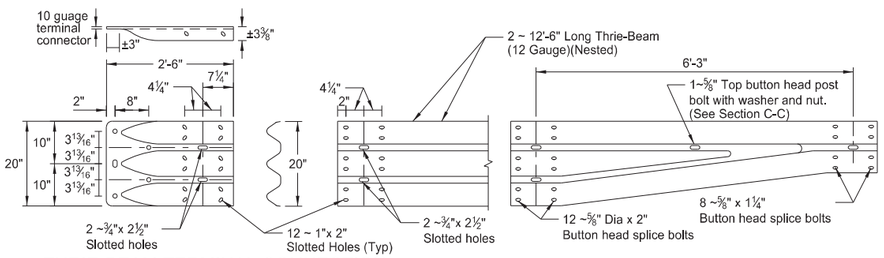


ELEVATION VIEW



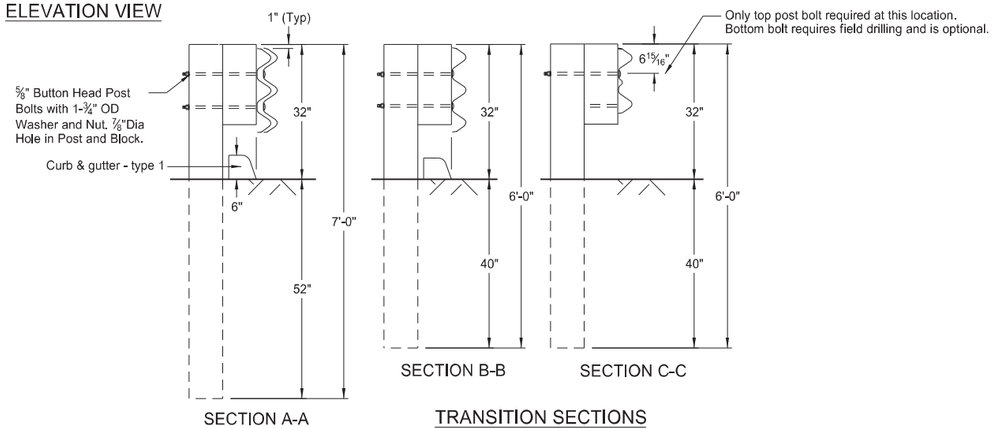
WOOD BLOCK
TO RECTANGULAR WOOD POST
(At posts 1 to 11)

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"



THRIE-BEAM TERMINAL CONNECTION

NON - SYMMETRICAL TRANSITION TO W-BEAM (10 GAUGE)

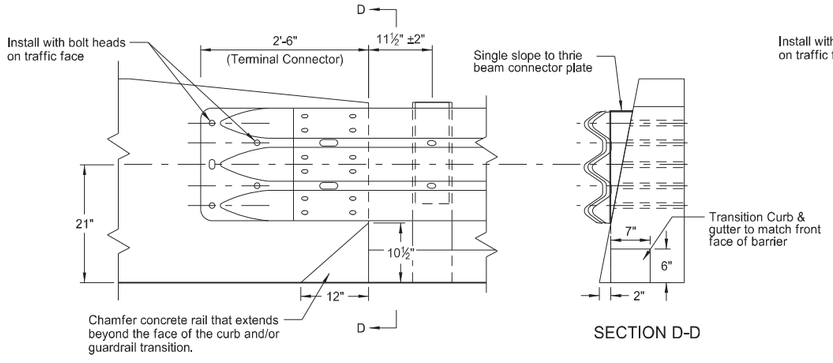


SECTION A-A

SECTION B-B

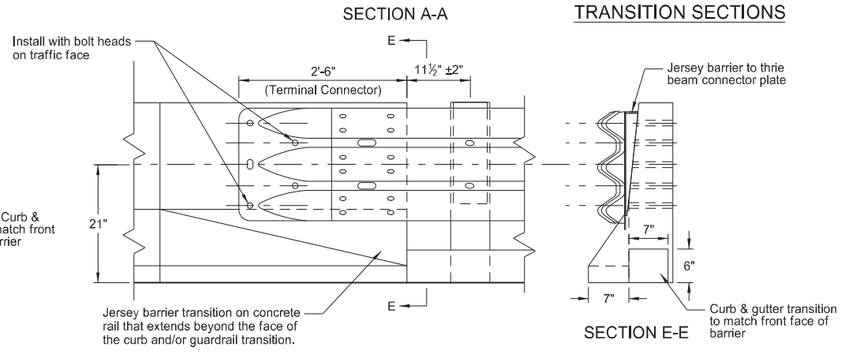
SECTION C-C

TRANSITION SECTIONS



SECTION D-D

CONNECTION TO CONCRETE SINGLE SLOPE BRIDGE RAIL AND TRAFFIC BARRIERS



SECTION E-E

CONNECTION TO CONCRETE JERSEY BARRIER BRIDGE RAIL AND TRAFFIC BARRIERS

(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.

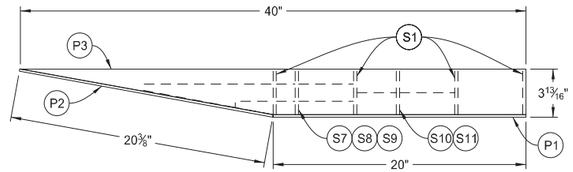
(B) Install 12'-6" length W-beam double rail section at location where curb extends past 15' length.

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12 02 2020

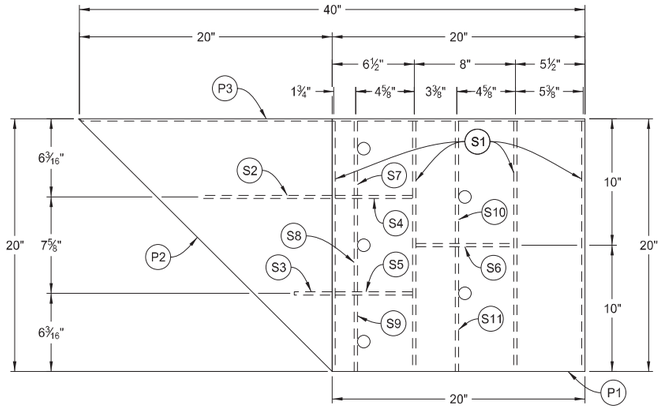
SINGLE SLOPE TO THRIE BEAM CONNECTOR PLATE DETAILS

D-764-61

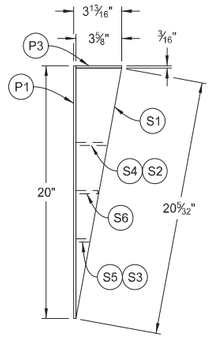


PLAN

NOTE: Assembly Detail is shown for guardrail installation on right hand side of entrance end of bridge barrier. Mirror for opposite side installation.

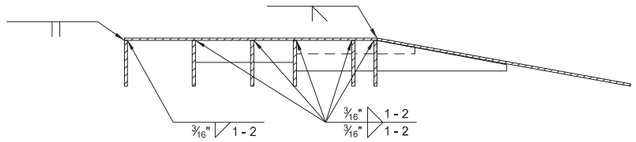


ELEVATION

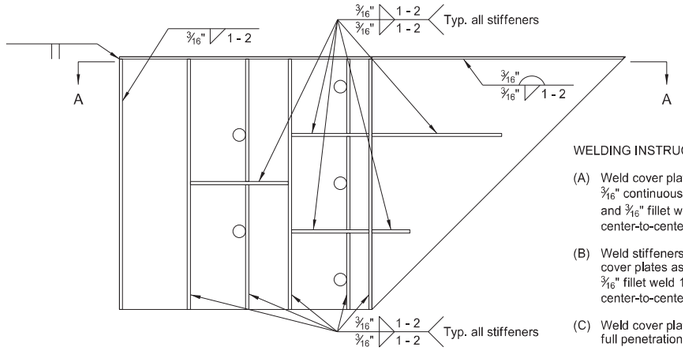


END

ASSEMBLY DETAIL
(Front View)



SECTION A-A



ELEVATION

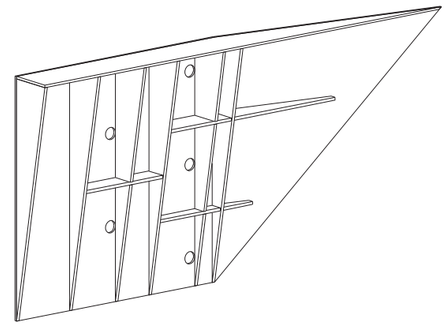
WELDING INSTRUCTIONS:

(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)

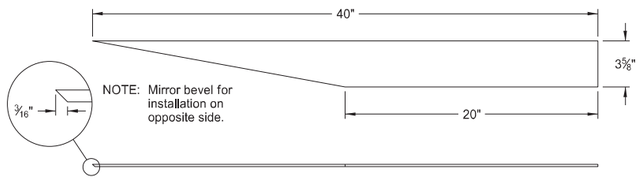


PLATE P3
Quantity: 1

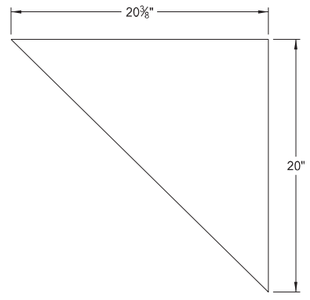


PLATE P2
Quantity: 1

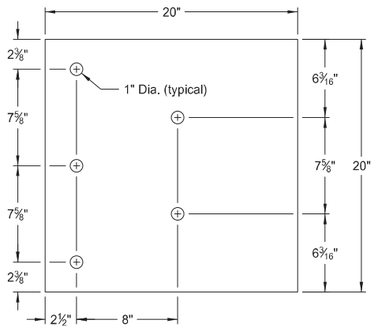
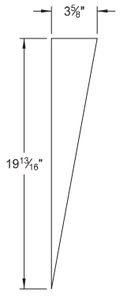
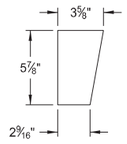


PLATE P1
Quantity: 1

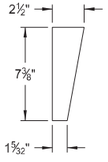
COVER PLATES



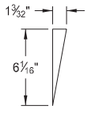
TYPE S1
Quantity: 4



TYPE S7
Quantity: 1

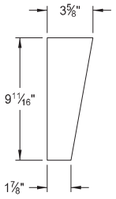


TYPE S8
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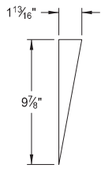


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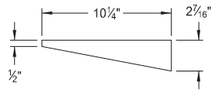
VERTICAL PLATES



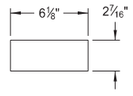
TYPE S10
Quantity: 1



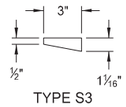
TYPE S11
Quantity: 1



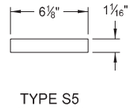
TYPE S2
Quantity: 1



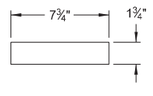
TYPE S4
Quantity: 1



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.

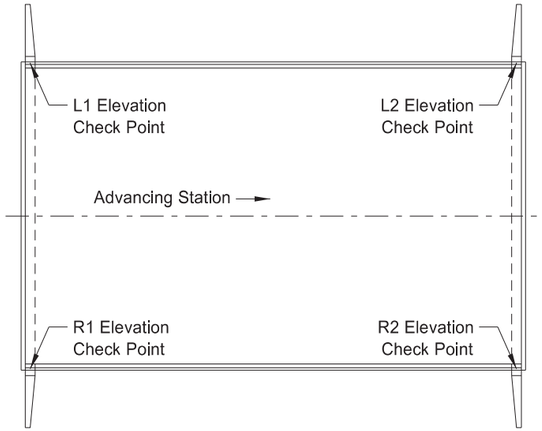
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

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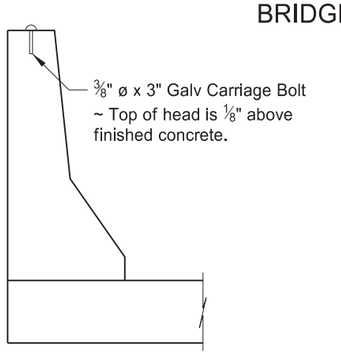
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BRIDGE BENCH MARKS

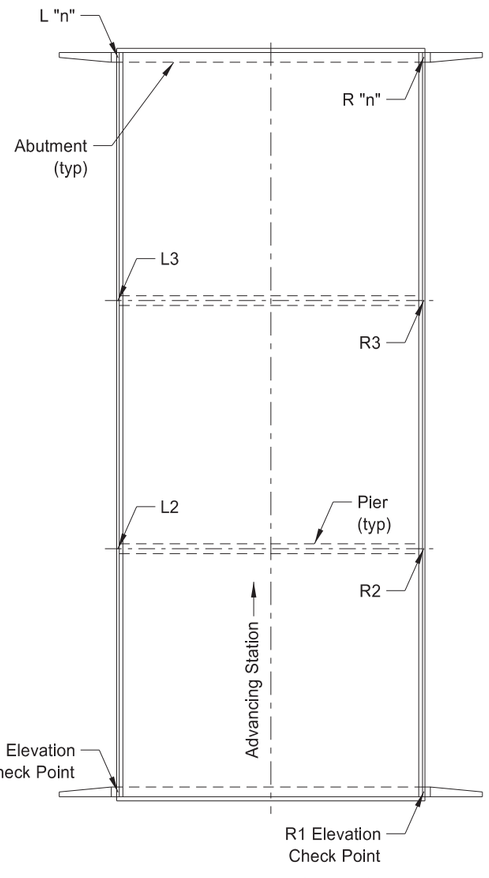
D-900-1



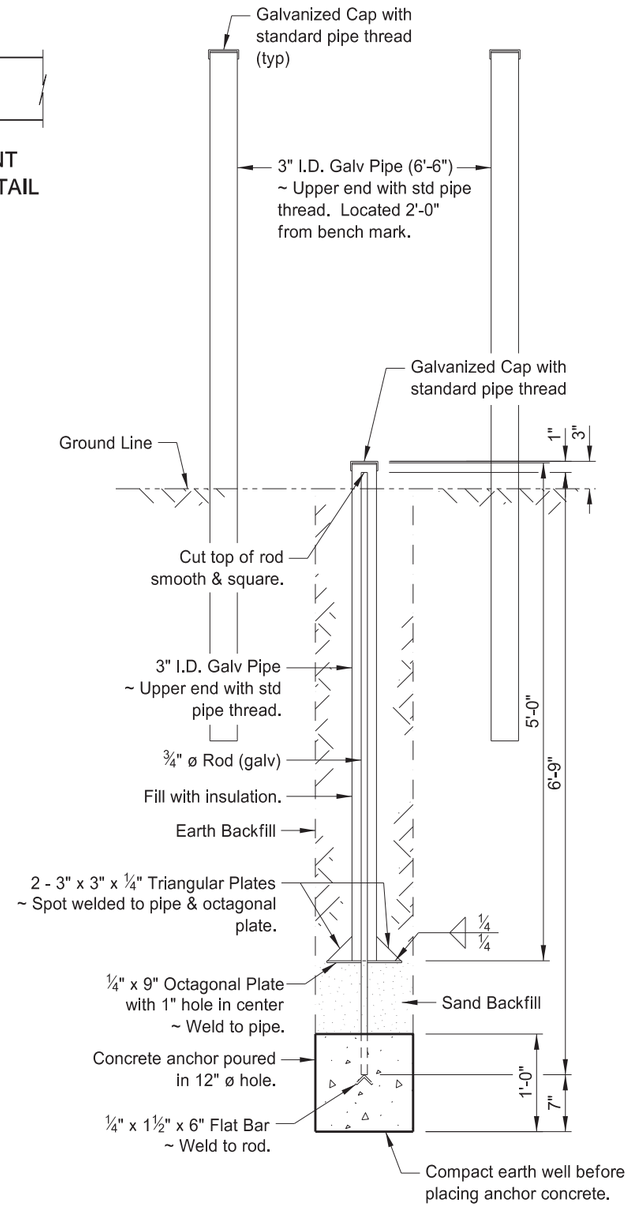
GENERAL LAYOUT FOR
SINGLE SPAN



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.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE
09/03/19	UPDATED SIGNATURE
02/23/24	Updated Signature Revised notes & updated to active voice

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