DESIGN DATA				
Traffic	Average Daily			
Current 2022	Pass: 2,700	Trucks: 1,485	Total: 4,185	
Forecast 2042	Pass: 3,485	Trucks: 1,920	Total: 5,405	
Clear Zone Dist. 38 ft		Design Speed: 75 mph		
Minimum Sight Dist. for Stopping: 820 ft		Bridges: HL-93 Design Loading		
Full Control of Access, No Point of Access Other Than at Interchange Ramps				
Pavement Design Life 30 (years)				
Design Accumulated One-way Rigid ESALs: 19,339,100				

Traffic Data provided is for EB I-94 only

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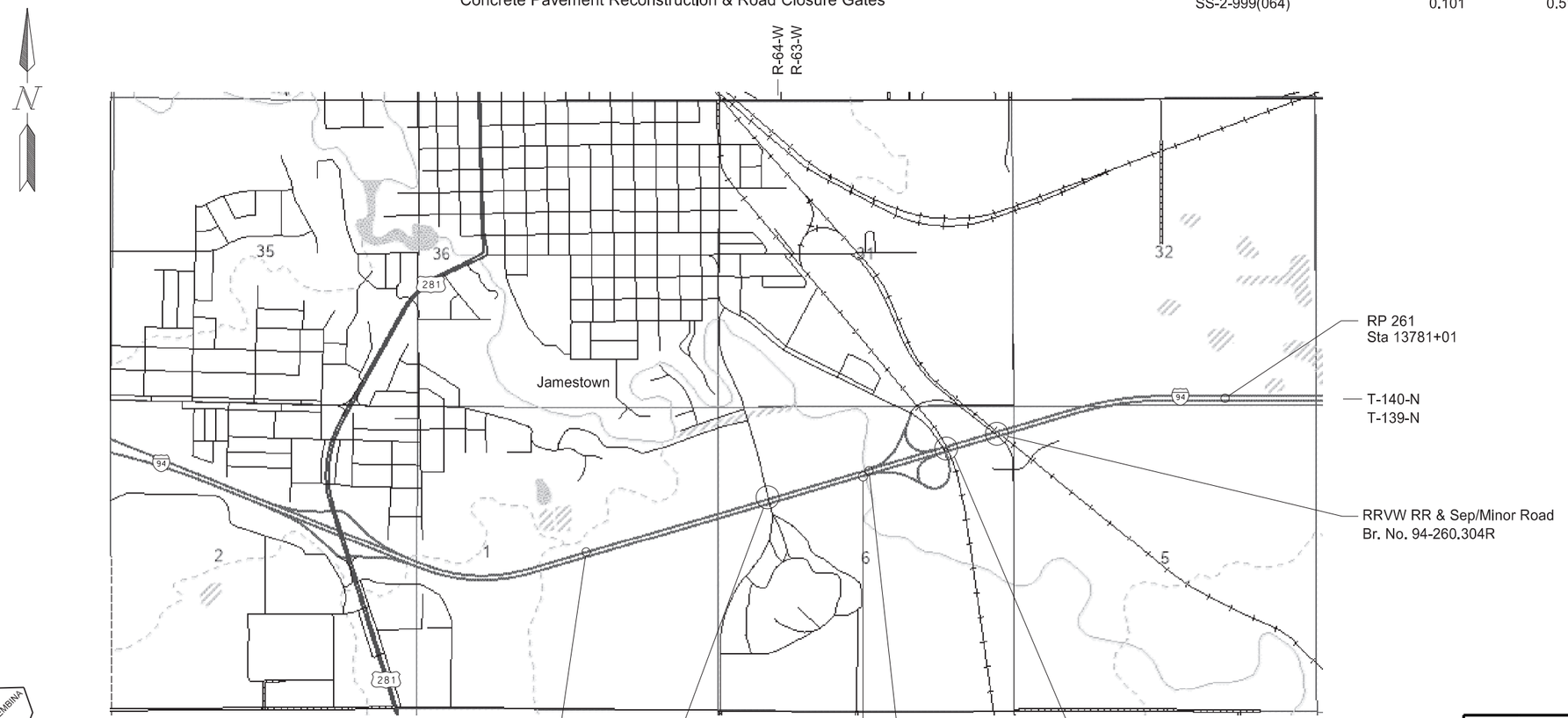
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

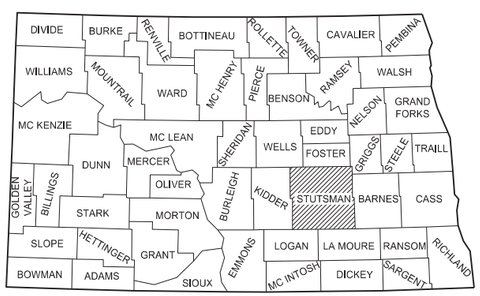
IM-2-094(194)260
SS-2-999(064)

Stutsman County
Hospital Road Separation, James River,
BNSF RR & SE Jamestown Interchange and RRVW RR Sep/Minor Road
Structure Replacement, Approach Slabs, Guardrail,
Concrete Pavement Reconstruction & Road Closure Gates

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	4/1/2023
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-2-094(194)260	0.413	0.413
SS-2-999(064)	0.101	0.514





STATE COUNTY MAP

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Jason Thorenson
10/13/23

BRIDGE DIVISION

REGISTERED PROFESSIONAL ENGINEER
JASON R. THORENSON
PE - 5048
DATE
10/13/23
NORTH DAKOTA

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LIST OF STANDARD DRAWINGS

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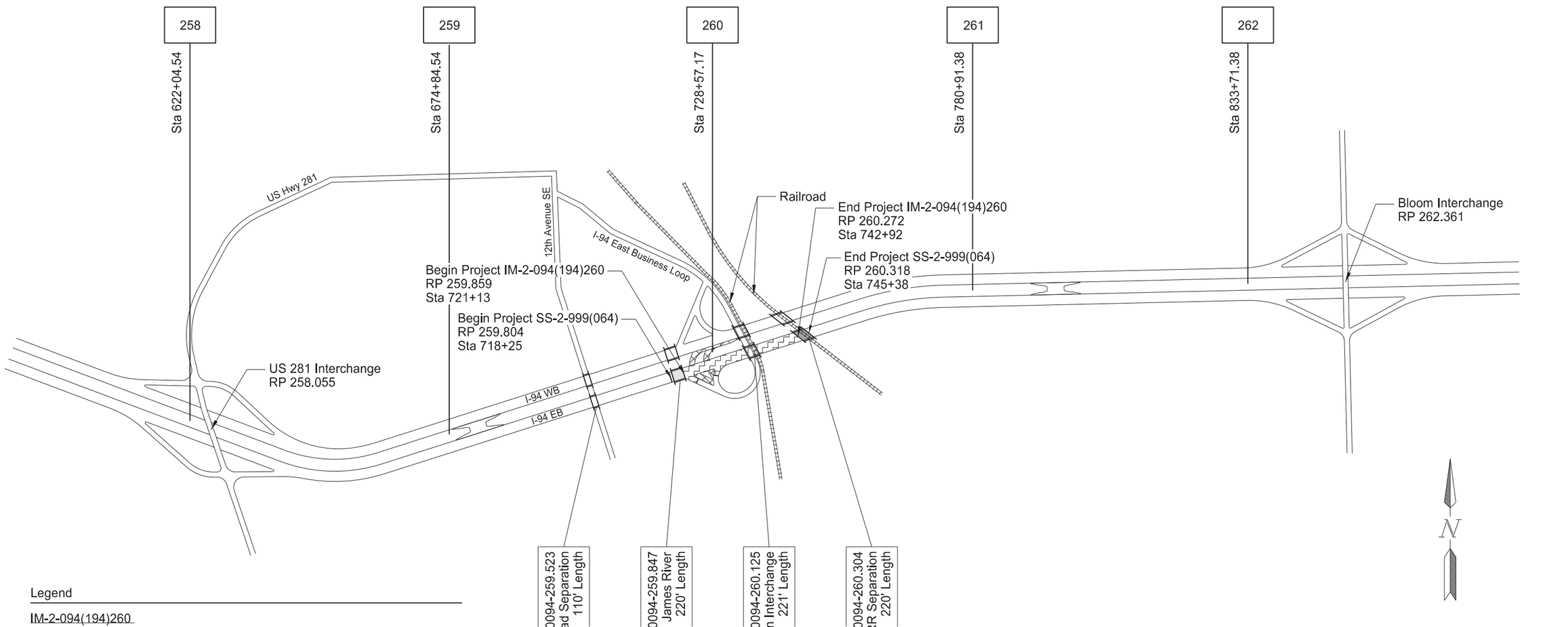

Legend

IM-2-094(194)260

Temporary Loop Ramp Connections

Structure Replacement and EB I-94 Roadway Reconstruction

SS-2-999(064)

East and West Approach Slab Replacement, Spall Repairs and Expansion Joint Modification

West Approach Slab Replacement, Spall Repairs and Expansion Joint Modification

Scope of Work

BNSF RR & SE Jamestown Interchange

James River Bridge & BNSF RR Separation

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

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NOTES

105-110 PAVEMENT SWEEPING: Sweep paved areas that were used by construction traffic before opening these areas to public traffic.

Sweep all newly constructed pavement no more than 24 hours before a scheduled final inspection.

Use a vacuum or pick-up type sweeper to perform this work.

105-P01 UTILITIES: No utility relocations or adjustments are planned. Protect all utilities in place at their existing location.

107-114 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project crosses the Red River Valley and Western Railroad Company at MP 2.37. The type of work that will be performed within the railroad right of way is bridge rehabilitation. Direct inquiries regarding railroad protective liability insurance to:

Kristin Nicholson
VP of Finance & Administration
Red River Valley and Western Railroad
P.O. Box 608
Wahpeton, ND 58074
701-642-8257 off.
kristin.nicholson@rrvw.net

Obtain information regarding crossing number 103725N from the Federal Railroad Administration website: http://safetydata.fra.dot.gov/Officeofsafety/

107-115 RAILROAD PROTECTIVE LIABILITY INSURANCE: This project crosses the BNSF Railway Company at RR Milepost 0039.50. The type of work that will be performed within the railroad right of way is bridge replacement. Direct inquiries regarding protective liability insurance to:

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

Obtain information regarding crossing number 966535T from the Federal Railroad Administration website: http://safetydata.fra.dot.gov/Officeofsafety/

107-300 CONSTRUCTION TRAFFIC ACCESS: Access areas within the right of way only at interchanges. The Engineer may allow temporary access at other locations.

To obtain temporary access, provide an access plan containing the following information:

- A traffic control plan;
- A traffic impact analysis;
- A safety analysis;
- A COA; and
- An environmental impact analysis.

To be considered for approval, the following minimum conditions must be met in the access plan:

- Construction traffic will not be allowed to cross the interstate median or lanes of traffic being used by the public at grade;
- The access plan must show that there will be methods in place, at all times, to prevent public traffic from using the access;
- A plan to restore the area disturbed by the access, including right of way fences, to preexisting or better condition.

All work necessary to provide the access plan, comply with the plan, and to restore the area to its pre-exiting condition must be completed at no additional cost to the Department.

107-P01 HAUL ROAD RESTORATION: Use Class 13 aggregate for haul road restoration. This material will be paid according to the PS-1 schedule.

108-P01 WEEKLY PLANNING & REPORTING MEETING: A bi-weekly (every two weeks) planning and reporting meeting is required.

201-P01 CLEARING & GRUBBING/REMOVAL OF TREES: Cut down trees that are 3 inches or larger in diameter measured at a point 4.5 feet above the ground after October 31st and before April 1st. Cut trees may be laid on the ground and removed at a later date.

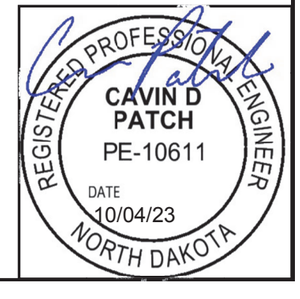
Trees to be cut down during this time period are shown in Section 40.

202-P01 REMOVAL OF PAVEMENT: Removal of pavement consists of removing concrete pavement, bituminous surfacing, and blended aggregate base.

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.

203-P01 COMMON EXCAVATION-TYPE A: Common excavation will not be measured on the project and will be paid as plan quantity.



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NOTES

251-P01 SEEDING CLASS II: Due to steep sloped areas, double the application rate for the Class II seed mixture. Apply the seed using a seed drill as specified in 251.02 A or with the use of a broadcast seed spreader.

251-P02 TEMPORARY COVER CROP: In the steep sloped areas, apply the temporary cover crop using a seed drill as specified in 251.02 B or with the use of a broadcast seed spreader.

261-P01 PERMANENT FIBER ROLLS: For fiber rolls remaining on the project, use fiber rolls that are composed of netting that meets either of the following:

- Bio- or photo-degradable plastic netting that has a life expectancy between 6 and 24 months.
- 100 percent biodegradable natural netting that has a life expectancy between 6 and 24 months.

302-110 BASE COURSE: Trim base course as specified in Section 302.04 C.1, "Surface Tolerance Type B."

302-P01 TEMPORARY PAVEMENT DROP OFF: Excavation and pavement removal operations will result in a pavement drop off adjacent to the road surface at the areas of the temporary ramp connections. The traffic lane adjacent to the drop-off will be closed to traffic by used of a lane closure.

This drop-off shall not exceed 12 inches at the end of each working day. All materials and work required to reestablish a drop off of less than 12” prior to the end of each working day shall not be paid for separately but shall be included in the price bid for “Aggregate Base Course CL 5”.

401-P01 BLOTTER MATERIAL CL 44: Include the cost of blotter material in the contract unit price for “Prime Coat”.

401-P02 FOG SEAL: Fog seal after final rolling with a minimum mat temperature of 125 degrees F.

550-P01 CONCRETE PAVEMENT: The Department will waive the requirement to place the reinforcing steel, tie bars and dowel bar assemblies a minimum of 2,000 feet ahead of the paving operation as stated in Sections 550.04 E.1 and 550.04 G.2 and allow the use of the roadway as a haul road at the Contractor’s request, provided the following conditions are met:

- Repair all damaged areas.
- Provide an additional trimmer in advance of the paving operation.
- Construct the finished surface to within 0.10 feet of the proposed elevation with the first pass of trimming equipment.
- Construct the finished surface to the specified surface tolerance prior to the placement of reinforcing steel, tie bars and dowel bar assemblies.
- Place the reinforcing steel and tie bars on approved supports securely, properly and accurately in advancing of the paving operation.

704-100 TRAFFIC CONTROL SUPERVISOR: Provide a Traffic Control Supervisor.

704-200 STATE FURNISHED MEDIAN BARRIER: Obtain (129) 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.

Section 704.04 J “Precast Concrete Median Barrier (State Furnished)” applies to the contract item “State Furnished Median Barrier”.

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.

Payment for the State Furnished Median Barrier will follow Section 704.06 D “Precast Concrete Median Barrier (State Furnished)”. Include all costs associated with median barriers in the contract unit price for “State Furnished Median Barrier”.

704-300 FLASHING BEACON: Provide solar powered flashing beacons that meet the requirements of the MUTCD and ITE. Provide beacons that are visible for a distance of 0.25 miles (1,320 feet) and are capable of operating for 20 days without a solar charge.

Include all costs for materials, equipment, labor, and incidentals in the contract unit price for "Flashing Beacon".

704-301 SEQUENCING ARROW PANEL – TYPE C – CROSSOVER: Provide solar powered arrow panels that meet the requirements of the MUTCD and ITE and that are capable of operating for 20 days without a solar charge.

Include all costs for materials, equipment, labor, and incidentals in the contract unit price for "Sequencing Arrow Panel – Type C – Crossover".

704-P01 TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using the following layouts on the Standard Drawing for traffic control.

D-704-15, Type A to be used on the crossroad under the structure when needed.
D-704-22, Type K and Type L for construction trucks hauling material.
D-704-35, Sign Layout for One Lane Closure Interstate System

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/04/23
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704-P02 WORK ZONE TRAFFIC CONTROL PHASES: The device list and plan sheets have been developed based on the following phases:

Phase 1:
Two one–lane closures (one for eastbound I-94 and one for westbound I-94) have been provided to construct the temporary ramp connections and place the median jersey barriers. Place signs and devices in accordance Sec 100 plan sheets based on D-704-35.

Phase 2a & 2b:
Traffic will use the median crossovers and travel head-to-head on the westbound roadway of I-94 while the eastbound structure and adjacent roadway reconstruction is taking place (approximate Sta 517+50 to east end of project). Place signs and devices in accordance with Sec 100 plan sheets. The traffic exiting eastbound I-94 at Exit 260 will use the existing ramp. Traffic entering eastbound I-94 will use a temporary ramp connection.

Phase 3a & 3b:
Traffic will continue using the median crossovers and travel head-to-head on the westbound roadway of I-94 while the leave-out portion of the I-94 roadway reconstruction is taking place. The leave-out extends from the west end of project to approximate Sta 517+50. The traffic entering at the eastbound entrance ramp will use a temporary ramp over the reconstructed portion of EB I-94. Place signs and devices in accordance with Sec 100 plan sheets. The traffic exiting eastbound I-94 at Exit 260 will use the existing ramp.

704-P03 PORTABLE CHANGEABLE MESSAGE SIGN: Install Portable Changeable Message Signs (PCMS) as shown on the Detour Layout in Sec 100 Sheet 16. Three PCMS have been provided in the quantities for this project. 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 CROSSROAD DETOUR: Close the Jamestown Business Loop (crossroad under the structure) during the removal of the bridge superstructure spanning the crossroad, placement of bridge beams for Span 2, and removal of roadway canopy under the new bridge. Detour traffic in accordance with Detour Layout in Sec 100 Sheet 16.

The detour timeframes for each activity are as follows:

- Removal of structure: 24 consecutive hours
- Placement of bridge beams: As approved by the Engineer.
- Removal of roadway canopy under new bridge: 24 consecutive hours

Prior to the detours taking place, provide all news and media informational releases to the public concerning the road closure.

704-P05 OBLITERATION OF PAVEMENT MARKINGS: Obliterate the white centerline marking and white and yellow edge lines at median crossover locations and temporary ramp connections where the roadway alignment is changed.

Obliterate the dashed white centerline markings throughout the two-lane, two-way area, designated for obliteration.

Include the cost of all equipment, material, and labor, including the removal of tape, if used, in the unit price bid for "Obliteration of Pavement Marking".

710-P01 REMOVAL OF TEMPORARY RAMP CONNECTION: Remove the temporary ramp connections upon completion of the eastbound roadway and when no longer needed to maintain traffic. This work consists of the following:

- Remove the bituminous pavement, aggregate base, and embankment material placed for construction of the temporary ramp connections.
- Reshape the foreslopes to 6:1 or flatter.
- Haul and dispose of materials.
- Pipe conduit, removal of pipe, topsoil, seeding, mulching, and erosion control are paid for separately.

Include all costs for labor and equipment to perform the work described above in the unit price bid for “Removal of Temp Connection” as shown in Sec 40.

762-050 PAVEMENT MARKING: If the Engineer and Contractor agree, plan quantity will be used as the measurement for payment for pavement marking items.

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
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762-P01 RAISED PAVEMENT MARKERS: Place raised pavement markers on the centerline of the two-lane two-way roadway. Also place raised pavement markers at the median cross-overs locations. Place the markers as shown on Section 100 details. Space the markers on 5-foot centers. Clean the markers when necessary to retain reflectivity as specified in Section 704.04 B. At completion of the project phases, remove the markers in accordance with the manufacturer's recommendations. Remove the adhesive pad down as close as possible to the pavement using a mechanical scraper such as a loader-type machine with a bucket. Include the cost of furnishing, installing, maintaining, and removing in the price bid for "Raised Pavement Markers."

900-P01 FLEXIBLE GROWTH MEDIUM: Use one of the following Flexible Growth Medium products:

Profile Flexterra HP-FGM
Mat Inc. Flex Guard
EarthGuard FM

If requested to the Engineer, Environmental & Transportation Services will review other manufacturers' products.

Apply Flexible growth medium (FGM) with hydraulic seeding equipment using a hose and a 50° nozzle. Apply FGM from opposing directions to assure 100% soil coverage. Apply FGM at a rate of 3000-3500 lbs/acre.

Include all costs associated with installation FGM areas in the unit price bid for "Flexible Growth Medium."

930-P01 3IN EXPANSION JOINT: Install expansion joints consisting of a pre-compressed polymer impregnated self-expanding polyurethane foam joint seal coated with a highway-grade silicone surface providing a permanent weather tight seal.

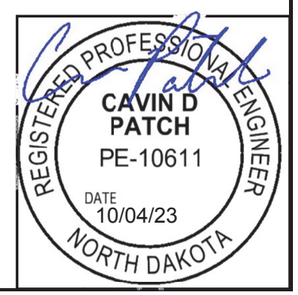
The joint seal may be:
1. Wabo FS Bridge Seal (Watson Bowman Acme);
2. BEJS Bridge Expansion Joint System (EMSEAL);
3. Iso-Flex Silfast XL (LymTal International), or an approved equal.

Prepare the joint opening and install the joint seal according to the manufacturer's recommendations. Use a compatible two-component epoxy adhesive on the expansion joint seal for bonding for the joint sides and a splice adhesive to join the foam sections together. Install the membrane sealant material into the joint, positioning it with recess of ½ inch from the top surface of the joint. Apply the polyurethane splice adhesive liberally to both mitered ends of the 2 sections of membrane sealant material that will meet in the joint. Do not stretch or compress the membrane sealant material.

Fabricate and install protection armor angles on each side of the expansion joint as shown in the Sec 20 Details. Hot dip galvanize the armor angles in accordance with Section 854.01 Galvanizing. Splices are permitted. Weld together any spliced ends. Coat any field weld splices or damaged coating areas with galvanizing paint in accordance with Section 854.02 Damaged Galvanized Coatings.

Include all work and materials associated with the expansion joint seal and protection armor angles in the bid item "3 IN Expansion Joint."

930-P02 CONCRETE SLEEPER SLAB: This work consists of constructing a concrete sleeper slab at the location of an expansion joint in the PCC pavement. Construct with equipment in accordance with Section 155 of the Standard Specifications. Use Class AAE Concrete in accordance with 802. Finish the surface to a smooth surface. No broom finish required. Allow concrete to cure for 24 hours prior to constructing the concrete roadway section above it. Include all costs for any excavation, aggregate base, reinforcing steel, labor and equipment in the price bid for "Concrete Sleeper Slab".



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NOTES

SECTION 100

764-P01 W-BEAM GUARDRAIL END TERMINALS FOR TWO-WAY TRAFFIC: Install seven W-beam guardrail end terminals on the westbound roadway during two-way traffic operation as shown in the plans.

At Hospital Road Separation, RP 259.523, install a thrie beam terminal connector, a 12'-6" thrie beam section (double thickness), a 6'-3" symmetrical thrie to W-beam transition section (double thickness), two 12’-6” W-beam rail sections, and a W-beam guardrail end terminal.

At James River Bridge, RP 259.847, install a thrie beam terminal connector, a 12'-6" thrie beam section (double thickness), a 6’-3” thrie beam section, a 6'-3" asymmetrical thrie to MGS W-beam transition section, one 12’-6” MGS W-beam rail section, and an MGS W-beam guardrail end terminal.

At the BNSF RR & SE Jamestown Interchange, RP 260.125, install a W-beam terminal connector, a 12'-6" MGS W-beam double rail section, two 12’-6” MGS W-beam rail sections, a curved MGS W-beam rail section, and an MGS W-beam guardrail end terminal.

At the RRVW & Minor Road Separation, RP 260.304, install a W-beam terminal connector, a 12'-6" double rail section, two 12’-6” W-beam rail sections and a W-beam guardrail end terminal.

The W-beam guardrail end terminals and additional guardrail materials, required for two-way traffic will remain the property of the contractor and be removed when no longer needed for two-way traffic operation. The W-beam guardrail end terminals will be measured and paid for by the number of W-beam guardrail end terminals required and accepted by the engineer and include all materials, including terminal connectors, rail sections, and all necessary posts, blocks, hardware, equipment, and labor.

764-P02 REMOVE W-BEAM GUARDRAIL AT CROSSROAD: The existing guardrail at the BNSF RR & SE Jamestown Interchange Crossroad, RP 260.131, is to remain in place throughout construction of the new bridge. Remove the crossroad guardrail when all construction is completed for the crossroad, as approved by the Engineer.

764-P03 REMOVE & RESET HIGH TENSION CABLE: There are 2 existing high tension cable guardrail segments including at the area of the west crossover, Sta 13675+00 to Sta 13685+00, and at the area of the temporary ramp connections to the west of the BNSF RR & SE Jamestown Interchange, Sta 13724+37 to Sta 13729+47. The existing high tension cable guardrail system is 4 cable Brifen O-Post with MASH end anchors.

Remove all of the existing cable and posts. The existing driven socket footings and end anchors are to remain in place, except for the socket footings at the temporary ramp connection locations, as shown in the plans. Drive any reset line post sockets plumb, in line, to below frost depth, and without damaging sockets.

At the west concrete crossover, there are concrete post footings in the crossover. After the posts are removed in the crossover, fill the holes with sand for the temporary traffic. When the temporary crossover is closed remove the sand in the concrete crossover and install the posts.

Place the removed cable on spools, and stack posts and socket footings on pallets.

Complete the installation of the cable within 10 days of the traffic median crossover being closed. Failure to have the cable installed and tensioned within 10 days will result in the Engineer performing a contract price reduction of $1,000 per day if the cable is not attached to the end anchor assembly with initial tension applied.

Tension the system according to the manufacturer’s recommendations. Check the system tension 3 weeks after initial tensioning. If necessary, re-tension the system.

Pay length of the system is from hook post to hook post. Any damaged high tension cable guardrail materials will be replaced at the contractor’s expense. Include all costs for removing and resetting the existing high tension cable guardrail as described above in the contract unit price bid for the items “Remove High Tension Guardrail,” and “Reset High Tension Guardrail.”

SECTION 130

748-P01 CURB & GUTTER – TYPE 1 SPECIAL: Install curb and gutter on the eastbound roadway at the entrance end of the James River Bridge, RP 259.847, both ends of the BNSF RR & SE Jamestown Interchange, RP 260.131, and at the entrance end of the RRVW & Minor Road Separation, RP 260.304, in accordance with Standard Drawing D-748-1, except for transitions described in the plans.

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.”

SECTION 140

770-P01 VERTICAL LIFT ROAD CLOSURE GATE: Install the vertical lift road closure gates on the light standards as shown on the Road Closure Gate layouts at the specified locations. The Engineer will measure each vertical lift gate completed and in place.

Provide B&B Roadway MU-605 Drop Gate, with arm of specified length. Provide the gate, flasher, transformer, transfer switch, junction box, winch, cables, and mounting hardware. Ensure all hardware, cables, and cranks are stainless steel.

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
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Provide Aurora LED Gate Arm Lights. Mount these lights on the gate as shown on the detail and connect them to flash alternately.

Ensure the new gate is installed and operational before the old gate is removed.

Ensure each gate has continuous power. Install a switch at the base of the pole that turns on the luminaire and flashing gate lights.

Provide an additional gate, 28 ft length with warning lights, and deliver to:

NDDOT Jamestown Section
3568 81st Ave SE
Jamestown, ND 58401

Include all costs in the price bid for the item “Vertical Road Closure Gate – 28 FT”.

770-P02 SAFETY SWITCH: Provide a NEMA 3R single throw weatherproof safety switch. Ensure the switch cover is lockable in the off and on positions. Mount a switch to the light standard below the winch as shown on the detail. Mount an on and off switch at the sign mounted flashing beacons. Refer to Section 140 for specific details regarding switch location.

Include all cost associated with this work in the price bid for “Vertical Road Closure Gate – 28 FT”.

770-P03 BREAKAWAY LIGHT STANDARD: Ensure the bases for the light standards are the breakaway transformer type. Galvanize the breakaway light standards and provide 6 ft davit mast arms. Ensure the shaft length is 42 feet from the top of the foundation to the bottom of the luminaire for all light standards.

770-P04 STRUCTURAL SPLICE BOXES: Provide 20 feet of slack of conductor in the structural splice box at each flashing beacon sign.

770-P05 REMOVAL ITEMS: Remove the road closure gates, vertical supports, and foundations. Salvage the gate and vertical support. Label each gate with its location when it is removed. Remove and salvage the folding signs and supports. Refer to the chart below for the location of each item. Coordinate delivery of these items to the Jamestown Section Storage Yard at a location shown below.

NDDOT Jamestown Section
3568 81st Ave SE
Jamestown, ND 58401

Include all costs for removal and delivery in the price bid for the item “Vertical Road Closure Gate – 28 FT”.

Location	Sta or RP	Remove & Deliver Item
I-94 Exit 260 EB	Sta 13691+59 rt & Sta 13691+59 rt mdn	Signs and Supports
I-94 Exit 260 SW off-ramp	Sta 13724+83 rt	Gate
I-94B business loop	Sta 29+35 rt & Sta 29+35 lt	Signs and Supports
I-94B business loop on-ramp	Sta 55+80 rt	Gate

770-P06 LED LUMINAIRE: Provide one of the luminaires listed or an approved equal:

Conventional Luminaire	Catalog Number
American Electric Autobahn ATB0	ATB0-P451-MVOLT-R3-NL-NR
Signify Lumec RoadFocus Plus Medium	RFM 105W40LED-740-G1-R3M-UNIV-GY3-NEMA LABEL

Provide alternate luminaires that meet the following:

Light Source	LED
Light Output	15,000 lm to 20,000 lm
Driver	650mA to 850mA
Wattage	100W to 150W
Color Temperature	4000K ±300K
Operating Temperature Range	-40°C to +40°C
Luminaire Housing	Die Cast Aluminum
Vibration Testing	ANSI/NEMA C136.31 Level 2, 3 G
Surge Suppression Rating	ANSI/IEEE C62.41 Cat C
Outdoor rating for housing, wiring, and drivers	ANSI C136.25 IP-65
Photo Control on each luminaire	No
NEMA Label	Yes
Tool-less Access	Yes
Qualified with DesignLights Consortium	Yes

Provide a NEMA label with black letters on a white background. Size of label is 3x3 inch and 1.25 inch letter height. Label should be two lines with the input wattage “XXX” on the top line and “LED” as the bottom line.

Include all costs for the luminaire in the price bid for the item “Vertical Road Closure Gate – 28 FT”.

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
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ENVIRONMENTAL NOTES

ENVIRONMENTAL NOTES (EN): The North Dakota Department of Transportation and the Federal Highway Administration have 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
Northern Long-Eared Bat	Forested/Wooded Areas/Bridges/Box Culverts/Caves/Mines	Active Season: April 1 - October 31* Inactive Season: November 1 - March 31*

*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).

REGISTERED PROFESSIONAL ENGINEER
CAVELL FANCHER
PE-10611
DATE 9/21/2023
NORTH DAKOTA

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	0.86	0.86
107	0121	RAILWAY PROTECTION INSURANCE - COMPANY A	L SUM	1	1
107	0141	RAILROAD COORDINATION - COMPANY A	L SUM	1	1
107	0162	RAILROAD FLAGGING - COMPANY A	DAY	2,000	2,000
201	0330	CLEARING & GRUBBING	L SUM	1	1
202	0105	REMOVAL OF STRUCTURE	L SUM	1	1
202	0136	REMOVAL OF PAVEMENT	TON	10,876	10,876
202	0174	REMOVAL OF PIPE ALL TYPES AND SIZES	LF	288	288
203	0101	COMMON EXCAVATION-TYPE A	CY	1,045	1,045
203	0109	TOPSOIL	CY	2,859	2,859
203	0140	BORROW-EXCAVATION	CY	6,446	6,446
210	0099	CLASS 1 EXCAVATION	L SUM	1	1
210	0201	FOUNDATION PREPARATION	EA	1	1
216	0100	WATER	M GAL	215	215
251	0200	SEEDING CLASS II	ACRE	3.8	3.8
251	2000	TEMPORARY COVER CROP	ACRE	2.8	2.8
253	0101	STRAW MULCH	ACRE	6.1	6.1
261	0112	FIBER ROLLS 12IN	LF	7,457	7,457
261	0113	REMOVE FIBER ROLLS 12IN	LF	4,101	4,101
302	0120	AGGREGATE BASE COURSE CL 5	TON	9,040	9,040
401	0060	PRIME COAT	GAL	4,914	4,914
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	988	988
550	0310	10IN NON REINF CONCRETE PVMT CL AE-DOWELED	SY	10,275	10,275
602	0130	CLASS AAE-3 CONCRETE	CY	450.1	450.1
602	1130	CLASS AE-3 CONCRETE	CY	359.4	359.4
602	1133	CONCRETE BRIDGE APPROACH SLAB	SY	226	226
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,541	1,541
604	9610	PRESTRESSED BOX BEAM-27IN	LF	1,701	1,701
612	0115	REINFORCING STEEL-GRADE 60	LBS	31,551	31,551
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	81,281	81,281
622	0040	STEEL PILING HP 12 X 53	LF	870	870
622	0060	STEEL PILING HP 14 X 73	LF	1,560	1,560
624	3005	CONNECTION PLATE MODIFICATION	EA	2	2

ESTIMATE NUMBER: 23559 ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 10/13/2023 TIME: 08:47:00

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
702	0100	MOBILIZATION	L SUM	0.86	0.86
704	0100	FLAGGING	MHR	1,050	1,050
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2,602	2,602
704	1045	ATTENUATION DEVICE-TYPE B-75	EA	3	3
704	1052	TYPE III BARRICADE	EA	31	31
704	1060	DELINEATOR DRUMS	EA	189	189
704	1067	TUBULAR MARKERS	EA	258	258
704	1072	FLEXIBLE DELINEATORS	EA	199	199
704	1081	VERTICAL PANELS-BACK TO BACK	EA	18	18
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2	2
704	1090	FLASHING BEACON	EA	2	2
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	2,132	2,132
704	3511	STATE FURNISHED MEDIAN BARRIER	LF	1,290	1,290
706	0400	FIELD OFFICE	EA	1	1
706	0500	AGGREGATE LABORATORY	EA	1	1
706	0600	CONTRACTOR'S LABORATORY	EA	1	1
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	11,870	11,870
710	0410	REMOVAL OF TEMP CONNECTION	EA	2	2
714	4090	PIPE CONDUIT 12IN	LF	68	68
714	4100	PIPE CONDUIT 18IN	LF	148	148
714	4105	PIPE CONDUIT 24IN	LF	72	72
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	62	62
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	137	137
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	23	23
754	0149	RESET DELINEATOR	EA	5	5
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	70	70
754	0210	GALV STEEL POST-STANDARD PIPE	LF	109	109
754	0214	GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE)	LF	66	66
754	0534	PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING	SF	15	15
754	0557	INTERSTATE MILE POSTS-TYPE C	EA	1	1
754	0592	RESET SIGN PANEL	EA	1	1
754	0801	OBJECT MARKERS - TYPE I	EA	2	2
754	0803	OBJECT MARKERS - TYPE III	EA	1	1

ESTIMATE NUMBER: 23559 ESTIMATE TYPE: FINAL FINALIZED: Y RUN DATE: 10/13/2023 TIME: 08:47:00

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	8	3

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
754	1100	CLASS AE CONCRETE-SIGN FOUNDATIONS	CY	3	3
754	1104	REMOVE SIGN FOUNDATION	EA	5	5
754	8015	VEHICLE SPEED FEEDBACK SIGN	EA	2	2
762	0200	RAISED PAVEMENT MARKERS	EA	6,313	6,313
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	20,729	20,729
762	0432	SHORT TERM 6IN LINE-TYPE NR	LF	14,470	14,470
762	1104	PVMT MK PAINTED 4IN LINE	LF	25,276	25,276
762	1108	PVMT MK PAINTED 8IN LINE	LF	647	647
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED	LF	19,292	19,292
764	0107	REMOVE HIGH TENSION GUARDRAIL	LF	1,510	1,510
764	0109	RESET HIGH TENSION GUARDRAIL	LF	1,510	1,510
764	0131	W-BEAM GUARDRAIL	LF	1,472	1,472
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	9	9
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	2,091	2,091
764	1050	RESET W-BEAM GUARDRAIL	LF	325	325
764	1059	RESET W-BEAM GUARDRAIL END TERMINAL	EA	1	1
764	2081	REMOVE END TREATMENT & TRANSITION	EA	5	5
772	2110	FLASHING BEACON-POST MOUNTED	EA	2	2
900	0700	FLEXIBLE GROWTH MEDIUM	SY	1,696	1,696
930	3000	BRIDGE BENCH MARKS	SET	1	1
930	7012	ROADWAY CANOPY	L SUM	1	1
930	8671	CONCRETE SLEEPER SLAB	SY	125	125
930	8700	3 IN EXPANSION JOINT	LF	187	187
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2	2
980	0811	VERTICAL ROAD CLOSURE GATE-28FT	EA	2	2

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	8	4

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
103	0100	CONTRACT BOND	L SUM	0.14	0.14
107	0122	RAILWAY PROTECTION INSURANCE - COMPANY B	L SUM	1	1
107	0142	RAILROAD COORDINATION - COMPANY B	L SUM	1	1
107	0153	RAILROAD FLAGGING - COMPANY B	L SUM	1	1
202	0136	REMOVAL OF PAVEMENT	TON	368	368
202	0310	REMOVAL OF CHAIN LINK FENCE	LF	438	438
203	0195	EMBANKMENT SPECIAL	L SUM	1	1
255	0201	TRM TYPE 1	SY	100	100
302	0120	AGGREGATE BASE COURSE CL 5	TON	79	79
401	0060	PRIME COAT	GAL	54	54
550	0310	10IN NON REINF CONCRETE PVMT CL AE-DOWELED	SY	153	153
602	0130	CLASS AAE-3 CONCRETE	CY	19.5	19.5
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	320.1	320.1
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	2,658	2,658
602	1260	BRIDGE DECK CRACK SEALING	LF	2,400	2,400
602	2000	REMOVE AND RESET ANCHOR BOLTS	EA	2	2
602	7000	SPECIAL SURFACE FINISH	SF	6,251	6,251
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	3,754	3,754
616	7500	BEARING MODIFICATION	EA	6	6
630	0110	SAND BLASTING & SPOT PAINTING	SF	114	114
650	0805	DECK SPALL REPAIR	SF	116	116
702	0100	MOBILIZATION	L SUM	0.14	0.14
748	0141	CURB & GUTTER-TYPE 1 SPECIAL	LF	19	19
752	0600	FENCE CHAIN LINK	LF	100	100
752	0993	FENCE TERMINAL	EA	4	4
752	3100	CORNER ASSEMBLY CHAIN LINK	EA	4	4
764	0131	W-BEAM GUARDRAIL	LF	104	104
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	104	104
910	0565	CONTROLLED DENSITY BACKFILL	CY	2.5	2.5
930	8671	CONCRETE SLEEPER SLAB	SY	31	31
930	8700	3 IN EXPANSION JOINT	LF	46	46
930	9505	BRIDGE REPAIR-BEARING	L SUM	1	1
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	1	1

ESTIMATE NUMBER: 23561 ESTIMATE TYPE: FINAL FINALIZED: N RUN DATE: 10/05/2023 TIME: 09:14:57

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	8	5

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	TOTAL
930	9612	SPALL REPAIR	SF	80	80
930	9660	ABUTMENT REPAIR	L SUM	1	1
950	8673	EXPANSION JOINT MODIFICATION	LF	61.7	61.7

ESTIMATE NUMBER: 23561 ESTIMATE TYPE: FINAL FINALIZED: N RUN DATE: 10/05/2023 TIME: 09:14:57

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	10	1

BASIS OF ESTIMATE

Material

Aggregate Base Course CL 5 @ 1.875 Ton/CY

Commercial Grade Hot Mix Asphalt @ 2 Ton/CY
Includes: Asphalt Cement @ 6.0%
Tack Coat @ 0.05 Gal/SY
Fog Seal @ .05 Gal/SY

Prime Coat @ 0.25 Gal/SY

Blotter Material CL 44 @ 15 lbs/SY
(Not a pay item – to be included in the price bid for “Prime Coat”)

Water

Water ,@ 10 Gals/Ton Aggregate Base Course CL 5

- 8,954 x 10 Gals/Ton = 159,560 Gal/1000 = **90 MGal**

Dust control **50 MGal**

Embankment

- 7,491 CY x 10 Gals/CY =74,910/1000 = **75 MGal**

Total **215 MGal**

Removals
Removal of Concrete Pavement
Concrete @ 2.0 Ton/CY
Bituminous @ 2.0 Ton/CY
Aggregate @ 1.875 Ton/CY

REGISTERED PROFESSIONAL ENGINEER
CAVELL FINCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	11	1

EARTH SUMMARY

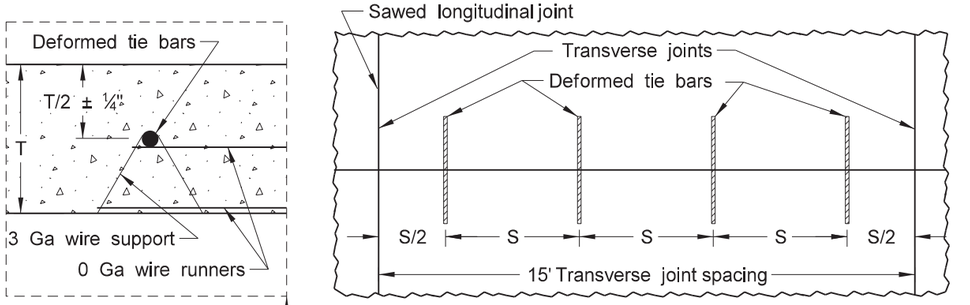
Location	Common Excavation - Type A Pay Item (CY) A	Embankment (CY) B	Borrow - Excavation Pay Item (CY) C = B - A	Topsoil Stripping Pay Item (CY) D
- I-94 Eastbound				
Mainline and Ramps	797	4,390	3,594	1,578
- Temp Ramp Connections				
Temp Ramp and Loop Connection 1	226	1,158	932	832
Temp Loop Connection 2	23	1,943	1,920	449
TOTALS =	1,045	7,491	6,446	2,859

Earth Summary

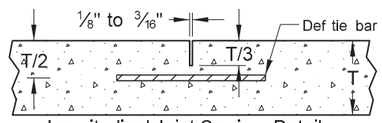
REGISTERED PROFESSIONAL ENGINEER
CAV[illegible]
PE-10611
DATE
9/21/2023
NORTH DAKOTA

9/6/2023 8:02:00 AM cpatch R:\project\20094260.194\design\Sheets\011DT_001.dgn

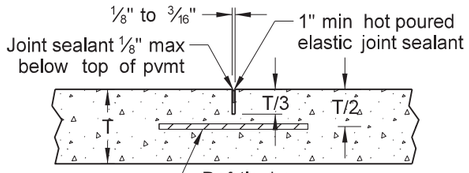
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	20	1



Longitudinal Tie Bar Assembly
(One unit shown)



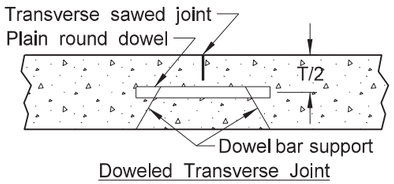
Longitudinal Joint Sawing Detail
(sawed and tied joints)



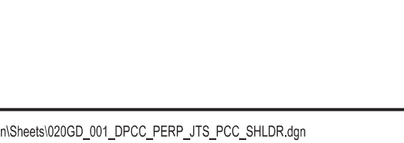
Longitudinal Joint Sealing Detail
(sawed and tied joints)

Grade 40 Longitudinal Joint Tie Bars	
PCC Depth	10"
Mainline Centerline	
Bar Size x Length (S=30")	#5 x 30"
Bar Size x Length (S=45")	#6 x 36"
Ramp/Loop Centerline	
Bar Size x Length (S=30")	#5 x 30"
Bar Size x Length (S=45")	#6 x 36"
10' Shoulder Joint	
Bar Size x Length (S=30")	#4 x 24"
Bar Size x Length (S=45")	#5 x 30"

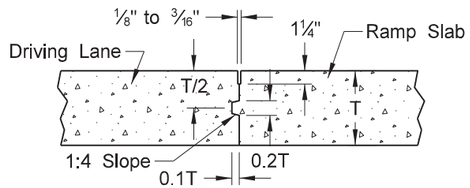
Grade 60 Longitudinal Joint Tie Bars	
PCC Depth	
Mainline Centerline	
Bar Size x Length (S=30")	#4 x 36"
Bar Size x Length (S=45")	#5 x 42"
Ramp/Loop Centerline	
Bar Size x Length (S=30")	#4 x 36"
Bar Size x Length (S=45")	#5 x 42"
10' Shoulder Joint	
Bar Size x Length (S=30")	#3 x 30"
Bar Size x Length (S=45")	#4 x 36"



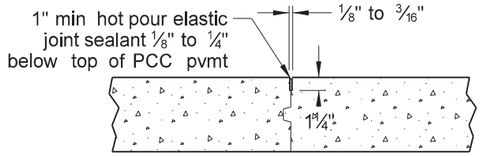
Deformed Bar Installation (2'-0" c to c)
(Transverse Joints)



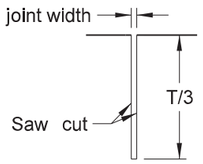
Doweled Transverse Joint



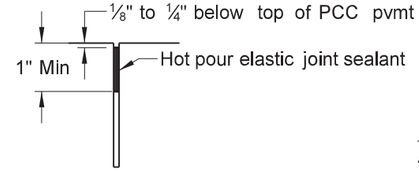
Longitudinal Joint Sawing Detail
(at ramps - non-tied keyed joints)



Longitudinal Joint Sealing Detail
(non-tied keyed joints)



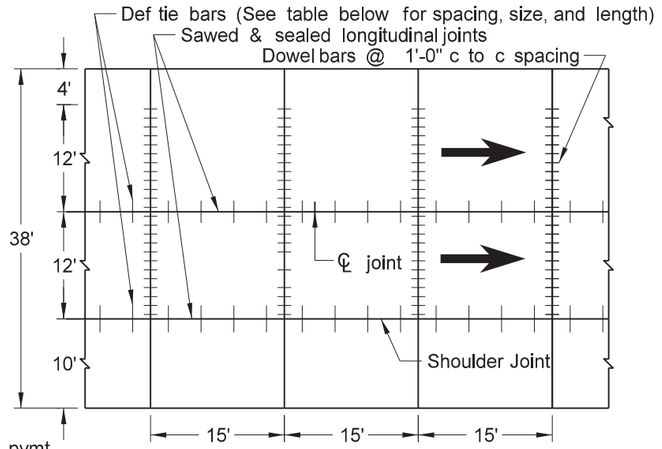
Transverse Joint Sawing



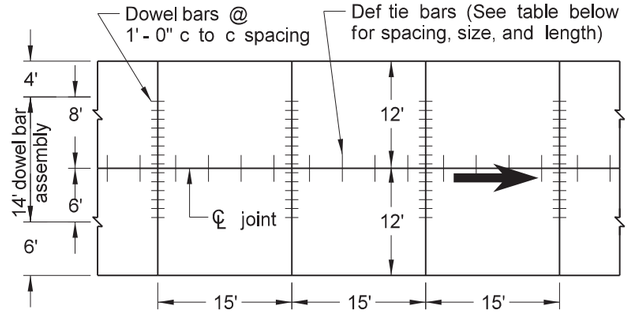
Transverse Joint Sealing

Notes:

1. S = Tiebar spacing
2. T = Pavement thickness
3. Place dowels in ramp tapers also.
4. Place no tie bar within 15" of a transverse joint.



Mainline Joints
15' joint spacing



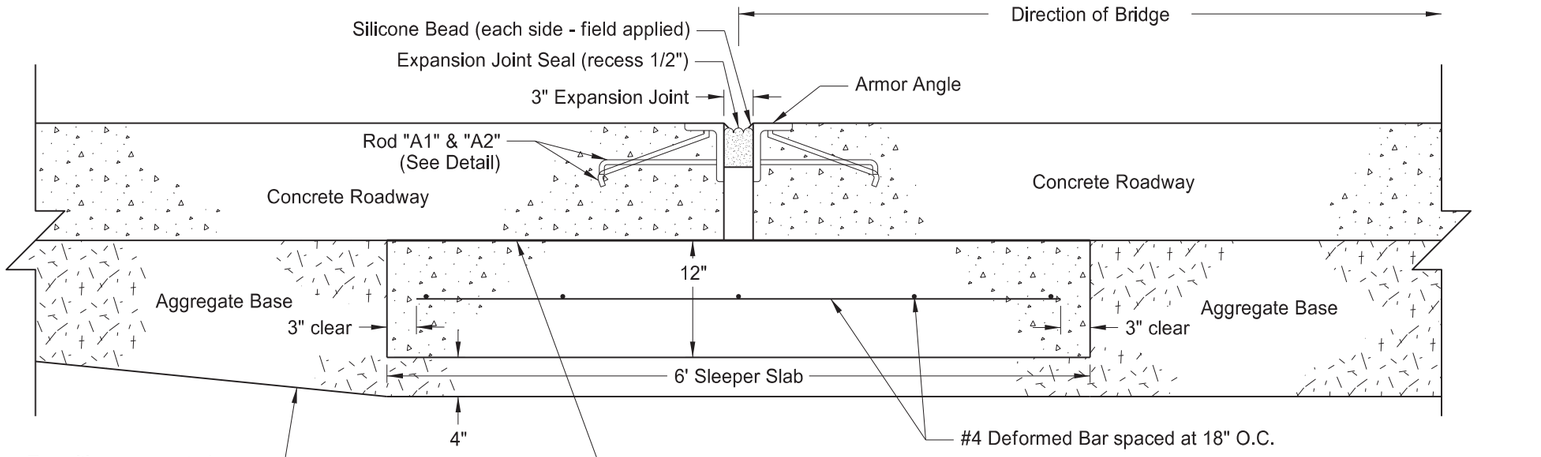
Loop & Ramp Joints

Transverse Joint Dowel Bars

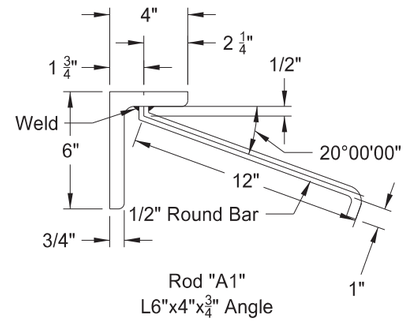
Joint Location	Dia x Length
ML	1.25" x 18"
Ramp	1.25" x 18"
Loop	1.25" x 18"

PCC Pavement - Perpendicular Joints@15' Spacing and 10' Wide Full Depth PCC Outside Shoulder

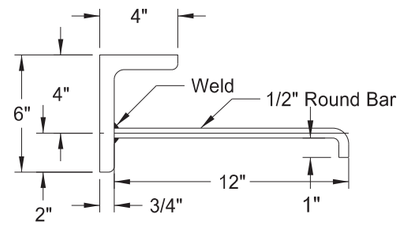
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	20	2



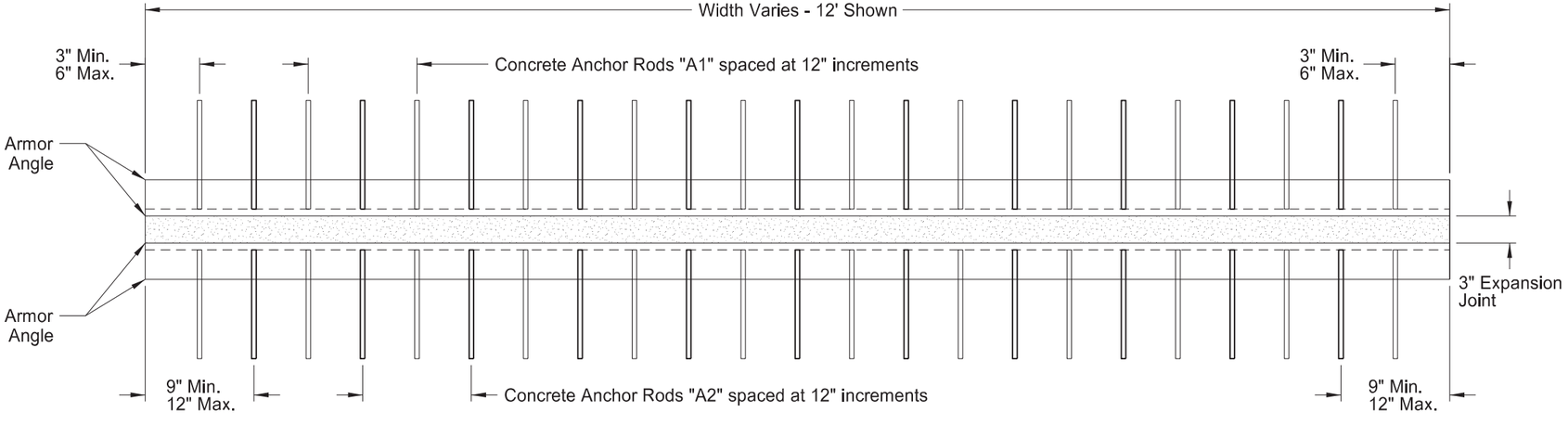
Profile View



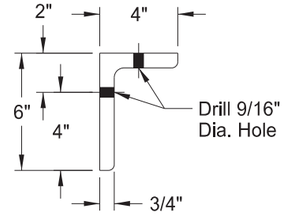
Rod "A1"
L6"x4"x$\frac{3}{4}$" Angle



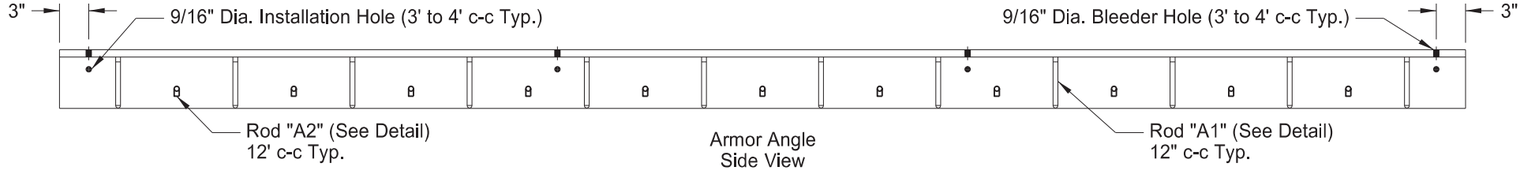
Rod "A2"
L6"x4"x$\frac{3}{4}$" Angle



Armor Angle
Top View



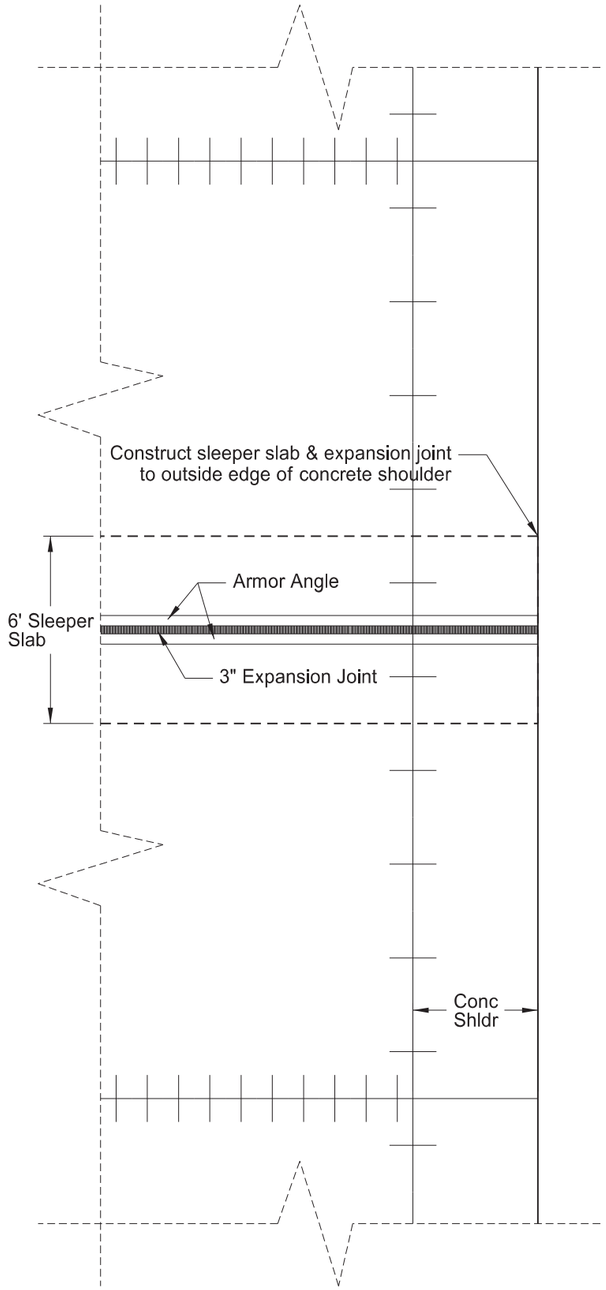
$\frac{9}{16}$" Drilled Holes
L6"x4"x$\frac{3}{4}$" Angle



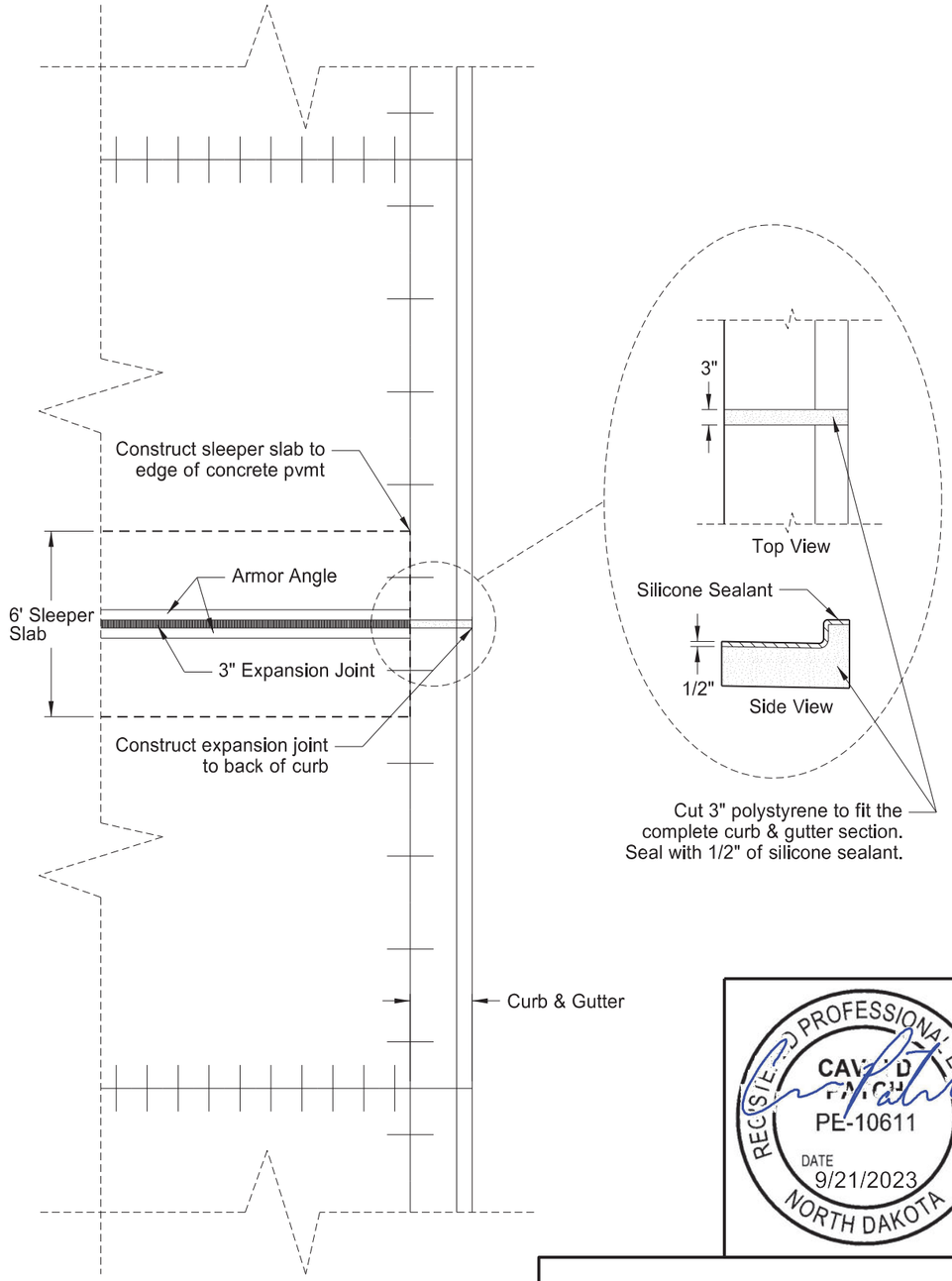
Armor Angle
Side View

3 Inch Expansion Joint Detail

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	20	3



Top View
Roadway w/Concrete Shoulder

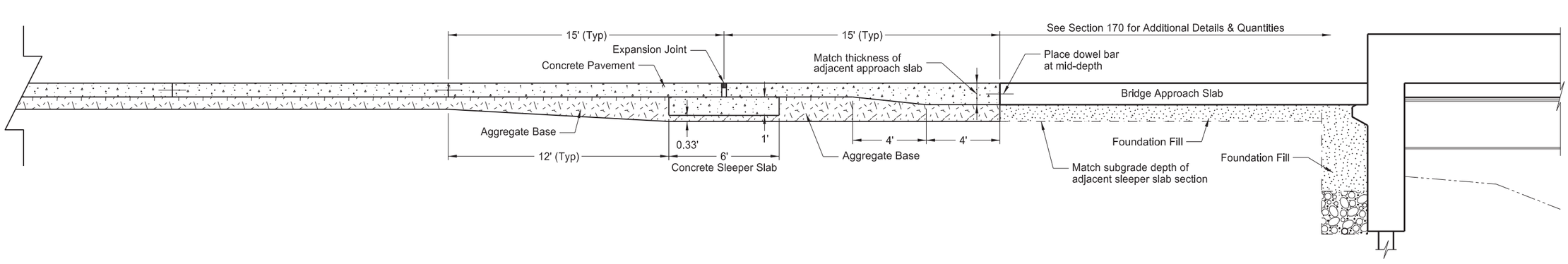


Top View
Roadway w/Curb & Gutter

REGISTERED PROFESSIONAL ENGINEER
CAVIN D. PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

3 Inch Expansion Joint Shoulder Alternatives

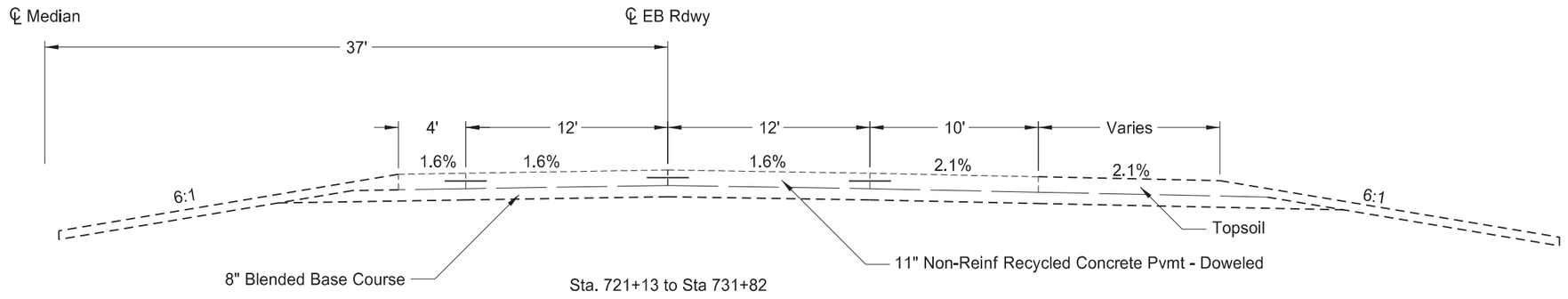
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	20	4



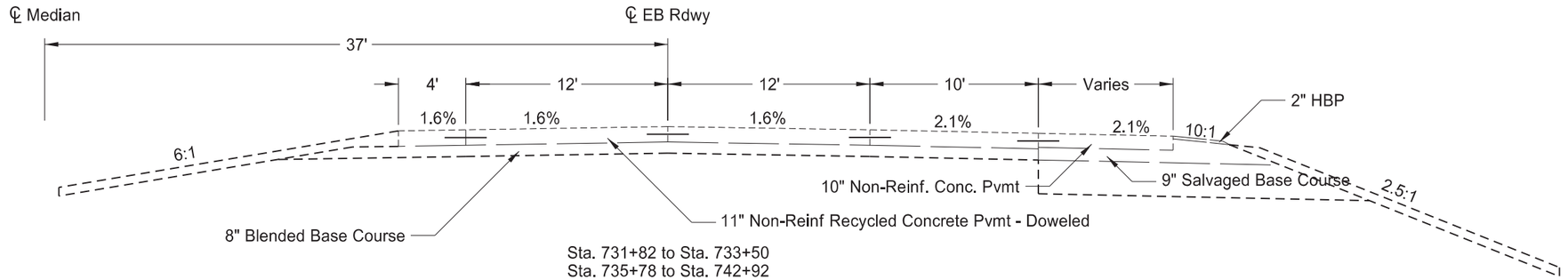
REGISTERED PROFESSIONAL ENGINEER
CAVELL FINCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Concrete Pavement to Bridge Approach Panel Transition Detail

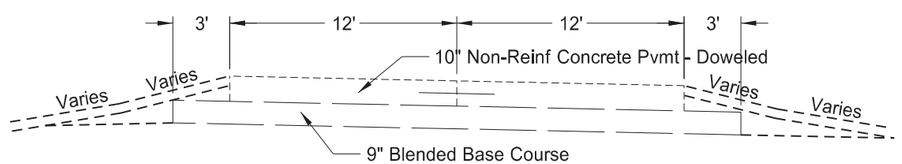
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	30	1



Sta. 721+13 to Sta 731+82



Sta. 731+82 to Sta. 733+50
Sta. 735+78 to Sta. 742+92



Existing Typical Section
Sta 14+25 to Sta 15+15 (Chain: SWRamp)
Sta 53+07 to Sta 54+86 (Chain: SWLoop)

Existing Typical Section

REGISTERED PROFESSIONAL ENGINEER
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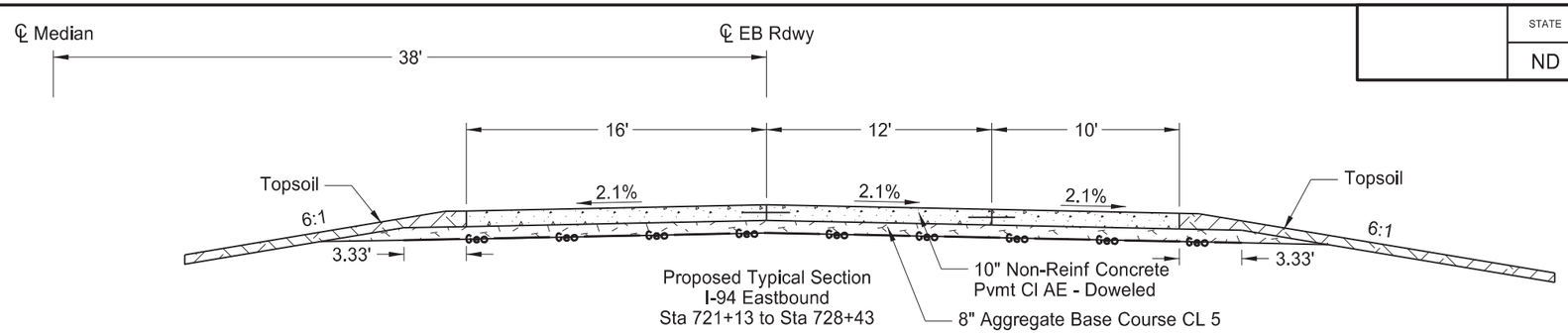
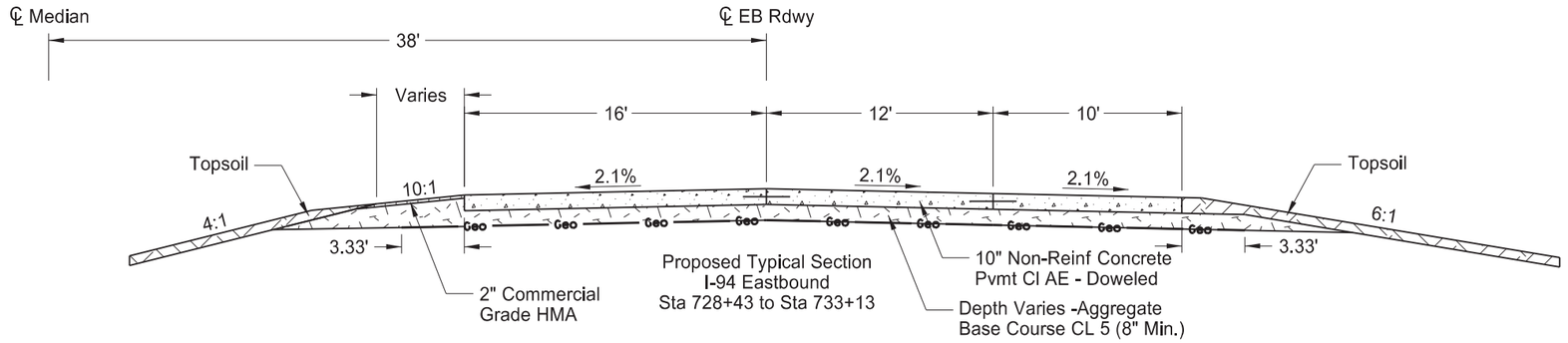
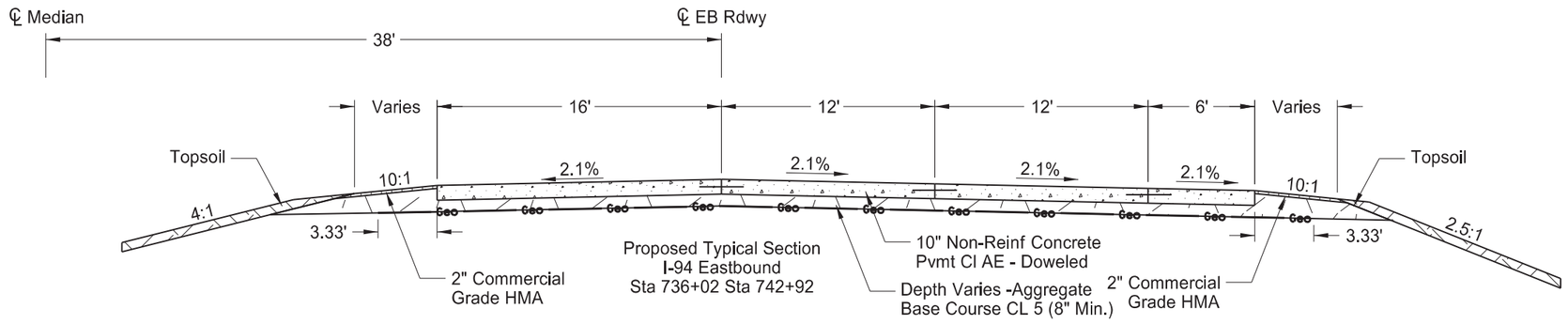
PE-10611
DATE
9/21/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	30	2





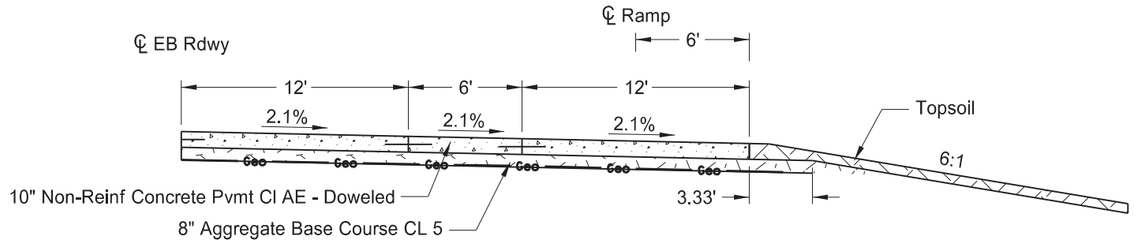


Proposed Typical Section
Mainline

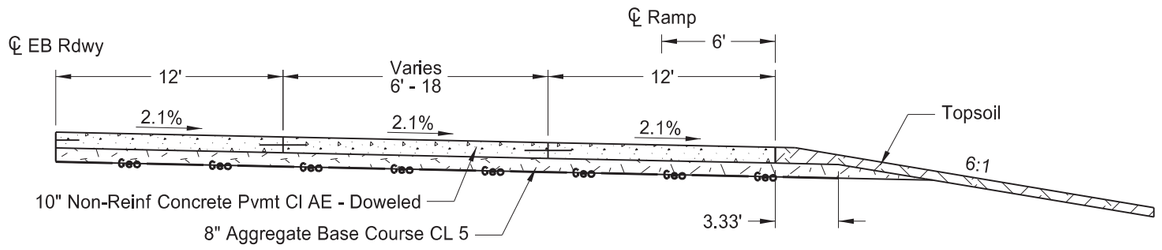
Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

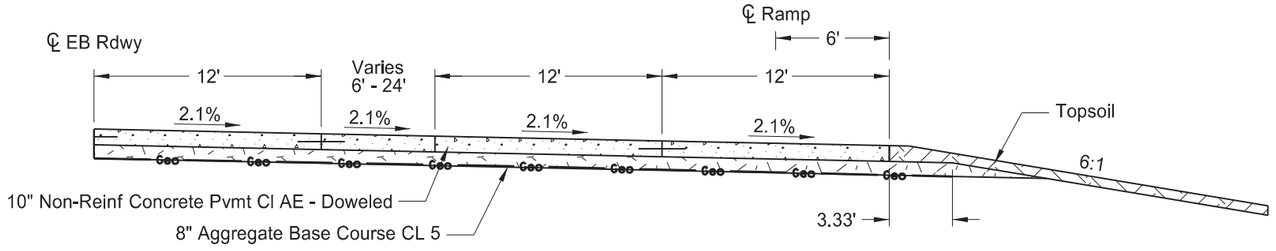
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	30	3



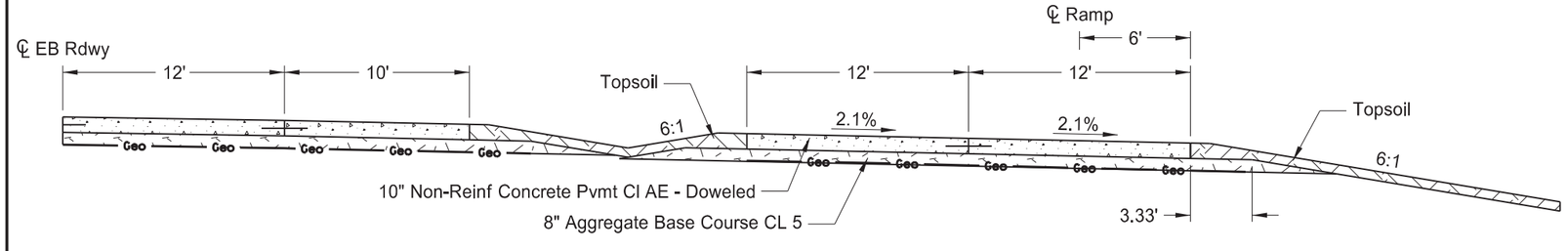
Sta 11+63 to Sta 12+27



Sta 12+27 to Sta 13+32



Sta 13+31.76 to Sta 14+25.42



Sta 14+25.42 to Sta 15+15

Proposed Typical Sections

EB Exit Ramp
Chain: SWRamp

Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

REGISTERED PROFESSIONAL ENGINEER
CAVALIER PATCH
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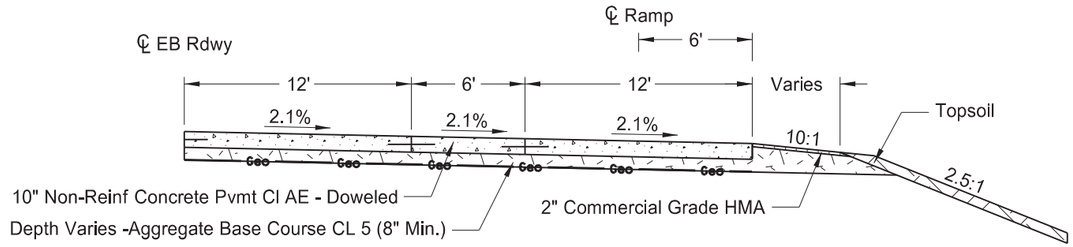
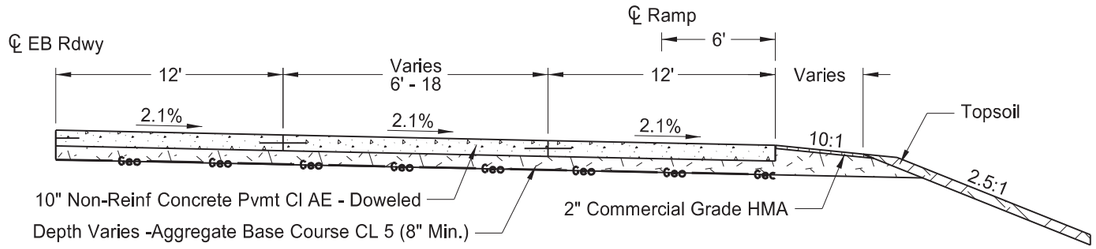
DATE 9/21/2023
NORTH DAKOTA

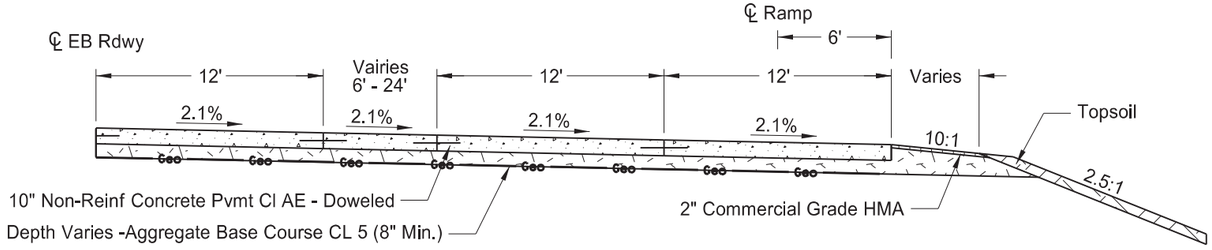
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	30	4



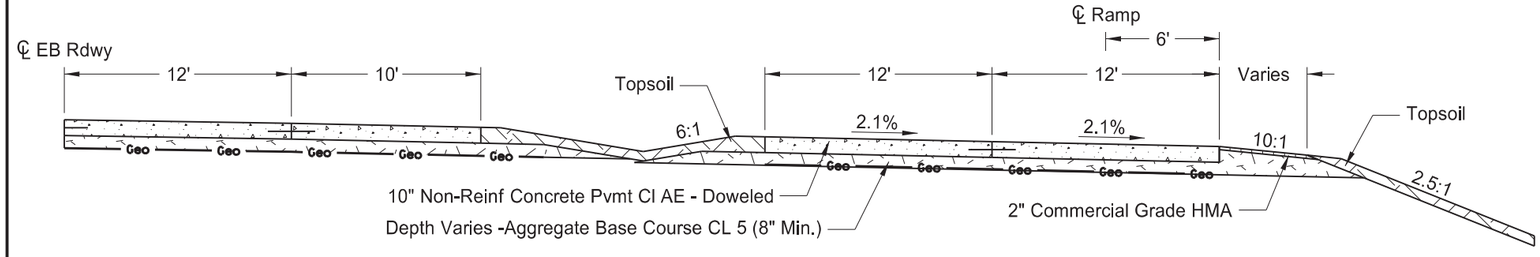
Sta 57+33 to Sta 57+60



55+79 to 57+33



Sta 54+86 to Sta 55+79



Sta 53+07 to Sta 54+86

Proposed Typical Sections

EB Entrance Loop
Chain: SWLoop

Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

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DATE 9/21/2023
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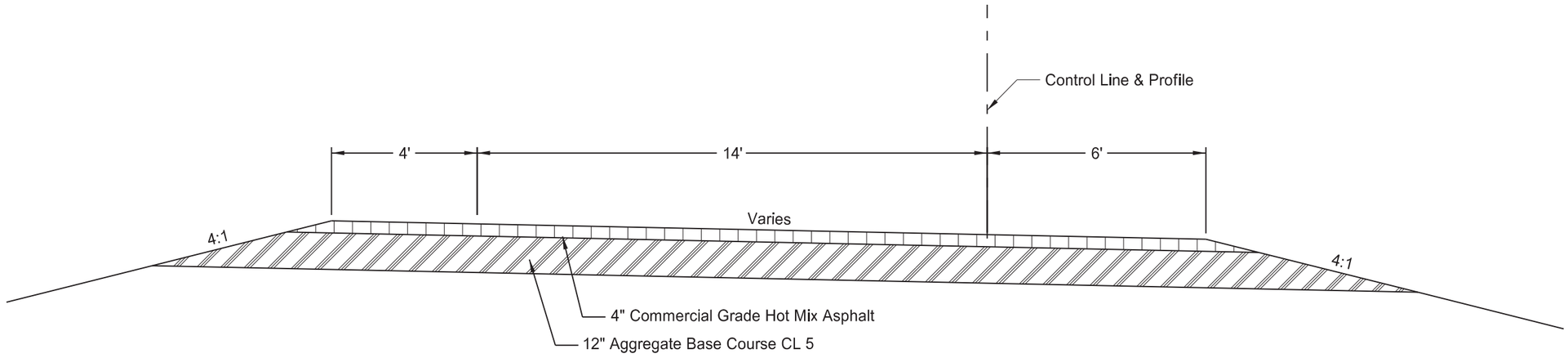
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	30	5



Proposed Typical Section
Temporary Ramp Connection

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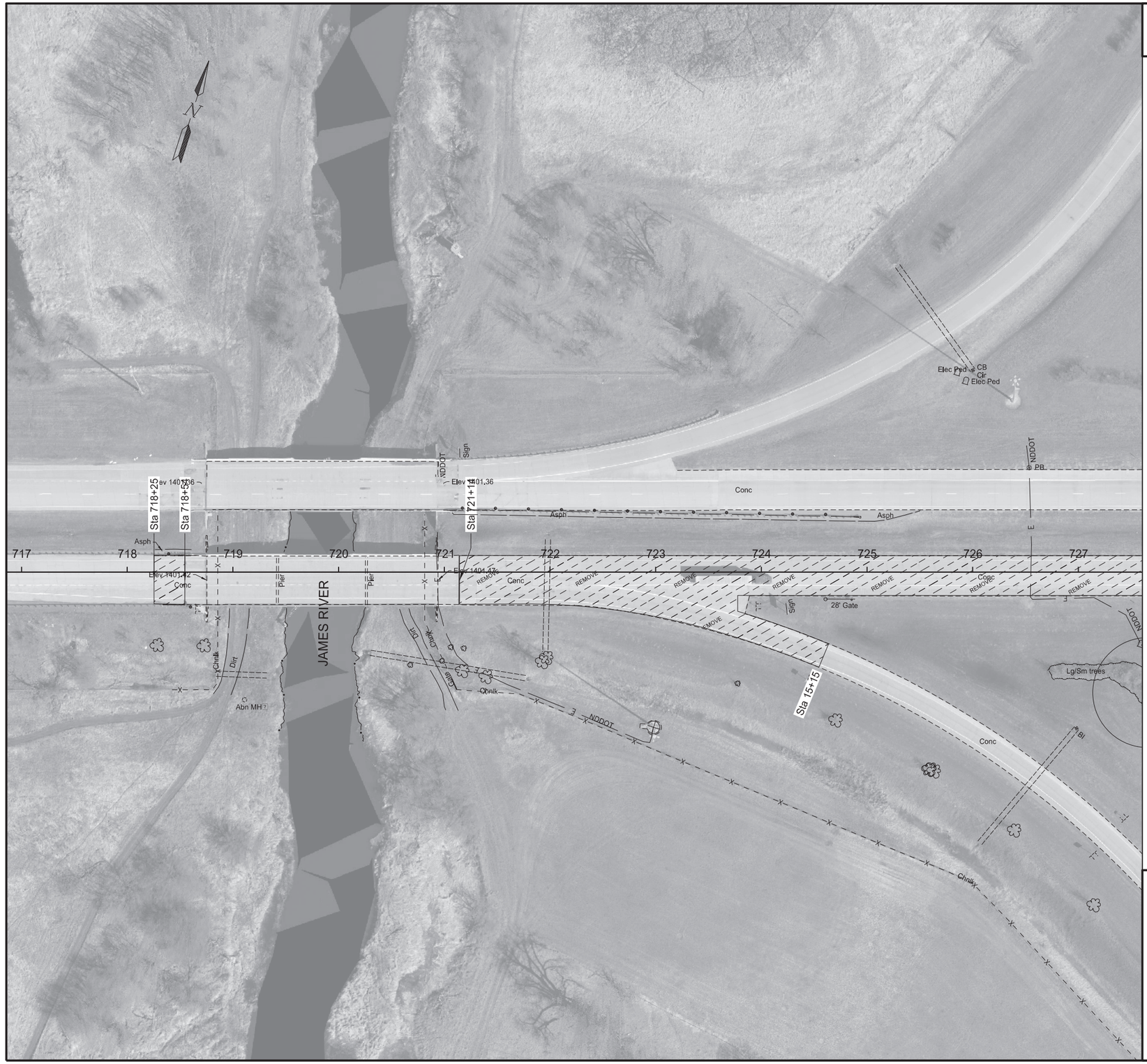
PE-10611
DATE
9/21/2023
NORTH DAKOTA

Typical Section

Temporary Ramp Connection



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	40	1

SS-2-999(064)

PROJECT SS-2-999(064)

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		I-94 EB Sta 718+25 to 721+14		
		Blended Base - Depth Varies	149	TON
		Conc Pvmt - 11" & Approach Slabs	219	TON

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		I-94 EB Sta 721+14 to 727+00		
		Blended Base - Depth Varies	912	TON
		Conc Pvmt - 11" & Approach Slabs	1337	TON
		Ramp - 11+43 to Sta 15+15		
		Blended Base - Depth Varies	380	TON
		Conc Pvmt - 10"	506	TON

LEGEND

REMOVE — Removals I-94 EB & Ramp

Removals

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/04/23
NORTH DAKOTA

10/4/2023 8:20:46 AM cpatch R:\project\20094260.194\design\Sheets\040RM.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	40	2

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
201	0330	CLEARING & GRUBBING		
			1	L SUM
202	0136	REMOVAL OF PAVEMENT		
		I-94 EB Sta 727+00 to 737+00		
		Blended Base - Depth Varies	1307	TON
		Conc Pvmt - 11" & Approach Slabs	1917	TON
		Ramp - 53+07 to Sta 57+94		
		Blended Base - Depth Varies	480	TON
		Conc Pvmt - 10"	640	TON
		Guardrail Surfacing Sta 729+12 to Sta 733+52 RT		
		Sta 729+12 to Sta 733+52 RT		
		Bituminous	56	TON
		Salvaged Base Course	106	TON
		Guardrail Surfacing Sta 728+43 to Sta 733+52 LT		
		Bituminous	27	TON
		Salvaged Base Course	51	TON

LEGEND

REMOVE

Removals I-94 EB & Ramp

Removals Guardrail Surfacing

Removals

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/04/23
NORTH DAKOTA

10/4/2023 8:20:49 AM cpatch R:\project\20094260.194\design\Sheets\040RM.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	40	3

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		I-94 EB Sta 737+00 to 743+14		
		Blended Base - Depth Varies	1263	TON
		Conc Pvmt - 11" & Approach Slab	1853	TON

LEGEND

REMOVE — Removals I-94 EB

Removals

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/04/23
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	40	4

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM		QTY	UNIT
710	0410	**REMOVAL OF TEMP CONNECTION**			
		Temp Ramp and Loop Ramp Connection		1	EA
		Aggregate - Ton	1514		
		Bituminous Pavement - Ton	538		
		Embankment - CY	1,158		
		Temp Loop Ramp Connection		1	EA
		Aggregate - Ton	935		
		Bituminous Pavement - Ton	332		
		Embankment - CY	1,943		
202	0136	**REMOVAL OF PAVEMENT**		41	TON
		Temp Guardrail Surfacing			
		Aggregate - Ton	30.5		
		Bituminous Pavement - Ton	10.9		

Removals

Temporary Ramp Connections

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/04/23
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	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	
4+58	35.7' Lt	4+24	23.0' Rt	12	Pipe Conduit	68	Reinforced Concrete Pipe - Class III (barrel length = 76 LF)	12							Specification 714.04 A
							Corrugated Steel Pipe	18	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	12	Z, A, P	3/4, 1	0.064				
							Polypropylene Pipe (AASHTO M330, Type S)	12							
5+90	11.2' Rt	5+36	30.4' Lt	24	Pipe Conduit	72	Reinforced Concrete Pipe - Class III (barrel length = 76 LF)	24							Specification 714.04 A
							Corrugated Steel Pipe	24	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	24	Z, A, P	3/4, 1	0.064				
							Polypropylene Pipe (AASHTO M330, Type S)	24							
2+18	18.9' Rt	2+18	42.8' Lt	18	Pipe Conduit	64	Reinforced Concrete Pipe - Class III (barrel length = 88 LF)	18							Specification 714.04 A
							Corrugated Steel Pipe	18	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	18	Z, A, P	3/4, 1	0.064				
							Polypropylene Pipe (AASHTO M330, Type S)	18							
3+98	14' Rt	3+40	37' Lt	18	Pipe Conduit	84	Reinforced Concrete Pipe - Class III (barrel length = 96 LF)	18							Specification 714.04 A
							Corrugated Steel Pipe	24	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	18	Z, A, P	3/4, 1	0.064				
							Polypropylene Pipe (AASHTO M330, Type S)	18							

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 were not provided for the temporary pipes.
FES = Flared End Section
TES = Traversable End Section

Allowable Pipe List

Temporary Pipes for EB Ramp Connections

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PE-10611
DATE 9/21/2023
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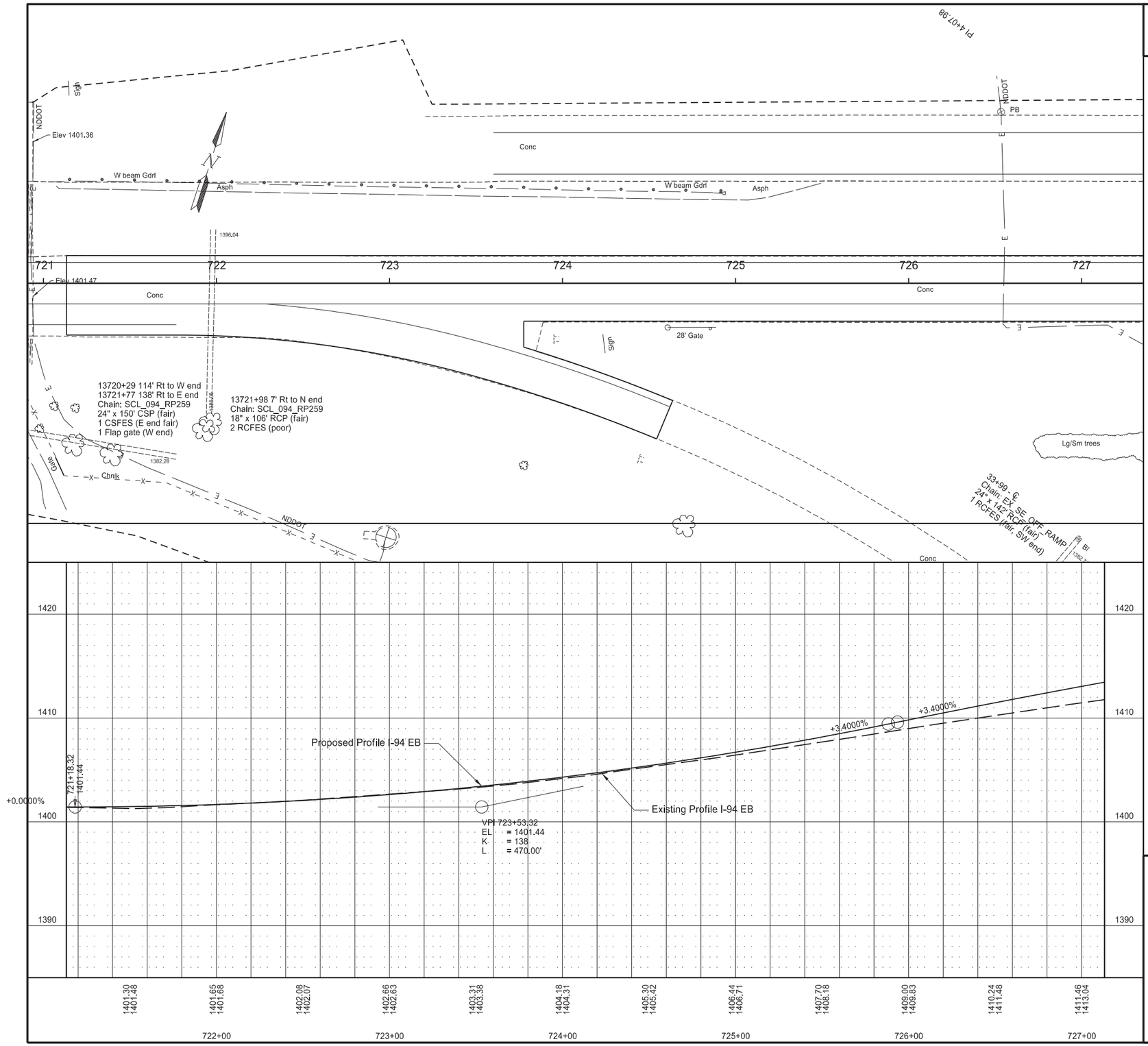
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	60	1



Plan & Profile

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

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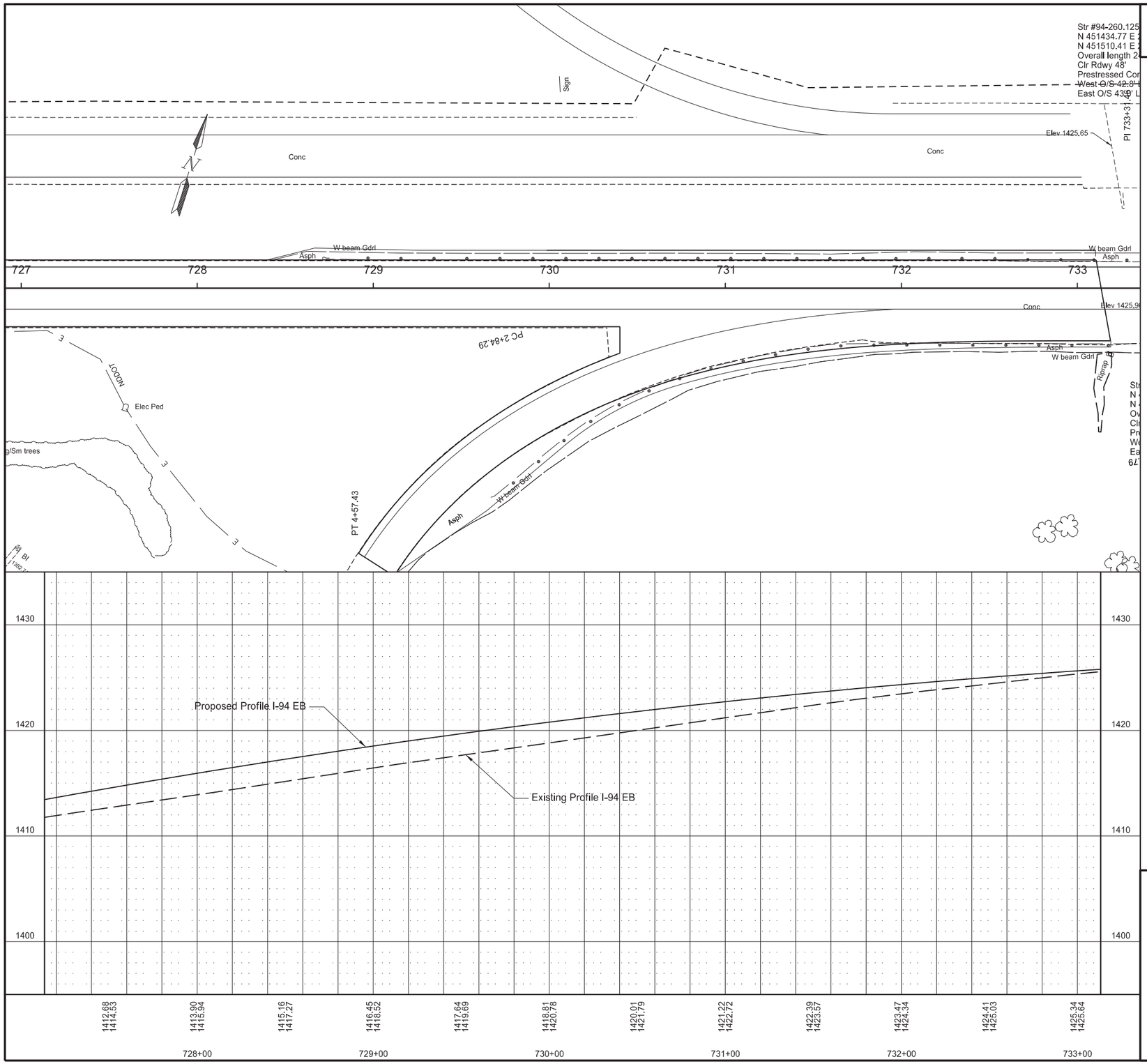
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	60	2



Plan & Profile

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAV[illegible]
PE-10611
DATE
9/21/2023
NORTH DAKOTA

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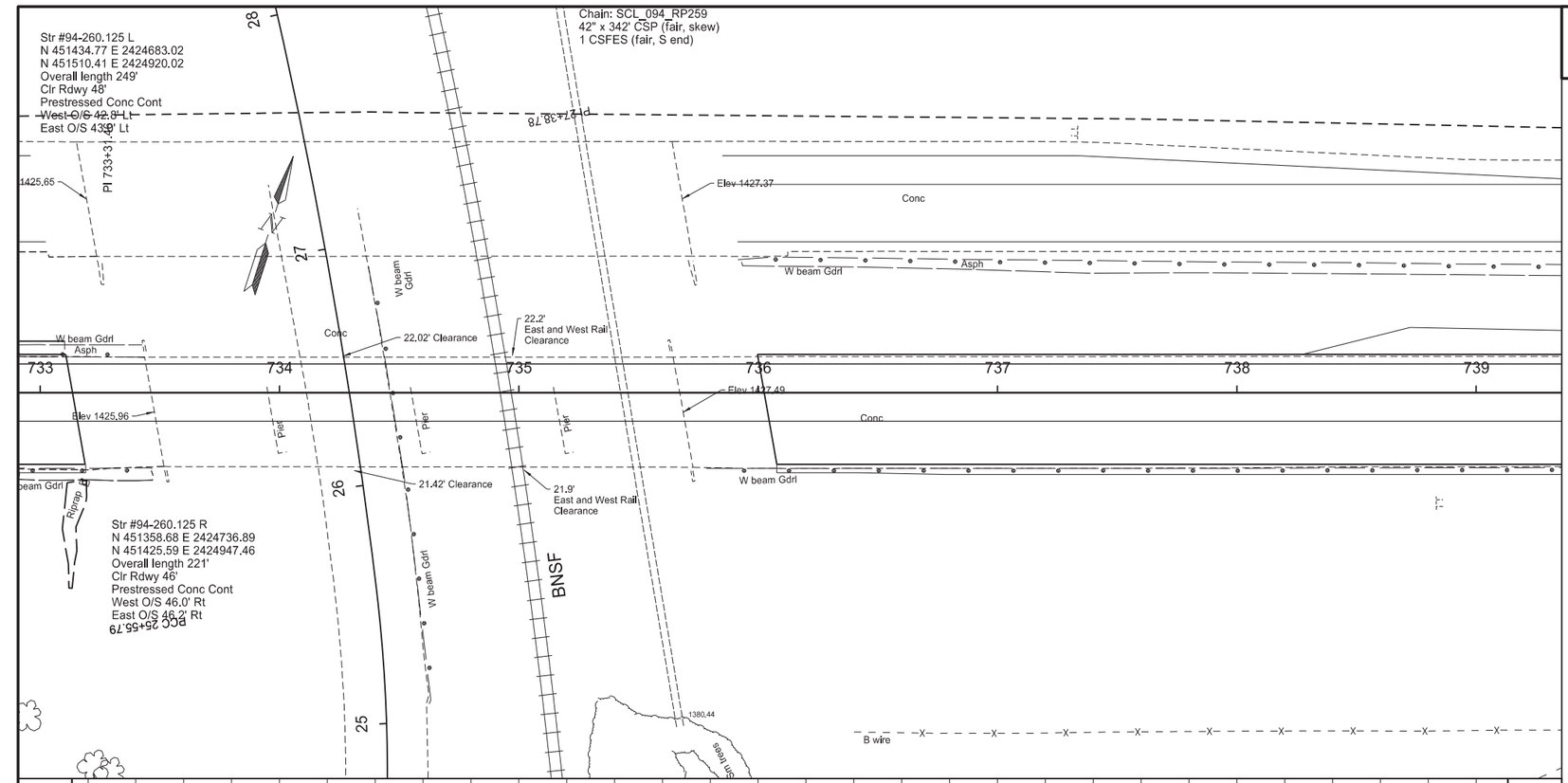
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	60	3

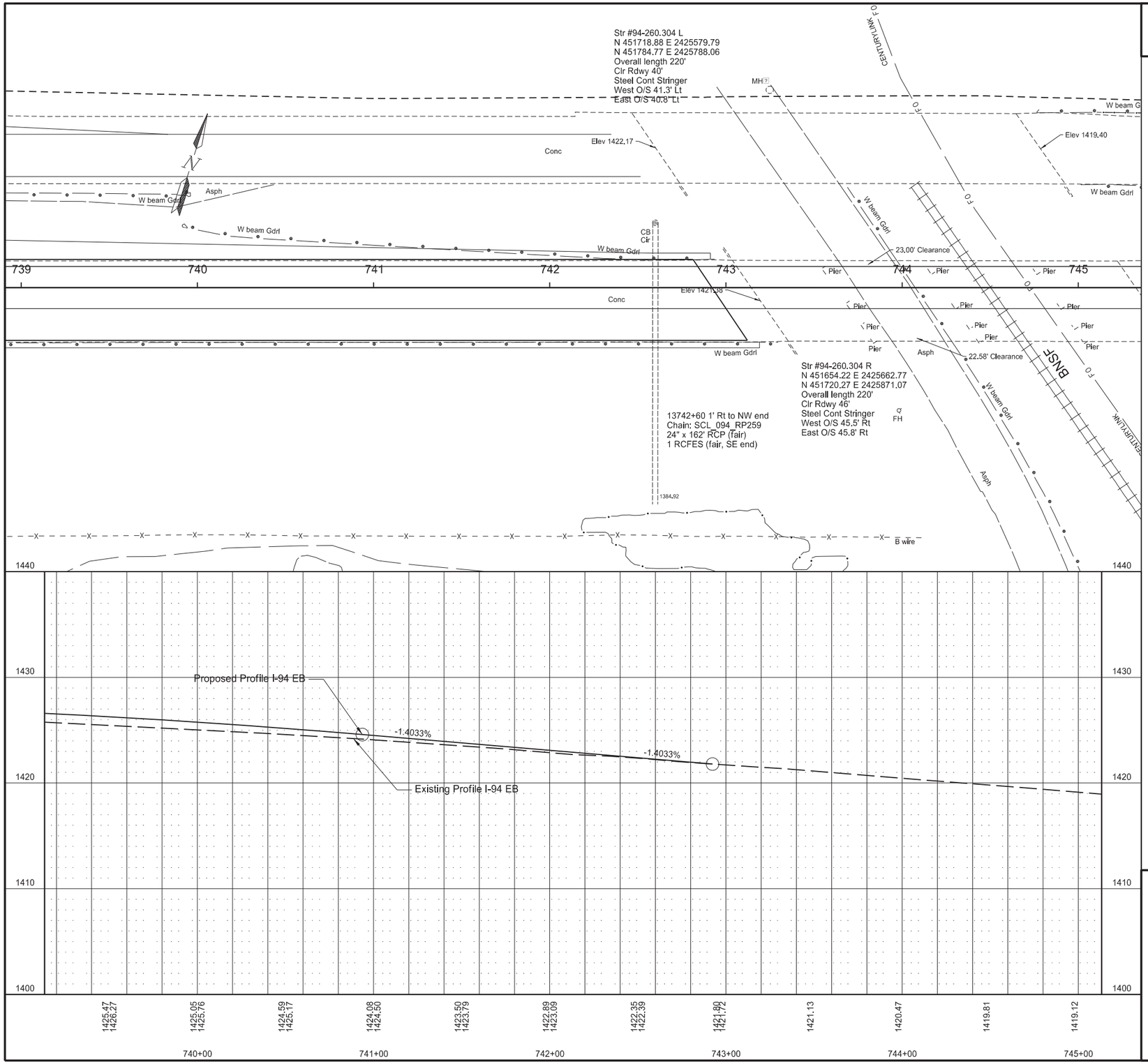


Plan & Profile

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	60	4



Plan & Profile

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

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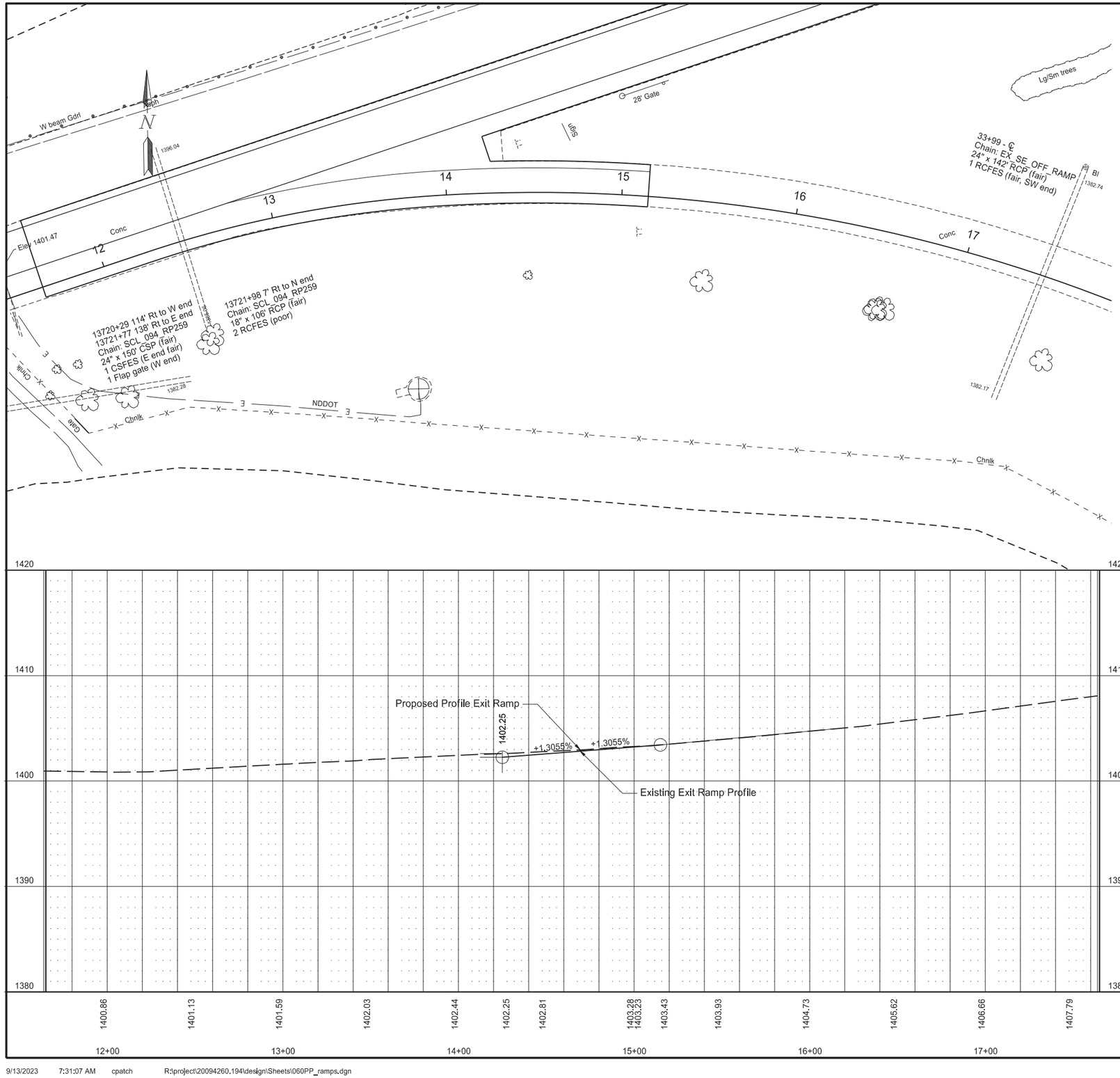
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	60	5



Plan & Profile

Exit Ramp

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

9/13/2023 7:31:07 AM cpatch R:\project\20094260.194\design\Sheets\060PP_ramps.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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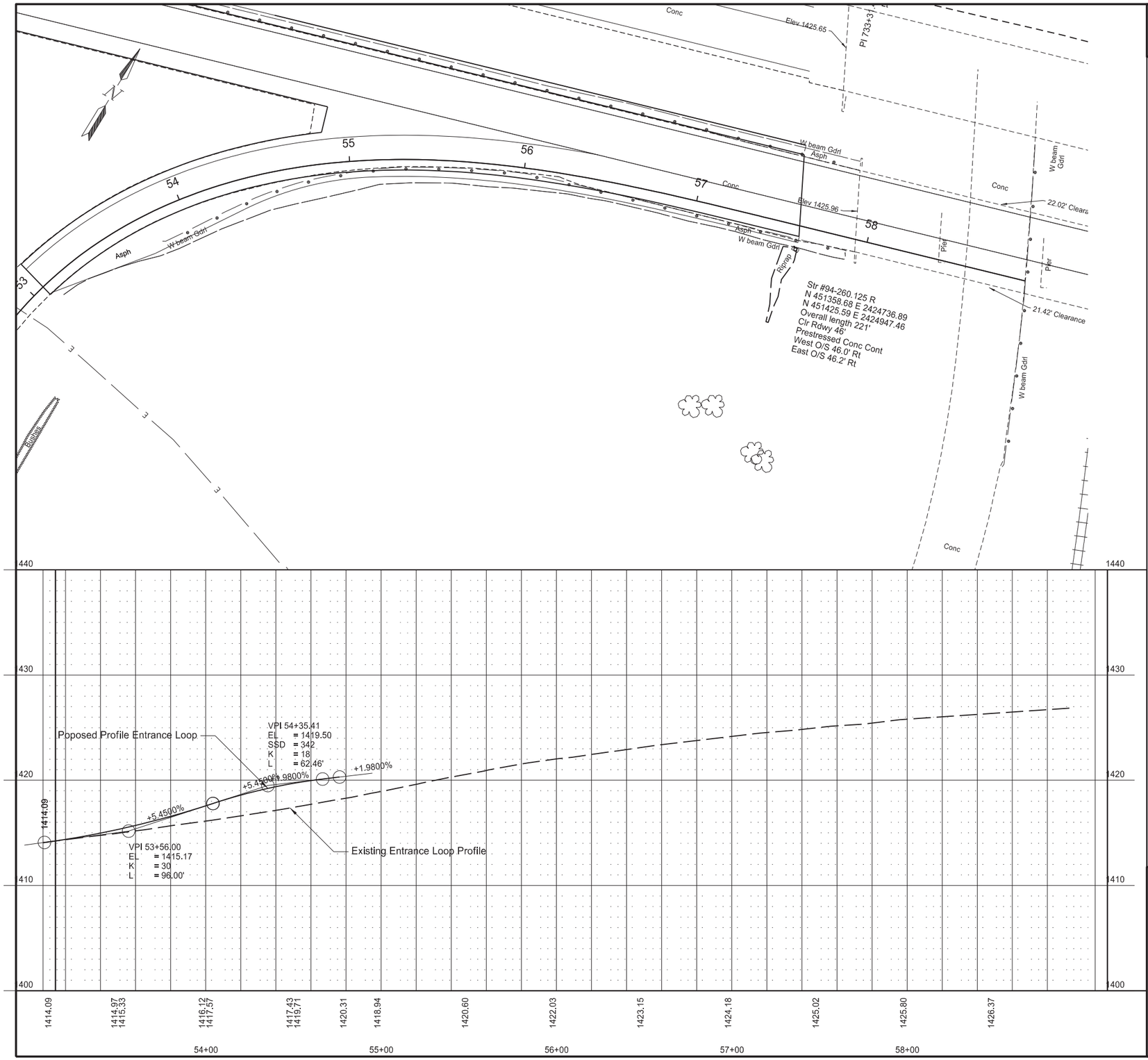


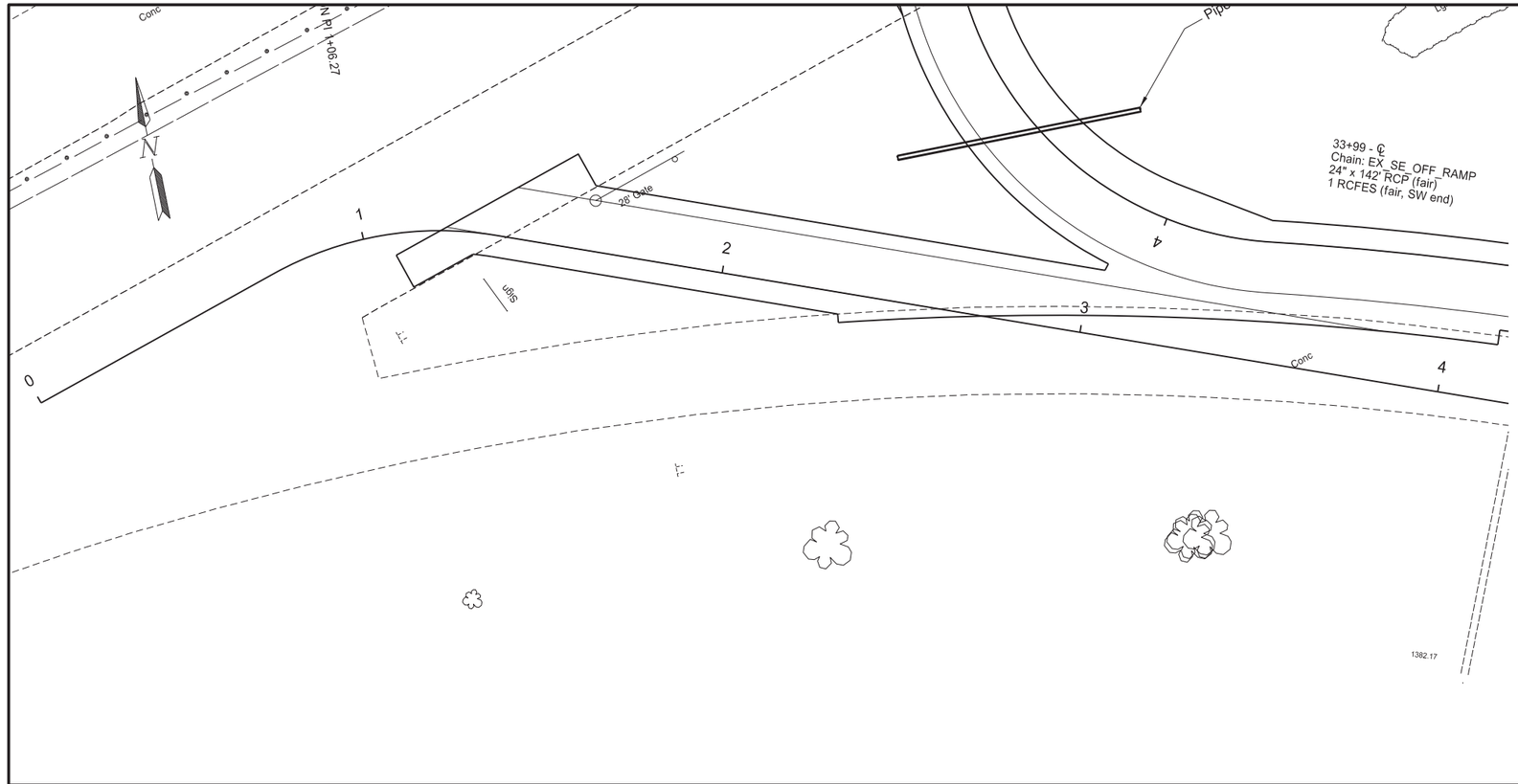
Plan & Profile

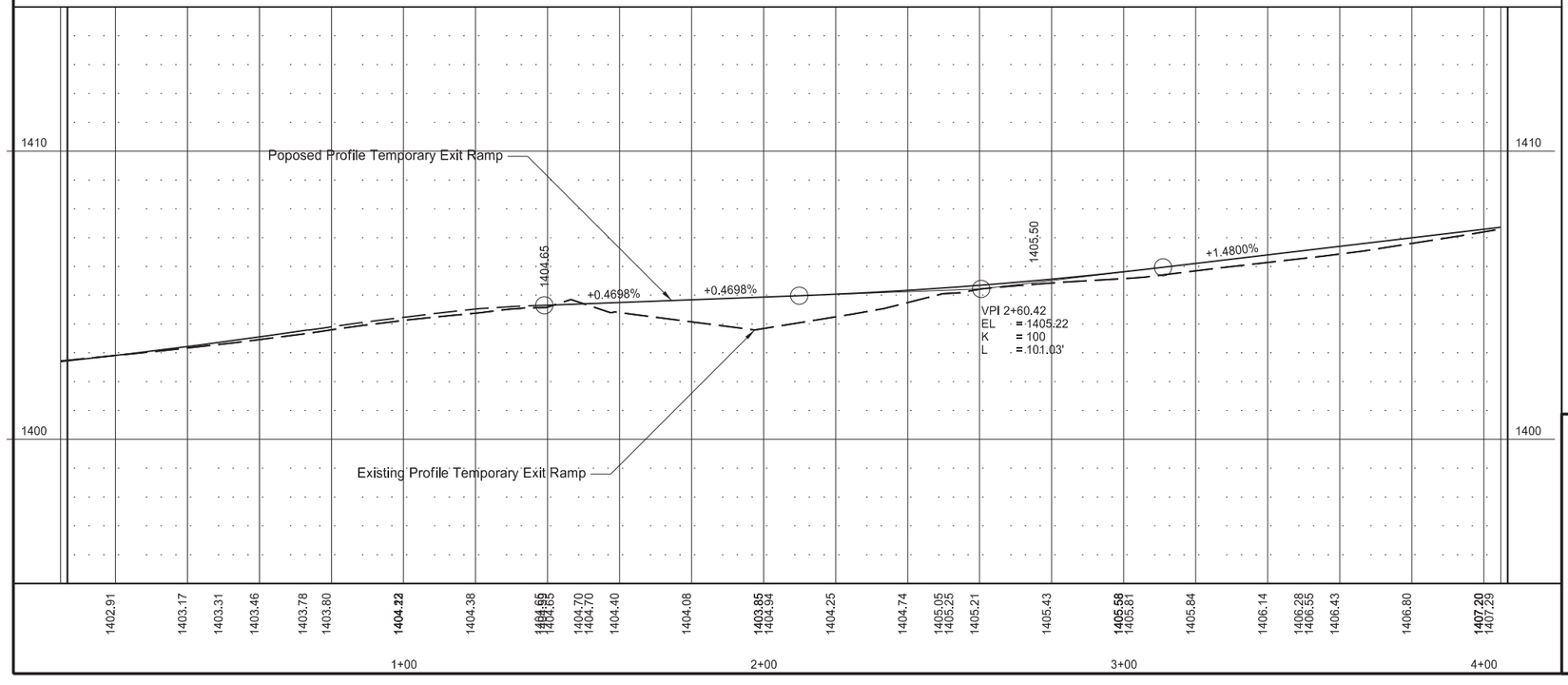
Entrance Loop

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

9/13/2023 7:31:06 AM cpatch R:\project\20094260.194\design\Sheets\060PP_ramps.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	60	7





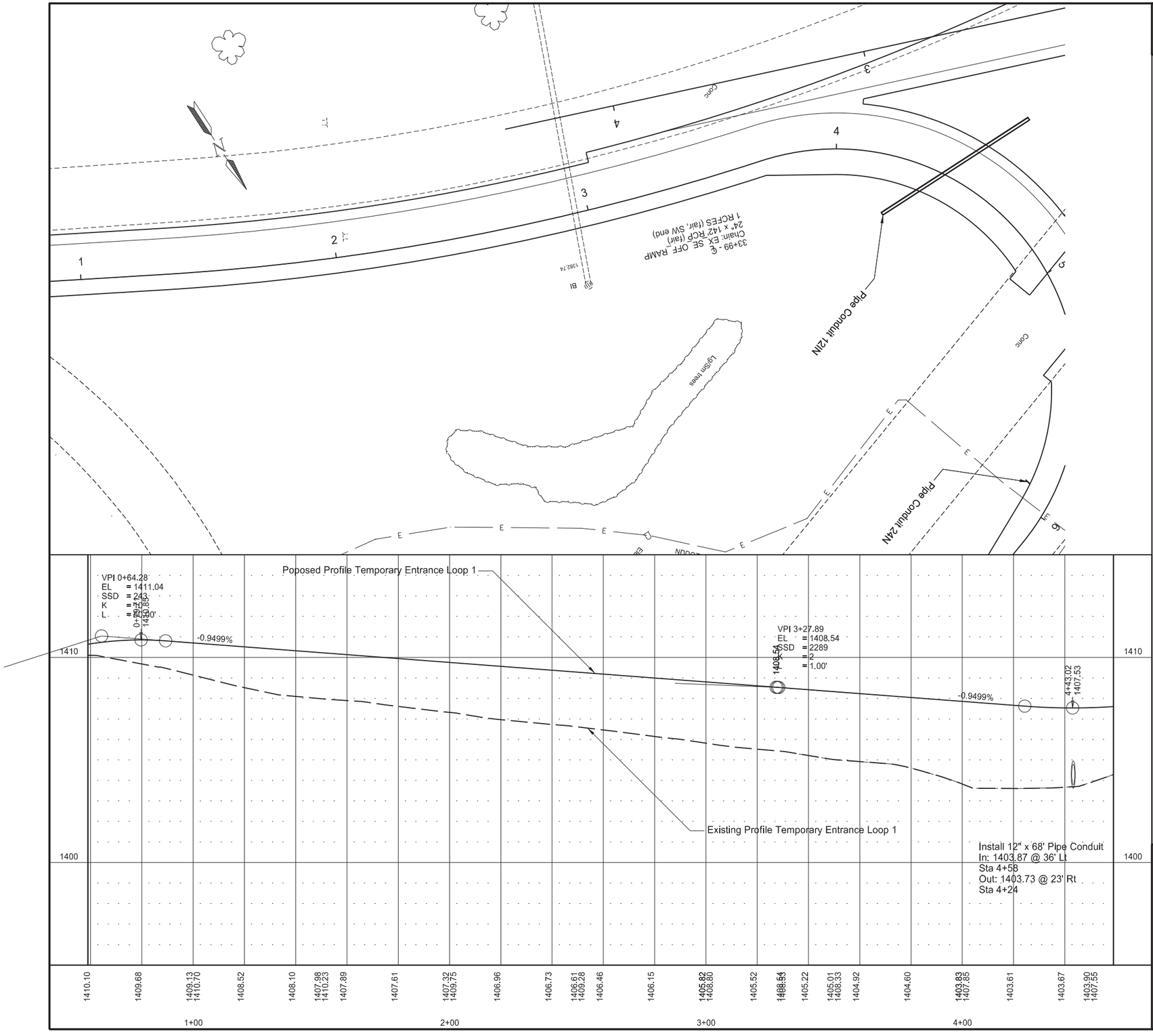
Plan and Profile

Temporary Exit Ramp

REGISTERED PROFESSIONAL ENGINEER
CAVEN D. PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	60	8

SPEC	CODE	BID ITEM	QTY	UNIT
714	4090	**PIPE CONDUIT 12IN**		
		Alignment 8 Gore	68	LF
		4+58 - 36' LT to 4+24 - 23' RT		
202	0174	**REMOVAL OF PIPE ALL TYPES AND SIZES**		
		Alignment 8 Gore	68	LF
		4+58 - 36' LT to 4+24 - 23' RT		



Plan and Profile

Temporary Entance Loop 1

REGISTERED PROFESSIONAL ENGINEER
CAV[illegible]
PE-10611
DATE
9/21/2023
NORTH DAKOTA

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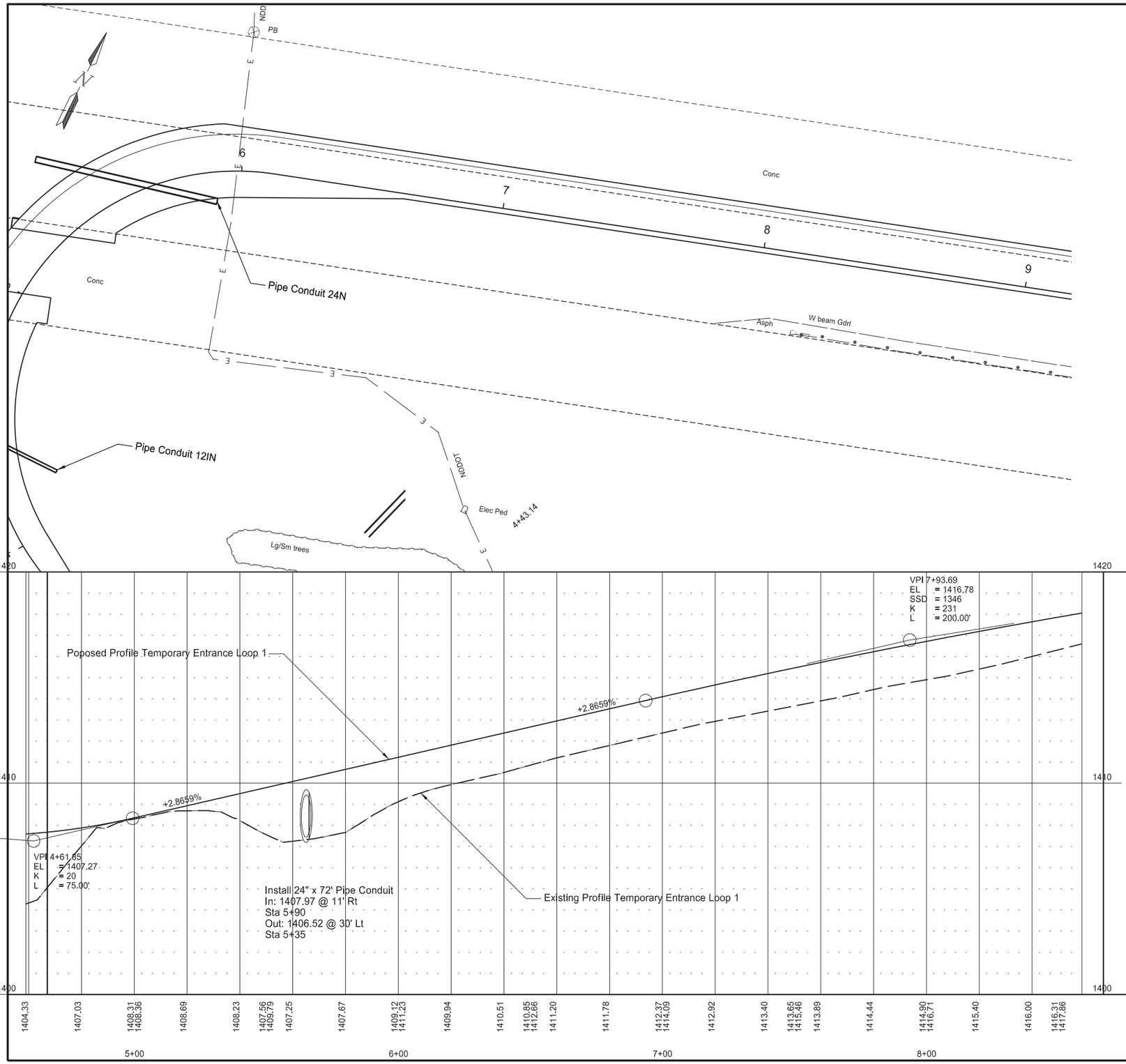
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	60	9

SPEC	CODE	BID ITEM	QTY	UNIT
714	**4105**	**PIPE CONDUIT 24IN**		
		Alignment 8 Median 5+90 - 11' RT to 5+35 - 30' LT	72	LF
202	**0174**	**REMOVAL OF PIPE ALL TYPES AND SIZES**		
		Alignment 8 Median 5+90 - 11' RT to 5+35 - 30' LT	72	LF



Plan and Profile

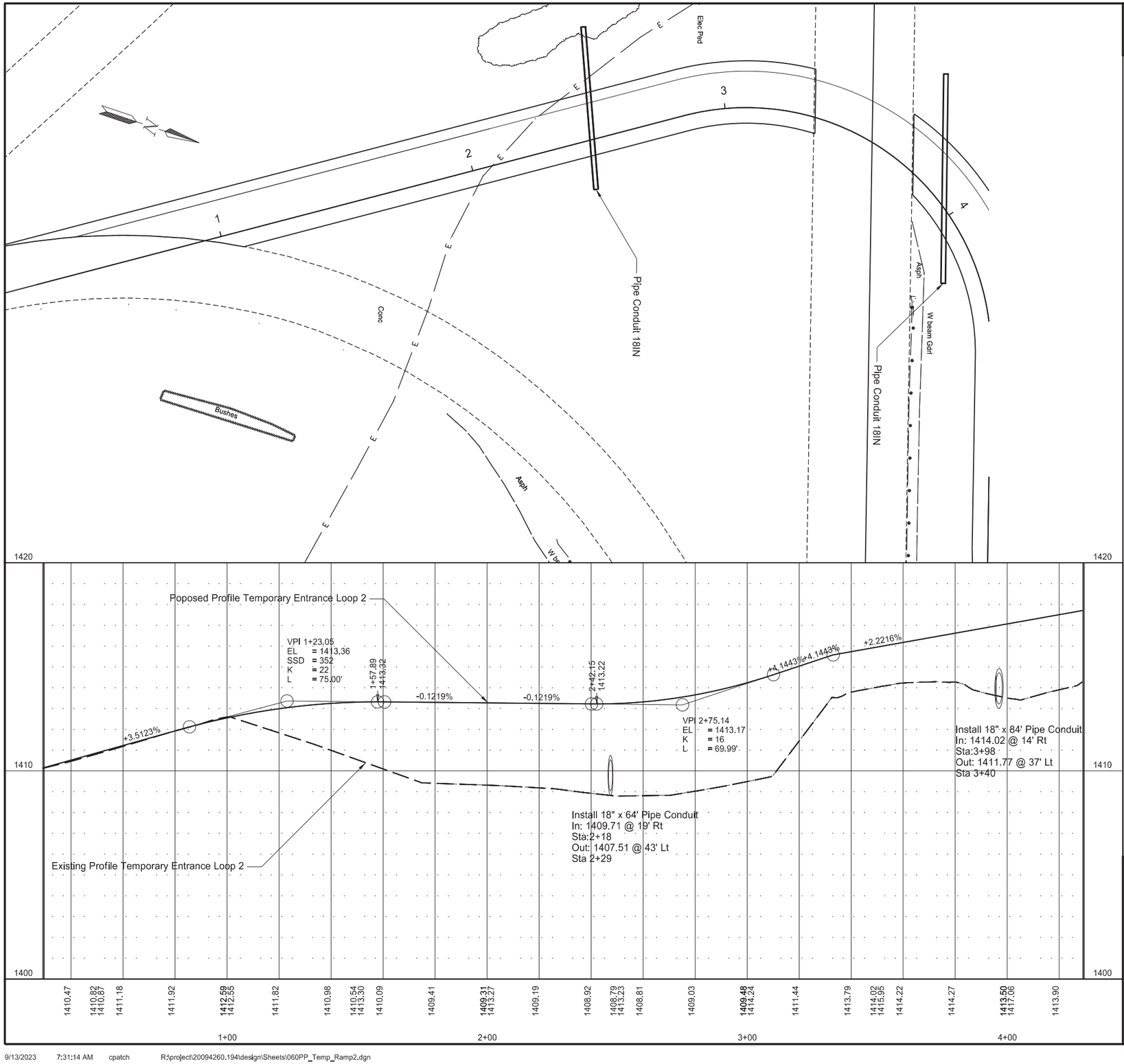
Temporary Entance Loop 1

PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

9/13/2023 7:31:10 AM cpatch R:\project\20094260.194\design\Sheets\060PP_Temp_Ramp.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	60	10

SPEC	CODE	BID ITEM	QTY	UNIT
714	**4100**	**PIPE CONDUIT 18IN**		
		Alignment 7 Gore	64	LF
		2+18 - 19' RT to 2+29 - 43' LT		
		Alignment 7 Median	84	LF
		3+98 - 14' RT to 3+40 - 38' LT		
202	**0174**	**REMOVAL OF PIPE ALL TYPES AND SIZES**		
		Alignment 7 Gore	64	LF
		2+18 - 19' RT to 2+29 - 43' LT		
		Alignment 7 Median	84	LF
		3+98 - 14' RT to 3+40 - 38' LT		



Plan and Profile

Temporary Entrance Loop 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impact					Wetland Mitigation		
					Wetland Impacts Acre(s)			USFWS Easement Impacts Acre(s)		Mitigation Proposed		
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm.	EO 11990	USACE	USFWS
1	Sec. 6, T139N, R63W	Ditch	Created	No			-	-	-	N	N	N
2	Sec. 6, T139N, R63W	Ditch	Created	No			-	-	-	N	N	N
3	Sec. 6, T139N, R63W	Ditch	Created	No			-	-	-	N	N	N
4	Sec. 6, T139N, R63W	Ditch	Created	Yes						N	N	N
				Totals	0.000	0.000		0	0			

[1] A wetland Jurisdictional Determination was issued by the USACE on 10/04/2023; NWO-2008-1679-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)		Temporary Wetland JD	
Natural/Non-JD (Fill/Drain)		Non-JD Wetland Temporary	
Artificial/JD (Fill/Drain)			
Artificial /Non-JD (Fill/Drain))		Permanent OW	
Total		Temporary OW	
JD Natural (Cut)		Permanent OW-d	
JD Artificial (Cut)		Temporary OW-d	
Non-JD Natural (Cut)			
Non-JD Artificial (Cut)			
Total	0.000		

Mitigation Summary Table

	Location	Ditch Shift Acre(s)	Onsite Acre(s)	11990 Bank Acre(s)
USACE Only				
EO 11990 Only				
USACE/11990				
USFWS				
Total		0	0	0

Wetland Impact Tables

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

8/31/2023 6:59:10 AM cpatch R:\project\20094260.194\design\Sheets\075WL.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	75	2

Sec 6
T-139-N
R-63-W

Str #94-259.847 L
N 450997.47 E 2423306.78
N 451063.51 E 2423515.12
Overall length 220'
Clr Rdwy 46'
Steel Cont Stringer
West O/S 44.0' Lt
East O/S 43.7' Lt

Str #94-259.847 R
N 450911.96 E 2423334.08
N 450978.42 E 2423542.19
Overall length 220'
Clr Rdwy 46'
Steel Cont Stringer
West O/S 45.8' Rt
East O/S 45.7' Rt

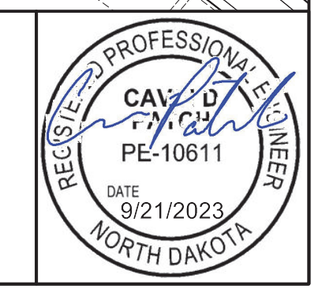
13720+29 114' Rt to W end
13721+77 138' Rt to E end
Chain: SCL_094_RP259
24" x 150' CSP (fair)
1 CSFES (E end fair)
1 Flap gate (W end)

13721+98 7' Rt to N end
Chain: SCL_094_RP259
18" x 106' RCP (fair)
2 RCFES (poor)

33+99 - ℄
Chain: EX_SE_OFF_RAMP
24" x 142' RCP (fair)
1 RCFES (fair, SW end)

Wetland Impacts

I-94 Eastbound



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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	75	3

or)
W end)

CB
Clr

Elec Ped

NDDOT

PB

Sign

Conc

W beam Gdrl

Asph

Str #94-260.125 L
N 451434.77 E 2424683.02
N 451510.41 E 2424920.02
Overall length 249'
Clr Rdwy 48'
Prestressed Conc Cont
West O/S 42.8' Lt
East O/S 43.0' Lt

Elev 1425.65

Grading Tie Line

Sec 6
T-139-N
R-63-W

22.02' Clearance

726 727 728 729 730 731 732 733 734 735

Elev 1425.96

Pier

21.42' Clearance

Str #94-260.125 R
N 451358.68 E 2424736.89
N 451425.59 E 2424947.46
Overall length 221'
Clr Rdwy 46'
Prestressed Conc Cont
West O/S 46.0' Rt
East O/S 46.2' Rt

Elec Ped

Lg/Sm trees

33+99 ℄
Chain-EX SE OFF RAMP
24" x 142' RCP (fair)
1 RCFES (fair, SW end)

Tip Bl

1382.74

1382.17

Ditch

Grading Tie Line

Wetland Impacts

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
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9/21/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	75	4

Sec 6
T-139-N
R-63-W

13735+11 159' Lt to NW end
13735+67 177' Rt to SE end
Chain: SCL_094_RP259
42" x 342' CSP (fair, skew)
1 CSFES (fair, S end)

Str #94-260.304 L
N 451718.88 E 2425579.79
N 451784.77 E 2425788.06
Overall length 220'
Clr Rdwy 40'
Steel Cont Stringer
West O/S 41.3' Lt
East O/S 40.8' Lt

1381.50

Elev 1427.37

Grading Tie Line

Conc

Asph

W beam Gdrl

Elev 1422.17

W beam Gdrl

Conc

Asph

W beam Gdrl

W beam Gdrl

CB
Cir

W beam Gdrl

Conc

22.02' Clearance

22.2'
East and West Rail
Clearance

734 735 736 737 738 739 740 741 742 743

Elev 1427.49

Conc

Elev 1421.38

Conc

Pier

Pier

Pier

21.42' Clearance

21.9'
East and West Rail
Clearance

W beam Gdrl

W beam Gdrl

BNSF

89
46

13742+60 1' Rt to NW
Chain: SCL_094_RP2
24" x 162' RCP (fair)
1 RCFES (fair, SE en

Grading Tie Line

1384.92

Wetland 1

1380.44

B wire

Lg/Sm trees

Lg/Sm trees

Wetland 2

Asph

Gr

Gr

Conc

Sign

ng
ht

Wetland Impacts

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAV[illegible]
PA[illegible]
PE-10611
DATE
9/21/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	76	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	**2000**	**TEMPORARY COVER CROP**		
		Sta 721+03 to 726+25 Lt I-94 Median	0.360	ACRE
		Sta 721+03 to 726+25 Rt	0.460	ACRE
253	**0101**	**STRAW MULCH**		
		Sta 721+03 to 726+25 Lt I-94 Median	0.360	ACRE
		Sta 721+03 to 726+25 Rt	0.460	ACRE
261	**0112**	**FIBER ROLLS 12IN**		
		Sta 721+03 to 725+16 - Lt (Protecting Slope)	430	LF
		Sta 721+03 to 724+55 - Rt (Protecting Slope)	407	LF
		Sta 724+72 to 725+38 - Rt (Protecting Slope)	187	LF
261	**0113**	**REMOVE FIBER ROLLS 12IN**		
		Sta 721+03 to 725+16 - Lt (Protecting Slope)	430	LF
		Sta 721+03 to 724+55 - Rt (Protecting Slope)	407	LF
		Sta 724+72 to 725+38 - Rt (Protecting Slope)	187	LF

LEGEND

Temporary Cover Crop
Straw Mulch

Fiber Rolls

Direction of Flow

Temporary Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

8/31/2023 7:00:13 AM cpatch R:\project\20094260.194\design\Sheets\076TE.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	76	2

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	**TEMPORARY COVER CROP**		
		726+25 to Sta 732+25 Lt I-94 Median	0.18	ACRE
		726+25 to Sta 732+25 Rt	1.04	ACRE
253	0101	**STRAW MULCH**		
		726+25 to Sta 732+25 Lt I-94 Median	0.18	ACRE
		726+25 to Sta 732+25 Rt	1.04	ACRE
261	0112	**FIBER ROLLS 12IN**		
		Sta 726+08 to 727+88 - Rt (Protecting Slope)	589	LF
		Sta 728+62 to 729+50 - Rt (Protecting Slope)	360	LF
		Sta 729+06 to 733+46 - Rt (Protecting Slope)	477	LF
261	0113	**REMOVE FIBER ROLLS 12IN**		
		Sta 726+08 to 727+88 - Rt (Protecting Slope)	589	LF
		Sta 728+62 to 729+50 - Rt (Protecting Slope)	360	LF
		Sta 729+06 to 733+46 - Rt (Protecting Slope)	477	LF

LEGEND

Temporary Cover Crop
Straw Mulch

Fiber Rolls

Direction of Flow

Temporary Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	76	3

SPEC	CODE	BID ITEM	QTY	UNIT
251	**2000**	**TEMPORARY COVER CROP**		
		Sta 732+25 to Sta 738+25 - Lt	0.160	ACRE
		Sta 732+25 to Sta 738+25 - Rt	0.180	ACRE
253	**0101**	**STRAW MULCH**		
		Sta 732+25 to Sta 738+25 - Lt	0.160	ACRE
		Sta 732+25 to Sta 738+25 - Rt	0.180	ACRE
261	**0112**	**FIBER ROLLS 12IN**		
		Sta 732+16 to 733+40 - Lt (Protecting Slope)	146	LF
		Sta 735+78 to 738+25 - Rt (Protecting Slope)	253	LF
		Sta 736+00 to 738+25 - Lt (Protecting Slope)	241	LF
261	**0113**	**REMOVE FIBER ROLLS 12IN**		
		Sta 732+16 to 733+40 - Lt (Protecting Slope)	146	LF
		Sta 735+78 to 738+25 - Rt (Protecting Slope)	253	LF
		Sta 736+00 to 738+25 - Lt (Protecting Slope)	257	LF

LEGEND

Temporary Cover Crop
Straw Mulch

Fiber Rolls

Direction of Flow

Str #94-260.125 L
N 451434.77 E 2424683.02
N 451510.41 E 2424920.02
Overall length 249'
Clr Rdwy 48'
Prestressed Conc Cont
West O/S 42.8' Lt
East O/S 43.0' Lt

13735+11 159' Lt to NW end
13735+67 177' Rt to SE end
Chain: SCL_094_RP259
42" x 342' CSP (fair, skew)
1 CSFES (fair, S end)

1381.50

Elev 1425.65

Grading Tie Line

Fiber Rolls 12IN

W beam Gdrl

Asph

Conc

22.02' Clearance

22.2'
East and West Rail
Clearance

W beam Gdrl

Elev 1427.37

Grading Tie Line

Conc

Temporary Cover Crop & Straw Mulch

Asph

W beam Gdrl

733 734 735 736 737 738

Elev 1425.96

Conc

Pier

Pier

Pier

Elev 1427.49

Conc

Asph

W beam Gdrl

Riprap

21.42' Clearance

21.9'
East and West Rail
Clearance

W beam Gdrl

Str #94-260.125 R
N 451358.68 E 2424736.89
N 451425.59 E 2424947.46
Overall length 221'
Clr Rdwy 46'
Prestressed Conc Cont
West O/S 46.0' Rt
East O/S 46.2' Rt

BNSF

W beam Gdrl

Conc

W beam Gdrl

Grading Tie Line

1380.44

B wire

Lg/Sm trees

Wetland 2

Lg/Sm trees

Sign

Temporary Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	76	4

SPEC	CODE	BID ITEM	QTY	UNIT
251	**2000**	**TEMPORARY COVER CROP**		
		Sta 738+25 to Sta 743+12 - Lt	0.180	ACRE
		Sta 738+25 to Sta 743+12 - Rt	0.240	ACRE
253	**0101**	**STRAW MULCH**		
		Sta 738+25 to Sta 743+12 - Lt	0.180	ACRE
		Sta 738+25 to Sta 743+12 - Rt	0.240	ACRE
261	**0112**	**FIBER ROLLS 12IN**		
		Sta 738+25 to 743+12 - Rt (Protecting Slope)	495	LF
		Sta 738+25 to 743+12 - Lt (Protecting Slope)	500	LF
261	**0113**	**REMOVE FIBER ROLLS 12IN**		
		Sta 738+25 to 743+12 - Rt (Protecting Slope)	495	LF
		Sta 738+25 to 743+12 - Lt (Protecting Slope)	500	LF

LEGEND

Temporary Cover Crop
Straw Mulch

Fiber Rolls

Direction of Flow

Str #94-260.304 L
N 451718.88 E 2425579.79
N 451784.77 E 2425788.06
Overall length 220'
Clr Rdwy 40'
Steel Cont Stringer
West O/S 41.3' Lt
East O/S 40.8' Lt

Fiber Rolls 12IN
Elev 1422.17
Conc
Asph
W beam Gdrl
CB
Clr
739
740
741
742
743
744
Elev 1421.38
Pier
MH
CENTURYLINK F O
23.00' Clearance
22.58' Clearance
Asph
Str #94-260.304 R
N 451654.22 E 2425662.77
N 451720.27 E 2425871.07
Overall length 220'
Clr Rdwy 46'
Steel Cont Stringer
West O/S 45.5' Rt
East O/S 45.8' Rt
FH
13742+60 1' Rt to NW end
Chain: SCL_094_RP259
24" x 162' RCP (fair)
1 RCFES (fair, SE end)
Fiber Rolls 12IN
Temporary Cover Crop & Straw Mulch
1384.92
Wetland 1
B wire
Gr
FO Ped
MDU
G

Temporary Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

8/31/2023 7:00:14 AM cpatch R:\project\20094260.194\design\Sheets\076TE.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	77	1

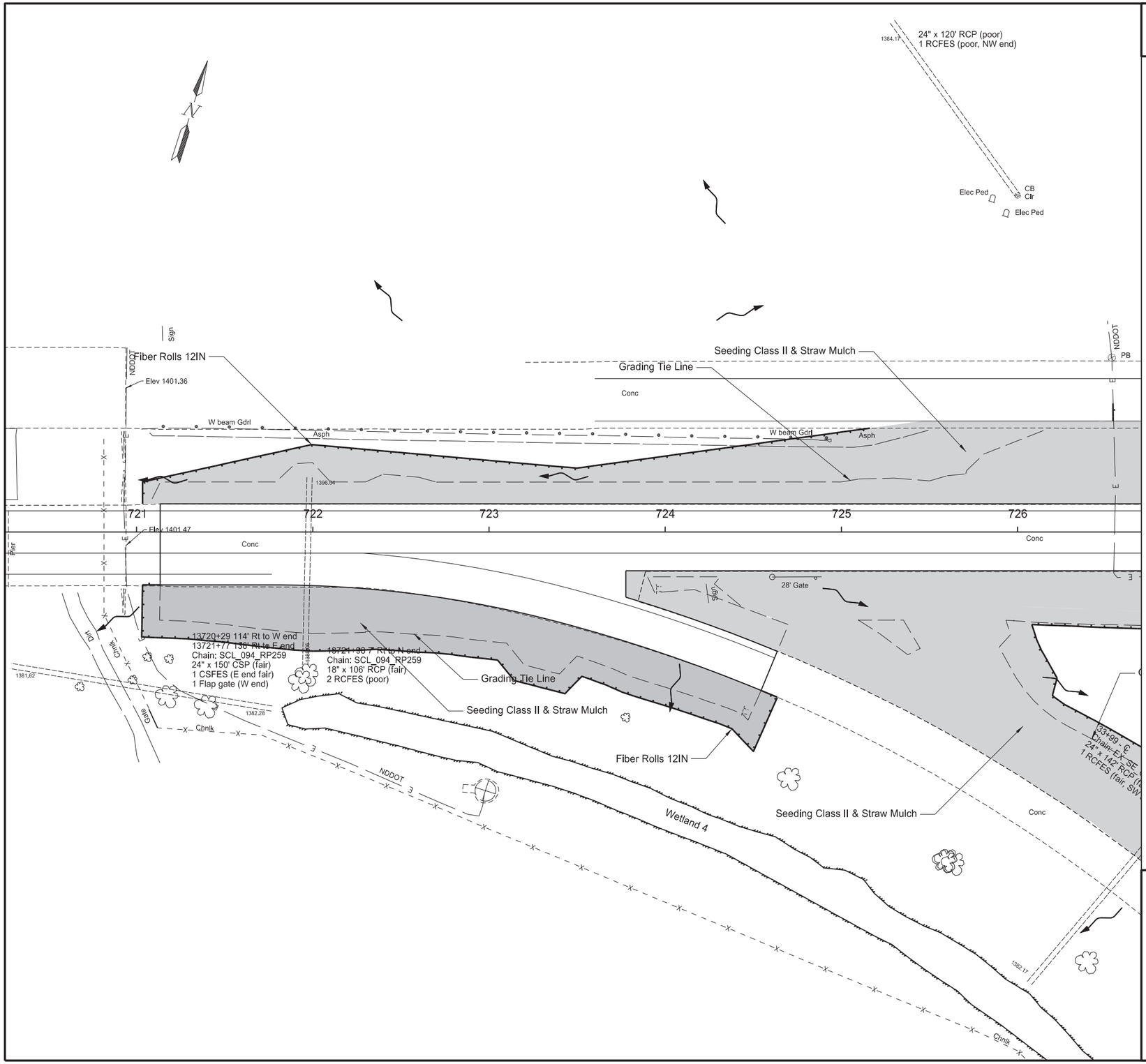
SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	**SEEDING CLASS II**		
		Sta 721+03 to 726+25 Lt I-94 Median	0.380	ACRE
		Sta 721+03 to 726+25 Rt	0.630	ACRE
253	0101	**STRAW MULCH**		
		Sta 721+03 to 726+25 Lt I-94 Median	0.380	ACRE
		Sta 721+03 to 726+25 Rt	0.630	ACRE
261	0112	**FIBER ROLLS 12IN**		
		Sta 721+03 to 725+16 - Lt (Protecting Slope)	430	LF
		Sta 721+03 to 724+55 - Rt (Protecting Slope)	220	LF

LEGEND

Seeding Class II
Straw Mulch

Fiber Rolls

Direction of Flow



Permanent Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE
9/22/2023
NORTH DAKOTA

9/22/2023 8:50:09 AM cpatch R:\project\20094260.194\design\Sheets\077PE.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	77	2

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	**SEEDING CLASS II**		
		726+25 to Sta 732+25 Lt I-94 Median	0.61	ACRE
		726+25 to Sta 732+25 Rt	1.50	ACRE
253	0101	**STRAW MULCH**		
		726+25 to Sta 732+25 Lt I-94 Median	0.61	ACRE
		726+25 to Sta 732+25 Rt	1.30	ACRE
261	0112	**FIBER ROLLS 12IN**		
		Sta 726+25 to 727+88 - Rt (Protecting Slope)	590	LF
		Sta 729+06 to 732+25 - Rt (Protecting Slope)	343	LF
900	0700	**FLEXIBLE GROWTH MEDIUM**		
		Sta 729+06 to 732+25 - Rt	949	SY

LEGEND

Seeding Class II
Straw Mulch

Seeding Class II
w/ Flexible Growth Medium

Fiber Rolls

Direction of Flow

Permanent Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE
9/22/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	77	3

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	**SEEDING CLASS II**		
		Sta 732+25 to Sta 738+25 - Lt	0.160	ACRE
		Sta 732+25 to Sta 738+25 - Rt	0.180	ACRE
253	0101	**STRAW MULCH**		
		Sta 732+25 to Sta 738+25 - Lt	0.160	ACRE
261	0112	**FIBER ROLLS 12IN**		
		Sta 732+25 to 738+25 - Rt (Protecting Slope)	387	LF
		Sta 736+00 to 738+25 - Lt (Protecting Slope)	407	LF
900	0700	**FLEXIBLE GROWTH MEDIUM**		
		Sta 732+25 to Sta 738+25 - Rt	894	SY

LEGEND

Seeding Class II
Straw Mulch

Seeding Class II
w/ Flexible Growth Medium

Fiber Rolls

Direction of Flow

Permanent Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
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PE-10611
DATE
9/22/2023
NORTH DAKOTA

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	77	4

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	**SEEDING CLASS II**		
		Sta 738+25 to Sta 743+12 - Lt	0.180	ACRE
		Sta 738+25 to Sta 743+12 - Rt	0.120	ACRE
253	0101	**STRAW MULCH**		
		Sta 738+25 to Sta 743+12 - Lt	0.180	ACRE
261	0112	**FIBER ROLLS 12IN**		
		Sta 738+25 to 743+12 - Rt (Protecting Slope)	495	LF
		Sta 738+25 to 743+12 - Lt (Protecting Slope)	500	LF
900	0700	**FLEXIBLE GROWTH MEDIUM**		
		Sta 738+25 to Sta 743+12 - Rt	1,177	SY

LEGEND

Seeding Class II
Straw Mulch

Seeding Class II
w/ Flexible Growth Medium

Fiber Rolls

Direction of Flow

Permanent Erosion Control

I-94 Eastbound

REGISTERED PROFESSIONAL ENGINEER
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PE-10611
DATE
9/22/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-2-999(064)	80	1

IM-2-094(194)260

PROJECT SS-2-999(064)

SPEC	CODE	BID ITEM	QTY	UNIT
202	0310	**REMOVAL OF CHAIN LINK FENCE**		
		West of James River	219	LF
		East of James River	219	LF
752	0600	**FENCE CHAIN LINK**		
		SW Wingwall to Existing Fence	25	LF
		NW Wingwall to Existing Fence	25	LF
		SE Wingwall to Existing Fence	25	LF
		NE Wingwall to Existing Fence	25	LF
752	0993	**FENCE TERMINAL**		
		Terminate at James River Bridge Wingwall	4	EA
752	3100	**CORNER ASSEMBLY CHAIN LINK**		
			4	EA

Fencing Layout

I-94 Eastbound

PROFESSIONAL ENGINEER
CAVALIER PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

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PRELIMINARY SURVEY COORDINATE AND CURVE DATA - SE Jamestown Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-094-(194)260	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
I 94 (SCL_094_RP259)			
Begin	13661+93.43	449,230.53	2,417,906.38
Rge line Xing	13693+81.47	450,198.49	2,420,944.20
Qtr line Xing	13719+29.79	450,972.07	2,423,371.99
Station Equation I 94 (SCL_094_RP259) & I 94/SE On Ramp (EX_SE_On_Ramp)			
I 94	13734+06.05	451,420.26	2,424,778.57
SE On Ramp	17+34.71	451,420.26	2,424,778.57
Sec line Xing	13746+81.00	451,807.33	2,425,993.34
PC	13757+86.06	452,142.82	2,427,046.24
Twp line Xing	13761+53.60	452,301.79	2,427,661.06
PI Curve	13766+09.46	452,392.81	2,427,830.77
PT	13774+21.66	452,411.74	2,428,653.96
End	13799+81.45	452,470.62	2,431,213.07
I 94/SE On Ramp (EX_SE_On_Ramp)			
Begin	0+00.00	451,337.35	2,424,725.20
PC	1+22.24	451,300.40	2,424,608.67
PI Curve	2+21.19	451,268.41	2,424,515.04
PCC	3+16.70	451,200.39	2,424,443.18
PI Curve	4+09.08	451,138.31	2,424,374.76
PCC	4+93.11	451,046.97	2,424,360.89
PI Curve	6+51.87	450,889.03	2,424,344.85
PCC	7+69.55	450,816.53	2,424,486.08
PI Curve	8+31.99	450,787.65	2,424,541.44
PCC	8+93.14	450,776.77	2,424,602.92
PI Curve	10+56.85	450,751.37	2,424,764.65
PCC	11+79.47	450,891.42	2,424,849.44
PI Curve	12+05.49	450,913.65	2,424,862.96
PCC	12+30.98	450,938.78	2,424,869.68
Continued on page 2			

CURVE DATA

ARC DEFINITION	
Curve	
PI STA = 13766+09.46	
Delta = 16° 21' 21" Rt	
Da = 1° 00' 00"	
R = 5,729.65'	
T = 823.40'	
L = 1,635.61'	
Curve	Curve
PI STA = 2+21.19	PI STA = 4+09.08
Delta = 24° 34' 31" Lt	Delta = 39° 09' 00" Lt
Da = 12° 38' 17"	Da = 22° 11' 31"
R = 454.28'	R = 259.80'
T = 98.95'	T = 92.38'
L = 194.85'	L = 177.52'
Curve	Curve
PI STA = 6+51.87	PI STA = 8+31.99
Delta = 68° 37' 35" Lt	Delta = 17° 30' 31" Lt
Da = 24° 49' 31"	Da = 14° 09' 58"
R = 232.61'	R = 405.48'
T = 158.75'	T = 62.44'
L = 278.61'	L = 123.91'
Curve	Curve
PI STA = 10+56.85	PI STA = 12+05.49
Delta = 67° 43' 58" Lt	Delta = 16° 20' 00" Lt
Da = 23° 39' 20"	Da = 32° 01' 11"
R = 243.94'	R = 181.29'
T = 163.71'	T = 26.02'
L = 288.37'	L = 51.68'

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-139-N R-63-W			
SW Cor Sec 6	1-C	446,840.03	2,421,026.69
N Qtr Cor Sec 6	2-A	452,161.10	2,423,339.32
Wt Cor Sec 6	2.1-A	452,166.69	2,423,582.15
S Qtr Cor Sec 6	2-C	446,896.96	2,423,483.94
NE Cor Sec 6	3-A	452,221.96	2,425,981.36
E Qtr Cor Sec 6	3-B	449,622.79	2,426,056.42
SE Cor Sec 6	3-C	446,961.25	2,426,133.62
N Qtr Cor Sec 5	4-A	452,282.26	2,428,600.52
NE Cor Sec 5	5-A	452,342.57	2,431,217.79
T-139-N R-64-W			
NE Cor Sec 2	11-A	451,966.59	2,415,682.13
NE Cor Sec 35	11-L	457,237.16	2,415,532.62
T-140-N R-63-W			
W Qtr Cor Sec 30	1-K	460,010.59	2,420,690.38
NE Cor Sec 31	3-L	457,494.77	2,425,816.77
E Qtr Cor Sec 31	3-M	454,863.15	2,425,897.97
E 1/16 Cor Sec 31	3-M.5	453,539.92	2,425,940.03
T-140-N R-64-W			
W Qtr Cor Sec 36	11-M	454,604.07	2,415,605.43
SE Cor Sec 36	13-N	452,104.25	2,420,897.39

REFERENCE MARKERS

#	NORTHING	EASTING	STATION	OFFSET	ALIGNMENT
268	451,731.65	2,424,568.62	N/A	N/A	N/A
259	449,684.09	2,419,104.20	13674+72	69' Lt	SCL_094_RP259
259	449,560.41	2,419,169.17	13674+96	69' Rt	SCL_094_RP259
260	451,156.70	2,424,182.04	13727+57	70' Rt	SCL_094_RP259
260	451,288.24	2,424,142.64	13727+60	67' Lt	SCL_094_RP259
261	452,356.28	2,429,334.95	13781+01	71' Rt	SCL_094_RP259
261	452,493.41	2,429,333.78	13781+03	66' Lt	SCL_094_RP259

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	ALIGNMENT	MONUMENT
PRIMARY CONTROL							
GPS 1	449,960.98	2,415,831.74	1,485.41'	N/A	N/A	SCL_094_RP259	1 1/2" Alum cap NDDOT LS1139
SECONDARY CONTROL							
RTK 20002	451,712.84	2,424,653.87	1,398.96'	20+52	46' Rt	EX_SE_ON_RAMP	#5 Rebar
RTK 20004	451,081.27	2,424,943.73	1,399.16'	13+80	55' Rt	EX_SE_ON_RAMP	#5 Rebar
RTK 40000	450,717.78	2,424,723.82	1,399.25'	10+01	67' Rt	EX_SE_ON_RAMP	1 1/2" Alum cap NDDOT
RTK 20003	451,433.70	2,424,815.54	1,401.13'	13734+45	2' Lt	SCL_094_RP259	#5 Rebar
RTK 20006	451,319.37	2,424,796.23	1,403.76'	13733+92	102' Rt	SCL_094_RP259	#5 Rebar
RTK 30913	451,602.96	2,425,851.10	1,393.15'	13744+83	152' Rt	SCL_094_RP259	#5 Rebar
RTK 30914	451,599.60	2,425,788.93	1,390.57'	13744+23	136' Rt	SCL_094_RP259	#5 Rebar
RTK 40001	450,712.07	2,426,080.72	1,388.30'	13744+31	1070' Rt	SCL_094_RP259	1 1/2" Alum cap
RTK 40004	452,266.11	2,426,958.58	1,423.66'	13757+39	144' Lt	SCL_094_RP259	1 1/2" Alum cap NDDOT
RTK 40005	451,509.96	2,424,127.80	1,402.37'	13728+13	283' Lt	SCL_094_RP259	1 1/2" Alum cap NDDOT
RTK 40011	452,187.89	2,426,219.53	1,412.86'	13750+12	294' Lt	SCL_094_RP259	1 1/2" Alum cap
RTK 51221	450,953.74	2,423,577.22	1,399.77'	13721+19	80' Rt	SCL_094_RP259	Rebar
RTK 51222	450,912.19	2,423,520.56	1,386.43'	13720+53	102' Rt	SCL_094_RP259	Rebar
RTK 51243	451,175.56	2,423,463.57	1,387.83'	13720+78	166' Lt	SCL_094_RP259	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 07/18/2022

☐ Assumed Coordinates

☒ All coordinates on this sheet are Stutsman County ground coordinates.
They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998560

REGISTERED PROFESSIONAL LAND SURVEYOR
STEVEN JOHNSON
LS-10169
DATE
NORTH DAKOTA
12/21/22

NOTES: Sheet 1 of 2
Alignment per NDDOT Projects: 1-01-07(6) 1956
2-094(015)238 1993
2-094(094)260 2010

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - SE Jamestown Interchange

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	81	2

HORIZONTAL ALIGNMENT				CURVE DATA		US PUBLIC LAND SURVEY DATA				SURVEY CONTROL POINTS							
PNT	STATION	NORTHING	EASTING	ARC DEFINITION		CORNER	IRN	NORTHING	EASTING	PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	ALIGNMENT	MONUMENT
Continued from page 1				Curve	Curve												
PI Curve	13+39.20	451,042.25	2,424,901.39	PI STA = 13+39.20	PI STA = 15+52.09												
PCC	14+42.90	451,148.78	2,424,882.29	Delta = 27° 12' 24" Lt	Delta = 17° 25' 15" Lt												
PI Curve	15+52.09	451,256.26	2,424,863.04	Ds = 12° 50' 17"	Ds = 08° 02' 46"												
PCC	16+59.41	451,353.04	2,424,812.49	R = 447.23'	R = 712.67'												
PI Curve	18+48.06	451,522.79	2,424,730.20	T = 108.23'	T = 109.19'												
PCC	20+35.88	451,677.27	2,424,621.91	L = 212.37'	L = 216.69'												
PI Curve	23+16.77	451,903.34	2,424,455.20														
End	25+87.76	452,033.00	2,424,206.02	Curve	Curve												
				PI STA = 18+48.06	PI STA = 23+16.77												
				Delta = 09° 09' 54" Lt	Delta = 26° 06' 20" Lt												
				Ds = 02° 26' 04"	Ds = 04° 43' 49"												
				R = 2,353.66'	R = 1,211.60'												
				T = 188.65'	T = 280.90'												
				L = 376.49'	L = 552.04'												
I 94/Exit 260 (EX_SE_OFF_RAMP)				Curve													
Begin	28+00.00	450,962.57	2,423,546.38	PI STA = 32+14.20													
PC	28+31.18	450,972.04	2,423,576.09	Delta = 46° 58' 18" Rt													
PI Curve	32+14.20	451,088.32	2,423,941.03	Ds = 6° 30' 00"													
PT	35+53.82	450,900.89	2,424,275.05	R = 881.47'													
End	37+01.94	450,828.41	2,424,404.22	T = 383.01'													
				L = 722.64'													

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 07/18/2022

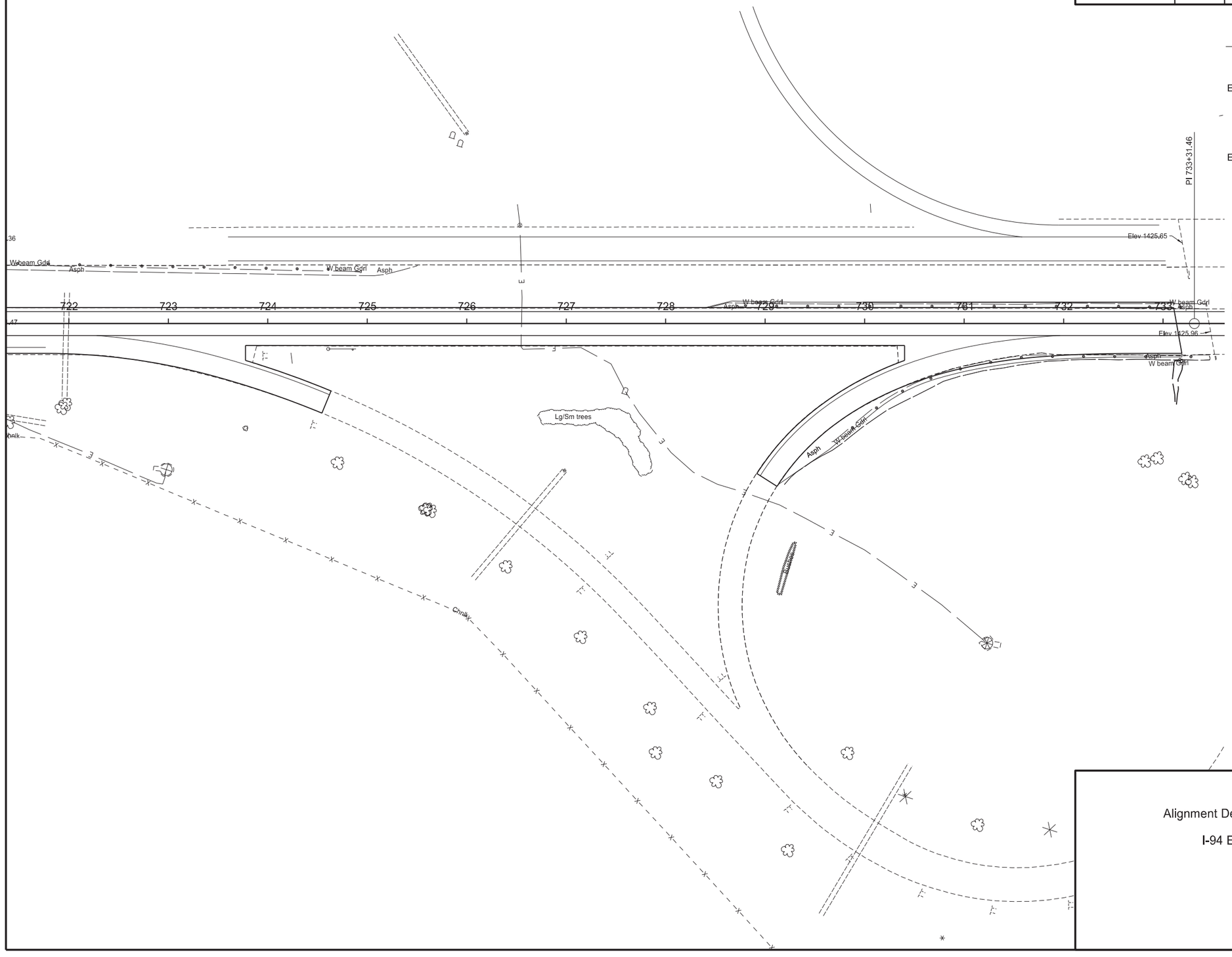
☐ Assumed Coordinates

☒ All coordinates on this sheet are Stutsman County ground coordinates.
They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998560

REGISTERED PROFESSIONAL LAND SURVEYOR
STEVEN JOHNSON
LS-10169
DATE
NORTH DAKOTA
12/21/22

NOTES: Sheet 2 of 2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	82	1



Chain Align 1

Beginning chain Align 1 description

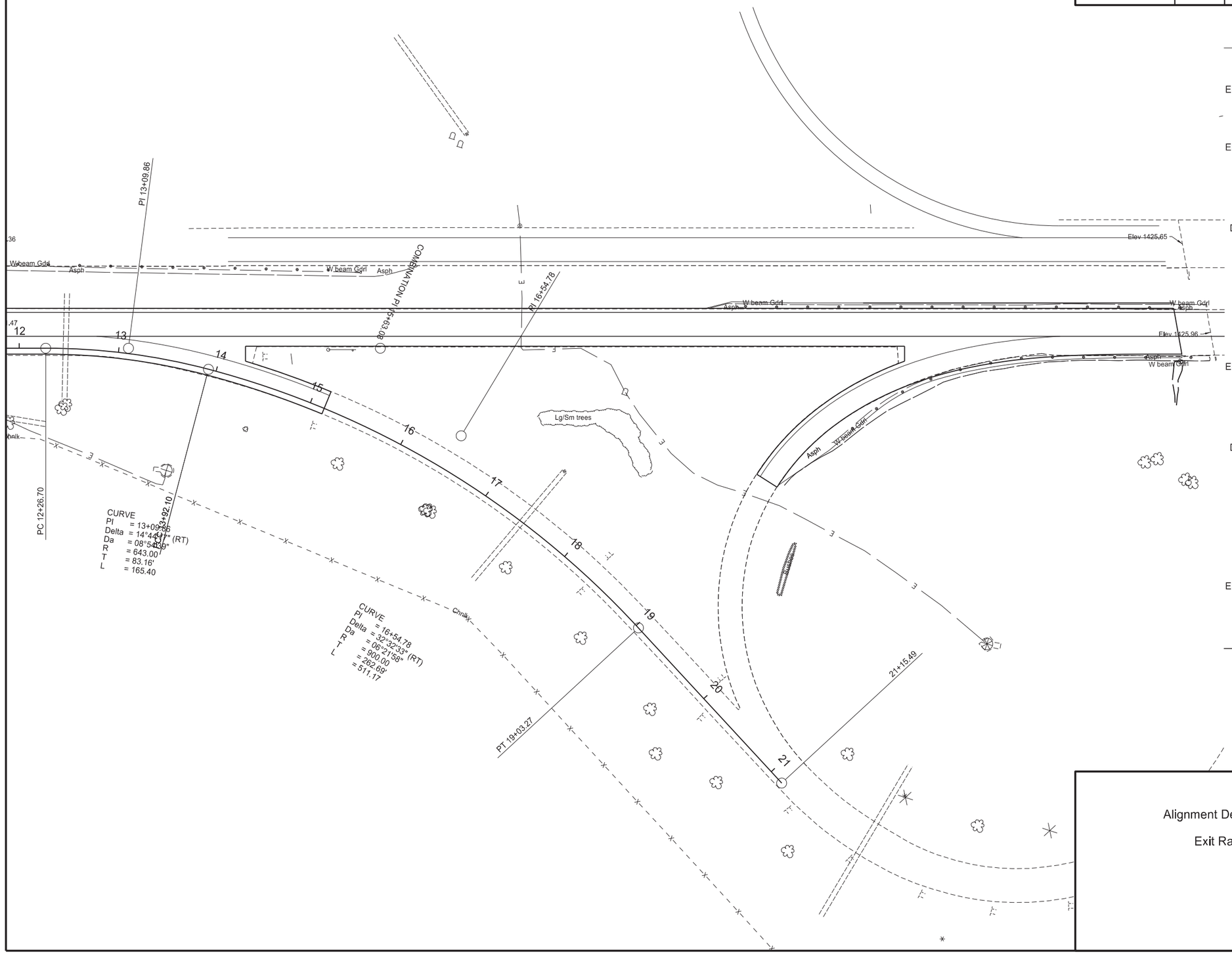
	Station	Northing	Easting
Element: Linear			
START	661+93.430 R1	449194.324	2417917.914
COMBINATION PI	733+31.455 R1	451361.413	2424719.026
Tangential Direction:	N72.326°E		
Tangential Length:	7138.025		
Element: Linear			
COMBINATION PI	733+31.455 R1	451361.413	2424719.026
PC	757+85.999 R1	452106.608	2427057.716
Tangential Direction:	N72.326°E		
Tangential Length:	2454.544		
Element: Circular			
PC	757+85.999 R1	452106.608	2427057.716
COMBINATION PI	766+04.283 R1	452355.037	2427837.377
CC		446683.671	2428785.668
PT	774+11.428 R1	452373.759	2428655.446
Radius:	5691.578		
Delta:	16°21'46.122"	Right	
Degree of Curvature (Arc):	01°00'24.036"		
Length:	1625.429		
Tangent:	818.284		
Chord:	1619.911		
Middle Ordinate:	57.926		
External:	58.522		
Back Tangent Direction:	N72.326°E		
Back Radial Direction:	S17.674°E		
Chord Direction:	N80.508°E		
Ahead Radial Direction:	S1.311°E		
Ahead Tangent Direction:	N88.689°E		
Element: Linear			
PT	774+11.428 R1	452373.759	2428655.446
END	799+68.716 R1	452432.269	2431212.065
Tangential Direction:	N88.689°E		
Tangential Length:	2557.288		

Alignment Description

I-94 EB

REGISTERED PROFESSIONAL ENGINEER
CAVELL D PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	82	2



Chain SWRamp

Beginning chain SWRamp description

	Station	Northing	Easting
Element: Linear			
START	10+00.000 R1	450919.165	2423410.143
PC	12+26.700 R1	450987.991	2423626.143
Tangential Direction:	N72.326°E		
Tangential Length:	226.7		
Element: Circular			
PC	12+26.700 R1	450987.991	2423626.143
COMBINATION PI	13+09.857 R1	451013.237	2423705.375
CC		450375.34	2423821.356
PCC	13+92.096 R1	451017.496	2423788.423
Radius:	643		
Delta:	14°44'16.654"	Right	
Degree of Curvature (Arc):	08°54'38.508"		
Length:	165.396		
Tangent:	83.157		
Chord:	164.941		
Middle Ordinate:	5.311		
External:	5.355		
Back Tangent Direction:	N72.326°E		
Back Radial Direction:	S17.674°E		
Chord Direction:	N79.695°E		
Ahead Radial Direction:	S2.936°E		
Ahead Tangent Direction:	N87.064°E		
Element: Circular			
PCC	13+92.096 R1	451017.496	2423788.423
COMBINATION PI	16+54.784 R1	451030.951	2424050.765
CC		450118.677	2423834.519
PT	19+03.271 R1	450901.172	2424279.156
Radius:	900		
Delta:	32°32'32.667"	Right	
Degree of Curvature (Arc):	06°21'58.312"		
Length:	511.175		
Tangent:	262.687		
Chord:	504.332		
Middle Ordinate:	36.048		
External:	37.553		
Back Tangent Direction:	N87.064°E		
Back Radial Direction:	S2.936°E		
Chord Direction:	S76.665°E		
Ahead Radial Direction:	S29.607°W		
Ahead Tangent Direction:	S60.393°E		
Element: Linear			
PT	19+03.271 R1	450901.172	2424279.156
END	21+15.487 R1	450796.329	2424463.665
Tangential Direction:	S60.393°E		
Tangential Length:	212.216		

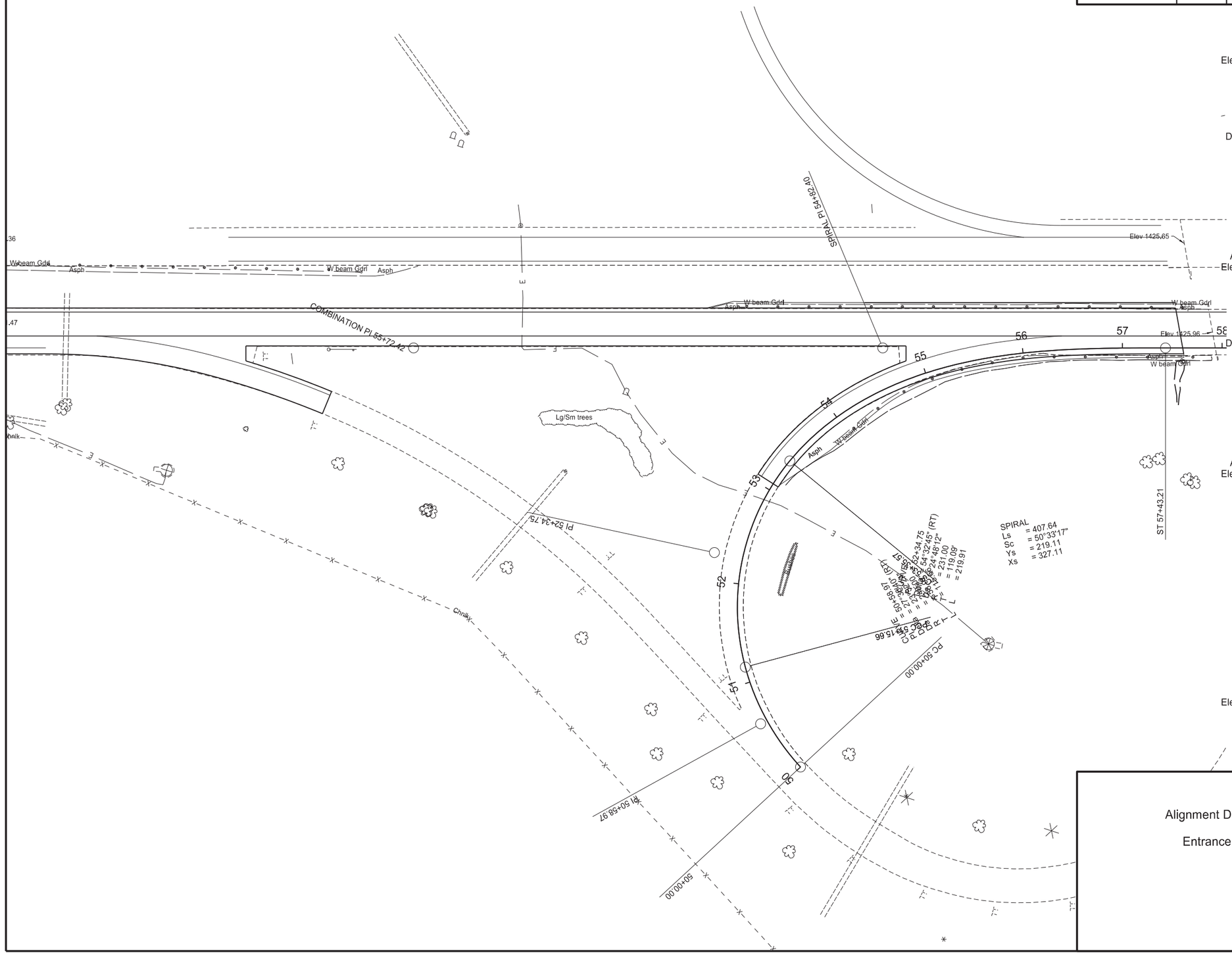
End chain SWRamp description

Alignment Description

Exit Ramp

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	82	3



Chain SWLoop

Beginning chain SWLoop description

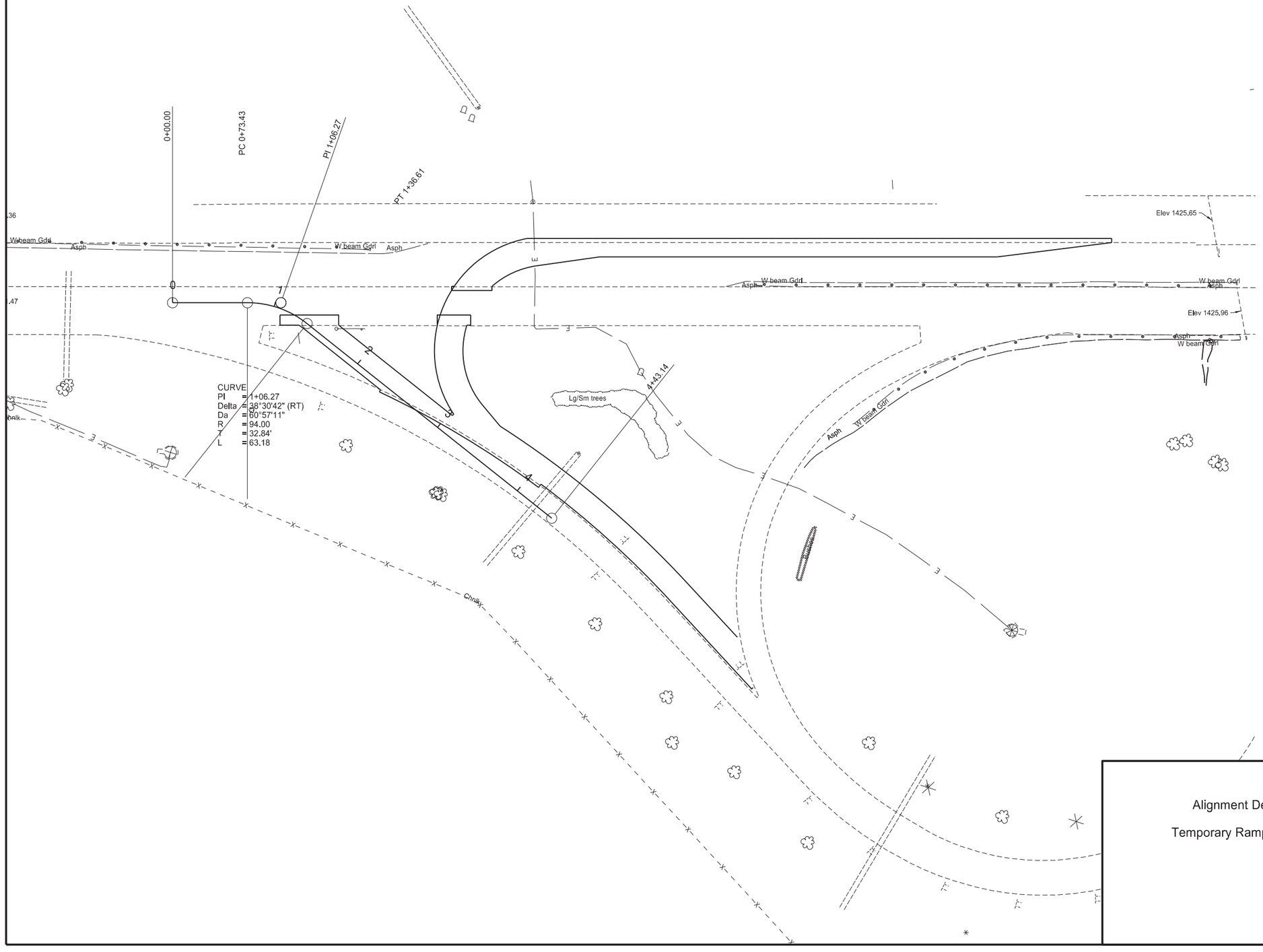
	Station	Northing	Easting
Element: Circular			
PC	50+00.000 R1	450817.196	2424475.523
COMBINATION PI	50+58.974 R1	450846.338	2424424.252
CC		451025.844	2424594.121
PCC	51+15.657 R1	450895.924	2424392.328
Radius:	240		
Delta:	27°36'39.538"	Right	
Degree of Curvature (Arc):	23°52'23.669"		
Length:	115.657		
Tangent:	58.974		
Chord:	114.541		
Middle Ordinate:	6.933		
External:	7.14		
Back Tangent Direction:	N60.385°W		
Back Radial Direction:	N29.615°E		
Chord Direction:	N46.580°W		
Ahead Radial Direction:	N57.225°E		
Ahead Tangent Direction:	N32.775°W		
Element: Circular			
PCC	51+15.657 R1	450895.924	2424392.328
COMBINATION PI	52+34.747 R1	450996.056	2424327.86
CC		451020.972	2424586.554
CS	53+35.570 R1	451106.651	2424372.031
Radius:	231		
Delta:	54°32'45.377"	Right	
Degree of Curvature (Arc):	24°48'12.124"		
Length:	219.913		
Tangent:	119.09		
Chord:	211.702		
Middle Ordinate:	25.679		
External:	28.891		
Back Tangent Direction:	N32.775°W		
Back Radial Direction:	N57.225°E		
Chord Direction:	N5.502°W		
Ahead Radial Direction:	S68.229°E		
Ahead Tangent Direction:	N21.771°E		
Element: Clothoid			
CS	53+35.570 R1	451106.651	2424372.031
SPI	54+82.404 R1	451243.012	2424426.493
ST	57+43.214 R1	451329.156	2424696.842
Entrance Radius:	231		
Exit Radius:	0		
Length:	407.644		
Angle:	50°33'17.103"	Right	
Constant:	306.864		
Long Tangent:	283.741		
Short Tangent:	146.834		
Long Chord:	393.713		
Xs:	377.031		
Ys:	113.39		
P:	29.154		
K:	198.646		
Tangent Direction:	N21.771°E		
Radial Direction:	S68.229°E		
Chord Direction:	N55.588°E		
Radial Direction:	S17.674°E		
Tangent Direction:	N72.326°E		
Element: Linear			
ST	57+43.214 R1	451329.155	2424696.842
END	58+92.775 R1	451374.562	2424839.343
Tangential Direction:	N72.326°E		
Tangential Length:	149.561		

End chain SWLoop description

Alignment Description

Entrance Loop

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	82	4



Chain SWRamp-Temp

Beginning chain SWRamp-Temp description

	Station	Northing	Easting
Element: Linear			
START	0+00.00	451048.266	2423736.255
PC	0+73.43	451070.559	2423806.22
Tangential Direction:	N72.326°E		
Tangential Length:	73.43		
Element: Circular			
PC	0+73.43	451070.559	2423806.22
COMBINATION PI	1+06.27	451080.528	2423837.507
CC		450980.996	2423834.758
PRC	1+36.61	451068.847	2423868.196
Radius:	94		
Delta:	38.512°	Right	
Degree of Curvature (Arc):	60.953°		
Length:	63.183		
Tangent:	32.837		
Chord:	62		
Middle Ordinate:	5.259		
External:	5.57		
Back Tangent Direction:	N72.326°E		
Back Radial Direction:	S17.674°E		
Chord Direction:	S88.418°E		
Ahead Radial Direction:	S20.838°W		
Ahead Tangent Direction:	S69.162°E		
Element: Linear			
PT	4+57.43	451273.314	2424287.729
COMBINATION PI	6+72.43	451338.588	2424492.581
Tangential Direction:	N72.326°E		
Tangential Length:	215		
Element: Linear			
COMBINATION PI	1+36.61	451068.847	2423868.196
END	4+43.14	450959.81	2424154.67
Tangential Direction:	S69.162°E		
Tangential Length:	306.524		

End chain SWRamp-Temp description

Alignment Description

Temporary Ramp Connection

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

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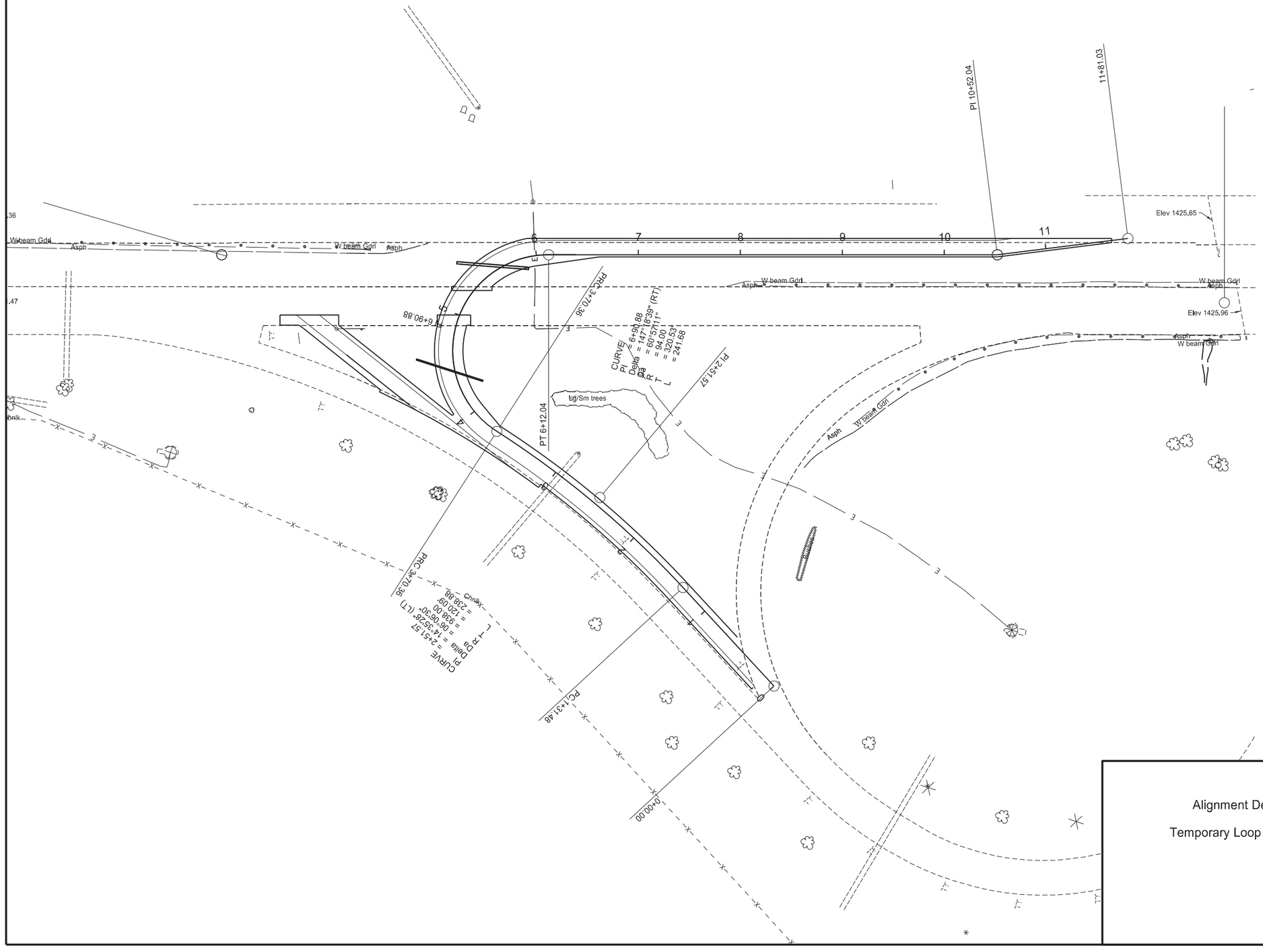
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	82	5



Chain SWLoop-Temp

Beginning chain SWLoop-Temp description

	Station	Northing	Easting
Element: Linear			
START	0+00.00	450869.254	2424412.244
PC	1+31.48	450934.211	2424297.93
Tangential Direction:	N60.393°W		
Tangential Length:	131.481		
Element: Circular			
PC	1+31.48	450934.211	2424297.93
COMBINATION PI	2+51.57	450993.539	2424193.521
CC		450118.677	2423834.519
PRC	3+70.36	451024.651	2424077.534
Radius:	938		
Delta:	14.591°	Left	
Degree of Curvature (Arc):	6.108°		
Length:	238.875		
Tangent:	120.087		
Chord:	238.23		
Middle Ordinate:	7.594		
External:	7.656		
Back Tangent Direction:	N60.393°W		
Back Radial Direction:	N29.607°E		
Chord Direction:	N67.689°W		
Ahead Radial Direction:	N15.015°E		
Ahead Tangent Direction:	N74.985°W		
Element: Circular			
PRC	3+70.36	451024.651	2424077.534
COMBINATION PI	6+90.89	451107.693	2423767.949
CC		451115.441	2424101.887
PT	6+12.04	451205.005	2424073.349
Radius:	94		
Delta:	147.311°	Right	
Degree of Curvature (Arc):	60.953°		
Length:	241.68		
Tangent:	320.529		
Chord:	180.402		
Middle Ordinate:	67.547		
External:	240.028		
Back Tangent Direction:	N74.985°W		
Back Radial Direction:	N15.015°E		
Chord Direction:	N1.329°W		
Ahead Radial Direction:	S17.674°E		
Ahead Tangent Direction:	N72.326°E		
Element: Linear			
PT	6+12.04	451205.005	2424073.349
COMBINATION PI	10+52.04	451338.588	2424492.581
Tangential Direction:	N72.326°E		
Tangential Length:	440		
Element: Linear			
COMBINATION PI	10+52.04	451338.588	2424492.581
END	11+81.03	451392.693	2424609.682
Tangential Direction:	N65.201°E		
Tangential Length:	128.996		

End chain SWLoop-Temp description

Alignment Description

Temporary Loop Connection 1

REGISTERED PROFESSIONAL ENGINEER
CAVIN D. PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

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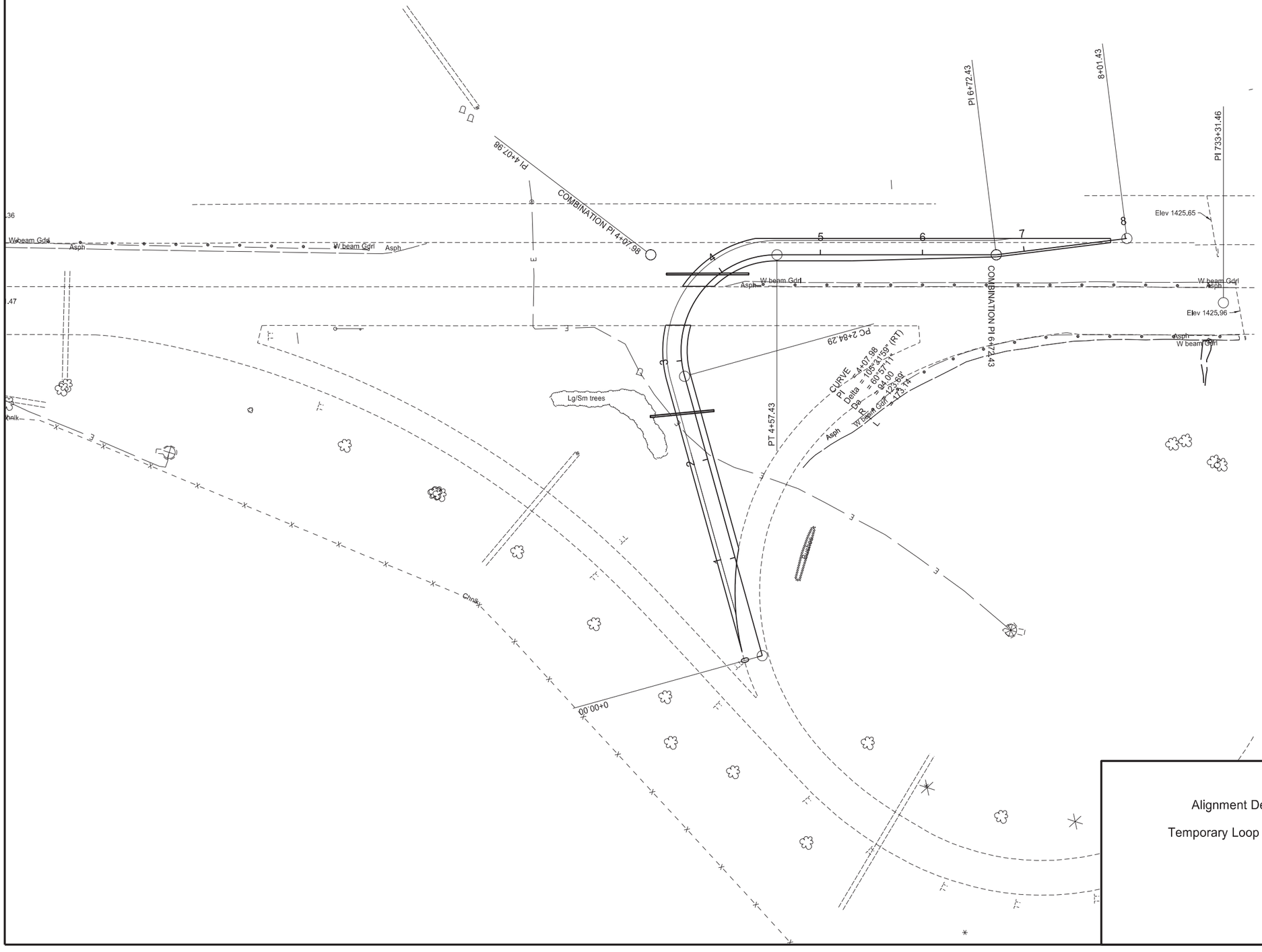
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	82	6



Chain SWLoop-Temp2

Beginning chain SWLoop-Temp2 description

	Station	Northing	Easting
Element: Linear			
START	0+00.00	450894.405	2424393.314
PC	2+84.29	451132.27	2424237.618
Tangential Direction:	N33.207°W		
Tangential Length:	284.291		
Element: Circular			
PC	2+84.29	451132.27	2424237.618
COMBINATION PI	4+07.98	451235.762	2424169.877
CC		451183.751	2424316.267
PRC	4+57.43	451273.314	2424287.729
Radius:	94		
Delta:	105.533°	Right	
Degree of Curvature (Arc):	60.953°		
Length:	173.139		
Tangent:	123.691		
Chord:	149.681		
Middle Ordinate:	37.124		
External:	61.356		
Back Tangent Direction:	N33.207°W		
Back Radial Direction:	N56.793°E		
Chord Direction:	N19.560°E		
Ahead Radial Direction:	S17.674°E		
Ahead Tangent Direction:	N72.326°E		
Element: Linear			
PT	4+57.43	451273.314	2424287.729
COMBINATION PI	6+72.43	451338.588	2424492.581
Tangential Direction:	N72.326°E		
Tangential Length:	215		
Element: Linear			
COMBINATION PI	6+72.43	451338.588	2424492.581
END	8+01.43	451392.693	2424609.682
Tangential Direction:	N65.201°E		
Tangential Length:	128.996		

End chain SWLoop-Temp2 description

Alignment Description

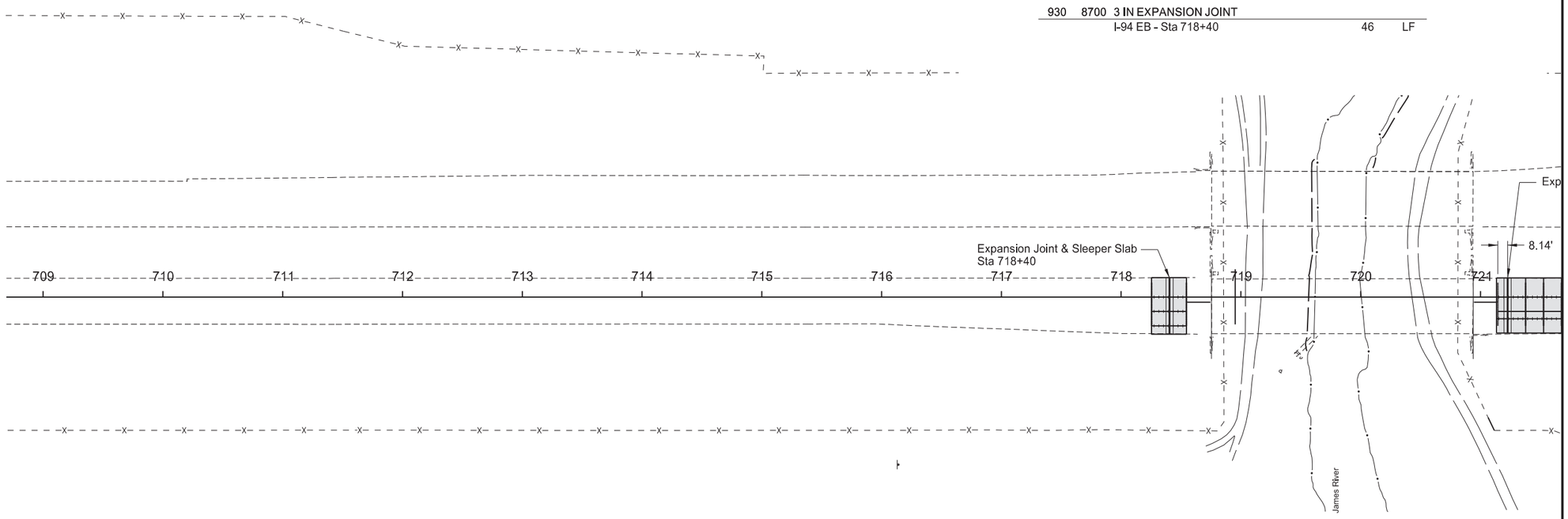
Temporary Loop Connection 2

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-2-999(064)	90	1

PROJECT SS-2-999(064)

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		I-94 EB - Sta 718+25 to 718+55	79	TON
401	0060	PRIME COAT		
		I-94 EB - Sta 718+25 to 718+55	54	GAL
550	0310	10 IN NON-REINF CONCRETE PVMT CL AE-DOWELED		
		I-94 EB - Sta 718+25 to 718+55	153	SY
930	8671	CONCRETE SLEEPER SLAB		
		I-94 EB - Sta 718+40	31	SY
930	8700	3 IN EXPANSION JOINT		
		I-94 EB - Sta 718+40	46	LF



Paving Layout
SW Exit Ramp

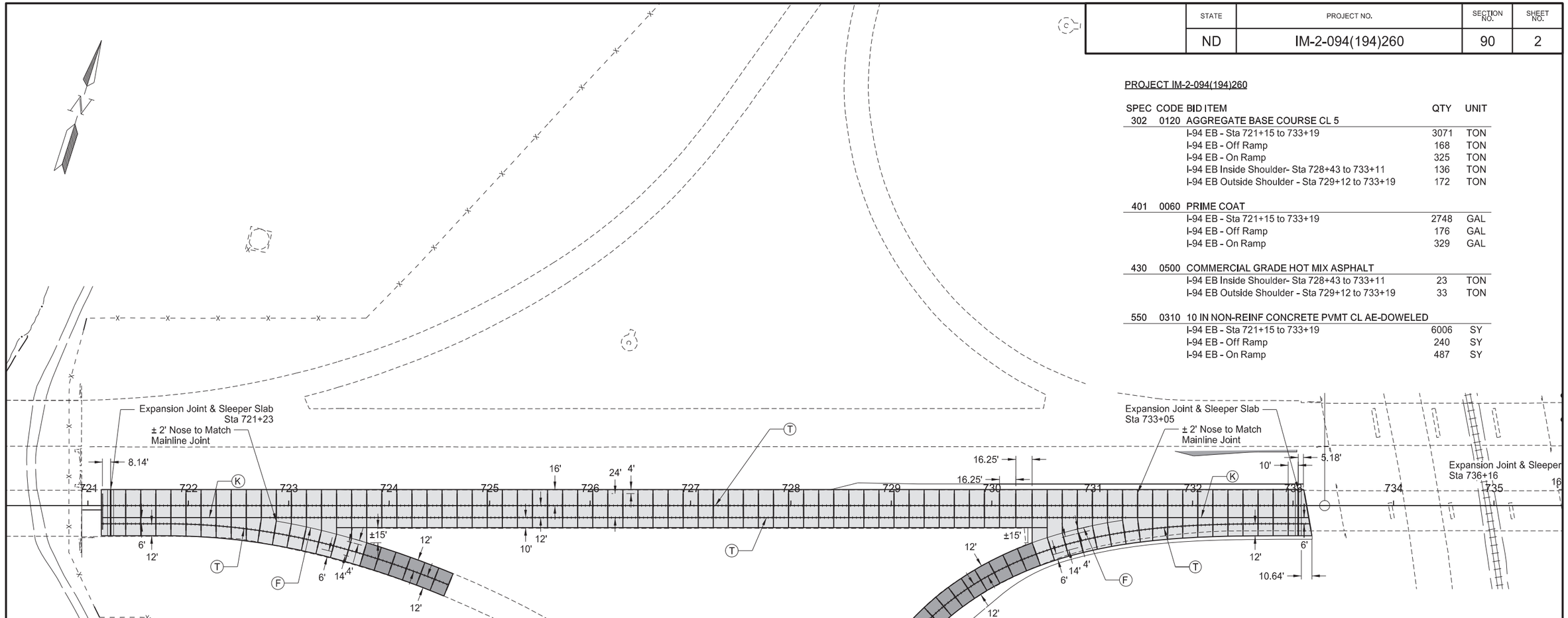
Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/06/23
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	90	2

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		I-94 EB - Sta 721+15 to 733+19	3071	TON
		I-94 EB - Off Ramp	168	TON
		I-94 EB - On Ramp	325	TON
		I-94 EB Inside Shoulder- Sta 728+43 to 733+11	136	TON
		I-94 EB Outside Shoulder - Sta 729+12 to 733+19	172	TON
401	0060	PRIME COAT		
		I-94 EB - Sta 721+15 to 733+19	2748	GAL
		I-94 EB - Off Ramp	176	GAL
		I-94 EB - On Ramp	329	GAL
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT		
		I-94 EB Inside Shoulder- Sta 728+43 to 733+11	23	TON
		I-94 EB Outside Shoulder - Sta 729+12 to 733+19	33	TON
550	0310	10 IN NON-REINF CONCRETE PVMT CL AE-DOWELED		
		I-94 EB - Sta 721+15 to 733+19	6006	SY
		I-94 EB - Off Ramp	240	SY
		I-94 EB - On Ramp	487	SY



SPEC	CODE	BID ITEM	QTY	UNIT
709	0100	GEOSYNTHETIC MATERIAL TYPE G		
		I-94 EB - Sta 721+15 to 733+19	6886	SY
		I-94 EB - Off Ramp	307	SY
		I-94 EB - On Ramp	622	SY
930	8671	CONCRETE SLEEPER SLAB		
		I-94 EB - Sta 721+23	31	SY
		I-94 EB - Sta 733+05	32	SY
930	8700	3 IN EXPANSION JOINT		
		I-94 EB - Sta 721+23	46	LF
		I-94 EB - Sta 733+05	48	LF

Legend

- (T) Tied Longitudinal Joint
- (K) Keyed Joint (Omit Tie Bars)
- (F) Free Joint (See Note)
- —— Doweled Joint - Placed in driving lanes only, 15' Spacing (Typ)

Note:
Use plastic sheeting or other material approved by the engineer as a bond breaker between the ramp and the gore PCC pavement.

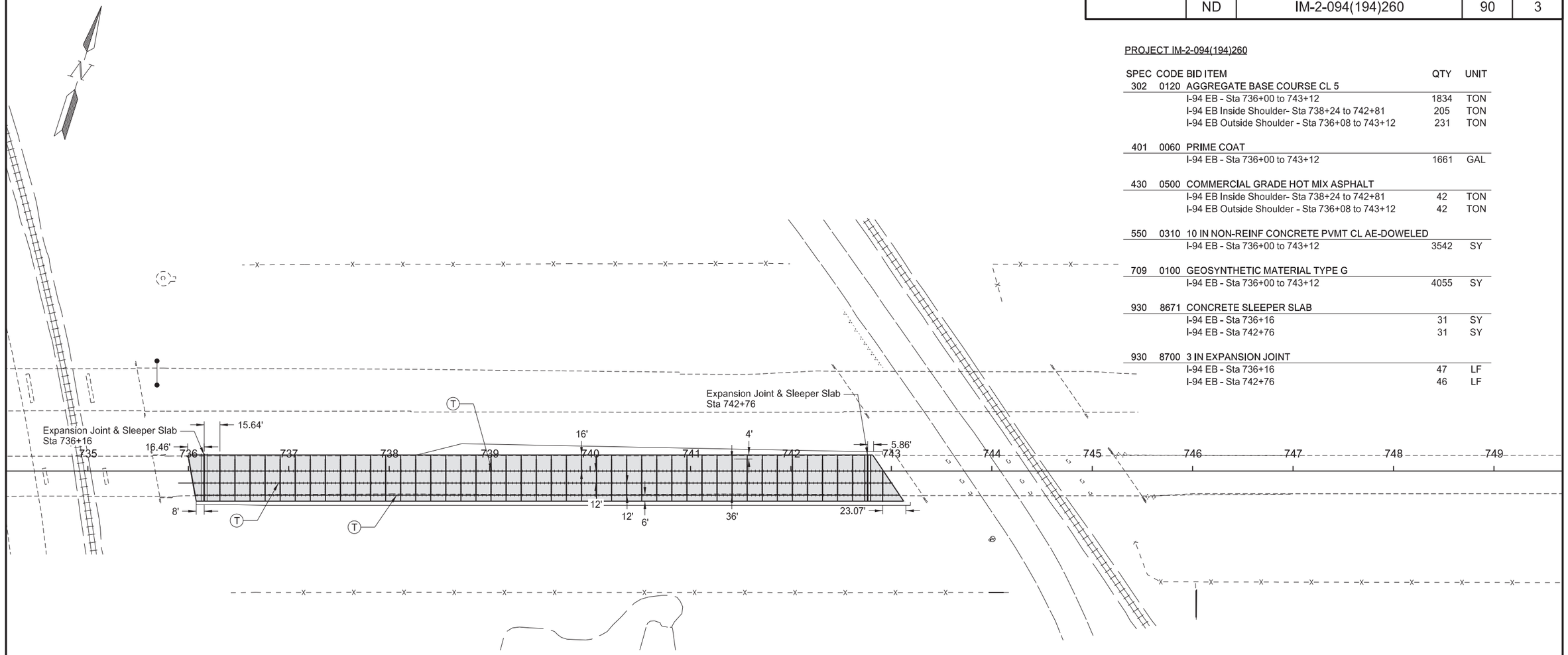
Paving Layout
SW Exit Ramp

Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/06/23
NORTH DAKOTA

10/4/2023 8:31:43 AM cpatch R:\project\20094260.194\design\Sheets\090PL_001.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	90	3



PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		I-94 EB - Sta 736+00 to 743+12	1834	TON
		I-94 EB Inside Shoulder- Sta 738+24 to 742+81	205	TON
		I-94 EB Outside Shoulder - Sta 736+08 to 743+12	231	TON
401	0060	PRIME COAT		
		I-94 EB - Sta 736+00 to 743+12	1661	GAL
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT		
		I-94 EB Inside Shoulder- Sta 738+24 to 742+81	42	TON
		I-94 EB Outside Shoulder - Sta 736+08 to 743+12	42	TON
550	0310	10 IN NON-REINF CONCRETE PVMT CL AE-DOWELED		
		I-94 EB - Sta 736+00 to 743+12	3542	SY
709	0100	GEOSYNTHETIC MATERIAL TYPE G		
		I-94 EB - Sta 736+00 to 743+12	4055	SY
930	8671	CONCRETE SLEEPER SLAB		
		I-94 EB - Sta 736+16	31	SY
		I-94 EB - Sta 742+76	31	SY
930	8700	3 IN EXPANSION JOINT		
		I-94 EB - Sta 736+16	47	LF
		I-94 EB - Sta 742+76	46	LF

Legend

- (T) Tied Longitudinal Joint
- (K) Keyed Joint (Omit Tie Bars)
- (F) Free Joint (See Note)
- ——— Doweled Joint - Placed in driving lanes only, 15' Spacing (Typ)

Note:
Use plastic sheeting or other material approved by the engineer as a bond breaker between the ramp and the gore PCC pavement.

Paving Layout
SW Entrance Loop Ramp

Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/06/23
NORTH DAKOTA

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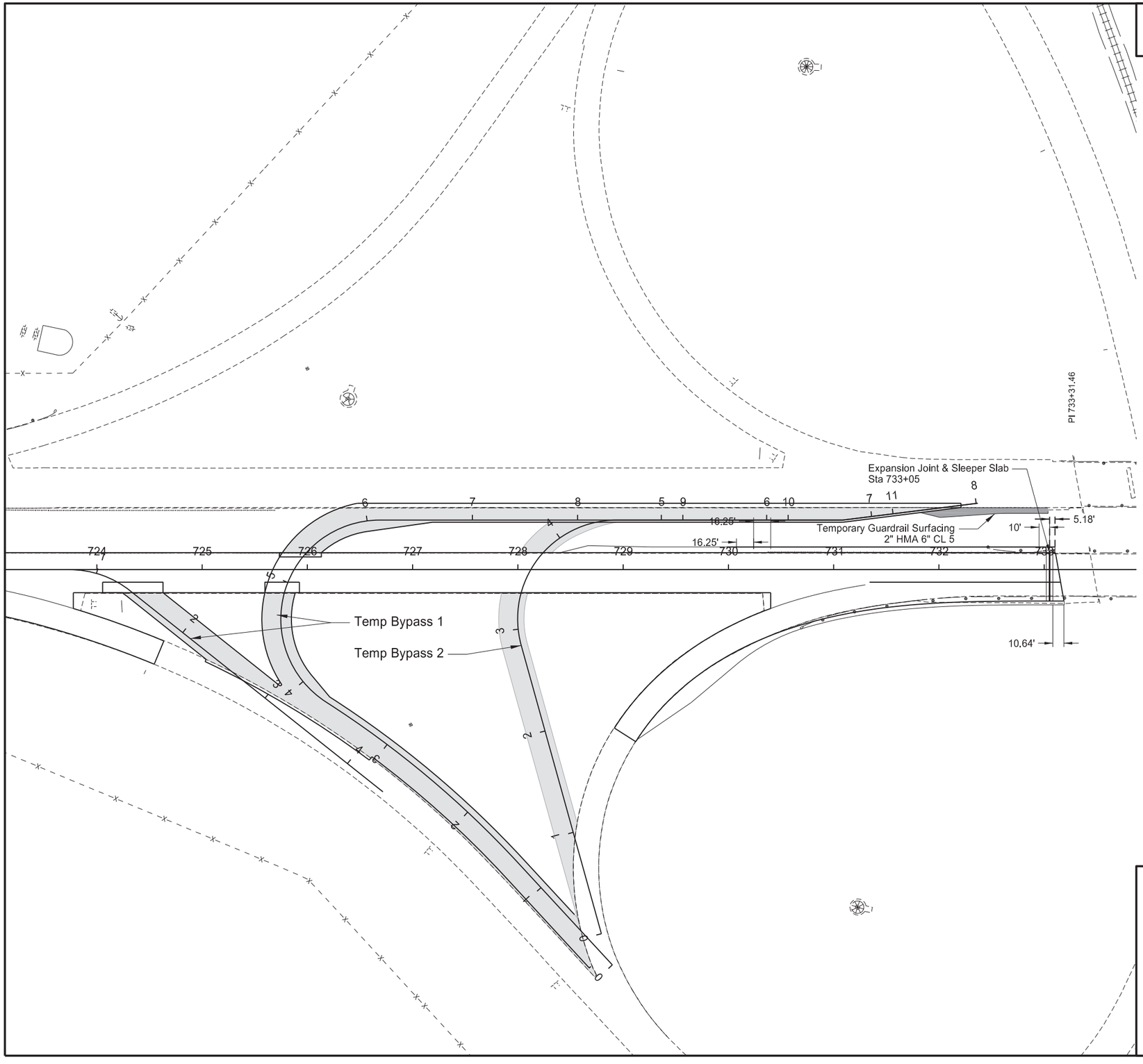
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	90	4

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		Temporary Ramp Connection 1	2200	TON
		Temporary Ramp Connection 2	667	TON
		Temporary Guardrail Surfacing	31	TON
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT		
		Temporary Ramp Connection 1	651	TON
		Temporary Ramp Connection 2	197	TON
		Temporary Guardrail Surfacing	11	TON



Paving Layout
SW Entrance Temporary Ramp Connection

Interstate 94 - Eastbound
SE Jamestown Interchange RP 260

REGISTERED PROFESSIONAL ENGINEER
CAVIN D PATCH
PE-10611
DATE 10/06/23
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	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**	**3**	**3**	**3**		**3**	**26**	**78**
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**	**6**	**7**	**7**		**7**	**59**	**413**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)						11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)						10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)						10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)						7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)						7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)						7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)						7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)						7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT						15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)						7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)						7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)						9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)						7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)						9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)						7	
R1-1-48	48"x48"	STOP						32	
R1-2-60	**60"x60"**	**YIELD**		**1**	**1**		**1**	**29**	**29**
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**3**	**4**	**4**		**4**	**30**	**120**
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**8**	**10**	**10**		**10**	**39**	**390**
R2-1aP-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**9**	**10**	**10**		**10**	**10**	**100**
R3-2-48	48"x48"	NO LEFT TURN						35	
R4-1-48	**48"x60"**	**DO NOT PASS**		**2**	**2**		**2**	**39**	**78**
R4-7-48	**48"x60"**	**KEEP RIGHT**		**2**	**2**		**2**	**39**	**78**
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)**		**4**	**5**		**5**	**12**	**60**
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	
W1-1-48	**48"x48"**	**RIGHT TURN**		**1**	**1**		**1**	**35**	**35**
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT						35	
W1-4-48	**48"x48"**	**REVERSE CURVE RIGHT or LEFT**		**2**	**2**		**2**	**35**	**70**
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT						35	
W1-6-48	**48"x24"**	**ONE DIRECTION LARGE ARROW**		**4**	**5**		**5**	**26**	**130**
W3-1-48	48"x48"	STOP AHEAD						35	
W3-3-48	48"x48"	SIGNAL AHEAD						35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**		**2**	**2**		**2**	**35**	**70**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**2**	**3**	**3**		**3**	**35**	**105**
W4-2-48	**48"x48"**	**LANE ENDS RIGHT or LEFT**	**2**	**2**	**2**		**2**	**35**	**70**
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**		**2**	**2**		**2**	**35**	**70**
W8-1-48	48"x48"	BUMP						35	
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						35	
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)**		**1**	**1**		**1**	**14**	**14**
W13-4R-48	**48"x60"**	**RAMP WITH ARROW**		**1**	**1**		**1**	**39**	**39**
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**	**2**	**2**	**2**		**2**	**35**	**70**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT or _ MILE						35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE						35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE						35	
W20-5-48	**48"x48"**	**RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE**	**4**	**4**	**4**		**4**	**35**	**140**
W20-7-48	**48"x48"**	**FLAGGER**	**4**	**2**	**2**		**4**	**35**	**140**
W20-8-18	18"x18"	STOP - SLOW PADDLE Back to Back						5	
W20-52P-54	**54"x12"**	**NEXT __ MILES (Mounted on warning sign post)**		**2**	**2**		**2**	**12**	**24**
W21-1-48	48"x48"	WORKERS						35	
W21-2-48	48"x48"	FRESH OIL						35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE						35	
W21-5-48	48"x48"	SHOULDER WORK						35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED BY PHASE NO. 1	2	3		TOTAL AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED						35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE						35	
W21-6-48	48"x48"	SURVEY CREW						35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT						35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY						35	
W21-52-48	48"x48"	PAVEMENT BREAKS						35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD						35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK						35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE						35	
W-4-5-48	**48"x48"**	**ENTERING ROADWAY MERGE**		**1**	**1**		**1**	**35**	**35**
SPECIAL SIGNS									
CONSIGN 1	**78"x48"**	**EXIT 260 WITH ARROW**		**1**	**1**		**1**	**52**	**52**
CONSIGN 2	**84"x24"**	**EXIT 260**		**2**	**2**		**2**	**39**	**78**
CONSIGN 3	**90"x54"**	**JAMESTOWN WITH ARROW**		**1**	**1**		**1**	**61**	**61**
CONSIGN 4	**90"x42"**	**JAMESTOWN 1 MILE**		**1**	**1**		**1**	**53**	**53**

SPEC & CODE

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	2602

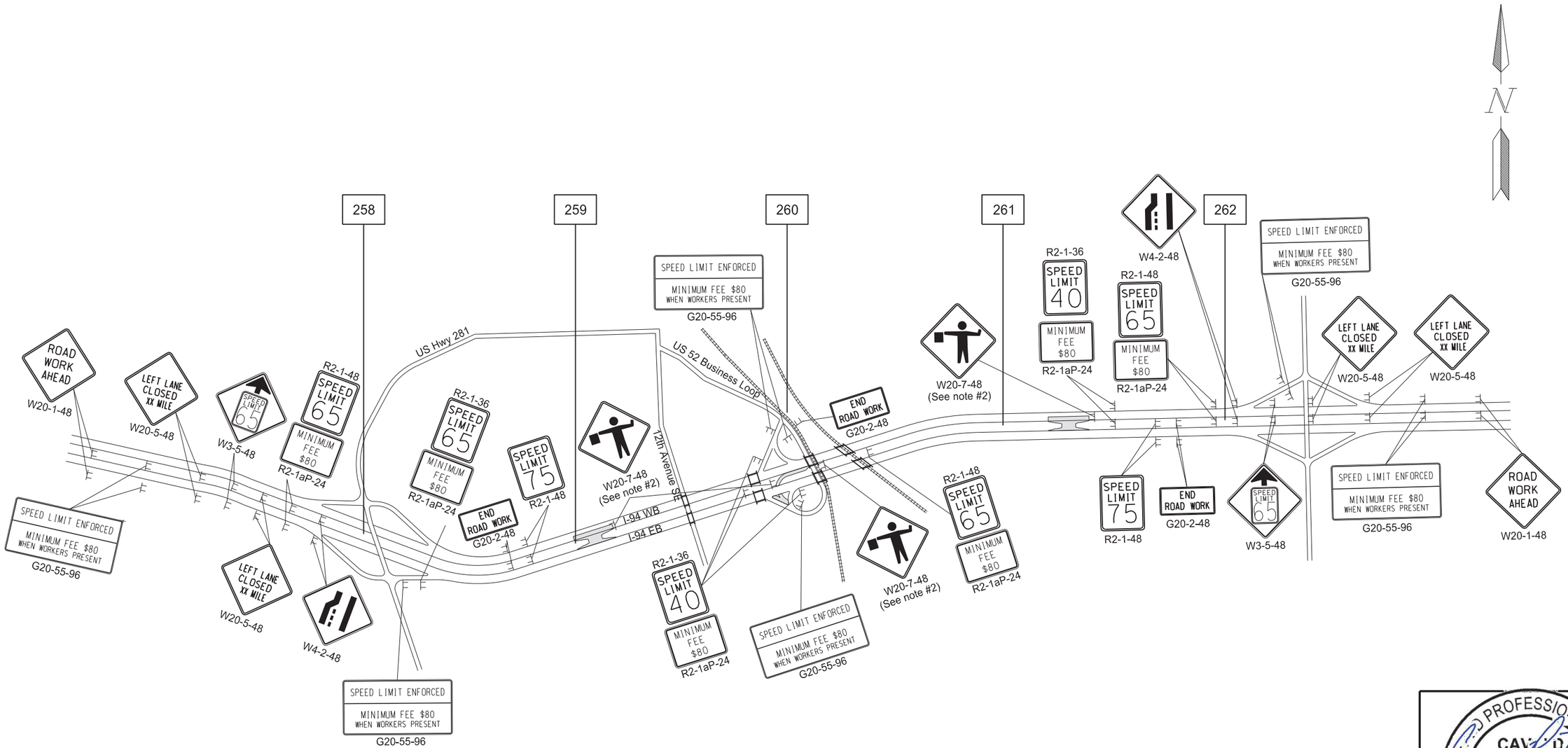
SPEC & CODE	DESCRIPTION	UNIT	QUANTITY BY PHASE NO. 1	2	3		TOTAL QUANTITY
704-0100	**FLAGGING**	MHR	**1000**	**50**			**1050**
704-1045	**ATTENUATION DEVICE-TYPE B-75**	EA		**3**	**3**		**3**
704-1048	PORTABLE RUMBLE STRIPS	EACH					
704-1050	TYPE I BARRICADES	EACH					
704-1052	**TYPE III BARRICADES**	EACH	**11**	**29**	**31**		**31**
704-1060	**DELINEATOR DRUMS**	EACH	**59**	**186**	**189**		**189**
704-1065	TRAFFIC CONES	EACH					
704-1067	**TUBULAR MARKERS**	EACH	**258**	**104**	**104**		**258**
704-1070	DELINEATOR	EACH					
704-1072	**FLEXIBLE DELINEATORS**	EACH		**199**	**199**		**199**
704-1080	STACKABLE VERTICAL PANELS	EACH					
704-1081	VERTICAL PANELS - BACK TO BACK	EACH					
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH					
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH					
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	EACH	**2**	**2**	**2**		**2**
704-1090	**FLASHING BEACON**	EA		**2**	**2**		**2**
704-1500	**OBLITERATION OF PVMT MK**	SF		**2132**			**2132**
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF					
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH					
704-3511	**STATE FURNISHED MEDIAN BARRIER**	LF		**1290**	**1290**		**1290**
754-8015	**VEHICLE SPEED FEEDBACK SIGN**	EACH		**2**	**2**		**2**
762-0200	**RAISED PAVEMENT MARKERS**	EACH		**6313**			**6313**
762-0420	SHORT TERM 4IN LINE - TYPE R	LF					
762-0430	**SHORT TERM 4IN LINE - TYPE NR**	LF		**20729**			**20729**
762-0432	**SHORT TERM 6IN LINE-TYPE NR**	LF		**13110**	**1360**		**14470**

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

REGISTERED PROFESSIONAL ENGINEER
CAVELL D. PACH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Traffic Control Devices List

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	2



Legend

Work Area

PROFESSIONAL ENGINEER
CAVELL FAUCHER
PE-10611
DATE 9/21/2023
NORTH DAKOTA

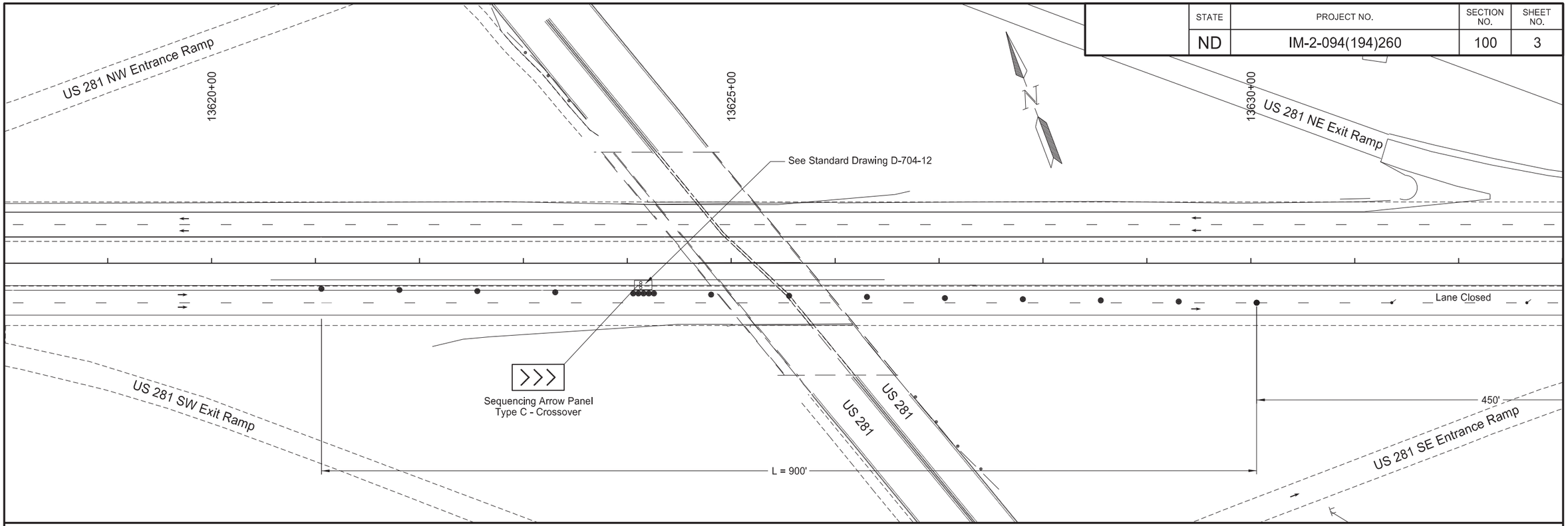
Work Zone Traffic Control

Phase 1

Sign Layout for One Lane Closure

Notes:
1. See Standard Drawing D-704-35 for sign spacing and additional traffic control devices required.
2. Cover or remove upon completion of the work day or when workers are not present.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	3



Legend

Work Area

See Std Dwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

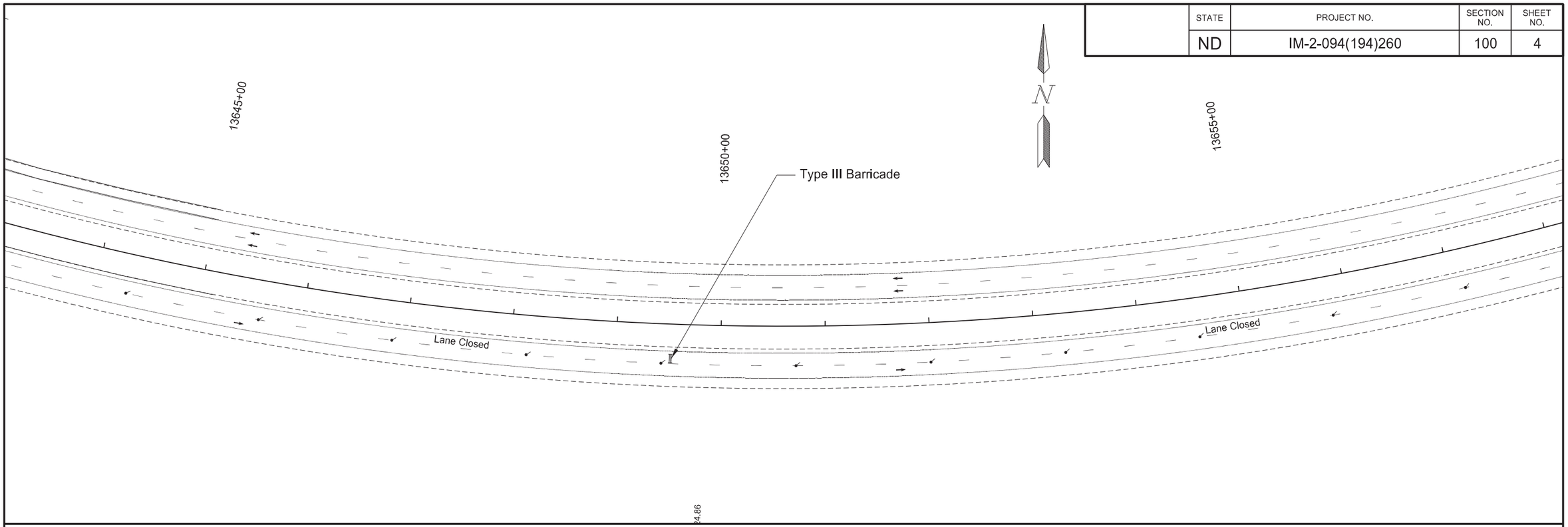
REGISTERED PROFESSIONAL ENGINEER
CAVELL FANCHER
PE-10611
DATE 9/21/2023
NORTH DAKOTA

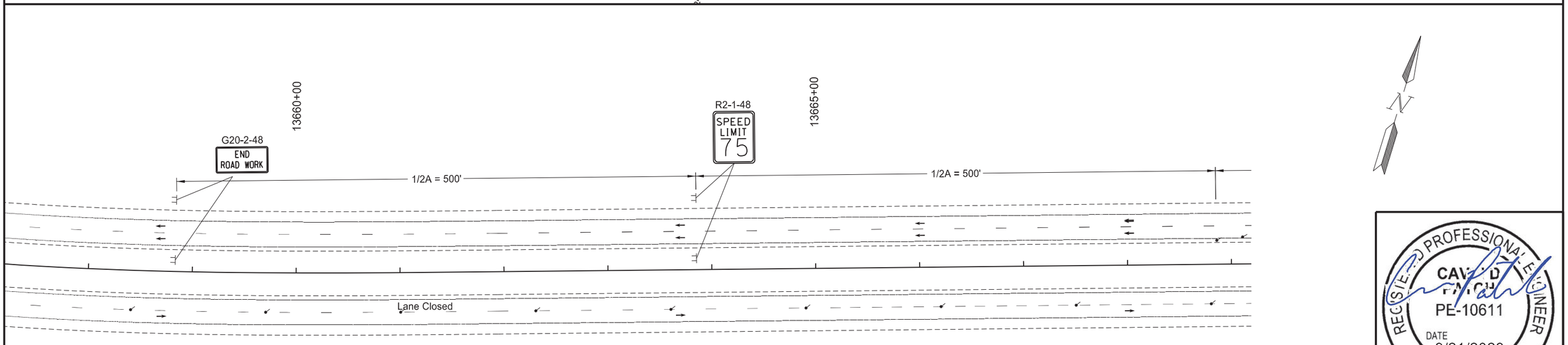
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	4





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

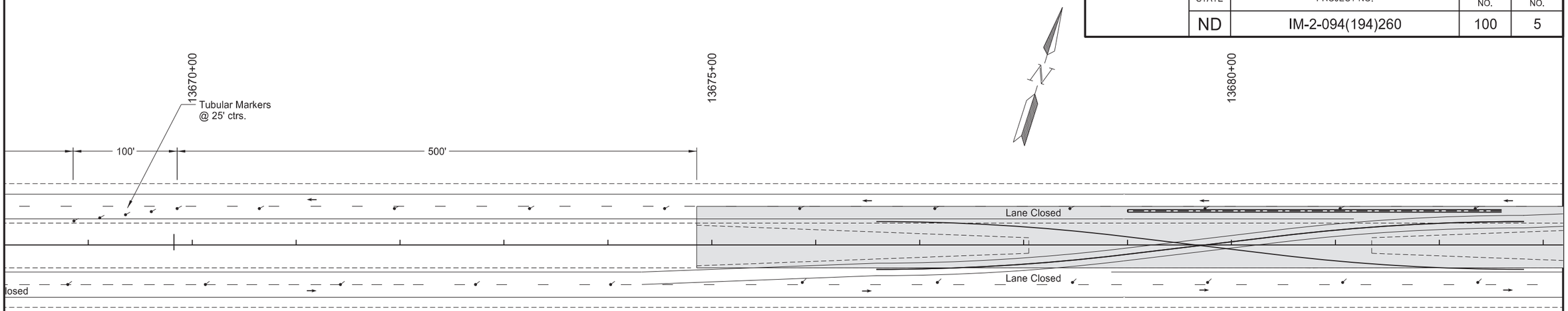
REGISTERED PROFESSIONAL ENGINEER
CAVALIER PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

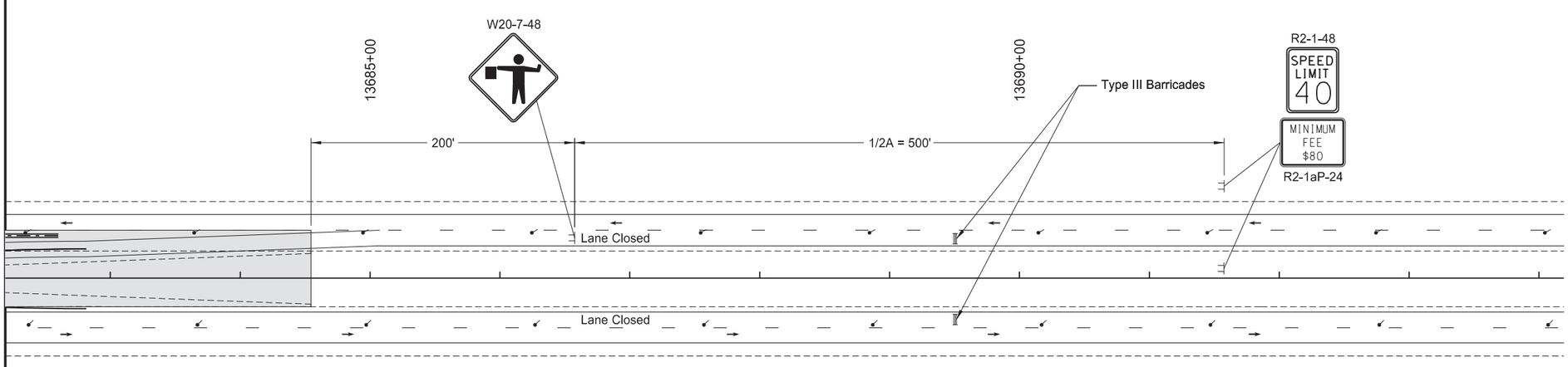
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	5





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

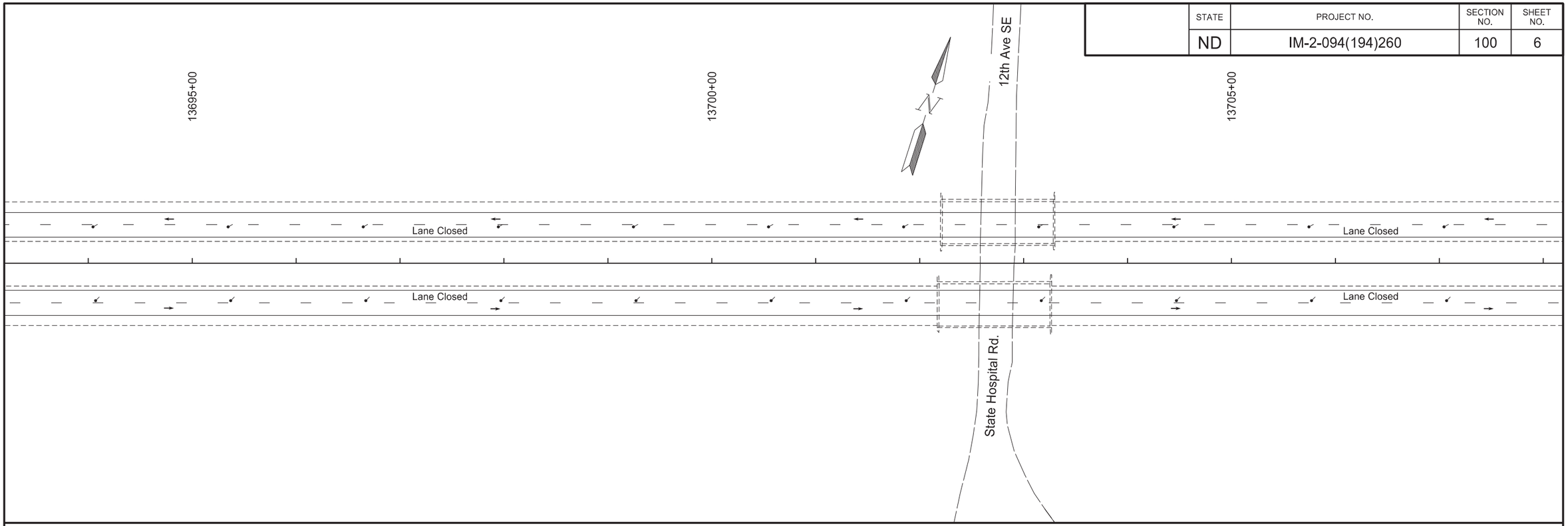
REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE
9/21/2023
NORTH DAKOTA

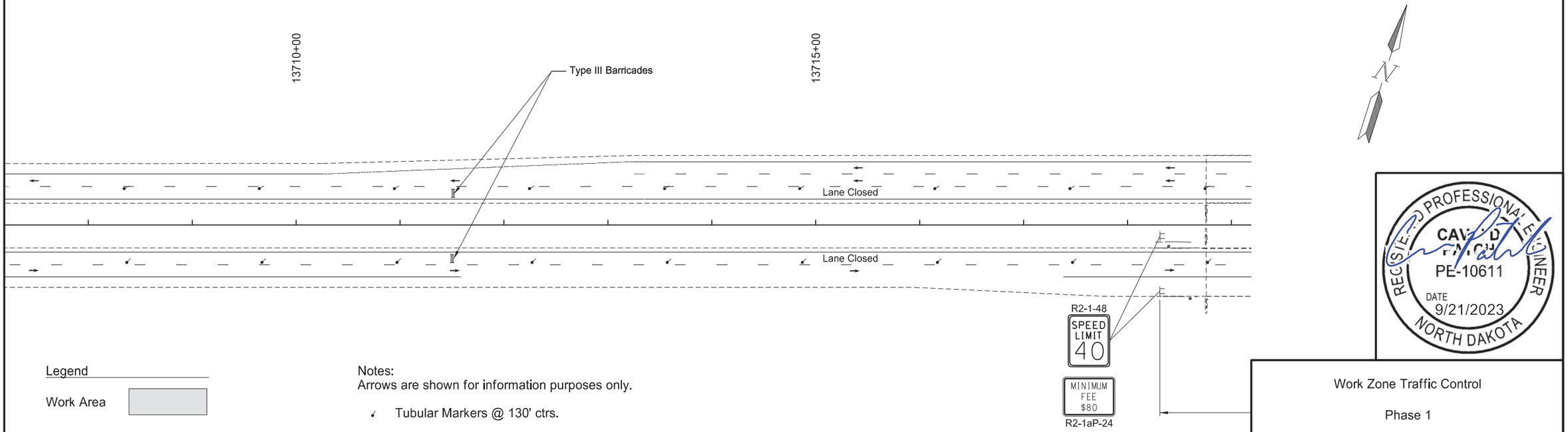
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	6





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

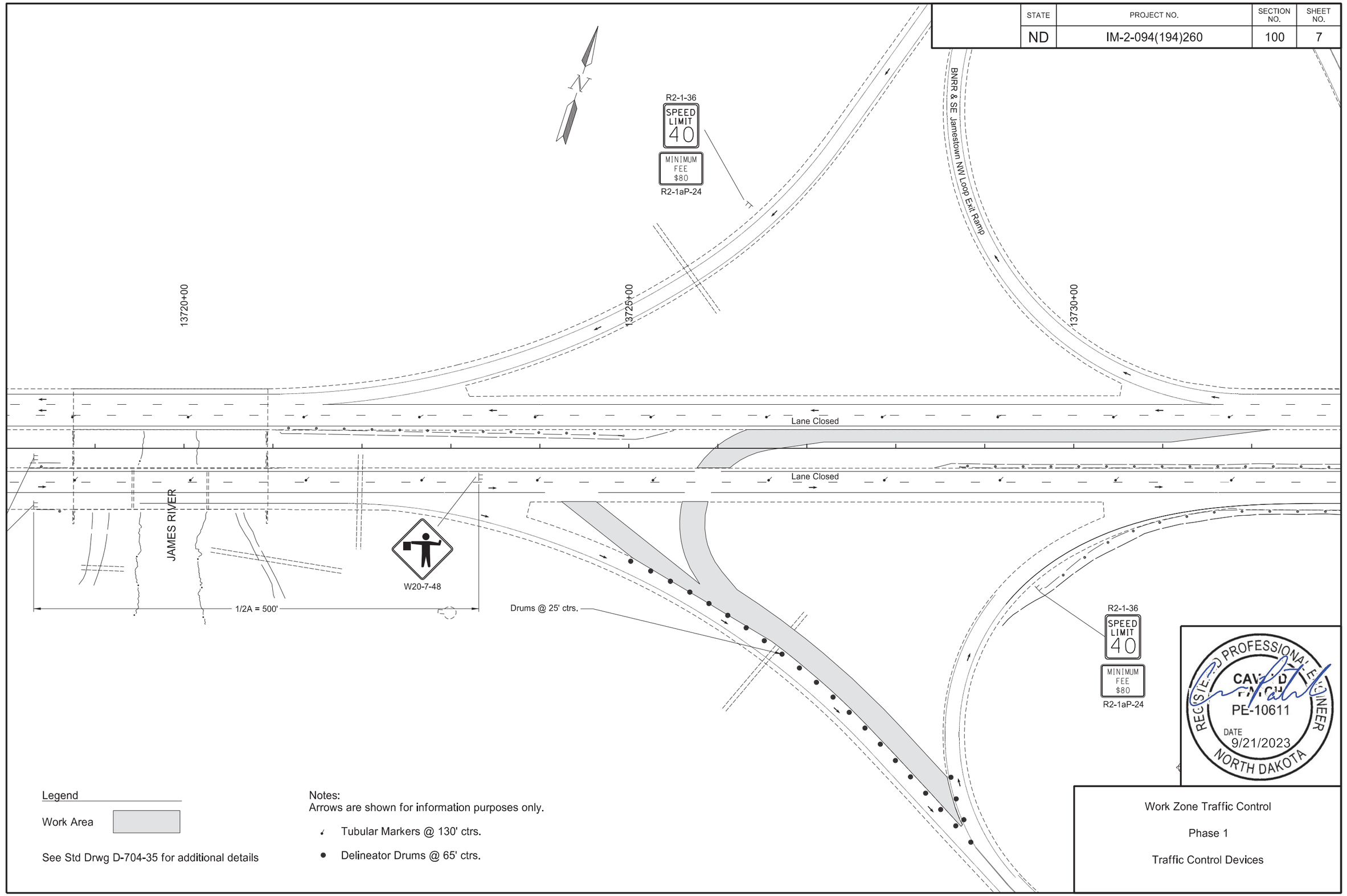
REGISTERED PROFESSIONAL ENGINEER
CAVELL FANCHER
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	7



REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

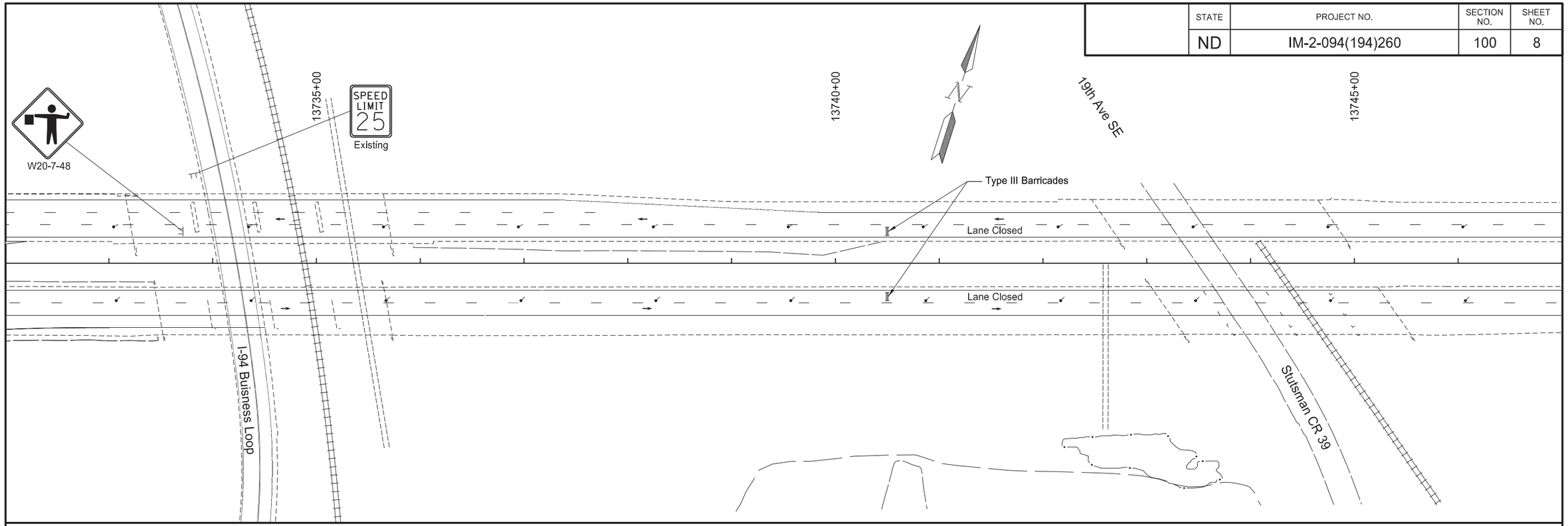
- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

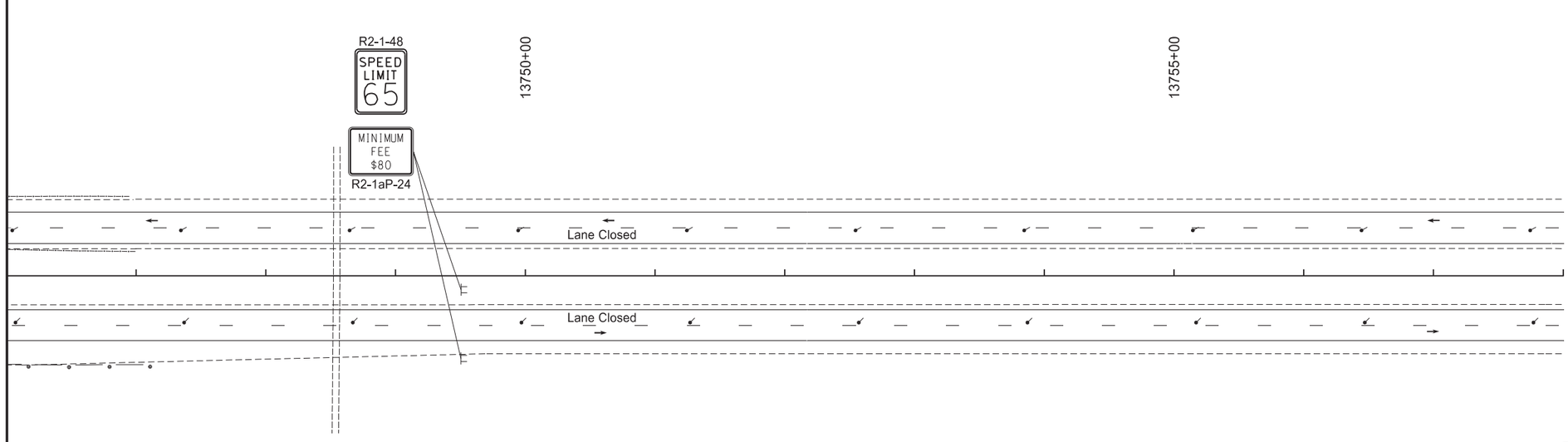
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	8





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

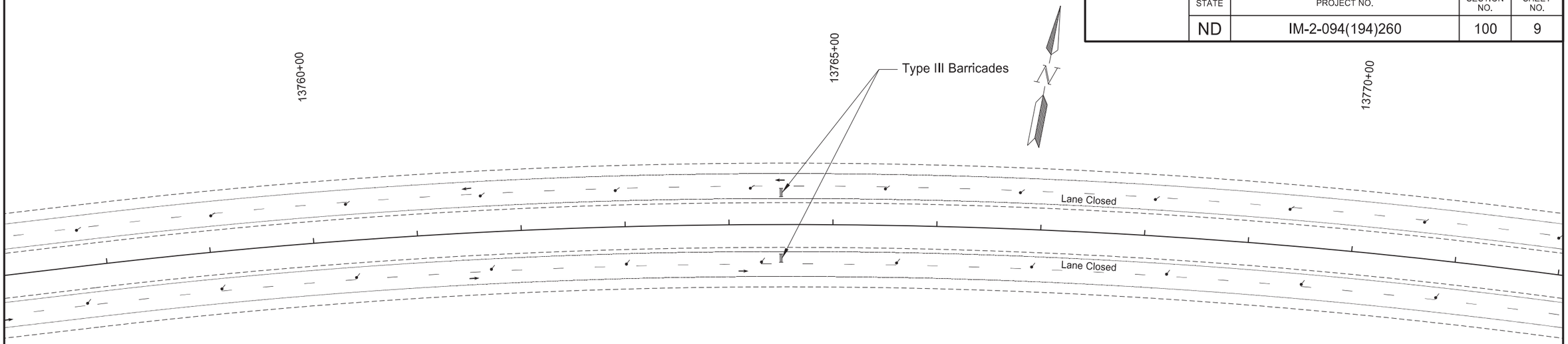
REGISTERED PROFESSIONAL ENGINEER
CAVAN PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

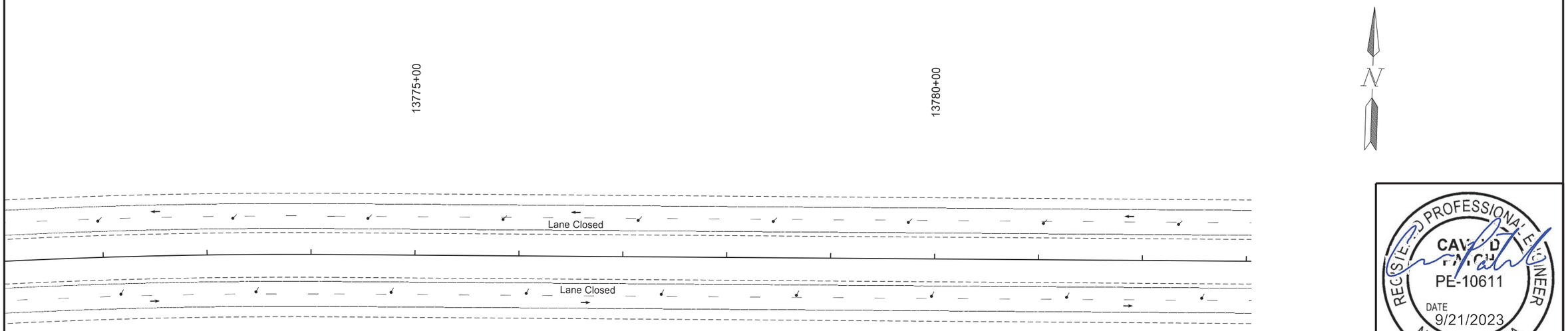
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	9





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

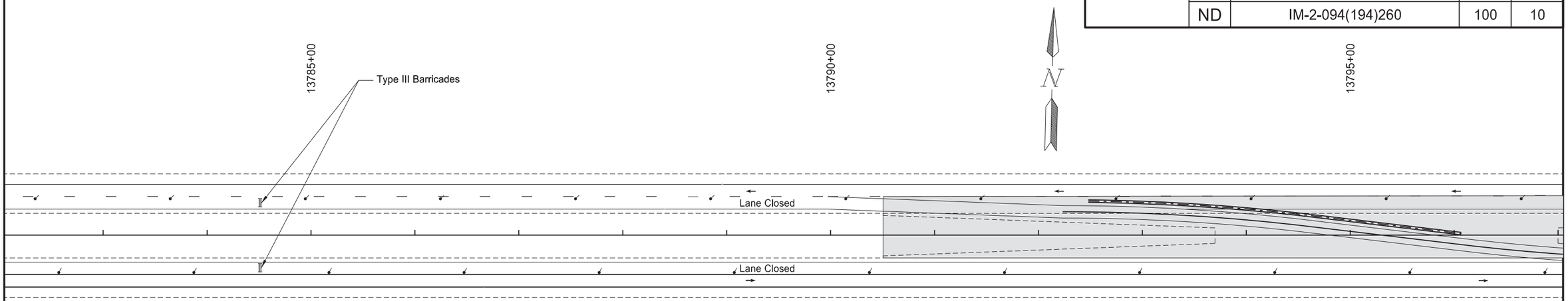
REGISTERED PROFESSIONAL ENGINEER
CAVALIER
PE-10611
DATE 9/21/2023
NORTH DAKOTA

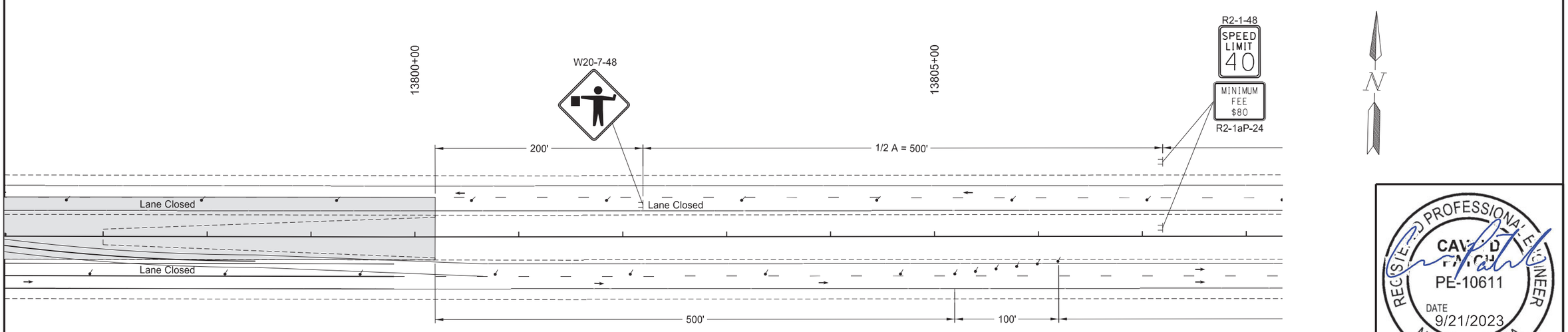
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	10





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

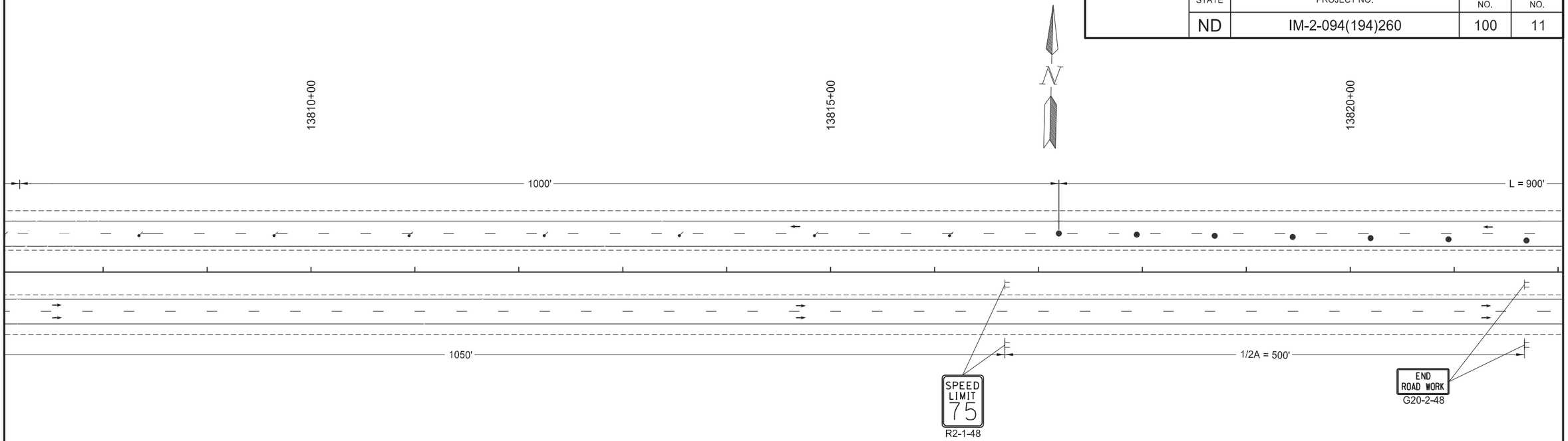
REGISTERED PROFESSIONAL ENGINEER
CAVID D PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

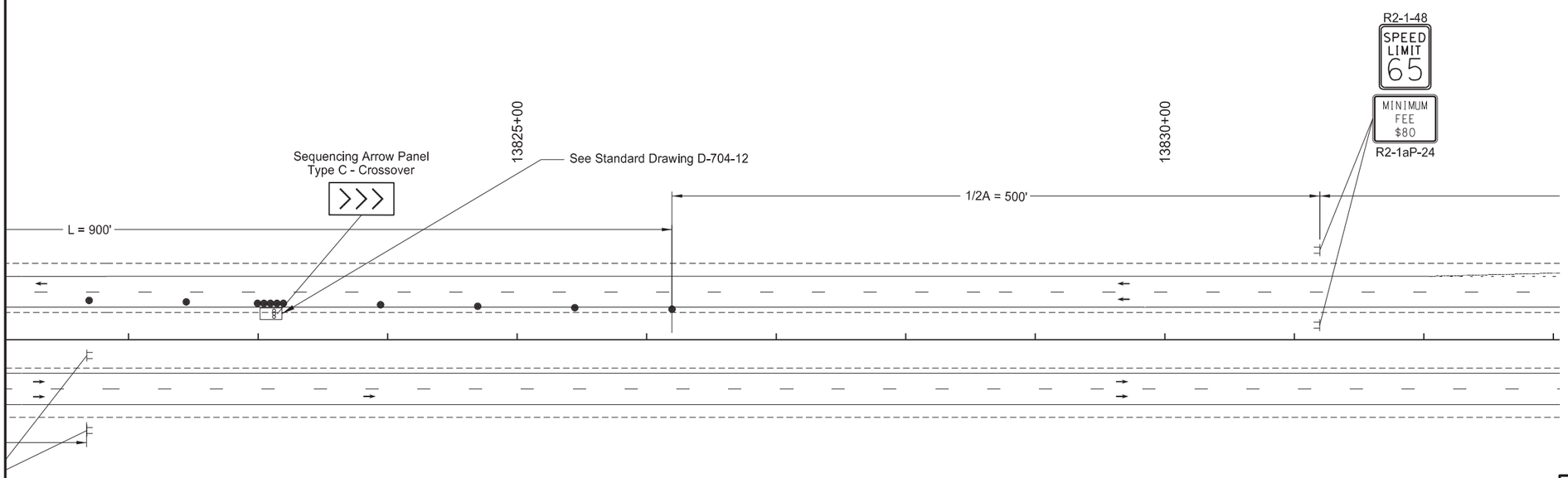
Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	11





Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 1

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	12

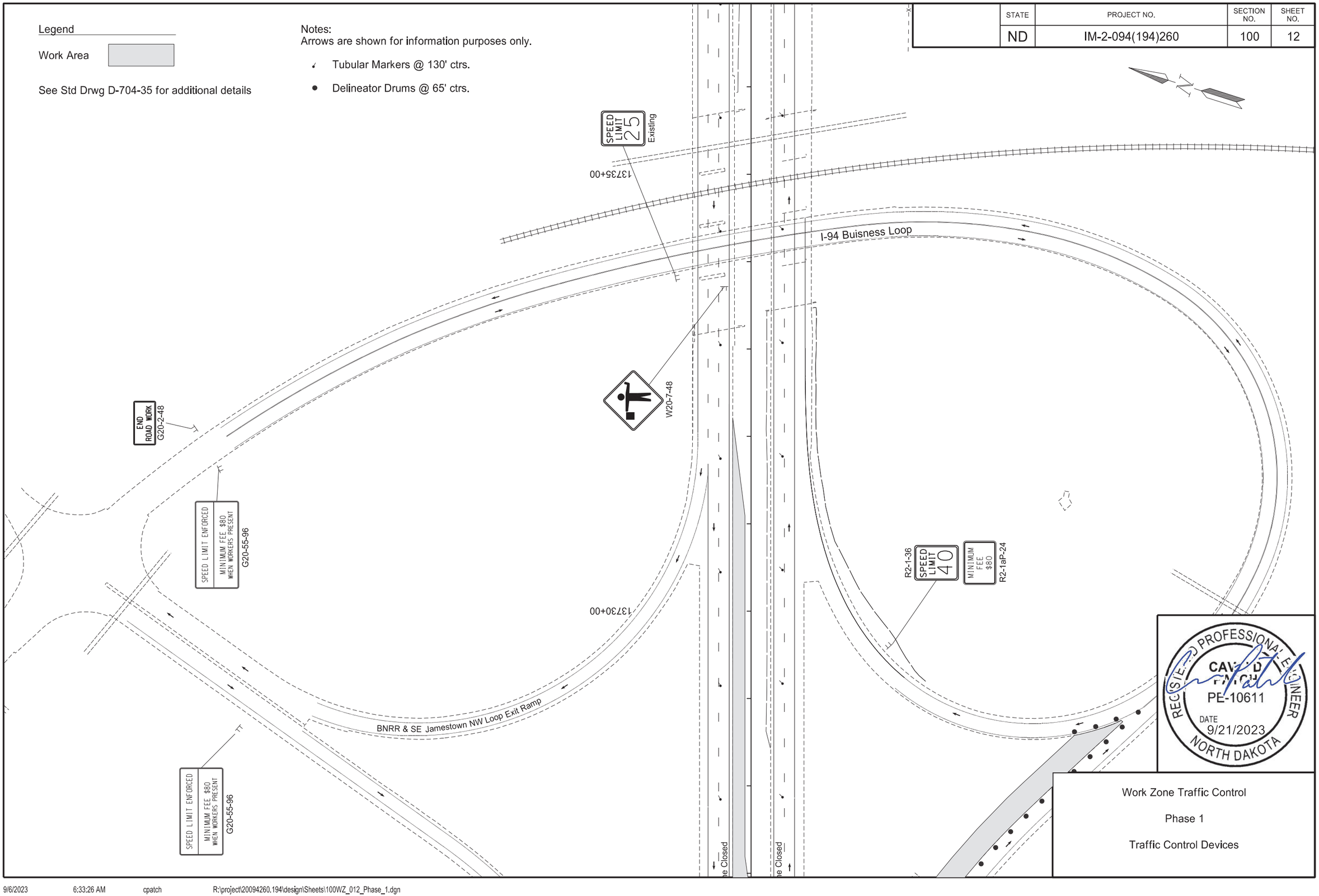
Legend

Work Area

See Std Drwg D-704-35 for additional details

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs.
- Delineator Drums @ 65' ctrs.



REGISTERED PROFESSIONAL ENGINEER
CAVALIER PATRICK
PE-10611
DATE 9/21/2023
NORTH DAKOTA

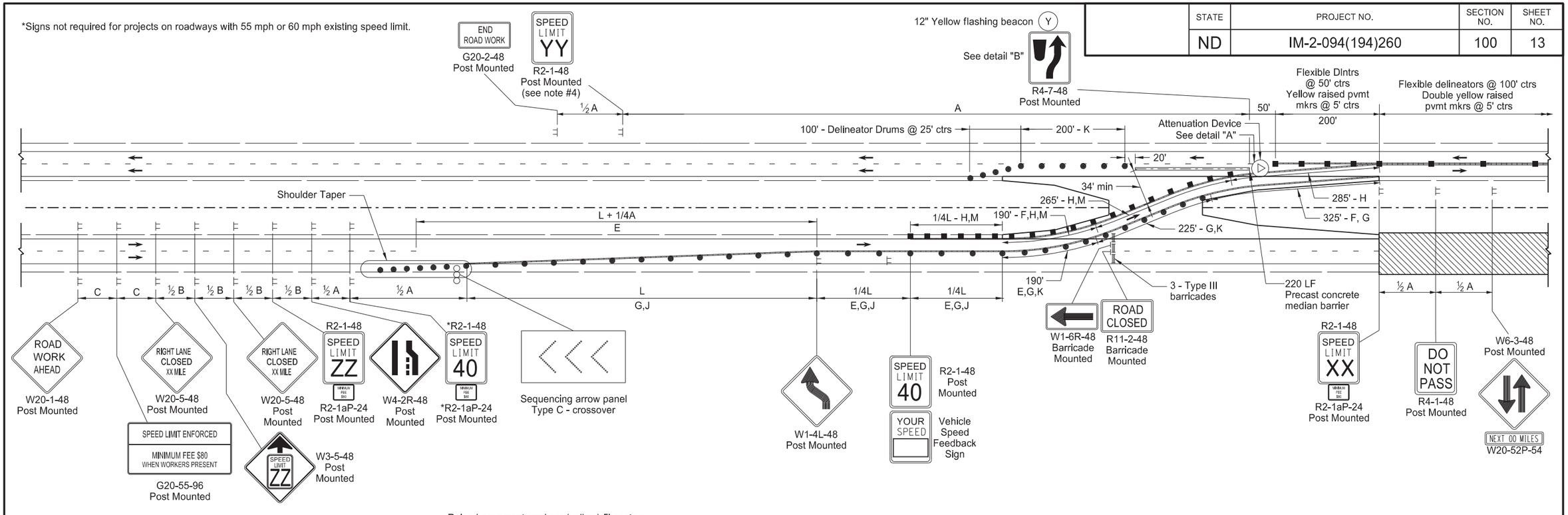
Work Zone Traffic Control

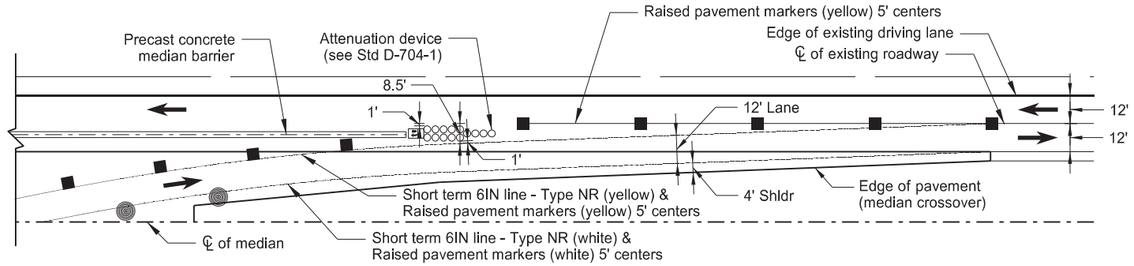
Phase 1

Traffic Control Devices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	13

*Signs not required for projects on roadways with 55 mph or 60 mph existing speed limit.





DETAIL "A"

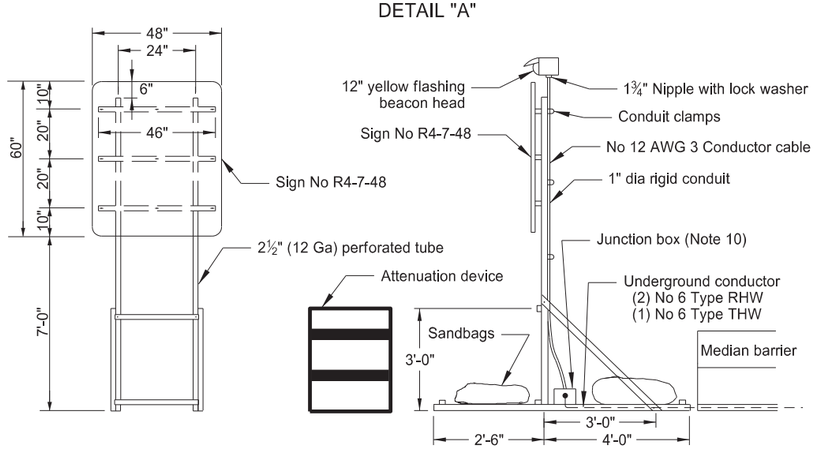
ROADWAY EXISTING SPEED LIMIT	SPEED LIMIT TO BE USED		
	XX	YY	ZZ
55	50	55	40
60	50	60	40
65	55	65	55
70	60	70	55
75	65	75	55

ADVANCE WARNING SIGN SPACING			
ROAD TYPE	Minimum Distance Between Signs (ft)		
	A	B	C
Urban Expressway and Freeway (55 mph to 65 mph)	850	1,350	2,200
Rural Expressway and Freeway (70 mph to 75 mph)	1,000	1,500	2,640

KEY

Type III barricae	Work area
Sign	Sequencing arrow panel
Flagger	Delineator drum
	Flexible Delineator

LEGEND
E Obliteration of pavement marking (10' line, 30' skip, ℄)
F Obliteration of pavement marking (edge lines)
G Short Term 6IN Line - Type NR (white) & raised pavement markers (white) 5' centers
H Short Term 6IN Line - Type NR (yellow) & raised pavement markers (yellow) 5' centers
J Drums spaced @ "S" centers
K Drums spaced @ 40' centers
M Flexible Delineators spaced @ 40' centers (O/s 2' from edge of lane line)



Place conductor behind barricade away from traffic, tie at each barrier connection, and drape above the ground. Place conductors a minimum of 6" underground between the barrier and pole.

DETAIL "B"

Notes:

1. Variables:
   S=Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
   W=Width of offset in feet
   L=Taper length in feet. Speeds 45 mph or greater L=WS.
2. Place signs and barricades on the roadway on moveable assemblies.
   Mount signs on barricades with the sign bottom on the top of the top barricade bar.
3. Install signs R4-1-48, W6-3-48, and W20-52P-54 at one mile increments and after each interchange.
4. Place the speed limit sign only if the crossover is more than 1 mile from an interchange exit ramp.
5. 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)
6. Cover existing speed limit signs within a reduced speed zone.
7. Upon approval, the Engineer will measure obliterated or covered pavement marking 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. Reduce speed when placing traffic control devices. Place "Minimum Fee $80" signs below speed limit signs in reduced speed areas. Place "Work Zone Speed Limit Enforced" sign in advance of the project at the time traffic control devices are installed.
10. Determine proper size, waterproof junction box, and attach to skid or vertical brace assembly.

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

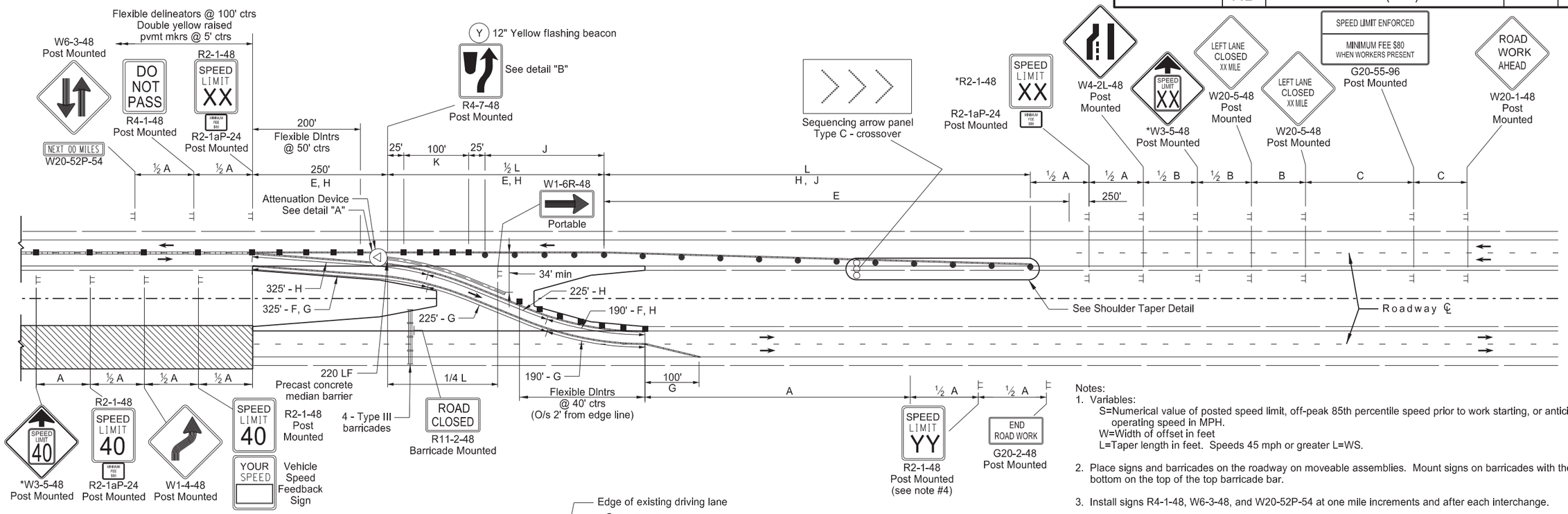
Work Zone Traffic Control

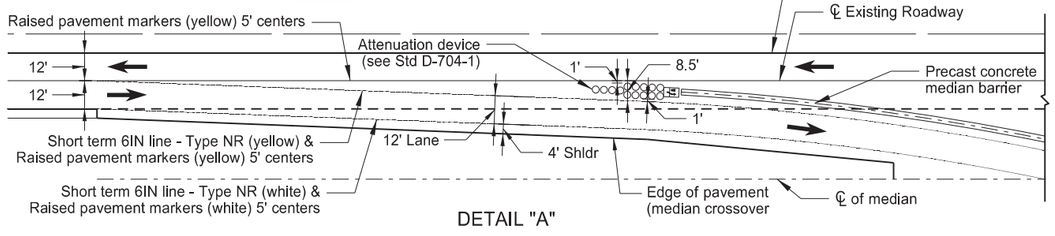
Phase 2 & 3

Traffic Control Detail

*Not required for projects on roadways with 55 mph existing speed limit.

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	14





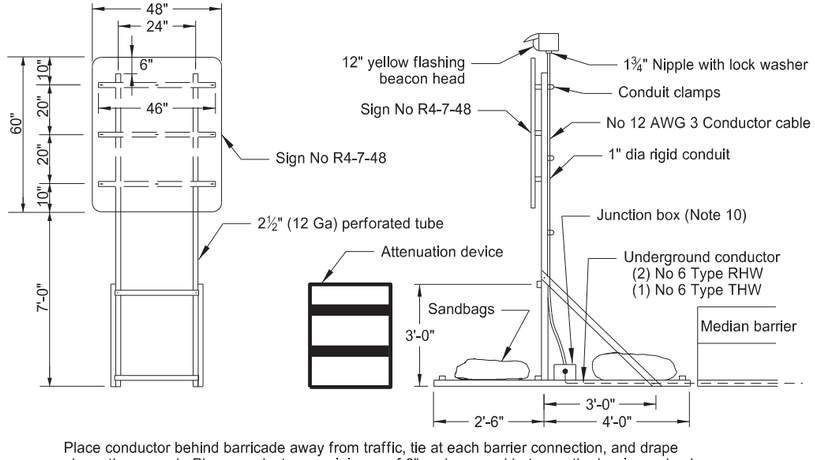
DETAIL "A"

KEY

Type III barricae	Work area
Sign	Sequencing arrow panel
Flagger	Delineator drum
	Flexible Delineator

LEGEND

E Obliteration of pavement marking (10' line, 30' skip, ℄)
F Obliteration of pavement marking (edge lines)
G Short Term 6IN Line - Type NR (white) & raised pavement markers (white) 5' centers
H Short Term 6IN Line - Type NR (yellow) & raised pavement markers (yellow) 5' centers
J Drums spaced @ "S" centers
K Flexible delineators-4 spaces @ 25'



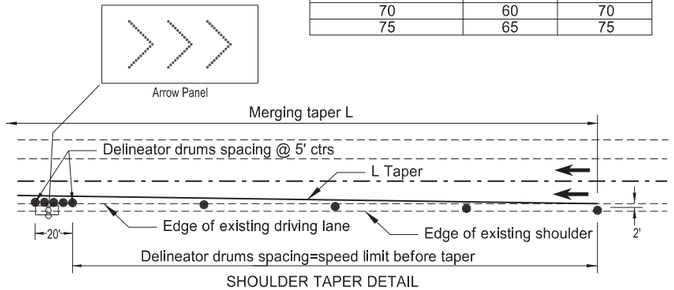
Place conductor behind barricade away from traffic, tie at each barrier connection, and drape above the ground. Place conductors a minimum of 6" underground between the barrier and pole.

DETAIL "B"

ADVANCE WARNING SIGN SPACING

ROAD TYPE	Minimum Distance Between Signs (ft) A	B	C
Urban Expressway and Freeway (55 mph to 65 mph)	850	1,350	2,200
Rural Expressway and Freeway (70 mph to 75 mph)	1,000	1,500	2,640

ROADWAY EXISTING SPEED LIMIT	SPEED LIMIT TO BE USED XX	YY
55	50	55
60	50	60
65	55	65
70	60	70
75	65	75



SHOULDER TAPER DETAIL

Notes:

1. Variables:
   S=Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
   W=Width of offset in feet
   L=Taper length in feet. Speeds 45 mph or greater L=WS.
2. Place signs and barricades on the roadway on moveable assemblies. Mount signs on barricades with the sign bottom on the top of the top barricade bar.
3. Install signs R4-1-48, W6-3-48, and W20-52P-54 at one mile increments and after each interchange.
4. Place the speed limit sign only if the crossover is more than 1 mile from an interchange exit ramp.
5. 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)
6. Cover existing speed limit signs within a reduced speed zone.
7. Upon approval, the Engineer will measure obliterated or covered pavement marking 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. Reduce speed when placing traffic control devices. Place "Minimum Fee $80" signs below speed limit signs in reduced speed areas. Place "Work Zone Speed Limit Enforced" sign in advance of the project at the time traffic control devices are installed.
10. Determine proper size, waterproof junction box, and attach to skid or vertical brace assembly.

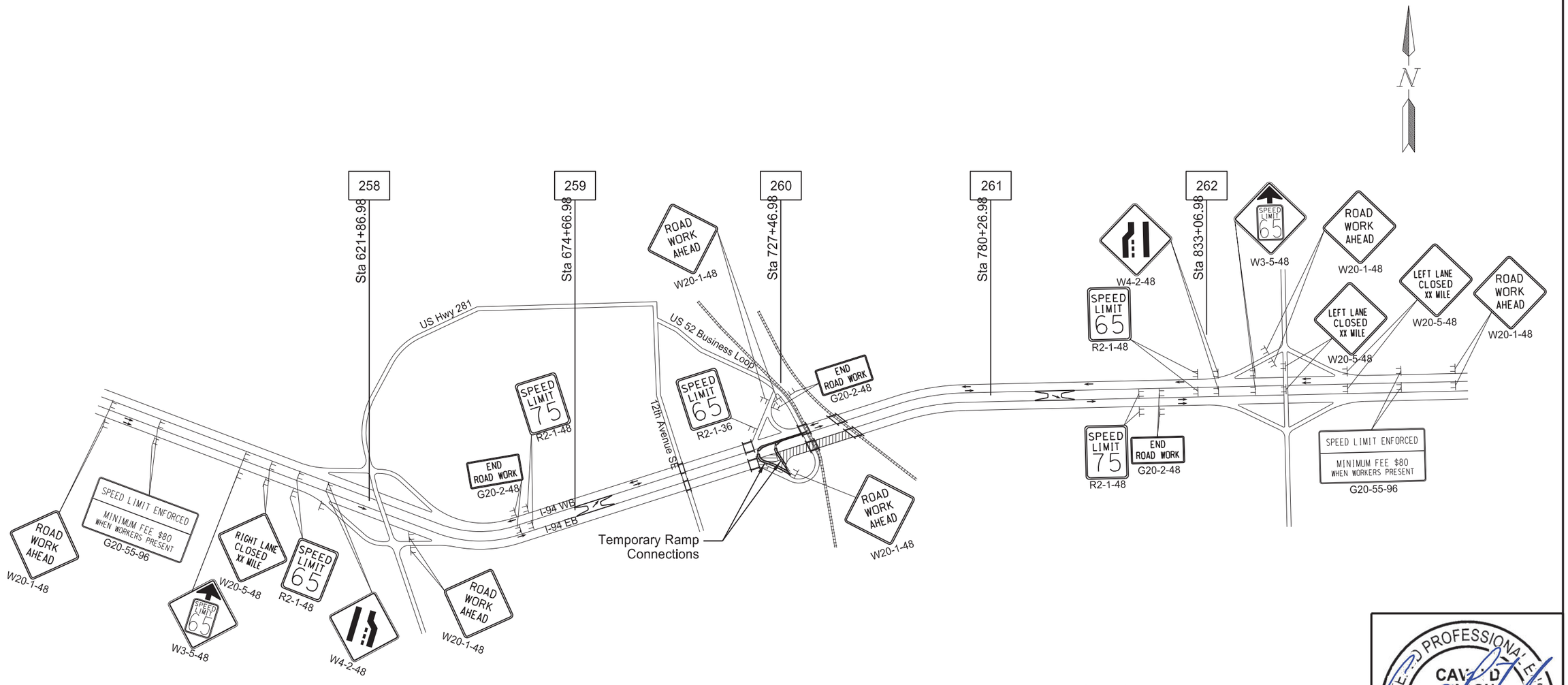
REGISTERED PROFESSIONAL ENGINEER
CAVALIER ENGINEER
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 2 & 3

Traffic Control Detail

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	15



Legend

Work Area - Phase 2

Work Area - Phase 3

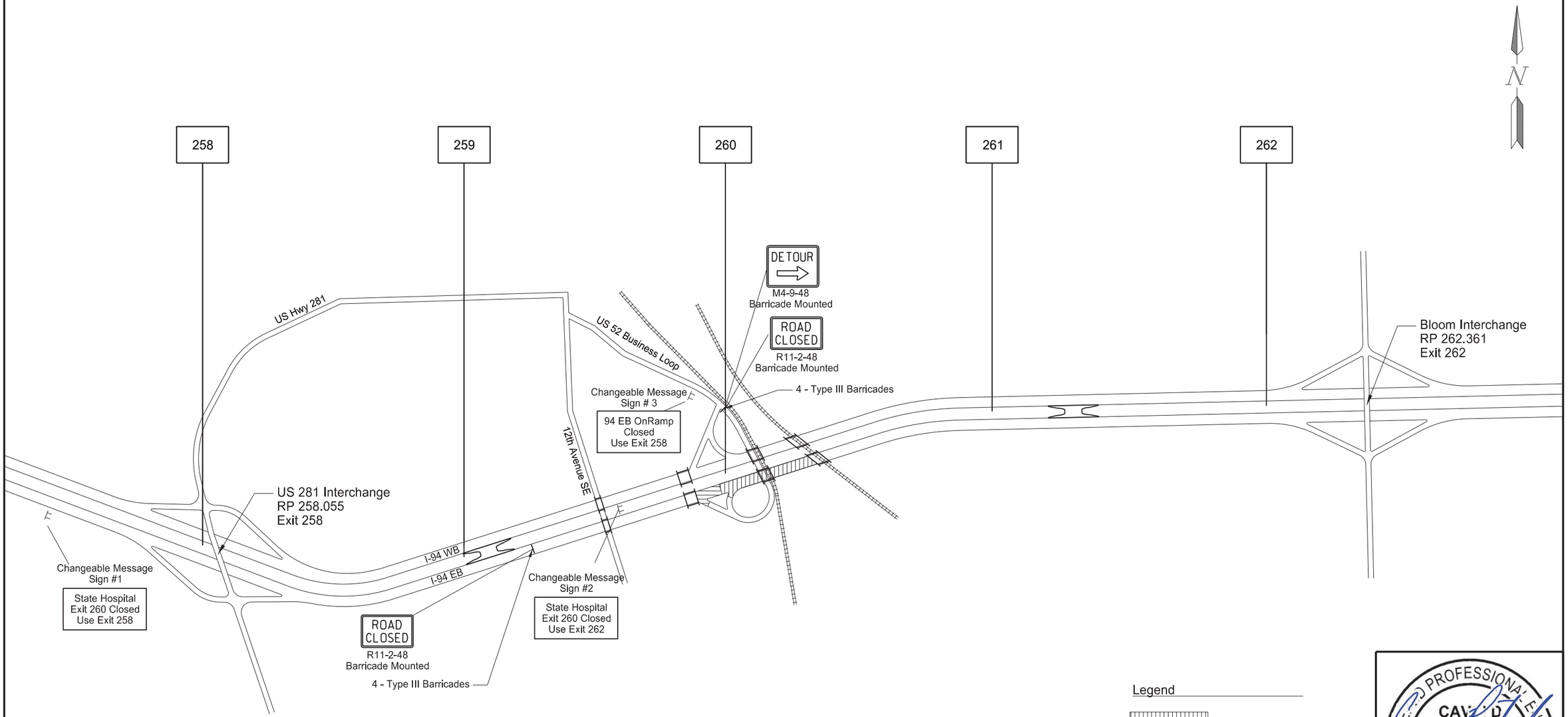
REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Terminal Sign Layout - Phase 2 & 3

Notes:
1. See Standard Drawing D-704-38 &D-704-39 for sign spacing and additional traffic control devices required.
2. Cover or remove upon completion of the work day or when workers are not present.
3. Terminal signing shown. See Work Zone Traffic Control Sheets for Phases 2 & 3 for additional signs and details.

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	16



Legend

Work Area - Phase 2

Work Area - Phase 3

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

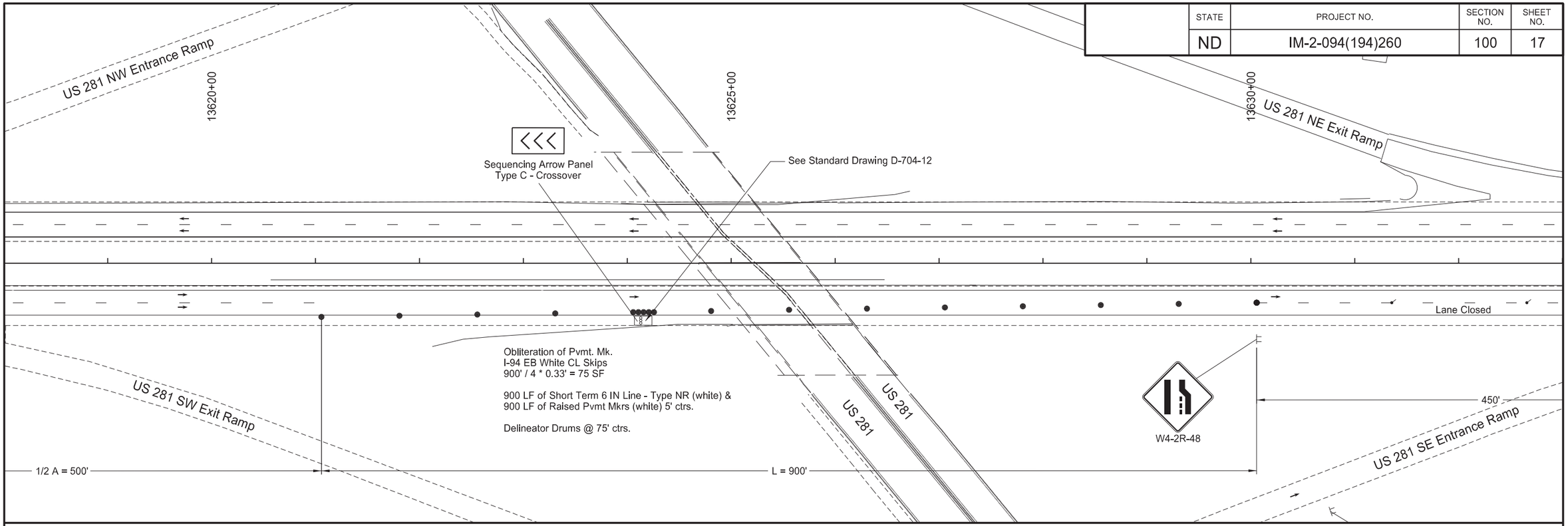
Notes:
1. See Sec 6 Plan Notes when the Detour can be used.

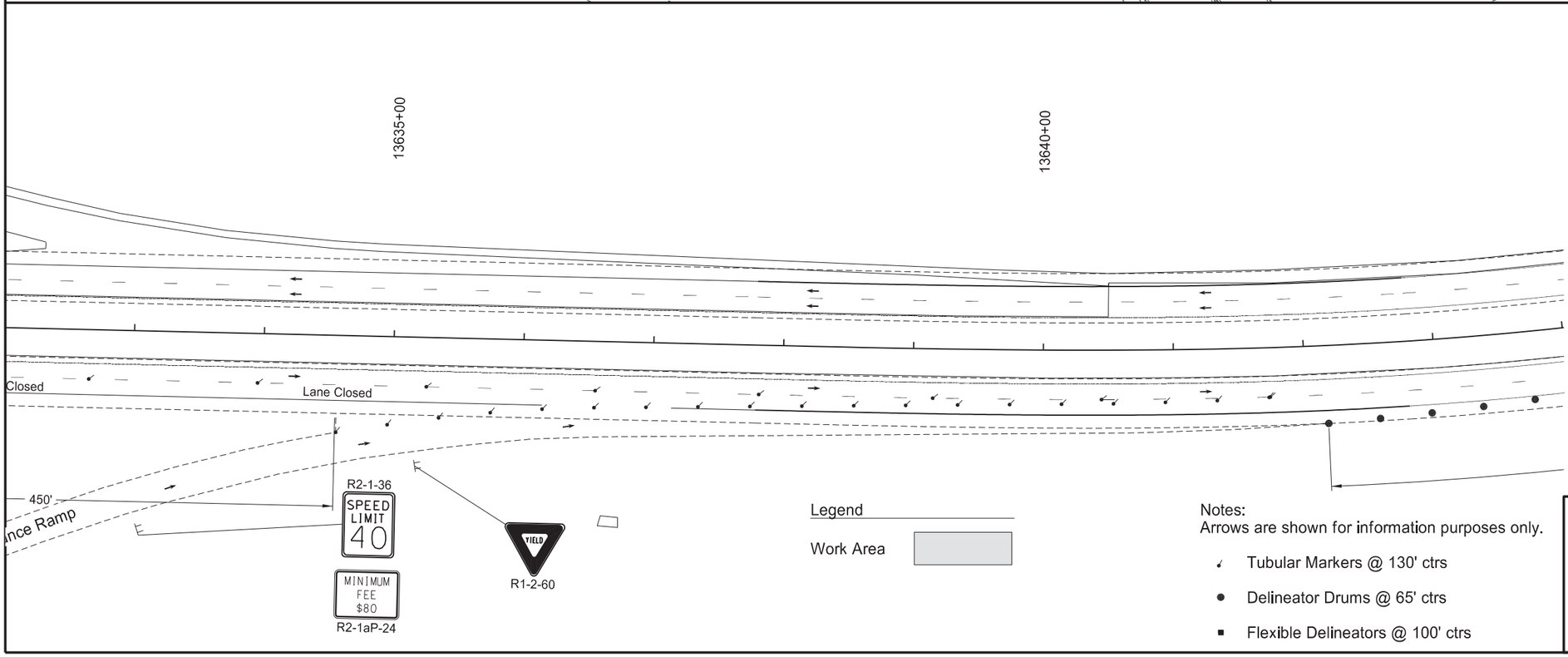
Work Zone Traffic Control

Phase 2

Detour Layout

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	17





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

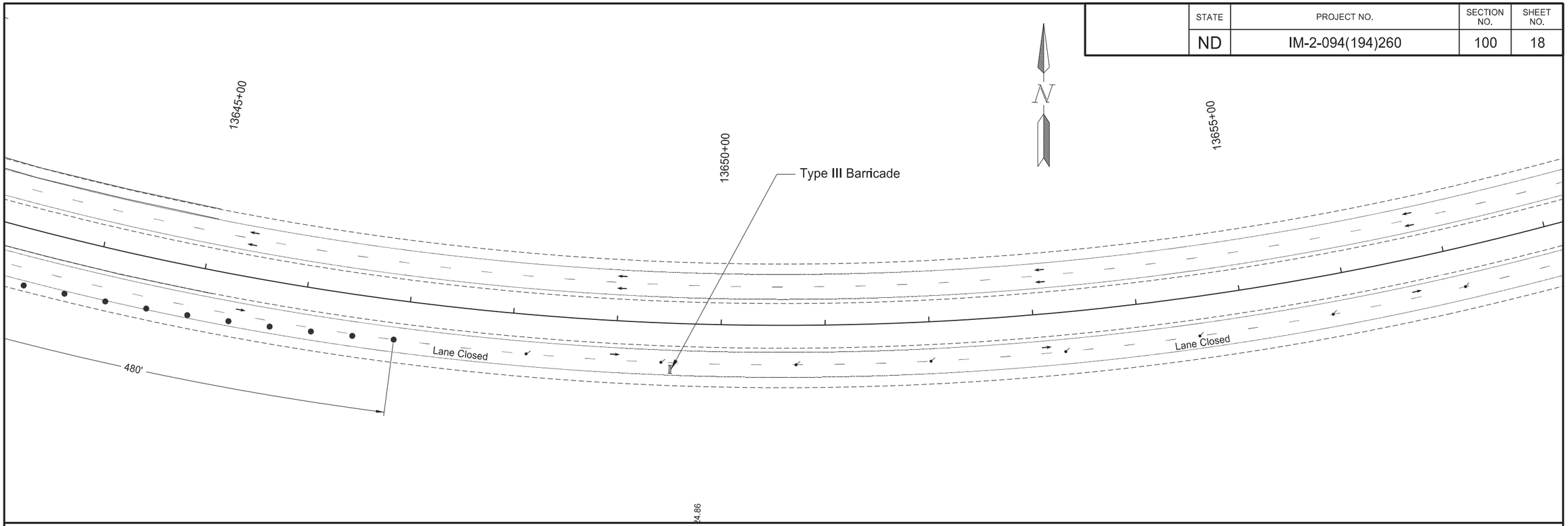
REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

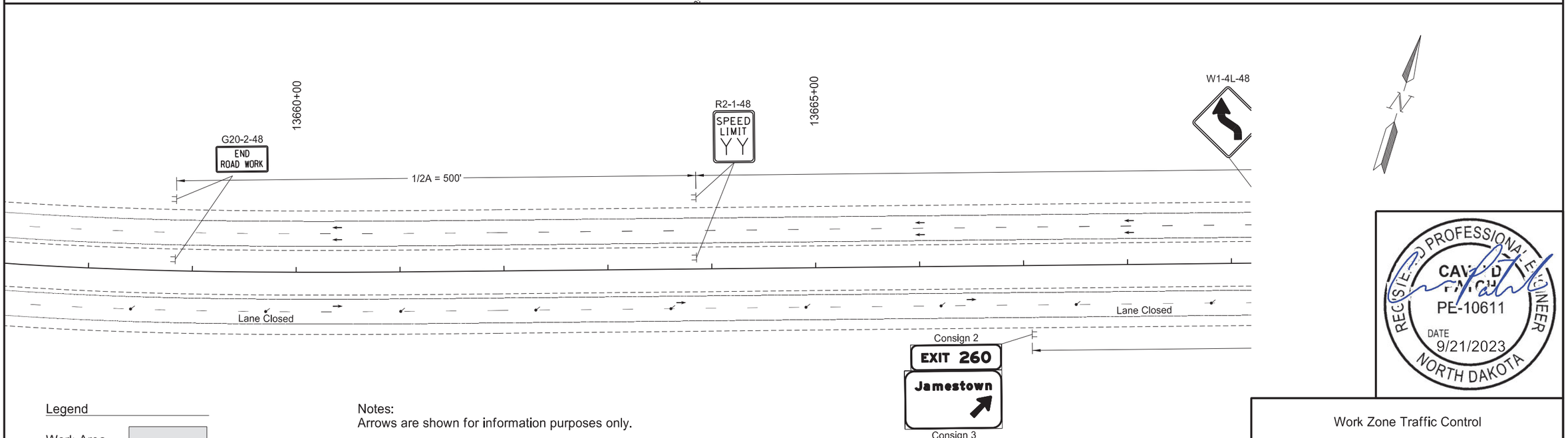
Work Zone Traffic Control

Phase 2

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	18





Legend

Work Area

Notes:
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- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

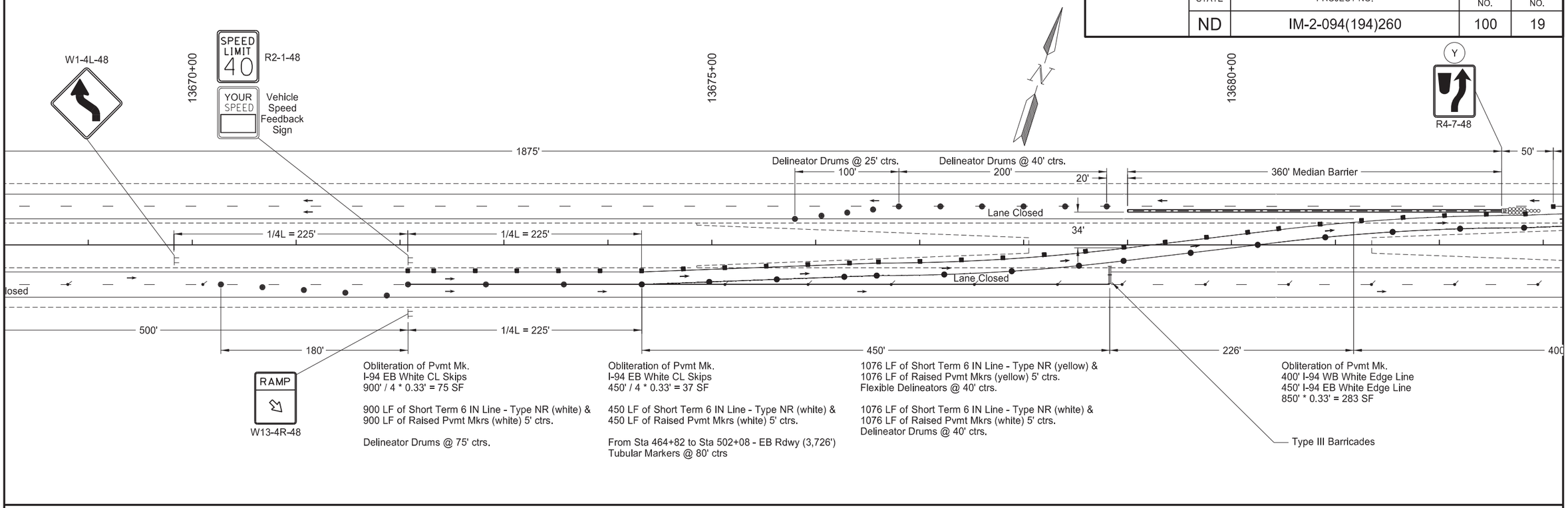
REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

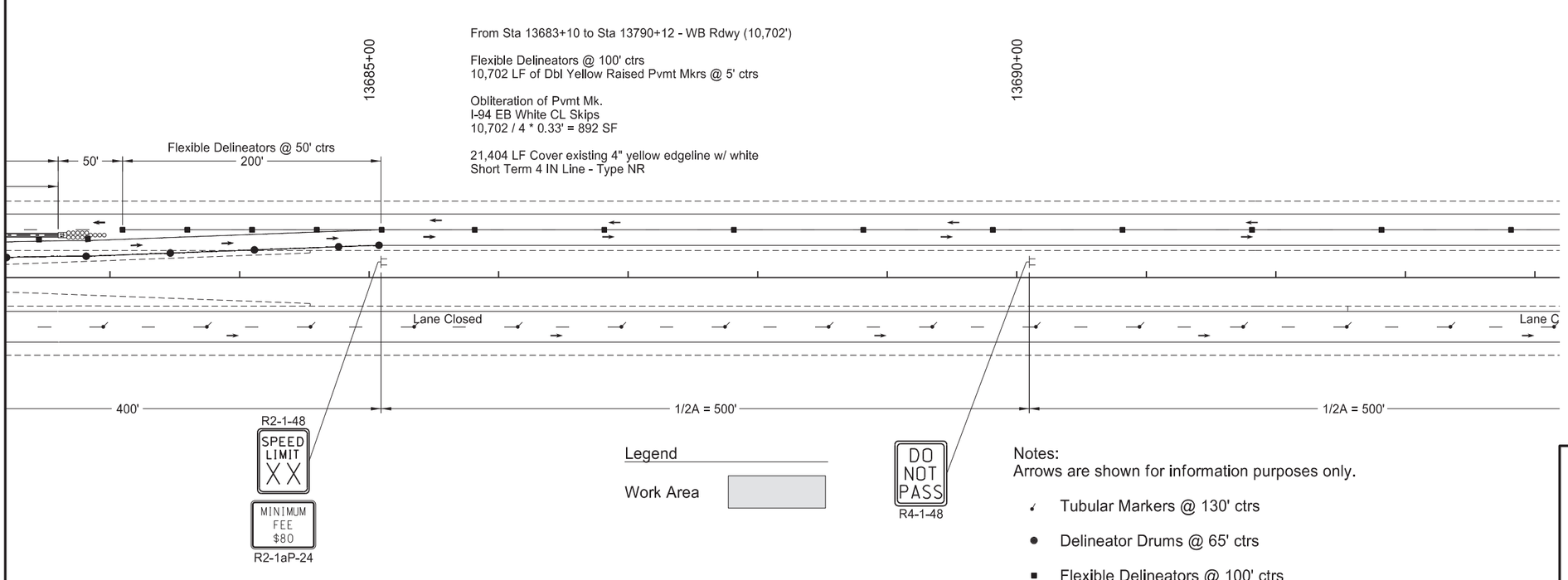
Work Zone Traffic Control

Phase 2

Traffic Control Devices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	19





Legend

Work Area

Notes:
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- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAVID FINCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 2

Traffic Control Devices

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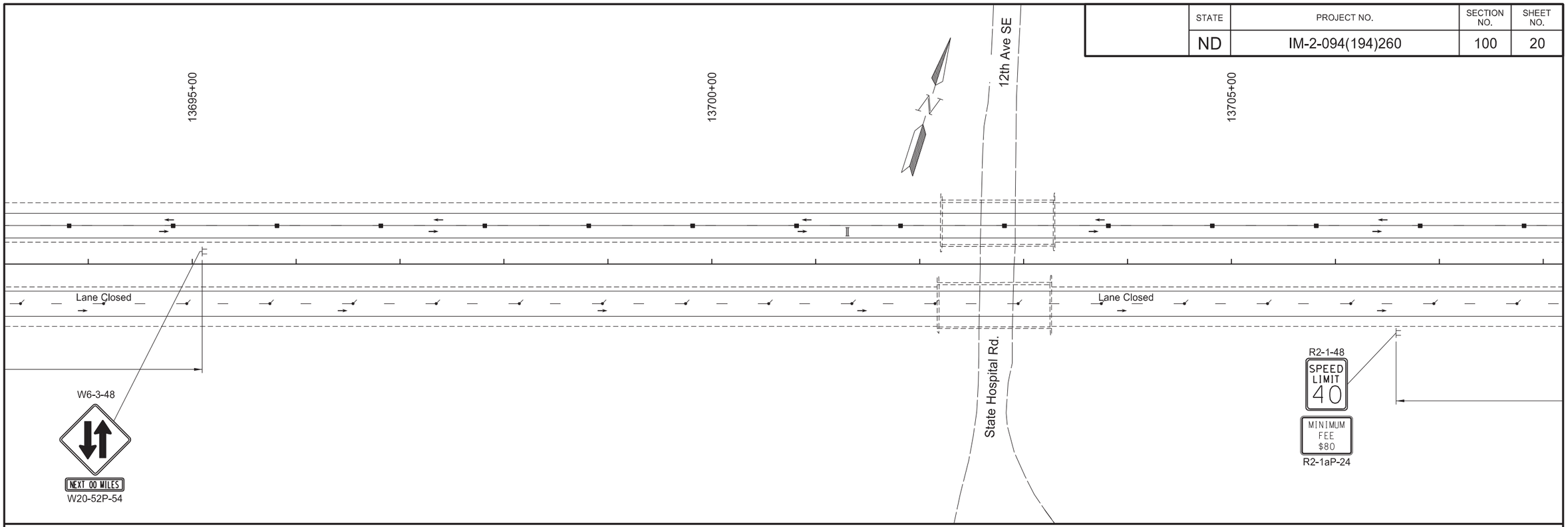
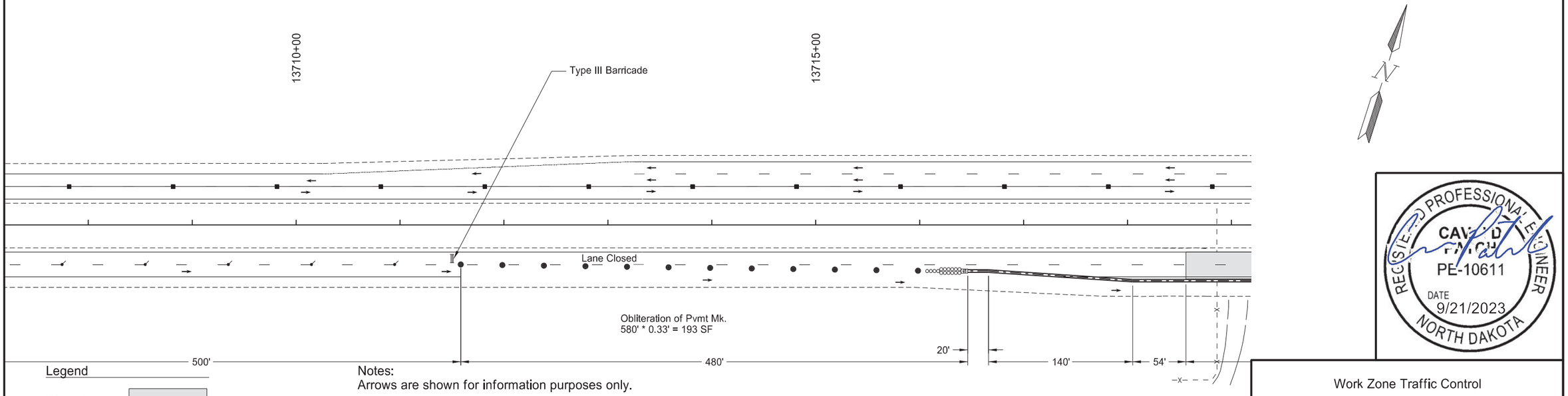
	ND	IM-2-094(194)260	100	20





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 2a

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	21

N

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

BNRR & SE Jamestown NW Loop Exit Ramp

13720+00

13725+00

13730+00

W4-5-48

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

Lane Closed
Lane Closed

54'

256' Bridge

100'

James River

Temp Ramp 1
Obliteration of Pvmt Mk.
60' * 0.33' = 20 SF

150 LF of Short Term 6 IN Line - Type NR (white)
242 LF of Short Term 6 IN Line - Type NR (yellow)

Barricade Mounted
ROAD CLOSED
R11-2-48
W1-6-48

EXIT
260
Consign 1

W1-1-48

15
M.P.H.
W13-1P-30

Barricade Mounted
W1-6-48
ROAD CLOSED
R11-2-48

Temp Ramp 2
Obliteration of Pvmt Mk.
30' * 0.33' = 10 SF
30' * 0.33' = 10 SF

1121 LF of Short Term 6 IN Line - Type NR (white)
1085 LF of Short Term 6 IN Line - Type NR (yellow)

REGISTERED PROFESSIONAL ENGINEER
CAVIN D. PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Legend

Work Area

Notes:
Arrows are shown for information purposes only.

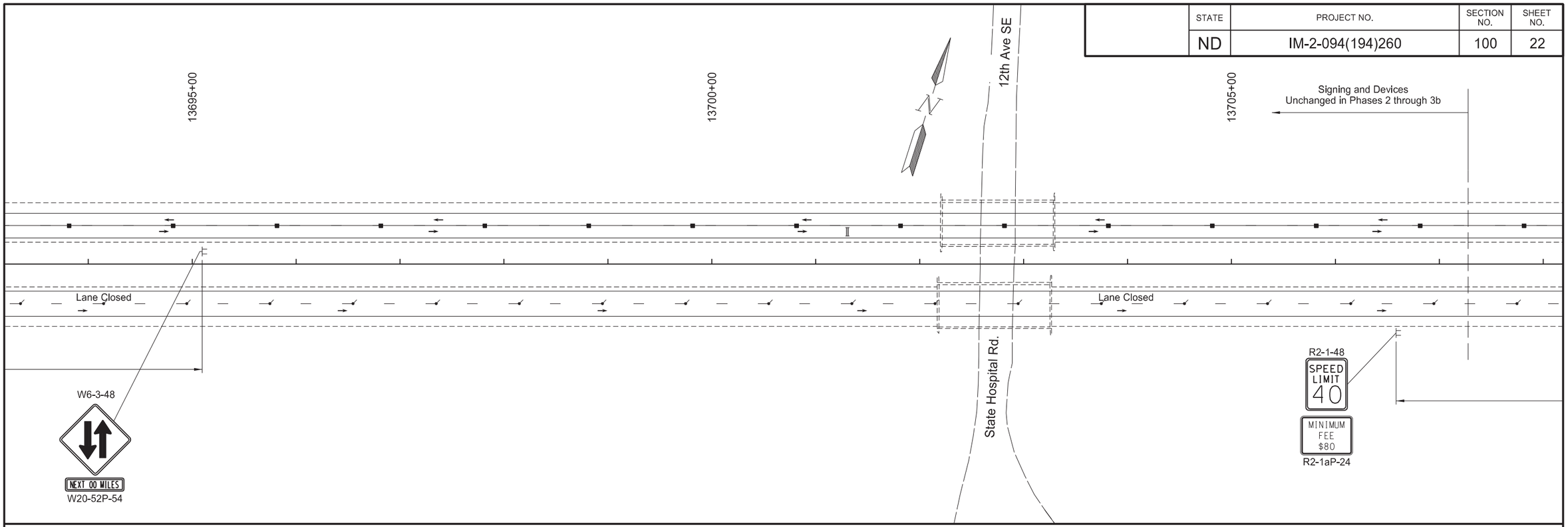
- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

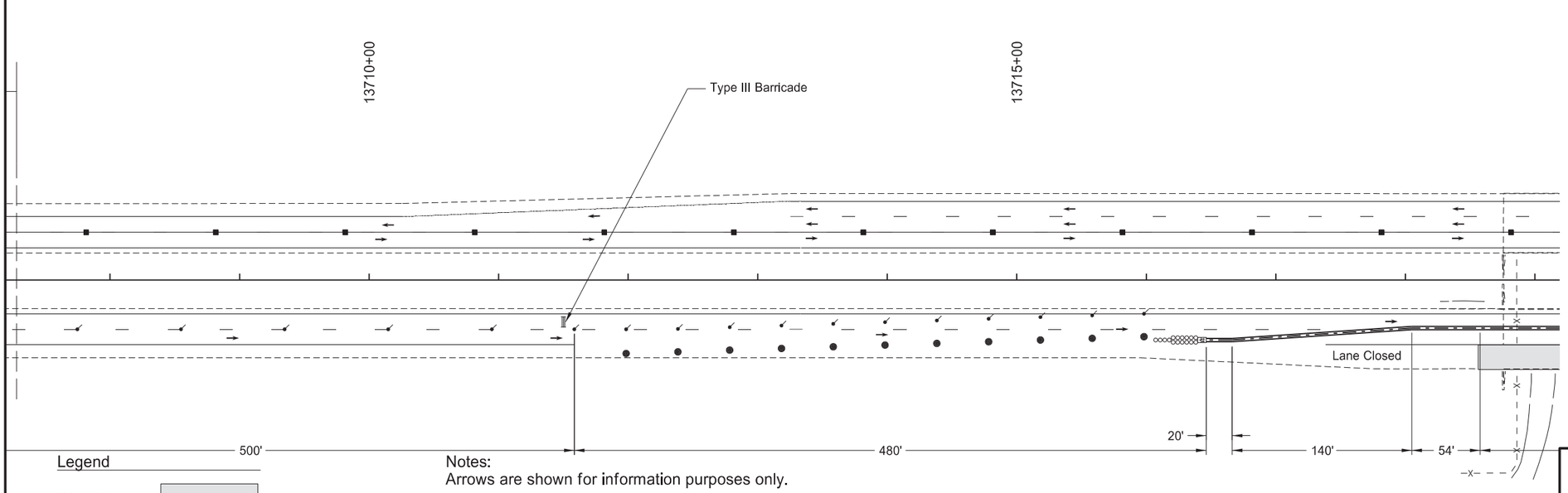
Work Zone Traffic Control

Phase 2a

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	22





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAMERON PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 2b

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	23

N

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

BNRR & SE Jamestown NW Loop Exit Ramp

13720+00

13725+00

13730+00

W4-5-48

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

Signing and Devices unchanged in phases 2 through 3b

Lane Closed

54' 256' Bridge 100'

James River

W1-1-48

15 M.P.H.
W13-1P-30

EXIT 260
Consign 1

Barricade Mounted
ROAD CLOSED
R11-2-48 W1-6-48

Barricade Mounted
W1-6-48 ROAD CLOSED R11-2-48

Barricade Mounted
W1-6-48 ROAD CLOSED R11-2-48

REGISTERED PROFESSIONAL ENGINEER
CAL[illegible] PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Legend

Work Area

Notes:
Arrows are shown for information purposes only.

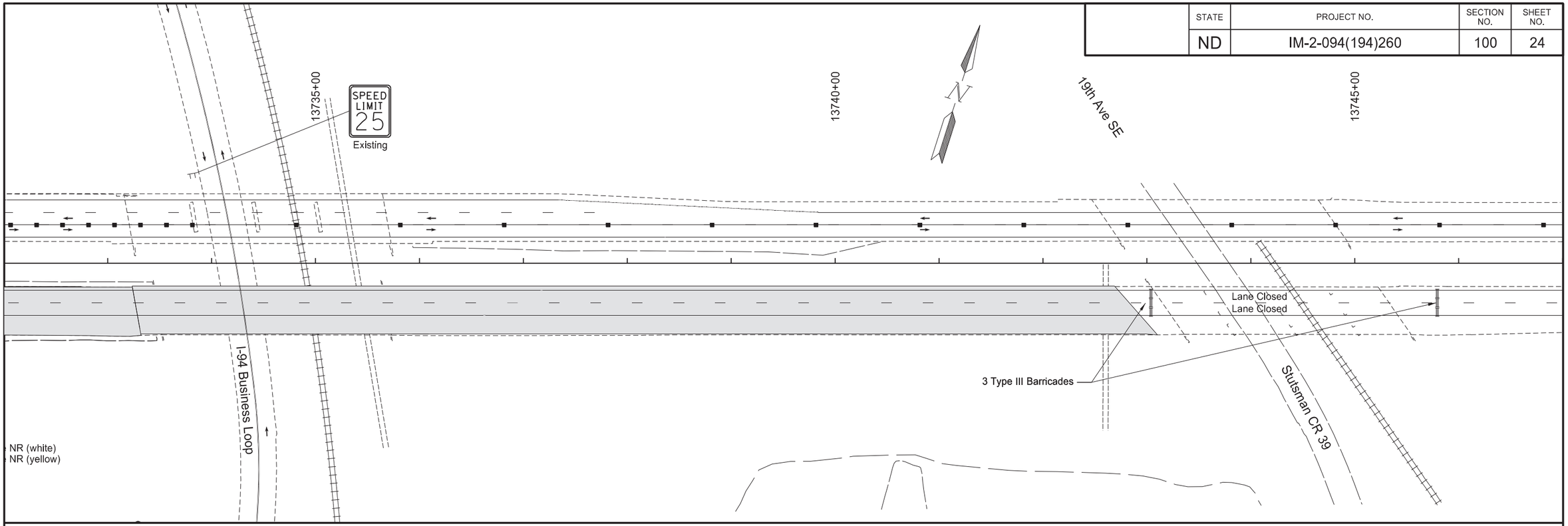
- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

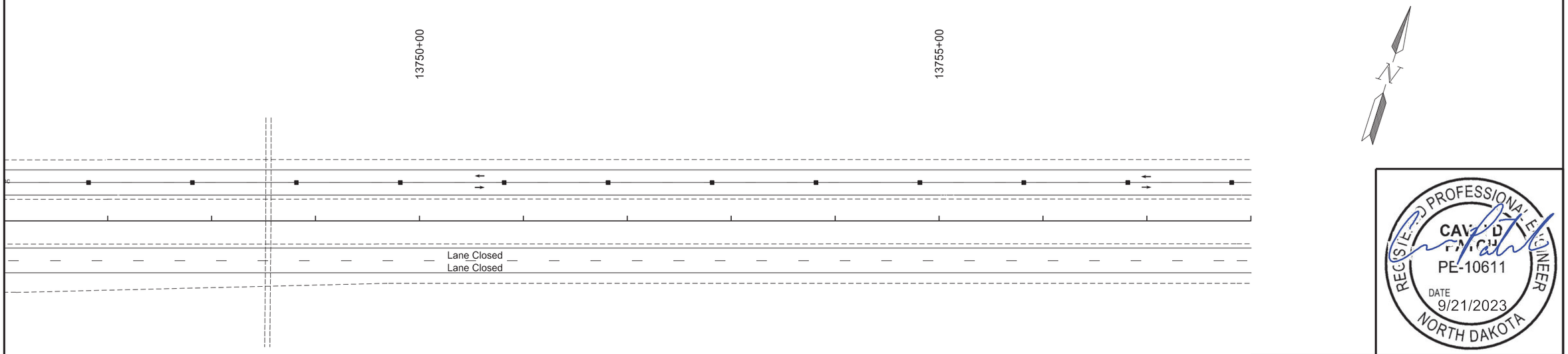
Work Zone Traffic Control

Phase 2b

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	24





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

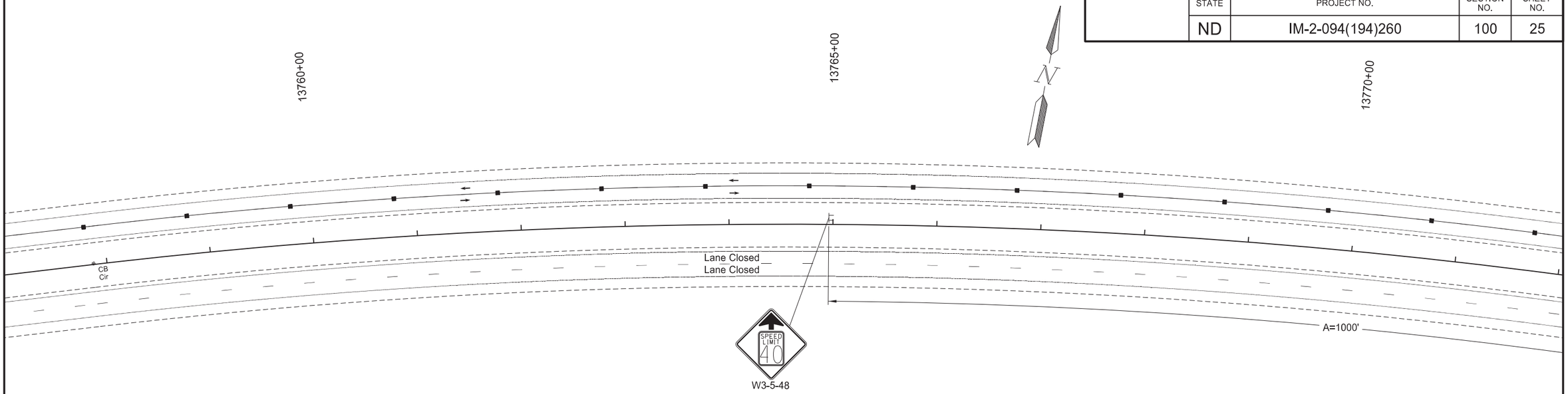
REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

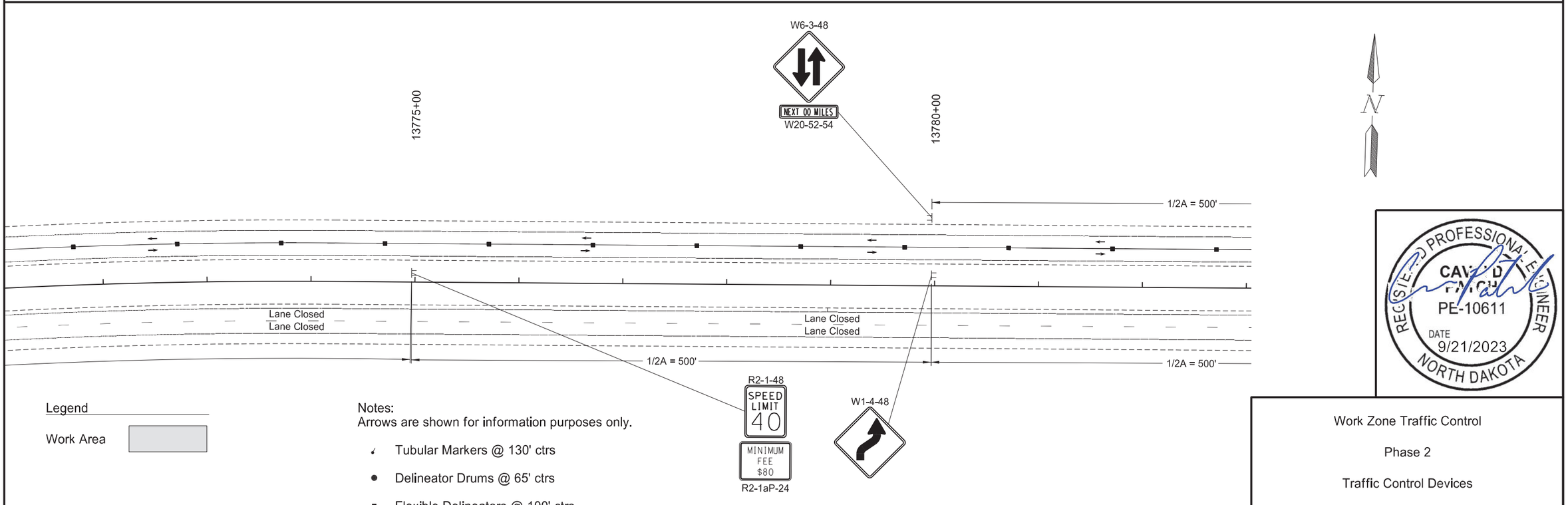
Work Zone Traffic Control

Phase 2

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	25





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

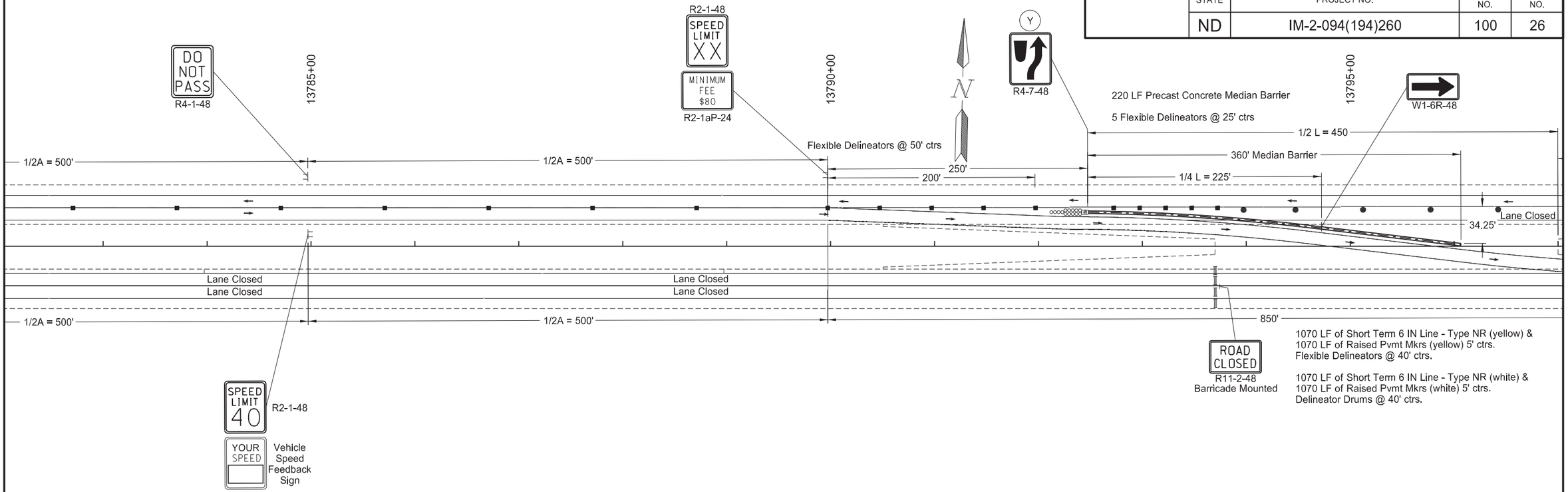
REGISTERED PROFESSIONAL ENGINEER
CAL[illegible]
PE-10611
DATE 9/21/2023
NORTH DAKOTA

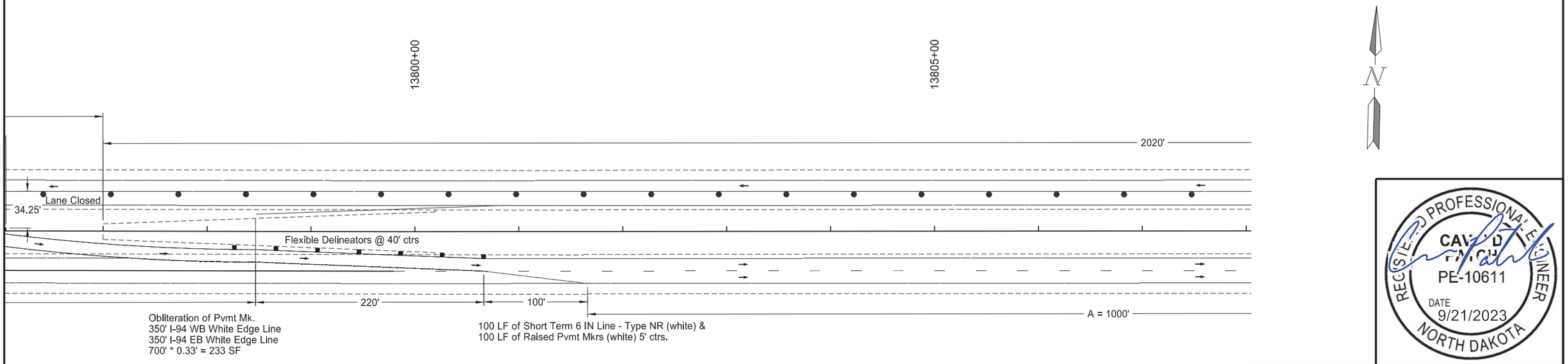
Work Zone Traffic Control

Phase 2

Traffic Control Devices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	26





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

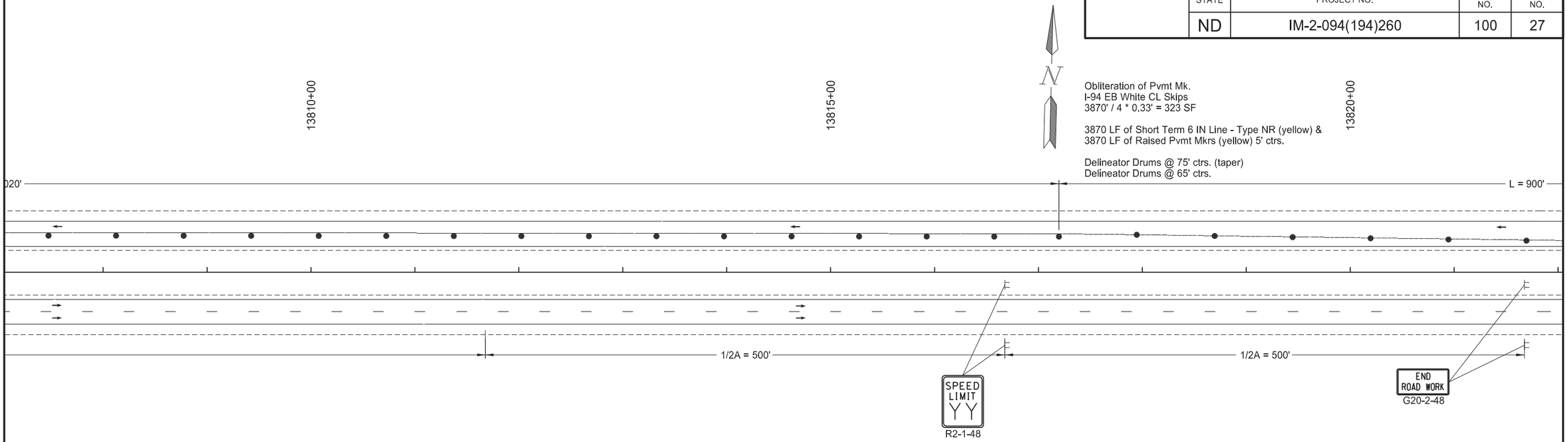
REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 2

Traffic Control Devices

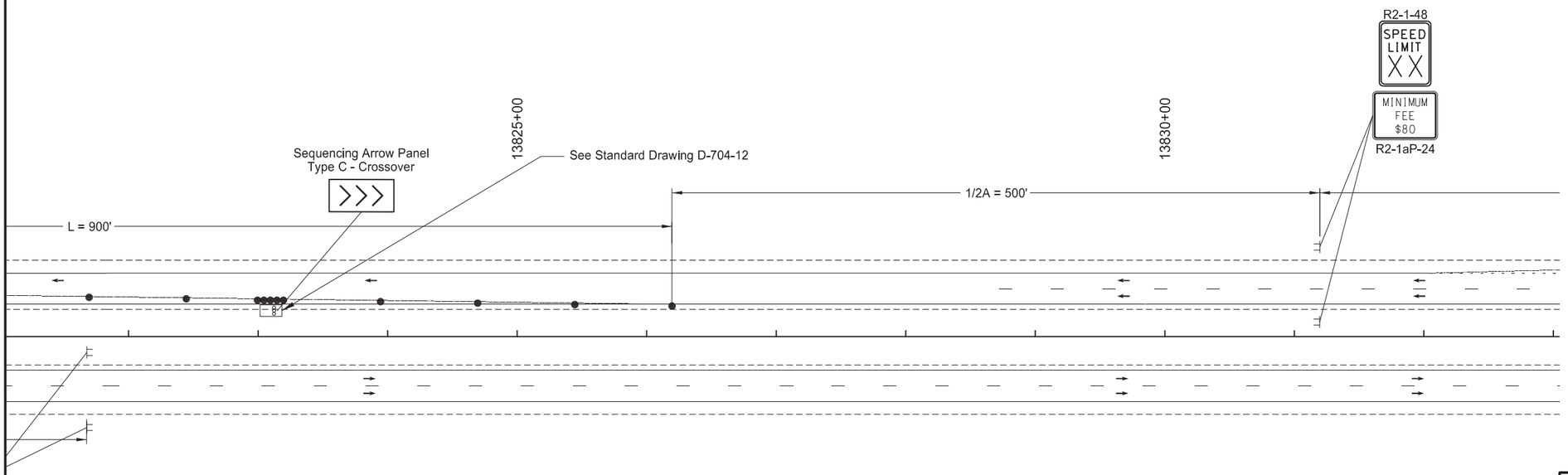
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	27



Obliteration of Pvmt Mk.
I-94 EB White CL Skips
3870' / 4 * 0.33' = 323 SF

3870 LF of Short Term 6 IN Line - Type NR (yellow) &
3870 LF of Raised Pvmt Mkrs (yellow) 5' ctrs.

Delineator Drums @ 75' ctrs. (taper)
Delineator Drums @ 65' ctrs.



Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAMERON PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 2

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	28

Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

SPEED LIMIT 25 Existing

137+35+00

I-94 Business Loop

W20-7-48

BE PREPARED TO STOP W3-4-48

END ROAD WORK G20-2-48

SPEED LIMIT ENFORCED
MINIMUM FEE $80
WHEN WORKERS PRESENT
G20-55-96

137+30+00

BNRR & SE Jamestown NW Loop Exit Ramp

R2-1-36 SPEED LIMIT XX

MINIMUM FEE $80 R2-1aP-24

Temp Ramp 2
Obliteration of Pvmt Mk.
30' * 0.33 = 10 SF
30' * 0.33 = 10 SF

1121 LF of Short Term 6 IN Line - Type NR (white)
1085 LF of Short Term 6 IN Line - Type NR (yellow)

Barricade Mounted ROAD CLOSED R11-2-48 W1-6-48

W1-1-48

15 M.P.H. W13-1P-30

REGISTERED PROFESSIONAL ENGINEER
CAVELL PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Bridge Replacement

Phase 2

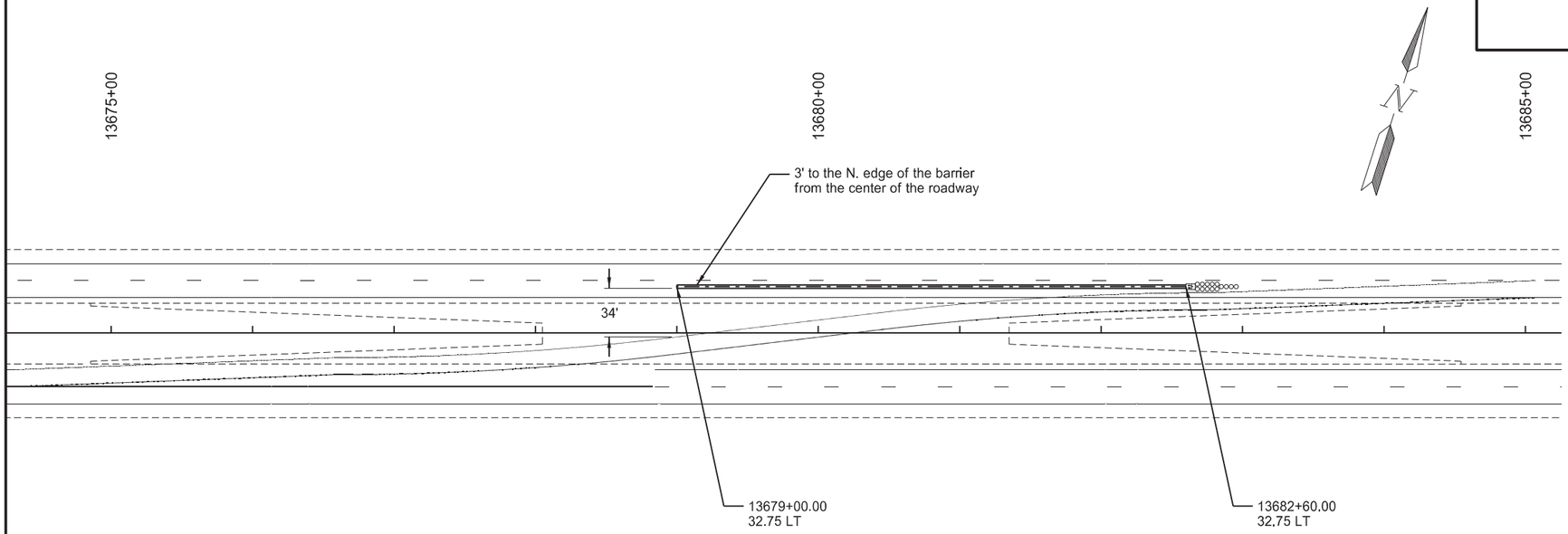
Traffic Control Devices

9/6/2023 6:34:08 AM cpatch R:\project\20094260.194\design\Sheets\100WZ_028_Bridge_Replacement_Phase_2.dgn

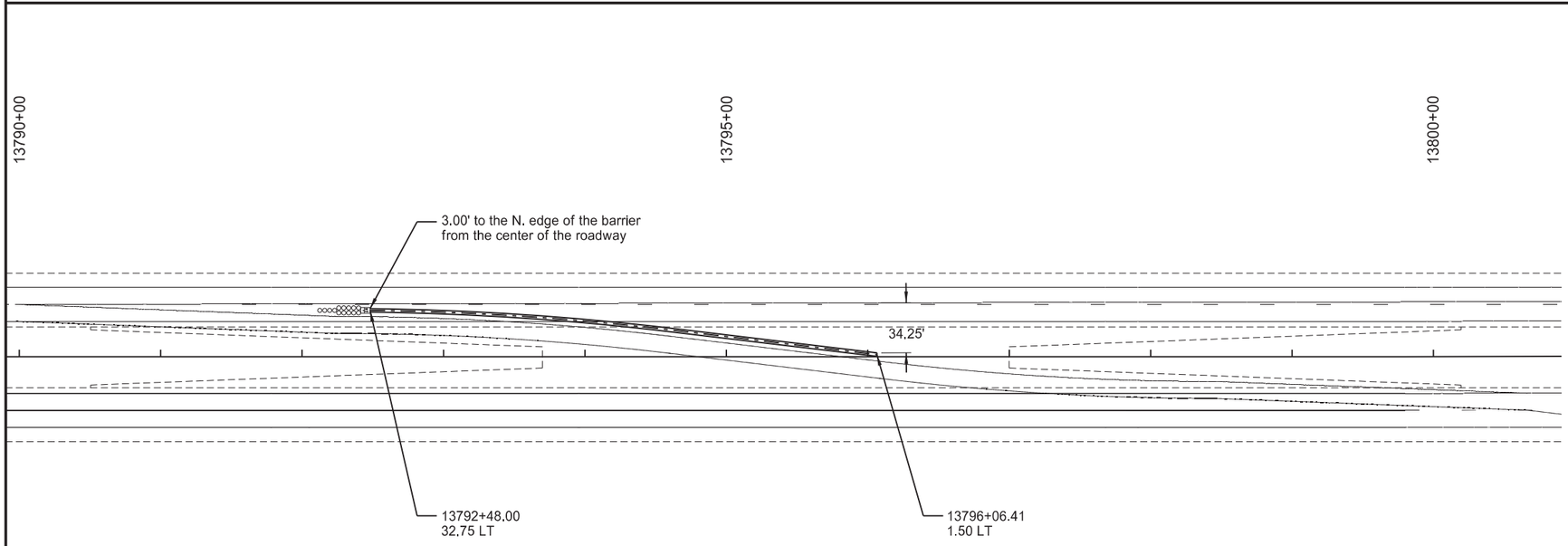
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	29

Spec	Code	Bid Item	Quantity	Unit
704	3511	STATE FURNISHED MEDIAN BARRIER		
		West Crossover	360	LF
		East Crossover	360	LF

Note:
All stations and offsets are measured to the center of the 2.5' wide concrete jersey barrier.



West Crossover



East Crossover

REGISTERED PROFESSIONAL ENGINEER
CAL[illegible]
PE-10611
DATE
9/21/2023
NORTH DAKOTA

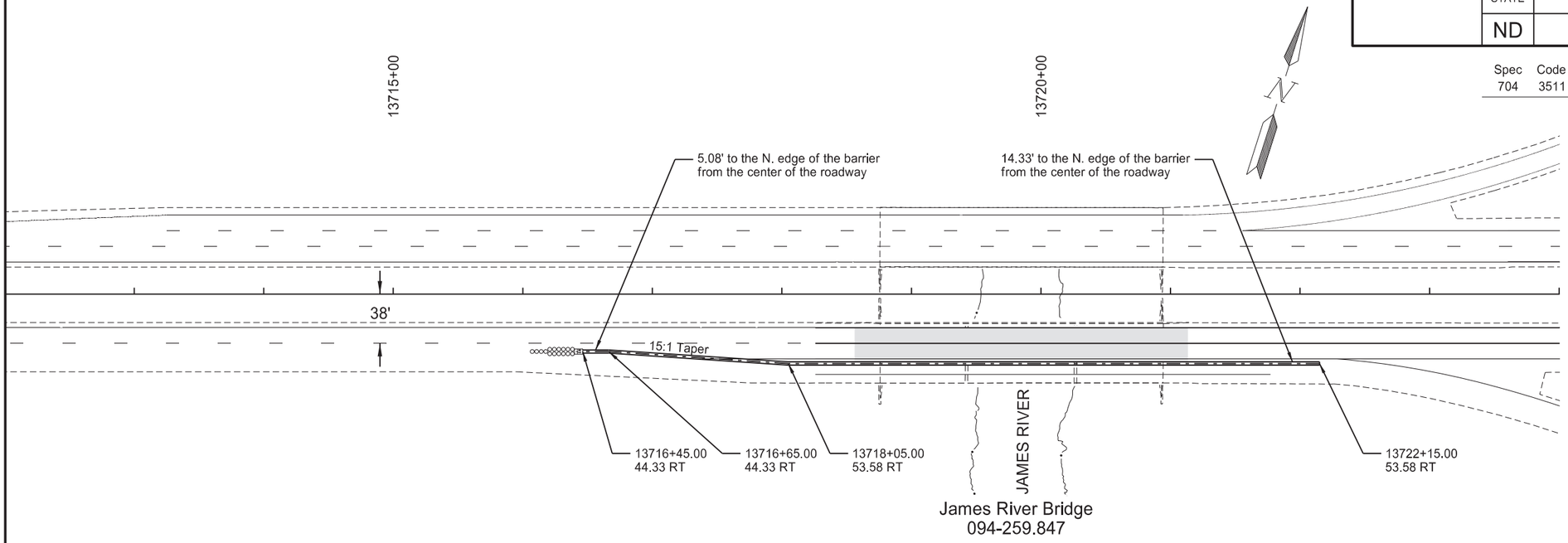
Barrier Layout

Work Zone Traffic Control

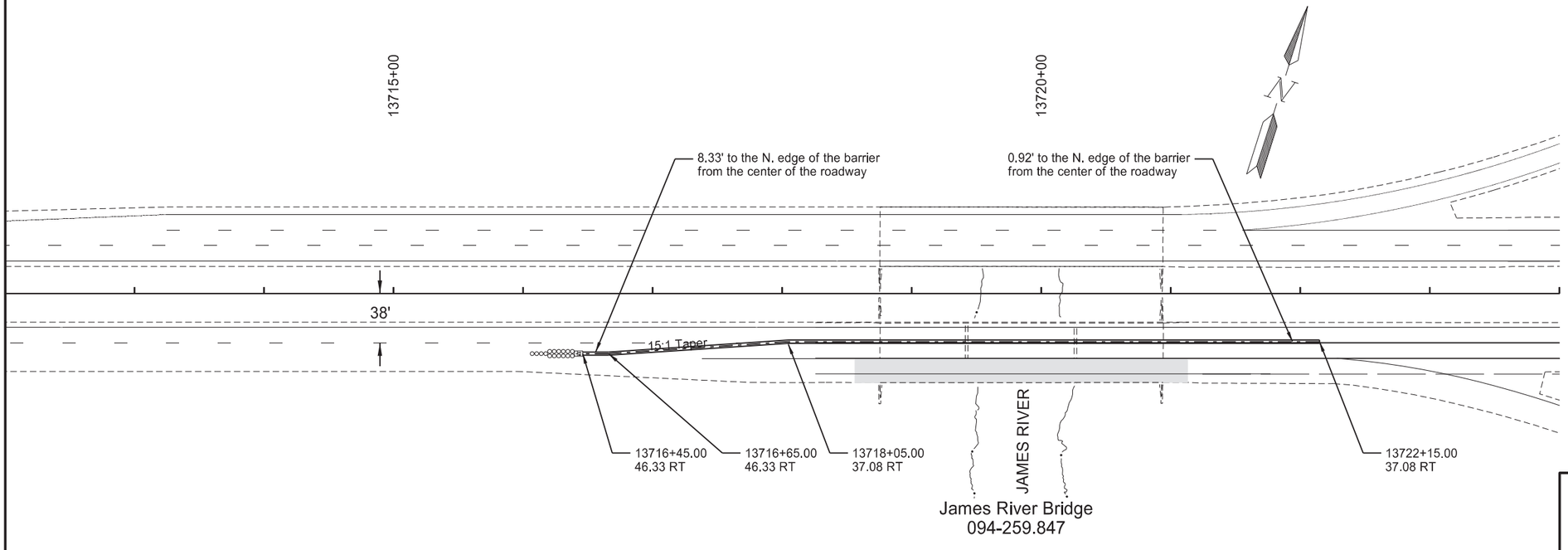
West & East Median Crossovers

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	30

Spec	Code	Bid Item	Quantity	Unit
704	3511	STATE FURNISHED MEDIAN BARRIER		
		Bridge Barrier	570	LF



Note:
All stations and offsets are measured to the center of the 2.5' wide concrete jersey barrier.



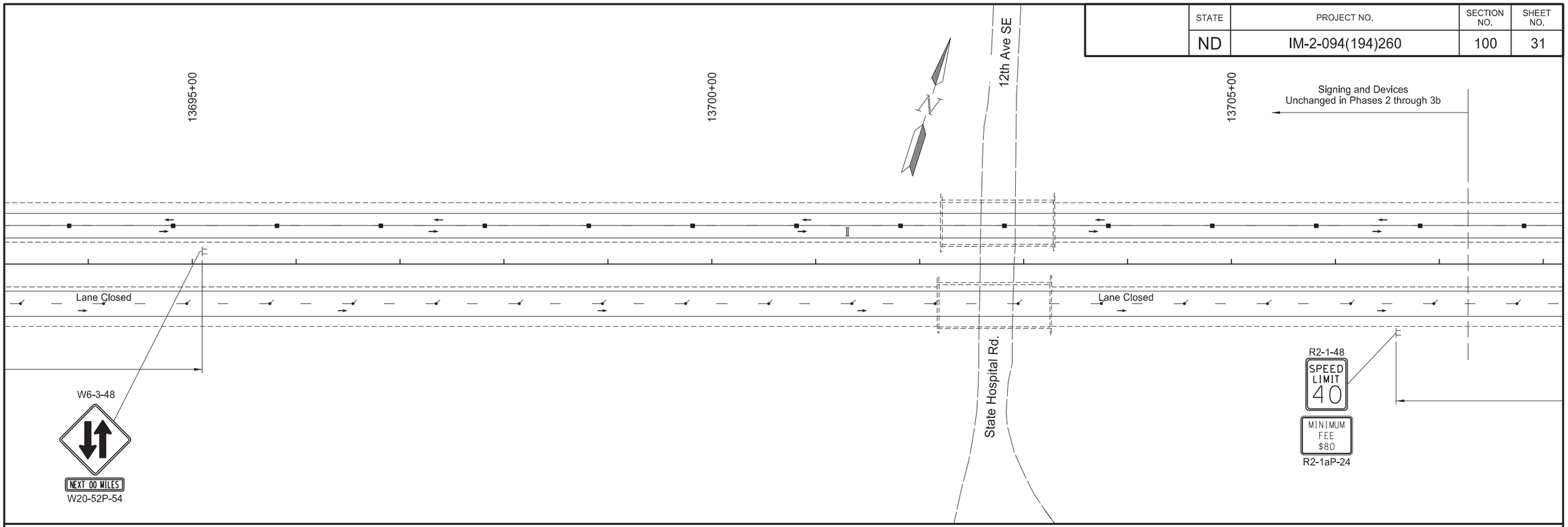
REGISTERED PROFESSIONAL ENGINEER
CAL[illegible]
PE-10611
DATE 9/21/2023
NORTH DAKOTA

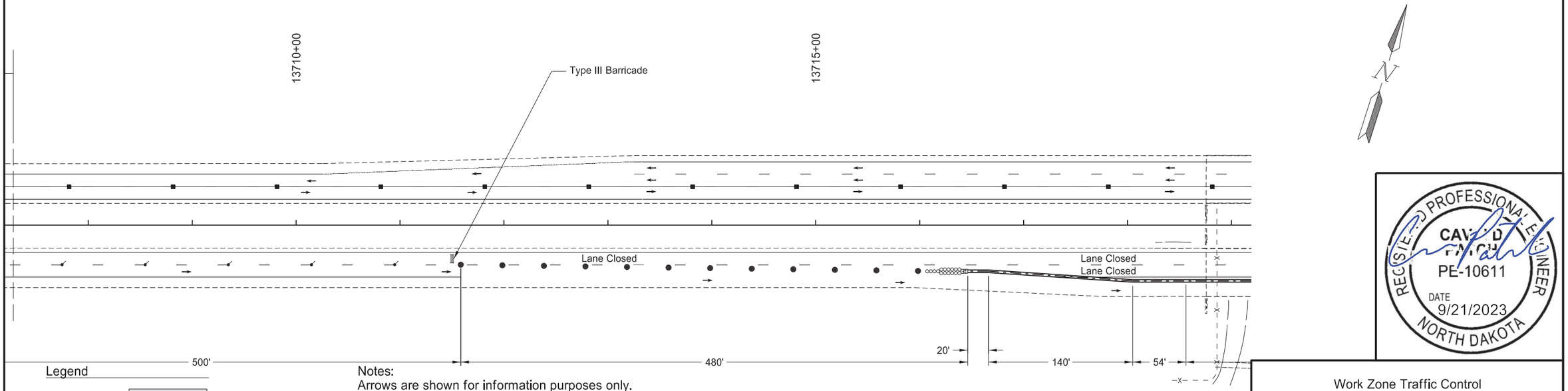
Barrier Layout

Work Zone Traffic Control

James River Bridge

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	31





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 3a

Traffic Control Devices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	32

N

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

W3-4-48
TO STOP

W20-7-48

BNRR & SE Jamestown NW Loop Exit Ramp

13720+00

13725+00

13730+00

W4-5-48

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

Signing and Devices unchanged in phases 2 through 3b

Lane Closed
Lane Closed

Lane Closed
Lane Closed

54' 256' Bridge 100'

James River

Barricade Mounted
W1-6-48 ROAD CLOSED R11-2-48

Lane Closed

W1-1-48

15 M.P.H.
W13-1P-30

Barricade Mounted
W1-6-48 ROAD CLOSED R11-2-48

EXIT 260
Consign 1

Barricade Mounted
ROAD CLOSED R11-2-48 W1-6-48

REGISTERED PROFESSIONAL ENGINEER
CAVALIER PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Legend

Work Area

Notes:
Arrows are shown for information purposes only.

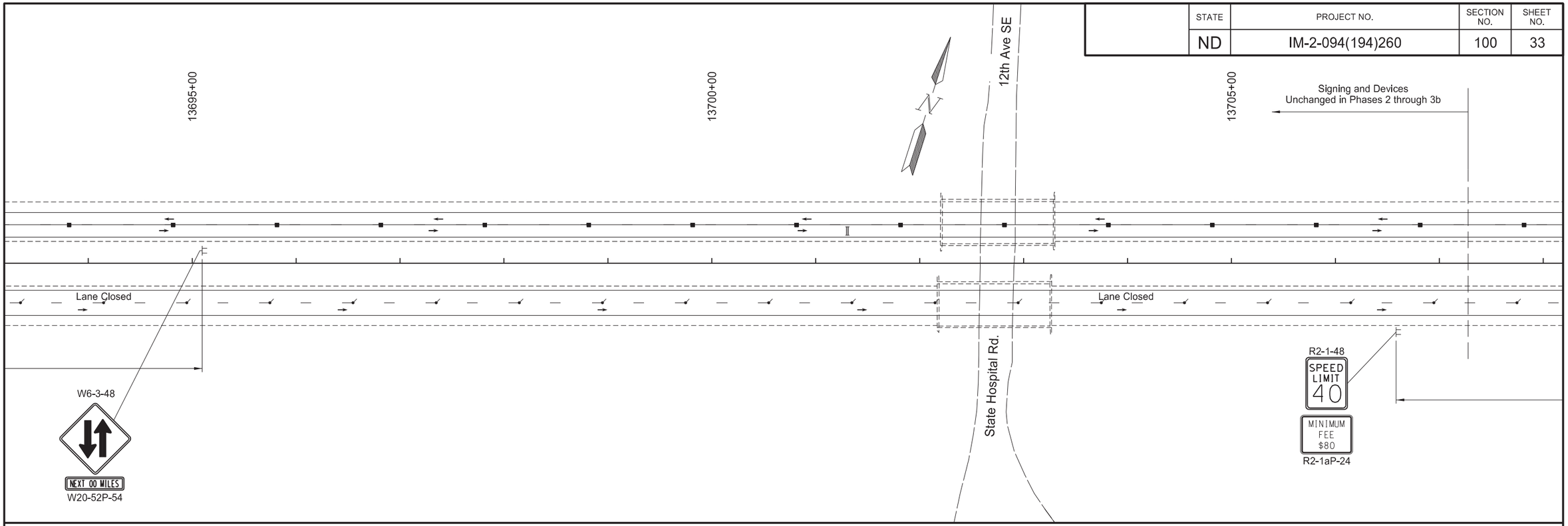
- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

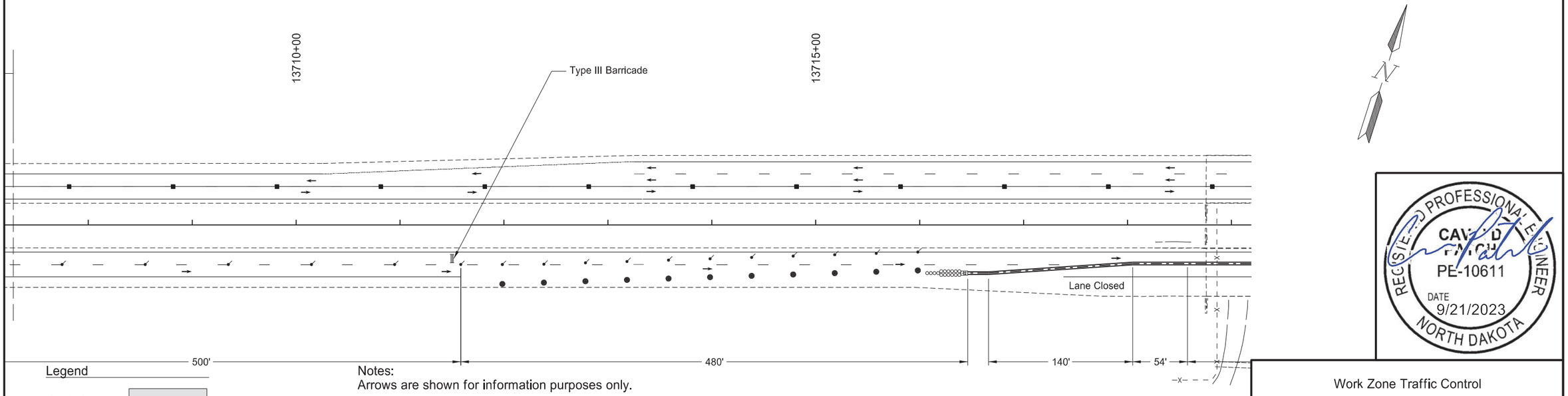
Work Zone Traffic Control

Phase 3a

Traffic Control Devices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	33





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 3b

Traffic Control Devices

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	34

N

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

TO STOP
W3-4-48

W20-7-48

BNRR & SE Jamestown NW Loop Exit Ramp

13720+00

13725+00

13730+00

W4-5-48

R2-1-36
SPEED LIMIT XX
MINIMUM FEE $80
R2-1aP-24

Signing and Devices unchanged in phases 2 through 3b

Lane Closed
Lane Closed

54' 256' Bridge 100'

James River

EXIT 260
Consign 1

Barricade Mounted
ROAD CLOSED R11-2-48 W1-6-48

Barricade Mounted
ROAD CLOSED R11-2-48 W1-6-48

Lane Closed

W1-1-48

15 M.P.H.
W13-1P-30

Barricade Mounted
W1-6-48 ROAD CLOSED R11-2-48

Barricade Mounted
ROAD CLOSED R11-2-48 W1-6-48

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Legend

Work Area

Notes:
Arrows are shown for information purposes only.

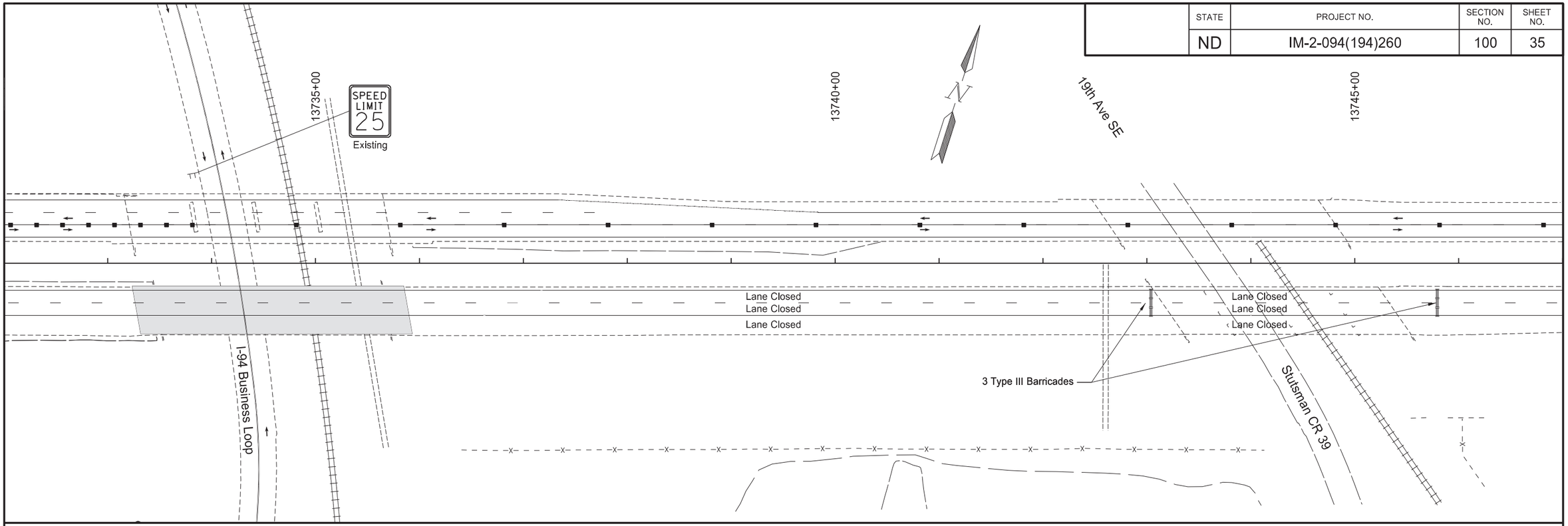
- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

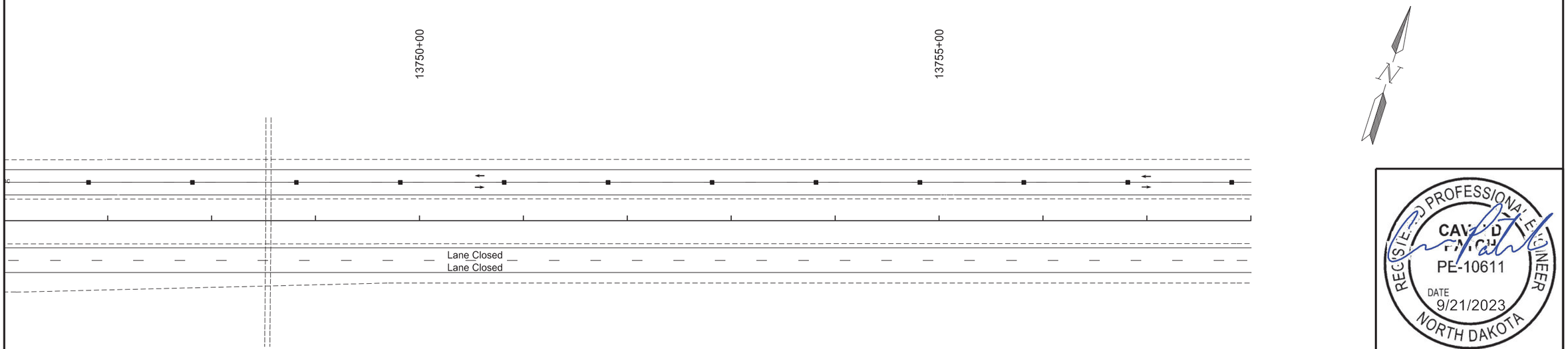
Work Zone Traffic Control

Phase 3b

Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	35





Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs

REGISTERED PROFESSIONAL ENGINEER
CAVID PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Work Zone Traffic Control

Phase 3

Traffic Control Devices

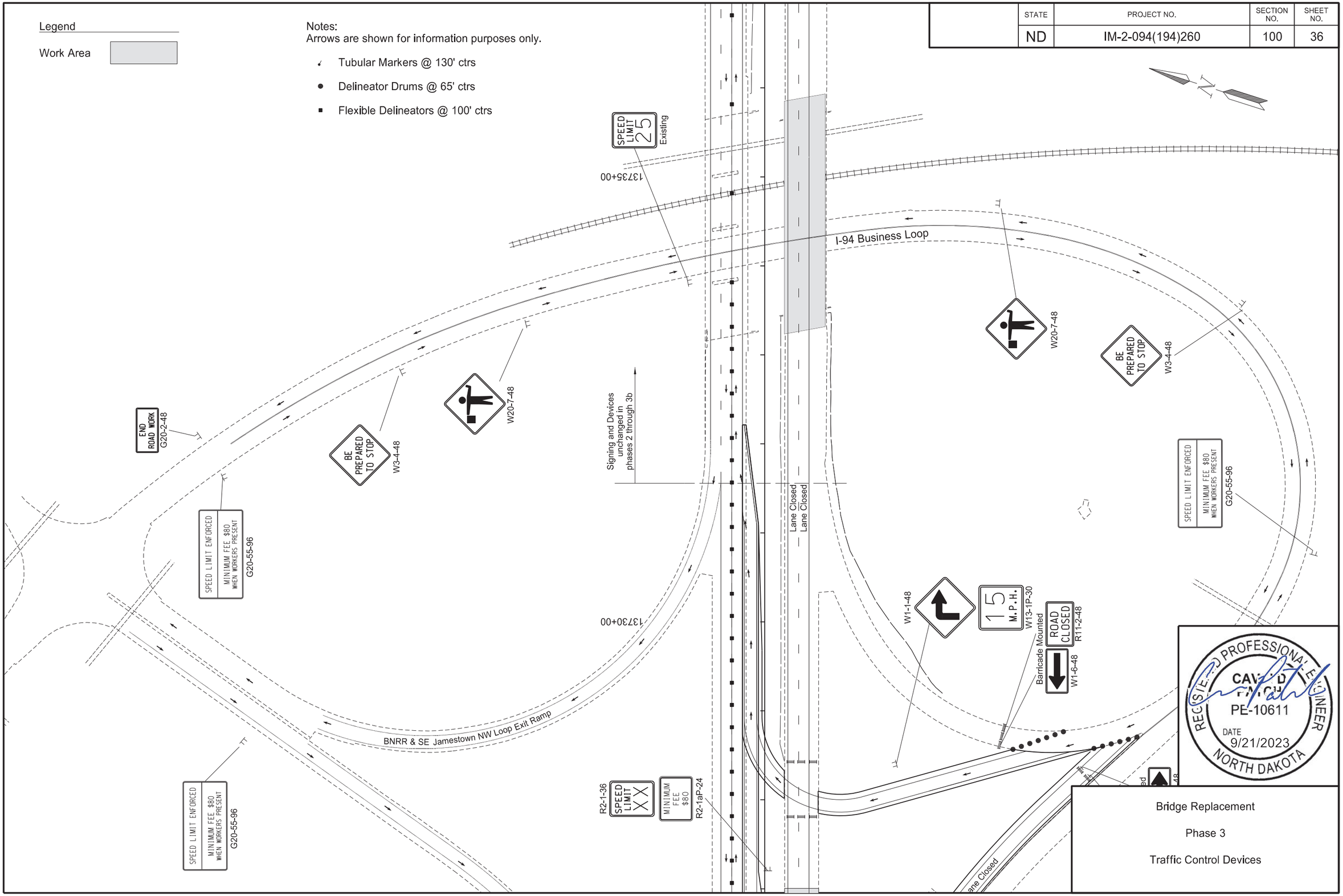
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	36

Legend

Work Area

Notes:
Arrows are shown for information purposes only.

- Tubular Markers @ 130' ctrs
- Delineator Drums @ 65' ctrs
- Flexible Delineators @ 100' ctrs



REGISTERED PROFESSIONAL ENGINEER
CAVELL D. PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Bridge Replacement

Phase 3

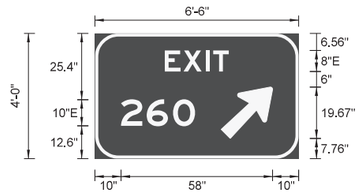
Traffic Control Devices

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	37

SIGN NUMBER	Consign 1
WIDTH X HEIGHT	6'-6" x 4'-0"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_8IN_TYPE A	48.3	7.8	15.1	25	315

STATION(S): AREA: 26.0 Sq.Ft.



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

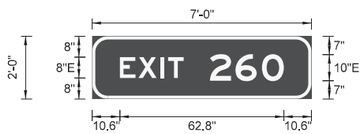
PANEL STYLE: ND_Const_Gore.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
E	X	I	T															24.5	8	E 2000
26.8	33.9	42.4	45.2																	
2	6	0																28.3	10	E 2000
10	19.8	29.9																		

SIGN NUMBER	Consign 2
WIDTH X HEIGHT	7'-0" x 2'-0"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): AREA: 14.0 Sq.Ft.



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

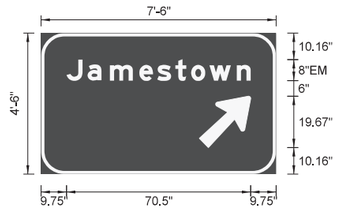
PANEL STYLE: ND_Const_Exit Panel.tsl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
E	X	I	T	2	6	0												62.8	8,10	E 2000
10.6	17.7	26.3	29.1	45.1	54.9	65														

SIGN NUMBER	Consign 3
WIDTH X HEIGHT	7'-6" x 4'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	9"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_8IN_TYPE A	60.6	10.2	15.1	25	315

STATION(S): AREA: 33.8 Sq.Ft.



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

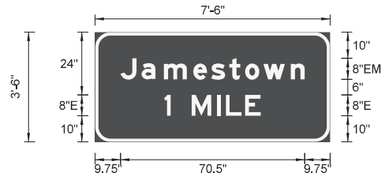
PANEL STYLE: ND_Const_Guide.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
J	a	m	e	s	t	o	w	n										70.5	8/6	EM 2000
9.8	17.8	26.3	37.6	44.5	51.4	57.4	64.5	75												

SIGN NUMBER	Consign 4
WIDTH X HEIGHT	7'-6" x 3'-6"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	6"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): AREA: 26.3 Sq.Ft.



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

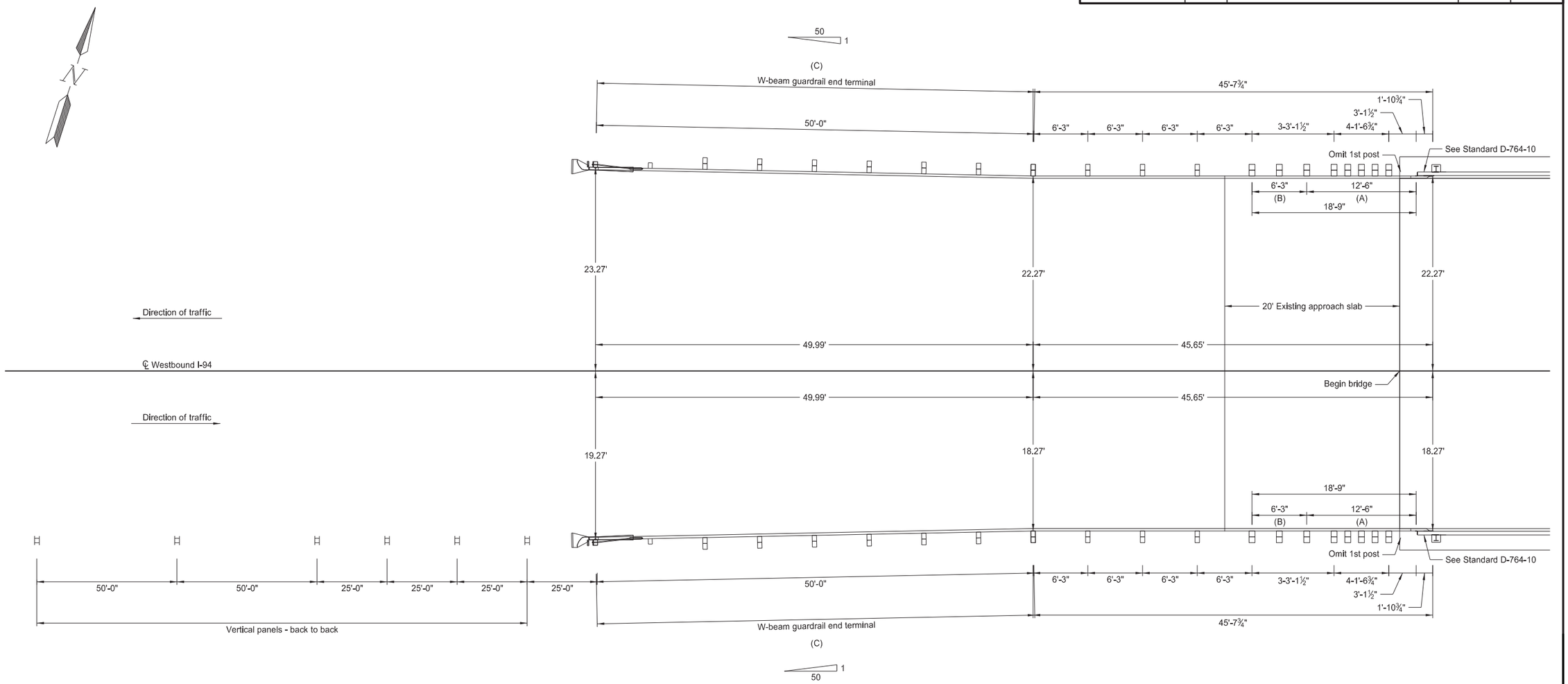
PANEL STYLE: ND_Const_Guide.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
J	a	m	e	s	t	o	w	n										70.5	8/6	EM 2000
9.8	17.8	26.3	37.6	44.5	51.4	57.4	64.5	75												
1	M	I	L	E														36.9	8	E 2000
26.6	37	46.6	50.1	57.4																

Construction Sign Details

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	38



23 USC § 407 Documents
NDDOT Reserves All Objections

(A) Thrie beam rail section (double thickness)

(B) W-Thrie beam transition section (double thickness)

(C) Install an SKT end terminal at this location. See Standard D-764-5.

SPEC	CODE	BID ITEM	QTY	UNIT
704	1081	VERTICAL PANELS - BACK TO BACK	6	EA
764	0145	W-BEAM GUARDRAIL END TERMINAL	2	EA

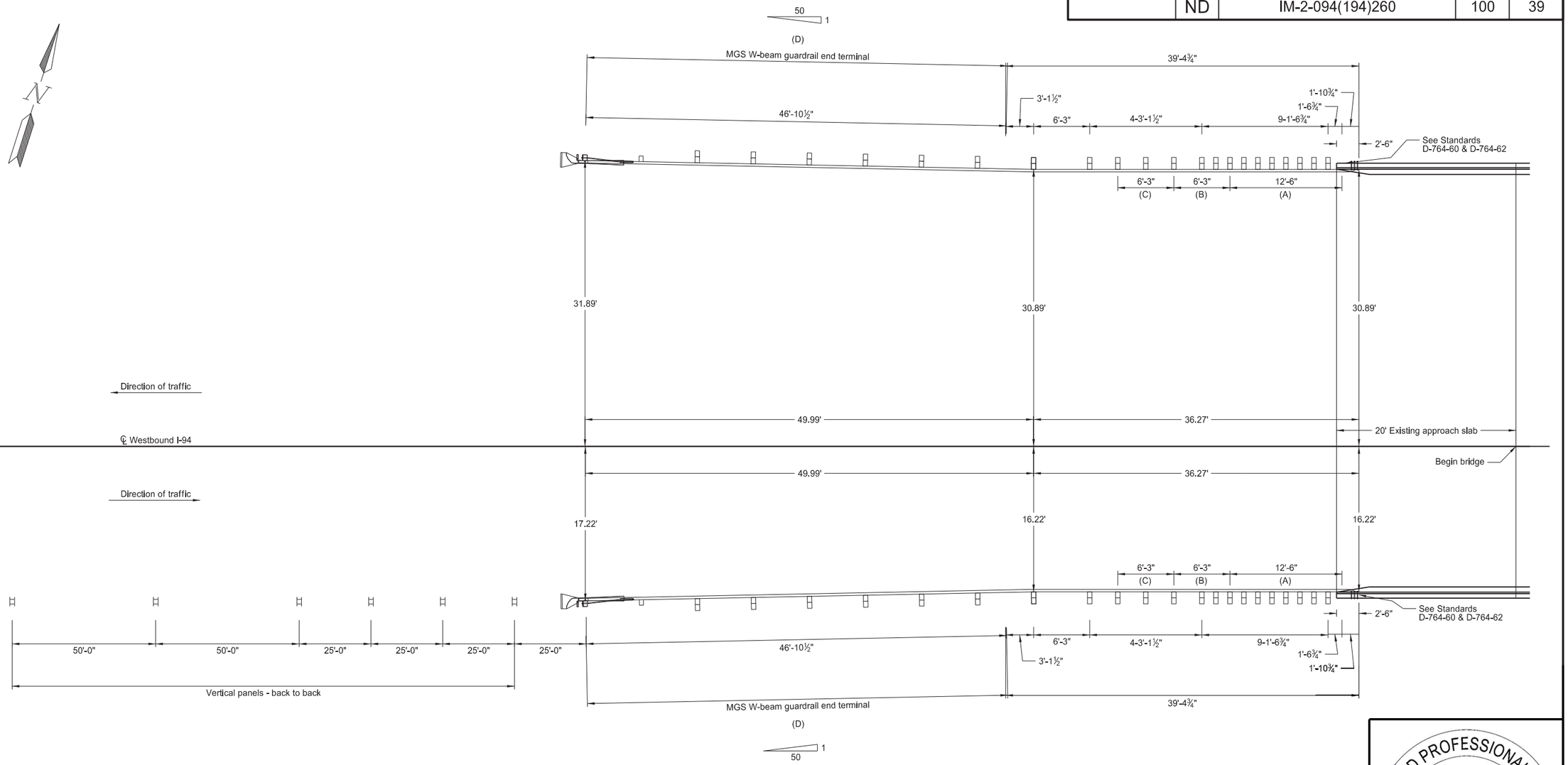
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

W-Beam Guardrail End Terminals
For Two-Way Traffic Operation

Hospital Road Separation
RP 259.523
Westbound I-94
Jamestown

10/10/2023 10:49:58 AM kaltepeter R:\project\20094260.194\traffic\100WZ_038_LGdrl_094_259.523L.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	39



23 USC § 407 Documents
NDDOT Reserves All Objections

(A) Thrie beam rail section (double thickness)

(B) Thrie beam rail section

(C) Asymmetrical W-Thrie beam transition section

(D) Install a MASH SKT end terminal at this location. See Standard D-764-51.

SPEC	CODE	BID ITEM	QTY	UNIT
704	1081	VERTICAL PANELS - BACK TO BACK	6	EA
764	0145	W-BEAM GUARDRAIL END TERMINAL	2	EA

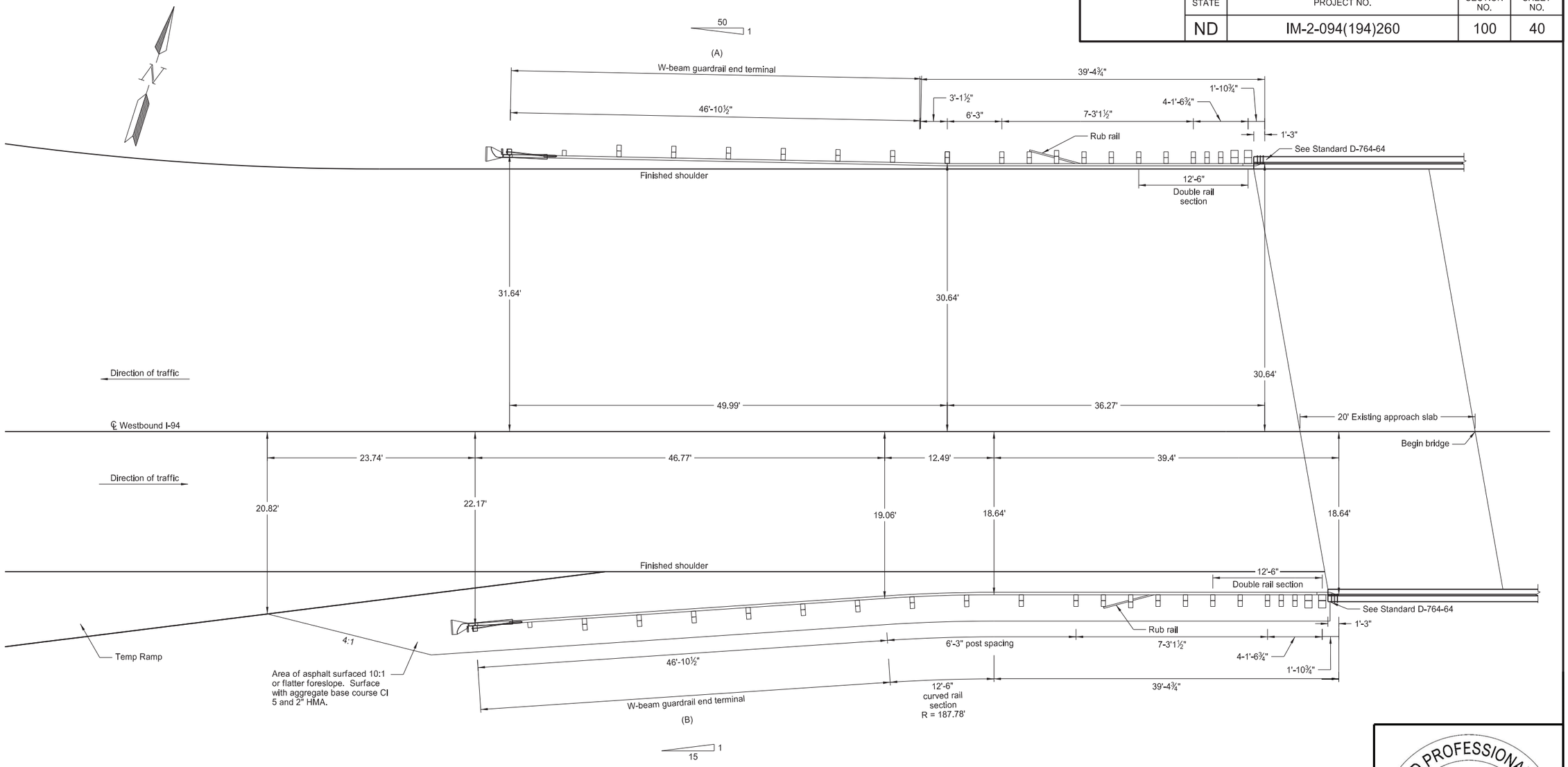
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

MGS W-Beam Guardrail End Terminals
For Two-Way Traffic Operation

James River Bridge
RP 259.847
Westbound I-94
Jamestown

10/11/2023 7:54:47 AM kaltepeter R:\project\20094260.194\traffic\100WZ_039_LGdrl_094_259.847L.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	40



23 USC § 407 Documents
NDDOT Reserves All Objections

(A) Install a MASH SKT at this location. See Standard D-764-51.

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

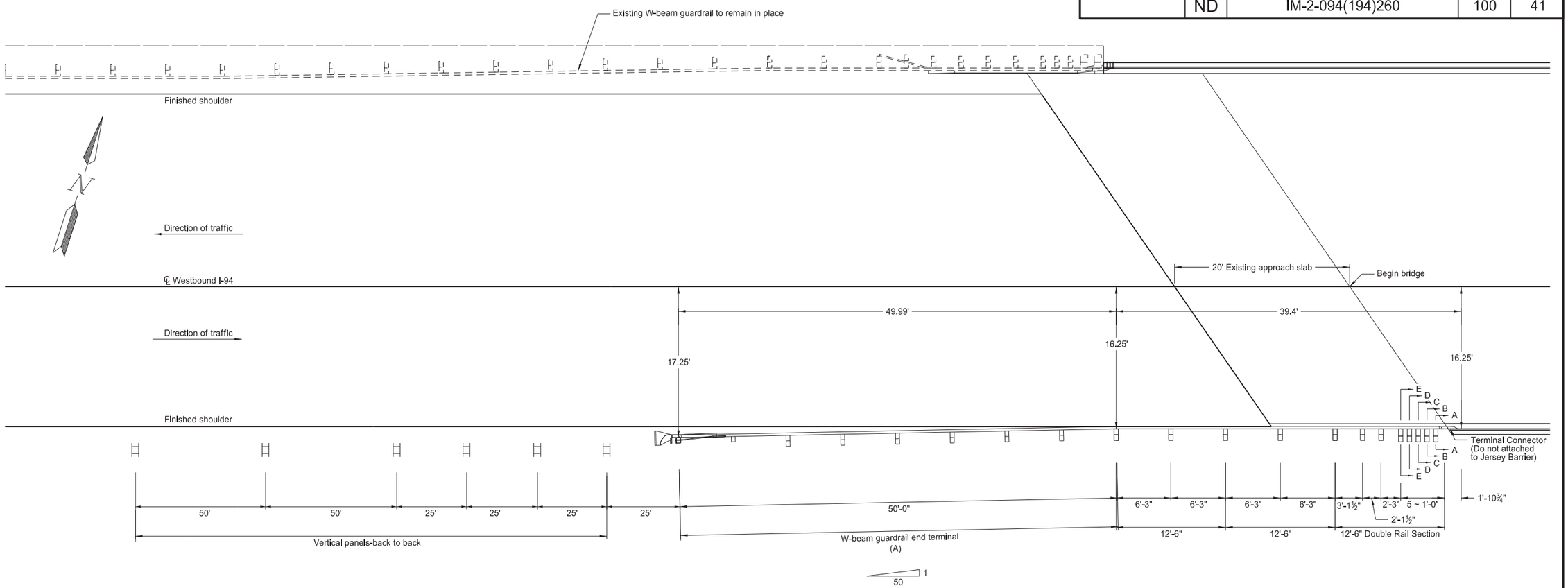
SPEC	CODE	BID ITEM	QTY	UNIT
764	0145	W-BEAM GUARDRAIL END TERMINAL	2	EA

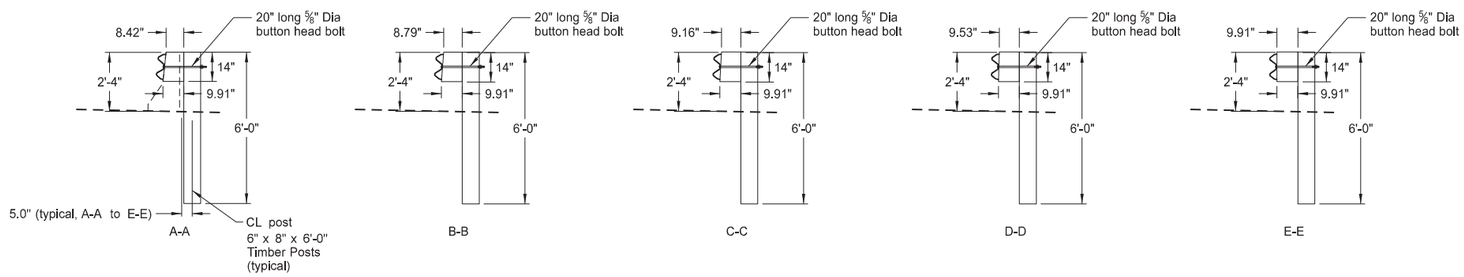
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

MGS W-Beam Guardrail End Terminals
For Two-Way Traffic Operation

BNSF RR & SE Jamestown Interchange
RP 260.125
Westbound I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	41





23 USC § 407 Documents
NDDOT Reserves All Objections

(A) Install SKT at this location.
See Standard D-764-5.

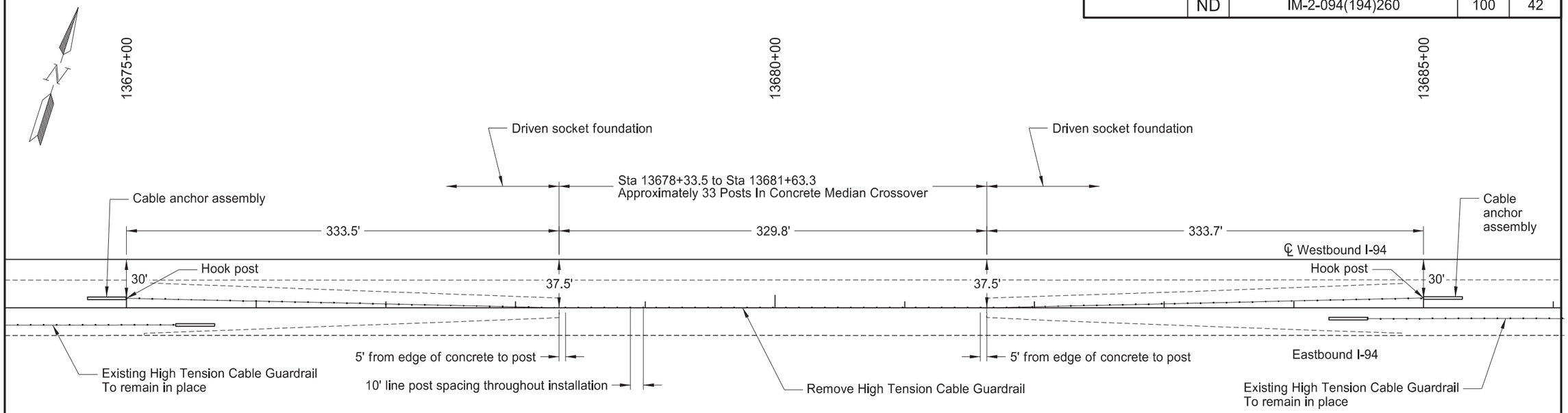
SPEC	CODE	BID ITEM	QTY	UNIT
704	1081	VERTICAL PANELS - BACK TO BACK	6	EA
764	0145	W-BEAM GUARDRAIL END TERMINAL	1	EA

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

W-Beam Guardrail End Terminals
For Two-Way Traffic Operation

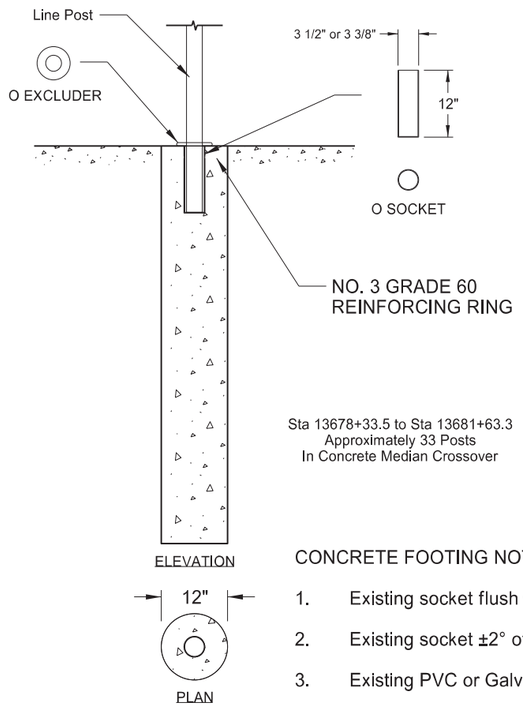
RRVW & Minor Road Separation
RP 260.304
Westbound I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	100	42



PLAN VIEW
High Tension Cable Guardrail Through Concrete Median Crossover
Sta 13675+00 to Sta 13685+00

CONCRETE FOOTING

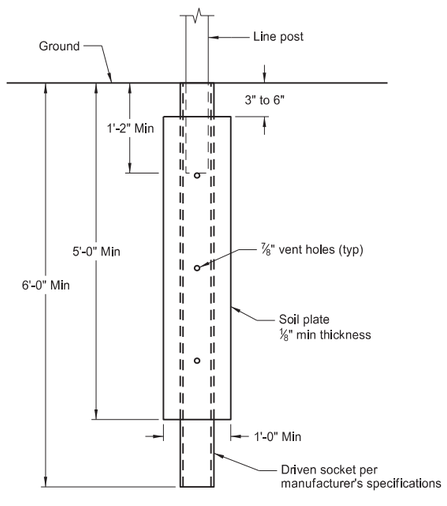


Sta 13678+33.5 to Sta 13681+63.3
Approximately 33 Posts
In Concrete Median Crossover

CONCRETE FOOTING NOTES:

1. Existing socket flush with the ground line.
2. Existing socket ±2° of vertical plumb.
3. Existing PVC or Galvanized steel O socket.

DRIVEN SOCKET FOOTING



NOTES:

1. Remove the existing high tension cable guardrail (cable and posts) from concrete end anchor to concrete end anchor. Fill the holes in the concrete crossover with sand. Leave the existing driven socket footings, concrete footings, and concrete end anchors in place.

   Pay length is from hook post to hook post.

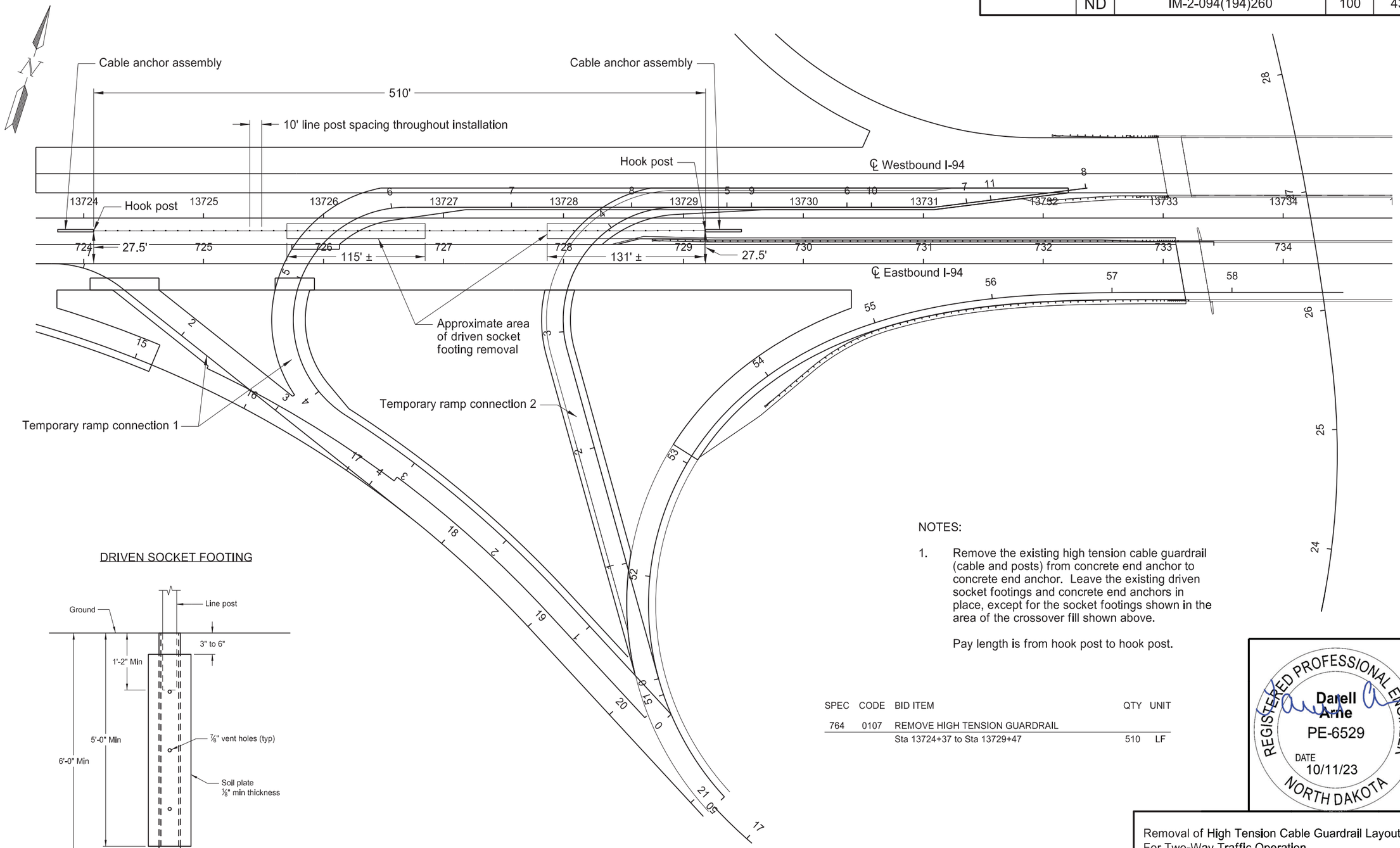
SPEC	CODE	BID ITEM	QTY	UNIT
764	0107	REMOVE HIGH TENSION GUARDRAIL Sta 13675+00 to Sta 13685+00	1,000	LF

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

Removal of High Tension Cable Guardrail Layout
For Two-Way Traffic Operation

West Median Crossover
Sta 13675+00 to Sta 13685+00
I-94
Jamestown

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	100	43



DRIVEN SOCKET FOOTING

NOTES:

1. Remove the existing high tension cable guardrail (cable and posts) from concrete end anchor to concrete end anchor. Leave the existing driven socket footings and concrete end anchors in place, except for the socket footings shown in the area of the crossover fill shown above.

   Pay length is from hook post to hook post.

SPEC	CODE	BID ITEM	QTY	UNIT
764	0107	REMOVE HIGH TENSION GUARDRAIL Sta 13724+37 to Sta 13729+47	510	LF

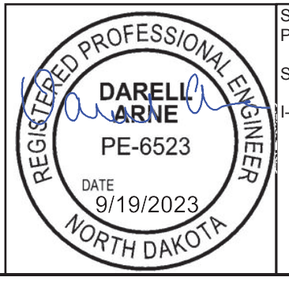
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

Removal of High Tension Cable Guardrail Layout
For Two-Way Traffic Operation

Temporary Ramp Connections
Sta 13724+37 to Sta 13729+47
I-94
Jamestown

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	IM-2-094(194)260	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
I-94B																							
29+04 Rt	SN 2			19.3	13.2	13.2	13.2		7.0	2.25 x 2.25 12 ga	17.8	1.6	1.6	1.6		2.5 x 2.5 12 ga	3	4	3 x 3 7 ga			3	
Sub Total			0.0	19.3		**Total**	39.6										**Total**	12.0		0	0	3	
I-94 Underpass																							
28+60 Lt		53		8.5	14.4				7.0	2.25 x 2.25 12 ga	16.8	4.1				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga			1	
Sub Total			0.0	8.5		**Total**	14.4										**Total**	4.0		0	0	1	
Grand Total			**0.0**	**27.8**		**Total**	**54.0**										**Total**	**16**	**0**	**0**	**0**	**4**	



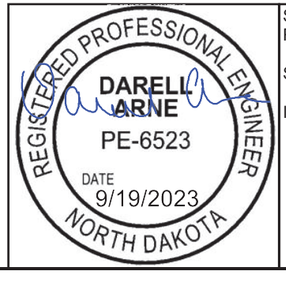
Sign Summary
Perforated Tube

SE Jamestown Interchange

I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	IM-2-094(194)260	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																												
13690+36 Rt	SN 1		63.0					7.0			W5x16	18.7	19.5		20.2	5.3					28							
13716+65 Rt	S.A.A		12.0					7.0	14.0		3.5				17.5			1.3	5.5	0.3								
13718+65 Rt	SN 3			15.0				7.0	13.1		3.5				16.0			1.3	5.5	0.3		1						
13720+27 Rt	S.A.C		22.3					7.0	18.3		3.5				18.5			1.3	6.0	0.3								
13724+24 Rt								7.0	16.1	16.1	5.0				17.7	4.5		1.8	8.0	1.4		2		1				
13738+83 Rt	S.A.B	22.5						7.0	17.5		4.0				17.5			1.3	7.5	0.4		1						
Sub Total		22.5	97.3	15.0					**Total**	95.1		**Total**	38.2							2.7	28	4	0	1	0	0	0	
Exit 260 off ramp																												
13+77 Rt	S.A.A		12.0					7.0	14.0		3.5				17.5			1.3	5.5	0.3								
15+10 Rt																						1						
Sub Total			12.0						**Total**	14.0		**Total**	0.0							0.3	0	1	0	0	0	0	0	
Grand Total		**22.5**	**109.3**	**15.0**					**Total**	**109.1**		**Total**	**38.2**							**3.0**	**28**	**5**	**0**	**1**	**0**	**0**	**0**	



Sign Summary
Round Steel Pipe & W-Shape

SE Jamestown Interchange

I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	110	3

SPEC	CODE	BID ITEM	QTY	UNIT
754	0149	RESET DELINEATOR Interchange Delineation D-754-22A	5	EA
754	0557	INTERSTATE MILE POSTS-TYPE C Sta 13727+56.18 Rt	1	EA
754	0801	OBJECT MARKER - TYPE I Sta 13724+24 Rt	2	EA
754	0803	OBJECT MARKER - TYPE III Sta 13723+79 Rt	1	EA

Note
(A) Install on gore sign supports, D-754-1

Sta 28+60 Lt
Assembly 53

W1-15
-30

30
MPH
W13-1P
-18

Sta 28+60 Lt
Remove

SPEED
LIMIT
25

Sta 13724+24 Rt (A)

Sta 13723+79 Rt
Remove

Sta 13723+79 Rt

OM-3C

OM1-1

M3-2-36 EAST

M1-1-36 INTERSTATE NORTH DAKOTA 94

M1-4-36 52

Sta 13738+83 Rt
Special Assembly B

EAST

INTERSTATE NORTH DAKOTA 94

52

Sta 13738+83 Rt
Remove sign, support
and foundation (x1)

EXIT
40
MPH
W13-2-36

Sta 13716+65 Rt
Special Assembly A

W1-11L-48

W13-1P-30
30
MPH

Sta 13720+27 Rt
Special Assembly C

W13-3-36
RAMP
30
MPH

Sta 13+77 Rt
Special Assembly A

OM1-1

Sta 13724+24 Rt (A)

SPEED
LIMIT
25

Sta 15+10 Rt
Remove sign, support
and foundation (x1)

MILE
260

Sta 13727+56.18 Rt
Remove

Sta 13727+56.18 Rt
New mile post

James
River

Sta 13718+65 Rt
Remove sign, support
and foundation

James
River

Sign 3

Sta 13718+65 Rt

EXIT
260

Sta 13724+24 Rt
Reset sign on
new support
Remove foundation (x2)

Sign Layout

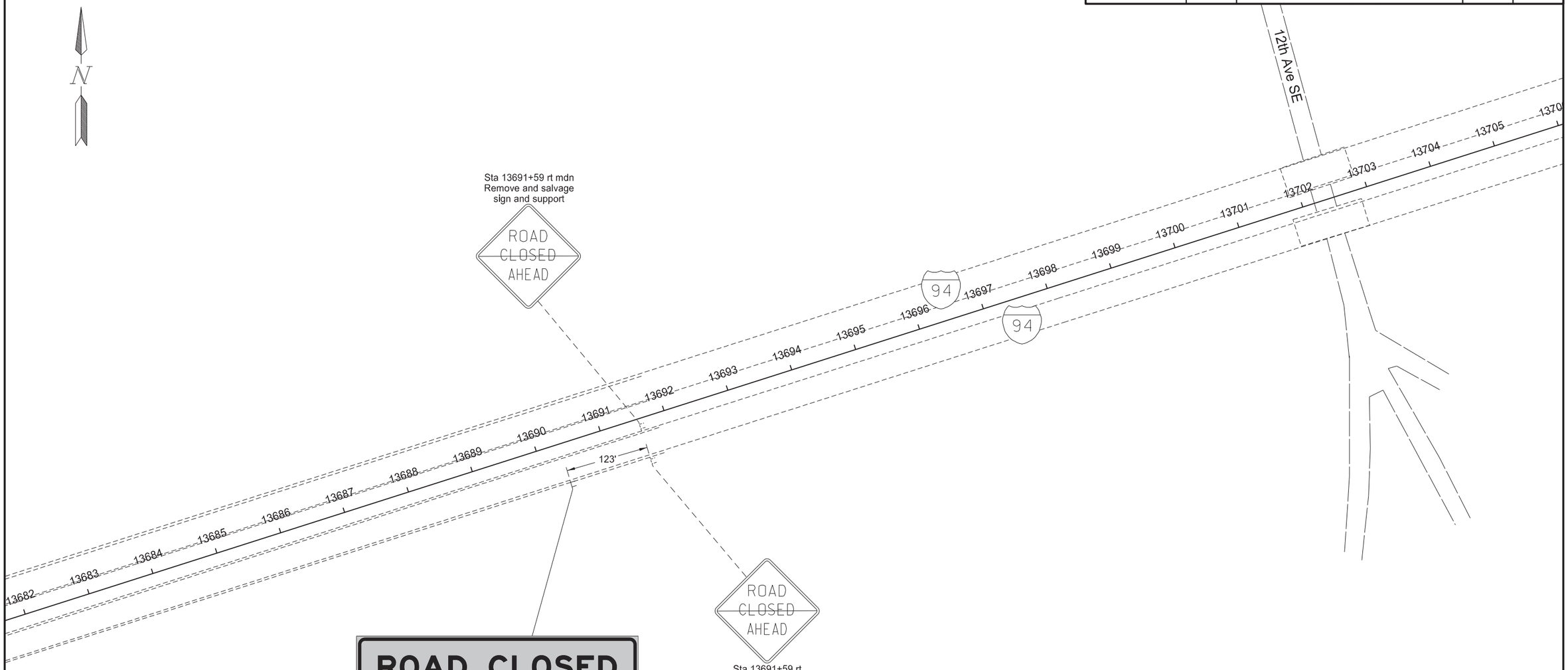
SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE
9/19/2023
NORTH DAKOTA

9/19/2023 7:00:01 AM jallery \\nd.gov\DOT\dot-data2\data\CADD\project\20094260.194\traffic\110SN_003_LSign.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	110	4



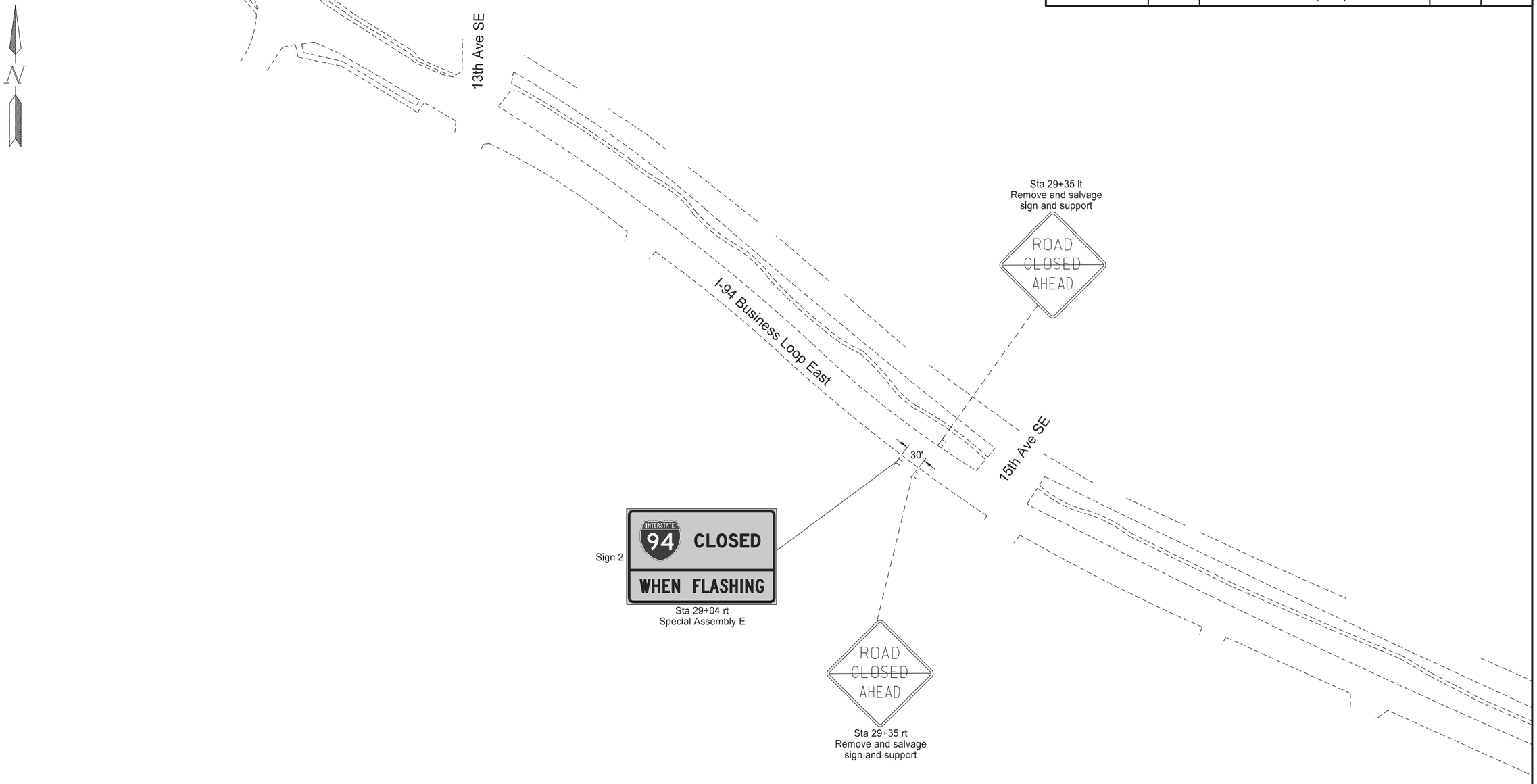
Sign Layout

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 9/19/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	110	5



Sign Layout

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 9/19/2023
NORTH DAKOTA

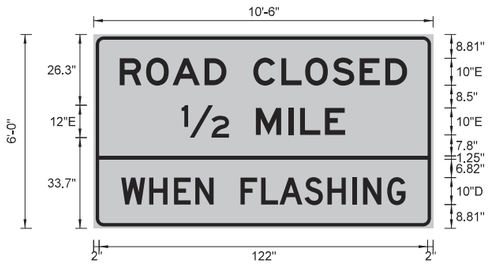
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	110	6

SIGN NUMBER	Sign 1
WIDTH X HEIGHT	10'-6" x 6'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: Yellow
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
13690+36 rt

AREA: 63.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Warn_48_Large.ssl

LETTER POSITION (X)																				LENGTH	SIZE	SERIES
R	O	A	D		C	L	O	S	E	D										106.7	10	E 2000
9.7	19.5	29.3	41.2	49.3	59.3	69.7	78.6	88.7	98.8	108.3												
1/2	M	I	L	E																60.7	12,10	E 2000
32.7	60.2	72.2	76.6	85.8																		
W	H	E	N		F	L	A	S	H	I	N	G								105.6	10	D 2000
10.2	20.6	29.8	37.7	44.5	54.5	62.2	69	78.3	86.8	96	100	109										

SIGN NUMBER	Sign 2
WIDTH X HEIGHT	5'-6" x 3'-6"
BORDER WIDTH	0.88" (inset 0.63")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: Yellow
LEGEND/BORDER	TYPE: Non-Reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
M1_1	5.8	19	18	18	0

STATION(S):
29+04 rt

AREA: 19.3 Sq.Ft.

Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Warn_36_Med.ssl

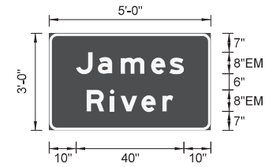
LETTER POSITION (X)																				LENGTH	SIZE	SERIES
C	L	O	S	E	D															29	6	D 2000
29.8	35.2	39.7	44.9	50	54.7																	
W	H	E	N		F	L	A	S	H	I	N	G								54.4	6	C 2000
5.8	11.2	15.9	20	23.3	29.3	33.2	36.7	41	45.4	50.1	52.3	56.8										

SIGN NUMBER	Sign 3
WIDTH X HEIGHT	5'-0" x 3'-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

STATION(S):
13718+65 Rt

AREA: 15.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Fwy_Geographic Feature.ssl

LETTER POSITION (X)																				LENGTH	SIZE	SERIES
J	a	m	e	s																40	8/6	EM 2000
10	18.1	26.6	37.8	44.7																		
R	i	v	e	r																32.1	8/6	EM 2000
14	22.6	26.5	34.3	42																		

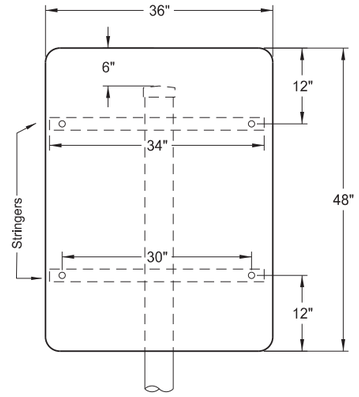
Sign Details

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 9/19/2023
NORTH DAKOTA

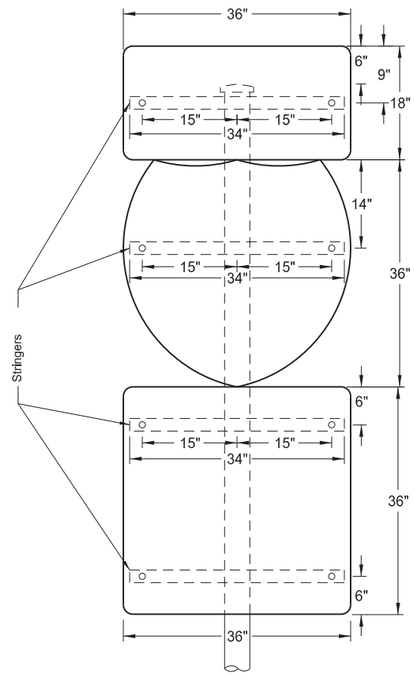
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	110	7



Special Assembly A
(Round Steel Pipe)

Sta 13716+65 Rt
Sta 13+77 Rt

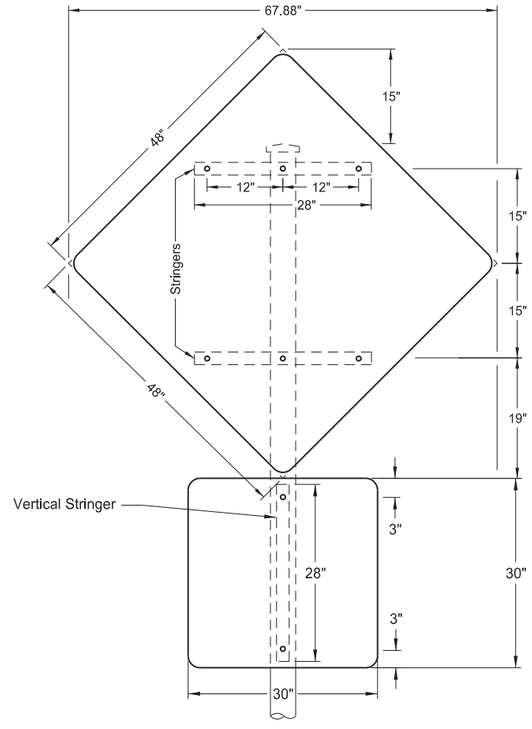
Pay Area: 12.0 Sq Ft



Special Assembly B
(Round Steel Pipe)

Sta 13738+83 Rt

Pay Area: 22.5 Sq Ft



Special Assembly C
(Round Steel Pipe)

Sta 13720+27 Rt

Pay Area: 22.3 Sq Ft

Sign Assemblies

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 9/19/2023
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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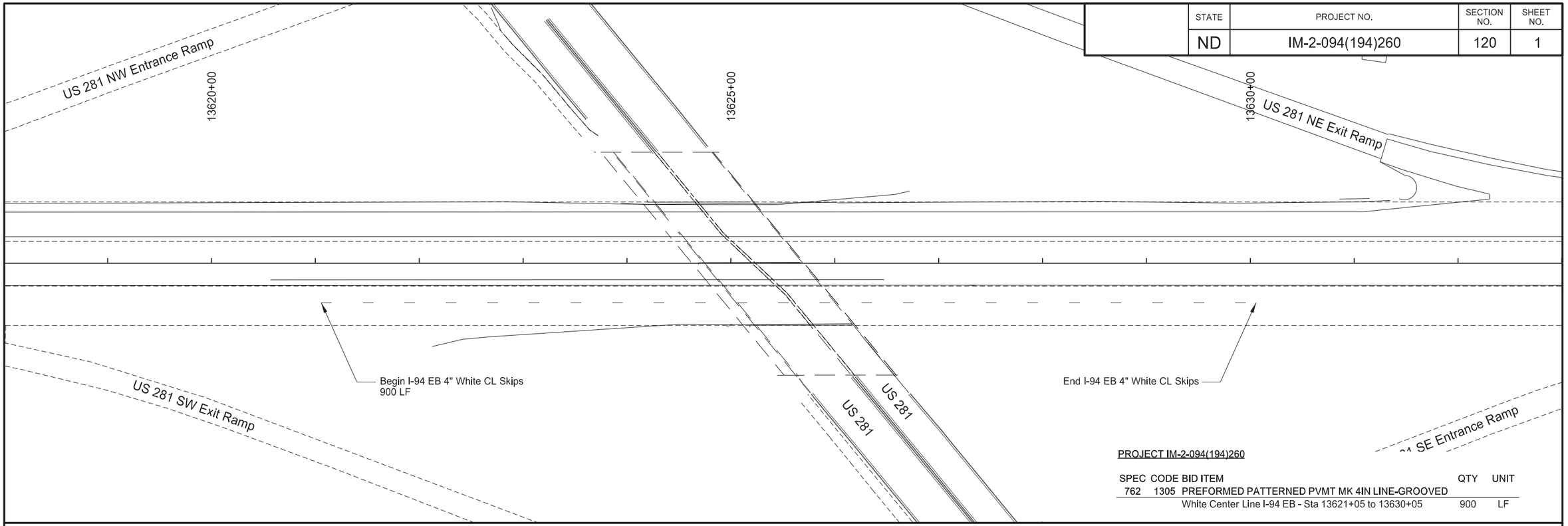

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED		
		White Center Line I-94 EB - Sta 13621+05 to 13630+05	900	LF

REGISTERED PROFESSIONAL ENGINEER
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PE-10611
DATE 9/21/2023
NORTH DAKOTA

Pavement Markings Layout

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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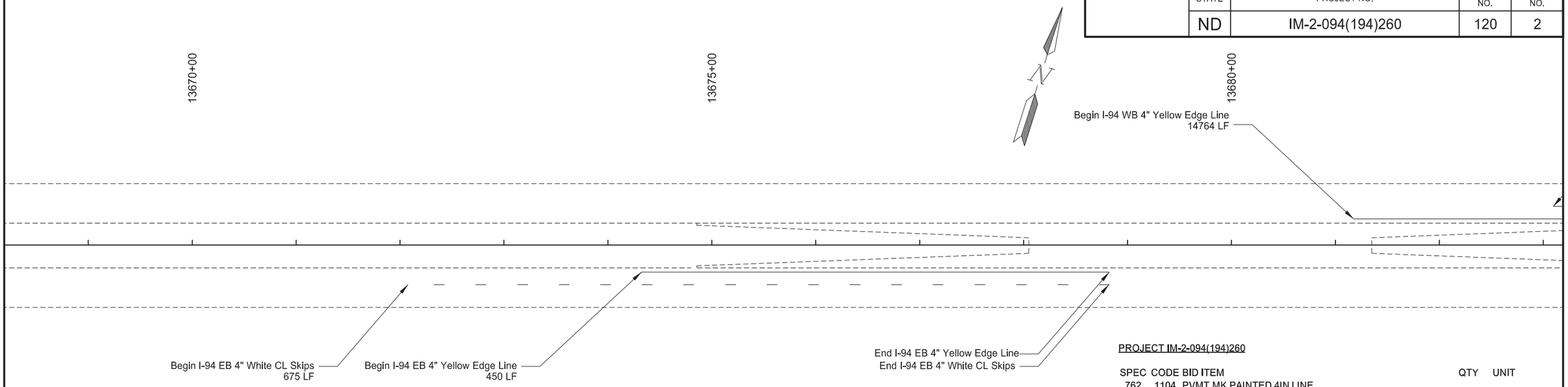
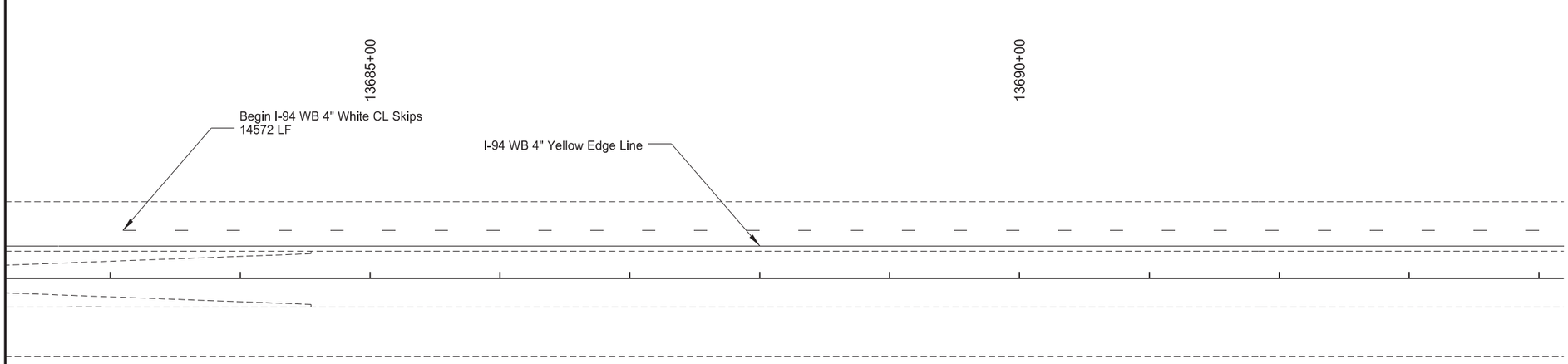


PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
762	1104	PVMT MK PAINTED 4IN LINE		
		Yellow Edge Line I-94 EB - Sta 13674+32 to 13678+82	450	LF
		Yellow Edge Line I-94 WB - Sta 13681+18 to 13828+82	14764	LF

SPEC	CODE	BID ITEM	QTY	UNIT
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED		
		White Center Line I-94 EB - Sta 13665+33 to 13678+83	675	LF



PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED		
		White Center Line I-94 WB - Sta 13683+10 to 13828+82	14572	LF

REGISTERED PROFESSIONAL ENGINEER
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PE-10611
DATE
9/21/2023
NORTH DAKOTA

Pavement Markings Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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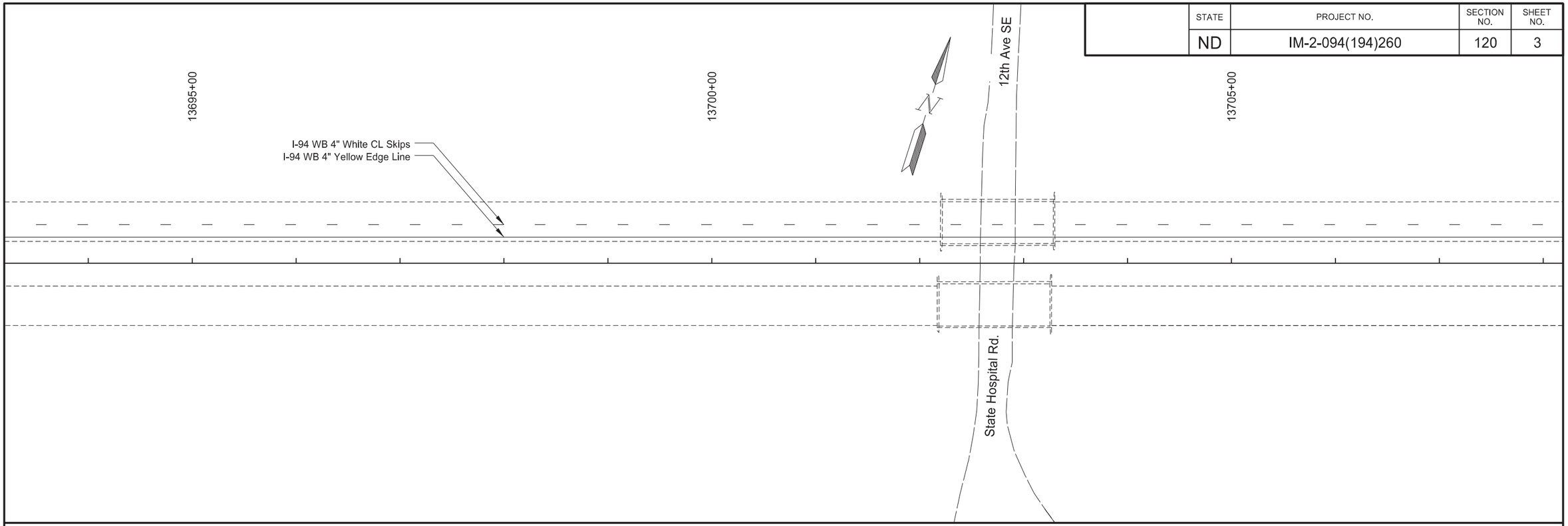
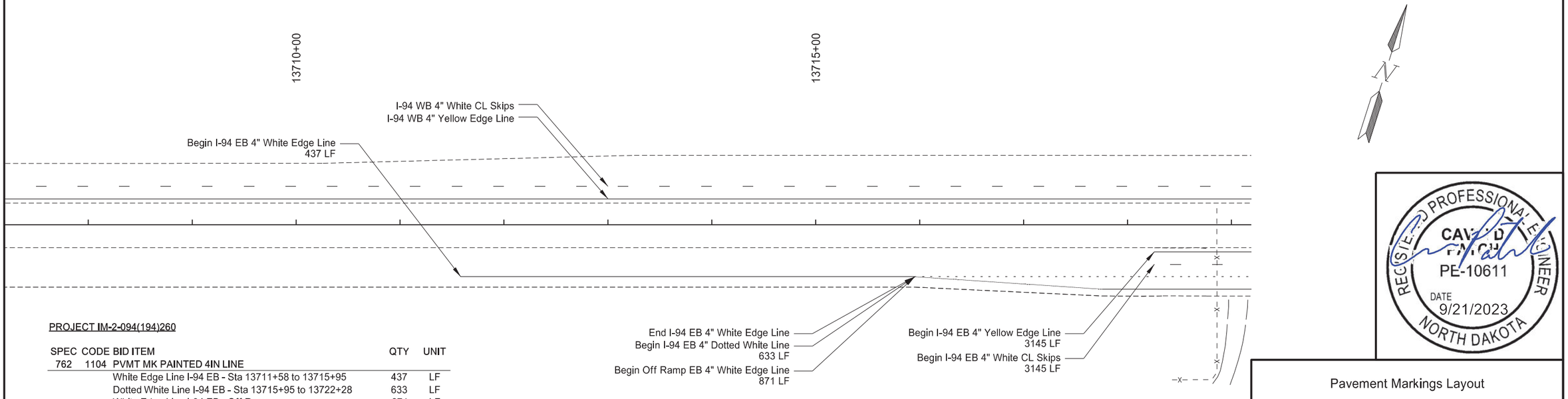




PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
762	1104	PVMT MK PAINTED 4IN LINE		
		White Edge Line I-94 EB - Sta 13711+58 to 13715+95	437	LF
		Dotted White Line I-94 EB - Sta 13715+95 to 13722+28	633	LF
		White Edge Line I-94 EB - Off Ramp	871	LF
		Yellow Edge Line I-94 EB - Sta 13718+26 to 13749+71	3145	LF

SPEC	CODE	BID ITEM	QTY	UNIT
762	1305	PREFORMED PATTERNED PVMT MK 4IN LINE-GROOVED		
		White Center Line I-94 EB - Sta 13718+26 to 13749+71	3145	LF

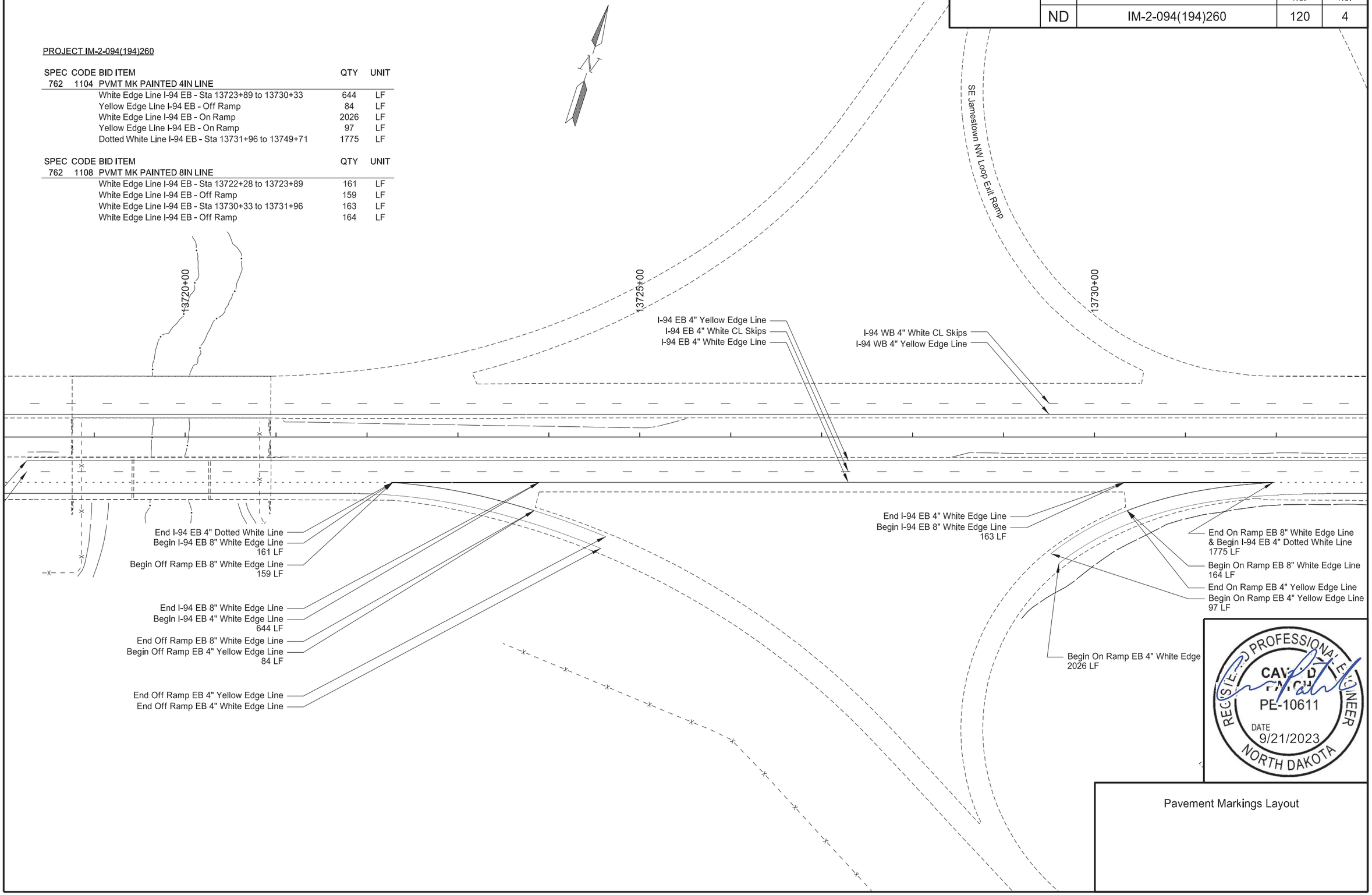
Pavement Markings Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	120	4

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
762	1104	PVMT MK PAINTED 4IN LINE		
		White Edge Line I-94 EB - Sta 13723+89 to 13730+33	644	LF
		Yellow Edge Line I-94 EB - Off Ramp	84	LF
		White Edge Line I-94 EB - On Ramp	2026	LF
		Yellow Edge Line I-94 EB - On Ramp	97	LF
		Dotted White Line I-94 EB - Sta 13731+96 to 13749+71	1775	LF

SPEC	CODE	BID ITEM	QTY	UNIT
762	1108	PVMT MK PAINTED 8IN LINE		
		White Edge Line I-94 EB - Sta 13722+28 to 13723+89	161	LF
		White Edge Line I-94 EB - Off Ramp	159	LF
		White Edge Line I-94 EB - Sta 13730+33 to 13731+96	163	LF
		White Edge Line I-94 EB - Off Ramp	164	LF



REGISTERED PROFESSIONAL ENGINEER
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PE-10611
DATE
9/21/2023
NORTH DAKOTA

Pavement Markings Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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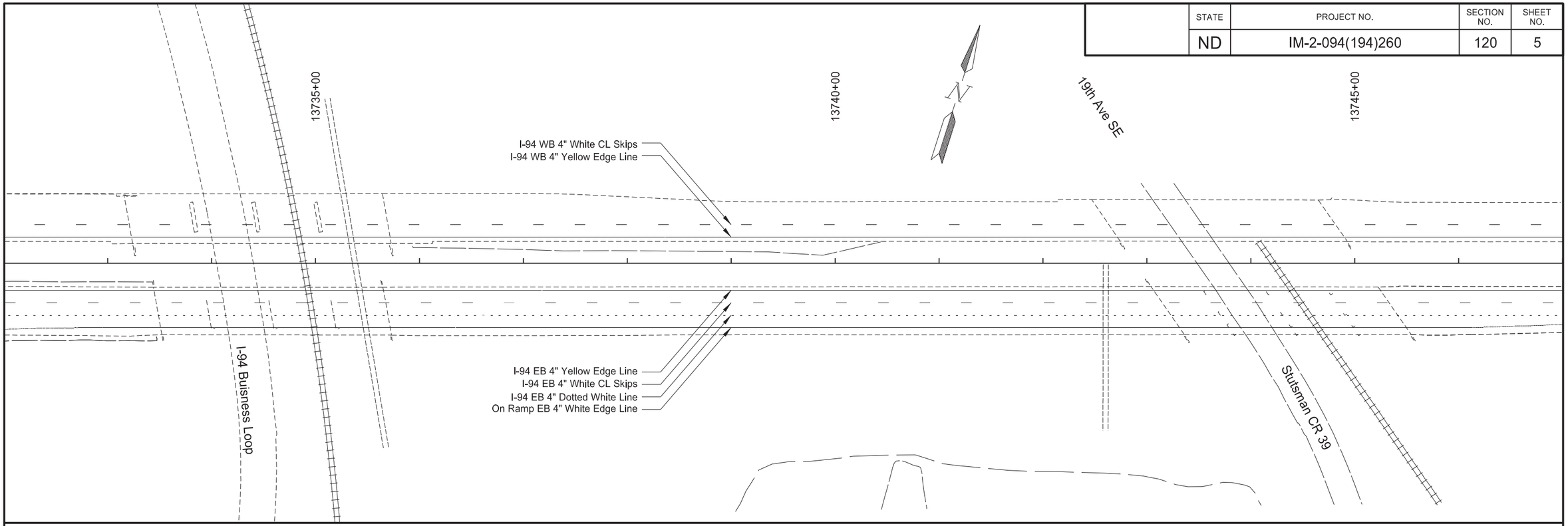

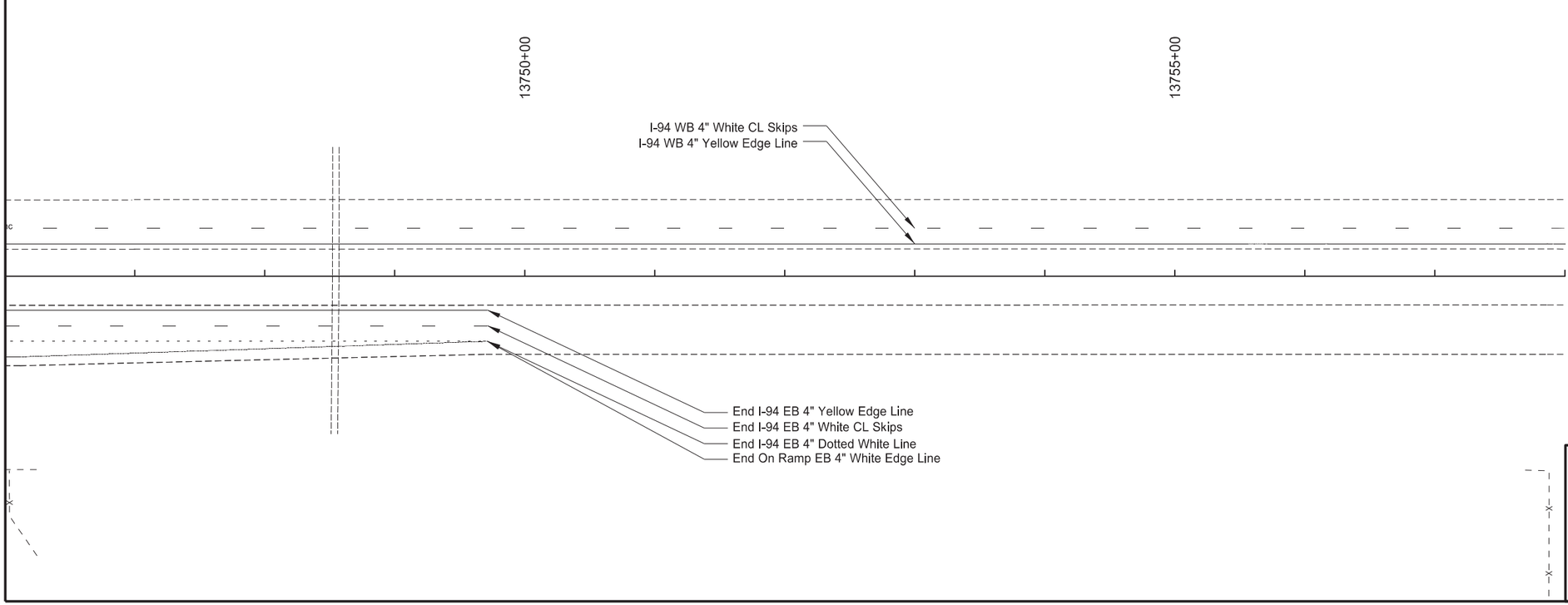

REGISTERED PROFESSIONAL ENGINEER
CAV[illegible] PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Pavement Markings Layout

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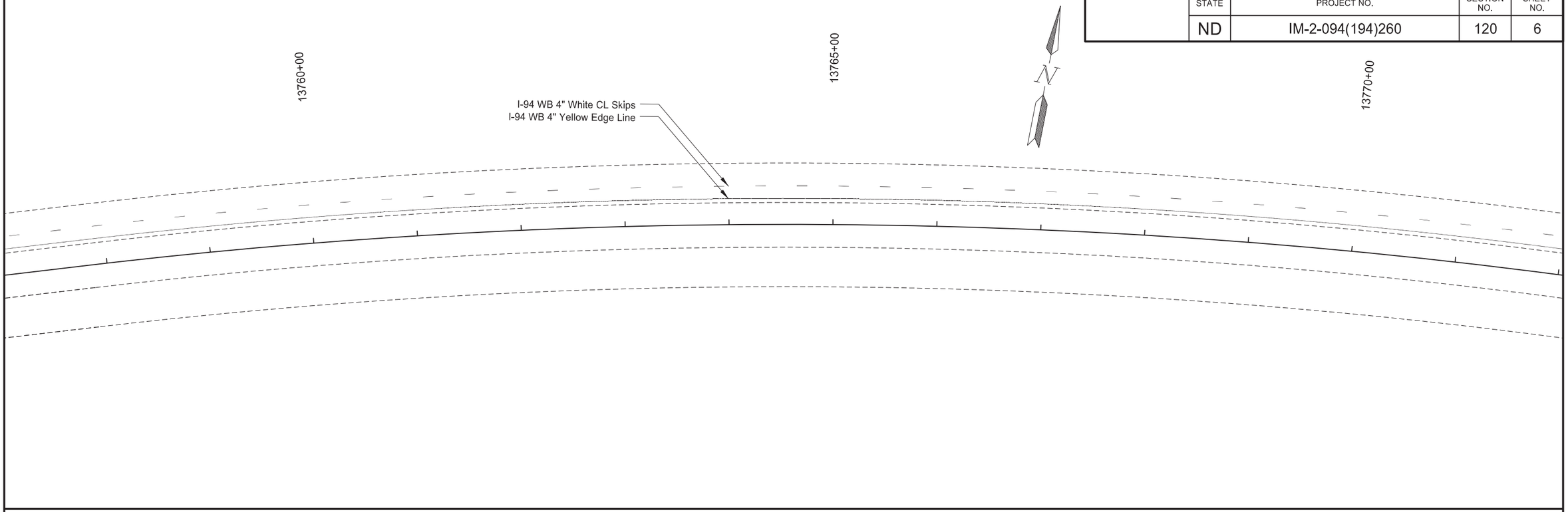

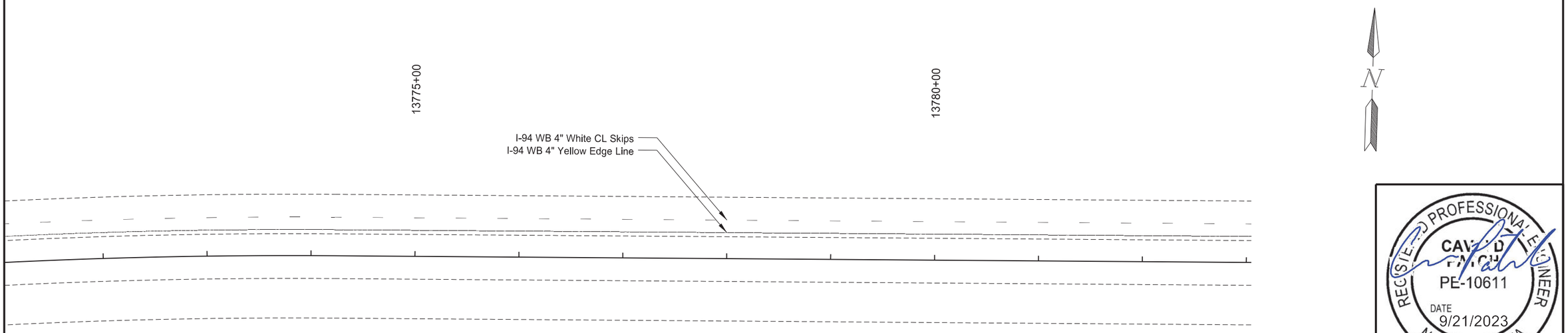

REGISTERED PROFESSIONAL ENGINEER
CAVIN D. PATCH
PE-10611
DATE 9/21/2023
NORTH DAKOTA

Pavement Markings Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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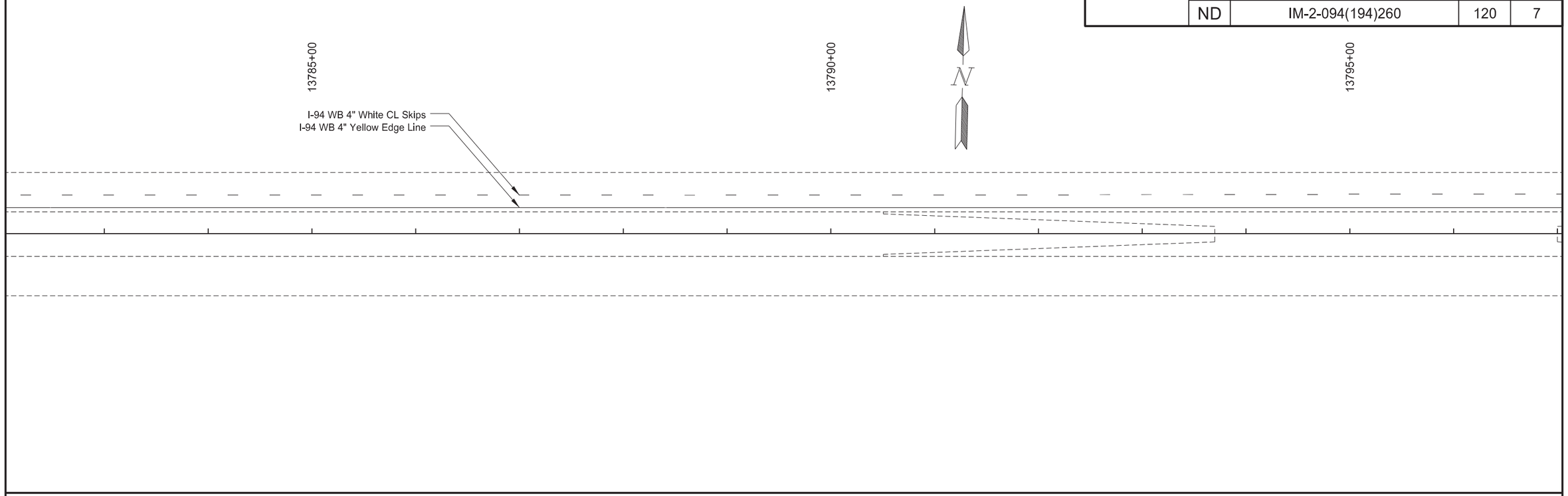

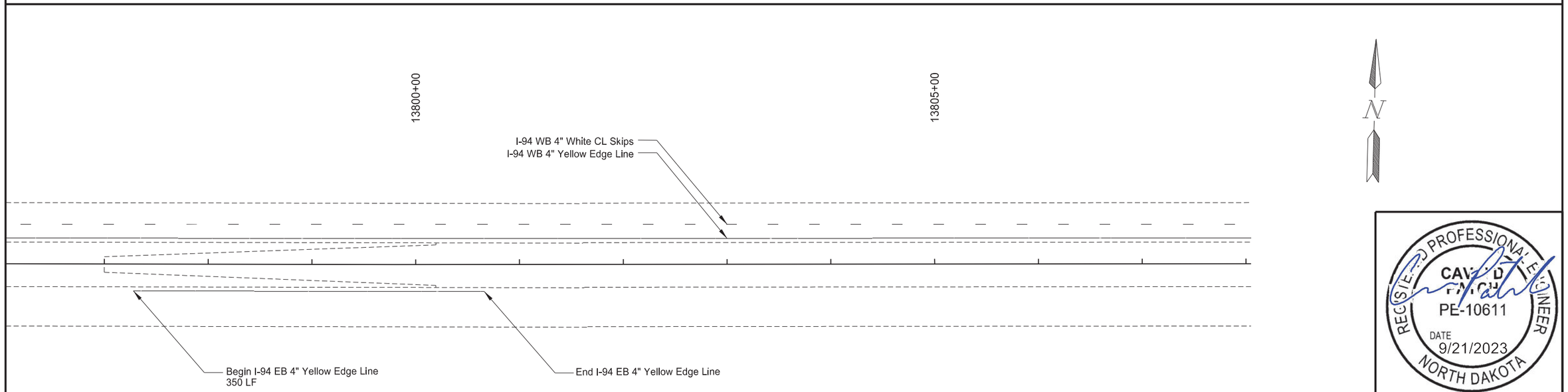

PROJECT IM-2-094(194)260

SPEC	CODE	BID ITEM	QTY	UNIT
762	1104	PVMT MK PAINTED 4IN LINE		
		Yellow Edge Line I-94 EB - Sta 13797+28 to 13800+78	350	LF

REGISTERED PROFESSIONAL ENGINEER
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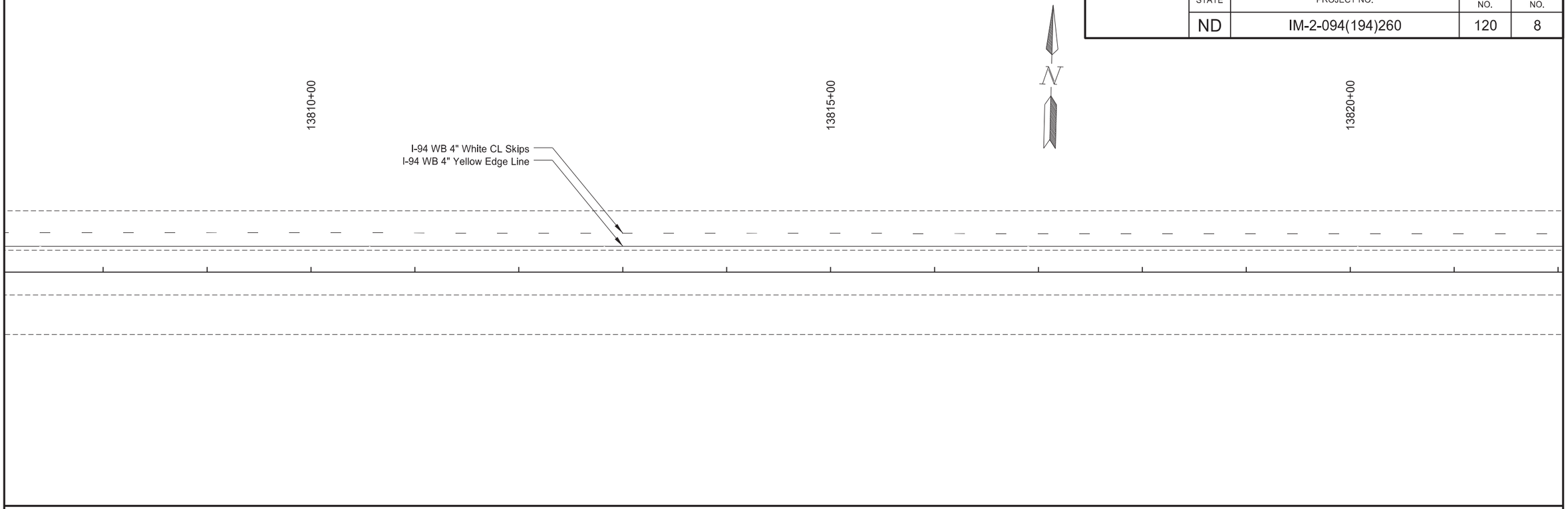
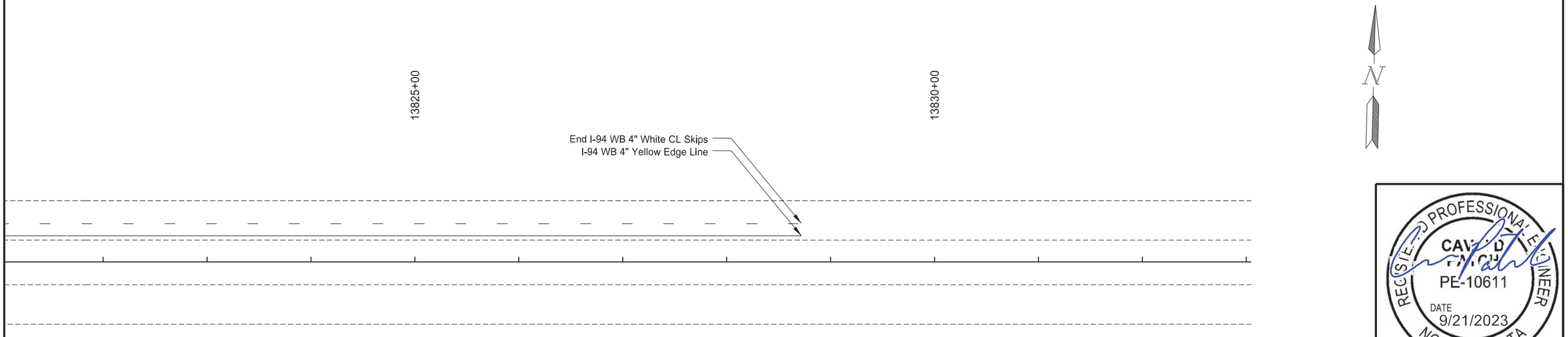
PE-10611
DATE
9/21/2023
NORTH DAKOTA

Pavement Markings Layout

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	120	8





REGISTERED PROFESSIONAL ENGINEER
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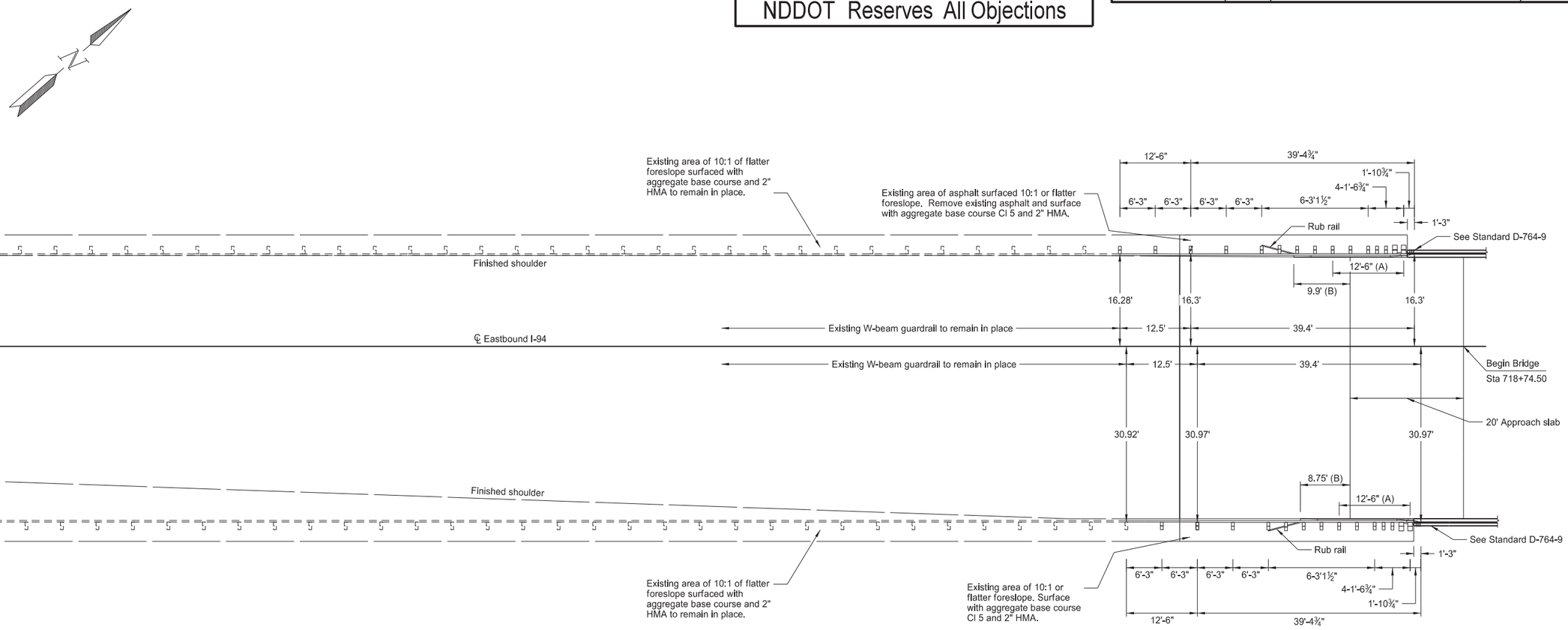
PE-10611
DATE
9/21/2023
NORTH DAKOTA

Pavement Markings Layout

23 USC § 407 Documents
NDDOT Reserves All Objections

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-2-999(064)	130	1



REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

(A) Double rail section.

(B) Install curb and gutter in accordance with Standard Drawing D-748-1, except for a height transition from 0" to 6" provided for a distance of 3 feet at the west end, as shown on Standard Drawing D-764-9.

The curb and gutter will be measured and paid for by the linear foot as "Curb & gutter - type I special".

W-Beam Guardrail Layout

James River Bridge
RP 259.847
Eastbound I-94
Jamestown

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	130	2

W-BEAM GUARDRAIL SUMMARY OF QUANTITIES

W-BEAM GUARDRAIL AT BRIDGE ENDS

LOCATION	(A) TERM-INAL CON-NECTOR EACH	(A) 5/8" Ø x 22" LONG GUARD-RAIL BOLT EACH	(A) 5/8" Ø x 20" LONG GUARD-RAIL BOLT EACH	(A) 7/8" Ø x 9" LONG H.S. HEX HEAD BOLT EACH	(A) 5/8" Ø x 18" LONG GUARD-RAIL BOLT EACH	(A) 6"x 8" x 14" WOOD OFF-SET BLOCK EACH	(A) 6"x 8" x 6' TIMBER POST EACH	(A) 5/8" Ø x 1 1/4" LONG GUARD-RAIL BOLT EACH	(A) 12'-6" DOUBLE RAIL SECTION EACH	(A) 12'-6" STRAIGHT RAIL SECTION EACH	(A) 12'-6" CURVED RAIL SECTION EACH	(A) 5/8" Ø x 11" LONG HEX HEAD BOLT EACH	(A) 1/2" Ø x 4" LONG LAG SCREW EACH	(A) 6" x 8" x 7'-0" TIMBER POSTS EACH	(A) RUB RAIL END SHOE EACH	(A) C 6 x 8.2 x 14'-6 1/4" RUB RAIL SECTION EACH	(A) C 6 x 8.2 x 12'-7" BENT RUB RAIL SECTION EACH	(A) 5/8" Ø x 1 1/2" LONG GUARD-RAIL BOLT EACH	(A) 7 3/4" x 4 ½" x 3/8" RUB RAIL SPLICE PLATE EACH	(A) 10"x 10" x 8'-0" TIMBER POST EACH	(A) 10"x 8" x 21" TAPERED TIMBER BLOCK EACH	(A) 6"x 8" x 21" TIMBER BLOCK EACH	(A) 6"x 9 3/4" x 14" TIMBER BLOCK EACH	(A) REFL-ECTOR-IZED PLATES EACH
Sta 718+15.10 to 718+67.00 Rt	1	2	10	4	12	5	10	40	1	3		2	1	3	1	1	1	4	1	2	2	7	1	3
Sta 718+13.95 to 718+65.85 Lt	1	2	10	4	12	5	10	40	1	3		2	1	3	1	1	1	4	1	2	2	7	1	3
TOTAL	2	4	20	8	24	10	20	80	2	6		4	2	6	2	2	2	8	2	4	4	14	2	6

SPEC	CODE	BID ITEM	QTY	UNIT
748	0141	CURB & GUTTER - TYPE 1 SPECIAL		
		Sta 718+45.75 to 718+54.50 Rt	8.8	LF
		Sta 718+44.60 to 718+54.50 Lt	9.9	LF
		Total	18.7	LF
764	0131	W-BEAM GUARDRAIL		
		Sta 718+15.10 to 718+67.00 Rt	51.9	LF
		Sta 718+13.95 to 718+65.85 Lt	51.9	LF
		Total	103.8	LF
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS		
		Sta 718+15.10 to 718+67.00 Rt	51.9	LF
		Sta 718+13.95 to 718+65.85 Lt	51.9	LF
		Total	103.8	LF

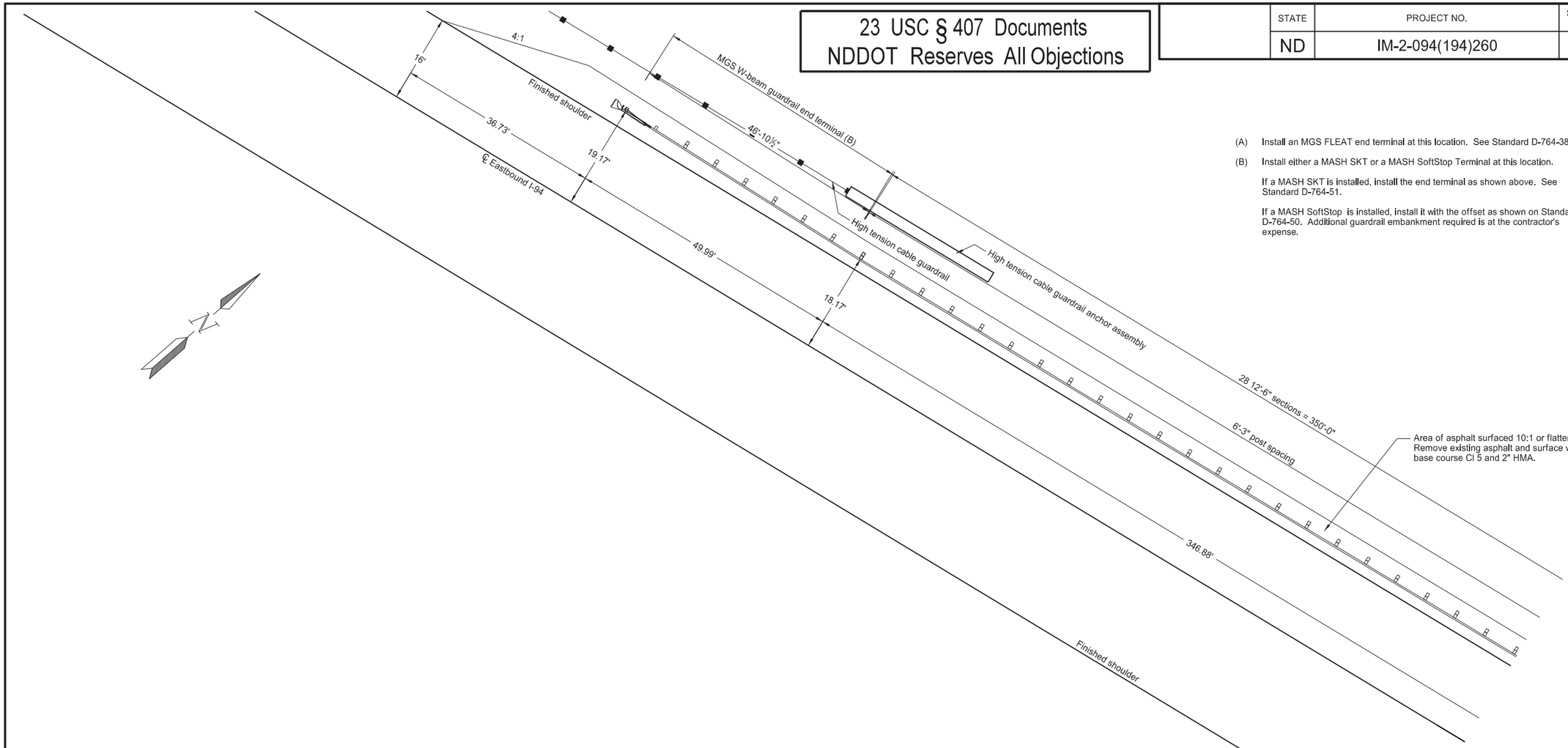
(A) Include these items in the contract unit price bid for "W-Beam Guardrail".

REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

W-Beam Guardrail Quantities

James River Bridge
RP 259.847
Eastbound I-94
Jamestown

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	130	3



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

(B) 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.

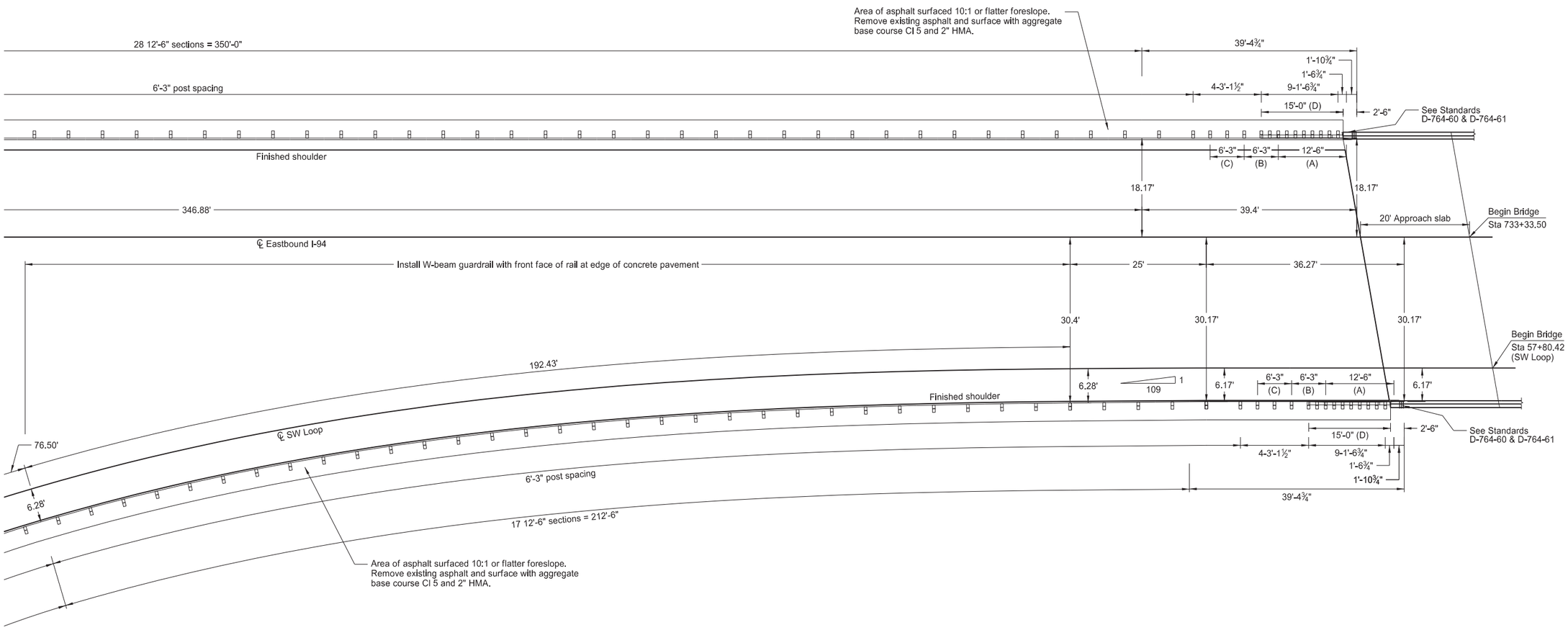
If a MASH SoftStop is installed, install it with the offset as shown on Standard D-764-50. Additional guardrail embankment required is at the contractor's expense.

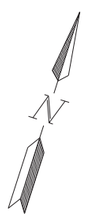
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

Thrie/MGS W-Beam Guardrail Layout
At Beginning of Bridge (Sheet 1 of 2)

BNSF RR & SE Jamestown Interchange
RP 260.131
Eastbound I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	130	4





23 USC § 407 Documents
NDDOT Reserves All Objections

(A) Thrie beam rail section (double thickness)

(B) Thrie beam rail section

(C) Asymmetrical W-Thrie beam transition section

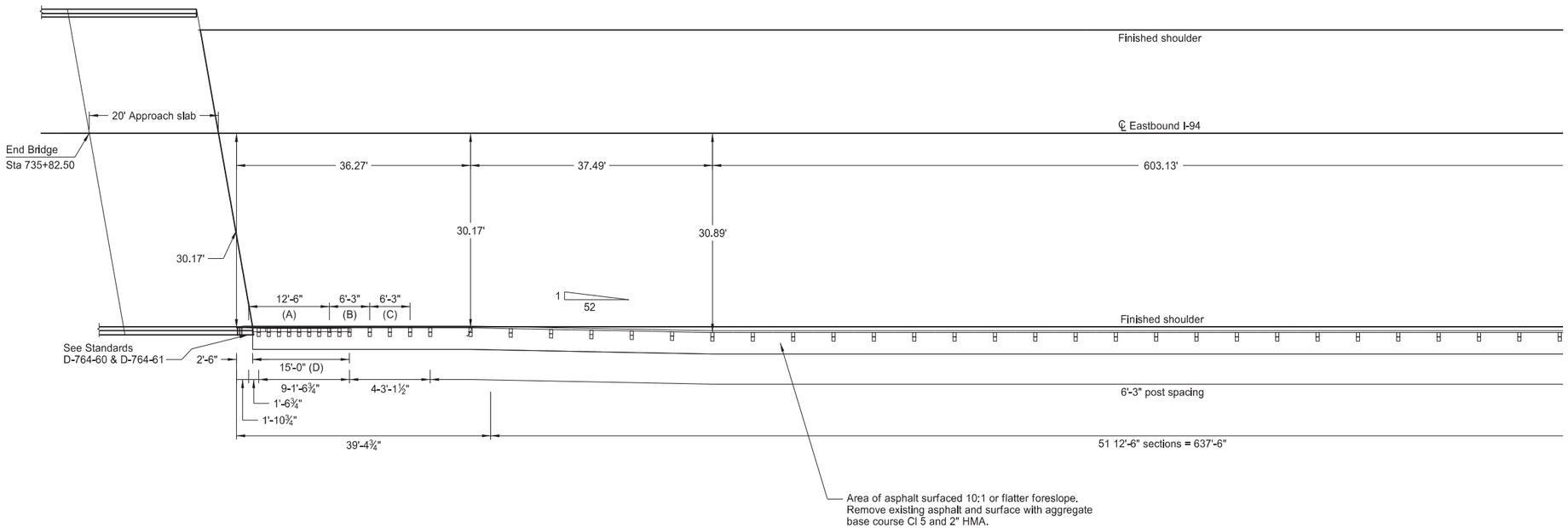
(D) Curb & gutter - type 1 special. Install in accordance with Standard Drawing D-748-1, except for transitions on each end as shown on Standard Drawing D-764-60.

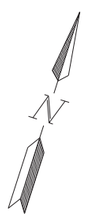
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

Thrie/MGS W-Beam Guardrail Layout
At Beginning of Bridge (Sheet 2 of 2)

BNSF RR & SE Jamestown Interchange
RP 260.131
Eastbound I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	130	5





REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE
10/11/23
NORTH DAKOTA

(A) Thrie beam rail section (double thickness)

(B) Thrie beam rail section

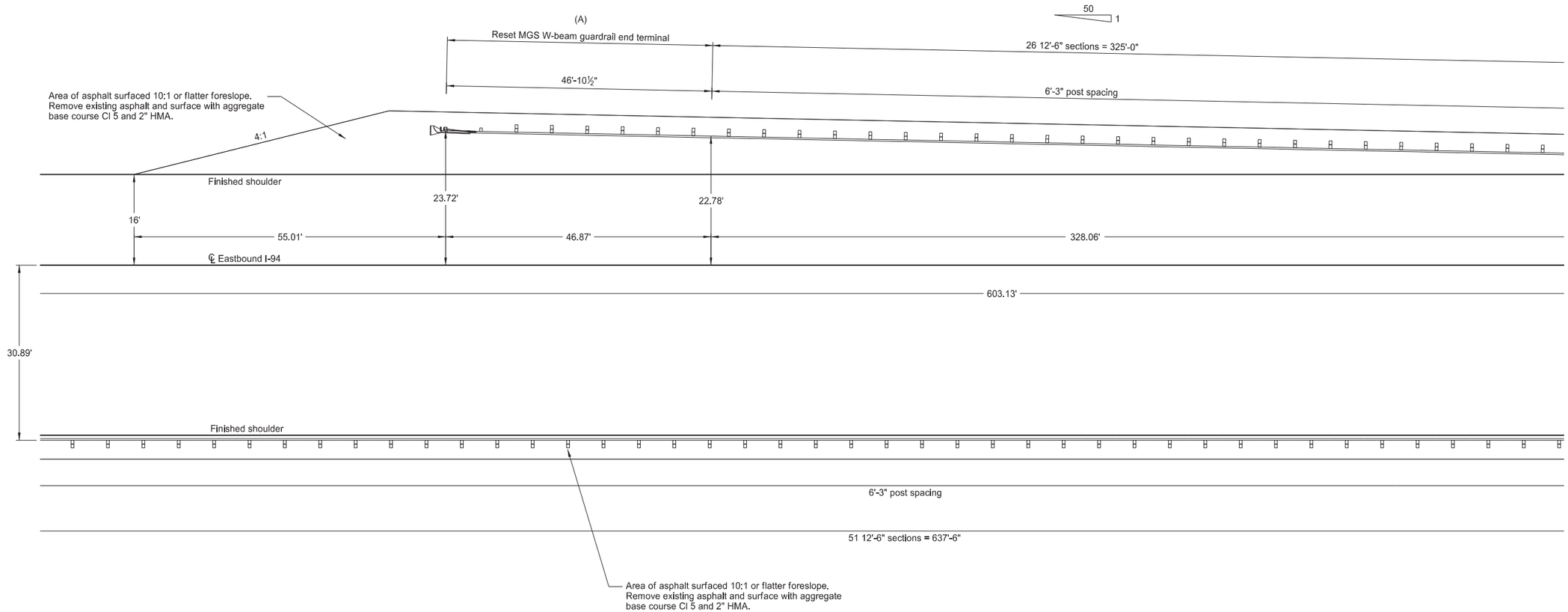
(C) Asymmetrical W-Thrie beam transition section

(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.

Thrie/MGS W-Beam Guardrail Layout
From End of RP 260.131 Interchange Bridge to
Beginning 260.304 Separation Bridge (Sheet 1 of 3)

BNSF RR & SE Jamestown Interchange,RP 260.131
RRVW & Minor Road Separation, RP 260.304
Eastbound I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	130	6



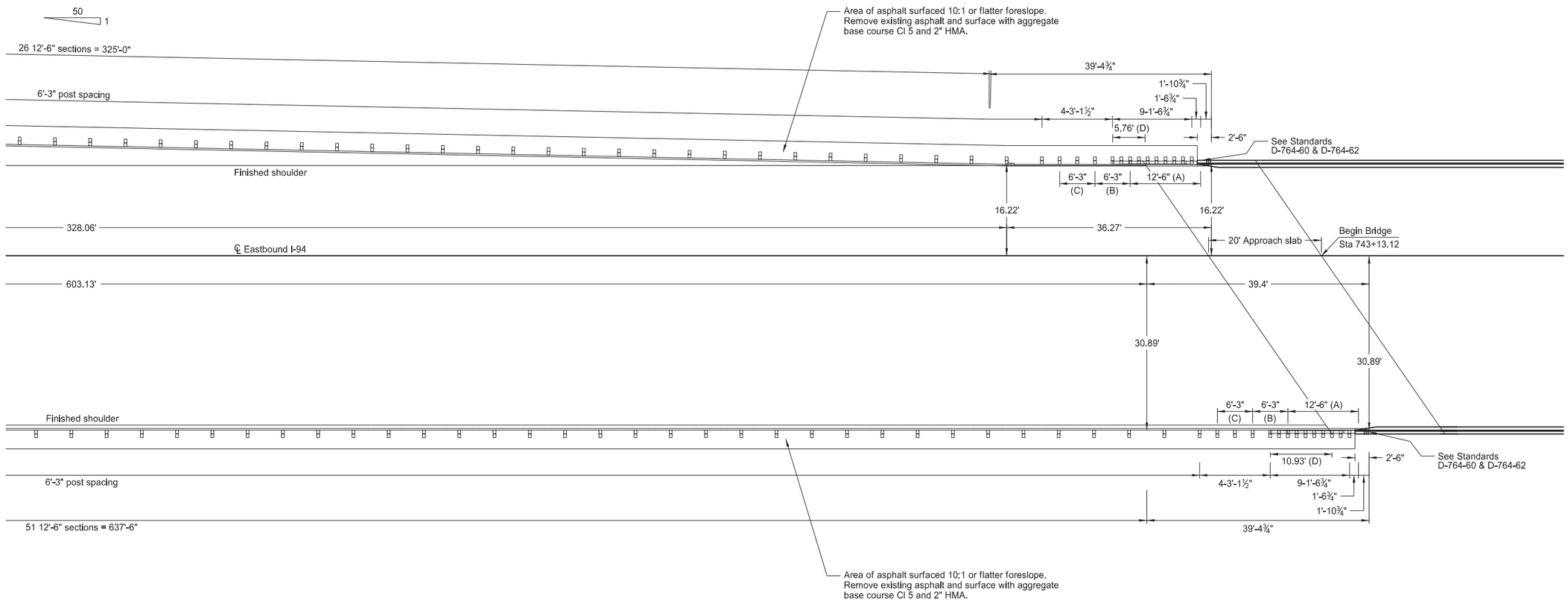
(A) Reset a MASH SKT at this location. See Standard D-764-51.

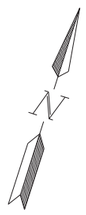
REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

Thrie/MGS W-Beam Guardrail Layout
From End of RP 260.131 Interchange Bridge to
Beginning 260.304 Separation Bridge (Sheet 2 of 3)

BNSF RR & SE Jamestown Interchange,RP 260.131
RRVW & Minor Road Separation, RP 260.304
Eastbound I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	130	7





REGISTERED PROFESSIONAL ENGINEER
Darell Arne
PE-6529
DATE 10/11/23
NORTH DAKOTA

(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 a height transition from 0" to 6" at the west end as shown on Standard Drawing D-764-60.

Thrie/MGS W-Beam Guardrail Layout
From End of RP 260.131 Interchange Bridge to Beginning 260.304 Separation Bridge (Sheet 3 of 3)

BNSF RR & SE Jamestown Interchange,RP 260.131
RRVW & Minor Road Separation, RP 260.304
Eastbound I-94
Jamestown

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	130	8

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 EACH	(A) 6" x 8" x 6'-0" TIMBER POST EACH	(A) 6" x 8" x 14" TIMBER BLOCK EACH	(A) 5/8" Ø x 1 1/4" LONG GUARD-RAIL BOLT EACH	(A) 12'- 6" STRAIGHT W-BEAM RAIL SECTION EACH	(A) 12'- 6" CURVED W-BEAM RAIL SECTION EACH	(A) REFL-ECTOR-IZED PLATES EACH	(A) 6" x 8" x 7' WOOD POST EACH	(A) 6" x 8" x 19" WOOD OFF-SET BLOCK EACH	(A) 6'-3" W-THRIE BEAM TRANS-ITION SECTION EACH	(A) 6'-3" THRIE BEAM SECTION EACH	(A) 12'-6" DOUBLE THRIE BEAM SECTION EACH	(A) 2'-6" THRIE BEAM TERM-INAL CON-NECTOR EACH	(A) 7/8" Ø x 15" LONG HEX HEAD BOLT EACH	(A) SINGLE SLOPE TO THRIE BEAM CONN-ECTOR PLATE EACH	(A) JERSEY BARRIER TO THRIE BEAM CONN-ECTOR PLATE EACH
Sta 54+33.78 to 57+63.98 Rt SW Loop	72	55	49	236	18	6	9	6	12	1	1	1	1	5	1	
Sta 729+23.43 to 733+12.83 Lt	82	65	59	276	29		10	6	12	1	1	1	1	5	1	
Sta 736+05.29 to 743+21.58 Rt	147	113	107	512	53		17	12	24	2	2	2	2	10	1	1
Sta 742+54.23 to 742+93.62 Lt	26	9	3	52	1		10	6	12	1	1	1	1	5		1
TOTAL	327	242	218	1076	101	6	46	30	60	5	5	5	5	25	3	2

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

(B) Removed from the crossroad. The existing guardrail is to remain in place until construction is completed on the crossroad bridge structure.

SPEC	CODE	BID ITEM	QTY	UNIT	
748	0141	CURB & GUTTER - TYPE 1 SPECIAL			
		Sta 57+46.48 to 57+61.48 Rt SW Loop	15	LF	
		Sta 732+95.33 to 733+10.33 Lt	15	LF	
		Sta 736+07.79 to 736+22.79 Rt	15	LF	
		Sta 743+04.07 to 743+15.00 Rt	10.9	LF	
		Sta 742+76.12 to 174+81.88 Lt	5.8	LF	
		Total	61.7	LF	
764	0131	W-BEAM GUARDRAIL			
		Sta 54+33.78 to 57+63.98 Rt SW Loop	326.9	LF	
		Sta 729+23.43 to 733+12.83 Lt	389.4	LF	
		Sta 736+05.29 to 743+21.58 Rt	716.3	LF	
		Sta 742+54.23 to 742+93.62 Lt	39.4	LF	
		Total	1472	LF	
764	0145	W-BEAM GUARDRAIL END TERMINAL			
		Sta 53+84.23 to 54+33.78 Rt SW Loop	1	Ea	
		Sta 728+76.56 to 729+23.43 Lt	1	Ea	
		Total	2	Ea	

SPEC	CODE	BID ITEM	QTY	UNIT	
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS			
		Sta 54+35.80 to 57+89.86 Rt SW Looop	420.7	LF	
		Sta 729+03.80 to 733+24.43 Lt	351.9	LF	
		Sta 735+77.17 to 743+21.58 Rt	753.8	LF	
		Sta 739+29.29 to 742+93.62 Lt	364.4	LF	
		Sta 16+17.54 to 18+14.27 Lt	200	LF	(B)
		Total	2090.8	LF	
764	1050	RESET W-BEAM GUARDRAIL			
		Sta 739+29.29 to 742+54.23 Lt	325	LF	
764	1059	RESET W-BEAM GUARDRAIL END TERMINAL			
		Sta 738+82.42 to 739+29.29 Lt	1	Ea	
764	2081	REMOVE END TREATMENT & TRANSITION			
		Sta 53+82.86 to 54+35.80 Rt SW Loop	1	Ea	
		Sta 728+53.81 to 729+03.80 Lt	1	Ea	
		Sta 739+29.29 to 742+54.23 Lt	1	Ea	
		Sta 15+69.84 to 16+17.54 Lt	1	Ea	(B)
		Sta 18+14.27 to 18+63.54 Lt	1	Ea	(B)
		Total	5	Ea	

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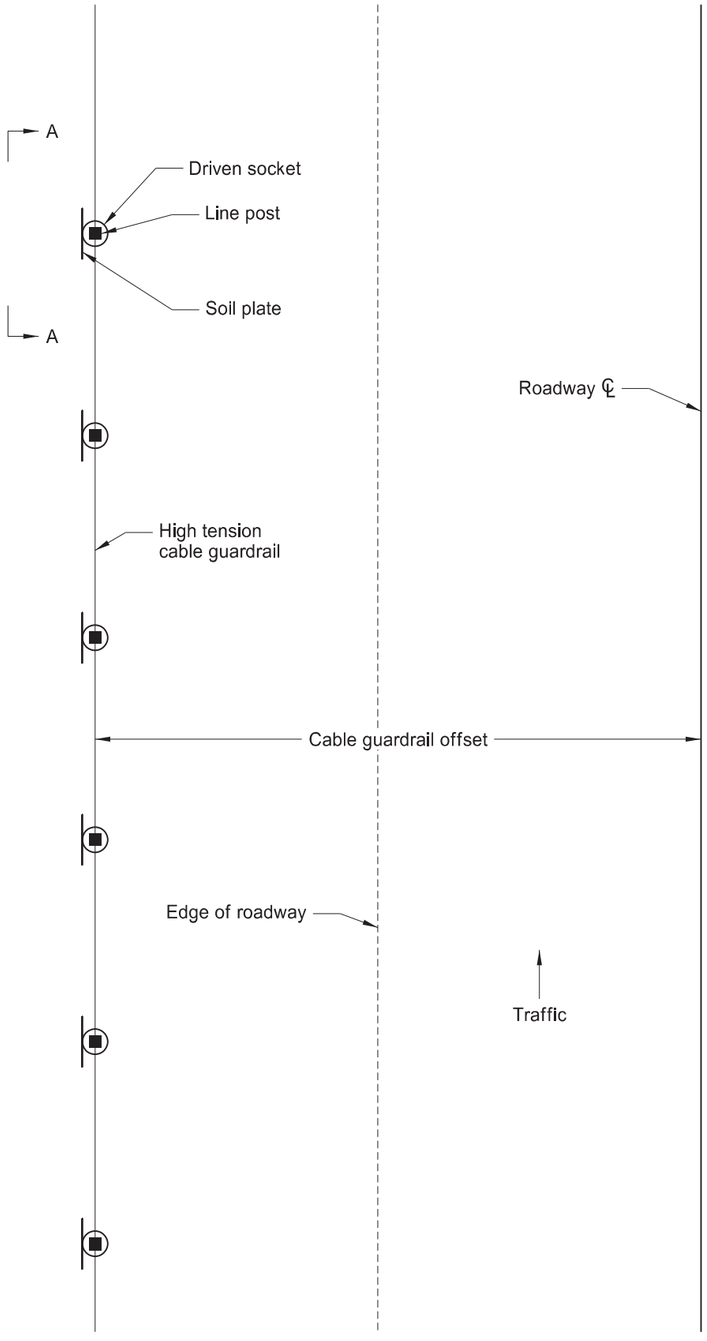
Thrie/MGS W-Beam Guardrail Quantities

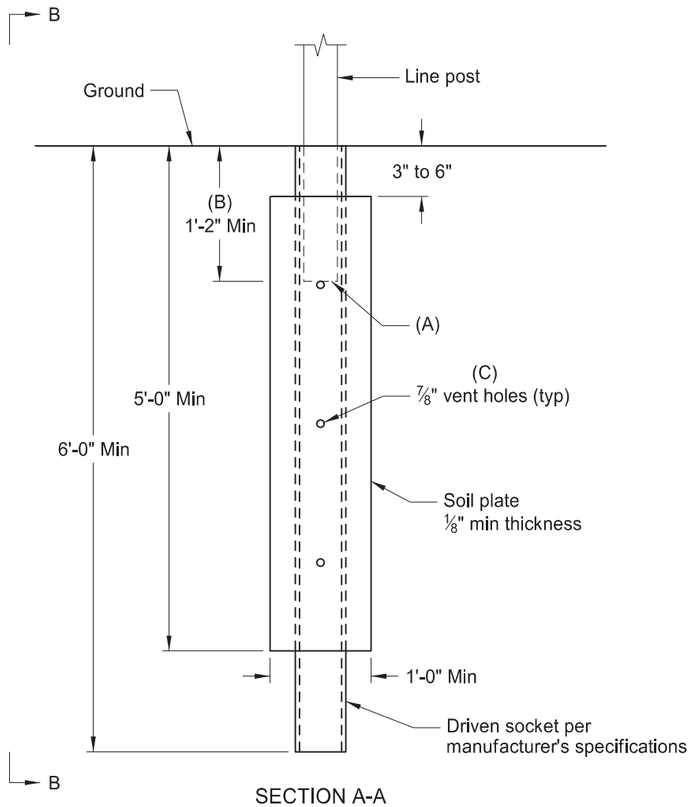
BNSF RR & SE Jamestown Interchange, RP 260.131
RRVW & Minor Road Separation, RP 260.304

Eastbound I-94
Jamestown

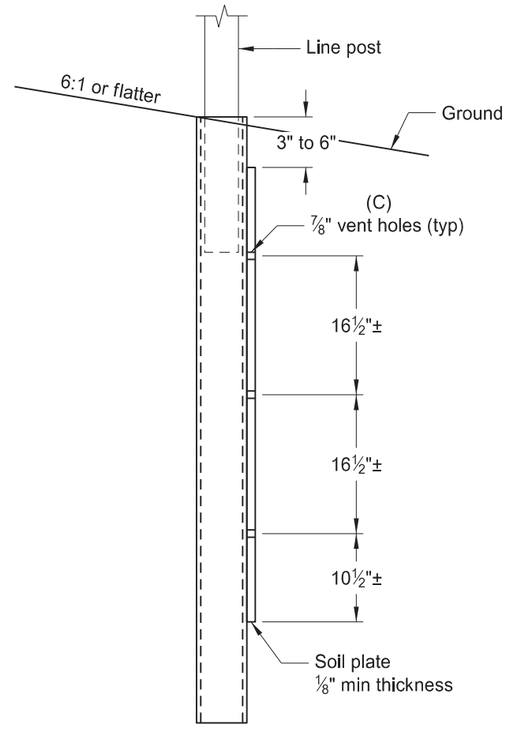
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	130	9



PLAN VIEW



SECTION A-A



SECTION B-B

DESIGN REQUIREMENTS:

1. Socket designed for a maximum deflection of 1" at ground level.
2. Sockets have a yield strength equal to or greater than that of the crash tested line posts.
3. Sockets designed for line posts to yield above ground.

NOTES:

(A) Existing post stop per manufacturer's recommendation.

(B) Existing line post depth as per manufacturer's specifications.

(C) Existing vent holes for galvanizing per manufacturer's recommendation. Upper hole may be used for post stop.

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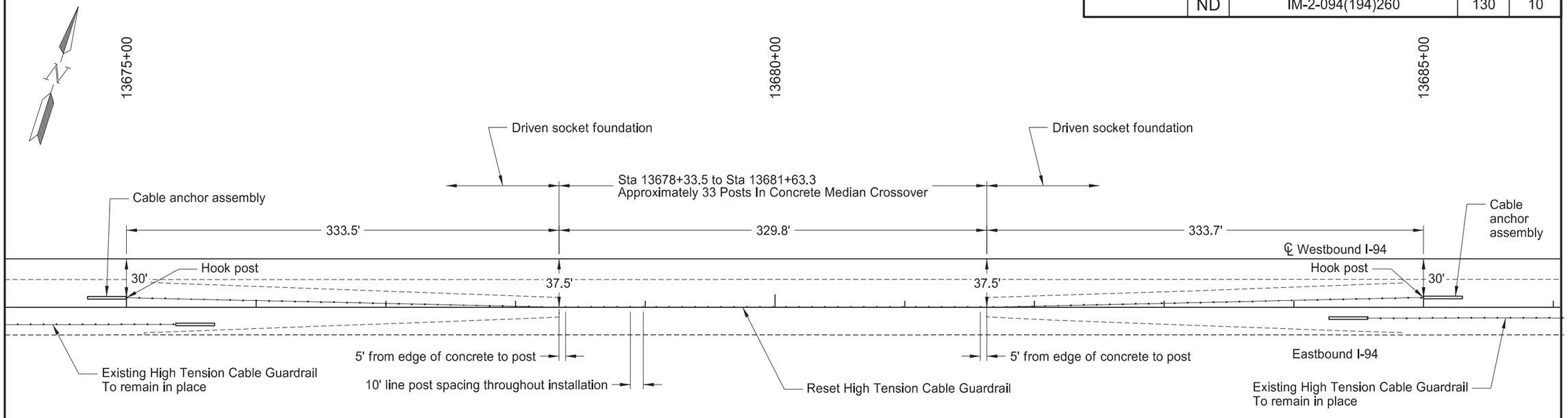
DATE 10/11/23
NORTH DAKOTA

High Tension Cable Guardrail Detail

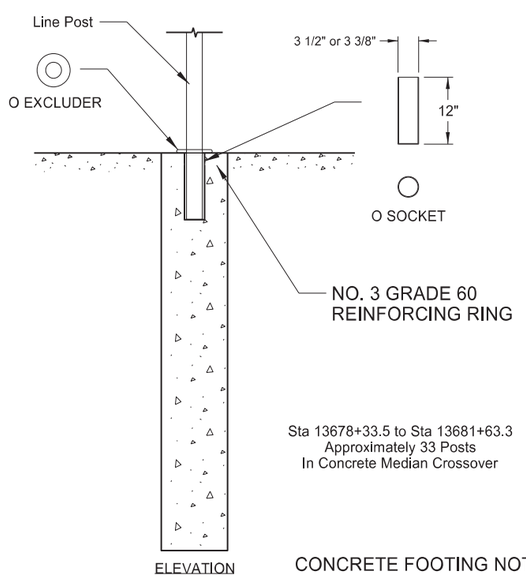
West Median Crossover,
Sta 13675+00 to Sta 13685+00
Temporary Ramp Connections,
Sta 13724+37 to Sta 13729+47
I-94
Jamestown

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	130	10



PLAN VIEW
High Tension Cable Guardrail Through Concrete Median Crossover
Sta 13675+00 to Sta 13685+00

CONCRETE FOOTING



Sta 13678+33.5 to Sta 13681+63.3
Approximately 33 Posts
In Concrete Median Crossover

CONCRETE FOOTING NOTES:

1. Existing socket flush with the ground line.
2. Existing socket ±2° of vertical plumb.
3. Existing PVC or Galvanized steel O socket.

NOTES:

1. Remove the sand in the holes in the concrete crossover. Reset the existing high tension cable guardrail (cable and posts) from concrete end anchor to concrete end anchor.

   Pay length is from hook post to hook post.

SPEC	CODE	BID ITEM	QTY	UNIT
764	0109	RESET HIGH TENSION GUARDRAIL		
		Sta 13675+00 to Sta 13685+00	1,000	LF

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PE-6529
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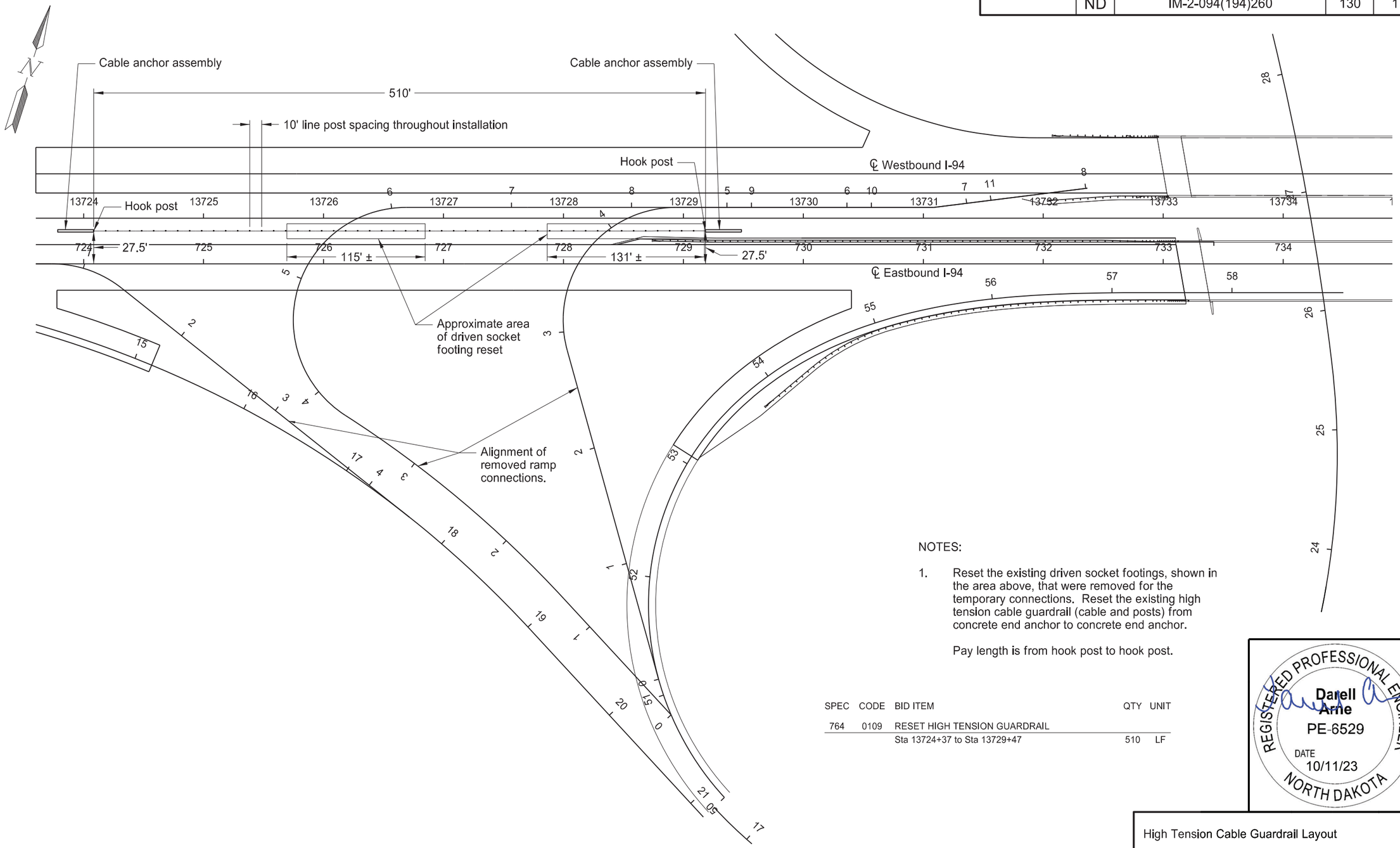
NORTH DAKOTA

High Tension Cable Guardrail Layout

West Median Crossover
Sta 13675+00 to Sta 13685+00
I-94
Jamestown

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	130	11



NOTES:

1. Reset the existing driven socket footings, shown in the area above, that were removed for the temporary connections. Reset the existing high tension cable guardrail (cable and posts) from concrete end anchor to concrete end anchor.

   Pay length is from hook post to hook post.

SPEC	CODE	BID ITEM	QTY	UNIT
764	0109	RESET HIGH TENSION GUARDRAIL		
		Sta 13724+37 to Sta 13729+47	510	LF

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DATE 10/11/23
NORTH DAKOTA

23 USC § 407 Documents
NDDOT Reserves All Objections

High Tension Cable Guardrail Layout

Temporary Ramp Connections
Sta 13724+37 to Sta 13729+47
I-94
Jamestown

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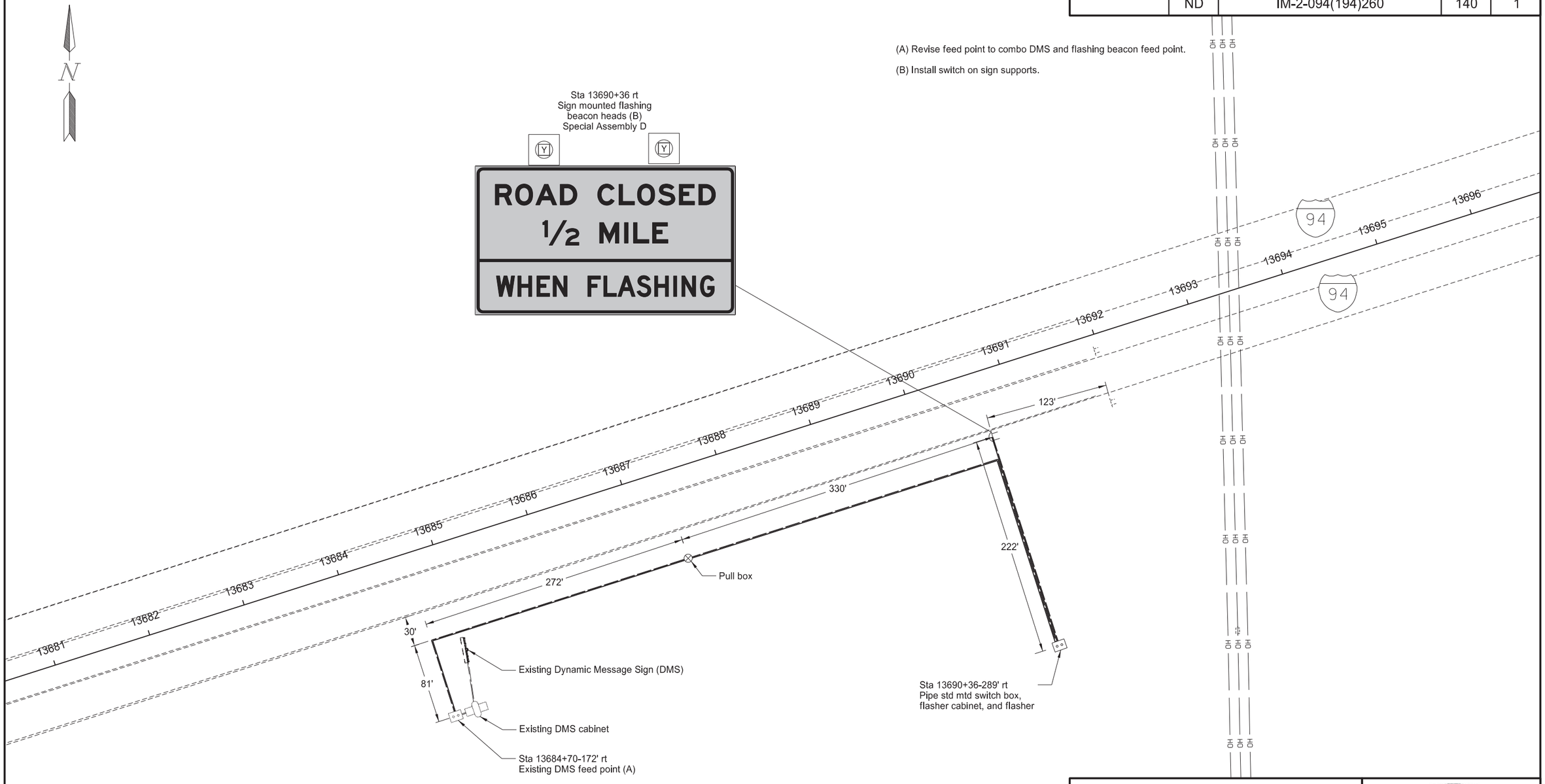
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	1

(A) Revise feed point to combo DMS and flashing beacon feed point.

(B) Install switch on sign supports.



Flashing Beacon Sign Layout

SE Jamestown Interchange

I-94

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DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	2

Quantities (A) - I-94 Exit 260 EB		
Structural Splice Box	EA	1
Pull box with Concrete Mow Strip	EA	1
Underground Conductor No 6 Type RHW	LF	1858
Underground Conductor No 6 Type THW	LF	929
No 14 AWG 5 Conductor Cable	LF	281
1" Diameter Steel Conduit	LF	25
2" Diameter Conduit	LF	1127
12" Yellow LED Flashing Beacon Head with Back Plate	EA	2
Flasher Cabinet Pipe Stand Mounted, including switch box, 2 in Perf. Tube, and Concrete Slab	EA	1
Revise DMS Feed Point	EA	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
772	2100	Flashing Beacon - Post Mounted		
			EA	1

(A) Include these quantities in the price bid for "Flashing Beacon - Post Mounted".

(B) Install 1" conduit to sign supports. See Special Assembly details.

Cable & Conduit Chart - I-94 Exit 260 EB				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
Flashing Beacon Sign to Flasher Cabinet	25 234	1 (B) 2	281	No 14 AWG 5
Flasher Cabinet to Pull Box	528	2	1128 564	(2) No 6 RHW (1) No 6 THW
Pull Box to Existing feed point	365	2	730 365	(2) No 6 RHW (1) No 6 THW

Quantities and Conductor Charts

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	140	3

(A) Install the light standard and gate assembly 19 feet downstream of the existing gate foundation. This includes a 28 foot vertical lift road closure gate mounted to a light standard. Install 14 feet from edge of driving lane. Install switch on pole.

(B) Revise to provide 120V to new combo feed point.

N

Pull box

485'

Existing conductor

Sta 13724+48 lt
Combo feed point lighting and flashing beacon pad mounted Type 1 with switch box, power panel, flashing beacon cabinet and flasher

10'

Existing high mast lighting feed point (B)

Existing conductor

268'

Existing conductor

19'

Sta 13724+83 rt
Road closure gate 28 ft with light std (A)

Sta 13724+64 rt
Remove gate and foundation

94

94

13720 13721 13722 13723 13724 13725 13726 13727 13728 13729 13730 13731 13732 13733 13734

10 11 12 13 14 15 16 17 18

Road Closure Gate Layout

SE Jamestown Interchange

I-94

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DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

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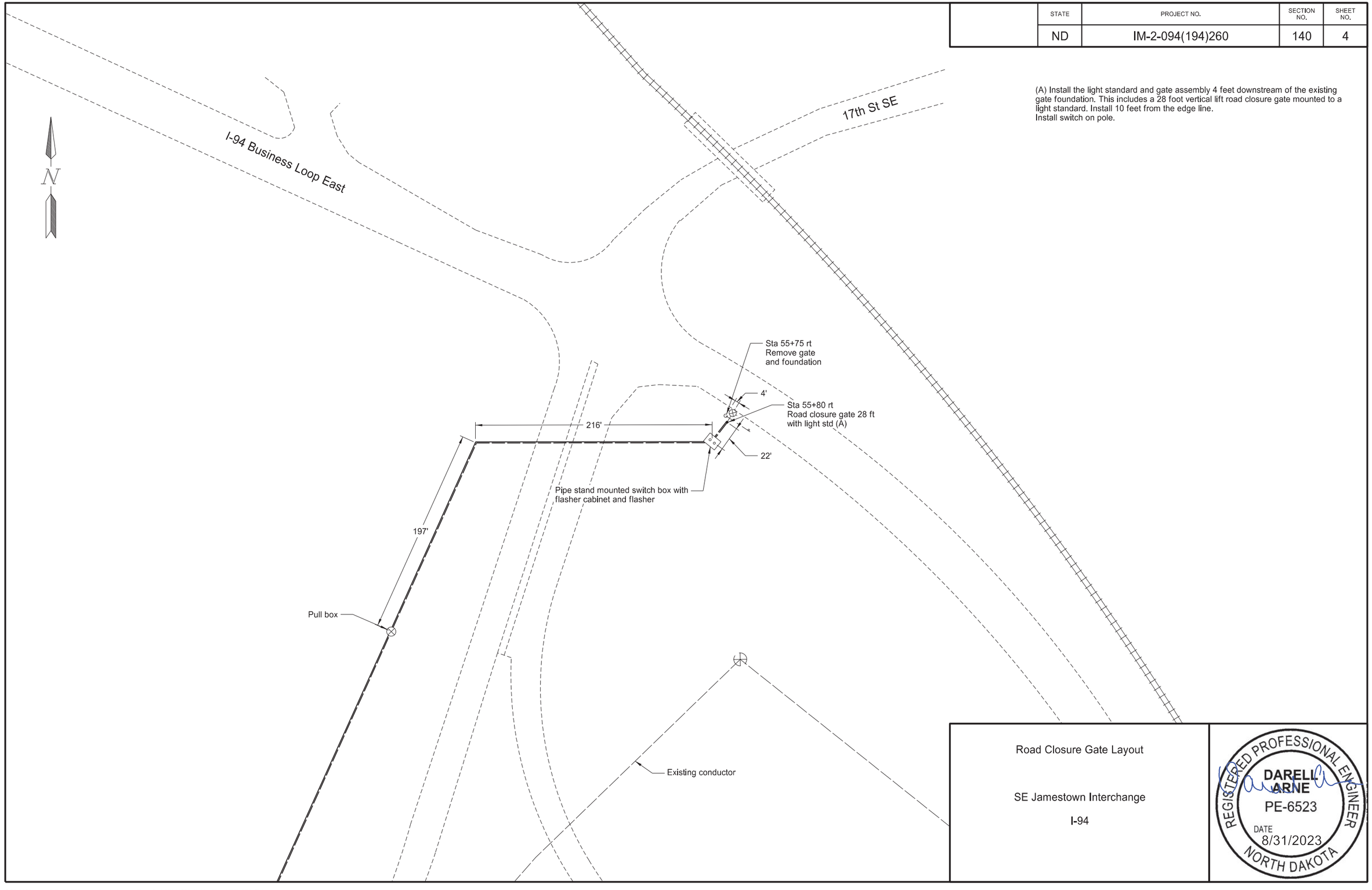
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	4

(A) Install the light standard and gate assembly 4 feet downstream of the existing gate foundation. This includes a 28 foot vertical lift road closure gate mounted to a light standard. Install 10 feet from the edge line.
Install switch on pole.



Road Closure Gate Layout

SE Jamestown Interchange

I-94

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DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	140	5

Quantities (A) - I-94 Exit 260 SW off-ramp		
Underground Conductor No 4 Type RHW	LF	60
Underground Conductor No 6 Type RHW	LF	564
Underground Conductor No 6 Type THW	LF	312
No 14 AWG 5 Conductor Cable	LF	282
2" Diameter Conduit	LF	310
Light Standard 6 ft Mast Arm 42 ft Pole Breakaway	EA	1
Vertical Lift Road Closure Gate System - 28 FT	EA	1
Concrete Foundation - Highway Lighting	EA	1
LED Luminaire	EA	1
Combo Feed Point Lighting and Flashing Beacon, Pad Mtd, Type 1, with Switch Box, Power Panel, Flasher Cabinet	EA	1
Revise High Mast Lighting Feed Point	EA	1
Remove Road Closure Gate and Foundation (B)	EA	1

Cable & Conduit Chart - I-94 Exit 260 SW off-ramp				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
Light Std with Gate to	130	2 (C)	282	No 14 AWG 5
Combo Feed Point	150	2	564 282	(2) No 6 RHW (1) No 6 THW
Combo Feed Point to Existing Feed Point	30	2	60 30	(2) No 4 RHW (1) No 6 THW

SPEC	CODE	BID ITEM	UNIT	QUANTITY
980	0811	Vertical Road Closure Gate - 28 FT	EA	2

(A) Include these quantities in the price bid for "Vertical Road Closure Gate - 28 FT".

(B) Refer to notes for gate removal.

(C) Bore this conduit under the roadway.

Quantities (A) - I-94 Exit 260 EB on-ramp		
Pull box with Concrete Mow Strip	EA	1
Underground Conductor No 6 Type RHW	LF	1916
Underground Conductor No 6 Type THW	LF	958
No 14 AWG 5 Conductor Cable	LF	36
2" Diameter Conduit	LF	956
Light Standard 6 ft Mast Arm 42 ft Pole Breakaway	EA	1
Vertical Lift Road Closure Gate System - 28 FT	EA	1
Concrete Foundation - Highway Lighting	EA	1
LED Luminaire	EA	1
Flasher Cabinet Pipe Stand Mounted, 2 in Perf. Tube, and Concrete Slab	EA	1
Remove Road Closure Gate and Foundation (B)	EA	1

Cable & Conduit Chart - I-94 Exit 260 EB on-ramp				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
Light Std with Gate to	34	2	36	No 14 AWG 5
Flasher Cabinet			72 36	(2) No 6 RHW (1) No 6 THW
Flasher Cabinet to	80	2 (C)	850	(2) No 6 RHW
Pull Box	345	2	425	(1) No 6 THW
Pull Box to	497	2	994	(2) No 6 RHW
Combo Feed Point			497	(1) No 6 THW

Quantities and Conductor Charts

SE Jamestown Interchange

I-94

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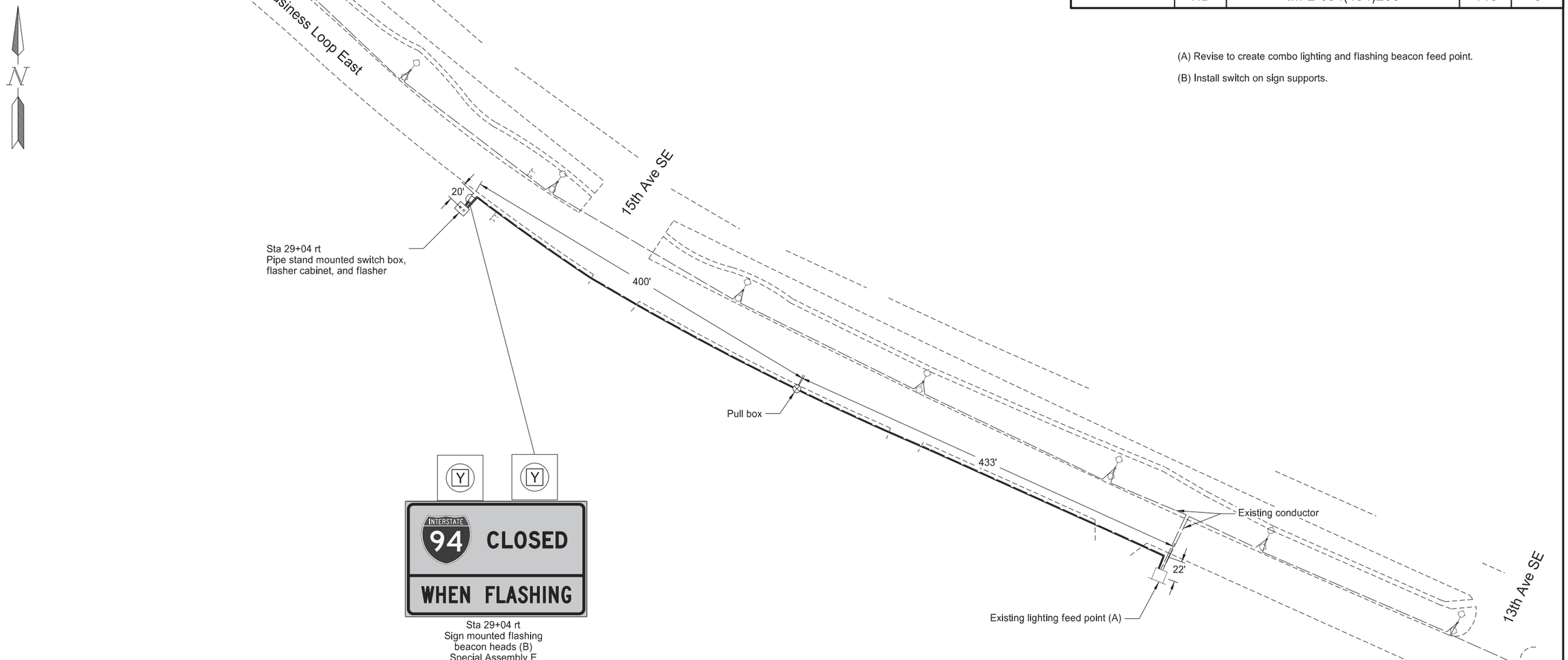
DATE 8/31/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	6

(A) Revise to create combo lighting and flashing beacon feed point.

(B) Install switch on sign supports.



Flashing Beacon Sign Layout

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	7

Quantities (A) - I-94B east business loop		
Structural Splice Box	EA	1
Pull box with Concrete Mow Strip	EA	1
Underground Conductor No 6 Type RHW	LF	1798
Underground Conductor No 6 Type THW	LF	899
No 14 AWG 5 Conductor Cable	LF	74
1" Diameter Steel Conduit	LF	20
2" Diameter Conduit	LF	921
12" Yellow LED Flashing Beacon Head with Back Plate	EA	2
Flasher Cabinet Pipe Stand Mounted, including switch box, 2 in Perf. Tube, and Concrete Slab	EA	1
Revise Lighting Feed Point	EA	1

SPEC	CODE	BID ITEM	UNIT	QUANTITY
772	2100	Flashing Beacon - Post Mounted	EA	1

(A) Include these quantities in the price bid for "Flashing Beacon - Post Mounted".

(B) Mount this conduit to the sign supports.

(C) Bore this conduit under the roadway.

Cable & Conduit Chart - I-94B east business loop				
Location	Conduit Runs		Cable Runs	
	LF	DIA IN	LF	Type
Flashing Beacon Sign to	20	1 (B)	74	No 14 AWG 5
Flasher Cabinet	22	2		
Flasher Cabinet to	50	2 (C)	864	(2) No 6 RHW
Pull Box	382	2	432	(1) No 6 THW
Pull Box to	90	2 (C)	934	(2) No 6 RHW
Existing Feed Point	377	2	467	(1) No 6 THW

Quantities and Conductor Charts

SE Jamestown Interchange

I-94

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PE-6523
DATE 8/31/2023
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	140	8

Light Standard with Vertical Snow Gate List					
Location	Station	Light Distribution Type	Wattage	Pole Height FT	Mast Arm FT
I-94 Exit 260 SW off-ramp	Sta 13724+83 rt	3	100-150	42	6
I-94B east business loop on-ramp	Sta 55+75 rt	3	100-150	42	6

Light Standard Chart

SE Jamestown Interchange

I-94

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DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

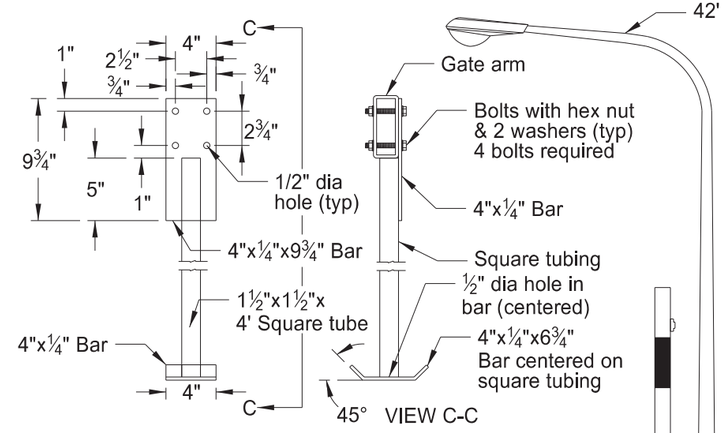
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	9

NOTES:
1) When mounting the 40' road closure gate on the light standard, the luminaire arm will be rotated slightly to allow the gate to be stowed in the upright position.

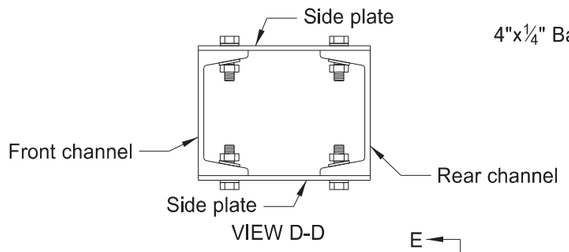
2) Provide and install light standard in accordance with Section 770 of the NDDOT Standard Specifications.

3) See plans for which locations require a mast arm and luminaire.

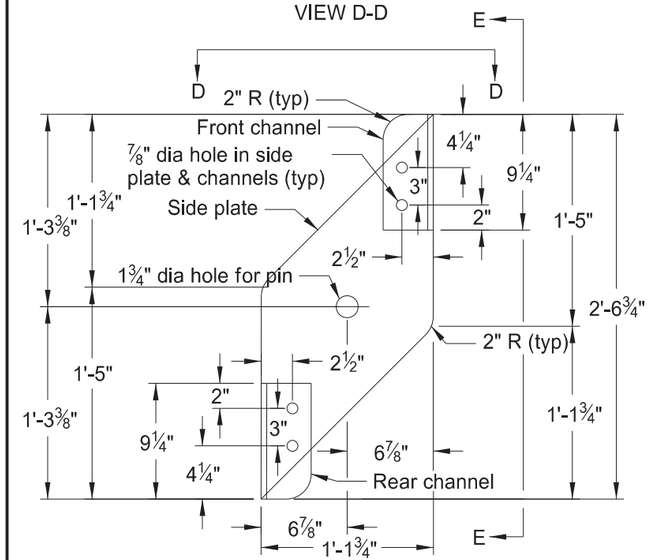
*See Standard D-770-1 for additional Light & Signal Standard Foundation details



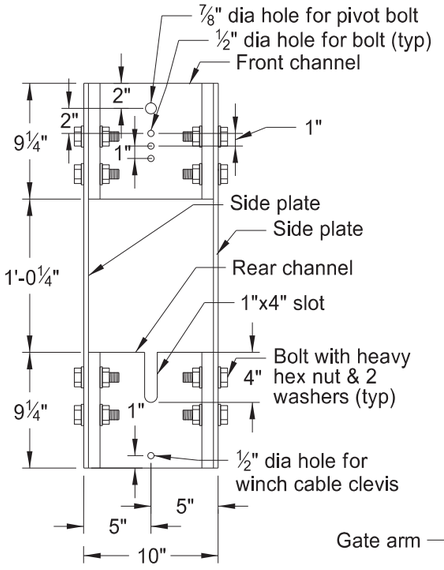
DROP GATE ARM SUPPORT DETAIL



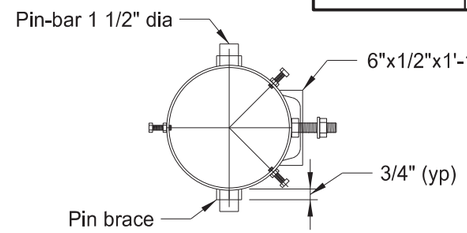
VIEW D-D



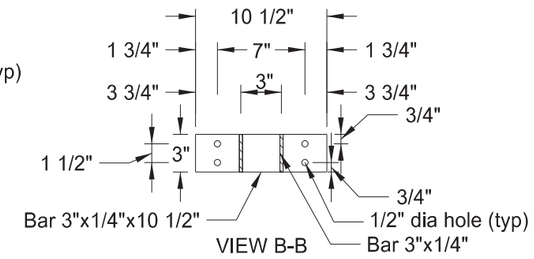
DROP GATE ARM PIVOT SIDE PLATE DETAIL



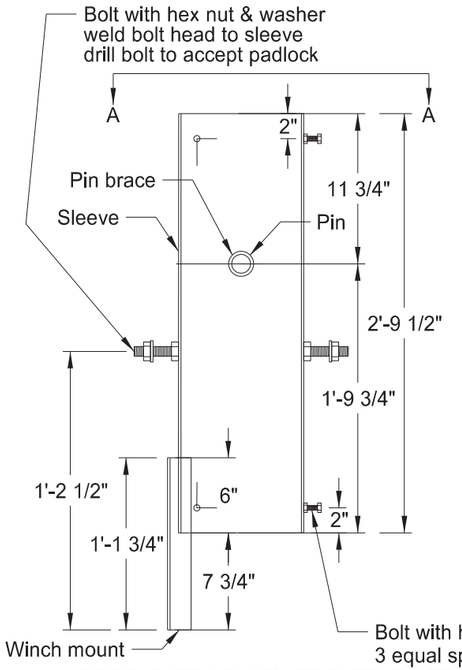
VIEW E-E



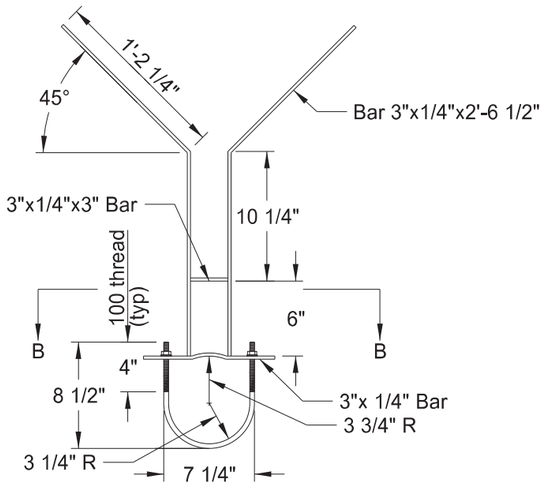
VIEW A-A



VIEW B-B



DROP GATE ARM PIVOT SLEEVE DETAIL



DROP GATE ARM GUIDE DETAIL

DROP GATE DETAIL

DROP GATE ARM PIVOT ASSEMBLY

TABLE 1	
Concrete Foundation*	
Depth	Diameter
6'	24" or 30"
5'	36" or 42"

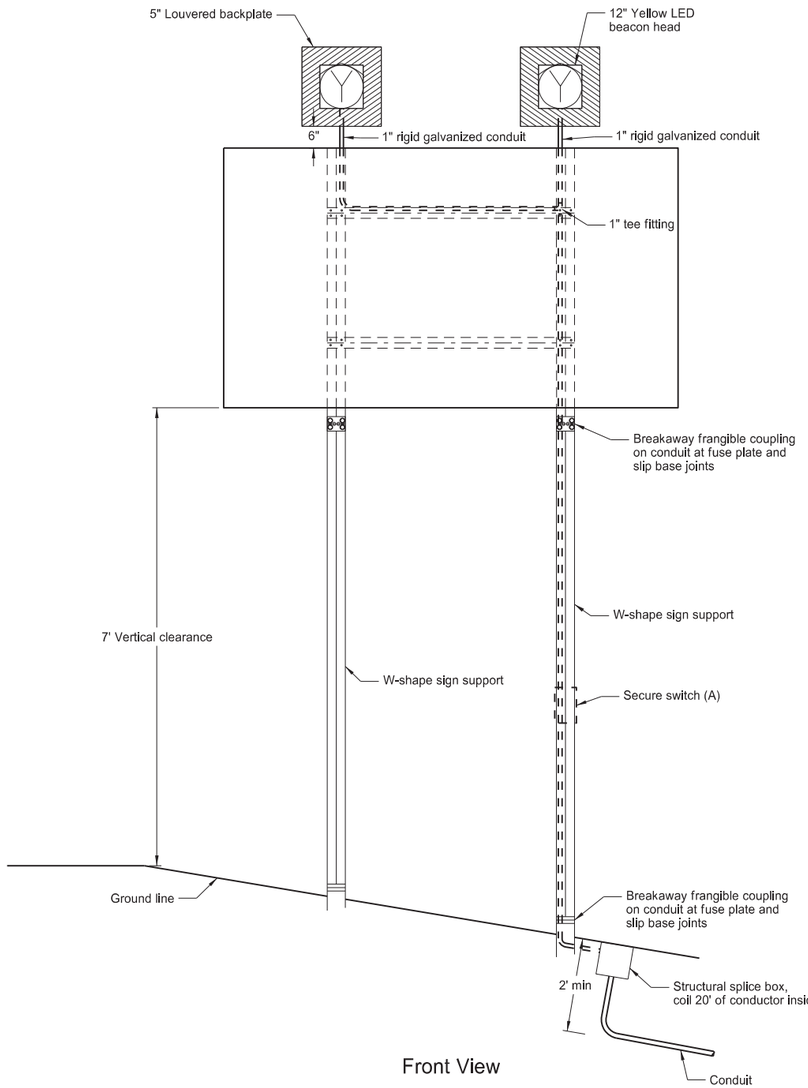
Light Standard with Road Closure Gate

SE Jamestown Interchange

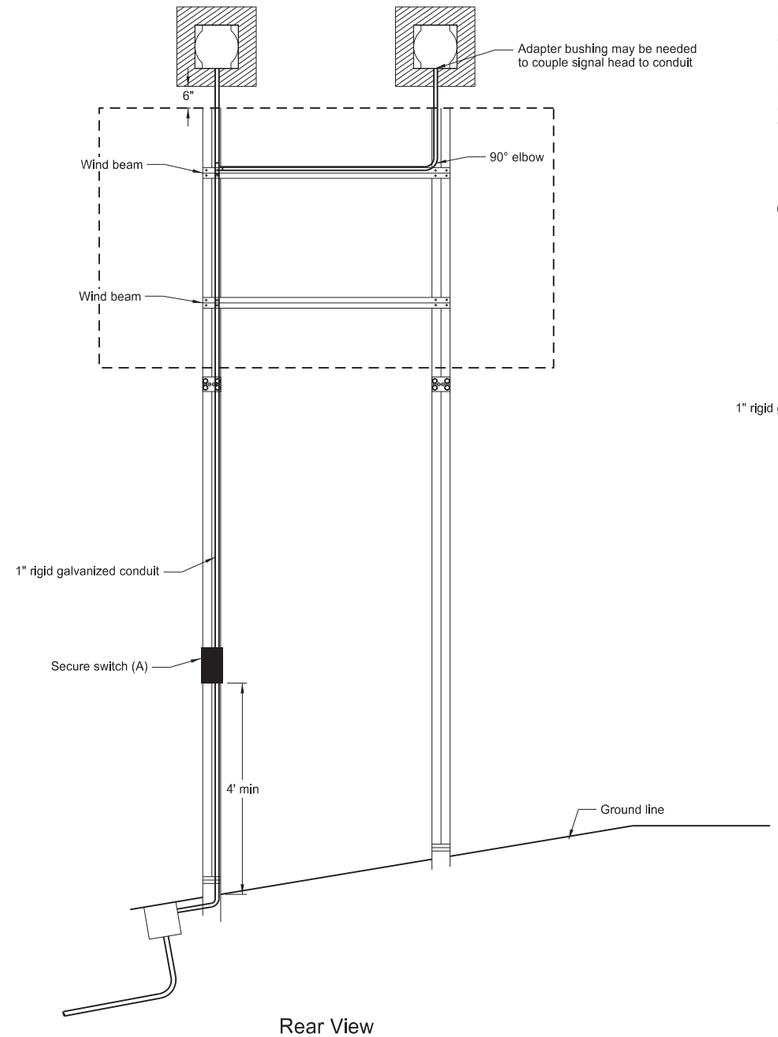
I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	10



Front View



Rear View

Special Assembly D
Sta 13690+36 rt

Notes:

Ensure the rigid galvanized conduit is securely fastened to the sign supports. Install the conduit in the web of the sign post as shown, on the side facing the ditch.

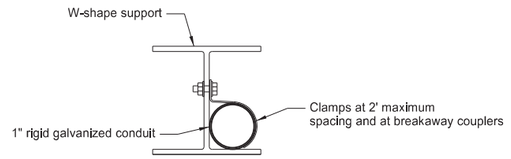
See Section 110 for post sizes and sign mounting details.

Operate the flashing beacons on 120 volts.

Ensure the flashing beacon heads flash alternately.

Conduit, Conductor, LED modules Signal Heads, Backplates, Connectors, Clamps, and components needed to attach the Flashing Beacons to the Sign Structure and make it operational include with the pay item "Flashing Beacon - Post Mounted".

(A) Refer to layout sheets for signs that require a switch.



Conduit Clamp Detail

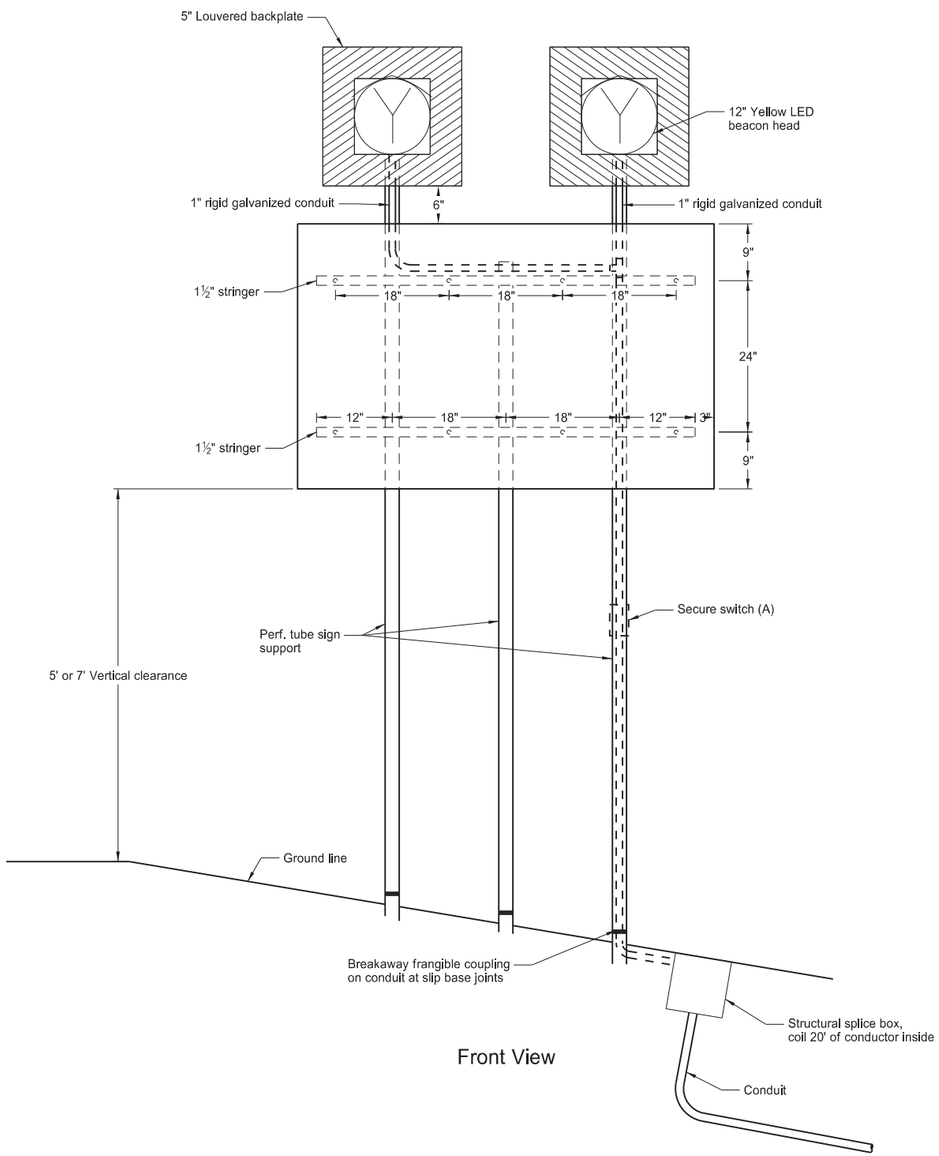
Flashing Beacon Sign Details
Special Assembly

SE Jamestown Interchange

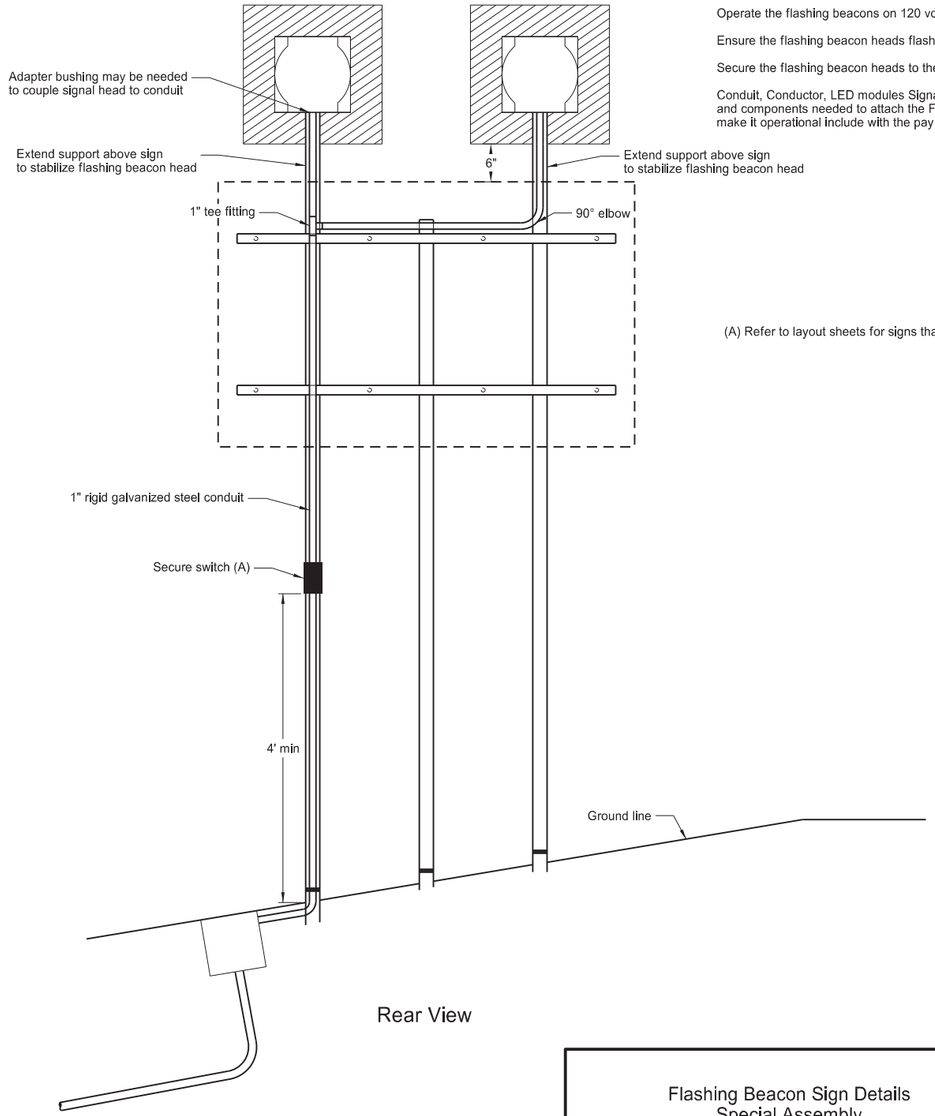
I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE
8/31/2023
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	11



Front View



Rear View

Special Assembly E
Sta 29+04 rt

Notes:

Ensure the rigid galvanized conduit is securely fastened to the sign supports. Provide straps on both sides of the conduit when attaching to the sign supports.

See Section 110 for post sizes.

Operate the flashing beacons on 120 volts.

Ensure the flashing beacon heads flash alternately.

Secure the flashing beacon heads to the sign supports.

Conduit, Conductor, LED modules Signal Heads, Backplates, Connectors, Clamps, and components needed to attach the Flashing Beacons to the Sign Structure and make it operational include with the pay item "Flashing Beacon - Post Mounted".

(A) Refer to layout sheets for signs that require a switch.

Flashing Beacon Sign Details
Special Assembly

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DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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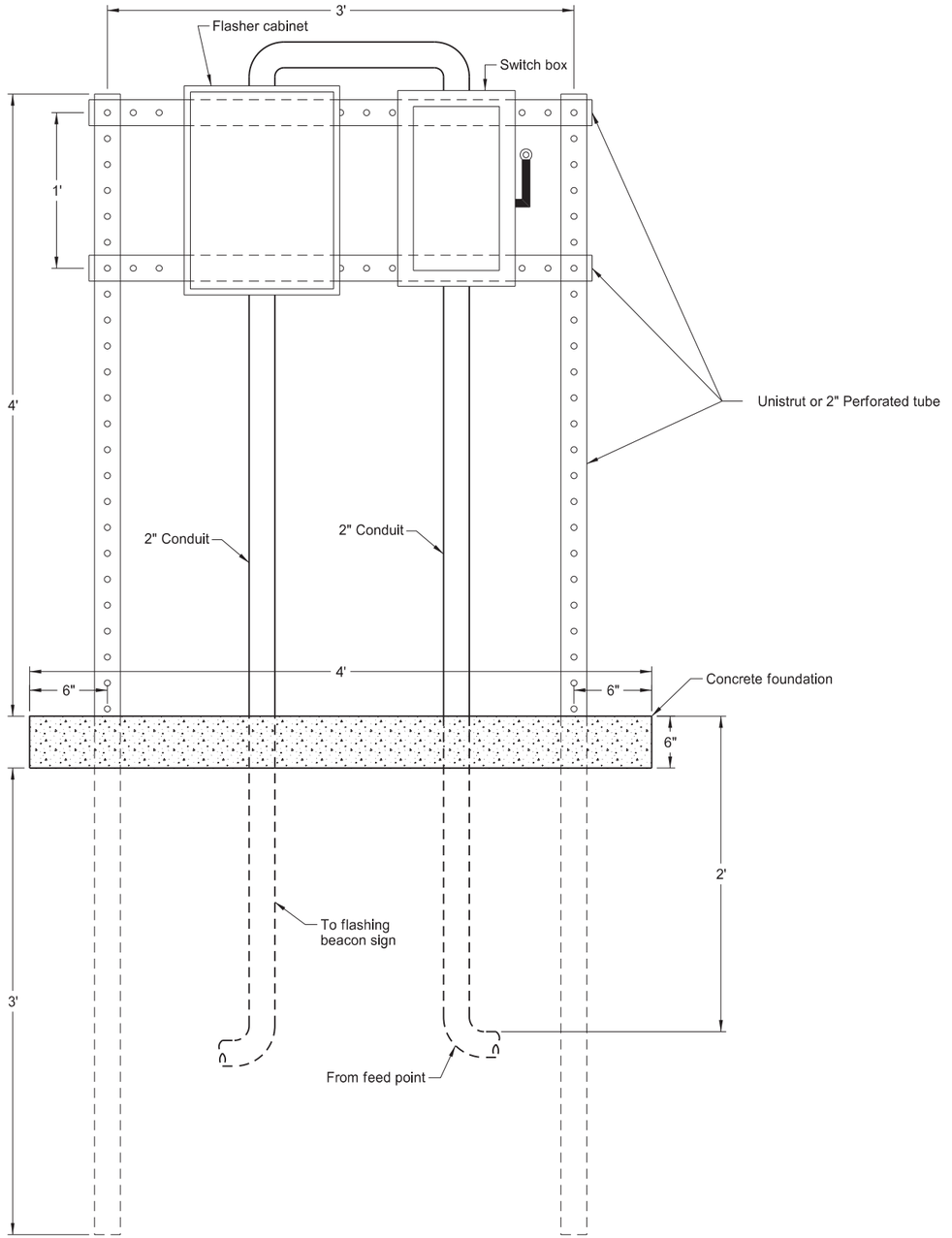
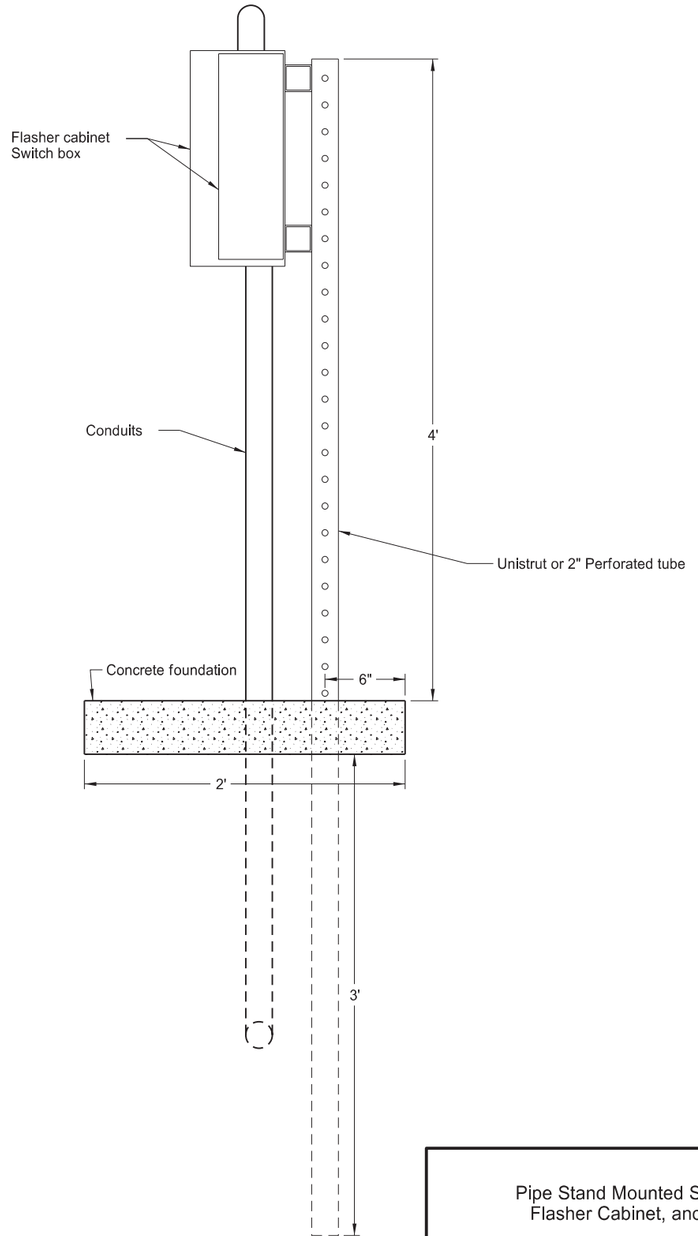


Front View



Side View

Pipe Stand Mounted Switch Box and Flasher Cabinet Detail

Pipe Stand Mounted Switch Box, Flasher Cabinet, and Flasher

SE Jamestown Interchange

I-94

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PE-6523
DATE 8/31/2023
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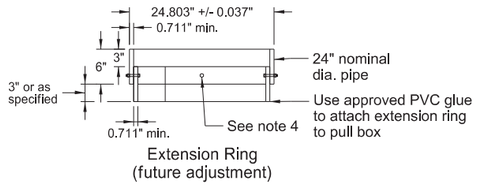
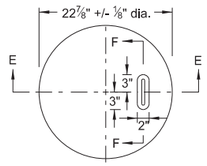
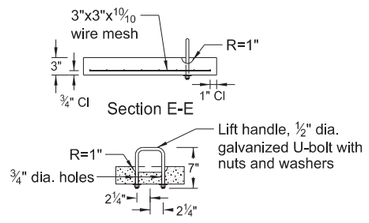
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	140	13



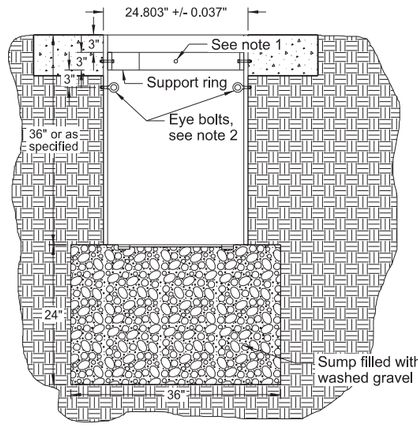
Extension Ring
(future adjustment)



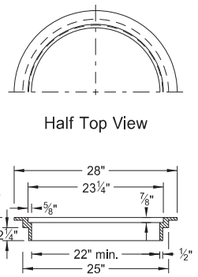
Top View



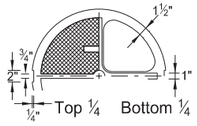
Concrete Cover



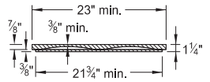
Elevation



Half Top View

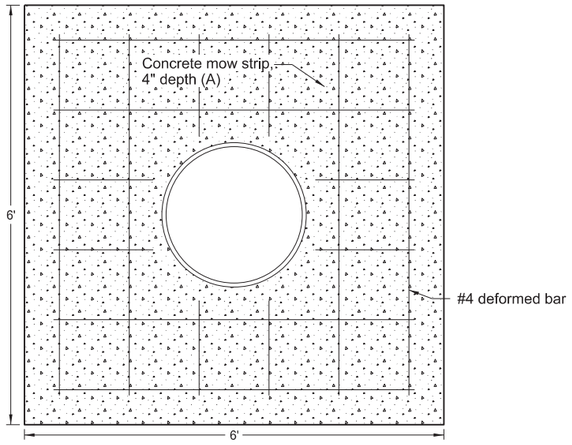


Section Frame

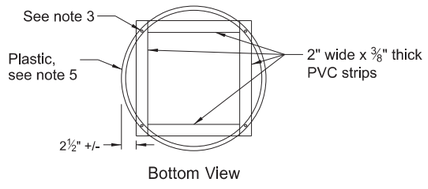


Section Cover

Cast Iron Frame and Cover

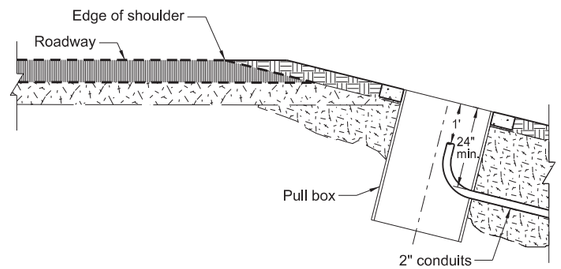


Top View
with mow strip



Bottom View

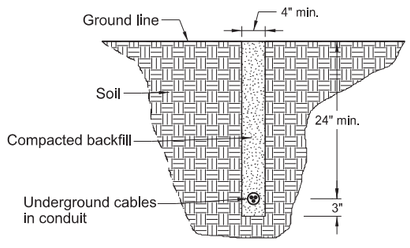
PVC Pull Box
with mow strip



Pull Box Installation Details

Note: The location of pull box will vary, refer to layout sheets for actual location.

(A) Install a mow strip around the pull box. Place expansion material between the foundation and the mow strip. Ensure the mow strip is 4" depth and 2' width from the foundation. Use #4 deformed bars in the mow strip. Space the bars 6" from the outside edge. Place the bars in a grid pattern at 1' apart.



Cable Installation
(plow or trench)

PVC Pull Box Notes:

1. Attach split 24" nominal diameter PVC cover support ring with four ⅜" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
2. Two type 2 shoulder eye bolts, ⅜" dia. x 1¼" shank length with hex nuts 180 degrees apart (for lifting pull box and supporting electric cable).
3. Four ¼" x 1¼" long galvanized lag screws. Screw assembly together.
4. Attach split 24" nominal diameter PVC cover support extension ring with four ⅜" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
5. Bolt assembly together.
6. Size conduit holes located in barrel section no more than 1" larger than size of conduit being used.
7. After pull box and conduit installation, install water tight seal for inside walls and cover.
8. PVC pipe to meet requirements of ASTM F679 or equal.
9. Provide Austenitic Stainless Steel Hex Head bolts and nuts. Other fasteners to be galvanized as per ASTM A153.
10. Install an epoxy coating on the top and sides of the concrete cover. Provide an epoxy protective coating that is light gray, clear, or neutral in color and apply as recommended by the pull box manufacturer. Before application, clean with a wire brush and dry the surfaces of the concrete to which the epoxy protective coating is applied.
11. If a Cast Iron cover is provided, use grey iron as per AASHTO M 306.

Pull Box and Trenching Details

SE Jamestown Interchange

I-94

REGISTERED PROFESSIONAL ENGINEER
DARELL ARNE
PE-6523
DATE 8/31/2023
NORTH DAKOTA

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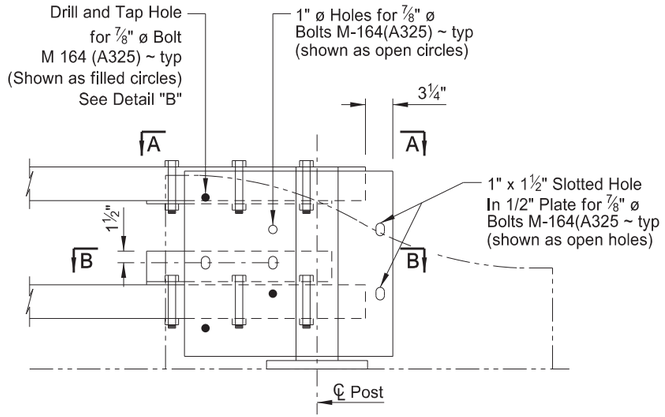
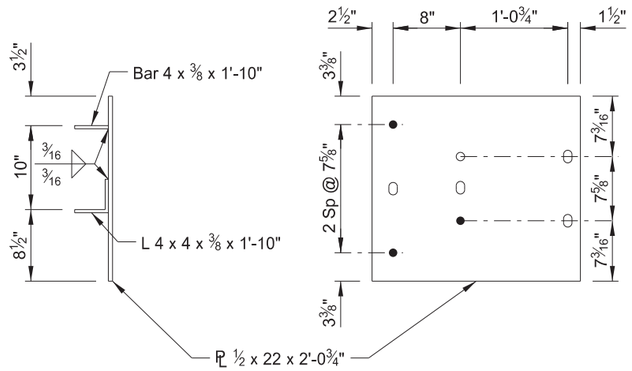
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	1



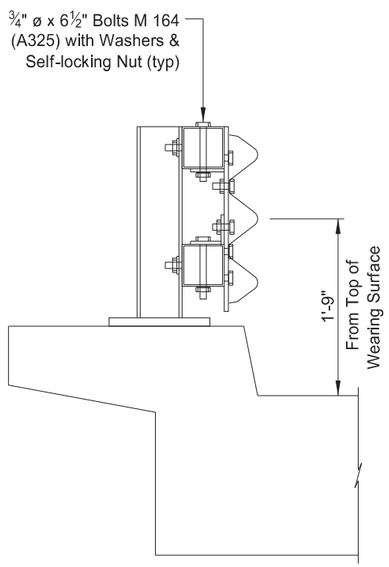
(TYP AT WEST END)

END POST CONNECTION DETAIL

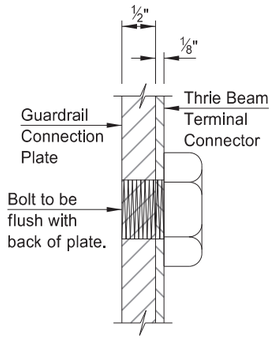


(2 REQUIRED)

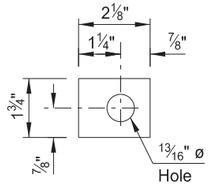
GUARDRAIL CONNECTION PLATE DETAILS



CONNECTION DETAIL

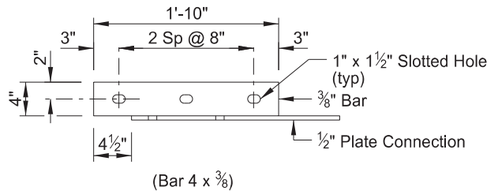


DETAIL "B"



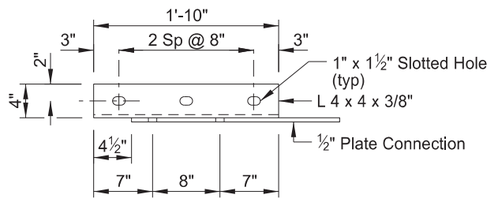
Position washers to completely cover slotted holes.

¼" BAR WASHER "C"



(Bar 4 x ⅜)

A-A



(L4 x 4 x ⅜)

B-B

NOTES:

Install connection plates at the exit end of the westbound structure. Field verify all dimensions and incorporate them into the work drawings. Submit the connection plate work drawings to the Engineer prior to fabrication.

Field drill ⅞" diameter holes into the existing railing for attachment of guardrail connection plates.

Galvanize all steel components after fabrication according to Section 854.

Provide reduced base studs in accordance with ASTM A108.

Remove the guardrail connection plates at the completion of the project and repair damage to the galvanized coating of the existing bridge rail according to Section 854.

Include all costs for furnishing, installing, and removing the guardrail connection plates in the unit price for "Connection Plate Modification".

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
624	3005	CONNECTION PLATE MODIFICATION	EA	2

REGISTERED PROFESSIONAL ENGINEER
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DATE 10/11/23
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JAMESTOWN
HOSPITAL ROAD SEPARATION

WESTBOUND STRUCTURE

CONNECTION PLATE DETAILS

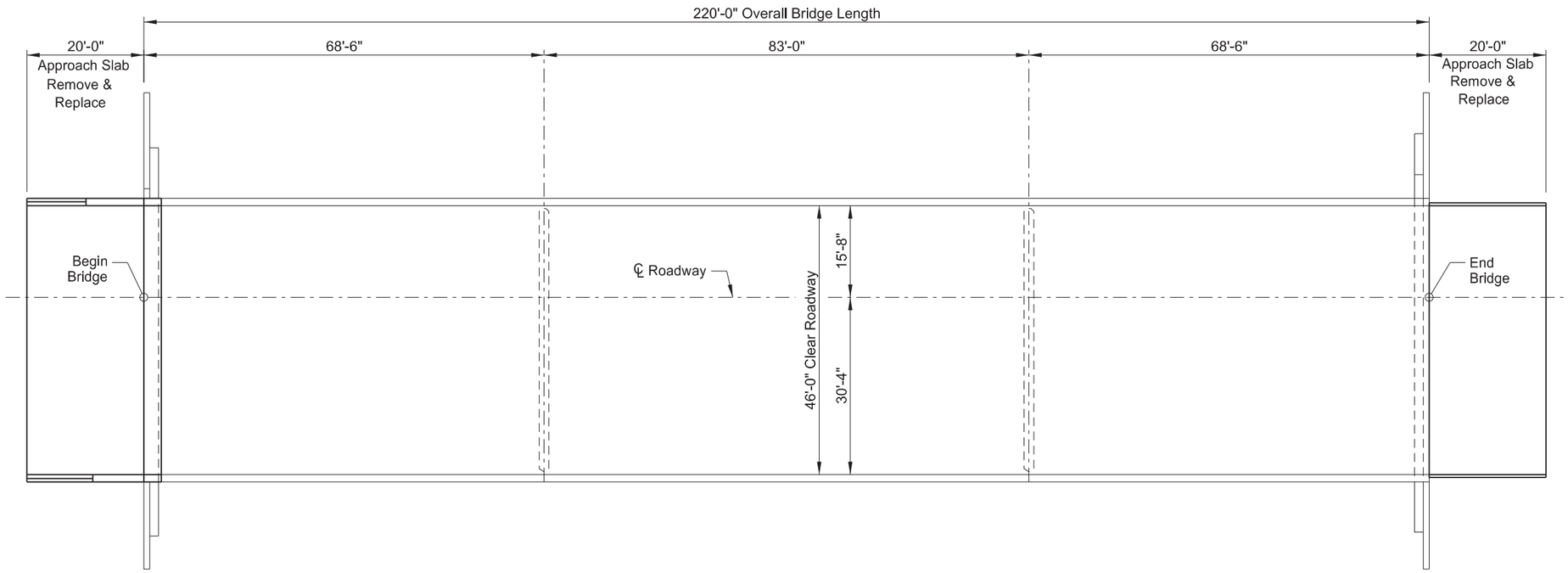
ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
10/11/23

DRAWING NO. 94-259.523L-1

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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	2



PLAN

DESIGN STRENGTHS:

f'c = 4,000 psi ~ Class AAE-3 Concrete
fy = 60,000 psi ~ Reinforcing Steel

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
602	0130	CLASS AAE-3 CONCRETE	CY	19.5
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	212.3
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,329
602	1260	BRIDGE DECK CRACK SEALING	LF	1,700
602	2000	REMOVE AND RESET ANCHOR BOLTS	EA	1
602	7000	SPECIAL SURFACE FINISH	SF	3,083
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	3,754
616	7500	BEARING MODIFICATION	EA	6
630	0110	SAND BLASTING & SPOT PAINTING	SF	114
650	0805	DECK SPALL REPAIR	SF	21
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	1
930	9612	SPALL REPAIR	SF	38
930	9660	ABUTMENT REPAIR	L SUM	1

REGISTERED PROFESSIONAL ENGINEER
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DATE 10/24/23
NORTH DAKOTA

SPECIAL PROVISIONS	
SSP 2	MIGRATORY BIRD TREATY ACT
SP 206(23)	REHAB PAINTING & CONTAINMENT

STANDARD DRAWINGS
D-714-18

JAMES RIVER
WEST OF JCT 52 & I-94

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
10/24/23

DRAWING NO. 94-259.847R-1

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	3

NOTES

100 SCOPE OF WORK: Work at this site consists of removing and replacing the bridge approach slabs, spall repairs to the bridge deck and abutments, bearing modifications, spot painting, abutment modifications, and crack sealing.

100 GENERAL: Include the cost of furnishing and placing expansion joint filler, concrete inserts, silicone sealant, and other miscellaneous items in the price bid for Class AAE-3 Concrete.

105 CONSTRUCTION SEQUENCE: Complete the bearing modifications at the west abutment prior to beginning abutment repairs. Provide shoring as needed to construct the repair work at the west abutment and the work to remove and replace the bridge approach slabs in stages as shown in the plans. Coordinate the construction stages with the work zone traffic control plan shown in Section 100.

602 CLASS AAE-3 CONCRETE: The strength requirements of Section 802.01 A.2 “Class AE and AAE Mixes” are revised to develop a design compressive strength of 4,000 psi for Class AAE-3 concrete at 28 days.

602 REMOVE AND RESET ANCHOR BOLTS: Remove and reset loose anchor bolts at the locations below. Remove any debris from anchor bolts and anchor bolt holes being reset. Embed the anchor bolts into concrete using a chemical adhesive system in accordance with Section 806.02, Epoxy Resin Adhesives. Install in accordance with manufacturer’s recommendations.

Location: Pier 2, North Bearing – 1 bolt

Include all costs for labor, materials, and equipment to complete this work in the unit price bid for “Remove and Reset Anchor Bolts.”

602 SPECIAL SURFACE FINISH: Apply TexCote XL 70 BridgeCote with Silane to the exposed outside edges of the bridge deck, and to all surfaces of the new and existing barriers on the bridge deck and approach slabs. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.

Prior to applying the TexCote surface finish, remove the existing surface finish, seal cracks in the new and existing barriers, and prep the surfaces in accordance with the manufacturer’s recommendations.

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

If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure washer at 3,000 psi minimum nozzle pressure.

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

616 BEARING MODIFICATION: Remove the existing bearings at the west abutment and install new bearings as shown in the plans. The existing bearings consist of a 5-7/8” thick elastomeric bearing pad vulcanized to a 5/8” thick top and bottom steel plates. The top steel plate is bolted to a 3/4” thick sole plate that is welded to the bottom flange of the steel girders. The total height of the existing bearings is 7-7/8”.

Remove the existing bearings by lifting and temporarily supporting the existing superstructure at the west abutment. Lift all beams simultaneously, in a manner that prevents damage to any parts of the structure to remain. Remove the sole plate welded to the bottom flange in a manner that prevents damage to the bottom flange of the girder and will permit the bottom flange to be welded to the new bearing assembly. Cut the existing anchor bolts flush with the surface of the concrete and paint the cut ends with epoxy.

Clean all dirt and debris from the concrete abutment bearing seats. Powerwash the horizontal surface of the abutment and apply penetrating water treatment prior to installing the new bearings.

Furnish and install the new bearings in accordance with the details provided in the plans.

Include all costs for labor, materials, and equipment to complete this work in the unit price bid for “Bearing Modification”.

630 SAND BLASTING AND SPOT PAINTING: Sandblast, clean, and paint structural steel surfaces as designated in the plans. Use a blue finish coat, color number 25177, meeting Aerospace Material Specification (AMS) Standard 595.

650 DECK SPALL REPAIR: The bridge deck has surface spall areas. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650 with the exception that a mobile mixer will not be required. The actual limits of the surface spall area to be repaired will be determined by the Engineer in the field by sounding.

Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete, whichever is greater. Include the saw cutting and all material, labor and equipment required to remove the concrete and repair the bridge deck and/or approach slab spall areas in the bid item “Deck Spall Repair.”

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DATE 10/24/23
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

930 SPALL REPAIR: The structure has areas of spalling and concrete deterioration as indicated in the “Spall Repair” table below.

Remove all unsound concrete and replace it to the original constructed section. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove concrete around the periphery of any exposed reinforcing steel to provide a minimum clearance behind the bar of ¼“ plus or minus the dimension of the maximum size aggregate of the repair material. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean the existing concrete and exposed reinforcing steel. Repair any damaged epoxy coating on the reinforcing steel with a patching material that meets ASTM A775 and ASTM D3963. Clean the existing concrete surface by high pressure water blasting.

Replace removed concrete with a two component, polymer-modified, cementitious repair mortar material that is specifically intended for patching concrete and contains a corrosion inhibitor. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), or an approved equal repair mortar. Place and cure the material as recommended by the manufacturer.

The extents of repairs as shown in the “Spall Repair” table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. See supplemental data for photos.

SPALL REPAIR		
PICTURE	LOCATION	QUANTITY (SF)
#1	West Abutment Column/Beam Seat	12.0
#2	West Abutment North Wing	6.0
#3	East Abutment Beam Seat	12.0
#4	East Abutment North Wing	8.0

Include all labor, materials, and equipment needed to repair the spall areas in the bid item “Spall Repair.”

930 ABUTMENT REPAIR: Abutment repairs consist of removing the concrete backwall and portions of the bridge deck and concrete barriers and constructing the new endwall at the west abutment as shown in the plans.

Excavate at the back face of the west abutment and sawcut the full thickness of the concrete backwall along the removal limits shown in the plans to create a smooth, clean joint. Coat the cut ends of the backwall reinforcement with epoxy paint following removal.

Remove the bridge deck concrete, the thickened bridge deck end block, and the concrete barriers to the limits shown in the plans. Sawcut along the surface of the removal limits to produce a sharp, neat line and least 1” deep below the top of the concrete bridge deck. Preserve in place the longitudinal reinforcement in the bridge deck and barriers designated in the plans to remain in place. Sand blast clean any rust scale found on the exposed reinforcing steel.

After removing the concrete, drill holes in the existing beam webs for new rebar, then sand blast and paint the structural steel surfaces at the west abutment to the limits designated in the plans. Complete all painting prior to installing formwork for the new abutment endwalls.

Construct the west abutment bridge deck, endwall, barriers, waterproof membrane system, and abutment underdrain system in accordance with the details provided in the plans. Clean the existing concrete bridge deck joint surface by light sand blasting or high-pressure water blasting. After the surface has dried and just before placing new concrete, coat the bridge deck joint surface with an epoxy bonding agent.

Construct the joint between the existing concrete abutment and the new concrete endwall using a flexible foam expansion joint filler. The expansion joint filler may be X-FOAM (W.R. Meadows); NOMAFLEX (Nomaco); or an approved equal meeting ASTM D 8139.

Include costs for excavation, shoring, concrete removal, drilling holes, flexible foam joint filler, and the membrane waterproof system, in the Lump Sum price bid for “Abutment Repair”. Class AAE-3 Concrete and “Reinforcing Steel – Grade 60 – Epoxy Coated” will be paid for separately.

930 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the items listed below to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" or greater in width at its 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 limits of crack, including those portions that are narrower than 0.007" 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.

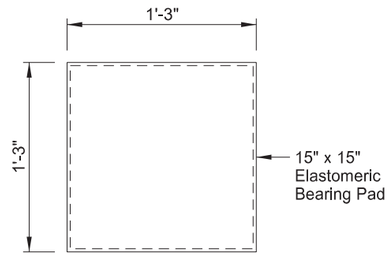
Include all material, labor and equipment required to crack seal the following items in the price bid for “Bridge Deck Crack Sealing:”

- Bridge Deck

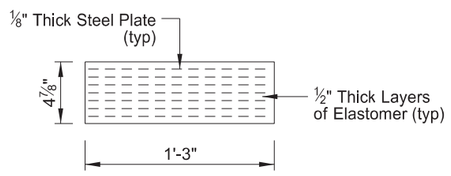
The material, labor and equipment required to crack seal the following items are incidental to other bid items:

- Bridge Approach Slabs

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	5



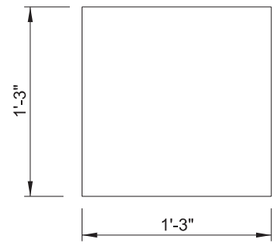
PLAN



SECTION THRU PAD

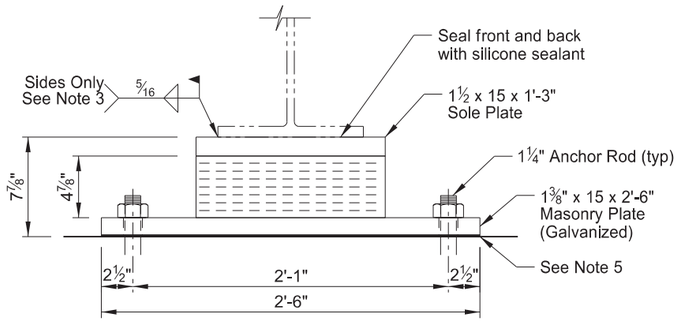
(60 DUROMETER HARDNESS)

STEEL REINFORCED ELASTOMERIC BEARING PAD

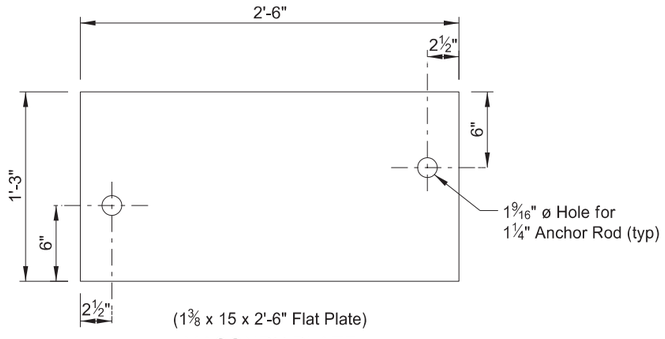


(1½ x 15 x 1'-3" Flat Plate)

SOLE PLATE
(VULCANIZE TO BEARING PAD)

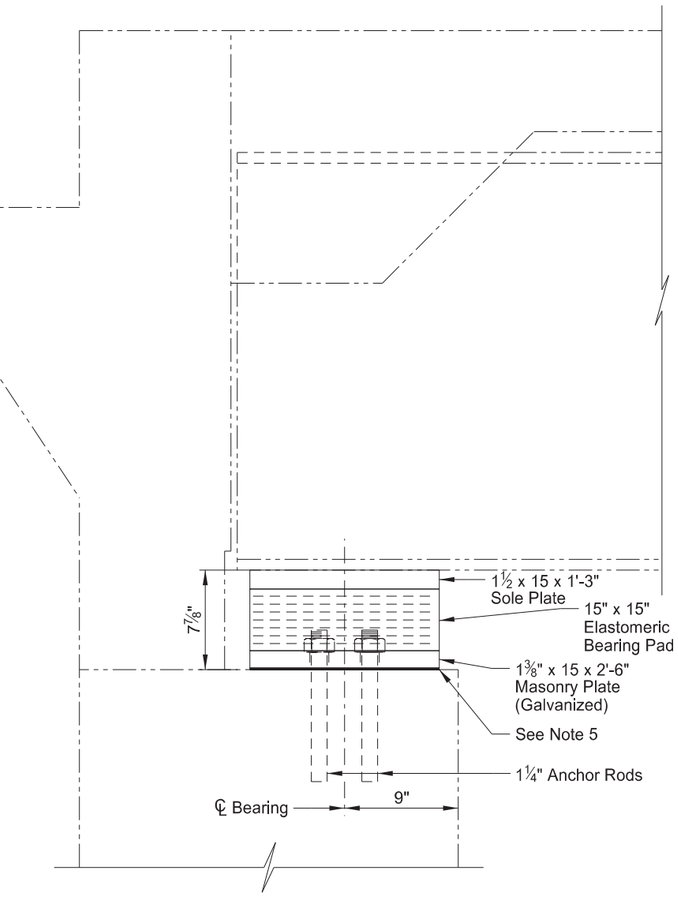


ABUTMENT BEARING DETAIL



(1⅜ x 15 x 2'-6" Flat Plate)

MASONRY PLATE
(VULCANIZE TO BEARING PAD)



ABUTMENT BEARING DETAIL

Notes:

1. Provide Sole Plates and Masonry Plates meeting ASTM A709 Grade 50. Galvanize the Masonry Plates according to Section 854.
2. Vulcanize the Steel Reinforced Elastomeric Bearing Pad to the Sole Plate and the Masonry Plate.
3. Use crayons to monitor the temperature of the steel Sole Plate adjacent to the Bearing Pad during field welding. Do not exceed a temperature of 225 degrees F in the steel Sole Plate adjacent to the Bearing Pad.
4. Provide Anchor Rods meeting ASTM F1554, Grade 55. Galvanize anchor rods and hardware according to Section 854. Install the 1¼" anchor rods into the existing concrete after field welding is complete. Embed the anchor rods into the concrete using a chemical adhesive system that meets the requirements of AASHTO M 235, Type IV, Grade 3. Select the appropriate class of adhesive based on the surface temperature of the concrete at the time of installation. Install the anchor rods and chemical adhesive system according to the Manufacturer's recommendations.
5. Provide a 1'-3" x 2'-6" x ⅛" thick plain elastomeric pad (60 durometer hardness) or cotton duck pad between the concrete bearing seat and the masonry plate. Provide holes in the pad to accomodate the anchor rods.

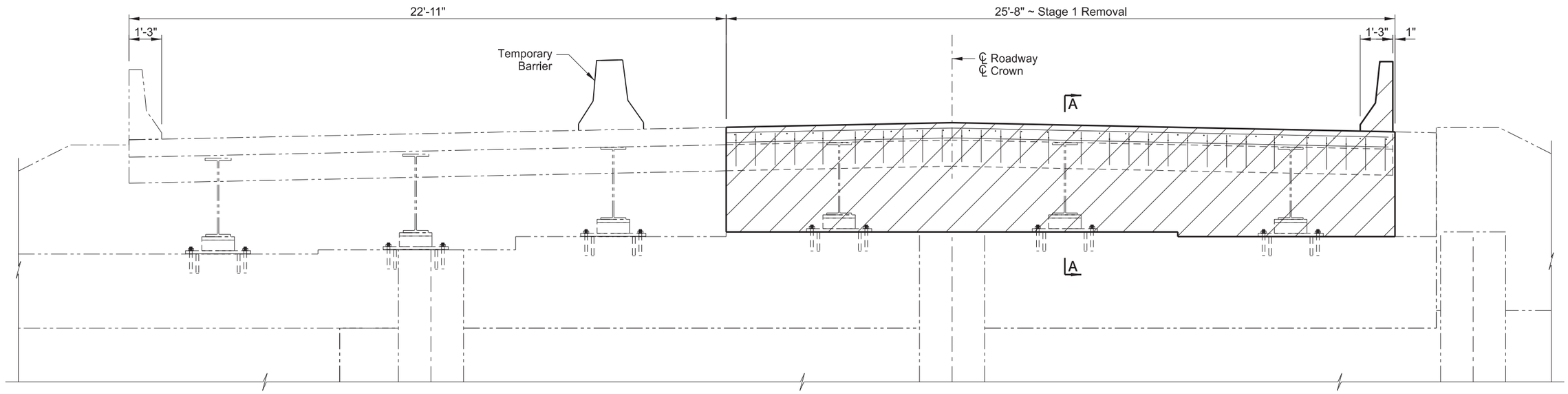
QUANTITIES	
BEARING MODIFICATION	6 EA

JAMES RIVER
WEST OF JCT US 52 & I-94

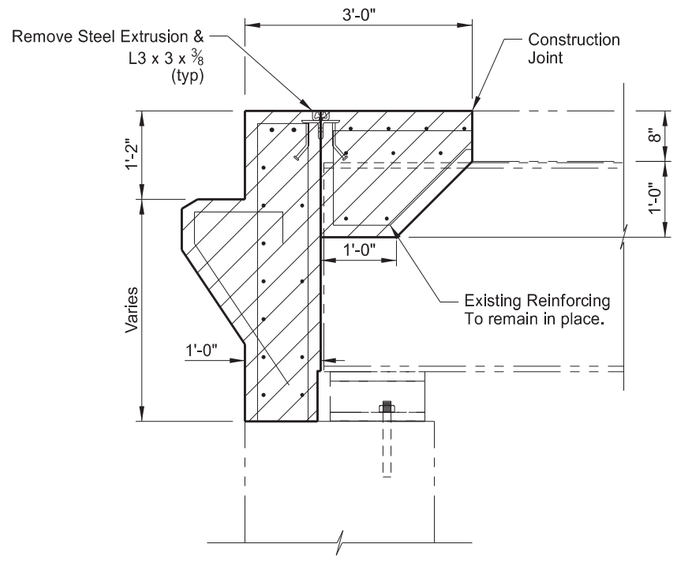
BEARING DETAILS

DRAWING NO.	94-259.847R-4

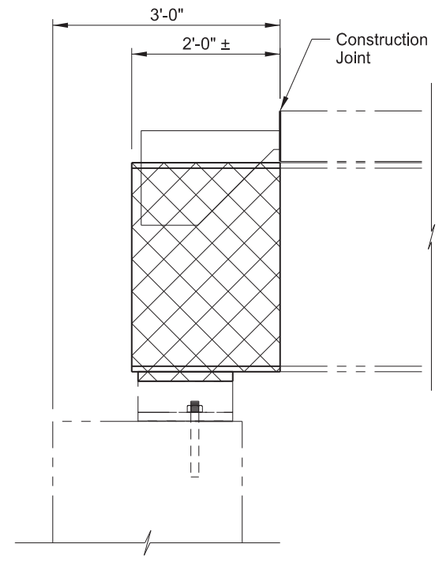
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	6



STAGE 1 REMOVALS



(SHOWING REMOVAL)
A-A



(SHOWING SAND BLASTING & PAINTING)
A-A

The hatched areas indicate concrete to be removed. Longitudinal reinforcing steel in the deck and barrier is to remain in place. Carefully remove concrete to ensure no damage is done to existing reinforcing steel and stud shear connectors on top of girders that are to remain in place.

The shaded area indicates the steel area to be sand blasted and painted after concrete removal. The area includes all exposed areas of the girder within the length shown and the exposed surfaces of the sole plate welded to the bottom flange.

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-259.847R-8

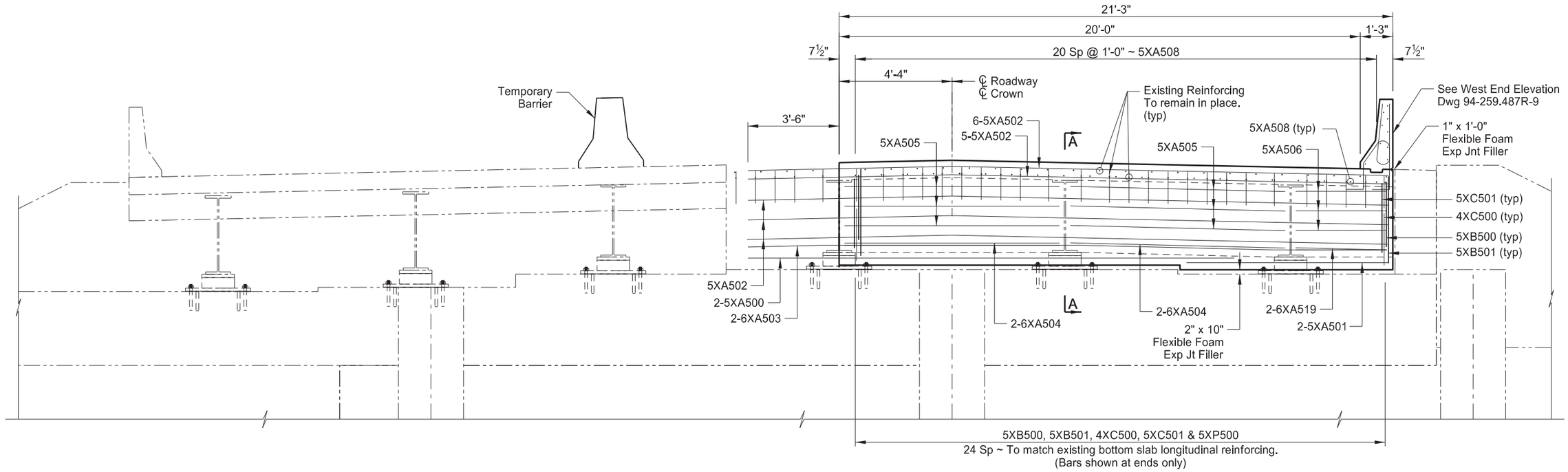
JAMES RIVER
WEST OF JCT US 52 & I-94

(SHOWING STAGE 1 REMOVAL)

ENDWALL DETAILS

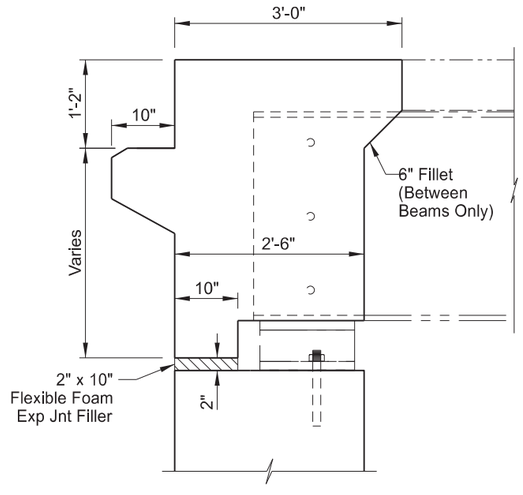
DRAWING NO.	94-259.847R-5

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	7



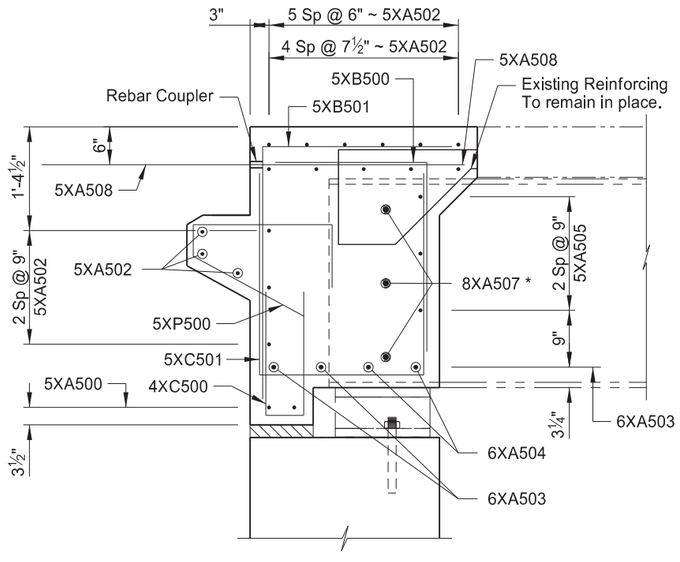
(APPROACH LIP NOT SHOWN)

STAGE 1 CONSTRUCTION



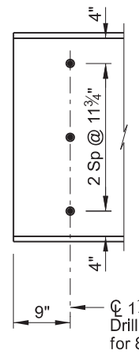
(SHOWING DIMENSIONS)

A-A



(SHOWING REINFORCING)

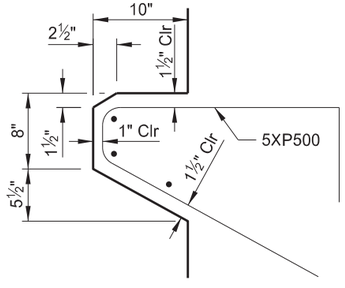
A-A



(W33 X 130)

GIRDER END DETAIL

* Place 8XA507 bars in holes drilled thru web of each girder. Extend bars 2-6" each side of girder ℄. Bars not shown in Stage 1 Construction View for clarity.



APPROACH LIP DETAIL

QUANTITIES
SEE DWG 94-259.847R-8

JAMES RIVER
WEST OF JCT US 52 & I-94

(SHOWING PHASE 1 CONSTRUCTION)

ENDWALL DETAILS

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

DRAWING NO.	94-259.847R-6

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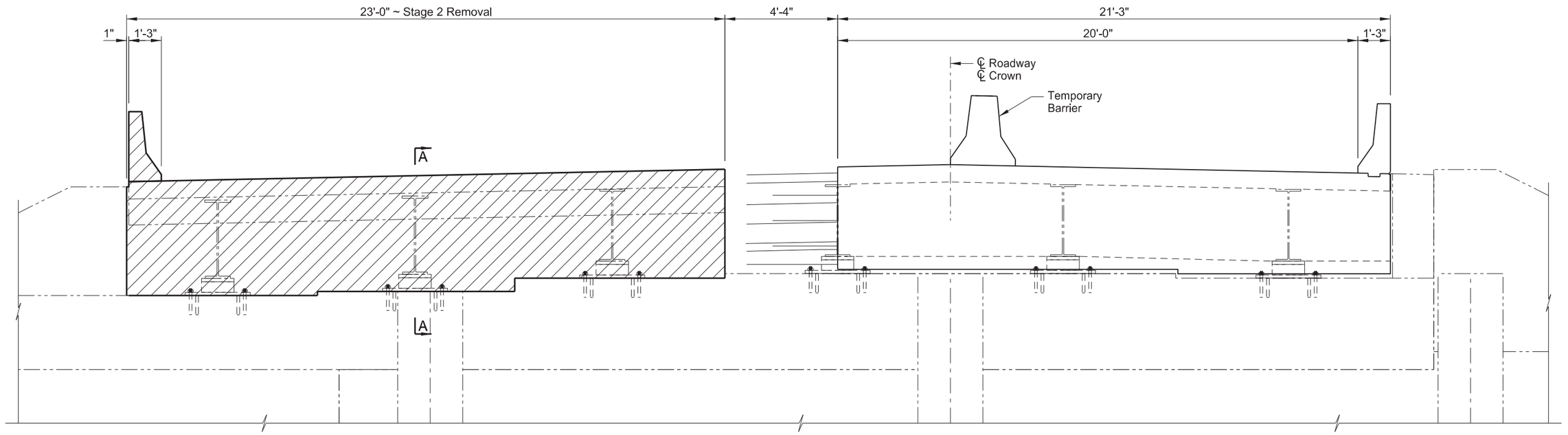
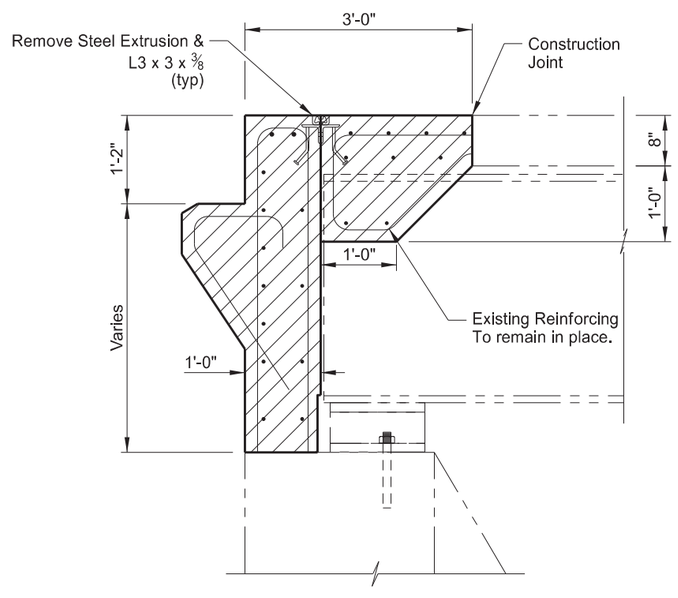
ATC JRR

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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	8

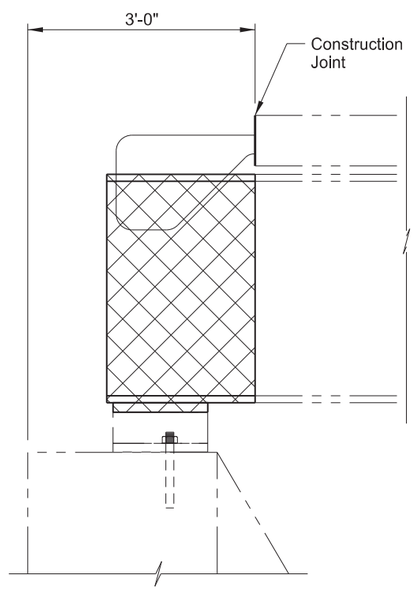


STAGE 2 REMOVAL



(SHOWING REMOVAL)

A-A



(SHOWING SANDBLASTING & PAINTING)

A-A

The hatched areas indicate concrete to be removed. Longitudinal reinforcing steel in the deck and barrier is to remain in place. Carefully remove concrete to ensure no damage is done to existing reinforcing steel and stud shear connectors on top of girders that are to remain in place.

The shaded area indicates the steel area to be sand blasted and painted after concrete removal. The area includes all exposed areas of the girder within the length shown and the exposed surfaces of the sole plate welded to the bottom flange.

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-259.847R-8

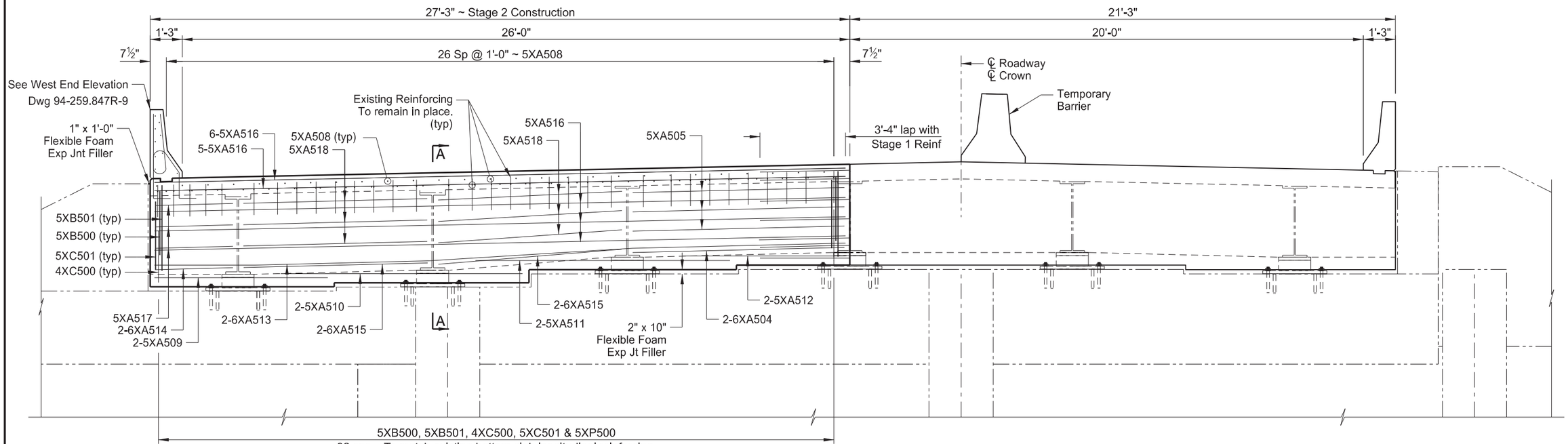
JAMES RIVER
WEST OF JCT US 52 & I-94

(SHOWING STAGE 2 REMOVAL)

ENDWALL DETAILS

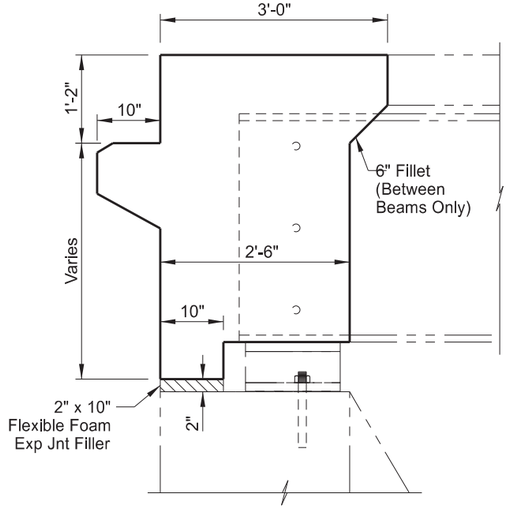
DRAWING NO.	94-259.847R-7

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	9



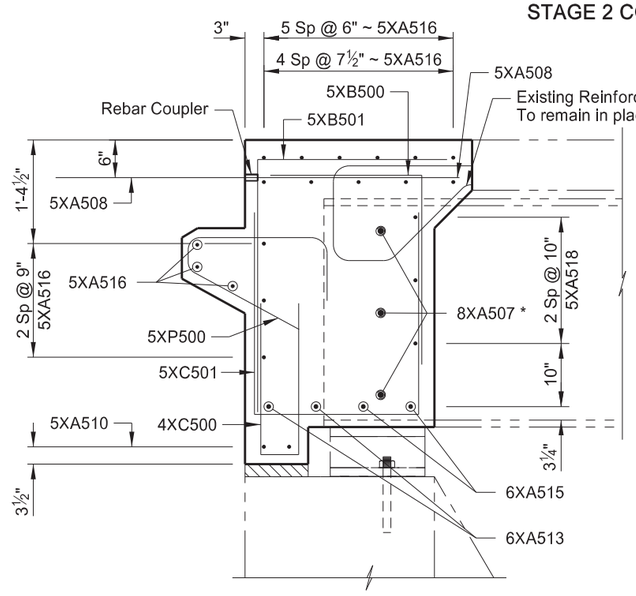
(APPROACH LIP NOT SHOWN)

STAGE 2 CONSTRUCTION



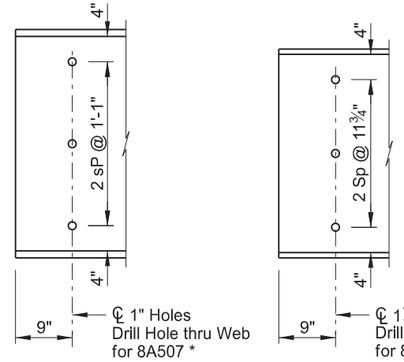
(SHOWING DIMENSIONS)

A-A



(SHOWING REINFORCING)

A-A



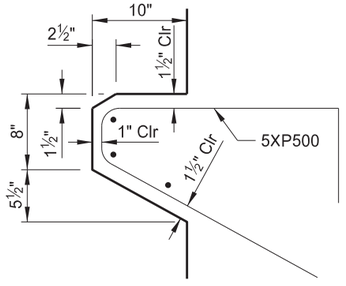
(W36 X 170)

GIRDER END DETAIL

(W33 X 130)

GIRDER END DETAIL

* Place 8XA507 bars in holes drilled thru web of each girder. Extend bars 2-6" each side of girder ℄. Bars not shown in Stage 2 Construction View for clarity.



APPROACH LIP DETAIL

QUANTITIES	
CLASS AAE-3 CONCRETE	19.5 CY
REINFORCING STEEL (EPOXY)	3,754 LBS
SAND BLASTING & SPOT PAINTING	114 SF
ABUTMENT REPAIR	1 EA

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

JAMES RIVER
WEST OF JCT US 52 & I-94

(SHOWING STAGE 2 CONSTRUCTION)

ENDWALL DETAILS

DRAWING NO.	94-259.847R-8

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS								
					a	b	c	d	e	f	g	h	k
ENDWALL	5	XA500	2	18'- 8"		18'- 8"							
	5	XA501	2	7'- 9"		7'- 9"							
	5	XA502	17	24'- 7"		24'- 7"							
	6	XA503	2	24'- 7"		24'- 7"							
	6	XA504	6	8'- 3"		8'- 3"							
	5	XA505	9	8'- 3"		8'- 3"							
	5	XA506	3	3'- 6"		3'- 6"							
	8	XA507	18	5'- 0"		5'- 0"							
	5	XA508	96	2'- 10"		2'- 10"							
	5	XA509	2	6'- 9"		6'- 9"							
	5	XA510	2	9'- 5"		9'- 5"							
	5	XA511	2	9'- 11"		9'- 11"							
	5	XA512	2	6'- 4"		6'- 4"							
	6	XA513	2	26'- 11"		26'- 11"							
	6	XA514	2	3'- 0"		3'- 0"							
	6	XA515	4	7'- 2"		7'- 2"							
	5	XA516	17	26'- 11"		26'- 11"							
	5	XA517	3	3'- 0"		3'- 0"							
	5	XA518	6	7'- 2"		7'- 2"							
	6	XA519	2	3'- 6"		3'- 6"							
	4	XA520	18	2'- 8"		2'- 8"							
	5	XB500	58	4'- 6"		2'- 6"	2'- 0"						
	5	XB501	58	5'- 10"		3'- 4"	2'- 6"						
	4	XC500	58	3'- 10"		1'- 8"	6"	1'- 8"					
	5	XC501	58	7'- 6"		2'- 8"	2'- 2"	2'- 8"					
	5	XK500	16	4'- 11"	1'- 4"	8"	11"	8"	1'- 0"	2.5"	8"	8.5	12
	5	XL500	16	5'- 1"	3"	2'- 2"	9"	2'- 2"		2.25"		1.25	12
	5	XP500	58	5'- 6"	5"	2'- 1"	2'- 2"			1.25"	10"	12	6.5

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

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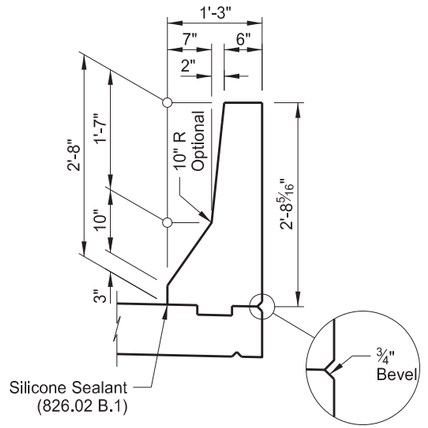
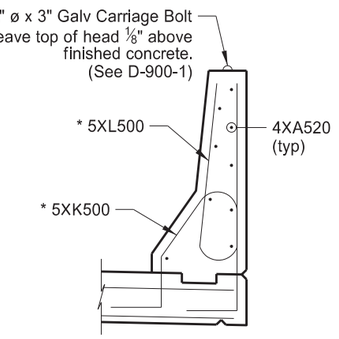
1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length 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.



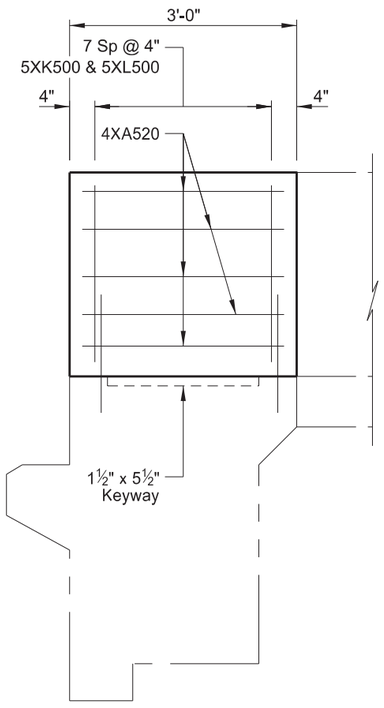
SHOWING DIMENSIONS



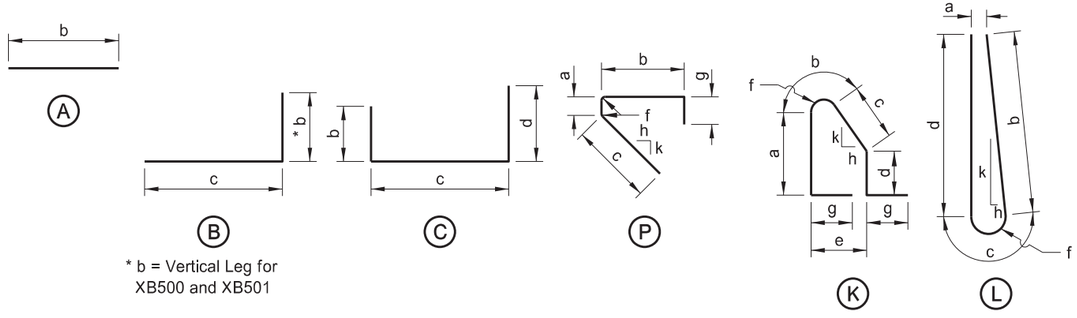
* Provide a 1½" clearance to the barrier reinforcing.

SHOWING REINFORCING

BARRIER DETAIL



WEST END ELEVATION



JAMES RIVER
WEST OF JCT US 52 & I-94

REINFORCING BAR LIST & DETAILS

DRAWING NO. 94-259.847R-9

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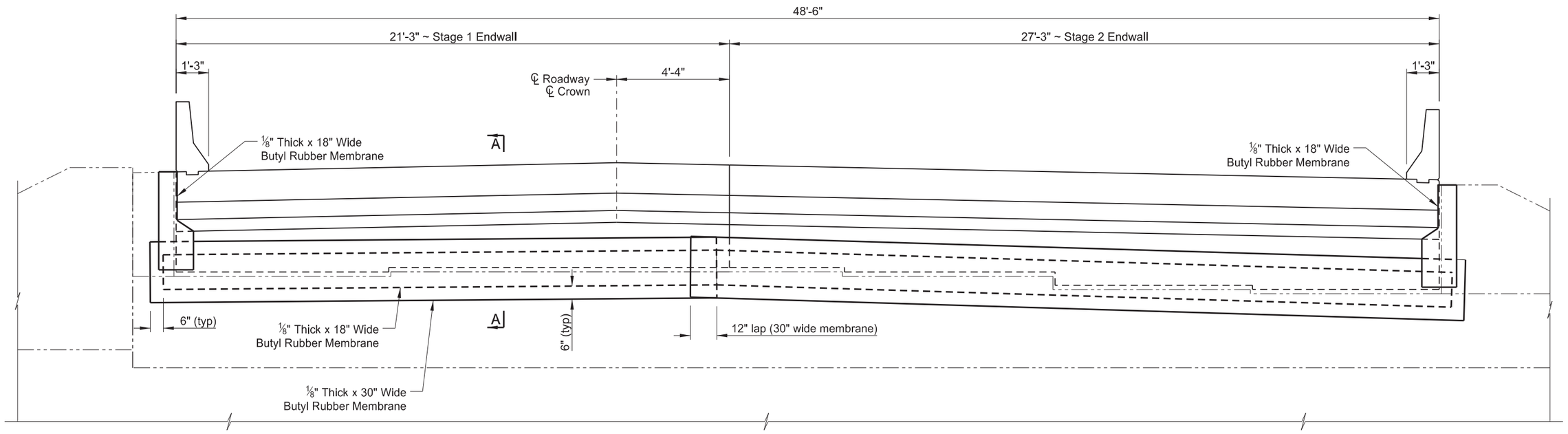
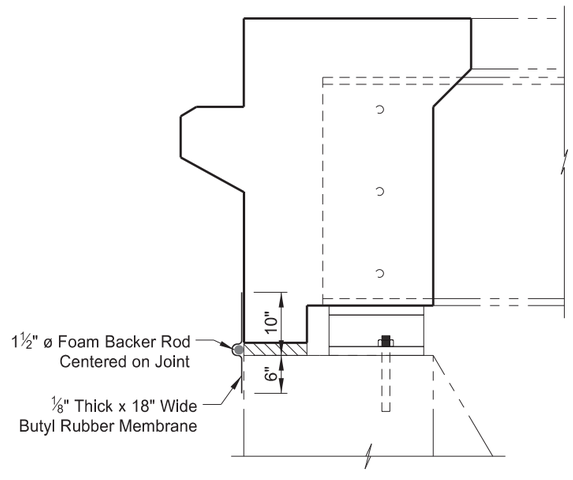
ATC JRR

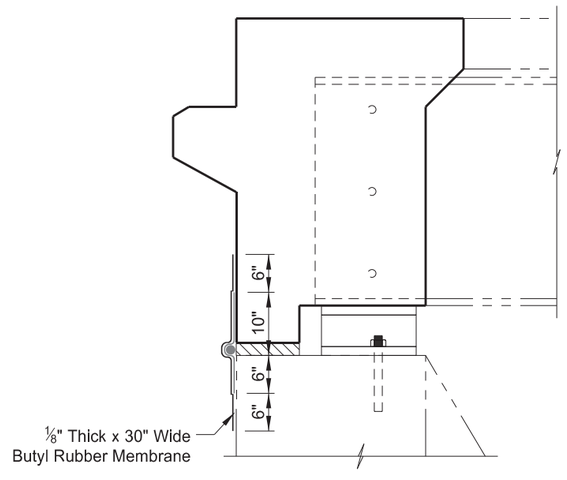
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	11



(SHOWING BACK FACE OF ABUTMENT)
ABUTMENT WATERPROOFING



(Membrane Layer 1)
A-A



(Membrane Layer 2)
A-A

NOTES:

Provide butyl rubber membranes meeting the requirments of ASTM D 6134, Type II. Fasten to the concrete surfaces using a waterproof adhesive in accordance with the Manufacturer's recommendations.

Place 2 layers of butyl rubber membrane at the horizontal joints as shown. Place 1 layer of butyl rubber membrane at the vertical joints. Place the membrane at the vertical joints after placing the horizontal membranes and cut as needed for installation around the approach lip.

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

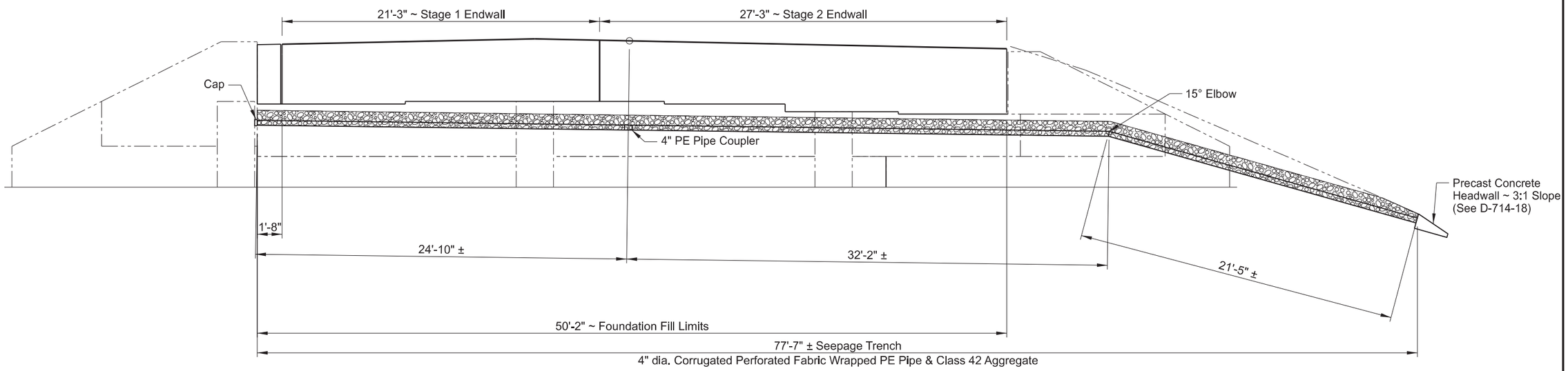
JAMES RIVER
WEST OF JCT US 52 & I-94

ABUTMENT WATERPROOFING DETAILS

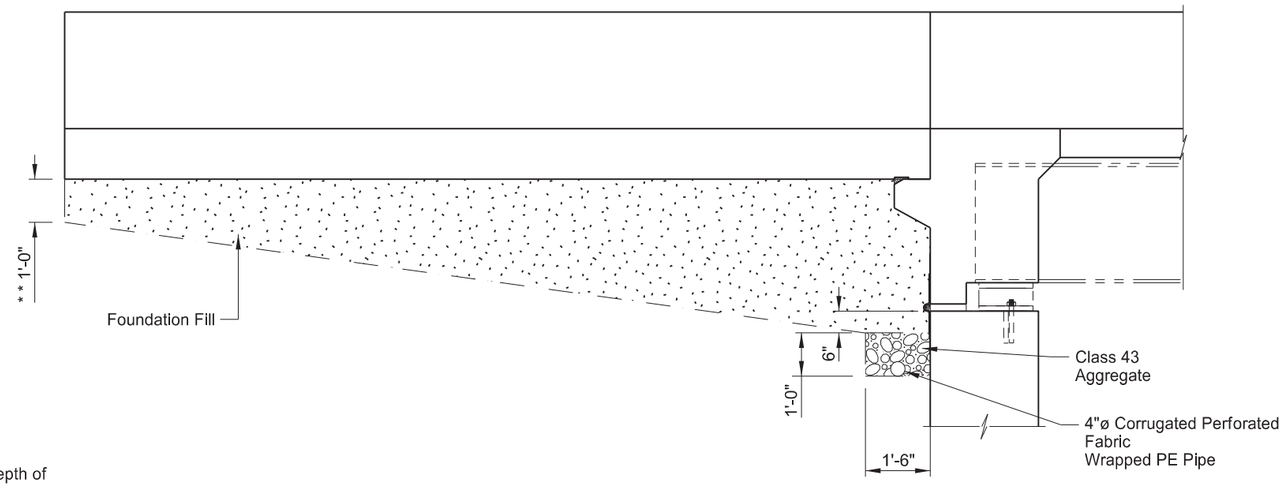
DRAWING NO.	94-259.847R-10

10/2/2023 3:17:56 PM jrensch R:\project\20999000.064\Bridge\dgn\94-259.847R\170BR_011_WATERPROOFING.dgn ATC JRR

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	12



BACK FACE OF ABUTMENT



** Match subgrade depth of adjacent roadway pavement.

DETAIL AT 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 210.03 B. Compact the foundation fill beneath the approach slab according to Section 210.04 B.3.

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

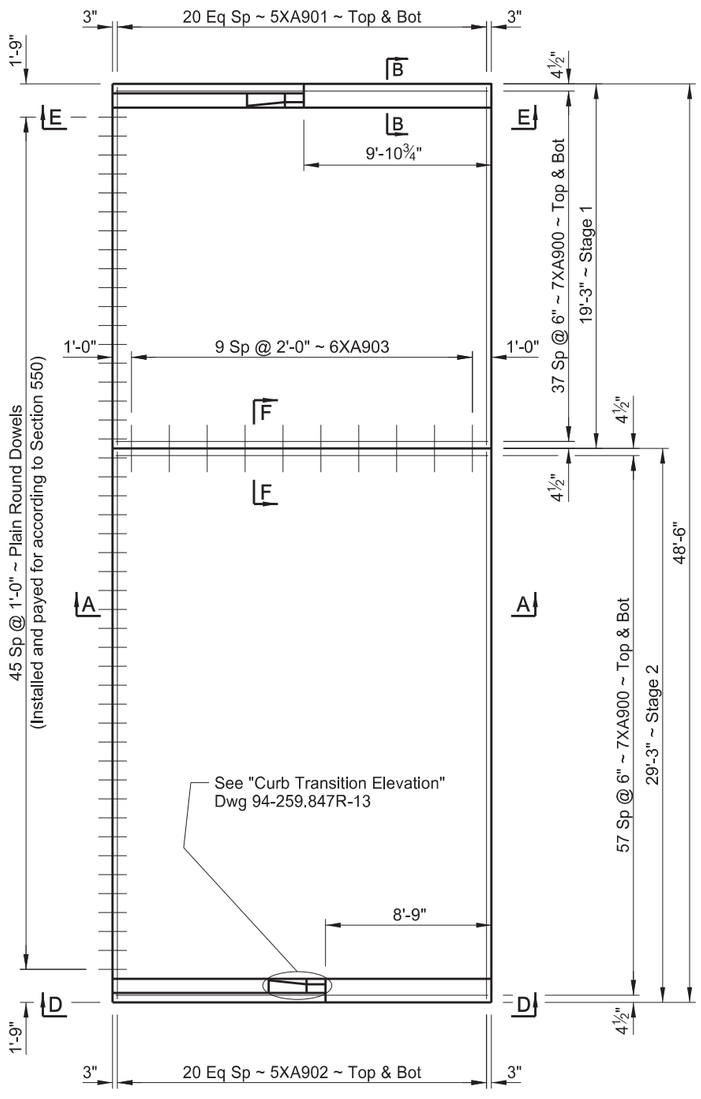
QUANTITIES	
ABUTMENT UNDERDRAIN SYSTEM	1 EA

JAMES RIVER
WEST OF JCT US 52 & I-94

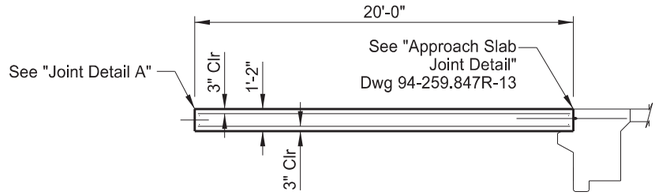
ABUTMENT & UNDERDRAIN EXCAVATION DETAILS

DRAWING NO.	94-259.847R-11

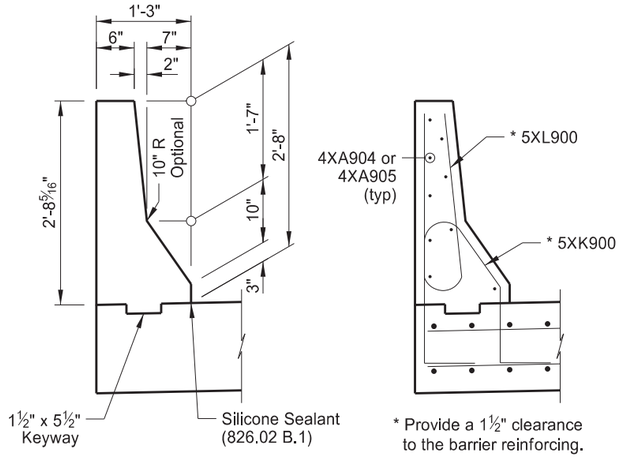
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	13



PLAN



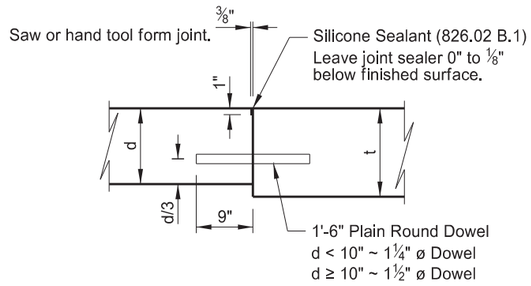
A-A



SHOWING DIMENSIONS

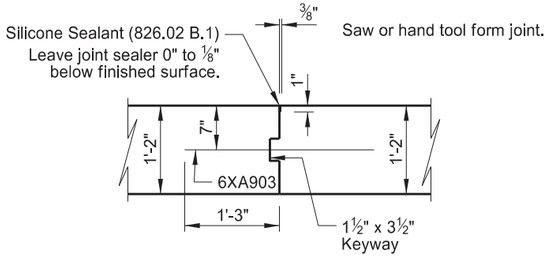
SHOWING REINFORCING

B-B



d = Pavement Thickness
t = Approach Slab Thickness

JOINT DETAIL A



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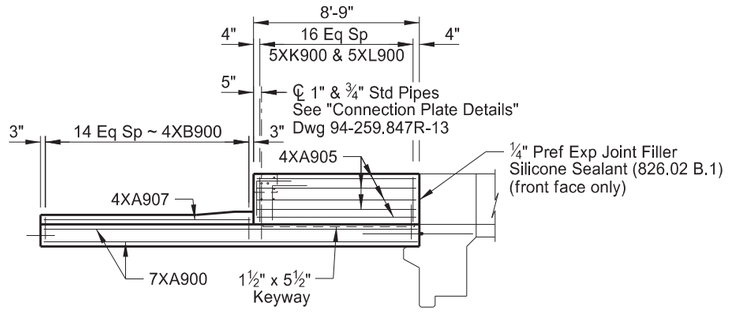
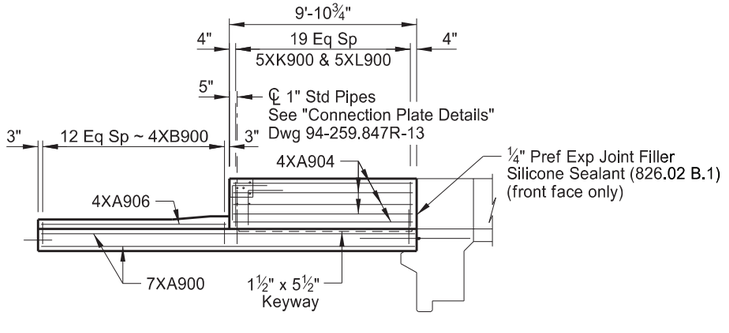


D-D



E-E

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-259.847R-13

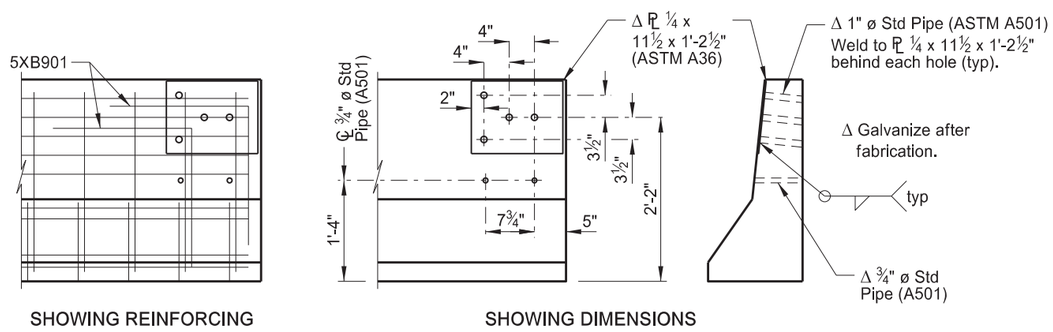
JAMES RIVER
WEST OF JCT US 52 & I-94

(ENTRANCE END)

APPROACH SLAB DETAILS

DRAWING NO.	94-259.847R-12

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	14



SHOWING REINFORCING

SHOWING DIMENSIONS

(SHOWING FRONT FACE)

CONNECTION PLATE DETAILS

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 pay item "Bridge Approach Slab-Remove & Replace." Use Class AAE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out. Radius values shown indicate the inside bend radius.

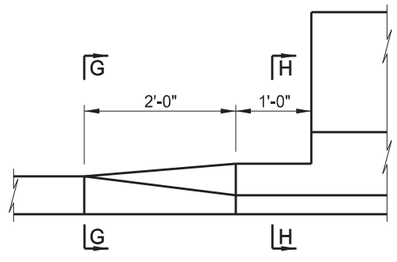
SKEW ANGLE = 0°

BAR LIST - ONE END

SIZE	MARK	NO.	LENGTH
7	XA900	192	19'- 8"
5	XA901	42	18'- 11"
5	XA902	42	28'- 11"
6	XA903	10	2'- 6"
4	XA904	9	9'- 6"
4	XA905	9	8'- 5"
4	XA906	1	9'- 9"
4	XA907	1	10'- 11"
4	XB900	28	2'- 4"
5	XB901	4	3'- 8"
5	XK900	37	5'- 7"
5	XL900	37	5'- 1"

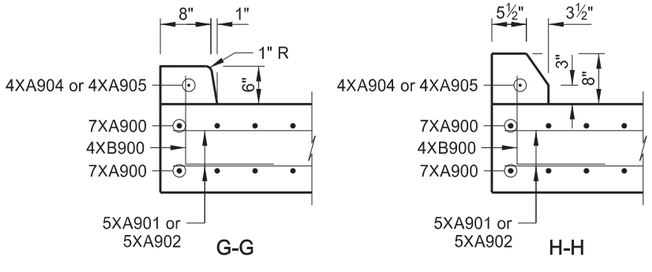
ESTIMATED MATERIAL QUANTITIES

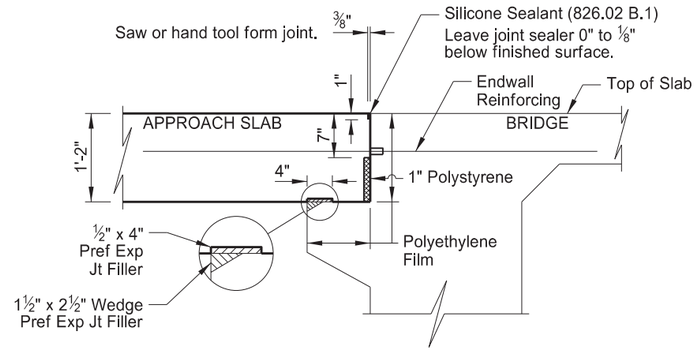
REINFORCING STEEL (LBS)	CONCRETE (CY)
10,443	43.6



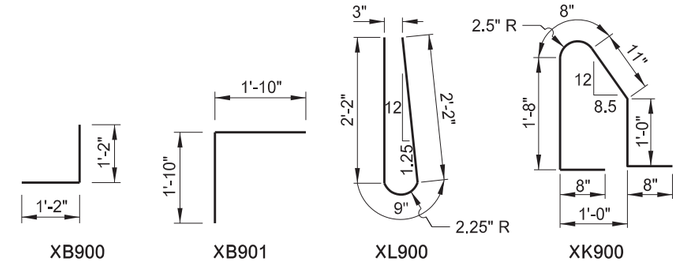
(SHOWING FRONT FACE)

CURB TRANSITION ELEVATION





APPROACH SLAB JOINT DETAIL



BENT BAR DETAILS

QUANTITIES	(ONE SLAB)
APPROACH SLAB	107.8 SY

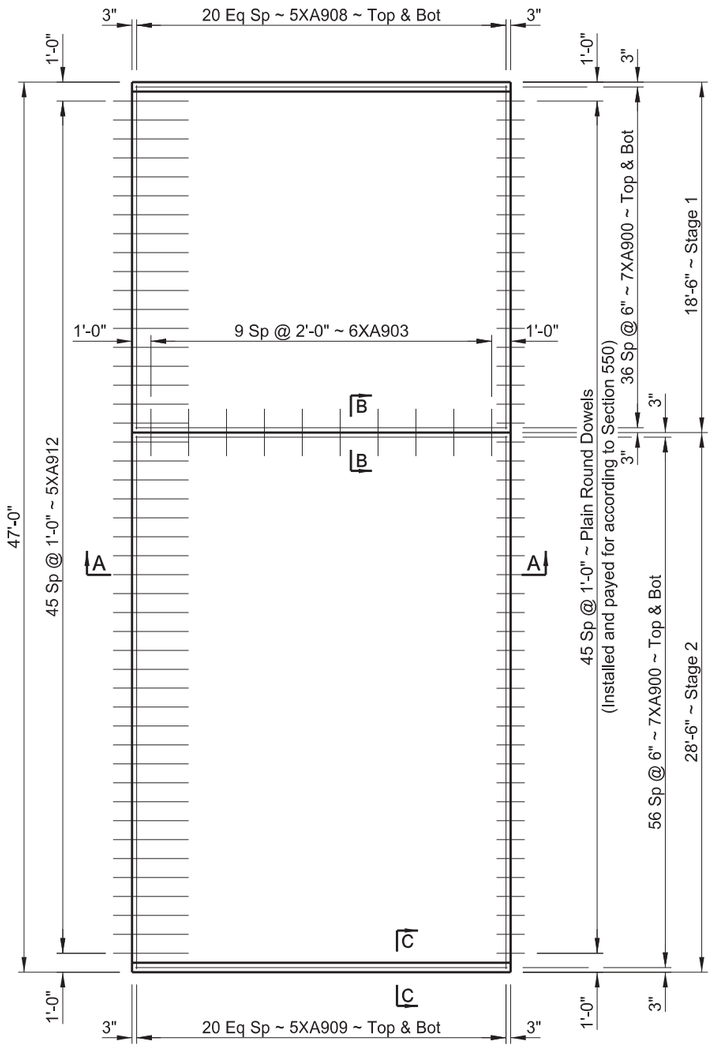
JAMES RIVER
WEST OF JCT US 52 & I-94

(ENTRANCE END)

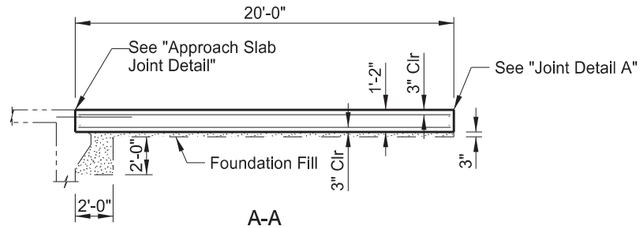
APPROACH SLAB DETAILS

DRAWING NO. 94-259.847R-13

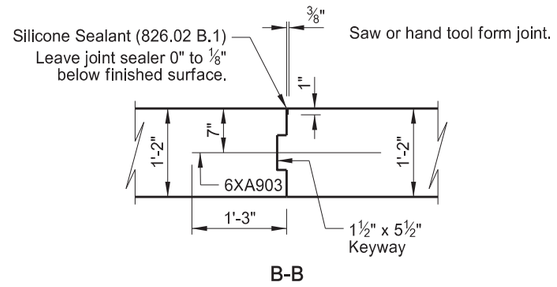
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	15



PLAN



A-A



B-B

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, foundation fill, connection plates and pipes, and labor required to build the approach slabs and barriers in the pay item "Bridge Approach Slab-Remove & Replace." Use Class AAE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out. Radius values shown indicate the inside bend radius.

Install 5XA912 bars according to the manufacture's recommendations, with high strength adhesive specifically intended for concrete anchorage (16k min, ultimate pullout) and that meets the requirements of Section 806.02. Embed the bars 9" minimum into slab.

SKEW ANGLE = 0°

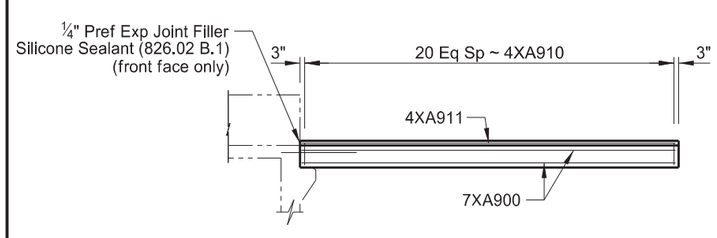
BAR LIST - ONE END

SIZE	MARK	NO.	LENGTH
7	XA900	188	19'- 8"
6	XA903	10	2'- 6"
5	XA908	42	18'- 2"
5	XA909	42	28'- 2"
4	XA910	42	1'- 2"
4	XA911	2	19'- 8"
5	XA912	46	** 4'- 0"

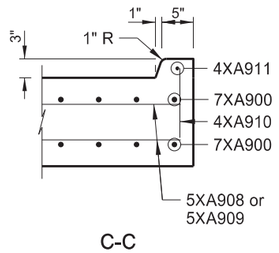
ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS)	CONCRETE (CY)
9,875	40.8

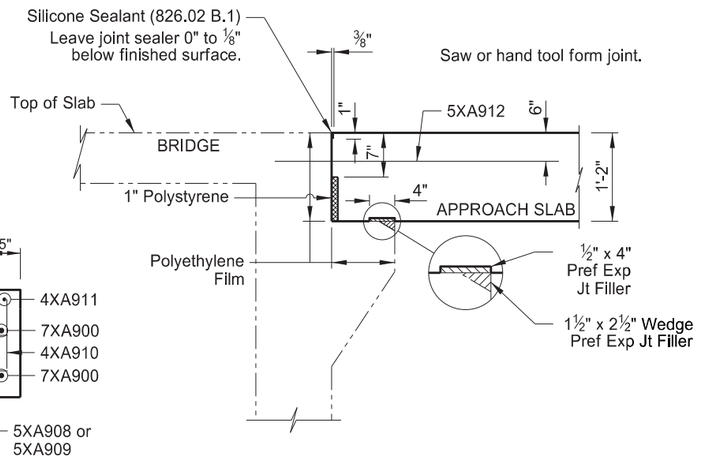
** Length may vary depending on manufacturer's recommendations for anchorage. Length based on 9" minimum anchorage length.



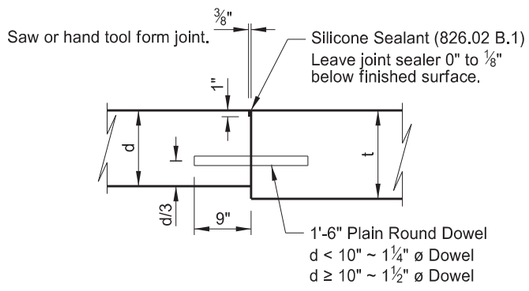
ELEVATION



C-C



APPROACH SLAB JOINT DETAIL



d = Pavement Thickness
t = Approach Slab Thickness

JOINT DETAIL A

QUANTITIES	(ONE SLAB)
APPROACH SLAB	104.5 SY

JAMES RIVER
WEST OF JCT US 52 & I-94

(EXIT END)

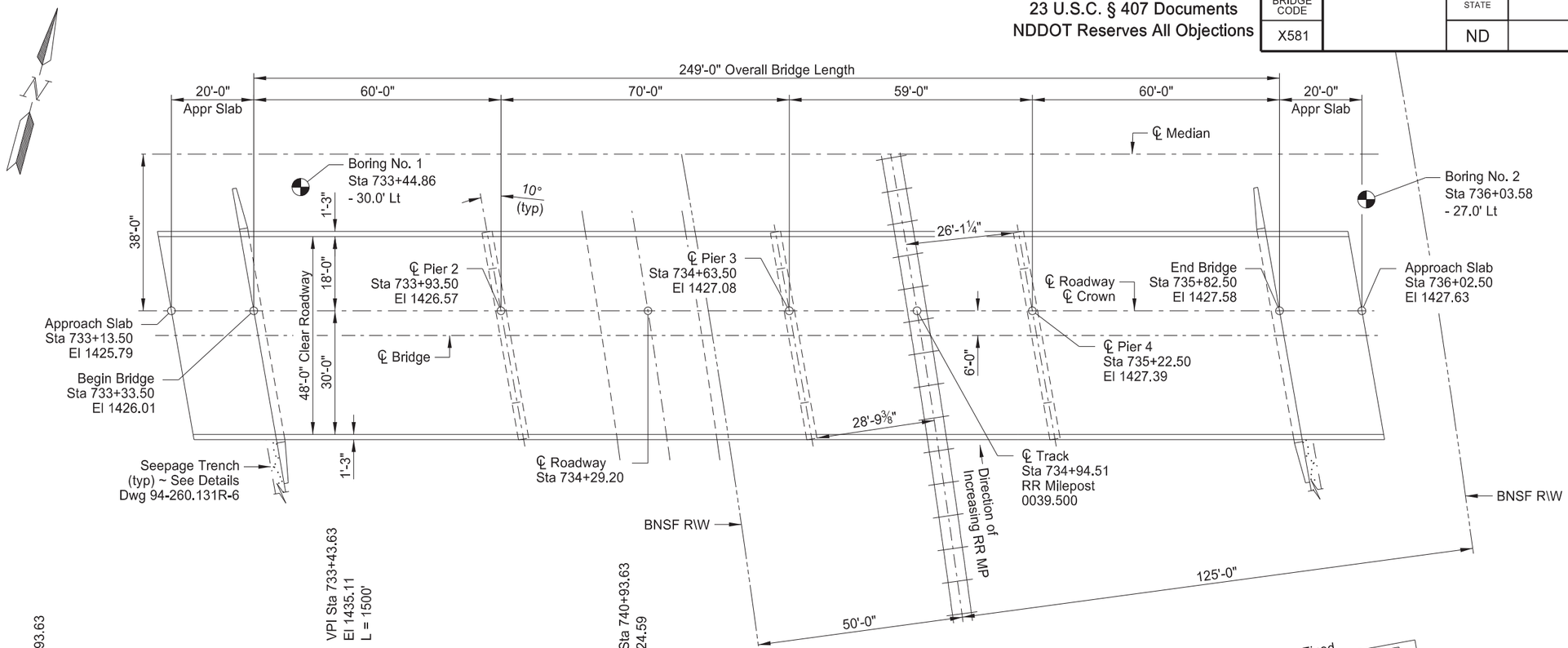
APPROACH SLAB DETAILS

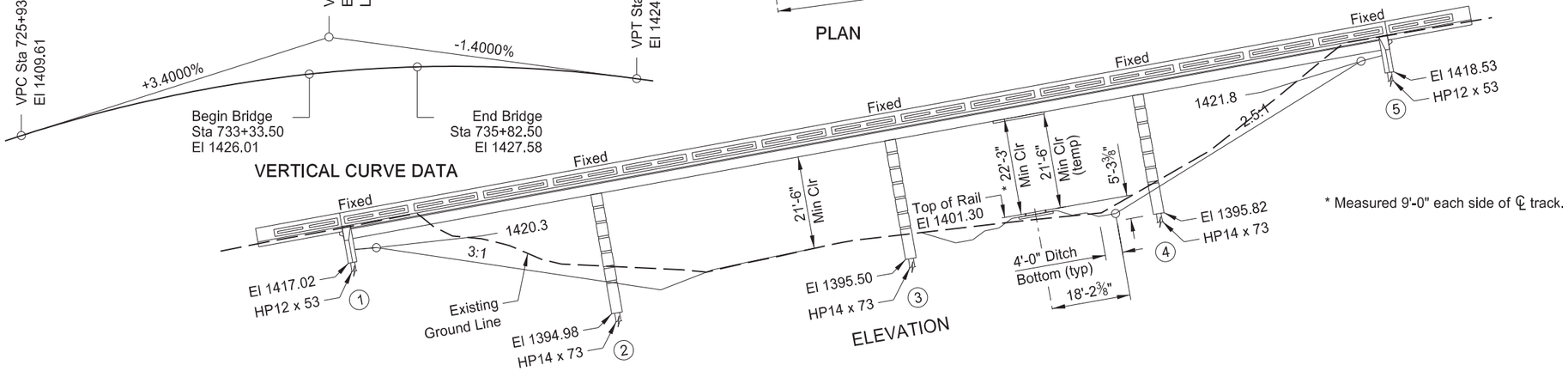
REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/24/23
NORTH DAKOTA

DRAWING NO.	94-259.847R-14

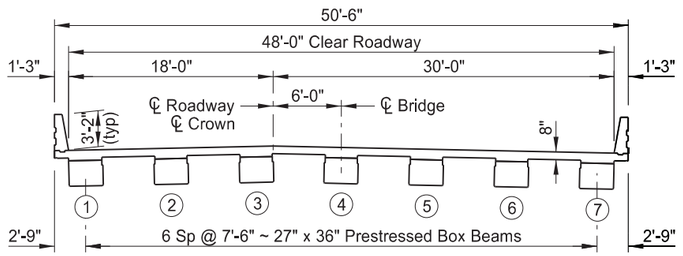
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

BRIDGE CODE		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
X581		ND	IM-2-094(194)260	170	16





* Measured 9'-0" each side of ℄ track.



SURVEY CONTROL POINTS			
POINT	NORTHING	EASTING	ELEVATION
RTK 3003	451,507.98	2,424,689.00	1408.01
RTK 3004	451,369.47	2,424,941.41	1407.83

DESIGN STRENGTHS:

f'c = 3,000 psi ~ Class AE-3 Concrete
f'c = 4,000 psi ~ Class AAE-3 Concrete
f'c = 5,600 psi ~ Prestressed Beam Concrete
f'c = 6,500 psi ~ Prestressed Beam Concrete
fy = 60,000 psi ~ Reinforcing Steel

Load & Resistance Factor Design

SPECIAL PROVISIONS	
SSP 2	MIGRATORY BIRD TREATY ACT
SP 53 (23)	RAILROAD REQUIREMENTS

STANDARD DRAWINGS

D-622-1, D-714-18, D-900-1

F.W.S. 15 PSF

HL-93 DESIGN LOADING

BNSF RR & SE JAMESTOWN INTERCHANGE
DOT CROSSING # 966535T

LS 287, MP 0039.500, KLOSE-JAMESTOWN SUB
LATTITUDE 46.8897800, LONGITUDE -98.675950

BRIDGE LAYOUT
STA 734+58.00

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
10/13/23

DRAWING NO. 94-260.131R-1

10/2/2023 3:30:29 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_016_BRLO.dgn ATC JRR

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	17

NOTES

100 SCOPE OF WORK: This project consists of removing an existing bridge and building a new 4-span prestressed concrete spread box beam bridge with a bridge slab length of 249'-0" and a bridge slab width of 50'-6".

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 Class AE-3 and AAE-3 concrete.

105 BNSF FOURTH QUARTER CONSTRUCTION MORATORIUM: BNSF has the right to shut down all construction activities on BNSF property during the fourth quarter of each year (October 1 to December 26) to accommodate BNSF's peak holiday shipping season. However, the Contractor can request a waiver (sent to the BNSF Project Engineer assigned to the project) from this moratorium by identifying the type of work to be performed, distance from BNSF track(s), and work timeframe. BNSF can choose to waive some or all of the moratorium (construction shut down during November 1 to December 26 only, for example) if BNSF determines that the construction activities will not have any impacts on BNSF peak train traffic. Minor work is often permitted adjacent to BNSF track(s), but major work (e.g. overhead bridge work) is typically not permitted by BNSF during the fourth quarter construction moratorium.

202 REMOVAL OF STRUCTURE: The existing structure is an 4-span prestressed concrete girder bridge, 221'-0" long with a clear roadway width of 49'-8", and concrete substructures. The substructures are supported on treated timber piling. Remove Pier 3 and Pier 4 substructures so there is no movement of railroad track ballast as determined by the railroad.

Construct a track protection canopy and track shield over the railroad tracks that cross beneath the existing structure. Design and construct the track protection canopy and track shield in accordance with SP 53(23) "Railroad Requirements". Remove the track protection canopy and track shield after demolition activities adjacent to the railroad are complete.

Include all costs for the removal of the bridge, including costs to construct, maintain and remove the railroad track protection canopy and track shield, in the contract unit price for "Removal of Structure".

Provide a minimum 4 week notice prior to the removal of substructures within the railroad right-of-way to:

Dan Peltier
Manager Engineering
763-782-3495
Daniel.Peltier@BNSF.com

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

210 FOUNDATION PREPARATION: Include all work to excavate and shape the slopes at the front face of each abutment in the Lump Sum price bid for "Foundation Preparation". Approximately 700 CY of material will need to be removed at Abutment 1 and 1,600 CY of material will need to be removed at Abutment 5. Suitable material removed from the abutments as part of the work for Foundation Preparation may be used as roadway embankment if approved by the Engineer.

602 CLASS AE-3 AND AAE-3 CONCRETE: The strength requirements of Section 802.01 A.2 "Class AE and AAE Mixes" are revised to develop a design compressive strength of 3,000 psi (AE-3) and 4,000 psi (AAE-3) at 28 days.

602 DIAPHRAGMS AND ENDWALLS: Place the intermediate diaphragm concrete before the deck concrete and allow the diaphragms to cure at least 72 hours before deck placement. Place the pier diaphragm and endwall concrete at the same time as the deck concrete.

602 DECK PLACEMENT: Place the deck concrete at a minimum rate of 40 CY per hour.

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 appearing on the top surface 0.007" or greater in width at its 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 limits of crack, including those portions that are narrower than 0.007" 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 work and materials associated with the bridge deck and approach slab crack sealing in the price bid for the Class AAE-3 concrete and approach slab bid items.

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	18

NOTES

602 SPECIAL SURFACE FINISH: Apply TexCote XL 70 BridgeCote with Silane on all exposed substructure surfaces, the outside edges of the pier diaphragms, the fascia of the exterior beams, the outside edges of the deck, the underside of the deck overhangs, the exposed endwall areas outside of the exterior beams, and to all bridge and approach slab barrier surfaces. Seal all cracks in accordance with the manufacturer's recommendations prior to applying the TexCote special surface finish. Include all special surface finish costs in the unit price bid for Class AE-3 and AAE-3 concrete.

Use a medium textured finish. Use brown surface finish color number 30475 meeting AMS-STD-595 for the back face of the barriers, excluding the recessed areas. Use gray surface finish color number 36424 meeting AMS-STD-595 for all other surfaces.

Submit to the Engineer a 1' x 1' sample of the brown surface finish.

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

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

622 PILING: Drive pier piling with a diesel hammer with an operational energy of at least 78,836 foot-pound-tons (minimum ram weight of 5,000 pounds) computed by the formula:

$W(E–22{,}176) + 0.711E$

Drive abutment piling with a diesel hammer with an operational energy of at least 47,848 foot-pound-tons (minimum ram weight of 4,000 pounds) computed by the formula:

$W(E–16{,}016) + 0.598E$

W = Weight of the ram (tons)
E = Operational hammer energy

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. Restrike the pile with 10 blows to determine if bearing has been achieved. If bearing was not achieved during restrike, continue to drive the pile until bearing is achieved.

930 ROADWAY CANOPY: Construct canopies beneath the new structure to protect traffic from falling material. Construct the canopies over the traveled roadway and the railroad tracks that cross beneath the structure. The canopies are added safeguards and do 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.

Construct the canopy over the railroad tracks in accordance with SP 53(23) “Railroad Requirements”. Provide a minimum vertical clearance of 21'-6" above the top of the railroad tracks. Extend the canopy a minimum distance of 5'-0" beyond the outside edge of the bridge deck and a minimum distance of 10'-0" in each direction from the centerline of the railroad tracks beneath the structure.

Construct the canopy over the roadway to provide a minimum vertical clearance of 15'-6" above the top of the 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.

Construct the canopies beneath the new structure before installing formwork for the new bridge deck. The canopies may be supported from the ground or suspended from the girders.

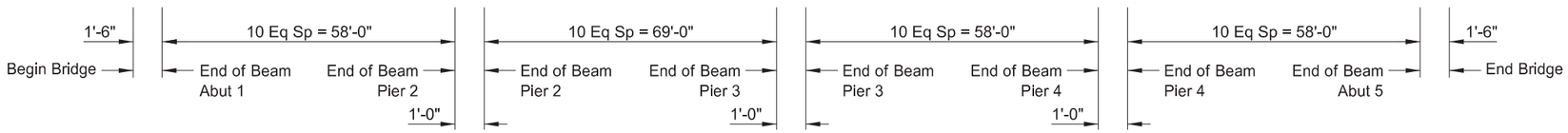
Maintain the canopies beneath the new structure during construction of the bridge superstructure and remove the canopies after construction of the bridge superstructure is complete. Include all costs for construction, maintenance, and removal of the canopy systems for the new structure in the Lump Sum price for “Roadway Canopy”.

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	19

℄ BEAM 1	℄ BEAM 2	℄ BEAM 3	℄ BEAM 4	℄ BEAM 5	℄ BEAM 6	℄ BEAM 7
1425.63	1425.80	1425.97	1425.89	1425.75	1425.61	1425.46
1425.65	1425.82	1425.99	1425.91	1425.76	1425.62	1425.48
1425.73	1425.90	1426.07	1425.99	1425.85	1425.71	1425.56
1425.82	1425.98	1426.15	1426.07	1425.93	1425.79	1425.64
1425.89	1426.06	1426.23	1426.15	1426.00	1425.86	1425.72
1425.96	1426.13	1426.30	1426.22	1426.07	1425.93	1425.78
1426.02	1426.19	1426.36	1426.27	1426.13	1425.99	1425.84
1426.07	1426.24	1426.41	1426.32	1426.18	1426.04	1425.89
1426.11	1426.28	1426.45	1426.36	1426.22	1426.08	1425.93
1426.14	1426.31	1426.48	1426.40	1426.25	1426.11	1425.96
1426.17	1426.34	1426.51	1426.42	1426.28	1426.13	1425.99
1426.20	1426.36	1426.53	1426.45	1426.30	1426.16	1426.01
1426.20	1426.37	1426.54	1426.46	1426.31	1426.17	1426.02
1426.31	1426.48	1426.65	1426.56	1426.42	1426.27	1426.13
1426.41	1426.58	1426.75	1426.66	1426.52	1426.37	1426.22
1426.50	1426.67	1426.83	1426.75	1426.60	1426.46	1426.31
1426.58	1426.74	1426.91	1426.83	1426.68	1426.53	1426.39
1426.64	1426.80	1426.97	1426.88	1426.74	1426.59	1426.44
1426.68	1426.84	1427.01	1426.93	1426.78	1426.63	1426.48
1426.70	1426.87	1427.04	1426.95	1426.80	1426.66	1426.51
1426.72	1426.88	1427.05	1426.96	1426.81	1426.67	1426.52
1426.72	1426.88	1427.05	1426.96	1426.81	1426.67	1426.52
1426.71	1426.88	1427.04	1426.96	1426.81	1426.66	1426.51
1426.72	1426.88	1427.05	1426.96	1426.81	1426.67	1426.52
1426.78	1426.95	1427.11	1427.02	1426.87	1426.73	1426.58
1426.84	1427.00	1427.17	1427.08	1426.93	1426.78	1426.63
1426.89	1427.05	1427.22	1427.13	1426.98	1426.83	1426.68
1426.93	1427.10	1427.26	1427.17	1427.03	1426.88	1426.73
1426.97	1427.13	1427.30	1427.21	1427.06	1426.91	1426.76
1427.00	1427.16	1427.32	1427.24	1427.09	1426.94	1426.79
1427.01	1427.18	1427.34	1427.25	1427.10	1426.95	1426.80
1427.02	1427.19	1427.35	1427.26	1427.11	1426.96	1426.81
1427.03	1427.19	1427.35	1427.26	1427.11	1426.96	1426.81
1427.03	1427.19	1427.36	1427.27	1427.12	1426.97	1426.82
1427.08	1427.24	1427.41	1427.32	1427.17	1427.02	1426.86
1427.13	1427.29	1427.45	1427.36	1427.21	1427.06	1426.91
1427.17	1427.33	1427.49	1427.40	1427.25	1427.10	1426.95
1427.20	1427.36	1427.53	1427.44	1427.28	1427.13	1426.98
1427.23	1427.39	1427.55	1427.46	1427.31	1427.16	1427.00
1427.24	1427.40	1427.56	1427.47	1427.32	1427.17	1427.02
1427.25	1427.41	1427.57	1427.48	1427.33	1427.18	1427.02
1427.25	1427.41	1427.57	1427.48	1427.33	1427.17	1427.02
1427.24	1427.40	1427.56	1427.47	1427.32	1427.16	1427.01
1427.23	1427.39	1427.55	1427.46	1427.31	1427.15	1427.00
1427.23	1427.39	1427.55	1427.46	1427.31	1427.16	1427.00



Beam 1 is the north beam.

SCREED ELEVATIONS

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
107	0121	RAILWAY PROTECTION INSURANCE - COMPANY A	L SUM	1
107	0141	RAILROAD COORDINATION - COMPANY A	L SUM	1
107	0162	RAILROAD FLAGGING - COMPANY A	DAY	2,000
202	0105	REMOVAL OF STRUCTURE	L SUM	1
210	0099	CLASS 1 EXCAVATION	L SUM	1
210	0201	FOUNDATION PREPARATION	EA	1
602	0130	CLASS AAE-3 CONCRETE	CY	450.1
602	1130	CLASS AE-3 CONCRETE	CY	359.4
602	1133	CONCRETE BRIDGE APPROACH SLAB	SY	226
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,541
604	9610	PRESTRESSED BOX BEAM-27IN	LF	1,701
612	0115	REINFORCING STEEL-GRADE 60	LBS	31,551
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	81,281
622	0040	STEEL PILING HP 12 X 53	LF	870
622	0060	STEEL PILING HP 14 X 73	LF	1,560
930	3000	BRIDGE BENCH MARKS	SET	1
930	7012	ROADWAY CANOPY	L SUM	1
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2

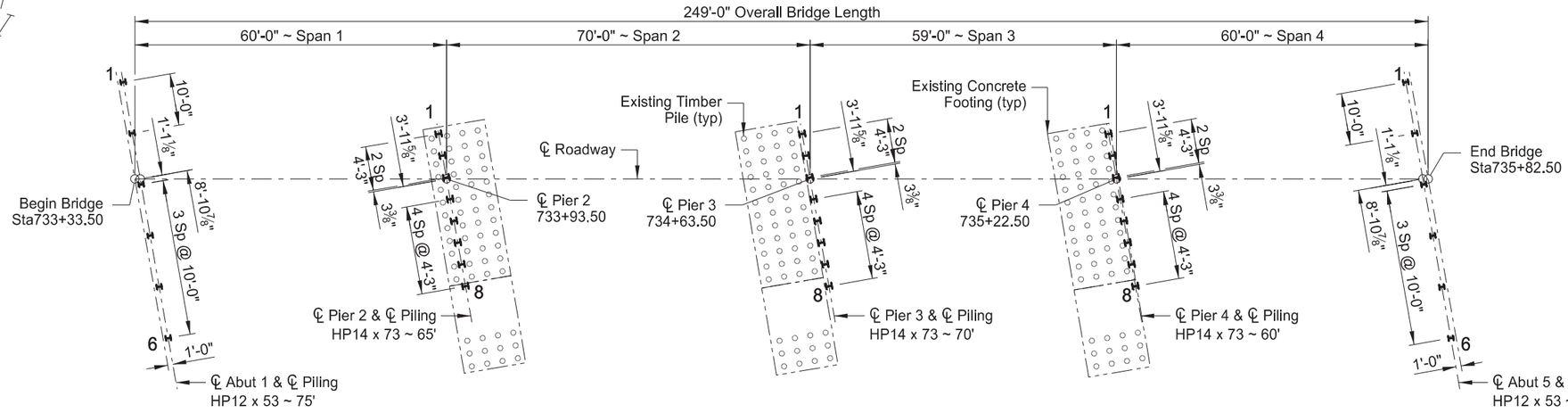
REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

BNSF RR & SE JAMESTOWN INTERCHANGE

SCREED ELEVATIONS
BID ITEM QUANTITIES

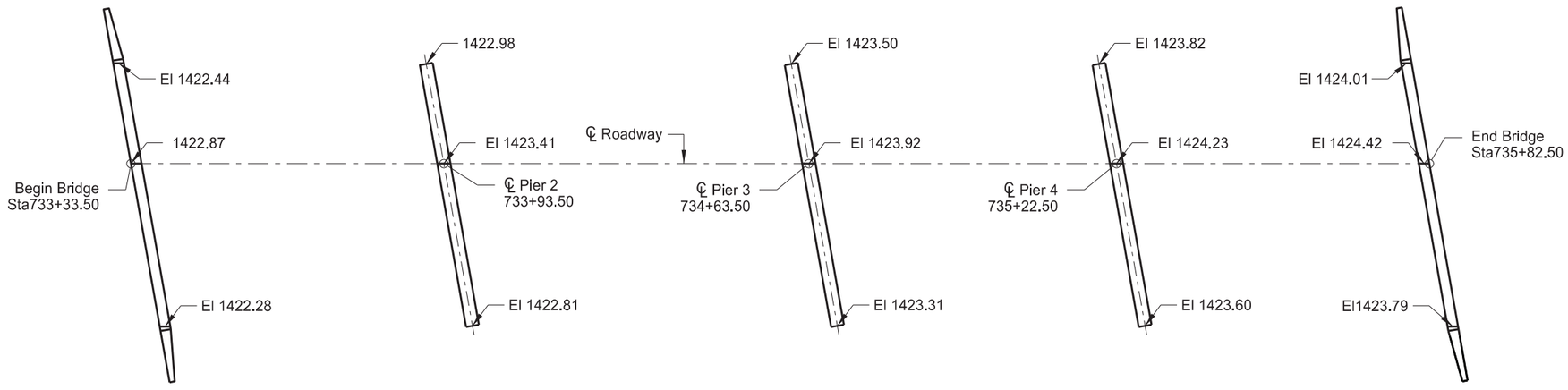
DRAWING NO. 94-260.131R-4

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	20



Drive the HP12 x 53 Pile to 130 tons.
Drive the HP14 x 73 Pile to 180 tons.

PILING LAYOUT



Elevations shown are to top of finished concrete.

BEARING ELEVATIONS

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 = Nominal 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
ABUT 1	1	451,379.08	2,424,713.16
	6	451,334.80	2,424,736.38
PIER 2	1	451,388.03	2,424,774.06
	8	451,361.68	2,424,787.88
PIER 3	1	451,409.28	2,424,840.76
	8	451,382.93	2,424,854.58
PIER 4	1	451,427.19	2,424,896.97
	8	451,400.84	2,424,910.79
ABUT 5	1	451,454.06	2,424,948.47
	6	451,409.78	2,424,971.70

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

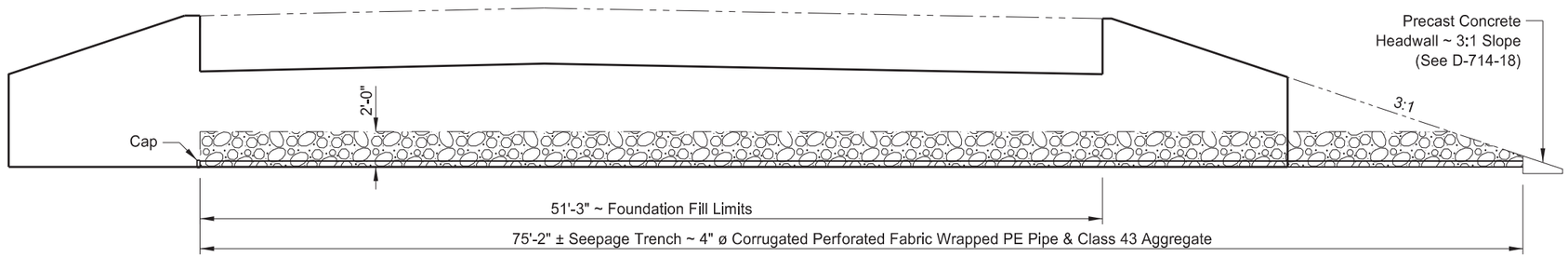
BNSF RR & SE JAMESTOWN INTERCHANGE

PILING LAYOUT &
BEARING ELEVATIONS

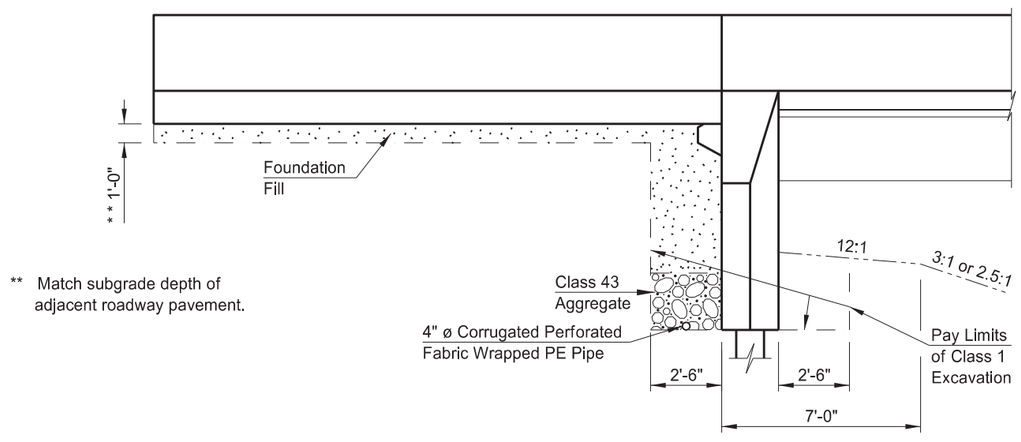
DRAWING NO. 94-260.131R-5

10/2/2023 3:30:30 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_020_PILELO.dgn ATC JRR

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	21



BACK FACE OF ABUTMENT



DETAIL AT 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 210.03 B. Compact the foundation fill beneath the approach slab according to Section 210.04 B.3.

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

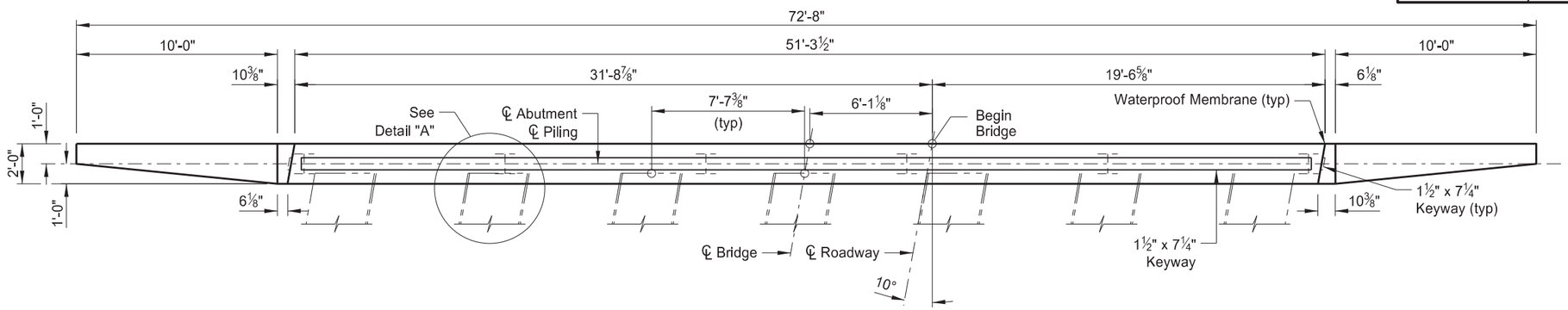
BNSF RR & SE JAMESTOWN INTERCHANGE

ABUTMENT UNDERDRAIN & EXCAVATION DETAILS

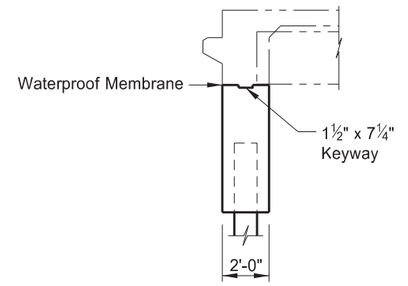
DRAWING NO. 94-260.131R-6

10/2/2023 3:30:32 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_021_UNDERDRAIN.dgn ATC JRR

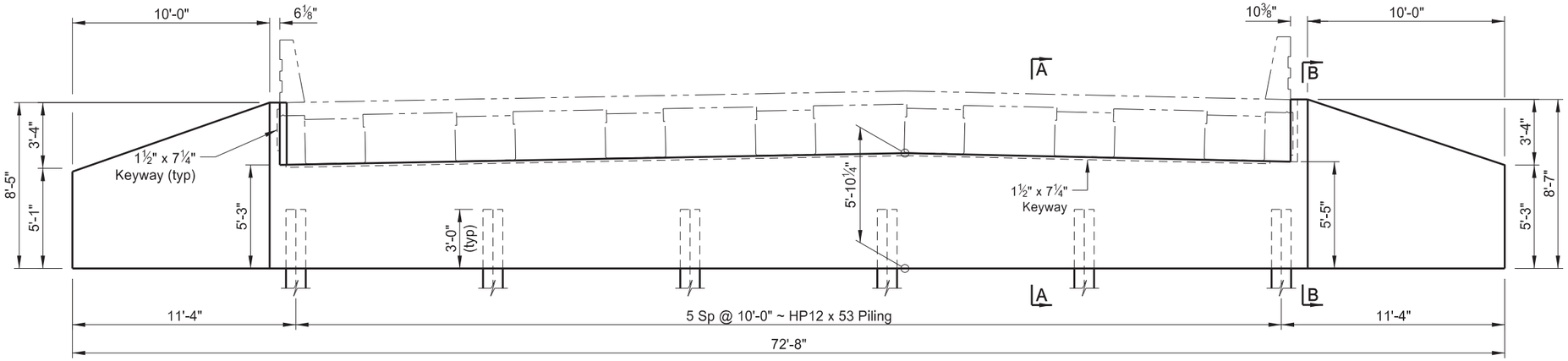
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	22



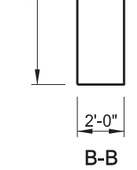
PLAN



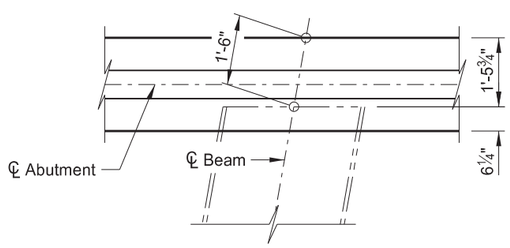
A-A



ELEVATION



B-B



DETAIL A

NOTE:

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
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DATE 10/13/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-260.131R-9

BNSF RR & SE JAMESTOWN INTERCHANGE

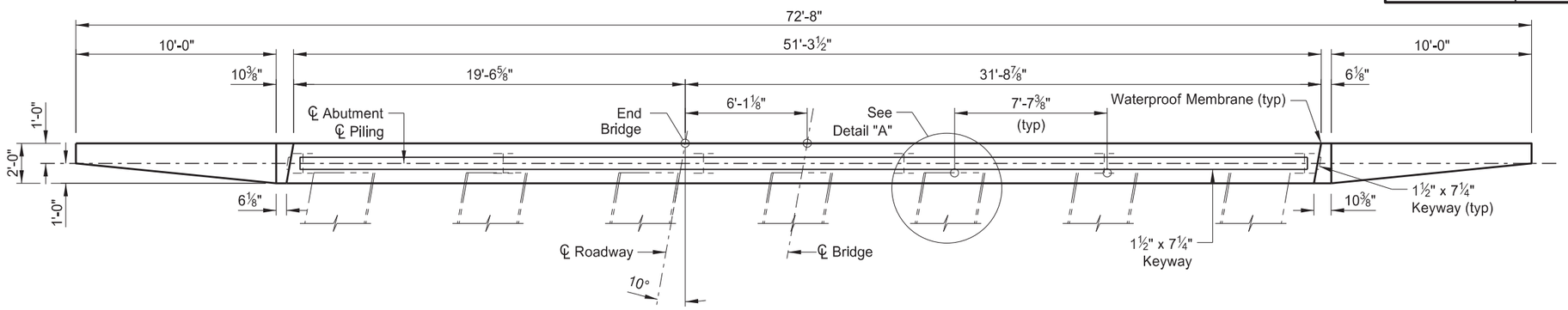
(SHOWING DIMENSIONS)

ABUTMENT 1 DETAILS

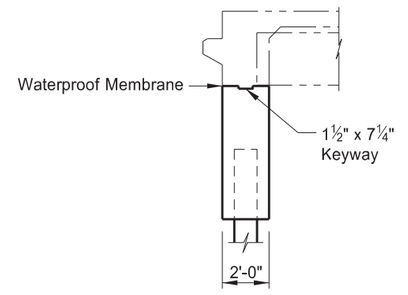
DRAWING NO. 94-260.131R-7

10/2/2023 3:30:33 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_022_ABUTDIM1.dgn ATC JRR

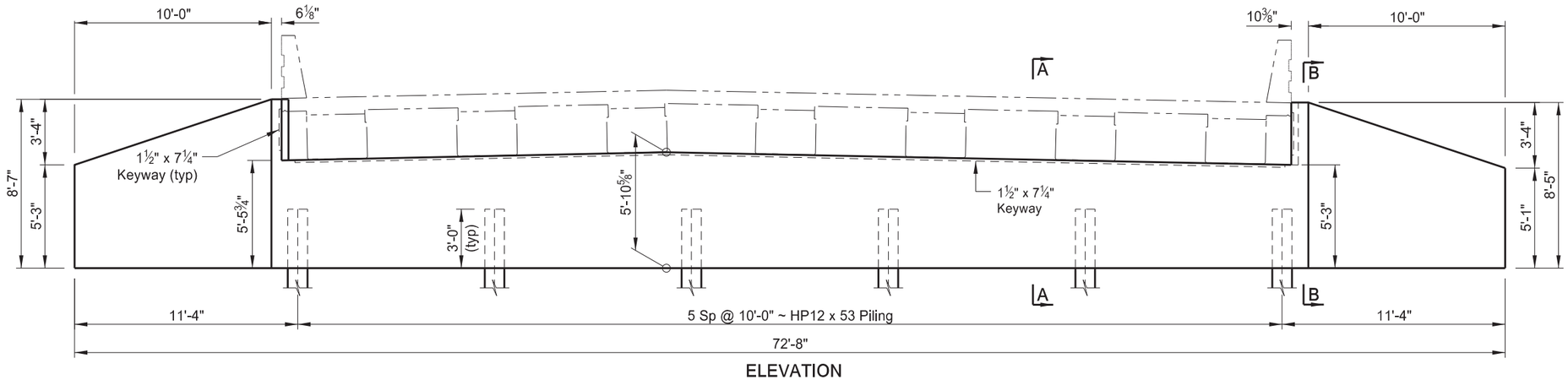
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	23



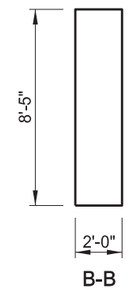
PLAN



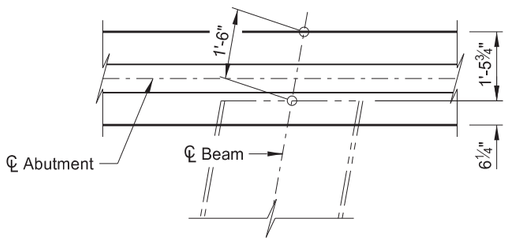
A-A



ELEVATION



B-B



DETAIL A

NOTE:

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

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-260.131R-9

BNSF RR & SE JAMESTOWN INTERCHANGE

(SHOWING DIMENSIONS)

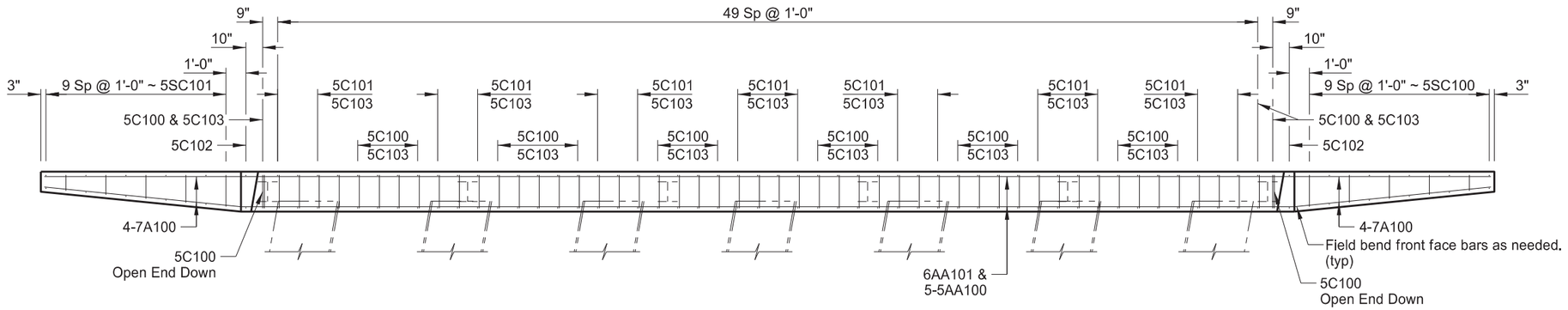
ABUTMENT 5 DETAILS

DRAWING NO. 94-260.131R-8

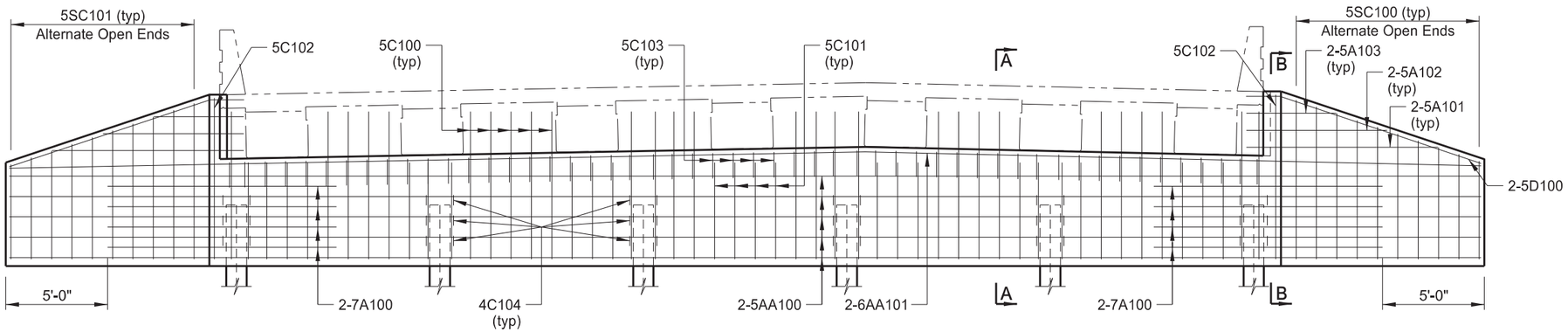
10/2/2023 3:30:33 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_023_ABUTDIM2.dgn

ATC JRR

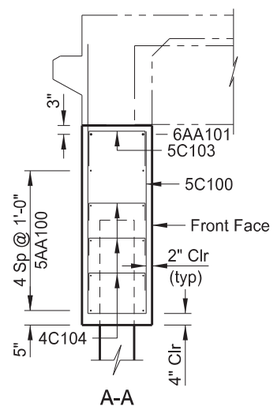
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	24



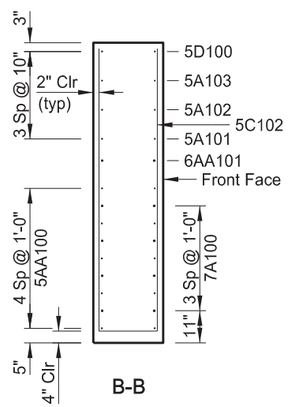
PLAN



ELEVATION



A-A



B-B

NOTE:

Abutment 1 shown.
Abutment 5 similar.

	QUANTITIES	
ABUT 1	CLASS AE-3 CONCRETE	29.6 CY
	REINFORCING STEEL	2,940 LBS
ABUT 5	CLASS AE-3 CONCRETE	29.6 CY
	REINFORCING STEEL	2,940 LBS

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

BNSF RR & SE JAMESTOWN INTERCHANGE

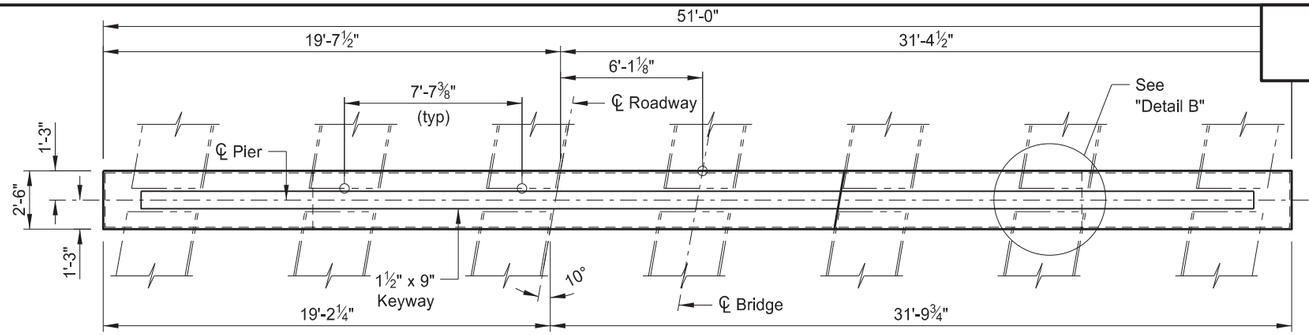
(SHOWING DIMENSIONS)

ABUTMENT 1 DETAILS

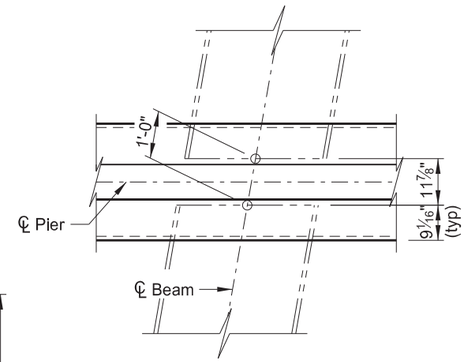
DRAWING NO. 94-260.131R-9

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	25

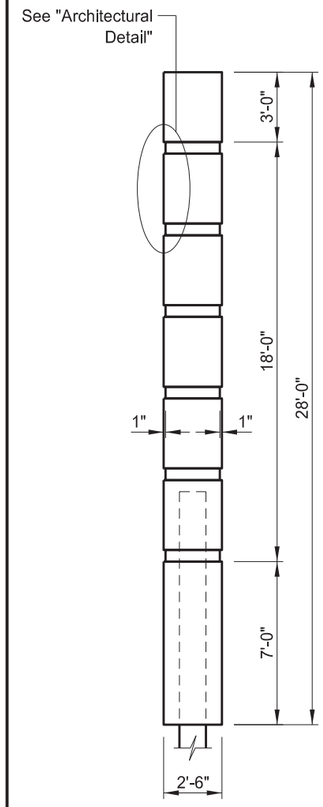
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections



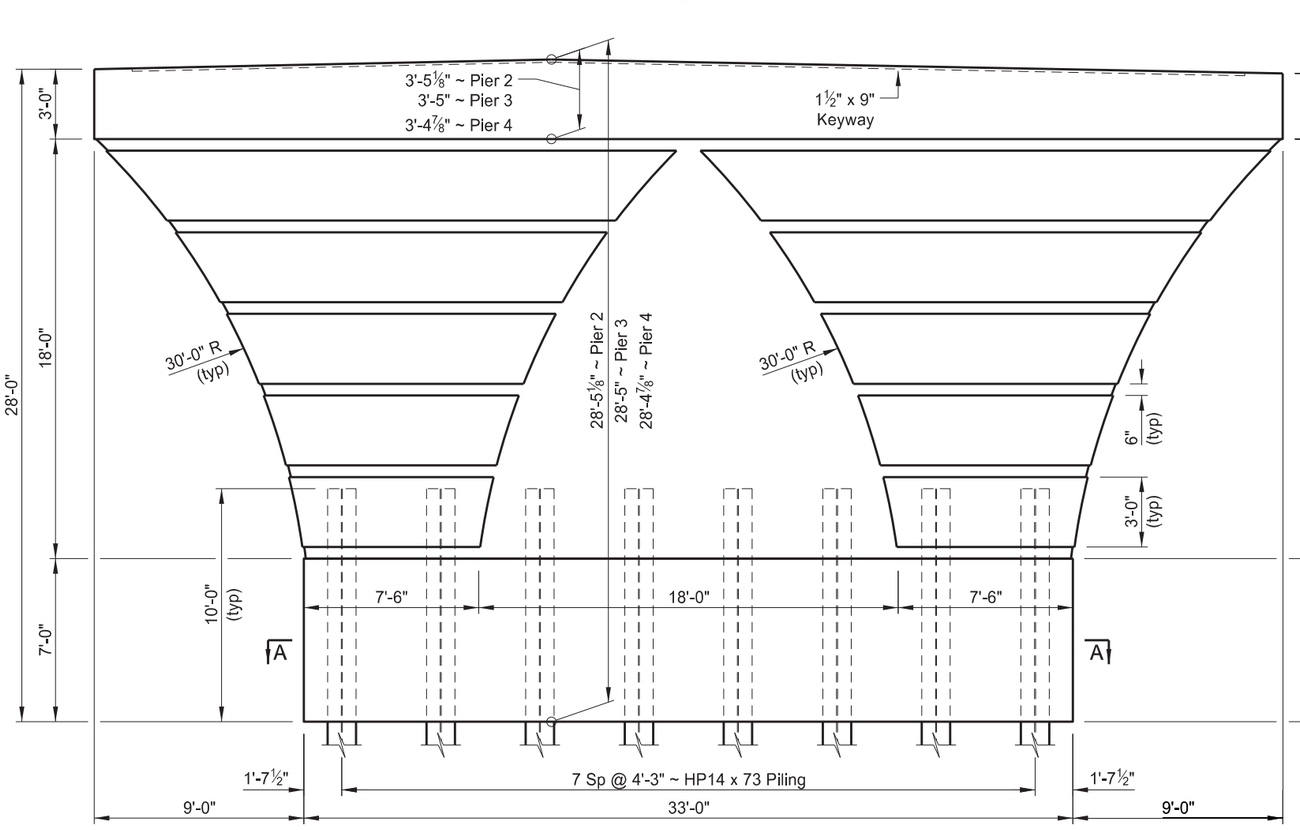
PLAN



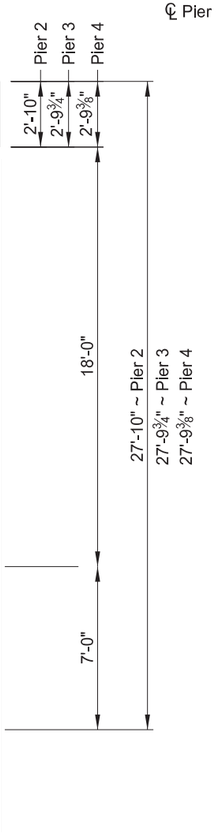
DETAIL B

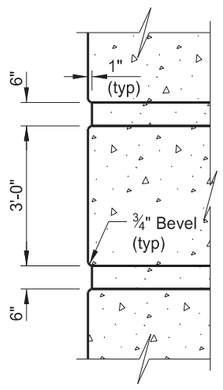


END VIEW

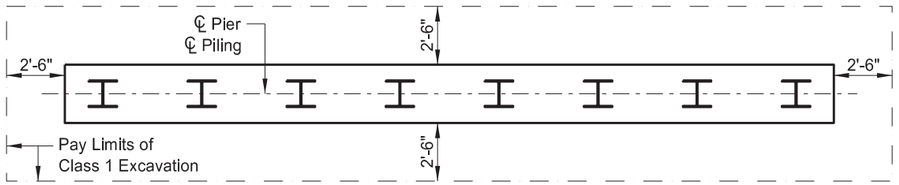


ELEVATION





ARCHITECTURAL DETAIL



A-A

QUANTITIES
SEE DWG 94-260.131R-11

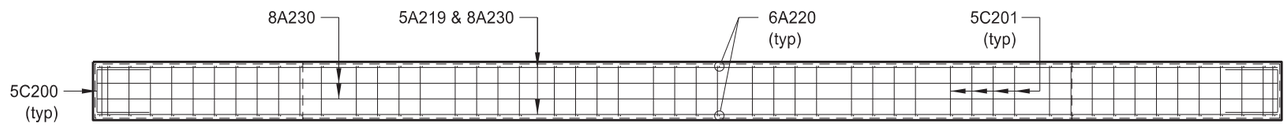
BNSF RR & SE JAMESTOWN INTERCHANGE

(SHOWING DIMENSIONS)

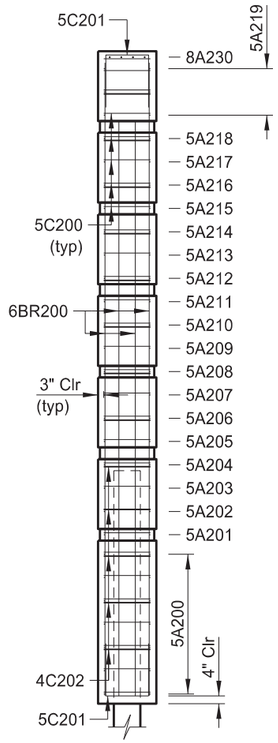
PIER DETAILS

DRAWING NO.	94-260.131R-10

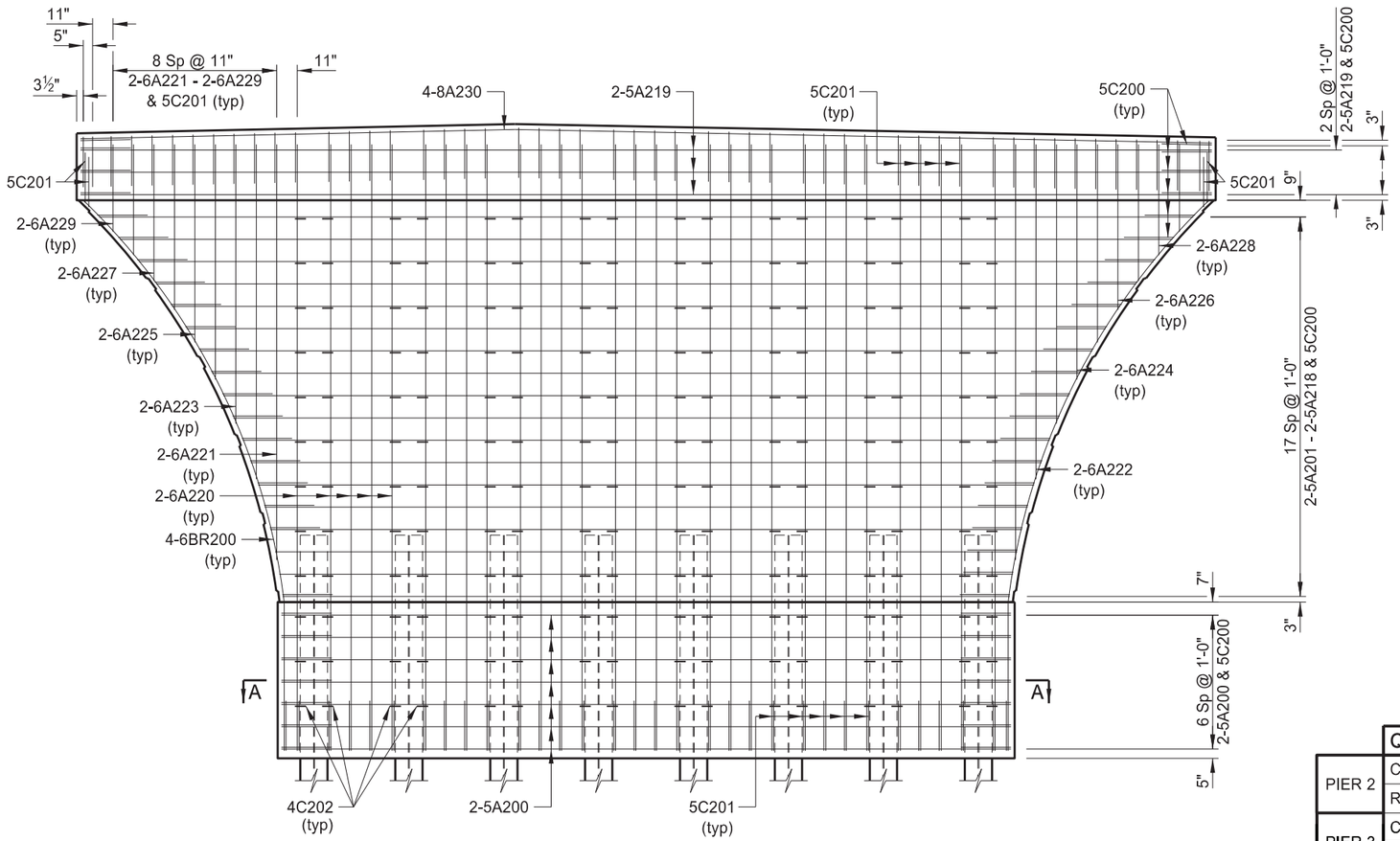
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	170	26



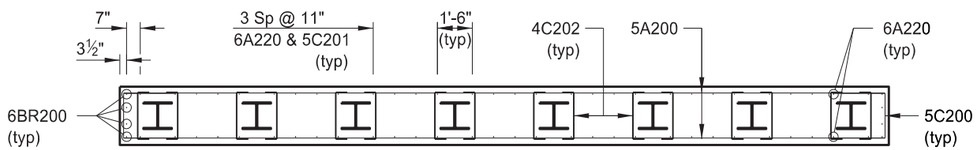
PLAN



END VIEW



ELEVATION



A-A

QUANTITIES		
PIER 2	CLASS AE-3 CONCRETE	100.1 CY
	REINFORCING STEEL	7,446 LBS
PIER 3	CLASS AE-3 CONCRETE	100.1 CY
	REINFORCING STEEL	7,446 LBS
PIER 4	CLASS AE-3 CONCRETE	100.0 CY
	REINFORCING STEEL	7,446 LBS

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

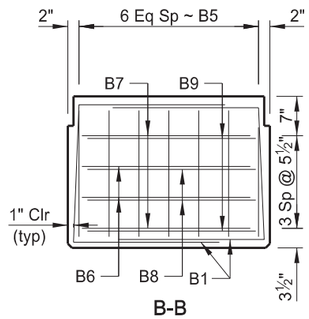
BNSF RR & SE JAMESTOWN INTERCHANGE

(SHOWING REINFORCING)

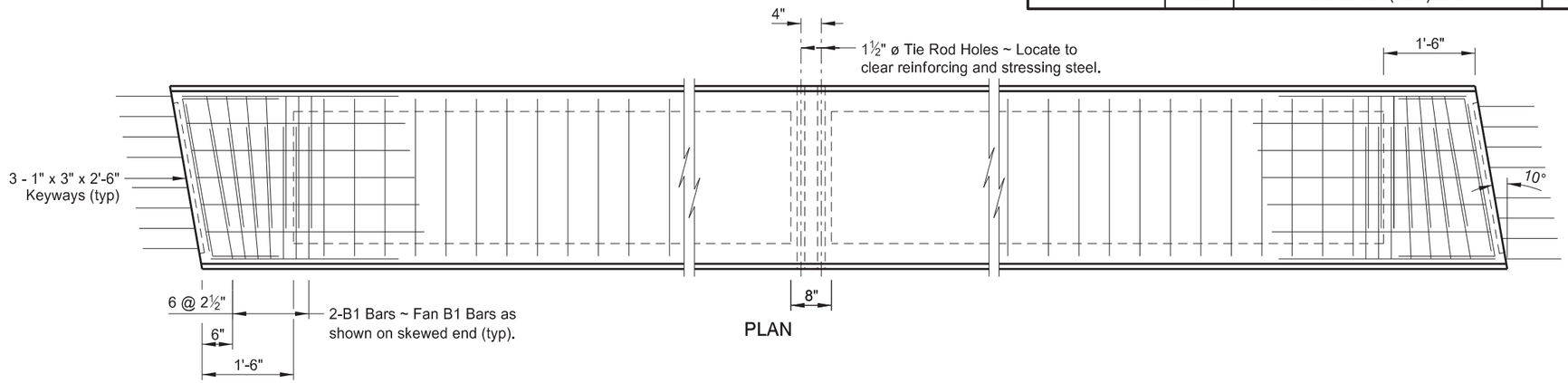
PIER DETAILS

DRAWING NO.	94-260.131R-11

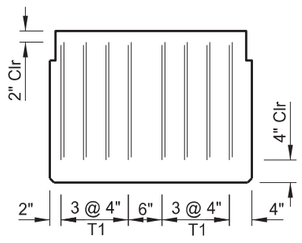
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	27



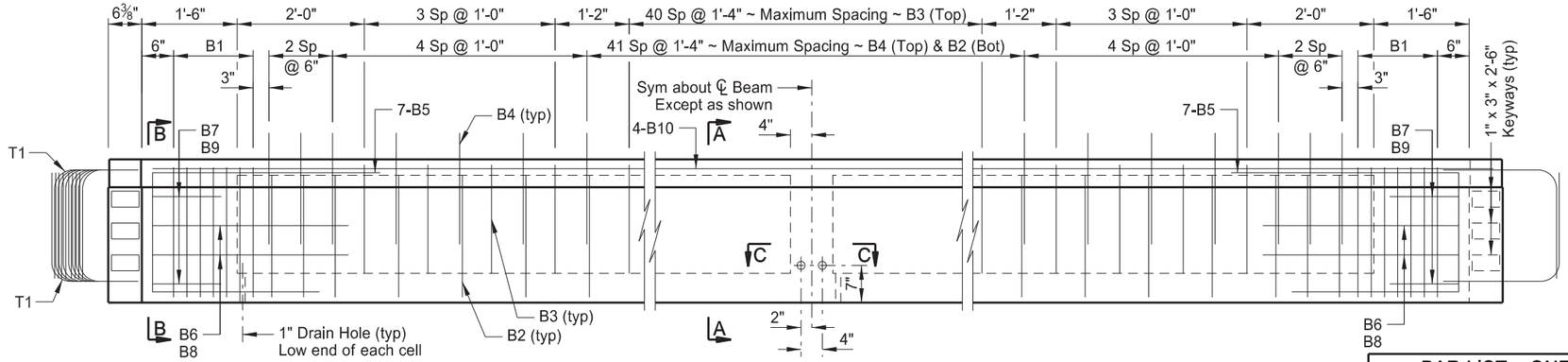
B-B



PLAN

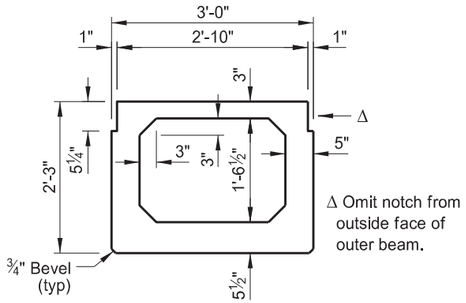


END VIEW

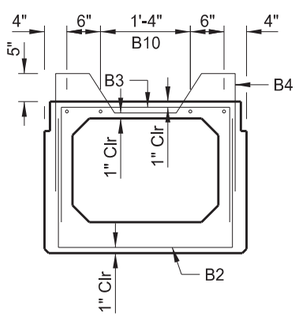


ELEVATION

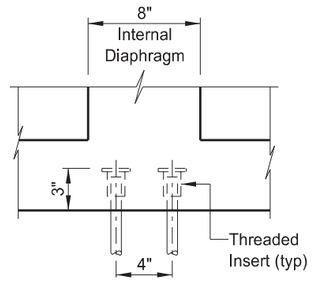
BAR LIST ~ ONE BEAM				
MARK	SIZE	NO.	LENGTH	SHAPE
B1	4	28	6'-5"	BENT
* B2	4	54	6'-5"	BENT
* B3	4	49	6'-0"	BENT
*** B4	4	54	6'-9"	BENT
B5	5	14	8'-1"	BENT
B6	4	4	5'-7"	BENT
B7	4	4	3'-7"	BENT
B8	4	4	6'-1"	BENT
B9	4	4	4'-1"	BENT
B10	4	8	35'-10"	STR
** T1	4	32	4'-6"	STR



(SHOWING DIMENSIONS)
A-A



(SHOWING REINFORCING)
A-A



(OUTER BEAMS ONLY)
DIAPHRAGM BAR INSERT
C-C

*** B4 bars to be epoxy coated.

** Field bend as shown (Grade 40).

* Welded Wire Reinforcing with minimum circumferential steel area of 0.15 sq in per ft may be substituted for B2 and B3 bars in the region designated as 1'-4" maximum spacing.

BEAM SECTION DATA
WT = 536.6 LBS/FT + 2091 LBS
CROSS SECTIONAL AREA = 498.5 IN^2
C.G. (FROM BOTTOM) = 12.11 IN
I = 43,612 IN^4
S_B = 3,601 IN^3

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

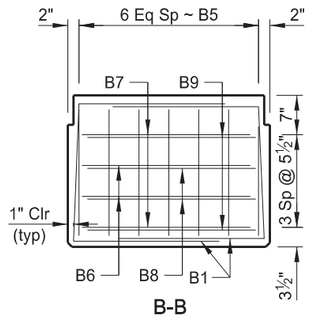
QUANTITIES	(ONE BEAM)
BEAM LENGTH	69.0 LF

BNSF RR & SE JAMESTOWN INTERCHANGE

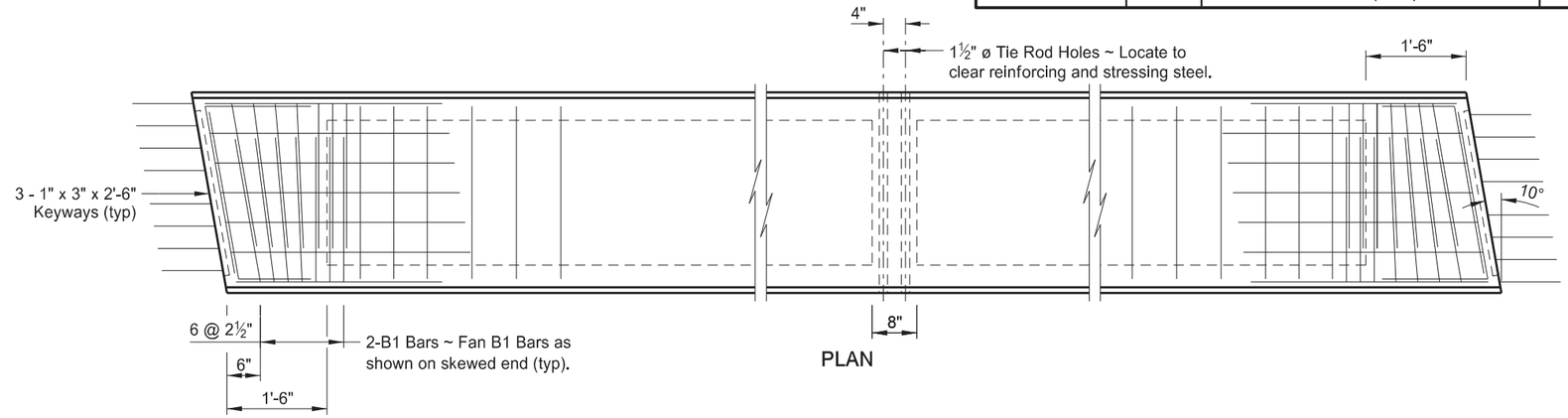
PRE-TENSIONED 27" X 36"
PRESTRESSED SPEAD BOX BEAM

DRAWING NO. 94-260.131R-12

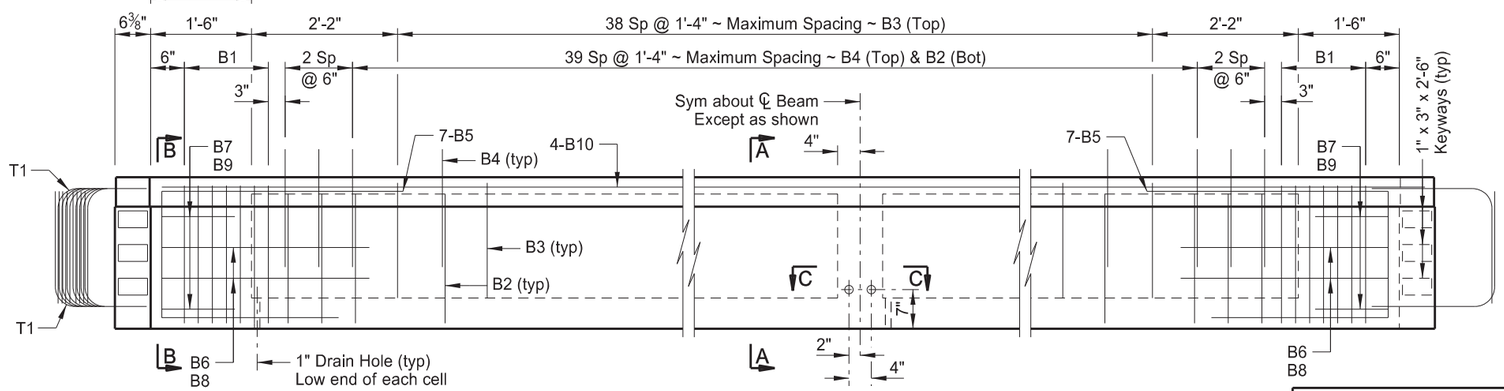
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	28



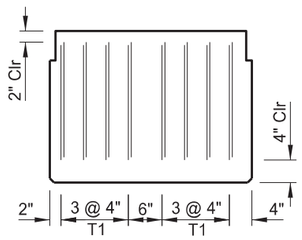
B-B



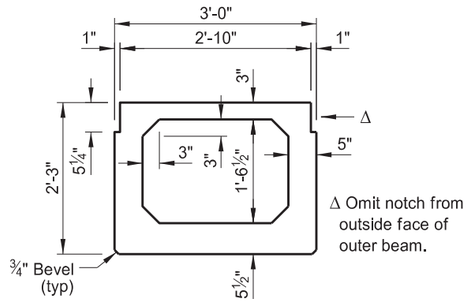
PLAN



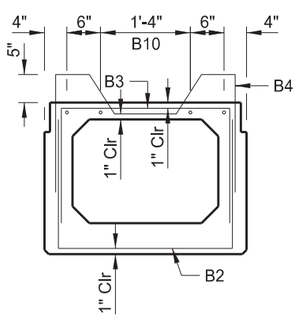
ELEVATION



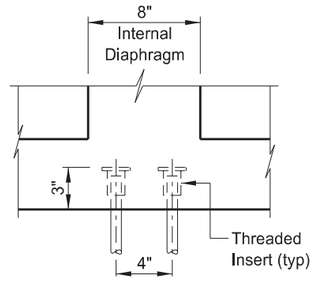
END VIEW



(SHOWING DIMENSIONS)
A-A



(SHOWING REINFORCING)
A-A



(OUTER BEAMS ONLY)
DIAPHRAGM BAR INSERT

C-C

*** B4 bars to be epoxy coated.

** Field bend as shown (Grade 40).

* Welded Wire Reinforcing with minimum circumferential steel area of 0.15 sq in per ft may be substituted for B2 and B3 bars in the region designated as 1'-4" maximum spacing.

BAR LIST ~ ONE BEAM				
MARK	SIZE	NO.	LENGTH	SHAPE
B1	4	28	6'-5"	BENT
* B2	4	44	6'-5"	BENT
* B3	4	39	6'-0"	BENT
*** B4	4	44	6'-9"	BENT
B5	5	14	8'-1"	BENT
B6	4	4	5'-7"	BENT
B7	4	4	3'-7"	BENT
B8	4	4	6'-1"	BENT
B9	4	4	4'-1"	BENT
B10	4	8	30'-4"	STR
** T1	4	32	4'-6"	STR

BEAM SECTION DATA
WT = 536.6 LBS/FT + 2091 LBS
CROSS SECTIONAL AREA = 498.5 IN^2
C.G. (FROM BOTTOM) = 12.11 IN
I = 43,612 IN^4
S_B = 3,601 IN^3

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

QUANTITIES	(ONE BEAM)
BEAM LENGTH	58.0 LF

BNSF RR & SE JAMESTOWN INTERCHANGE

PRE-TENSIONED 27" X 36"
PRESTRESSED SPEAD BOX BEAM

DRAWING NO. 94-260.131R-13

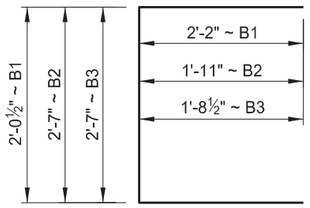
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	29

NOTES:

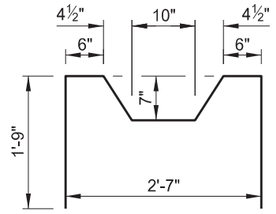
Select the final prestress force (remaining after all losses have been accounted for) and its corresponding center of gravity, from those on a curve determined by the three values shown in the "Prestressing Data" table.

Provide holes and inserts in the beams at locations shown to accommodate the diaphragm bars.

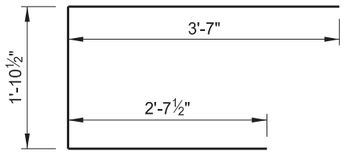
Minor changes to the shape of the beam and to reinforcing steel may be made to accommodate the forms of various contractors and their construction methods with the approval of the Engineer.



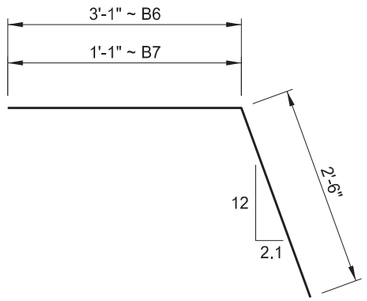
B1, B2 & B3



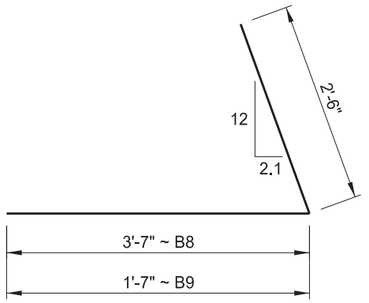
B4



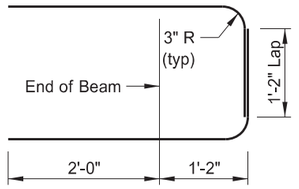
B5



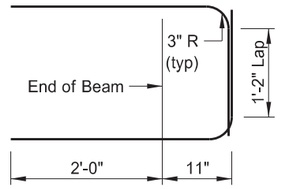
B6 & B7



B8 & B9



(AT ABUTMENTS)

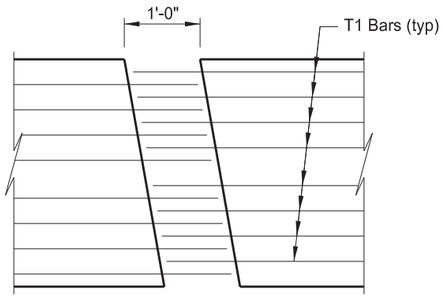


(AT PIERS)

T1

(DIMENSIONS SHOWN ARE OUT TO OUT)

BENT BAR DETAILS



BEAM END PLAN AT PIER

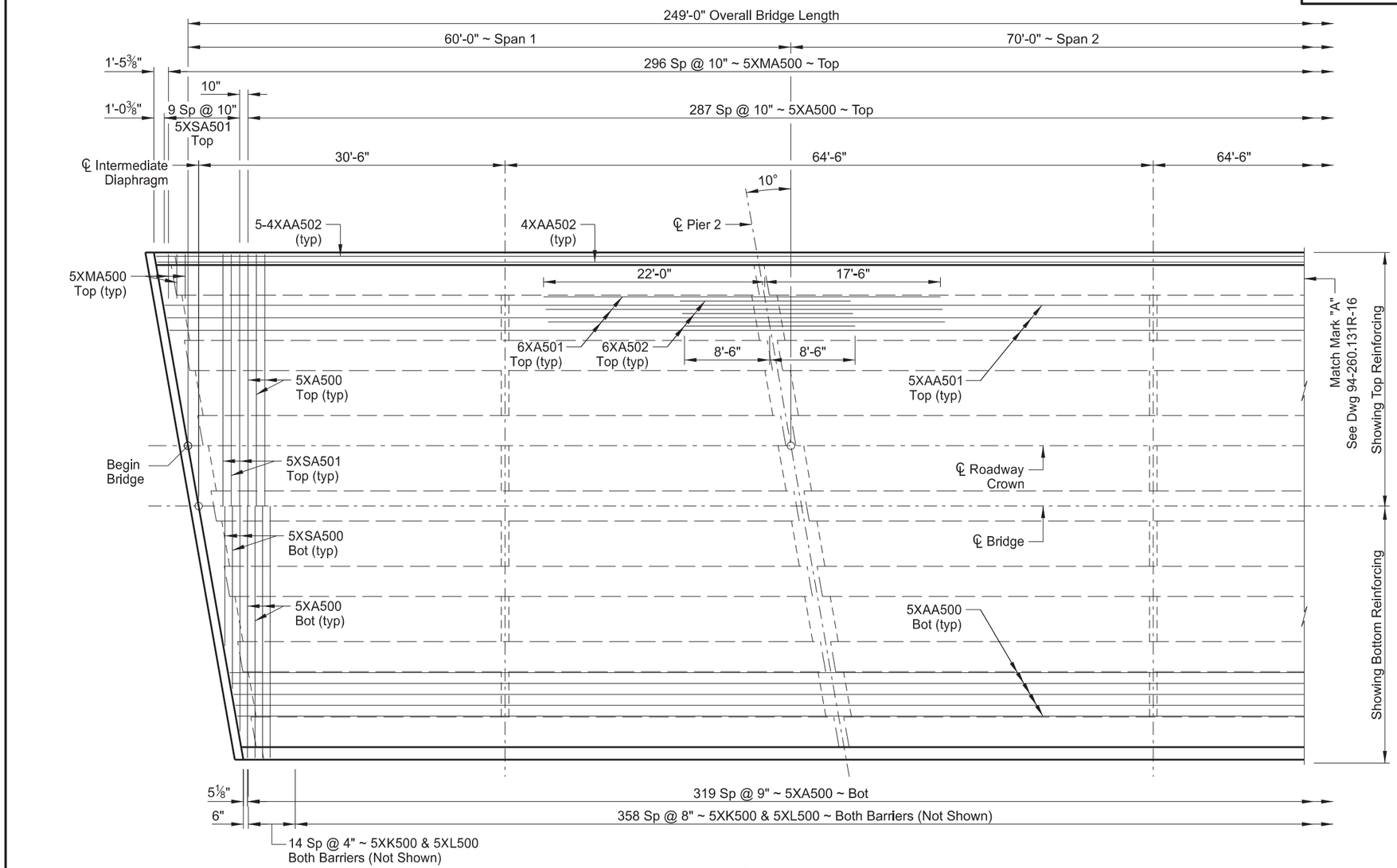
PRESTRESSING DATA					
C.G.	FINAL FORCE	DETENSION STRENGTH	ACCEPTANCE STRENGTH	WEIGHT (TONS)	BEAM LENGTH
4.00"	880.7 k	6,500 psi (Min)	6,500 psi (Min)	19.6	69'-0"
4.25"	895.3 k				
4.50"	910.4 k				
4.00"	627.2 k	5,600 psi (Min)	5,600 psi (Min)	16.6	58'-0"
4.25"	637.6 k				
4.50"	648.4 k				

BNSF RR & SE JAMESTOWN INTERCHANGE

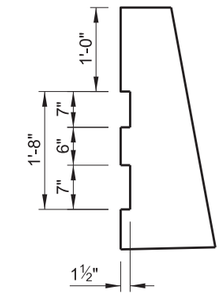
PRE-TENSIONED 27" X 36"
PRESTRESSED SPEAD BOX BEAM

DRAWING NO.	94-260.131R-14

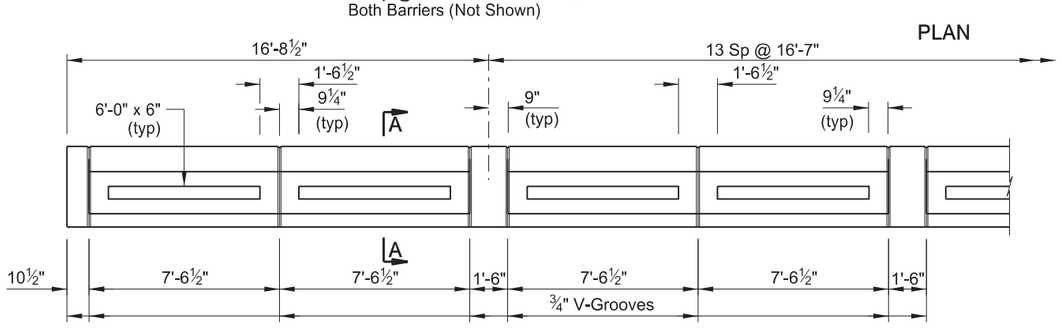
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	30



PLAN



A-A



(SHOWING DIMENSIONS ~ BACK FACE)
BARRIER ELEVATION

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-260.131R-20

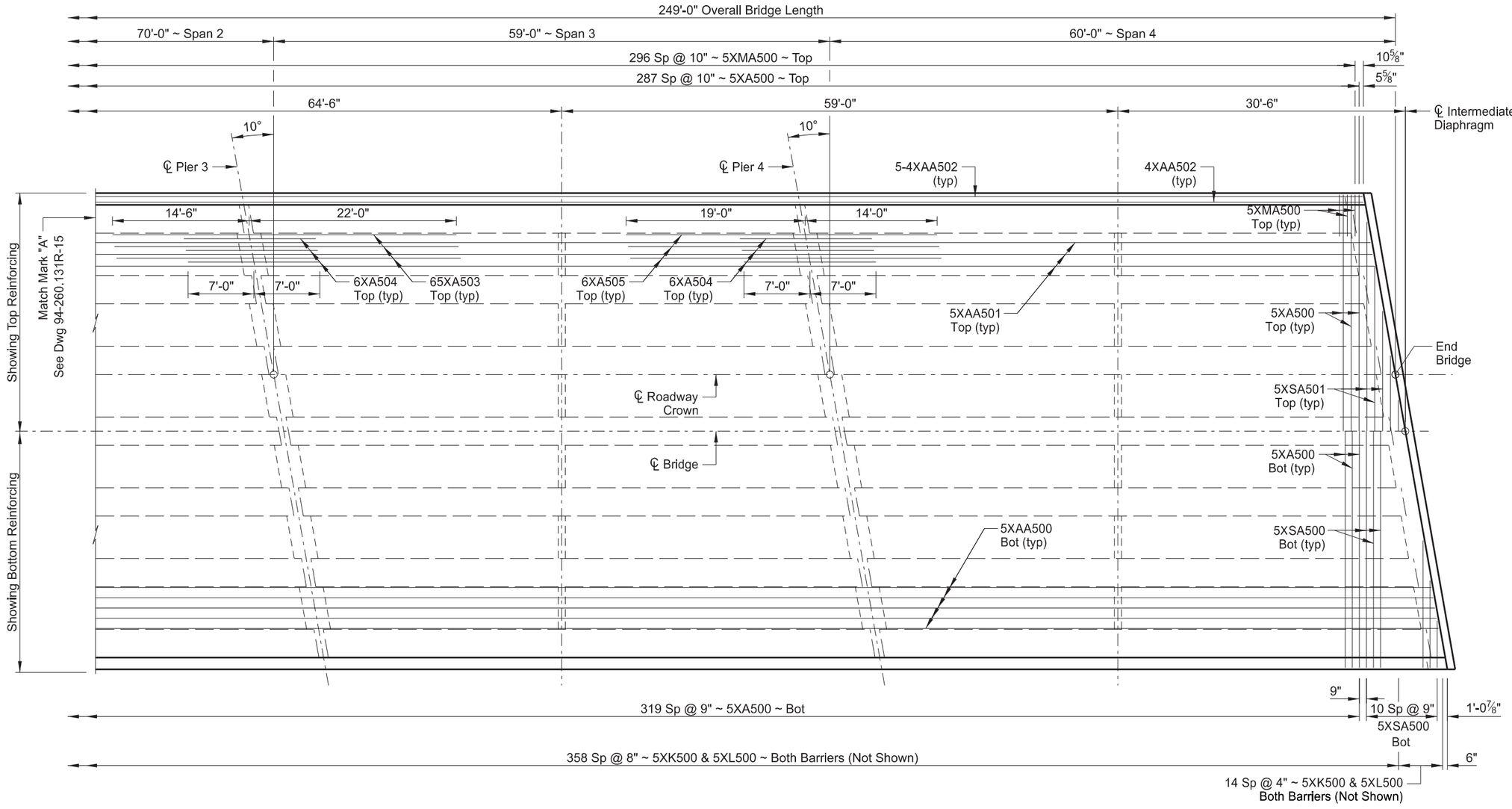
BNSF RR & SE JAMESTOWN INTERCHANGE

HALF SLAB LAYOUT

DRAWING NO.	94-260.131R-15

10/2/2023 3:30:38 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_030_SLABLO1.dgn ATC JRR

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	31



PLAN

QUANTITIES

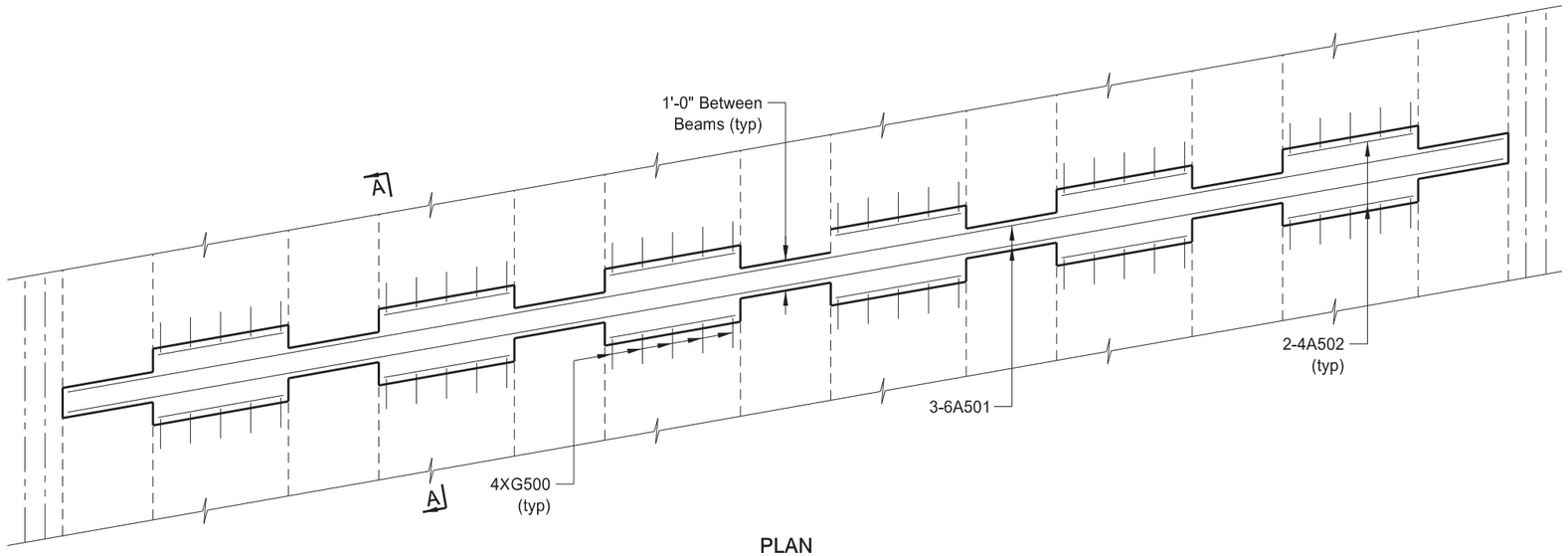
SEE DWG 94-260.131R-20

BNSF RR & SE JAMESTOWN INTERCHANGE

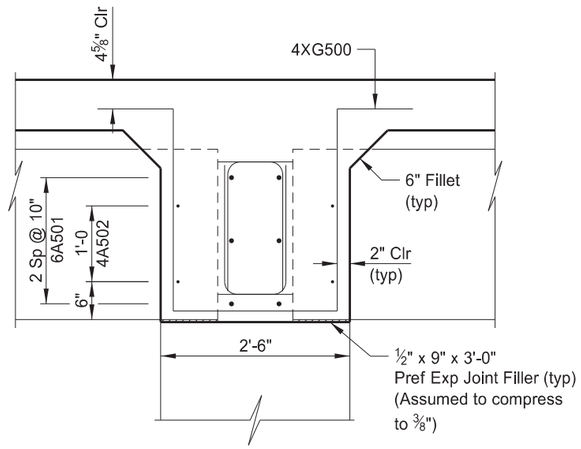
SLAB LAYOUT

DRAWING NO.	94-260.131R-16

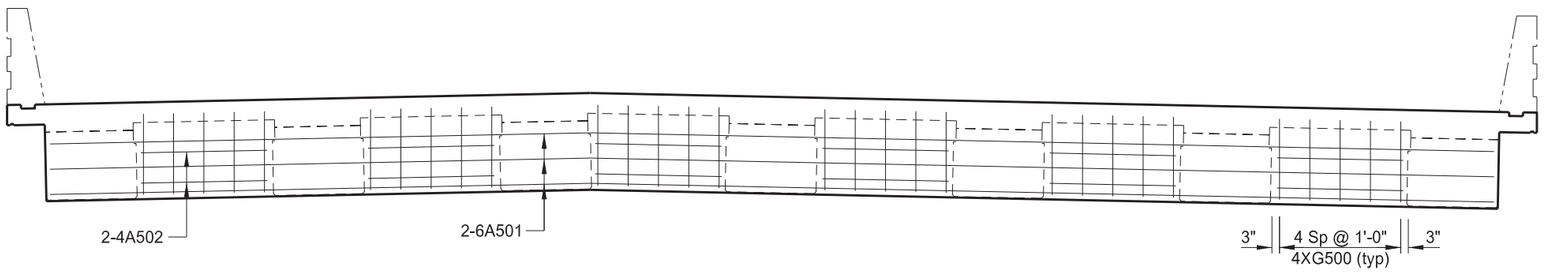
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	32



PLAN



A-A



ELEVATION

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

QUANTITIES

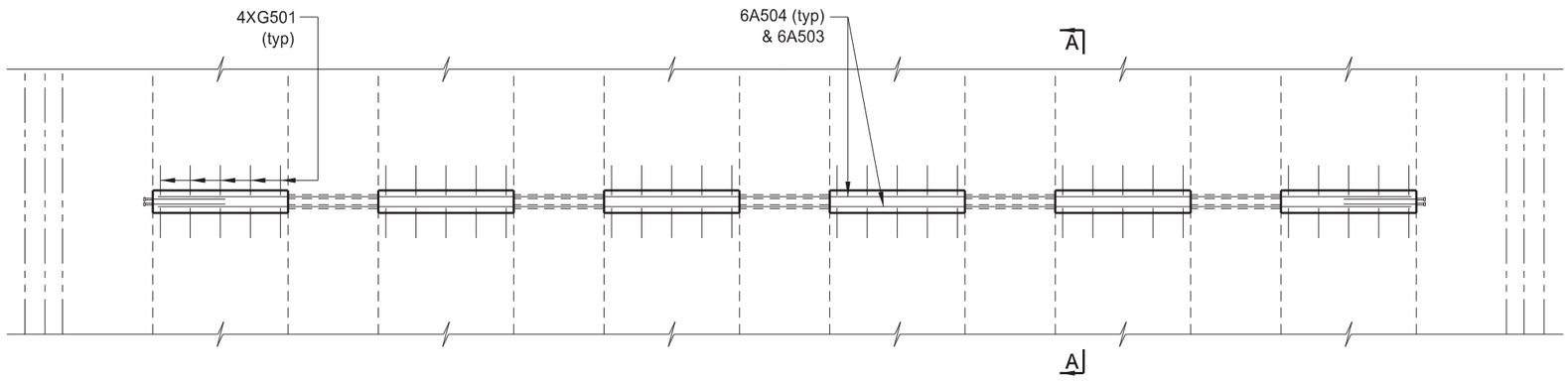
SEE DWG 94-260.131R-20

BNSF RR & SE JAMESTOWN INTERCHANGE

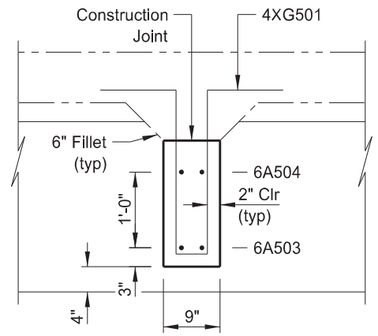
PIER DIAPHRAGM DETAILS

DRAWING NO. 94-260.131R-17

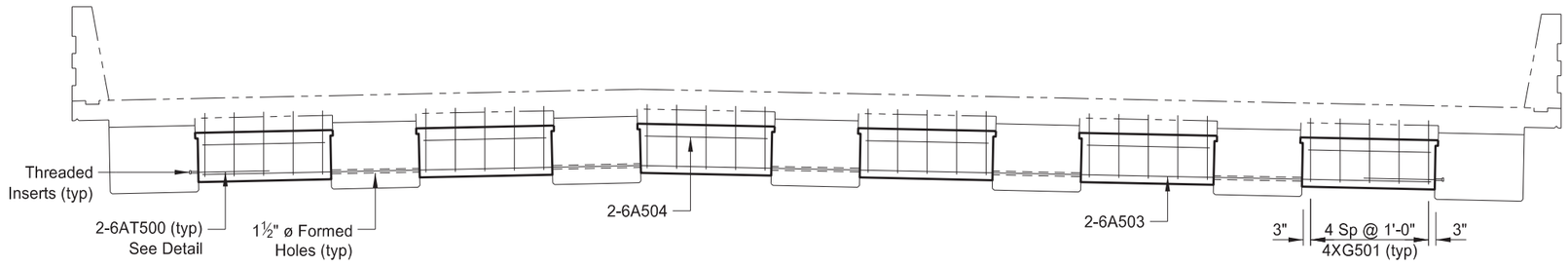
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	33



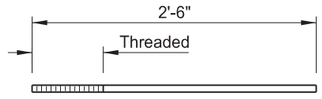
PLAN



A-A



ELEVATION



No. 6 Reinforcing Steel ~ Include
in the Prestressed Beam bid item.

6AT500 DETAIL

QUANTITIES

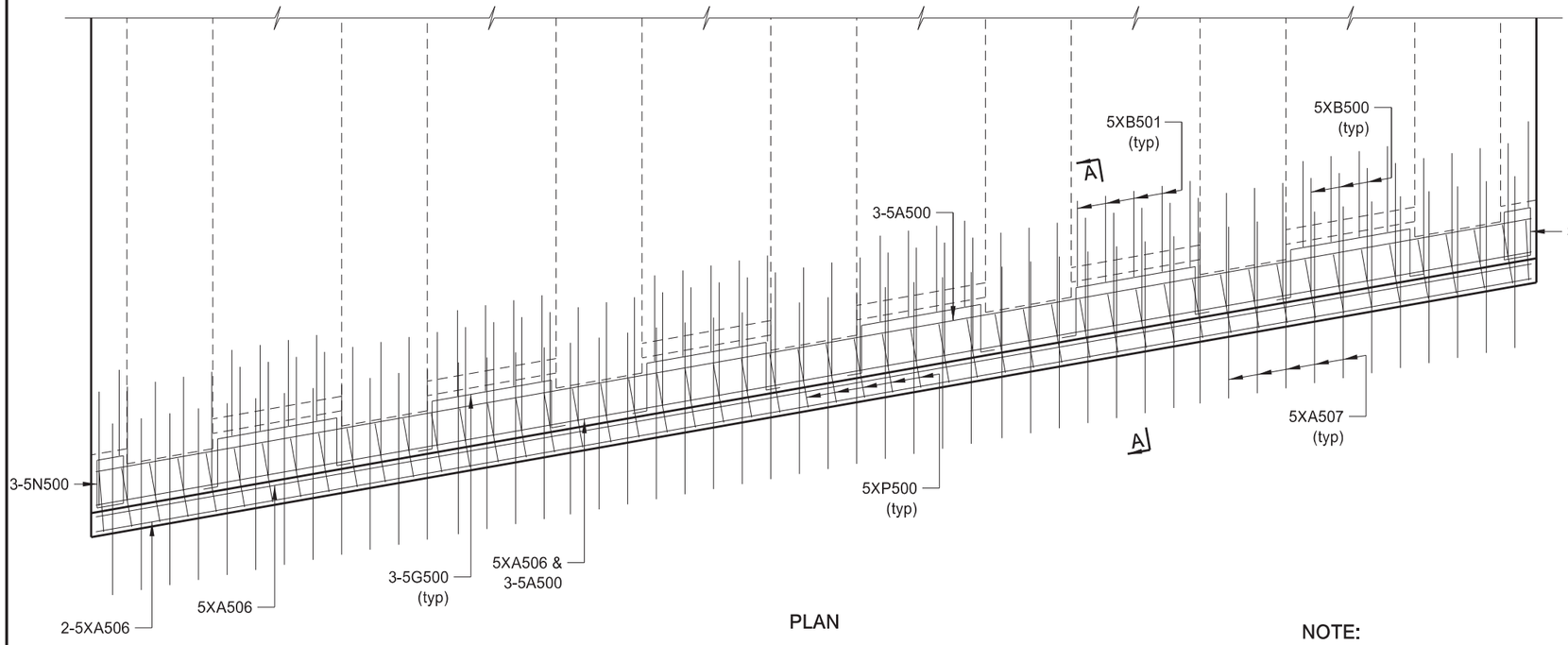
SEE DWG 94-260.131R-20

BNSF RR & SE JAMESTOWN INTERCHANGE

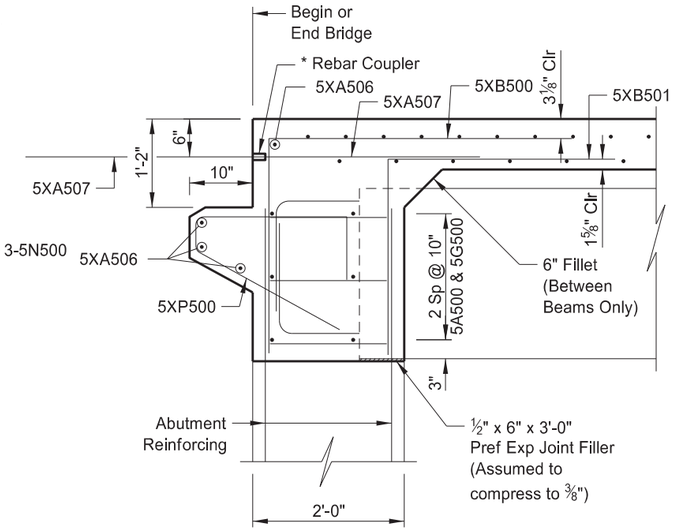
INTERMEDIATE DIAPHRAGM DETAILS

DRAWING NO.	94-260.131R-18

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	34



PLAN

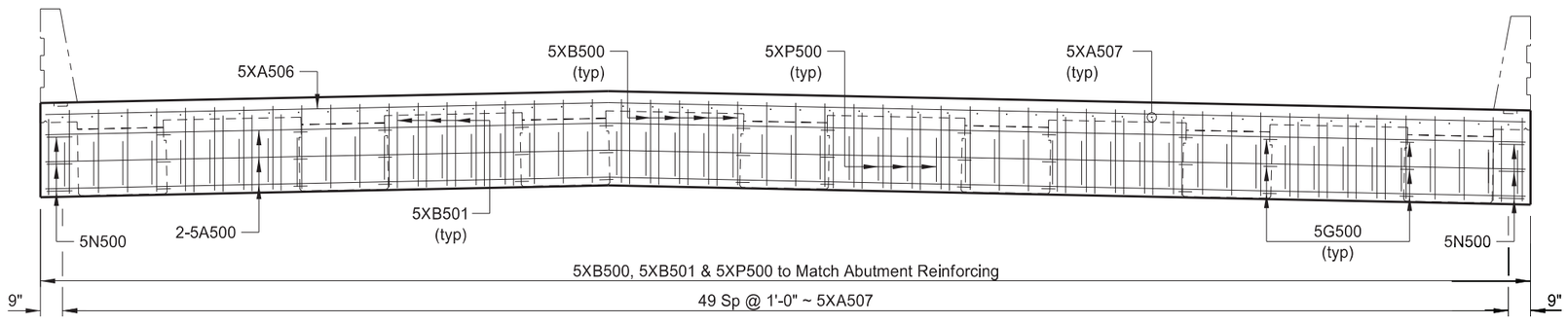


A-A

* 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.

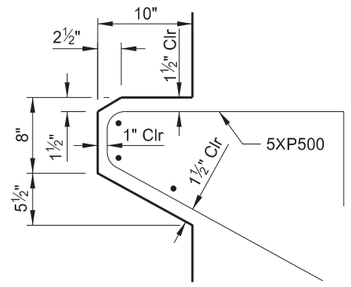
NOTE:

Do not install the 5XA507 bars into the approach slab until all of the foundation fill is in place.



(APPROACH LIP NOT SHOWN)

ELEVATION



APPROACH LIP DETAIL

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

QUANTITIES

SEE DWG 94-260.131R-20

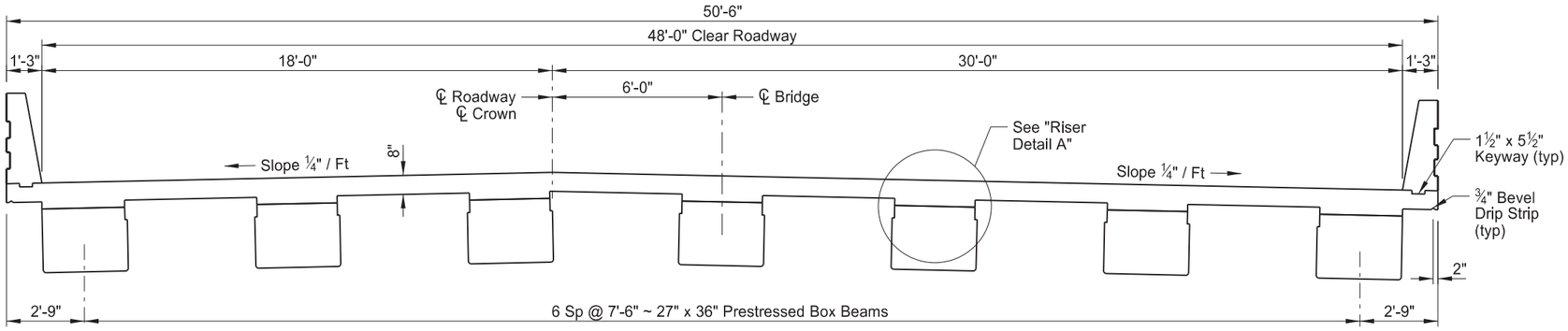
BNSF RR & SE JAMESTOWN INTERCHANGE

ENDWALL DETAILS

DRAWING NO.	94-260.131R-19

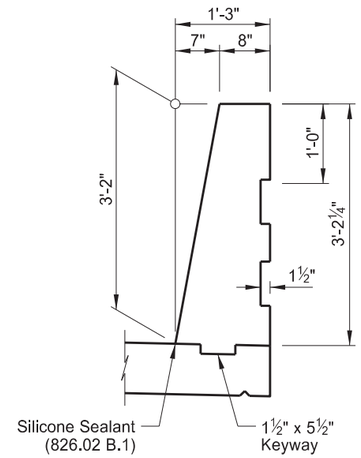
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	35

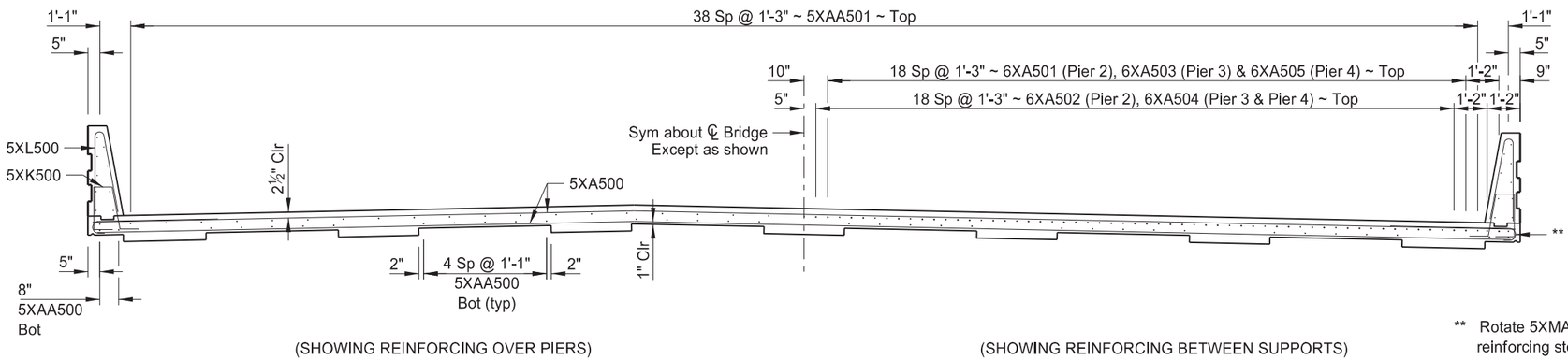


(SHOWING DIMENSIONS)

SLAB SECTION



SHOWING DIMENSIONS

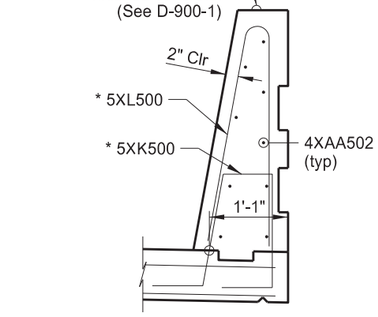


(SHOWING REINFORCING OVER PIERS)

(SHOWING REINFORCING BETWEEN SUPPORTS)

SLAB SECTION

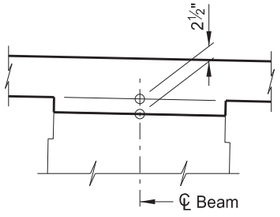
** Rotate 5XMA500 reinforcing steel to provide 1" clear from hook to bottom of slab.



* Provide a 2" clearance from the front face to the barrier reinforcing.

SHOWING REINFORCING

BARRIER DETAIL



RISER DETAIL A

The 2½" dimension shown is located at the supports. The anticipated midspan riser is 1¾" for Span 1, 3 & 4 and 1⅛" for Span 2. Adjust the riser to maintain the 8" slab thickness.

QUANTITIES	
CLASS AAE-3 CONCRETE	450.1 CY
REINFORCING STEEL	3,333 LBS
REINFORCING STEEL (EPOXY)	81,281 LBS

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

BNSF RR & SE JAMESTOWN INTERCHANGE

SLAB SECTION

DRAWING NO. 94-260.131R-20

10/2/2023 3:30:40 PM jrensch R:\project\20094260.194\bridge\dgn\94-260.131R\170BR_035_SLABSEC.dgn ATC JRR

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(194)260	170	36

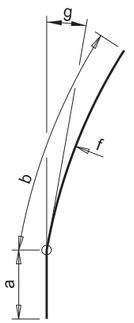
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
ABUTMENTS	7	A100	32	11'- 3"		11'- 3"							
	5	A101	8	9'- 5"		9'- 5"							
	5	A102	8	6'- 11"		6'- 11"							
	5	A103	8	4'- 5"		4'- 5"							
	5	C100	56	16'- 2"		7'- 3"	1'- 8"	7'- 3"					
	5	C101	48	13'- 8"		4'- 9"	1'- 8"	7'- 3"					
	5	C102	4	17'- 8"		8'- 0"	1'- 8"	8'- 0"					
	5	C103	104	4'- 2"		1'- 3"	1'- 8"	1'- 3"					
	4	C104	72	2'- 8"		6"	1'- 8"	6"					
	5	D100	8	12'- 2"		1'- 10"	10'- 4"					12	4
	5	AA100	20	75'- 4"		50'- 0"	3'- 0"	25'- 4"	1		72'- 4"		
	6	AA101	4	75'- 4"		50'- 0"	3'- 0"	25'- 4"	1		72'- 4"		
	5	SC100	2	136'- 4"	8"	4'- 9"	7'- 9"	1'- 7"	9				
	5	SC101	2	132'- 11"	8"	4'- 7"	7'- 7"	1'- 7"	9				

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
PIERS	5	A200	42	32'- 8"		32'- 8"							
	5	A201	6	32'- 6"		32'- 6"							
	5	A202	6	32'- 10"		32'- 10"							
	5	A203	6	33'- 2"		33'- 2"							
	5	A204	6	33'- 8"		33'- 8"							
	5	A205	6	34'- 2"		34'- 2"							
	5	A206	6	34'- 9"		34'- 9"							
	5	A207	6	35'- 5"		35'- 5"							
	5	A208	6	36'- 1"		36'- 1"							
	5	A209	6	36'- 11"		36'- 11"							
	5	A210	6	37'- 10"		37'- 10"							
	5	A211	6	38'- 10"		38'- 10"							
	5	A212	6	39'- 11"		39'- 11"							
	5	A213	6	41'- 2"		41'- 2"							
	5	A214	6	42'- 5"		42'- 5"							
	5	A215	6	43'- 10"		43'- 10"							
	5	A216	6	45'- 5"		45'- 5"							
	5	A217	6	47'- 1"		47'- 1"							
	5	A218	6	49'- 0"		49'- 0"							
	5	A219	18	50'- 8"		50'- 8"							
	6	A220	180	27'- 2"		27'- 2"							
	6	A221	12	18'- 7"		18'- 7"							
	6	A222	12	14'- 11"		14'- 11"							
	6	A223	12	12'- 6"		12'- 6"							
	6	A224	12	10'- 6"		10'- 6"							
	6	A225	12	8'- 10"		8'- 10"							
	6	A226	12	7'- 5"		7'- 5"							
	6	A227	12	6'- 1"		6'- 1"							
	6	A228	12	4'- 11"		4'- 11"							
	6	A229	12	3'- 11"		3'- 11"							
	8	A230	12	50'- 8"		50'- 8"							
	5	C200	174	6'- 6"		2'- 3"	2'- 0"	2'- 3"					
	5	C201	264	6'- 4"		2'- 3"	1'- 10"	2'- 3"					
	4	C202	576	3'- 0"		6"	2'- 0"	6"					
	6	BR200	24	27'- 2"	6'- 8"	20'- 6"				30'	7°		

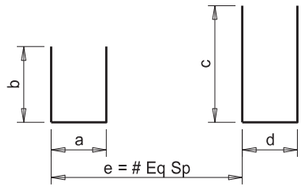
23 U.S.C. § 407 Documents
NDDOT Reserves All Objections

NOTES:

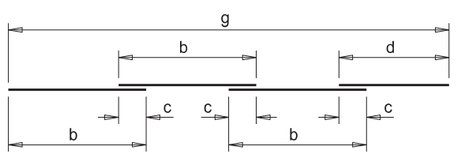
1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length 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.



BR

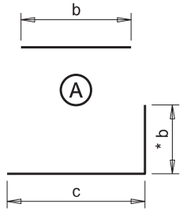


SC



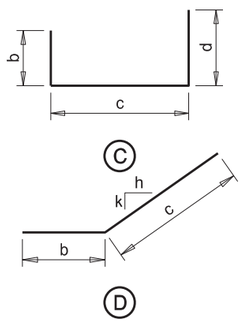
c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d

AA

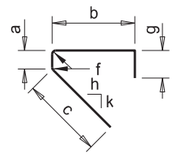


B

* b = Vertical Leg for XB500 and XB501



C D



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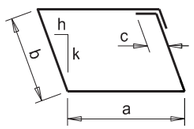


N

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

BNSF RR & SE JAMESTOWN INTERCHANGE

REINFORCING BAR LIST & DETAILS

DRAWING NO. 94-260.131R-21

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

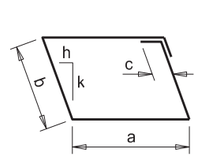
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
SUPERSTRUCTURE	5	A500	12	50'- 11"		50'- 11"							
REGULAR	6	A501	18	48'- 4"		48'- 4"							
	4	A502	72	4'- 2"		4'- 2"							
	6	A503	8	41'- 8"		41'- 8"							
	6	A504	48	4'- 2"		4'- 2"							
	5	G500	36	8'- 4"	1'- 7"	4'- 2"	1'- 7"	6"				12	2.1
	5	N500	12	6'- 0"	1'- 7"	11"	6"					2.1	12
SUPERSTRUCTURE	5	XA500	608	50'- 2"		50'- 2"							
EPOXY	6	XA501	40	39'- 6"		39'- 6"							
	6	XA502	40	17'- 0"		17'- 0"							
	6	XA503	40	36'- 6"		36'- 6"							
	6	XA504	80	14'- 0"		14'- 0"							
	6	XA505	40	33'- 0"		33'- 0"							
	5	XA506	8	50'- 11"		50'- 11"							
	5	XA507	200	3'- 0"		3'- 0"							
	5	XB500	104	6'- 10"		2'- 10"	4'- 0"						
	5	XB501	58	5'- 7"		2'- 7"	3'- 0"						
	4	XG500	90	9'- 4"	2'- 7"	2'- 2"	2'- 7"	1'- 0"				12	0
	4	XG501	120	6'- 7"	2'- 1"	5"	2'- 1"	1'- 0"				12	0
	5	XK500	774	4'- 11"	1'- 6"	7"			10"		8"	2.2	12
	5	XL500	774	5'- 11"	9"	2'- 9"	5"			1.25"		2.2	12
	5	XMA500	594	5'- 0"		4'- 5"							
	5	XP500	104	5'- 6"	5"	2'- 1"	2'- 2"			1.25"	10"	12	6.5
	5	XAA500	34	260'- 8"		60'- 0"	3'- 0"	20'- 8"	4		248'- 8"		
	5	XAA501	41	258'- 8"		60'- 0"	2'- 6"	18'- 8"	4		248'- 8"		
	4	XAA502	18	258'- 8"		60'- 0"	2'- 6"	18'- 8"	4		248'- 8"		
	5	XSA500	2	287'- 10"	4'- 10"	47'- 6"			10				
	5	XSA501	2	259'- 7"	4'- 8"	47'- 3"			9				

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	37

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

NOTES:

1. All dimensions are out to out of bars.
2. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
3. Turn adjacent "AA" bars end for end so that the splice locations are staggered.
4. The "f" dimension indicates the inside radius unless otherwise noted.
5. An "X" preceding a bar designation indicates an epoxy coated bar.
6. Verify the quantity, size, and shape of the bar reinforcment 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 unit price.



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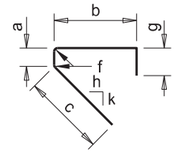
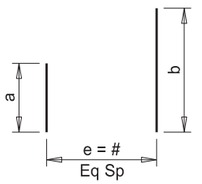


(P)



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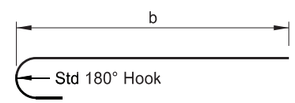

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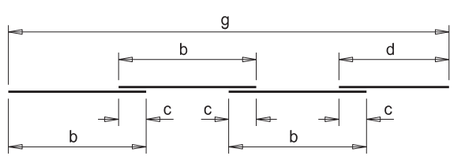
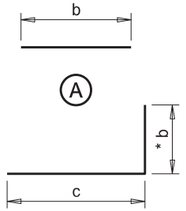
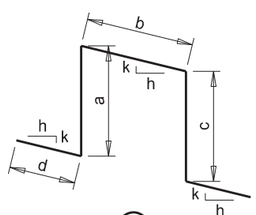


c = Lap Splice (typ)
e = # of "b" Length Pieces in a Set
Total Length per Set = e x b + d
(AA)

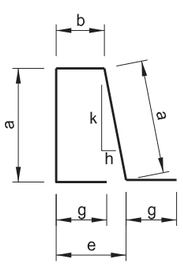


(A) (B)

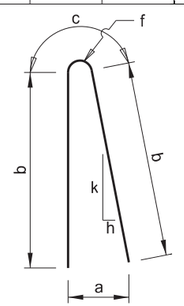
* b = Vertical Leg for XB500 and XB501



(G)



(K)



(L)

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/13/23
NORTH DAKOTA

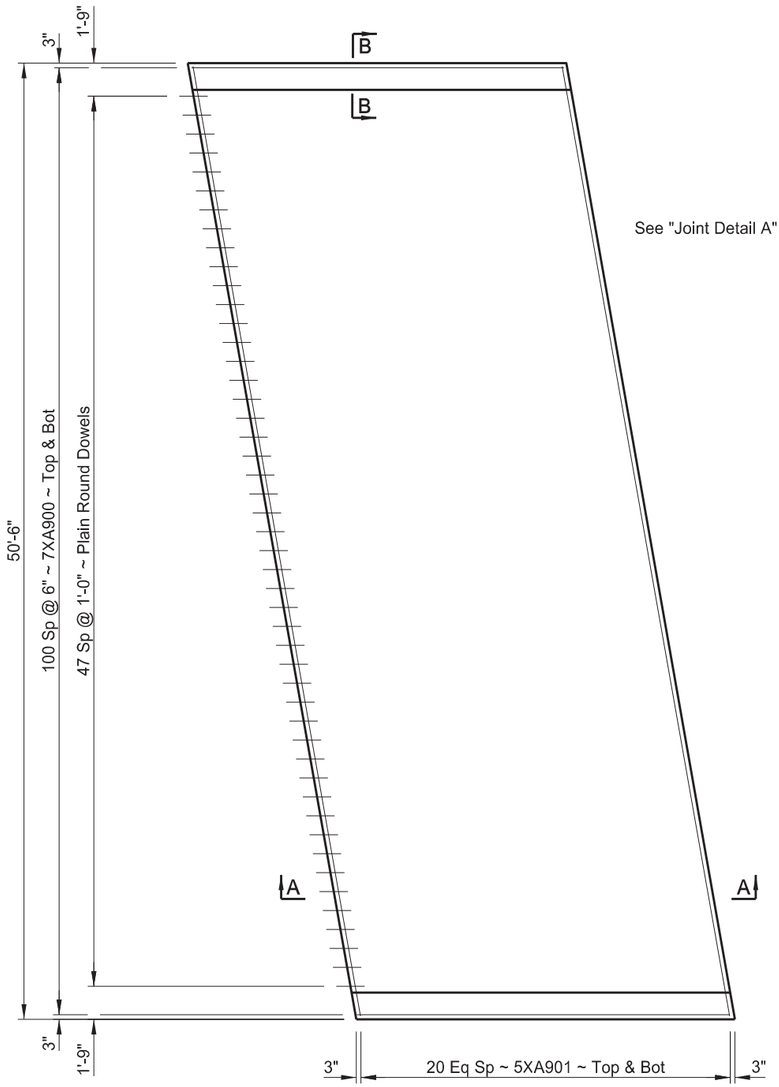
BNSF RR & SE JAMESTOWN INTERCHANGE

REINFORCING BAR LIST & DETAILS

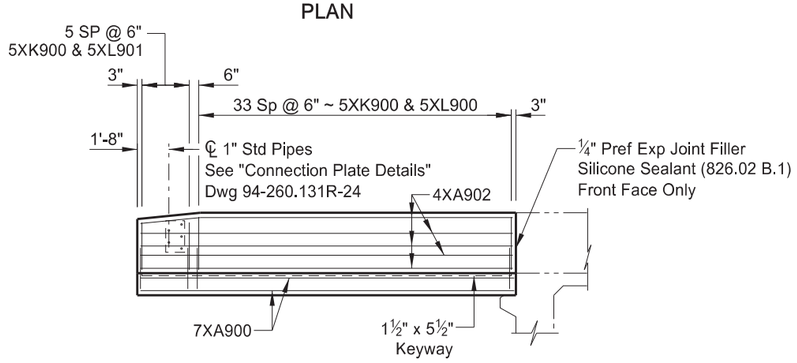
DRAWING NO. 94-260.131R-22

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

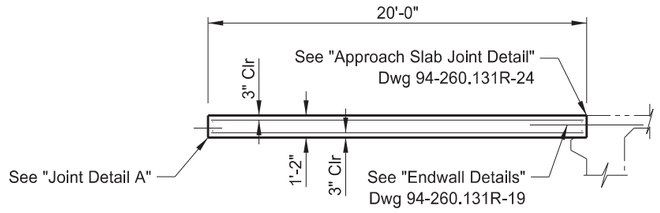
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	170	38



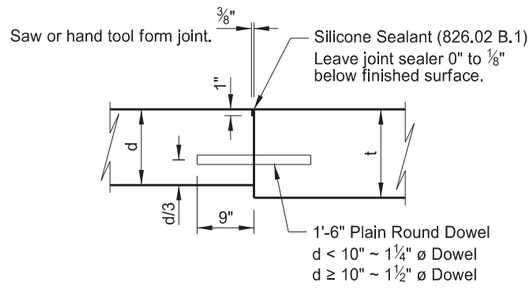
PLAN



ELEVATION

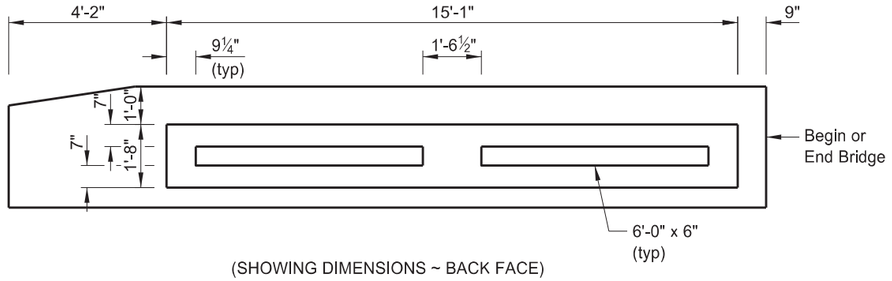


A-A



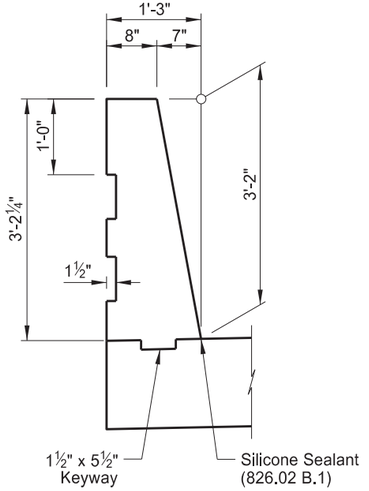
d = Pavement Thickness
t = Approach Slab Thickness

JOINT DETAIL A



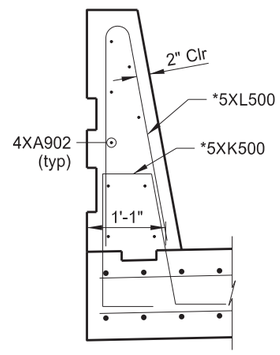
(SHOWING DIMENSIONS ~ BACK FACE)

BARRIER ELEVATION



SHOWING DIMENSIONS

B-B



* Provide a 2" clearance from the front face to the barrier reinforcing.

SHOWING REINFORCING

SKEW ANGLE = 10°			
BAR LIST - ONE END			
SIZE	MARK	NO.	LENGTH
7	A900	202	19'- 8"
5	A901	42	50'- 11"
4	A902	18	19'- 8"
5	XK900	80	5'- 7"
5	XL900	68	5'- 11"
5	XL901	12	5'- 3"

ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
11,538	48.0

NOTES:

See Dwg 94-260.131R-24 for notes and bent bar details.

REGISTERED PROFESSIONAL ENGINEER
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PE-8211
DATE 10/13/23
NORTH DAKOTA

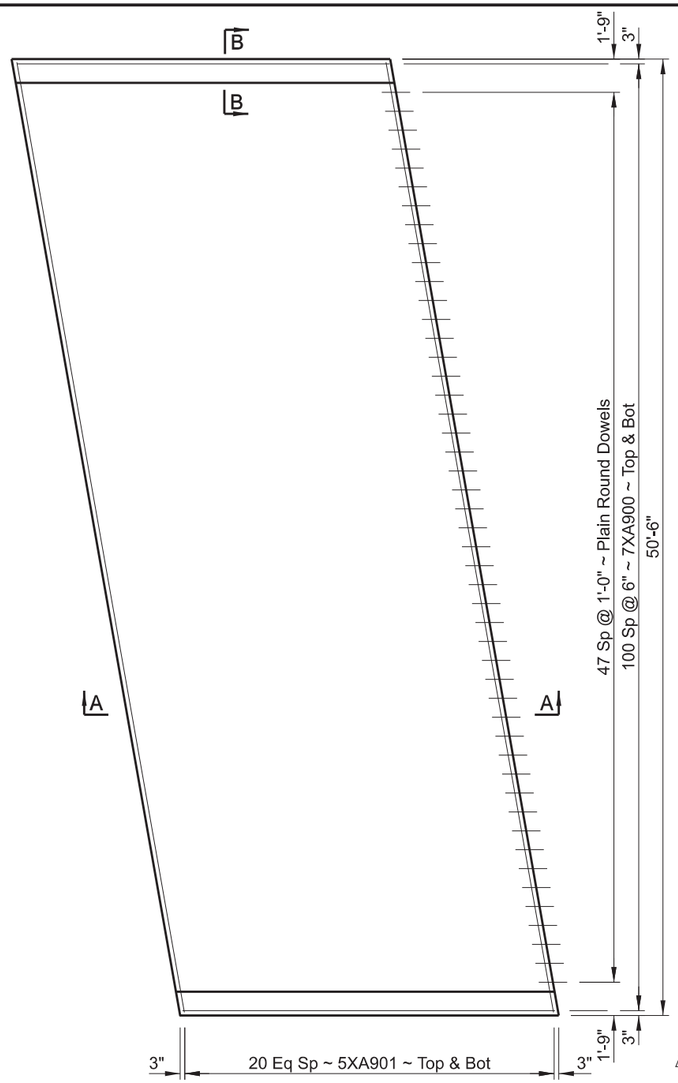
QUANTITIES	(WEST END)
APPROACH SLAB	113.0 SY

BNSF RR & SE JAMESTOWN INTERCHANGE

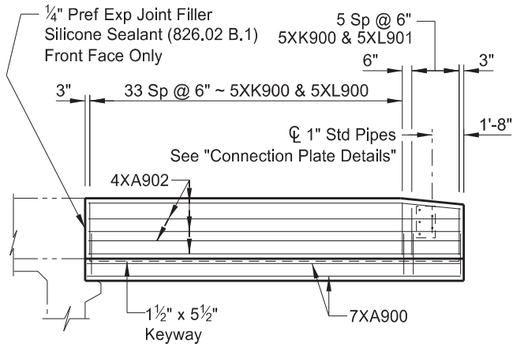
APPROACH SLAB DETAILS

DRAWING NO. 94-260.131R-23

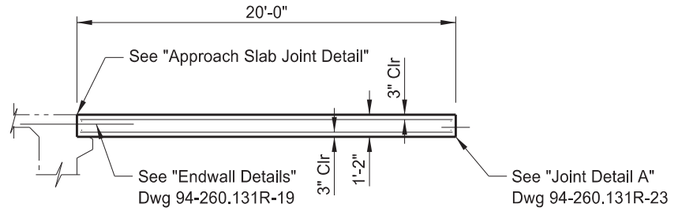
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	170	39



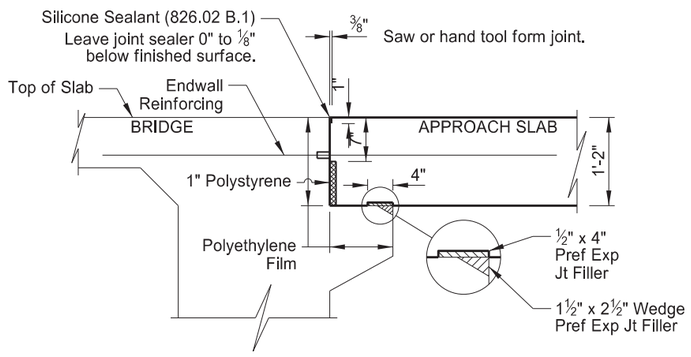
PLAN



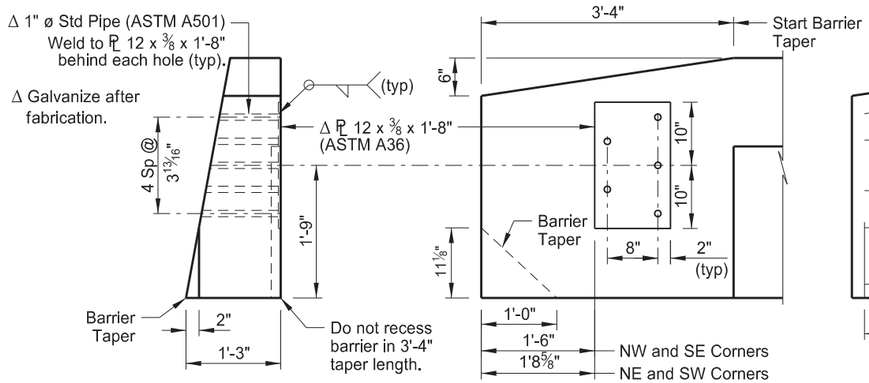
ELEVATION



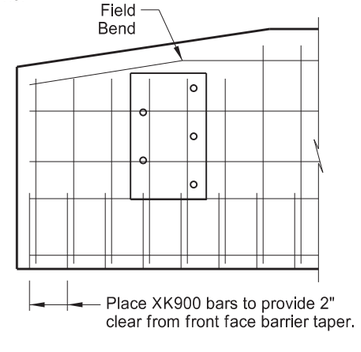
A-A



APPROACH SLAB JOINT DETAIL



SHOWING DIMENSIONS



SHOWING REINFORCING

(SHOWING BACK FACE)

CONNECTION PLATE DETAILS

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 pay item "Concrete Bridge Approach Slab." Use Class AAE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

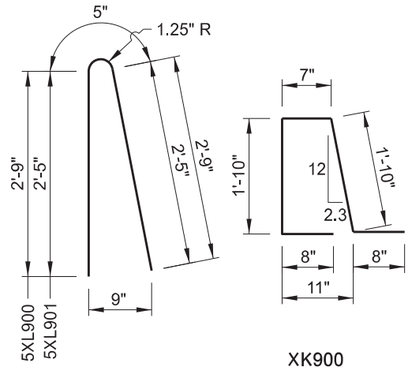
The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out. Radius values shown indicate the inside bend radius.

SKEW ANGLE = 10°			
BAR LIST - ONE END			
SIZE	MARK	NO.	LENGTH
7	A900	202	19'- 8"
5	A901	42	50'- 11"
4	A902	18	19'- 8"
5	XK900	80	5'- 7"
5	XL900	68	5'- 11"
5	XL901	12	5'- 3"

ESTIMATED MATERIAL QUANTITIES	
REINFORCING STEEL (LBS)	CONCRETE (CY)
11,538	48.0

NOTES:

See Dwg 94-260.131R-23 for Section B-B.



BENT BAR DETAILS

QUANTITIES	(EAST END)
APPROACH SLAB	113.0 SY

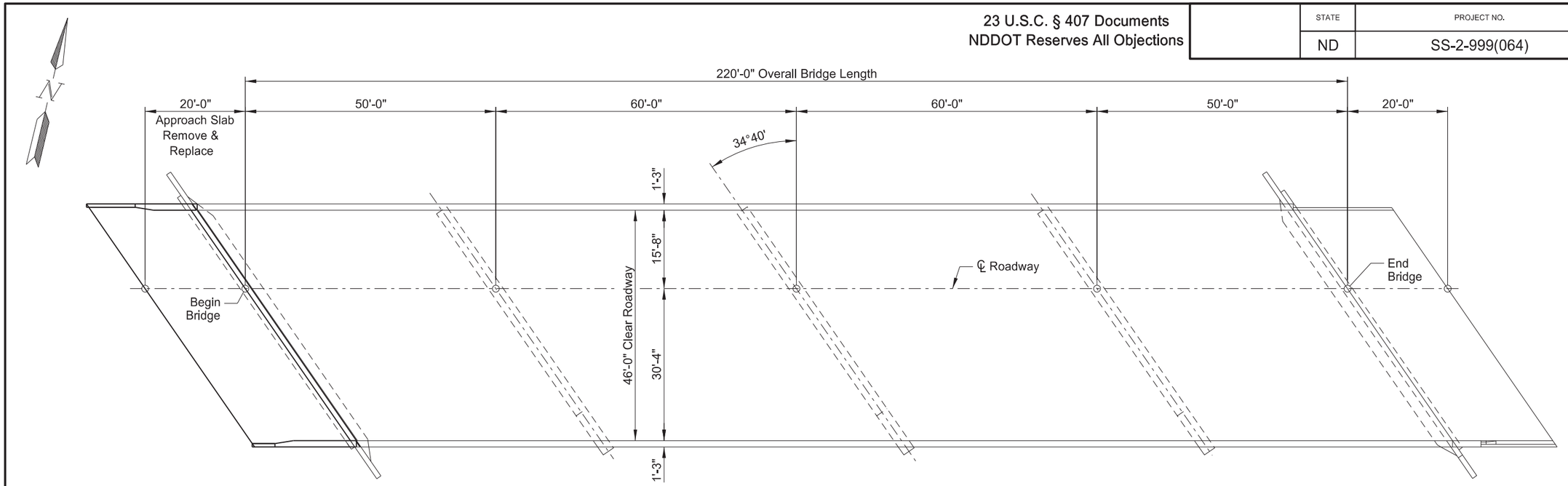
BNSF RR & SE JAMESTOWN INTERCHANGE

(EAST EXIT END)

APPROACH SLAB DETAILS

DRAWING NO.	94-260.131R-24

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	40



PLAN

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
107	0122	RAILWAY PROTECTION INSURANCE - COMPANY B	L SUM	1
107	0142	RAILROAD COORDINATION - COMPANY B	L SUM	1
107	0153	RAILROAD FLAGGING - COMPANY B	L SUM	1
203	0195	EMBANKMENT SPECIAL	L SUM	1
255	0201	TRM TYPE 1	SY	100
602	1135	BRIDGE APPROACH SLAB-REMOVE & REPLACE	SY	107.8
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	1,329
602	1260	BRIDGE DECK CRACK SEALING	LF	700
602	2000	REMOVE AND RESET ANCHOR BOLTS	EA	1
602	7000	SPECIAL SURFACE FINISH	SF	3,168
650	0805	DECK SPALL REPAIR	SF	95
910	0565	CONTROLLED DENSITY BACKFILL	CY	2.5
930	9505	BRIDGE REPAIR-BEARING	L SUM	1
930	9612	SPALL REPAIR	SF	42
950	8673	EXPANSION JOINT MODIFICATION	LF	61.7

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/11/23
NORTH DAKOTA

SPECIAL PROVISIONS	
SSP 2	MIGRATORY BIRD TREATY ACT
SP 239(23)	RAILROAD REQUIREMENTS

RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

BRIDGE LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Jason Thorenson
10/12/23

DRAWING NO.	94-260.304R-1

10/2/2023 3:23:03 PM jrensch R:\project\20999000.064\Bridge\dgn\94-260.304R\170BR_040_BRLO.dgn

EAJ DWW

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-2-999(064)	170	41

NOTES

100 SCOPE OF WORK: Work at this site consists of removing and replacing the west approach slab, deck spall repairs, spall repairs to substructures, repair and reset bearings, erosion repair, and expansion joint modification.

203 EMBANKMENT SPECIAL: Place imported topsoil meeting Section 203.04 D.3 to repair areas of erosion at the west and east abutments.

At the west abutment, erosion has occurred behind the SW wingwall and beneath the south end of the abutment. After the void beneath the abutment is filled with controlled density backfill, place and compact the topsoil in layers not to exceed 12 inches. It is estimated that less than 15 CY of imported topsoil will be required for the repairs at the west abutment.

At the east abutment, an erosion trench has formed near the north end of the abutment. Place topsoil to fill the erosion trench and compact the topsoil in layers not to exceed 12 inches. It is estimated that less than 5 CY of imported topsoil will be required for the repairs at the east abutment. Install a waterproof membrane per Section 602.03 B on the back face of the east abutment at the vertical joint between the bridge deck and the NE wingwall. Excavate to a depth of 2'-0" to install the membrane, backfill, and seed per Note 255 TRM TYPE 1.

Include all labor, equipment, and material to repair the slope erosion at the abutments and install the joint waterproofing at the east abutment in the bid item "Embankment Special."

255 TRM TYPE 1: After placing imported topsoil at the abutments, seed the topsoil with Class II seed mixture meeting Section 251.03 D. Prior to seeding, loosen the soil by means of a hand rake or drag. Place seed by broadcasting the area at a rate of 0.06 pounds per SY. After seeding, rake the area loosely to cover the seed. Install TRM Type 1 over the repaired embankment. Do not trench the sides of the TRM. Include all labor, equipment, and material to seed and install the TRM in the bid item "TRM Type 1."

602 REMOVE AND RESET ANCHOR BOLTS: Remove and reset loose anchor bolts at the locations below. Remove any debris from anchor bolts and anchor bolt holes being reset. Embed the anchor bolts into concrete using a chemical adhesive system in accordance with Section 806.02, Epoxy Resin Adhesives. Install in accordance with manufacturer's recommendations.

Location: Pier 2, South Bearing – 1 bolt

Include all costs for labor, materials, and equipment to complete this work in the unit price bid for "Remove and Reset Anchor Bolts."

602 SPECIAL SURFACE FINISH: Apply TexCote XL 70 BridgeCote with Silane to the exposed outside edges of the bridge deck, and to all surfaces of the new and existing barriers on the bridge deck and approach slabs. Use gray surface finish color 36424 meeting AMS-STD-595 with a medium textured finish.

Prior to applying the TexCote surface finish, remove the existing surface finish, seal cracks in the new and existing barriers, and prep the surfaces in accordance with the Manufacturer's recommendations.

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

If water washing equipment is used for cleaning, provide either a water pressure washer with 160°F water at 1,800 psi minimum nozzle pressure or a cold water pressure washer at 3,000 psi minimum nozzle pressure.

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

650 DECK SPALL REPAIR: The bridge deck has surface spall areas. Construct the deck spall repair as a Bridge Deck Overlay meeting Section 650 with the exception that a mobile mixer will not be required. Include the area of bridge deck repair adjacent to the expansion joint at the west abutment in the quantity and work required for "Deck Spall Repair". The actual limits of the surface spall area to be repaired will be determined by the Engineer in the field by sounding.

Saw cut the perimeter of the repair area to a depth of 1". Remove all concrete to a minimum depth of 2" or to sound concrete, whichever is greater. Include the saw cutting and all material, labor and equipment required to remove the concrete and repair the bridge deck and/or approach slab spall areas in the bid item "Deck Spall Repair."

910 CONTROLLED DENSITY BACKFILL: Fill the voids beneath the west abutment footing, and around the piling, using a controlled density backfill consisting of cement, water, fly ash, and aggregate at the ratio specified below. The mix design yields approximately one cubic yard of flowable mortar.

MIX DESIGN

Material	Weight (lbs)
Cement	70
Fly Ash	125
Fine Aggregate	2600
Water	416.5

Include all labor, materials, and equipment to fill the void beneath the abutment in the bid item "Controlled Density Backfill."

REGISTERED PROFESSIONAL ENGINEER
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PE-8211
DATE 10/11/23
NORTH DAKOTA

NOTES

930 BRIDGE REPAIR - BEARINGS: Complete repairs to 20 bridge bearings at the locations noted below. Bearings at each of the substructures are numbered sequentially, starting with Bearing 1 located beneath the north exterior girder line.

West Abutment – Bearings 1 thru 5
Pier 2 – Bearings 1 thru 5
Pier 3 – Bearings 1 thru 5
Pier 4 – Bearings 1 thru 5

Remove the existing bearings by lifting and temporarily supporting the existing superstructure at each of the substructure locations noted. Lift the superstructure at only one substructure unit at a time. Lift all beams simultaneously, in a manner that prevents damage to any parts of the structure to remain.

Remove the sole plates, pins, and rockers at the designated locations. Do not remove the anchor bolts, masonry plates, pintles, or keeper plates fastened to the masonry plates. The sole plates for Bearings 1 thru 4 are fastened to the bottom girder flange using cap screws. The sole plates for Bearing 5 are welded to the bottom girder flange at each location. Remove all sole plates in a manner that prevents damage to the bottom flange of the girder and will permit the sole plate to be re-welded to the bottom flange. Remove portions of the concrete diaphragms at the piers, as designated in the plans, to facilitate removal and reinstallation of the sole plates.

Clean the sole plates, pins and rockers after removal. Clean all rust from the pins and the cradles in contact with the pins and grease the pins with an all-purpose lithium grease prior to reinstalling the bearings. Reinstall the bearings in a vertical position beneath each girder line and weld the sole plate to the bottom girder flange as designated in the plans. Replace the concrete removed from the pier diaphragms with new Class AE-3 concrete. Sand blast clean the existing concrete and exposed reinforcing steel prior to placing the new concrete.

Clean in-place the masonry plates, anchor bolts, pintles and keeper plates prior to reinstalling the bearings. Clean all dirt and debris from the concrete pier caps and abutment bearing seats and pressure wash the surfaces with water.

Include all costs for labor, equipment, and materials to complete this work in the lump sum price bid for “Bridge Repair - Bearing”.

930 SPALL REPAIR: The structure has areas of spalling and concrete deterioration as indicated in the “Spall Repair” table below.

Remove all unsound concrete and replace it to the original constructed section. Use a 15 pound maximum size chipping hammer on any unsound concrete. Remove concrete around the periphery of any exposed reinforcing steel to provide a minimum clearance behind the bar of ¼“ plus or minus the dimension of the maximum size aggregate of the repair material. Provide sharp, neat lines at least 1 inch deep at the edges of the repair areas. Produce these sharp, neat lines by saw cutting or other means approved by the Engineer.

Sand blast clean the existing concrete and exposed reinforcing steel. Repair any damaged epoxy coating on the reinforcing steel with a patching material that meets ASTM A775 and ASTM D3963. Clean the existing concrete surface by high pressure water blasting.

Replace removed concrete with a two component, polymer-modified, cementitious repair mortar material that is specifically intended for patching concrete and contains a corrosion inhibitor. This patching material may be SikaTop 123 Plus (Sika Corporation), Duraltop Gel (Euclid Chemical Company), MasterEmaco N 400 (BASF Corporation), or an approved equal repair mortar. Place and cure the material as recommended by the manufacturer.

The extents of repairs as shown in the “Spall Repair” table are approximations. The actual limits and number of repair locations are to be determined by the Engineer in the field. See supplemental data for photos.

Include all labor, equipment and materials needed to repair the spall areas in the bid item “Spall Repair.”

SPALL REPAIR		
PICTURE	LOCATION	QUANTITY (SF)
#1	West Abutment Bearing Seat	30.0
#2	West Abutment Backwall	4.0
#3	East Abutment Bearing Seat	3.0
#4	East Abutment Backwall	1.0
#5	Back Face Barrier – SW Corner	3.0
#6	Pier 3 – Column 1	1.0

930 CRACK SEALING: After the penetrating water repellent has been applied and is dry, the Engineer will perform a visual inspection of the items listed below to determine the need for crack sealing. Mark and repair all visible cracks appearing on the top surface 0.007" or greater in width at its 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 limits of crack, including those portions that are narrower than 0.007" 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 following items in the price bid for “Bridge Deck Crack Sealing:”

- Bridge Deck

The material, labor and equipment required to crack seal the following items are incidental to other bid items:

- West Approach Slab

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NOTES

950 EXPANSION JOINT MODIFICATION: Remove the existing expansion joint and concrete abutment end block as detailed in the plans. Construct a new concrete abutment end block and install a polyurethane foam joint seal. Use a pre-compressed polymer impregnated polyurethane foam expansion joint seal coated with a highway-grade silicone surface providing a permanent weather tight seal. Use a compatible two-component epoxy adhesive on the expansion joint seal for bonding.

The joint seal may be Wabo FS Bridge Seal (Watson Bowman Acme); BEJS Bridge Expansion Joint System (Emseal); Iso-Flex Silfast XL (LymTal International), or an approved equal. Prepare the joint opening and install the joint seal according to the manufacturer's recommendations. The quantity of expansion joint modification includes the full length of the end block to be repaired. Provide a joint seal the full length of the clear roadway width between barriers, plus an additional 6 inches of joint seal at each end to be turned up vertically matching the inside face of the barrier. Include all to labor, materials and equipment needed to remove and reconstruct the concrete end block, and to install the polyurethane foam joint seal, in the unit price bid for “Expansion Joint Modification.”

REGISTERED PROFESSIONAL ENGINEER
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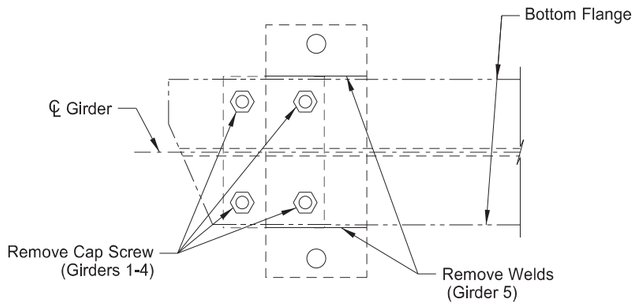
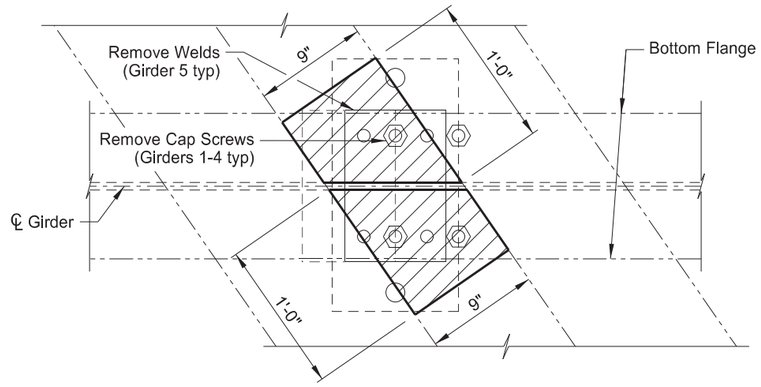
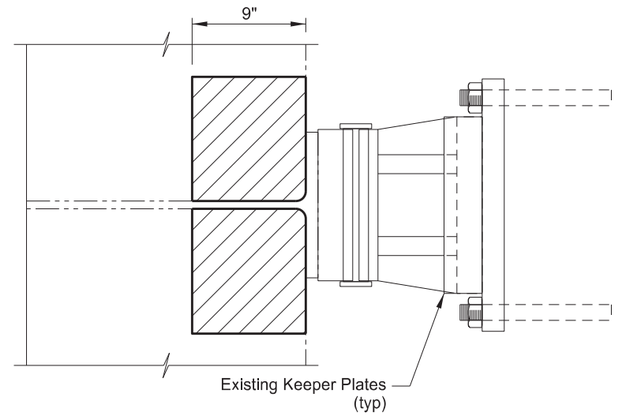


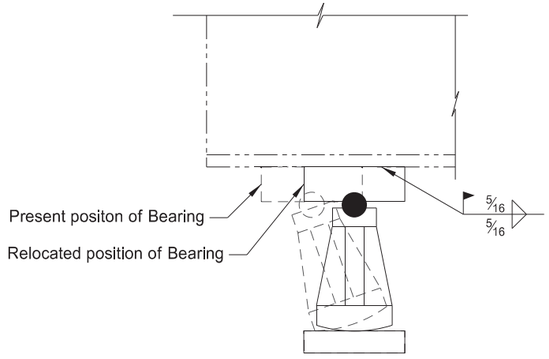
ABUTMENT 1 PLAN



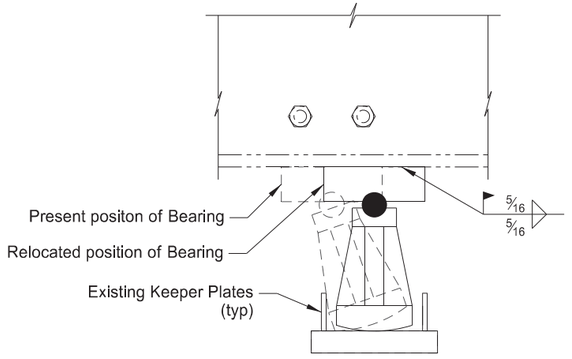
PIER 2-4 PLAN



PIER ELEVATION



ABUTMENT BEARING RELOCATION DETAIL



PIER BEARING RELOCATION DETAIL

NOTE

Bearings beneath girder lines 1-4 are bolted to the bottom flange with cap screws as shown. Remove the cap screws and reposition the bearings to a plumb position. Bearings beneath girder line 5 are welded to bottom of flange. Remove the existing welds in a manner that does not damage the bottom flange and reposition the bearings to a plumb position. Weld the sole plates to the bottom flanges of all girders after they have been reset.

Hatched area indicates pier diaphragm concrete to be removed and replaced to remove cap screws and reposition bearings. All existing reinforcment in the diaphragms is to remain in place.

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DATE 10/11/23
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QUANTITIES	
BRIDGE REPAIR - BEARING	1 LSUM

RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

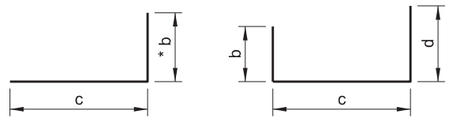
BEARING DETAILS

DRAWING NO.	94-260.304R-5

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS								
					a	b	c	d	e	f	g	h	k
ENDWALL	4	XB500	62	4'- 0"		6"	3'- 6"						
	4	XC500	62	2'- 7"		1'- 0"	7"	1'- 0"					
	4	XAA500	4	64'- 0"		40'- 0"	2'- 8"	24'- 0"	1		61'- 4"		



(B) (C)

* b = Vertical Leg for XB500

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

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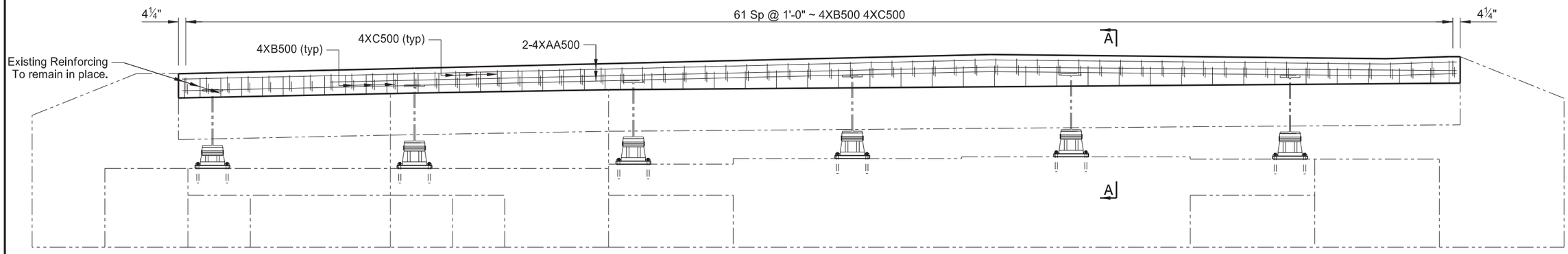
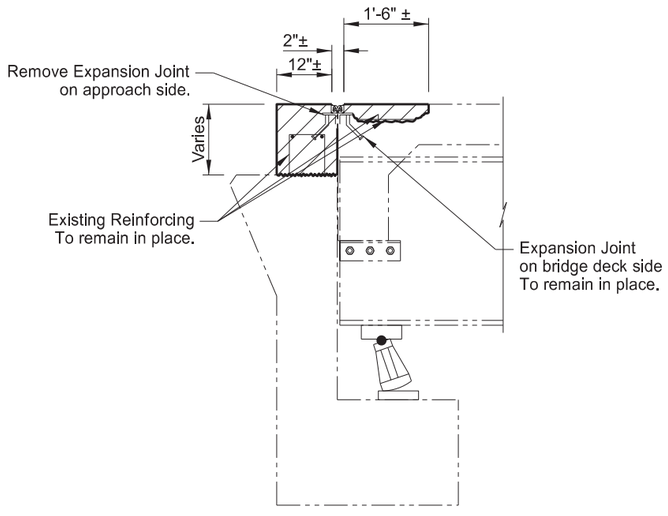
NOTES:

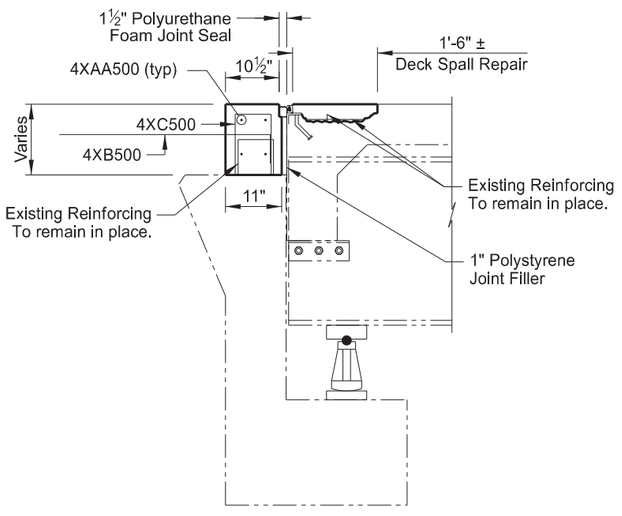
1. Verify the quantity, size, and shape of the bar reinforcement against the structure drawings and immediately notify the Engineer of any discrepancies. Discrepancies in the bar list will not be cause for adjustment of the contract unit price.
2. All dimensions are out to out of bars.
3. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
4. An "X" preceding a bar designation indicates an epoxy coated bar.



ENDWALL ELEVATION



(SHOWING EXISTING)
A-A



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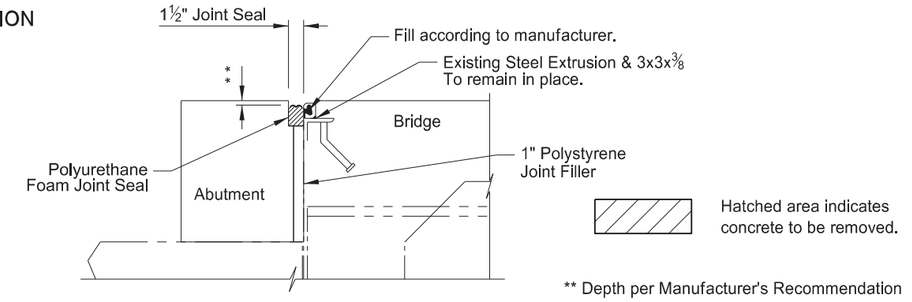
A-A



POLYURETHANE FOAM JOINT SEAL

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/11/23
NORTH DAKOTA

QUANTITIES	
EXPANSION JOINT MODIFICATION	61.7 LF

RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

ENDWALL DETAILS

DRAWING NO. 94-260.304R-6

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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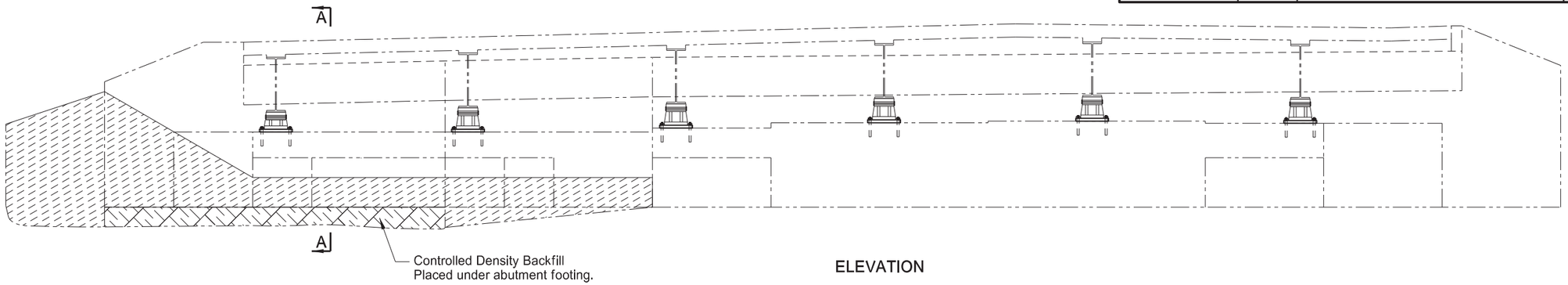
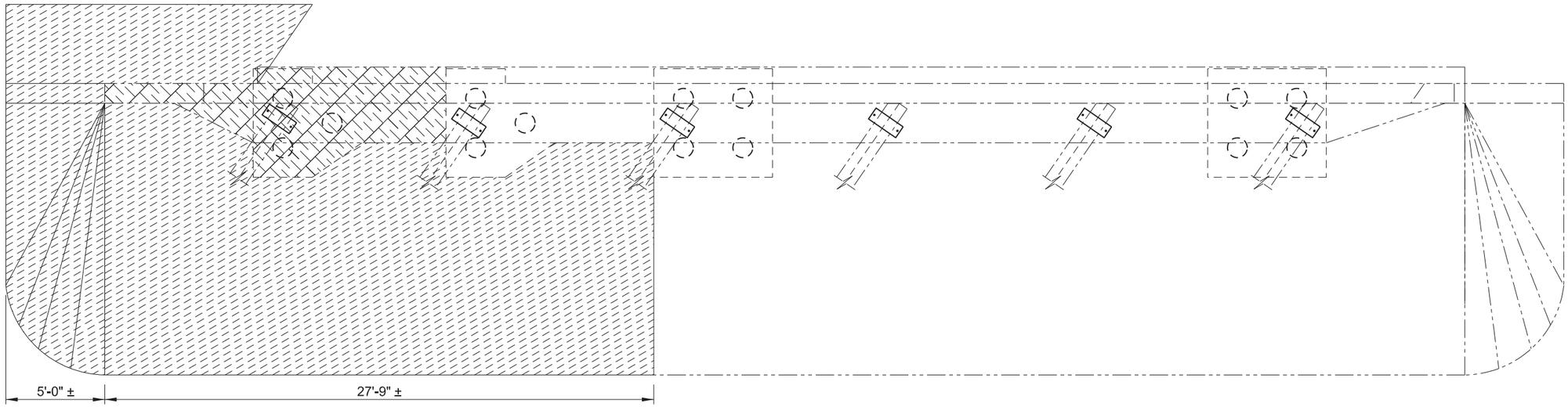
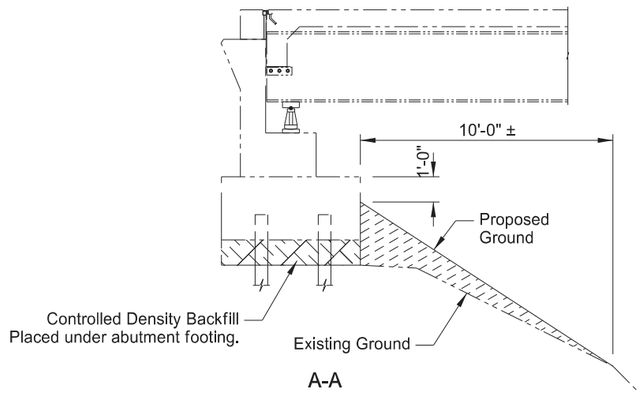


ELEVATION



PLAN



A-A

Embankment Special &
TRM Type 1

Controlled Density Backfill

QUANTITIES	
EMBANKMENT SPECIAL	0.75 L SUM
TRM TYPE 1	50 SY
CONTROLLED DENSITY BACKFILL	2.5 CY

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RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

WEST ABUTMENT SLOPE REPAIR

DRAWING NO. 94-260.304R-7

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EAJ DWW

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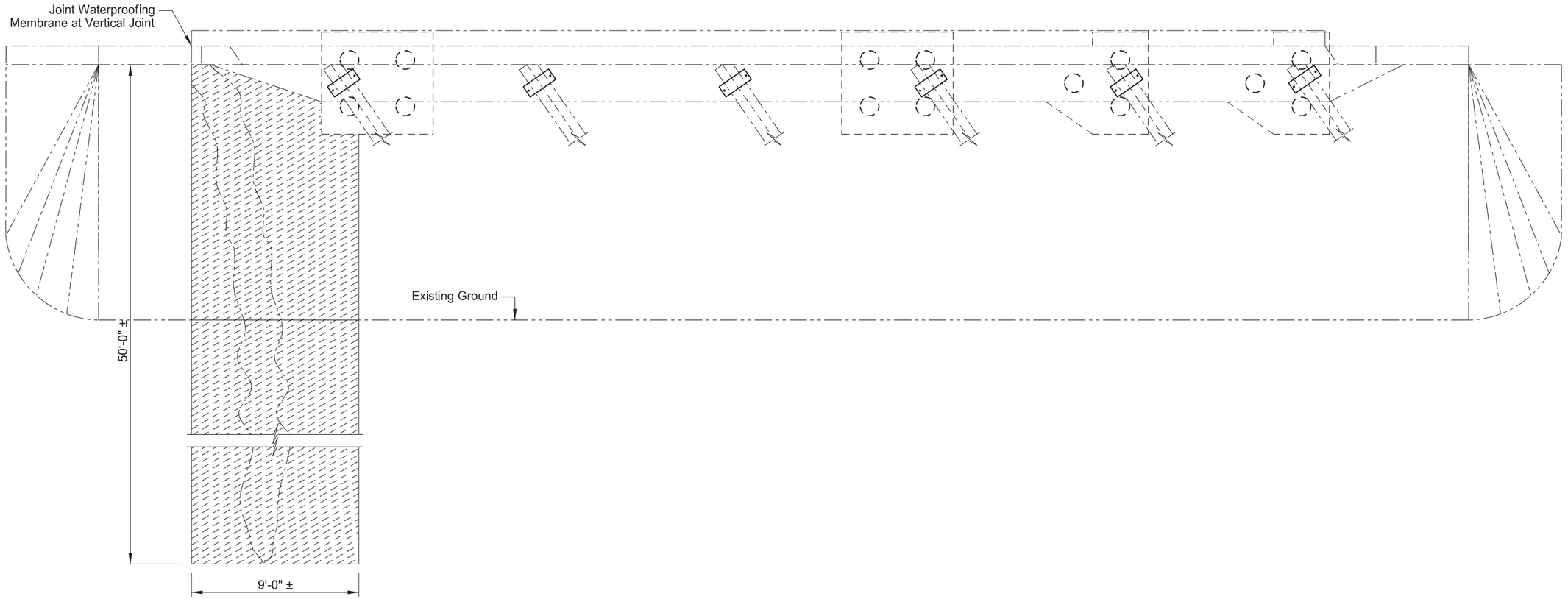

PLAN

Embankment Special &
TRM Type 1

QUANTITIES	
EMBANKMENT SPECIAL	0.25 L SUM
TRM TYPE 1	50 SY

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/11/23
NORTH DAKOTA

RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

EAST ABUTMENT SLOPE REPAIR

DRAWING NO. 94-260.304R-8

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EAJ DWW

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

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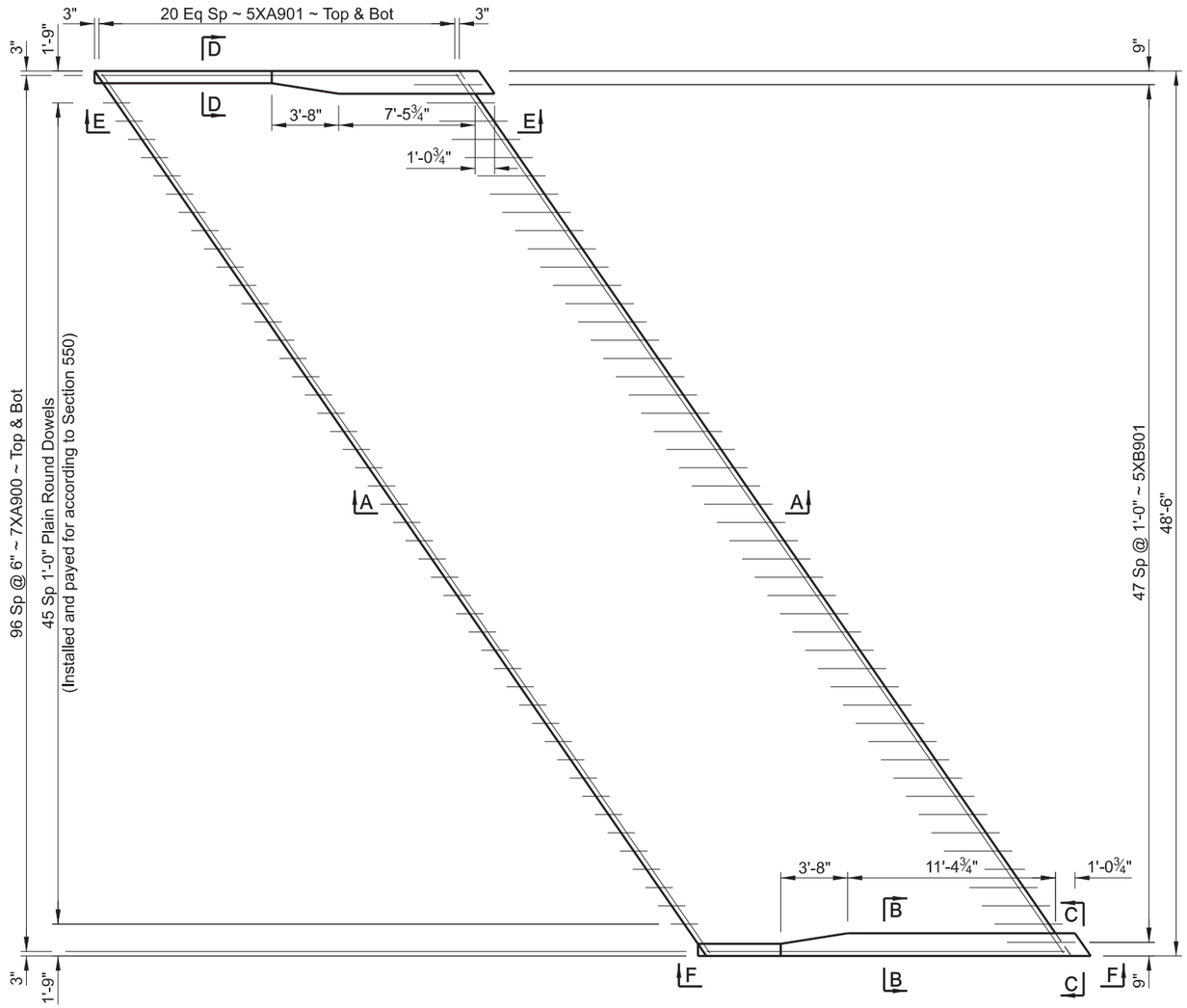
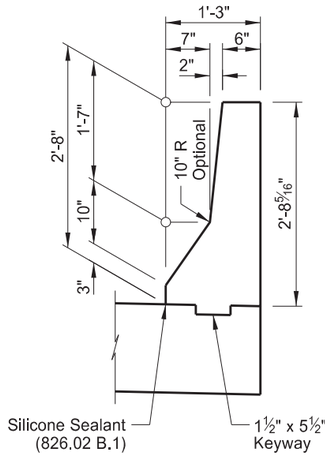
NOTE:

See Dwg 94-260.304R-10 for Sections E-E & F-F.

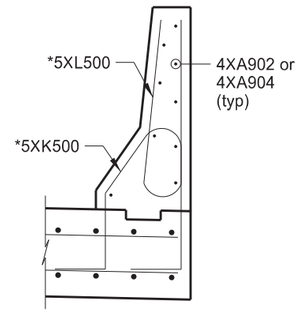


PLAN



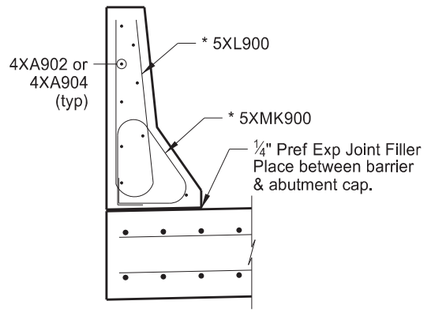
SHOWING DIMENSIONS

B-B

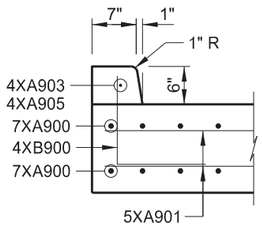


SHOWING REINFORCING

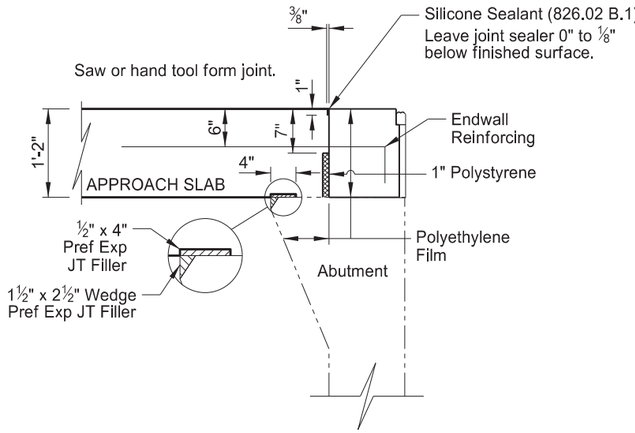
* Provide a 1½" clearance to the barrier reinforcing.



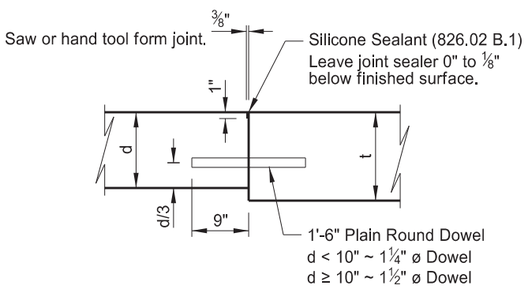
C-C



D-D

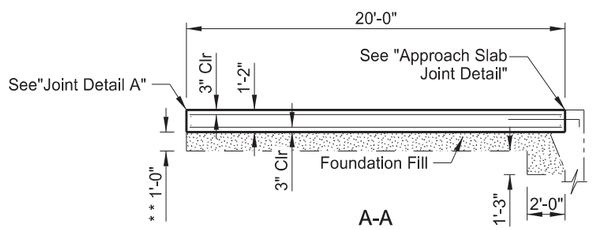


APPROACH SLAB JOINT DETAIL



d = Pavement Thickness
t = Approach Slab Thickness

JOINT DETAIL A



A-A

** Match Subgrade depth of adjacent roadway pavement.

QUANTITIES

SEE DWG 94-260.304R-10

RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

(ENTRANCE END)

APPROACH SLAB DETAILS

DRAWING NO. 94-260.304R-9

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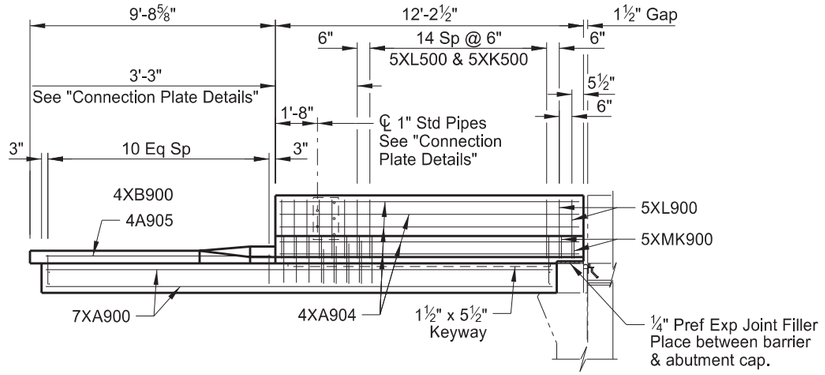
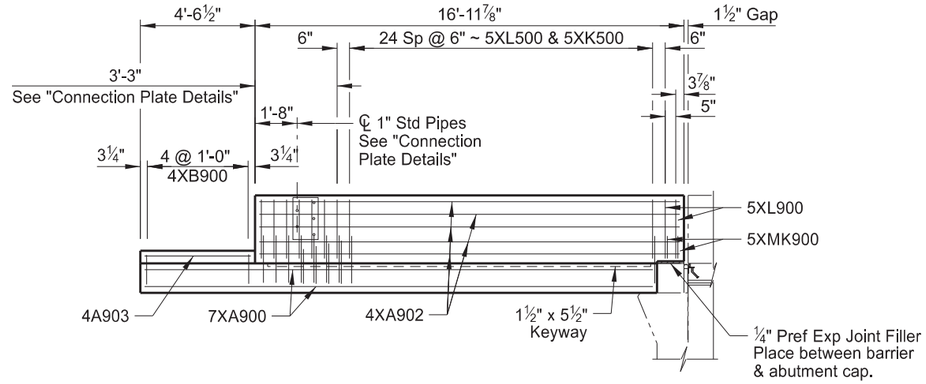
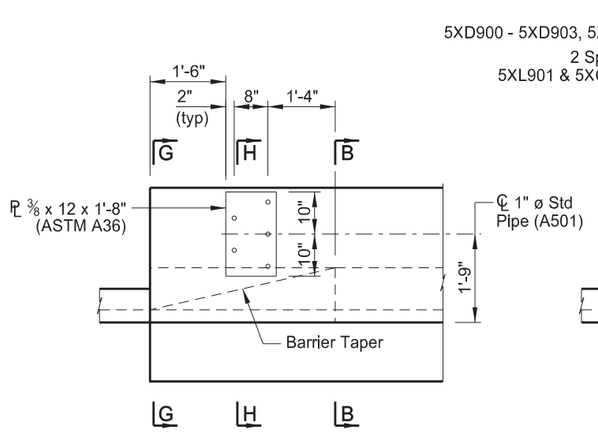


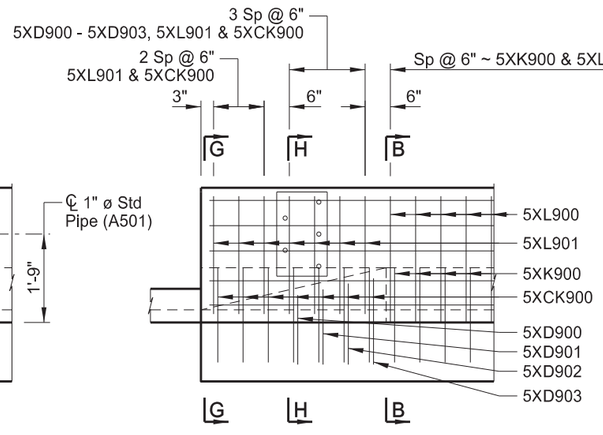
E-E



F-F



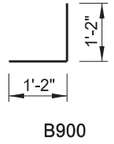
SHOWING DIMENSIONS



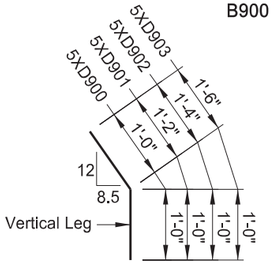
SHOWING REINFORCING

(SHOWING BACK FACE & JERSEY BARRIER TRANSITION)

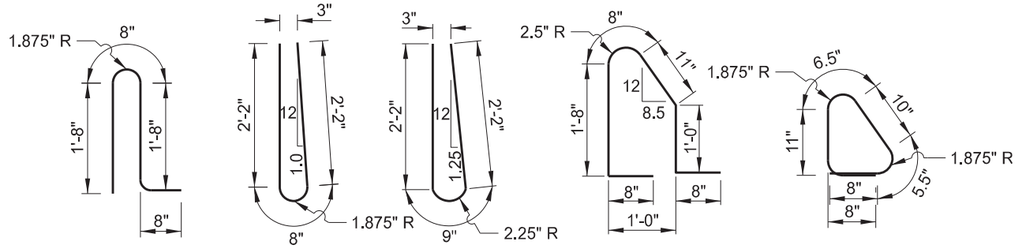
CONNECTION PLATE DETAILS



B900

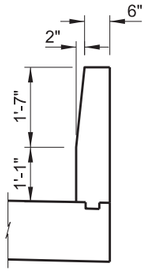


XD900 - XD903

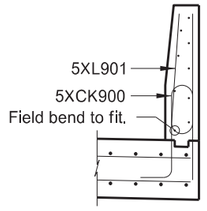


XCK900 XL901 XL900 XK900 XMK900

BENT BAR DETAILS

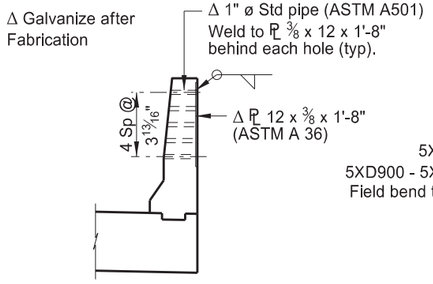


SHOWING DIMENSIONS

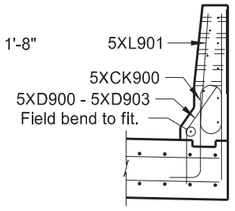


SHOWING REINFORCING

G-G



SHOWING CONNECTION PLATE



SHOWING REINFORCING

H-H

NOTES:

The estimated material quantities shown are for information purposes only. Include the concrete, reinforcing bars, polyethylene film, preformed joint filler, polystyrene, silicone sealant, foundation fill, connection plates and pipes, and labor required to build the approach slabs and barriers in the pay item "Bridge Approach Slab-Remove & Replace." Use Class AAE-3 concrete and Grade 60 reinforcing steel. Provide reinforcing steel that meets the requirements of Section 612. Use polyethylene film that meets the requirements of ASTM C171.

The bar marks beginning with an "X" indicate an epoxy coated bar. The dimensions shown in the "Bent Bar Details" are out to out. Radius values shown indicate the inside bend radius.

SKEW ANGLE = 30°40'

BAR LIST - WEST END

SIZE	MARK	NO.	LENGTH
7	XA900	194	19'- 8"
5	XA901	42	58'- 6"
4	XA902	9	16'- 7"
4	XA903	1	4'- 2"
4	XA904	9	11'- 10"
4	XA905	1	8'- 11"
4	XB900	16	2'- 4"
5	XD900	2	2'- 0"
5	XD901	2	2'- 2"
5	XD902	2	2'- 4"
5	XD903	2	2'- 6"
5	XK900	40	5'- 7"
5	XL900	44	5'- 1"
5	XL901	14	5'- 0"
5	XMK900	4	4'- 1"
5	XCK900	14	4'- 8"

ESTIMATED MATERIAL QUANTITIES

REINFORCING STEEL (LBS)	CONCRETE (CY)
11,209	44.3

QUANTITIES	(ONE SLAB)
APPROACH SLAB	107.8 SY

REGISTERED PROFESSIONAL ENGINEER
JEFFREY R. RENSCH
PE-8211
DATE 10/11/23
NORTH DAKOTA

RRVW SEPARATION - MINOR ROAD
EAST OF JCT US 52

(ENTRANCE END)

APPROACH SLAB DETAILS

DRAWING NO. 94-260.304R-10

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(194)260	175	1

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

LOG OF BORING B1

PROJECT NUMBER IM-2-094(194)260 **DATE STARTED** **COMPLETED**

PCN 23577 **ELEVATION** 1423.4 ft

LOCATION Stutsman County **RP + FEET** 260+0570

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD**

ENGINEER

NOTES West

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	GRAPHIC LOG	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	◎ SPT N VALUE	● MC PL LL 20 40 60 80 / ☐ CLAY FRACTION (%)	TESTS & REMARKS
	0	Loose Moist Brn Clayey Sand		A-2-4(0)	SC	337	50	6	20 37	
1420		1421.4 ft 2.0 ft		A-6(8)	CL	338	50	7	18 37	
		Medium stiff to stiff Moist Brn/Gry Lean Clay		A-7-6(10)	CL	339	75	6	19 42	Y=129.2 pcf, UC= 4912 psf, c=2457 psf
				A-7-6(11)	CL	340	75		18 42	
	10			A-6(9)	CL	341	75	5	18 40	
				A-6(10)	CL	342	85		17 40	
1410									20 42	
				A-7-6(10)	CL	343	75	5	19 40	Y=128.6 pcf, CU= 35° c'=180 psf
				A-6(9)	CL	344	75		20 42	
	20			A-7-6(11)	CL	345	60	9	18 42	Y=129.3 pcf, UC= 3336 psf, c=1669 psf
				A-7-6(11)	CL	346	65		18 38	
1400				A-6(9)	CL	347	75	15	17 37	Y=129.9 pcf, UC=2416 psf, c=1208psf
				A-6(9)	CL	348	75		19 42	
	30			A-7-6(10)	CL	349	75	14	17 38	Y=128.4 pcf, c=1977 psf
				A-6(10)	CL	350	75		19 41	
1390				A-7-6(11)	CL	351	100	27	21 38	Y=129.0 pcf, c=3210 psf
				A-6(9)	CL	352	85		20 34	
	40			A-6(6)	CL	353	100	7	19 37	
		1380.4 ft 43.0 ft		A-6(10)	CL	354	100	8		
1380		Loose to medium dense Wet Brn/Gry Silty Sand		A-1-b(1)	SP-SM	355	15	17	0	
	50			A-1-b(0)	SP-SM	356	85	7	0 2 30	
				A-1-b(1)	SP	357	85			
1370				A-3(1)	SP-SM	358	85	27	0	
				A-1-b(0)	SP-SM	359	100	21	0	
	60			A-1-a(0)	SP-SM	360	100	66	0	
1360										
		1355.4 ft 68.0 ft		A-2-4(0)	SW-SM	362	5	7	2 32	
						363	65	14		
	70	Dense Wet Gry Silty Sand		A-1-b(0)	SM	364	80		96 0 230	
1350				A-1-b(0)	SM	365	75	32	0	
				A-2-4(0)	SP-SM	366	75	25	0	
				A-2-4(0)	SM	367	75	33	0	
	80			A-2-4(0)	SM	368	50	46	0	
				A-2-4(0)	SM	369	75	48	0	
1340						370	5	54		
								52	0	
	90			A-2-4(0)	SM	371	100			
1330								38	0	
		1327.4 ft 96.0 ft		A-2-4(0)	SM	372	100			
		Hard Moist Gry Silt						37	18 34	
	100			A-6(5)	SC	373	100			
1320		1317.4 ft 106.0 ft		A-4(0)	CL-ML	374	100	63	25	
		Hard Moist Gry Fat Clay		A-6(4)	SC	375	77		100 22 37	
	110									
1310				A-7-6(16)	CH	376	100		100 27 60	
		1303.9 ft 119.5 ft		A-7-6(25)	CH	377	100		100 26 69	
		Bottom of borehole at 119.5 ft								

NDDOT LOG 11X17 PLAN SHEET RP+FEET - NDDOT_DATATEMP_20180208.GDT - 7/13/23 12:30 - R:\PROJECT\20094260.194\MATERIAL\GEOTECH\DEEP FOUNDATION\VOID\BORING 1.GPJ

REGISTERED PROFESSIONAL ENGINEER
COLTER SCHWAGLER
PE-27747
DATE 7/19/2023
NORTH DAKOTA

Boring Log 1

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(194)260	175	2

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

LOG OF BORING B2

PROJECT NUMBER IM-2-094(194)260 **DATE STARTED** _____ **COMPLETED** _____

PCN 23577 **ELEVATION** 1426 ft

LOCATION Stutsman County **RP + FEET** 260+0828

DRILLED BY Dallan **LOGGED BY** Jamie **DRILLING METHOD** _____

ENGINEER _____

NOTES East abutment

ELEVATION (ft)	DEPTH (ft)	MATERIAL DESCRIPTION	AASHTO	USCS	SAMPLE TYPE & NUMBER	RECOVERY (%)	SPT N VALUE	MC / PL LL / CLAY FRACTION (%)	TESTS & REMARKS
	0	Stiff Moist Brn Lean Clay	A-6(5)	SC	378	75	10	19 37	
						0		17 38	
1420			A-6(10)	CL	379	60	6	20 41	Y=126.5 pcf, UC=4136 psf, c=2068 psf
			A-7-6(10)	CL	380	35		17 40	
	10		A-6(10)	CL	381	60	6	18 38	Y=127.1 psf, UC=1456 psf, c=728psf
			A-6(8)	CL	382	50		16 40	
1410			A-6(11)	CL	383	75	11	18 38	Y=129.9 psf, UU=1532 psf
			A-6(9)	CL	384	85		16 37	
	20		A-6(9)	CL	385	75	9	19 40	Y=131.9 psf, UU=2618psf
			A-6(9)	CL	386	50		19 42	
1400			A-7-6(7)	SC	387	75	10	18 41	Y=129.2 psf, UC=3653 psf, c=1826 psf
			A-7-6(11)	CL	388	75		17 38	
	30		A-6(10)	CL	389	60	11	17 39	Y=131.3 psf, UC=3243 psf, c=1621 psf
			A-6(10)	CL	390	85		16 39	
		1390.0 ft 36.0 ft	A-6(11)	CL	391	85	14	17 28	Y=129.6 psf, CU=32.3°, c'=155 psf
		Stiff to Very Stiff Moist Brn/Gry/Blk Clayey Sand	A-2-6(0)	SC	392	85		19 31	
1380	40		A-2-6(0)	SC	393	100	31	2 31	
			A-2-4(0)	SC	394	100			
			A-6(3)	SC	395	90	23	21 36	
			A-6(3)	SC	396	100	27	12 27	
	50		A-4(0)	SC	397	85	14	2 29	
			A-4(2)	CL	398	85	15	2 31	
		1373.0 ft 53.0 ft	A-2-4(0)	SC	399	50	7	18 33	
1370		Medium Dense to Dense Wet Gry Silty Sand	A-6(9)	CL	400	100	16	0	
			A-1-b(0)	SW-SM	401	85		0	
	60		A-1-a(0)	SW-SM	402	85	42	0	
			A-1-b(0)	SW-SM	403	85	36	0	
			A-2-6(0)	SC	404	90	37	22 33	
1360			A-1-b(0)	SW-SM	405	90	27	23	
		1358.0 ft 68.0 ft							
		Water Bearing Coal			406	25	49		
	70				407	85	42		
					408	65	16		
1350					409	65	46		
					410	90	26		
	80				411	90	30		
					412	100	24		
		1340.0 ft 86.0 ft							
1340		Medium Dense to Dense Wet Gry Silty Sand	A-3(1)	SP-SM	413	75	22	0	
	90								
			A-3(1)	SP-SM	414	90	46	0	
1330									
	100	1325.0 ft 101.0 ft	A-2-4(0)	SM	415	95	21	0	
		Medium Dense to Dense Moist Gry Clayey Sand	A-4(1)	SC	416	95	47	17 27	
1320									
	110		A-6(2)	SC	417	100		100 17 31	
			A-7-6(8)	CH	418	100		100 27 50	
1310		1306.4 ft 119.6 ft							
			A-7-5(10)	MH	419	67		100 34 66	
		Bottom of borehole at 119.6 ft							

Boring Log 2

NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Bk	back
BF	back face
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
BI	beehive inlet
Beg	begin
BG	below grade
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
BH	bore hole
Bot	bottom
Blvd	Boulevard
Bndry	boundary
Brkwy	breakaway
Br	bridge
Bldg	building
Bus.	business
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
CL or ℄	centerline
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
CECB	concrete erosion control blanket
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
Co	County
Crse	course
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	crossroad
Crn	crown
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia or ø	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
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

KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
08/16/22

NDDOT ABBREVIATIONS

D-101-2

Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Gov	government
Grd	graded/grade
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ht	height
Hel	helical
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
HTCG	high tension cable guardrail
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IP	iron pipe
Jt	joint
Jct	junction

Ln	lane
Lg	large
Lat	latitude
Lt	left
Lens	lenses
Lvl	level
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Liq	liquid
LL	liquid limit
Loc	location
Long.	longitude
Lp	loop
LD	loop detector
Lum	luminaire
Mb	mailbox
ML	main line
MH	manhole
Mkd	marked
Mkr	marker
Mkg	marking
MA	mast arm
Matl	material
Max	maximum
MC	meander corner
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	North East
NW	North West
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
Prop Ln	property line
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	
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08-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

KIRK J. HOFF
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ENGINEER
NORTH DAKOTA
08/16/22

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	South East
SW	South West
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
WC	witness corner

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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08-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

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08/16/22

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
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
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
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
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

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DATE	CHANGE
12-18-20	Sheet Added - Continued from D-101-3

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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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

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09-23-16 12-18-20	Added and Revised Items, Organized by Functional Groups 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

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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

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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)

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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)

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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

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Cross Section Legend

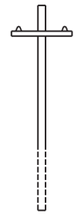
D-101-40

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.

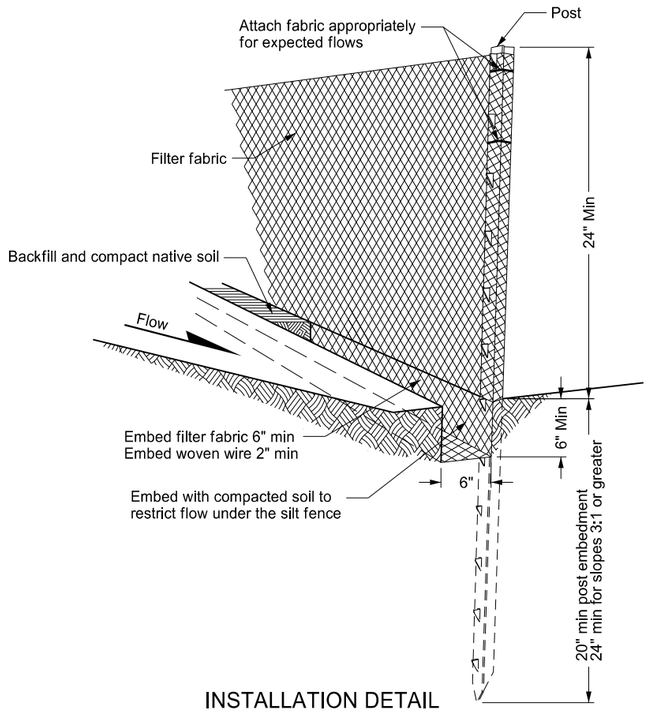
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

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

06/14/23

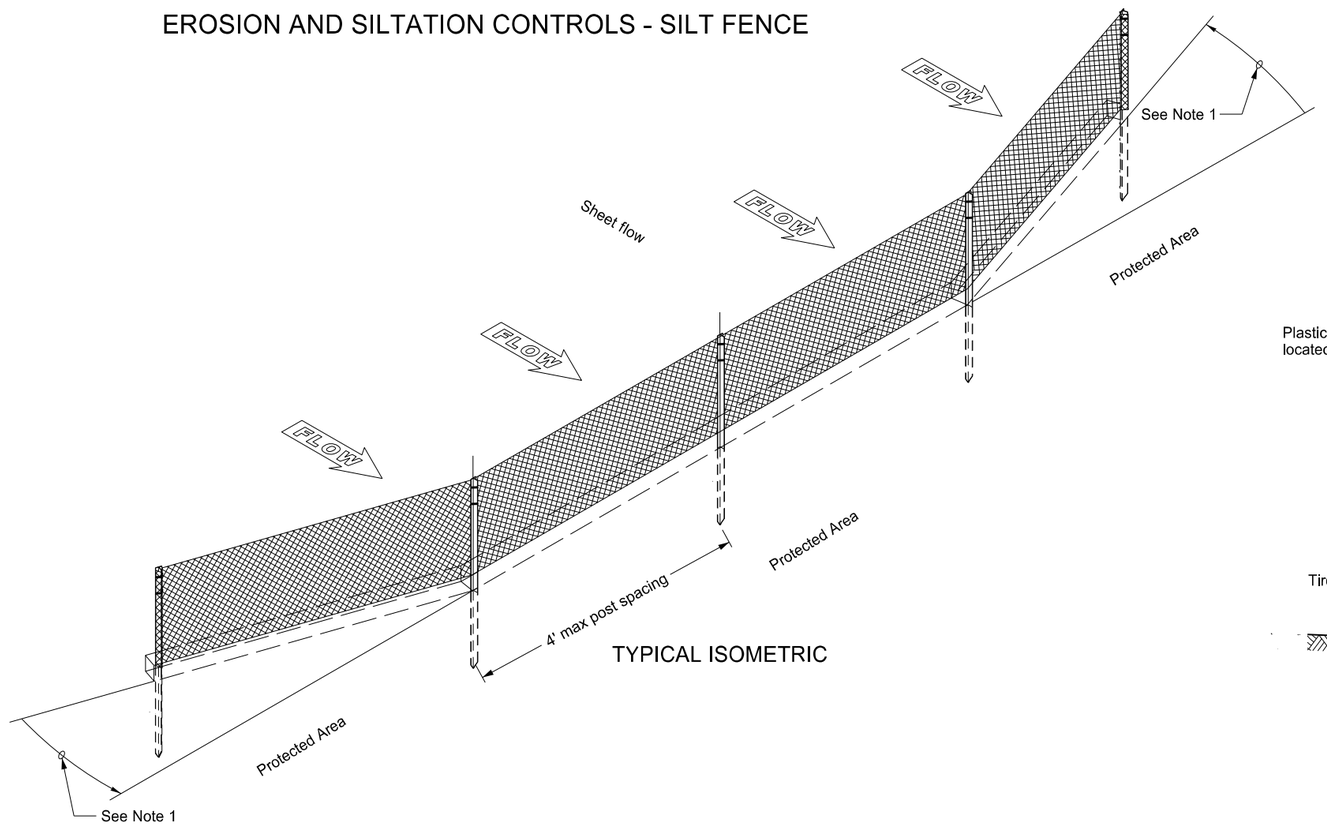
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1

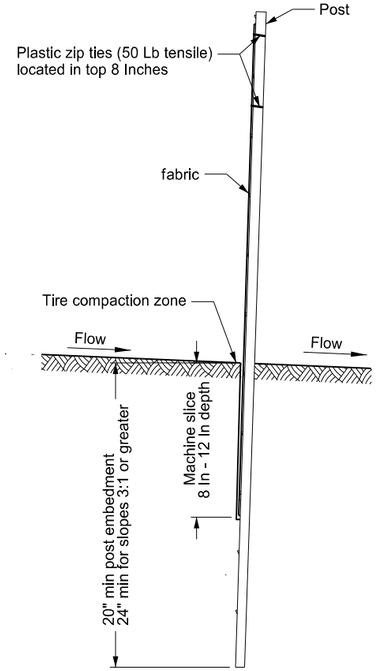


INSTALLATION DETAIL

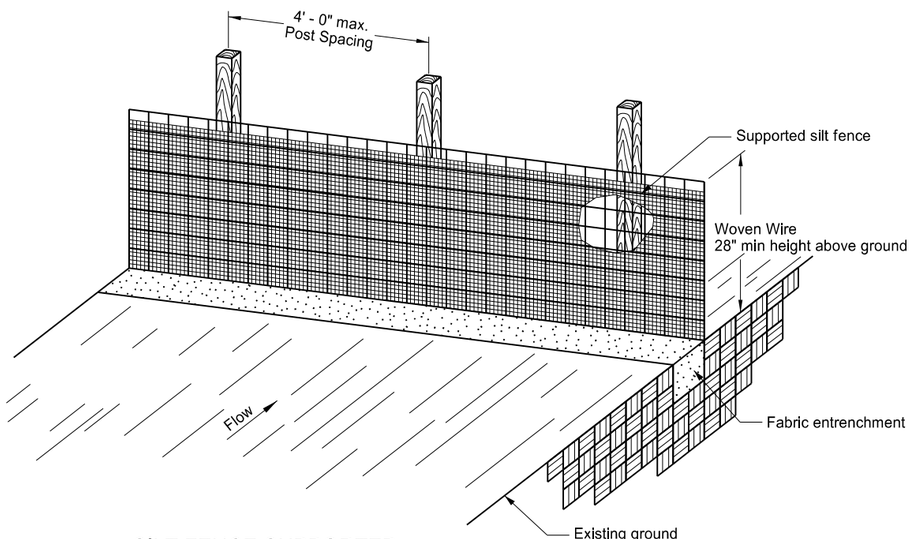
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



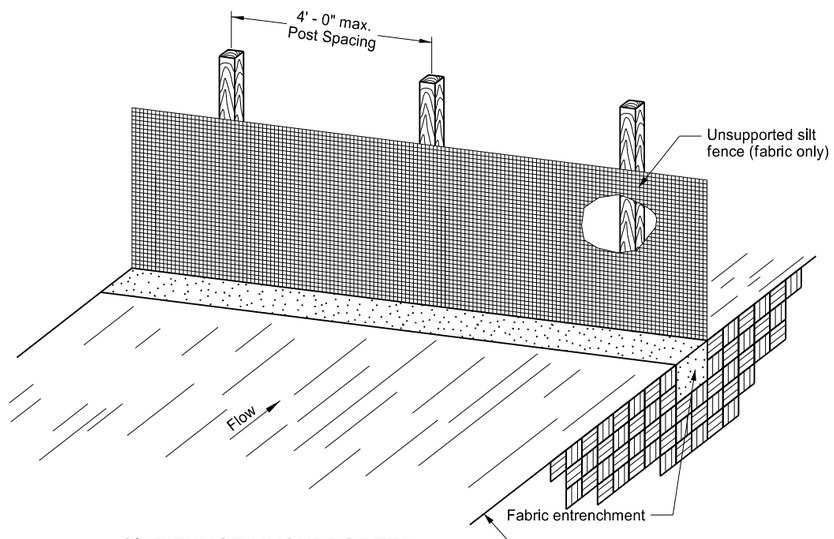
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



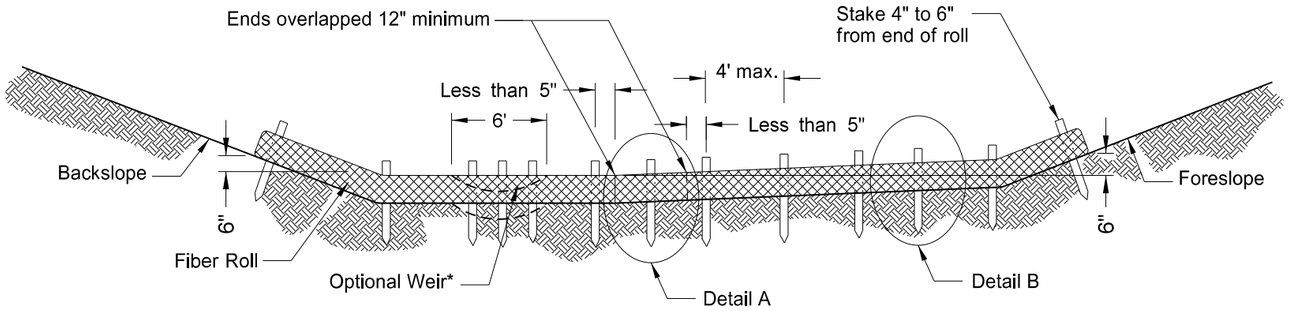
SILT FENCE UNSUPPORTED

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.
06-27-16 08-27-19	Revised details & added new ones. New Design Engineer PE Stamp.

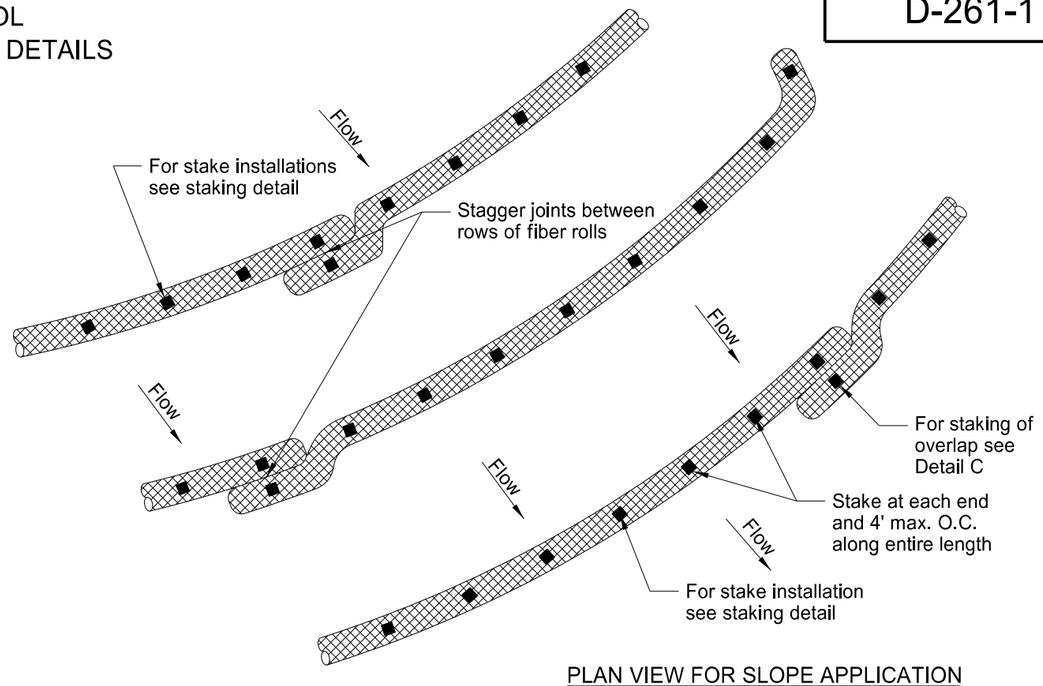
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 08/27/19 and the original document is stored at the North Dakota Department of Transportation

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

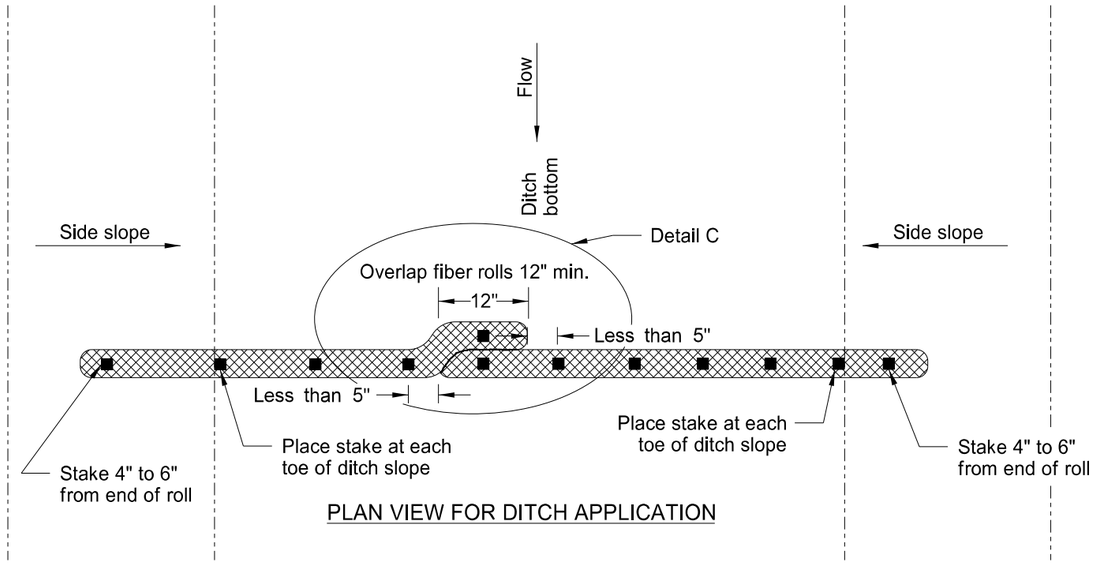


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

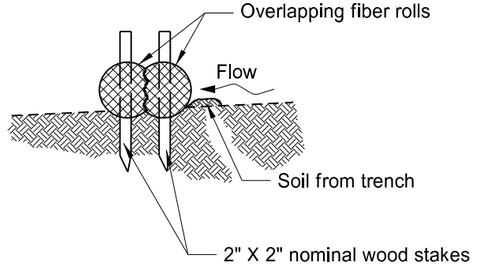
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

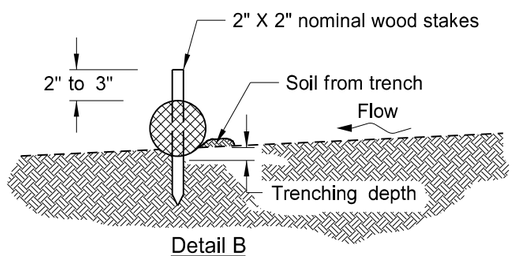


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-18-10

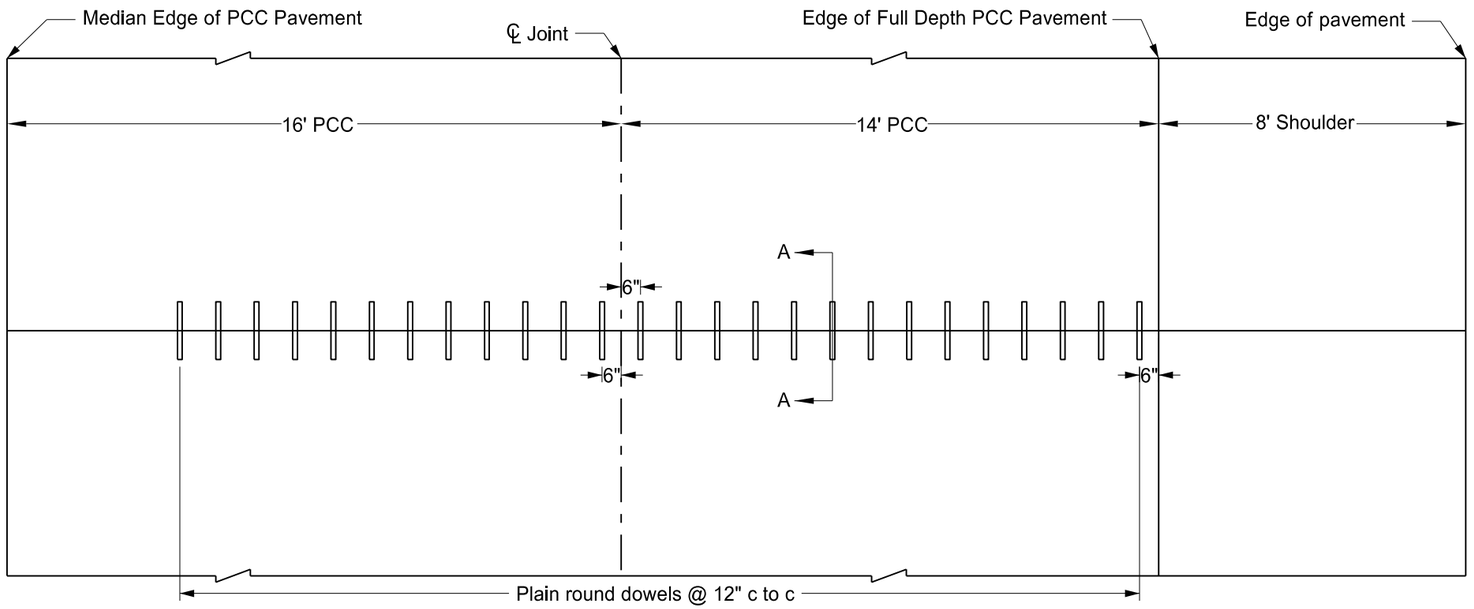
REVISIONS

DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp

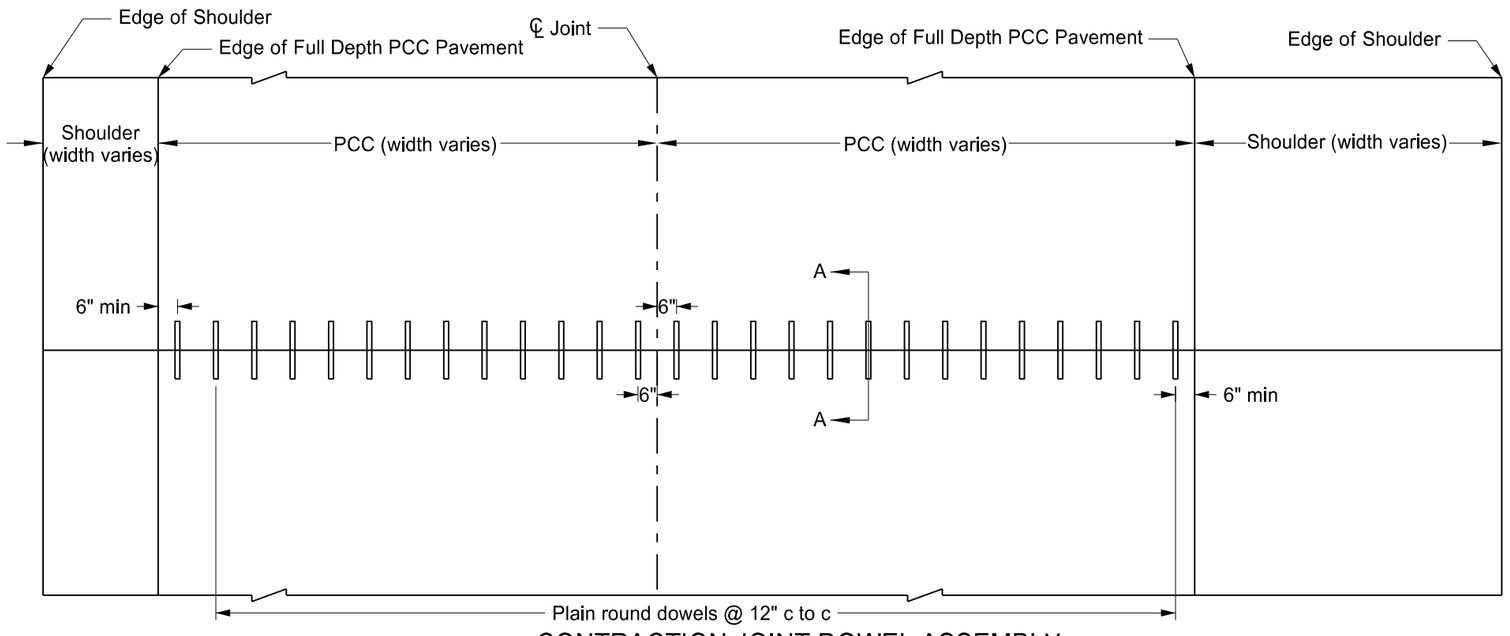
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 08/27/19 and the original document is stored at the North Dakota Department of Transportation

TRANSVERSE CONTRACTION JOINT DETAILS

D-550-3



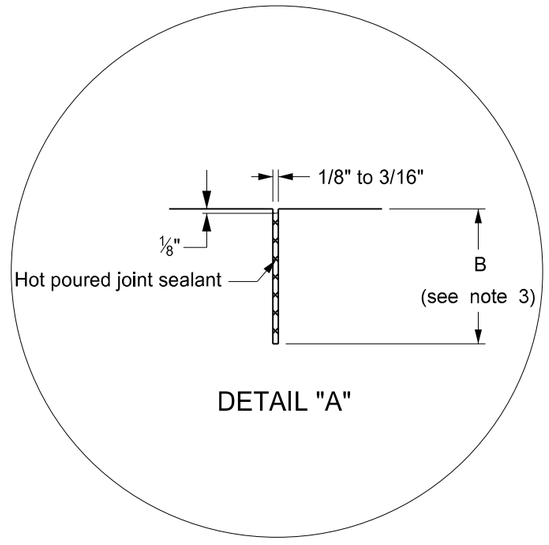
CONTRACTION JOINT DOWEL ASSEMBLY
INTERSTATE



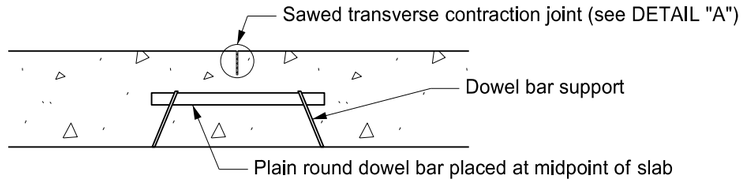
CONTRACTION JOINT DOWEL ASSEMBLY
NON-INTERSTATE

Notes

1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3. B = T/4 + ¼" for AE or YE for non-dowelled concrete pavement or
   B = T/3 for AAE or dowelled concrete pavement



DETAIL "A"



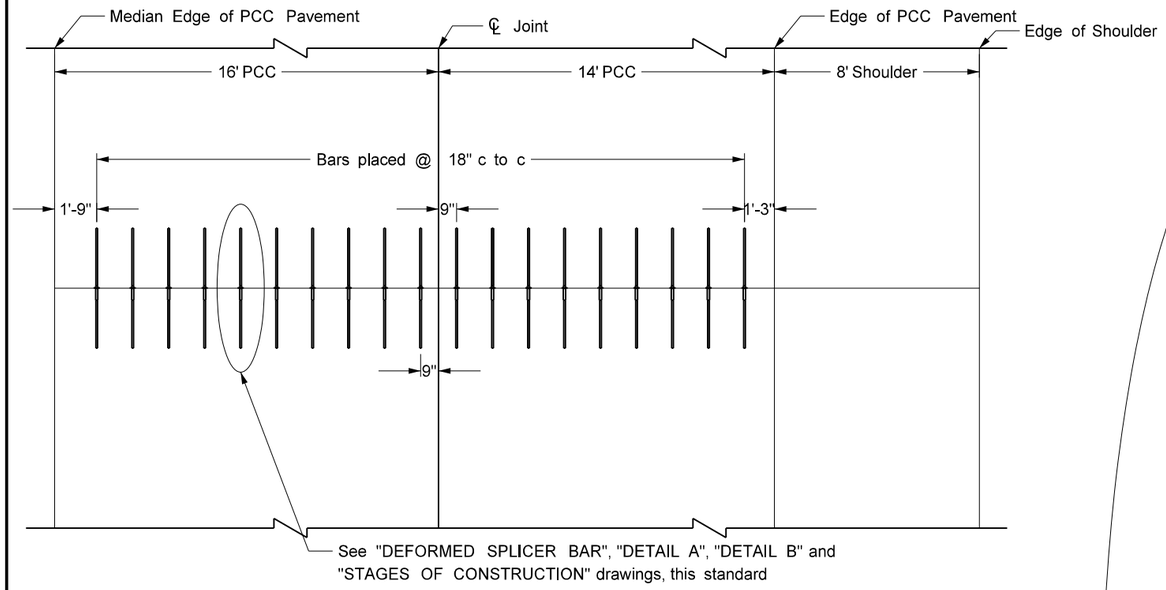
SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-10	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference
3/16/2016	Revised Joint Details and notes
10/25/2019	Expanded Details for clarity

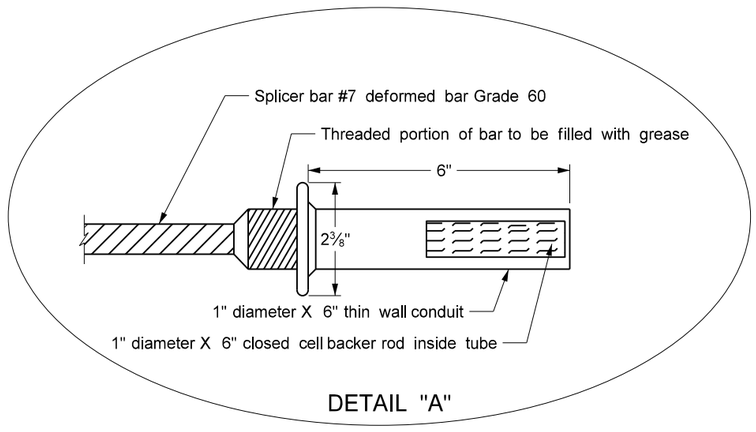
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/25/19 and the original document is stored at the North Dakota Department of Transportation

TRANSVERSE CONSTRUCTION JOINT

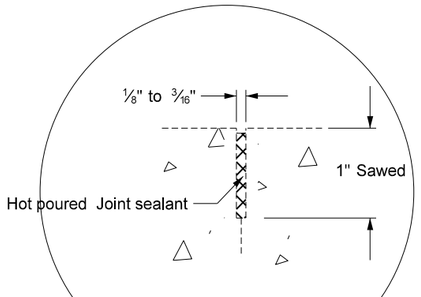
D-550-5



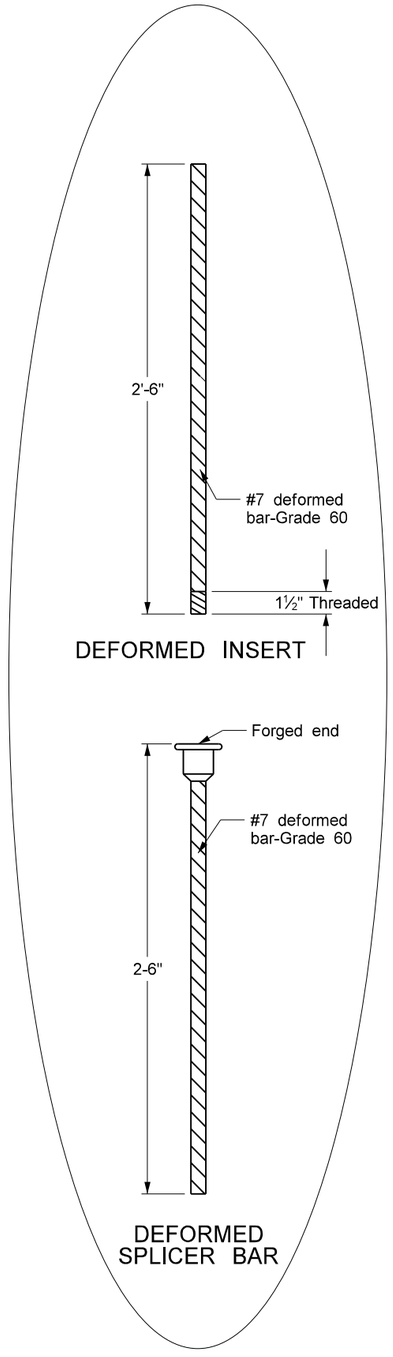
PLAN VIEW



DETAIL "A"



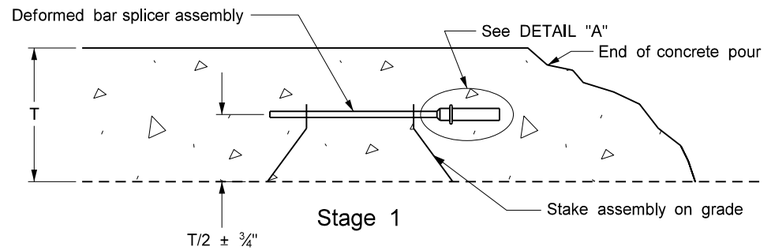
DETAIL "B"



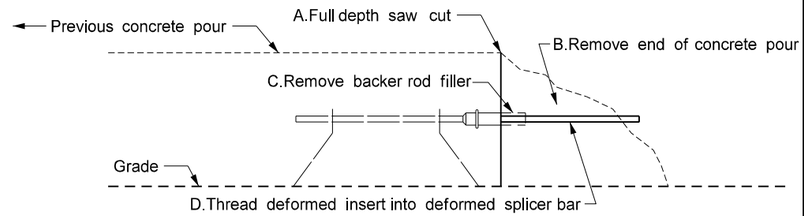
DEFORMED INSERT

DEFORMED SPLICER BAR

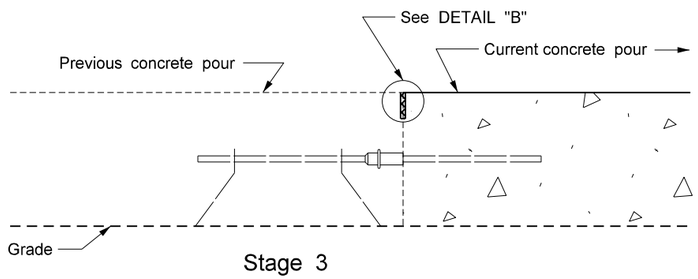
STAGES OF CONSTRUCTION



Stage 1



Stage 2



Stage 3

Notes

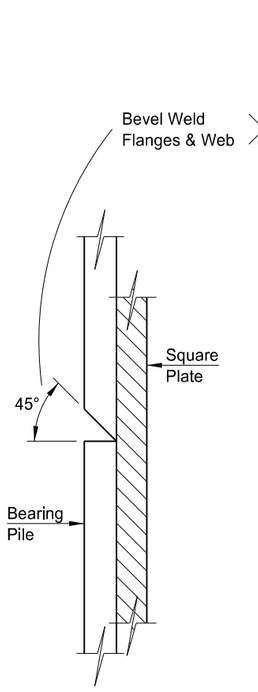
1. Saw and seal all construction joints.
2. Include all costs for transverse construction joints in the price bid for PCC pavement.
3. Do not saturate the subgrade during the sawing operation.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
3-16-16 8-27-19	Revised Joint Details & notes. New Design Engr PE Stamp.

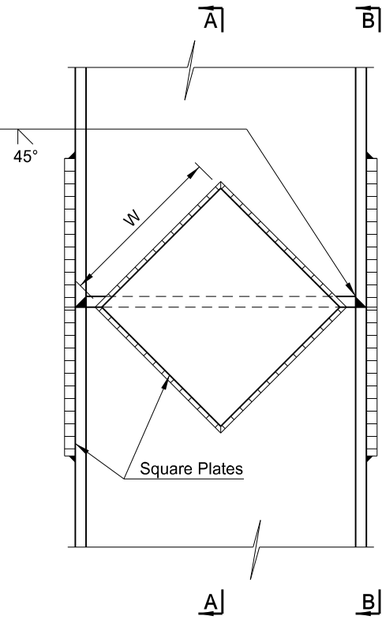
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

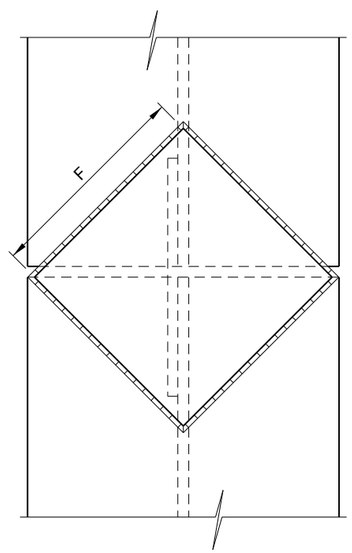
PILE SPLICE DETAILS

D-622-1

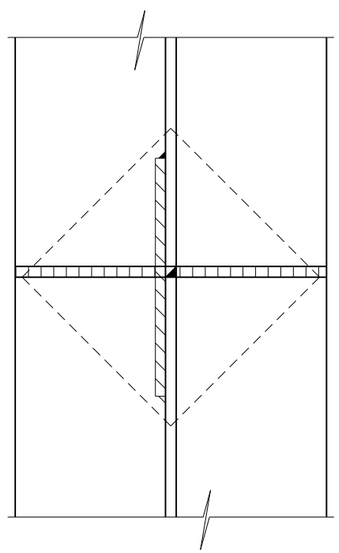


ENLARGED VIEW



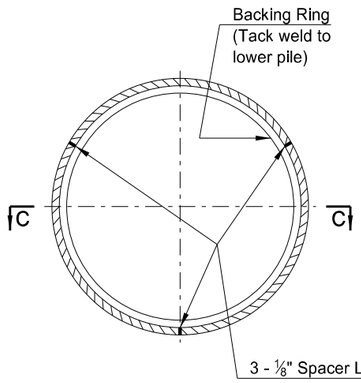


B-B

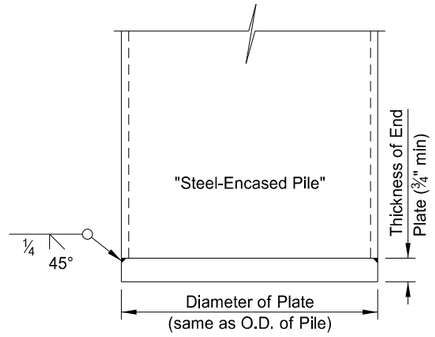


A-A

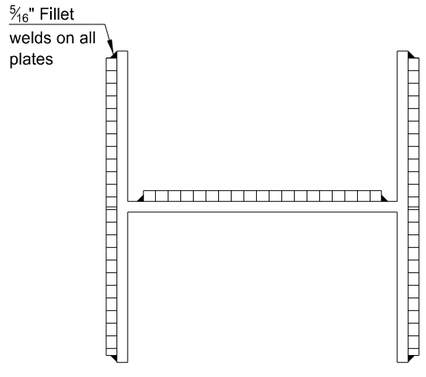
Flame scarf inside of both flanges and one side of web of upper section.



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

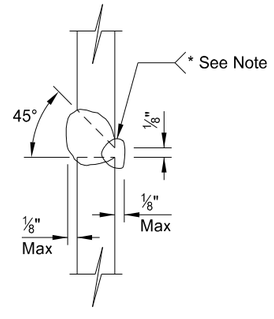


END PLATE DETAIL

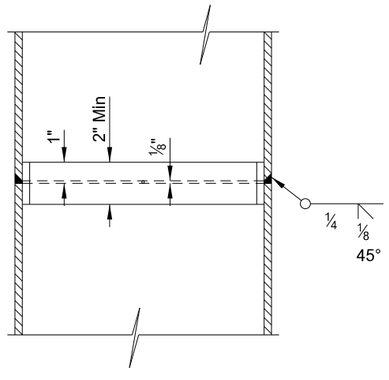


PILE	8"	10"	12"	14"
"F" FLANGE	5"	6½"	8"	10"
"W" WEB	4"	5½"	6½"	8"

H-PILE SPLICE DETAIL

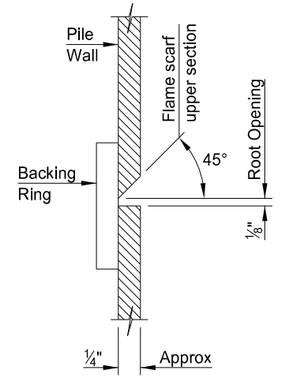


ALTERNATE H-PILE SPLICE DETAIL



C-C

STEEL-ENCASED CONCRETE PILE SPLICE DETAIL



ENLARGED VIEW

NOTES:

Steel H-Pile may be spliced with complete penetration groove welds in both flanges and web in lieu of using the reinforcing plates.

AWS classification E7OXX Low Hydrogen Electrodes shall be used.

* Welds made without the use of backing material shall have the root gouged to sound metal and welded from the second side.

All welding shall conform to the current AASHTO/AWS D1.5 Bridge Welding Code.

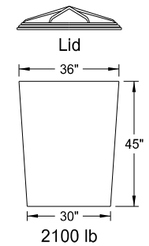
The thickness of the steel square plates shall at a minimum be as thick as the flanges and web of the pile being spliced.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
09/14/11	
REVISIONS	
DATE	CHANGE
09/03/19	UPDATED SIGNATURE

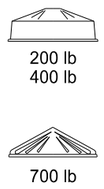
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 09/03/19 and the original document is stored at the North Dakota Department of Transportation

ATTENUATION DEVICE

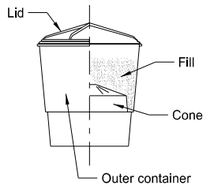
D-704-1



Outer Containers

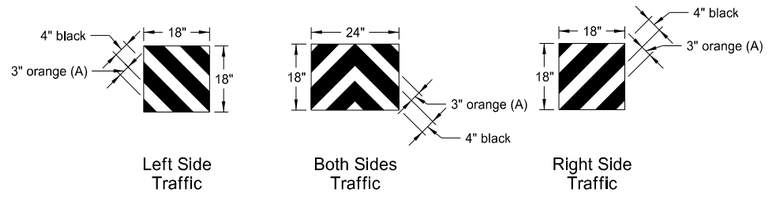


Cones



Typical Assembly

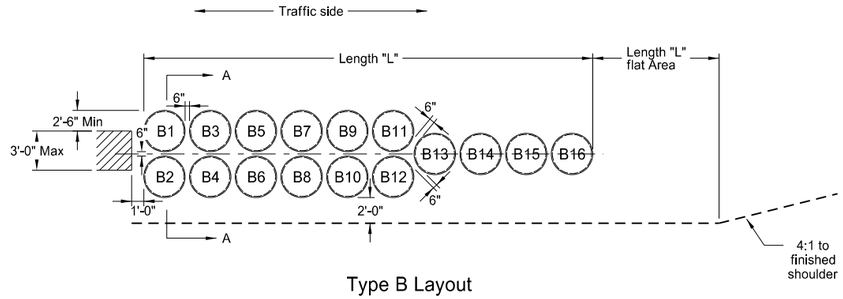
Typical Module
Construction Detail



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.

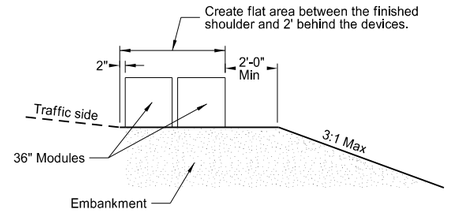
(A) Use 3" orange sheeting for temporary installations, and 3" yellow sheeting for permanent installations.



Type B Layout

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

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



Section A-A
(Type B Layout)

Type B Attenuation Device											
Module Number	Dash Number										
	75	70	65	60	55	50	45	40	35	30	25
	Module Weights (LBS)										
B1	2100										
B2	2100										
B3	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B4	2100	2100	2100	2100	2100	2100	2100	2100	2100		
B5	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B6	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B7	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B8	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400	1400
B9	700	700	700	700	700	700	700	700	700	700	700
B10	700	700	700	700	700	700	700	700	700	700	700
B11	700	700	700	700	700	700	700	700	700	700	700
B12	700	700	700	700	700	700	700	700	700	700	700
B13	700	700	700	700	700	700	700	700	700	700	700
B14	400	400	400	400	400	400	400	400	400	400	400
B15	400	400	400	400	400	400	400	400	400	400	400
B16	200	200	200	200	200	200	200	200	200	200	200
Length (L)	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		
1400	1	1	1	1	1	1	1	1	1	1	1
700	2	2	2	2	2	2	2	2	2	2	2
400	1	1	1	1	1	1	1	1	1	1	1
200	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
7-18-14	Revised sheeting in reflective sheet detail
9-27-17	Update to active voice
10-03-19	New Design Engr PE Stamp

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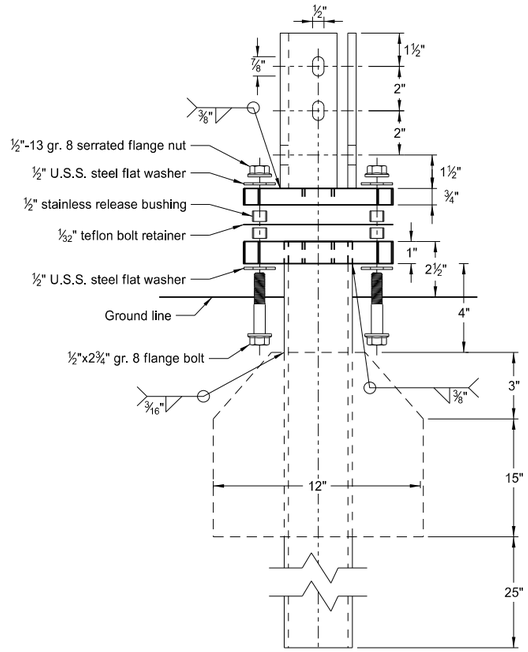
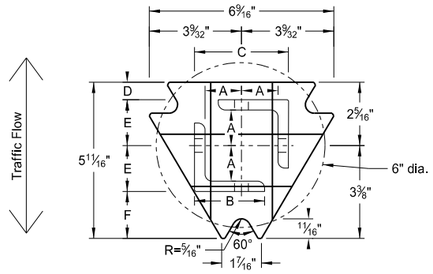
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

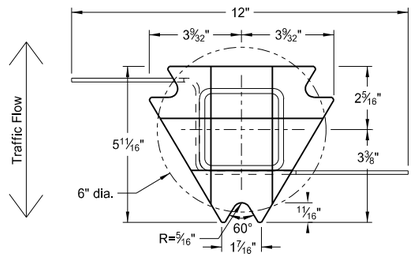


Multi-Directional
Slip Base Assembly

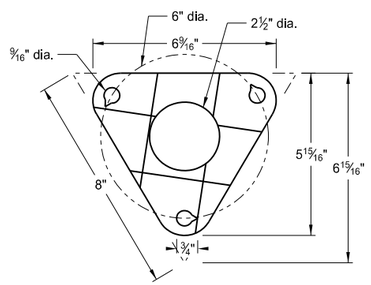
Perforated Tube



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.

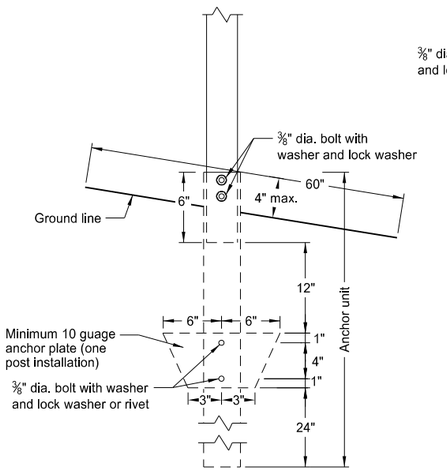
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½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

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

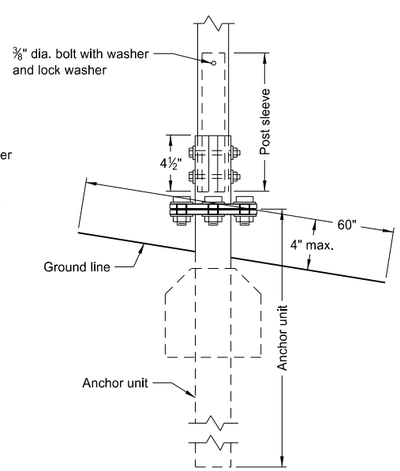
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

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

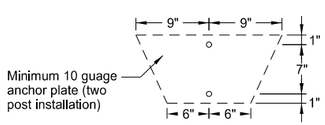
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



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

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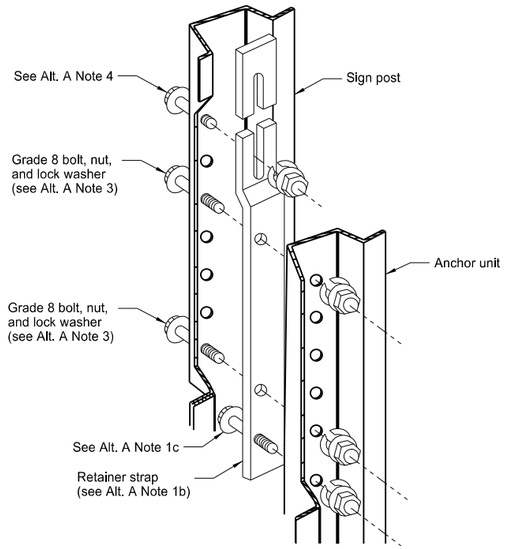
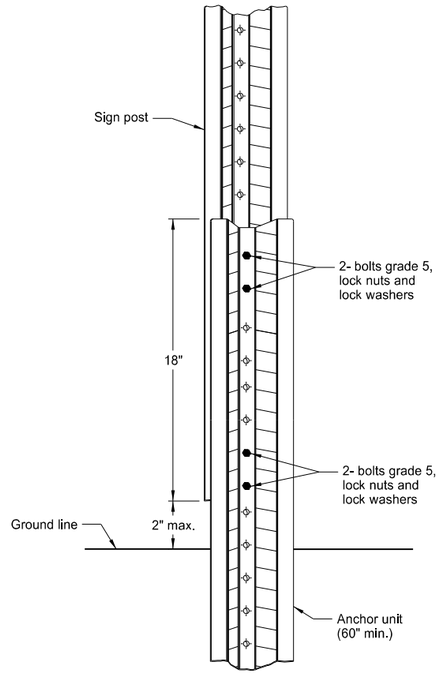
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

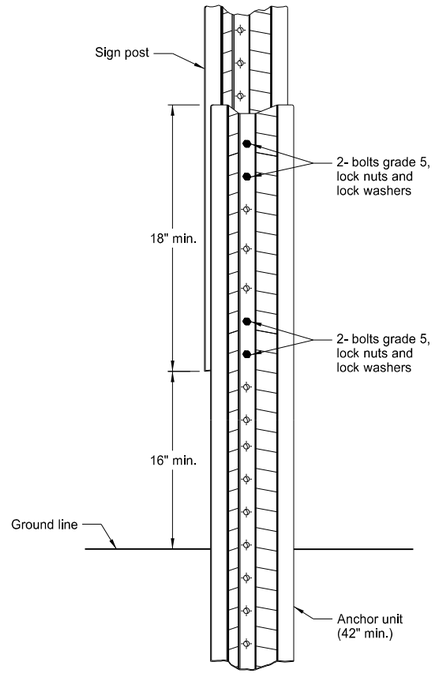


Detail A



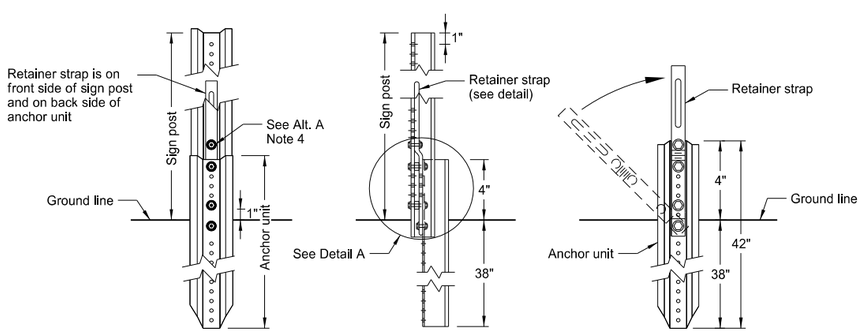
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

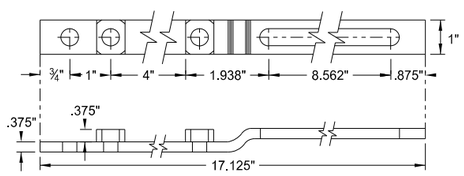
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

Alternate A Steps of Installation:

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

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

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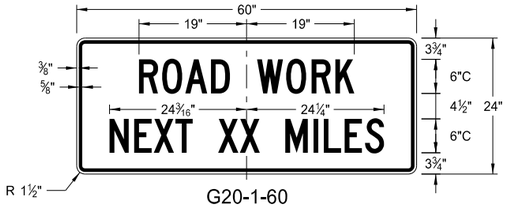
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



G20-1-60
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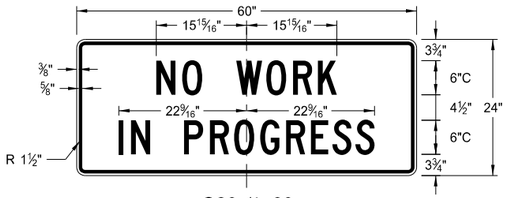
Background: orange



G20-1b-60
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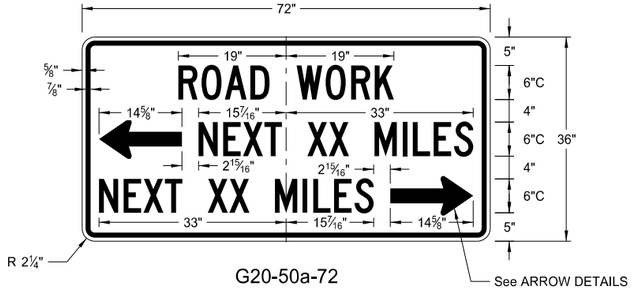
Background: orange



G20-50a-72
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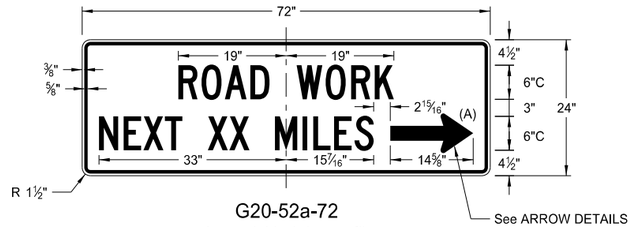
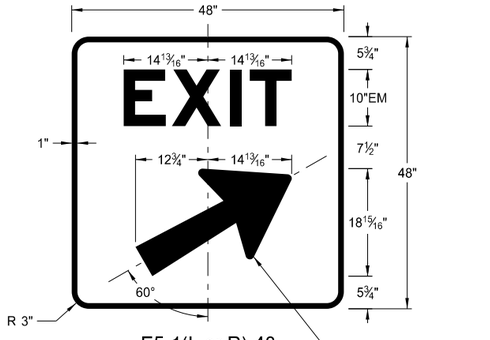
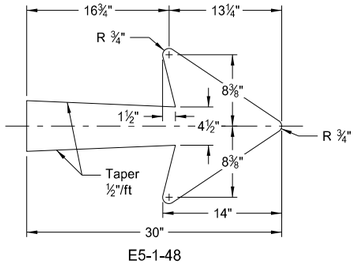
Background: orange



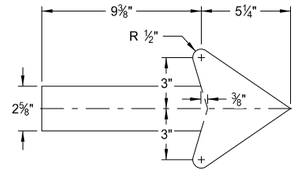
G20-52a-72
Legend: black (non-refl)
Background: orange



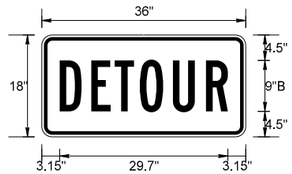
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



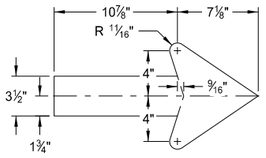
E5-1-48



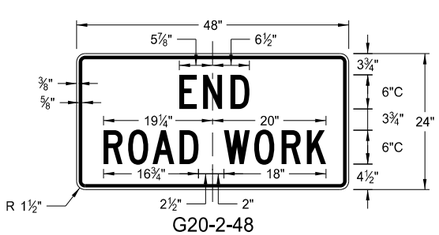
G20-50a-72
G20-52a-72



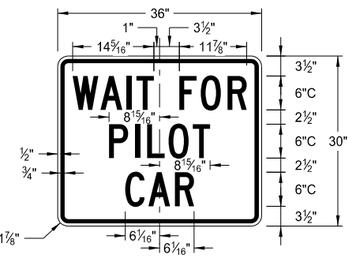
M4-8-36
Legend: black (non-refl)
Background: orange



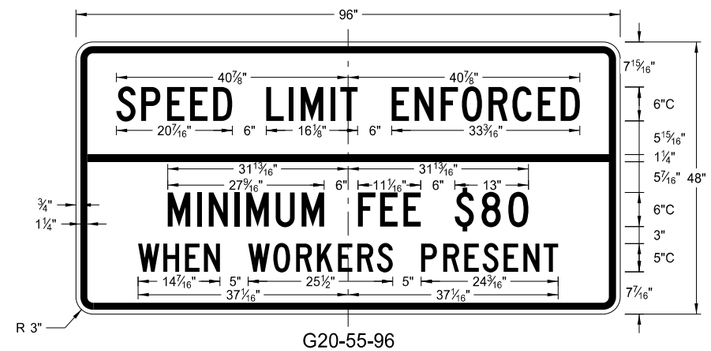
M4-9(L or R)-30
Right or Left



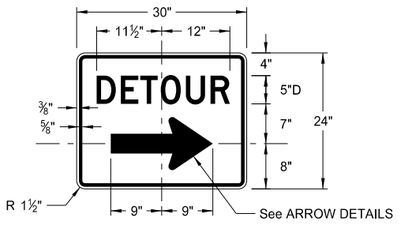
G20-2-48
Legend: black (non-refl)
Background: orange



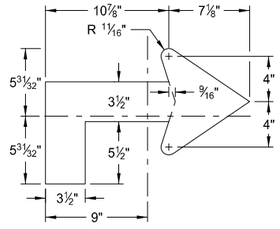
G20-4b-36
Legend: black (non-refl)
Background: orange



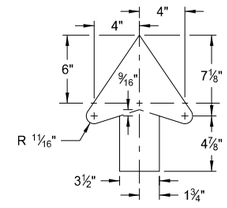
G20-55-96
Legend: black (non-refl)
Background: orange



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



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



M4-9-30
Straight

ARROW DETAILS

NOTES:

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

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

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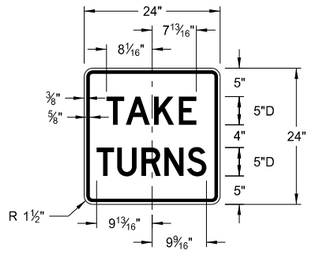
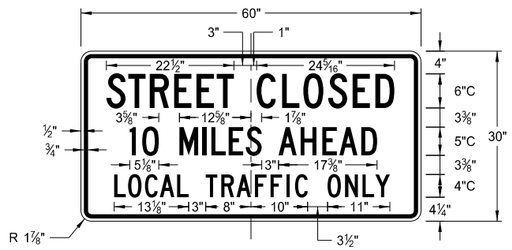
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



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



R11-3c-60
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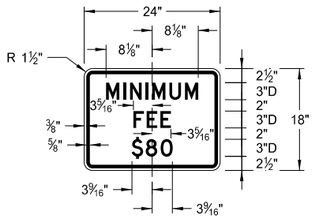
Background: white



R2-1aP-24
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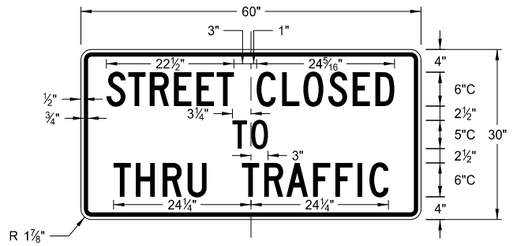

R11-4a-60
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Background: white

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

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

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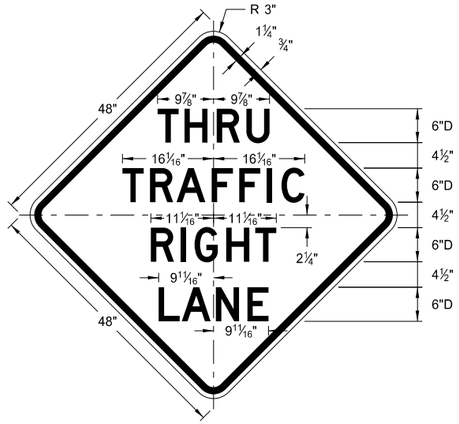
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W5-8-48
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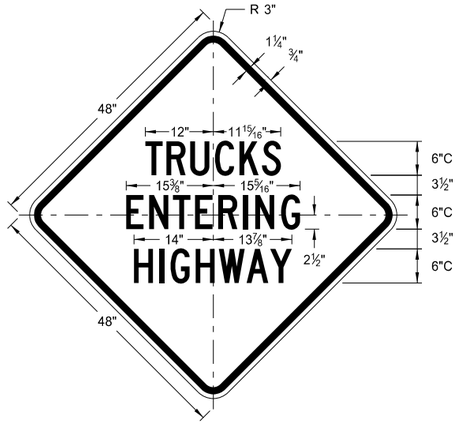

W8-53-48
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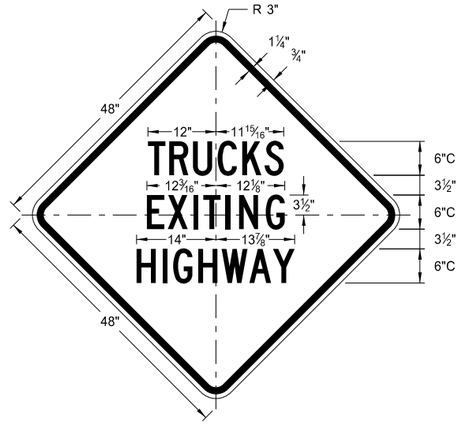

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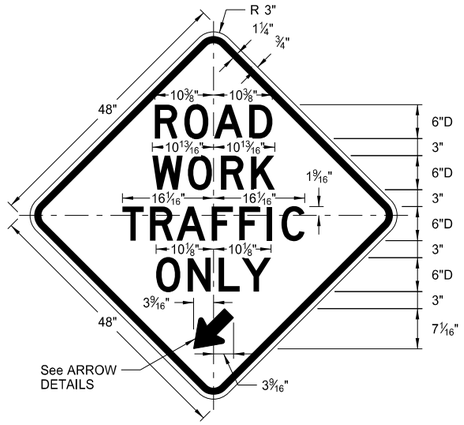

W5-9-48
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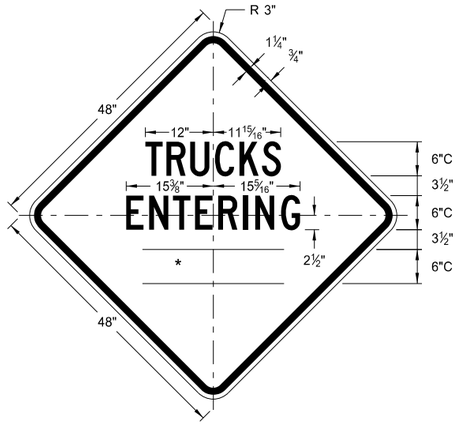

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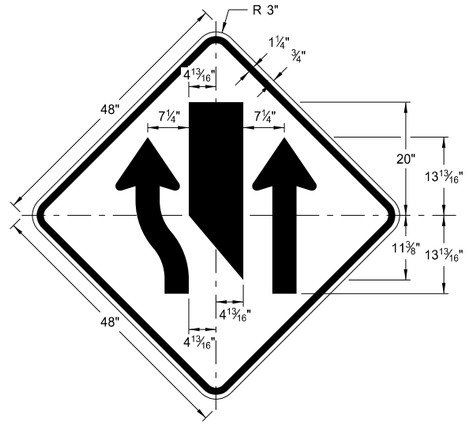
Background: orange



W9-3a-48
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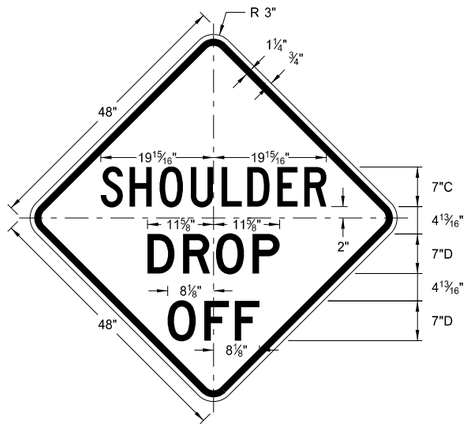
Background: orange



W8-9a-48
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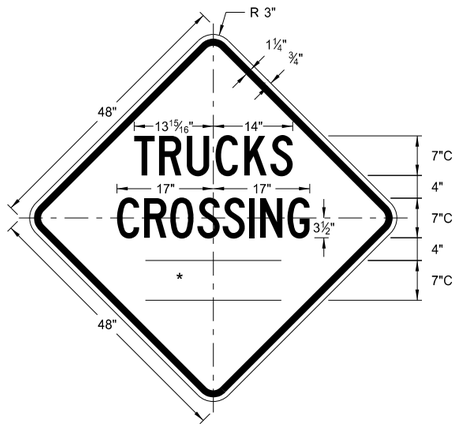
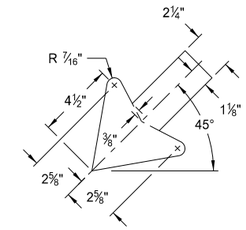
Background: orange



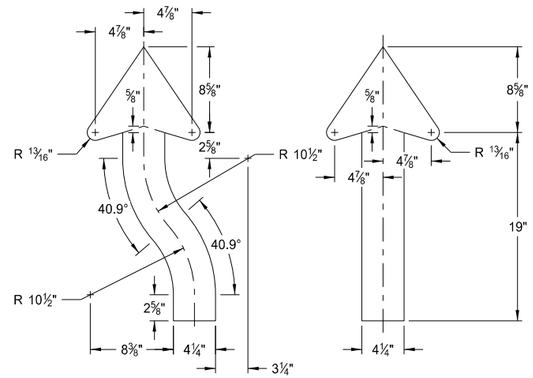
W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



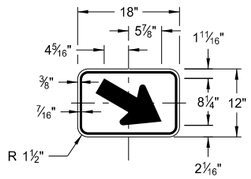
W9-3a-48

ARROW DETAILS

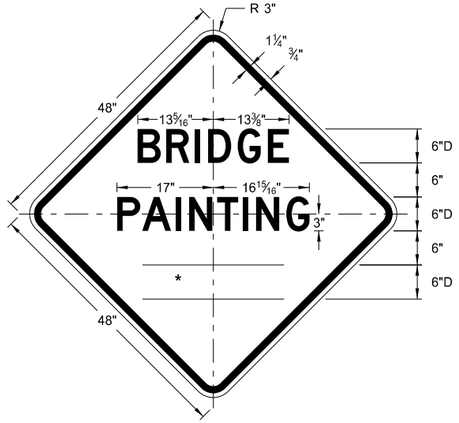
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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

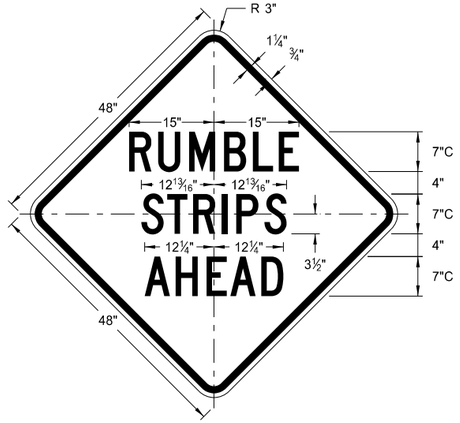
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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



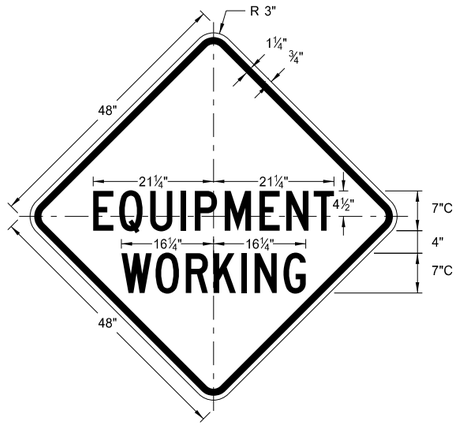
W21-50-48
Legend: black (non-refl)
Background: orange



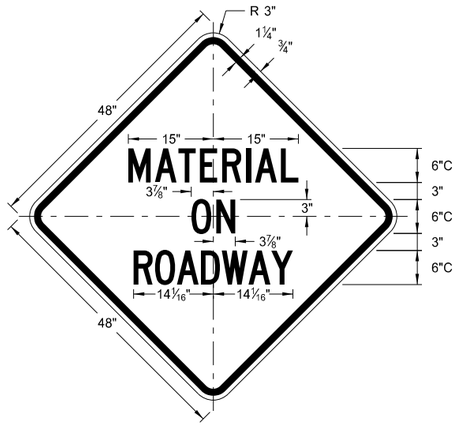
W21-53-48
Legend: black (non-refl)
Background: orange

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

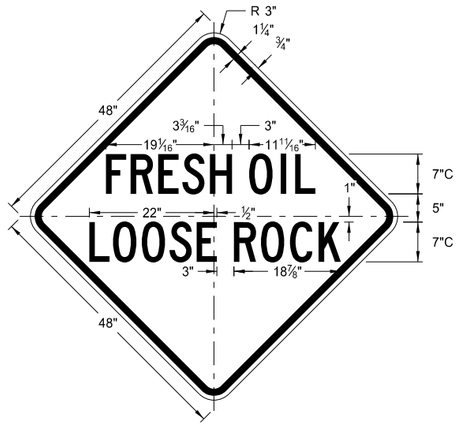
* DISTANCE MESSAGES



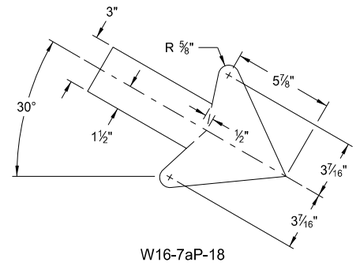
W20-51-48
Legend: black (non-refl)
Background: orange



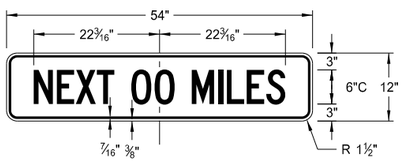
W21-51-48
Legend: black (non-refl)
Background: orange



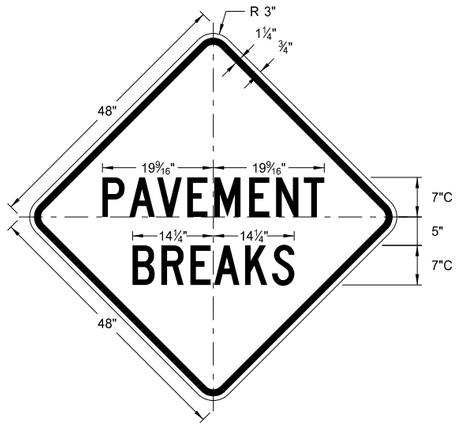
W22-8-48
Legend: black (non-refl)
Background: orange



W16-7aP-18



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



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

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

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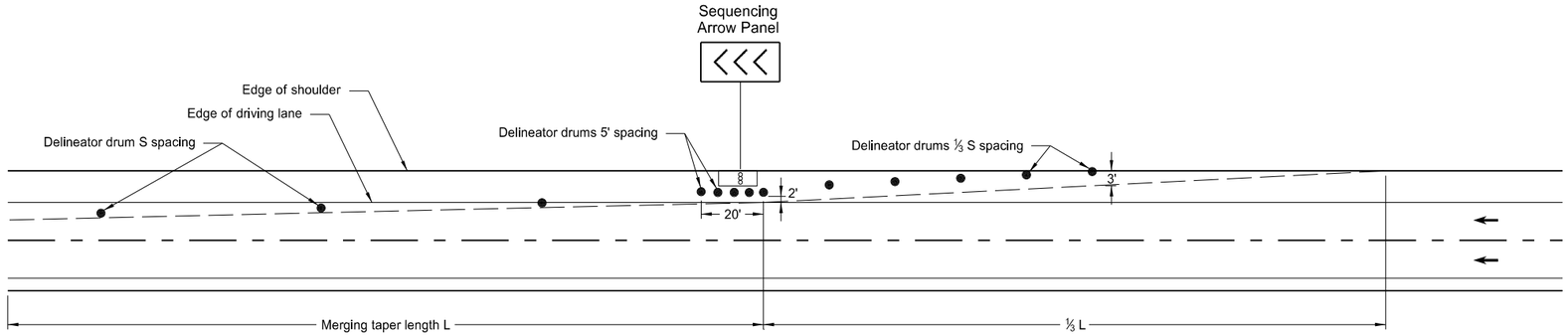
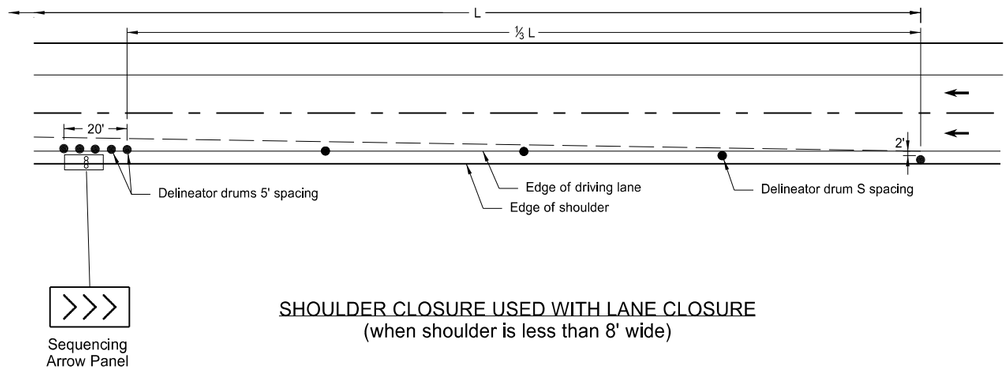
SHOULDER CLOSURE TAPERS

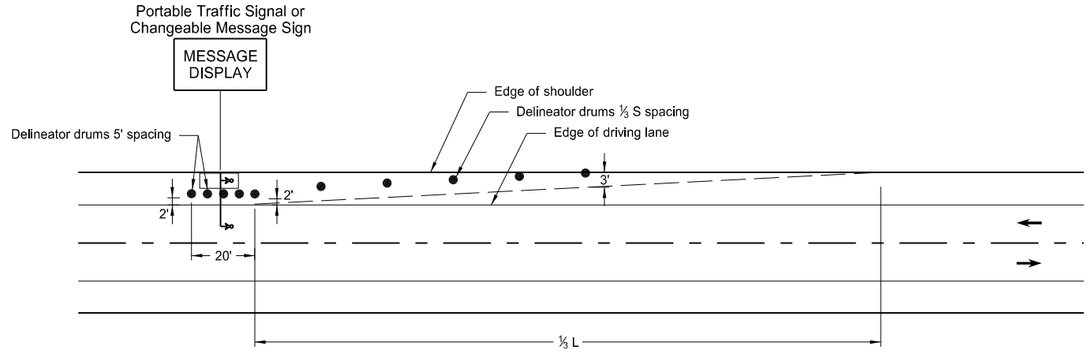
D-704-12



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:

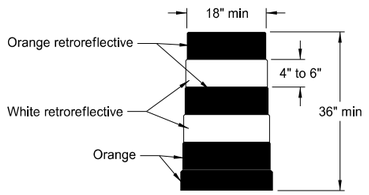
1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, use a length of approximately ⅓L. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
3. When 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 voice
10-25-19	Added L dimension to detail

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 10/25/19 and the original document is stored at the North Dakota Department of Transportation

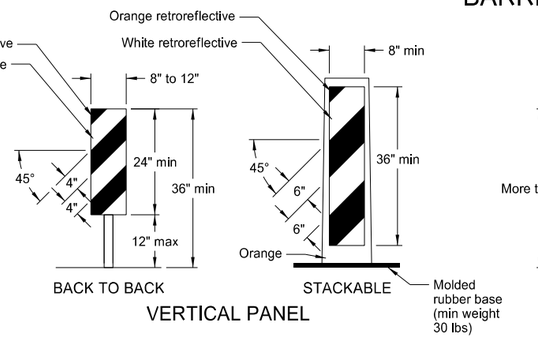
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



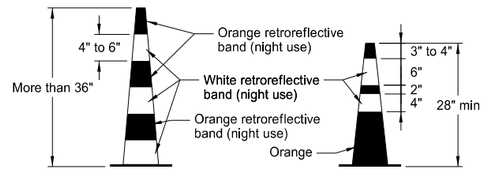
DELINEATOR DRUM

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



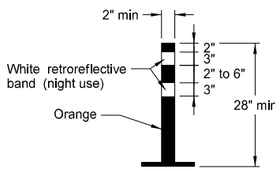
VERTICAL PANEL

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



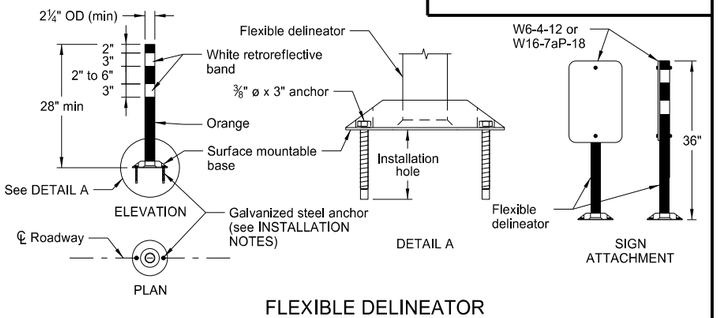
TRAFFIC CONE

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



TUBULAR MARKER

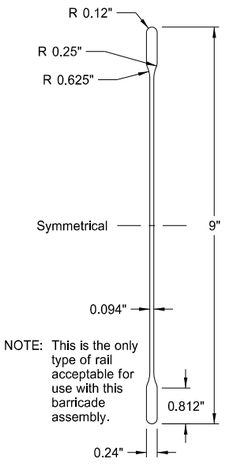
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

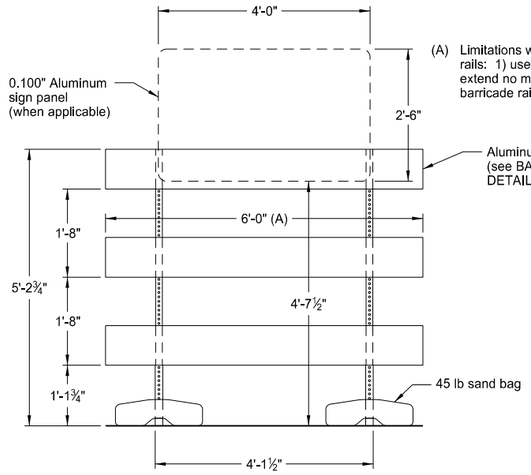
INSTALLATION NOTES:

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



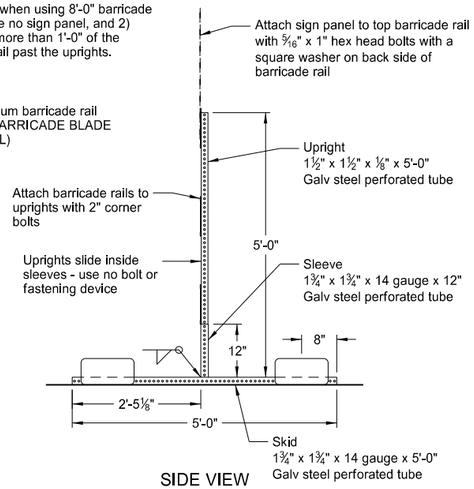
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



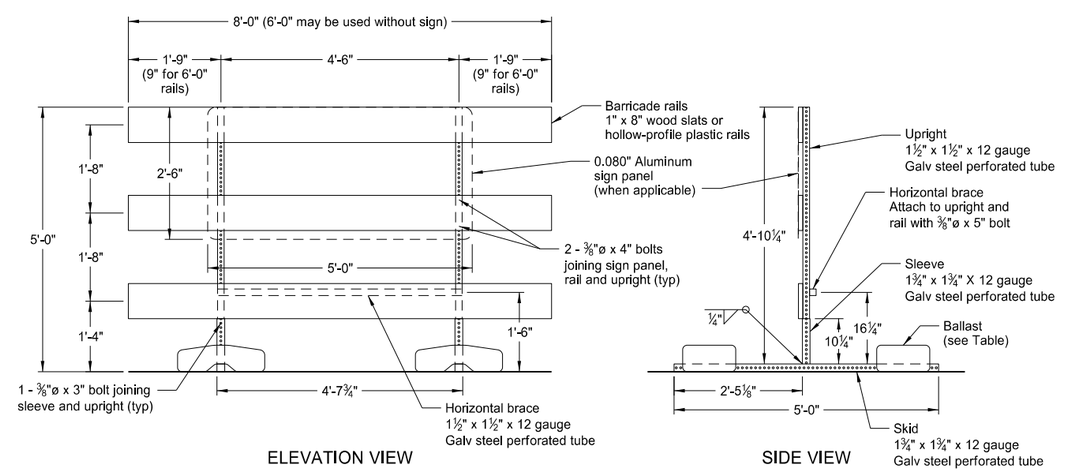
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



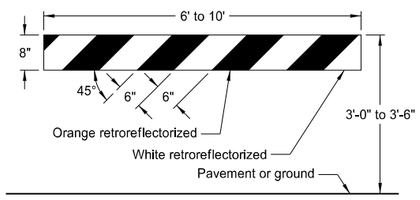
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

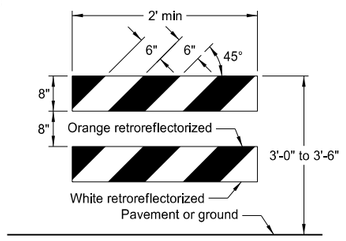


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

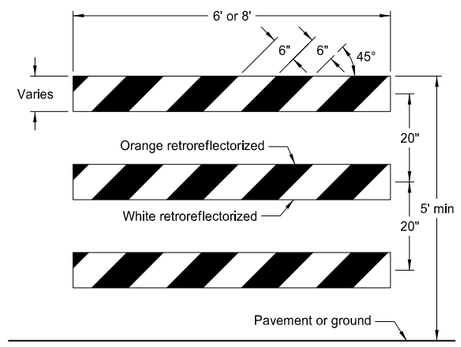
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

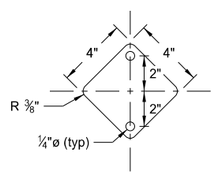


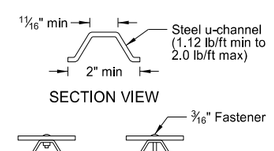
TYPE II BARRICADE

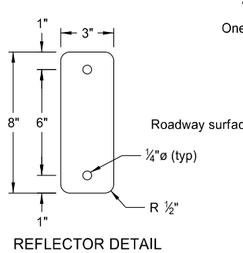


TYPE III BARRICADE

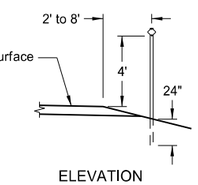
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

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

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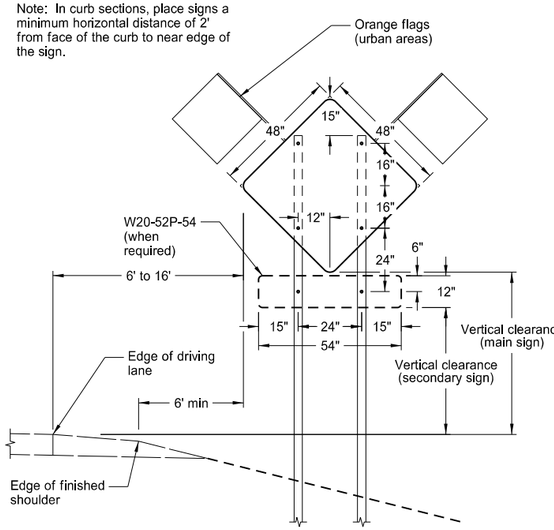
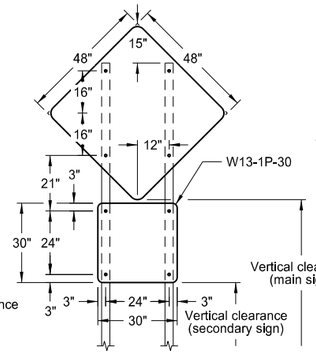
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

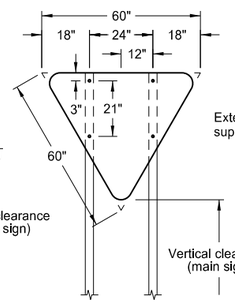
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



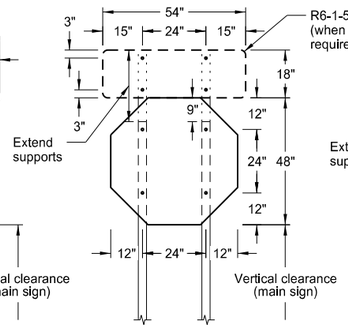
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



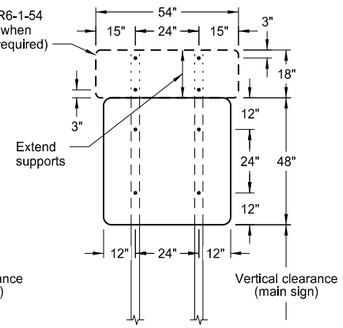
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



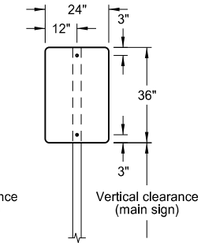
R1-2-60 - YIELD SIGN



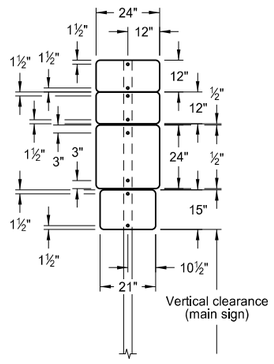
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



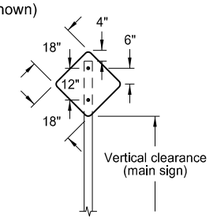
48" x 48" SIGN
(with R6-1-54 sign as required)



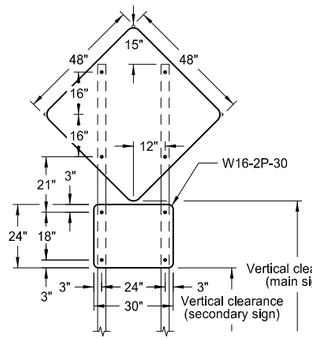
24" x 36" SIGN



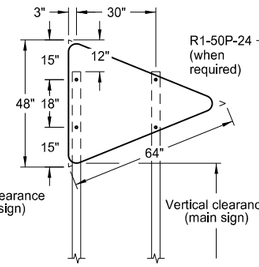
24" x 24"
ROUTE MARKER
ASSEMBLY



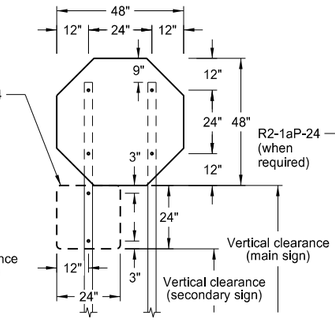
18" x 18"
DIAMOND SIGN



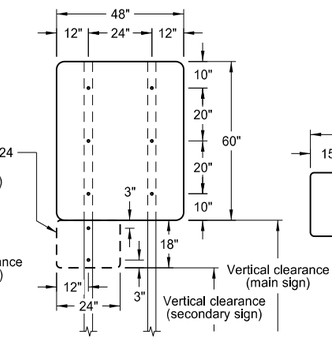
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



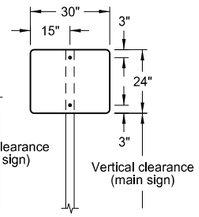
W14-3-64 - PENNANT SIGN



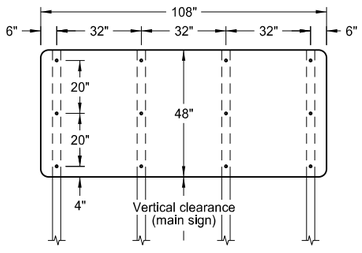
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



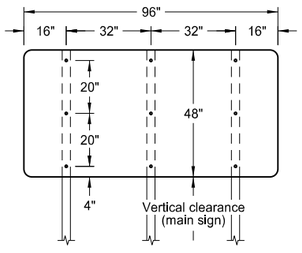
48" x 48" SIGN
(with R2-1aP-24 sign as required)



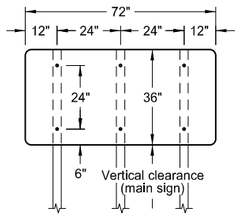
30" x 24" SIGN



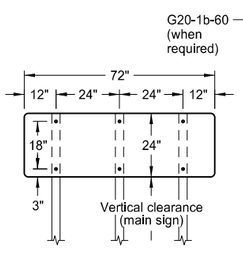
108" x 48" SIGN



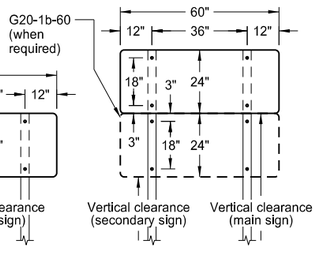
96" x 48" SIGN



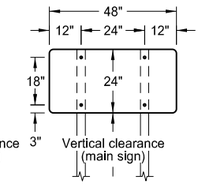
72" x 36" SIGN



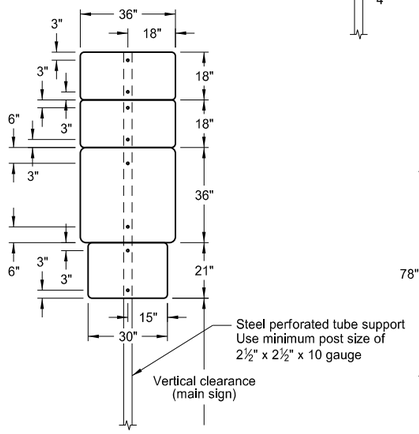
72" x 24" SIGN



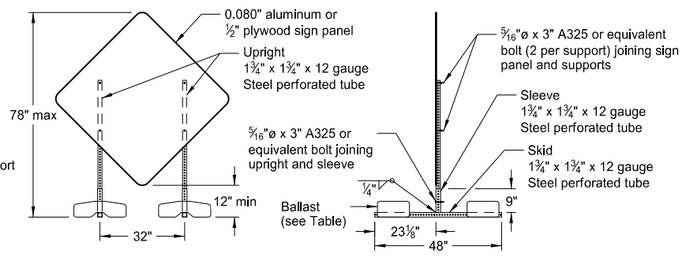
60" x 24" SIGN



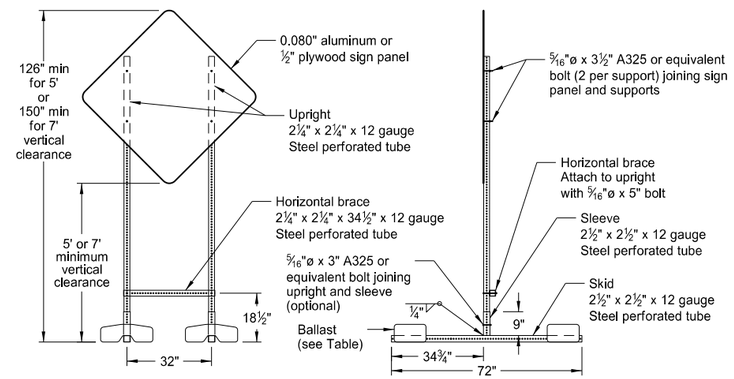
48" x 24" SIGN



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

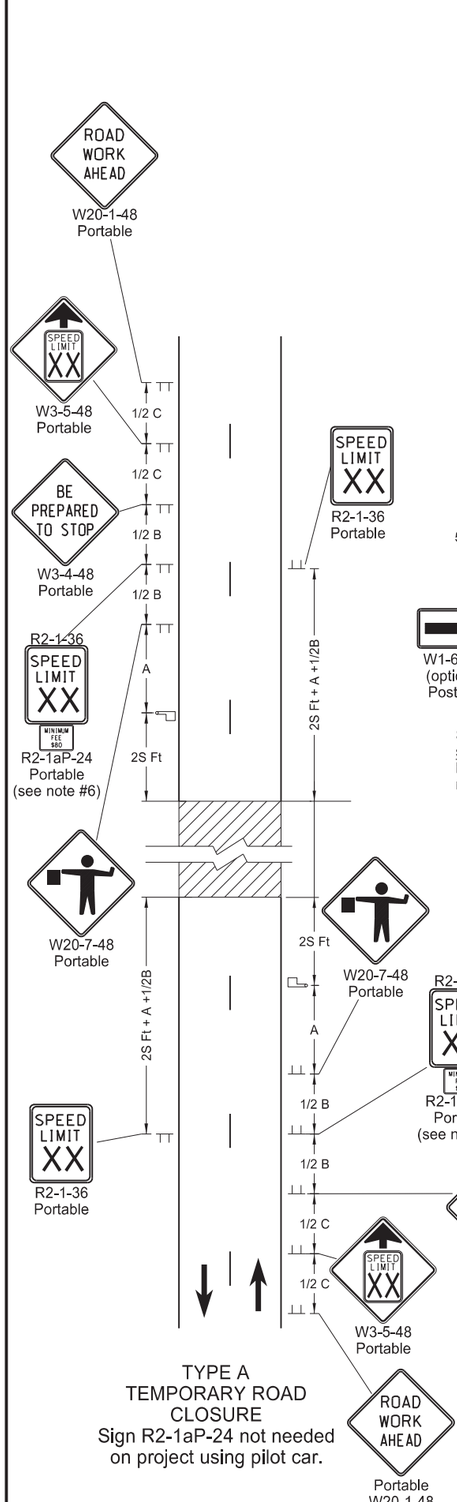
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

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

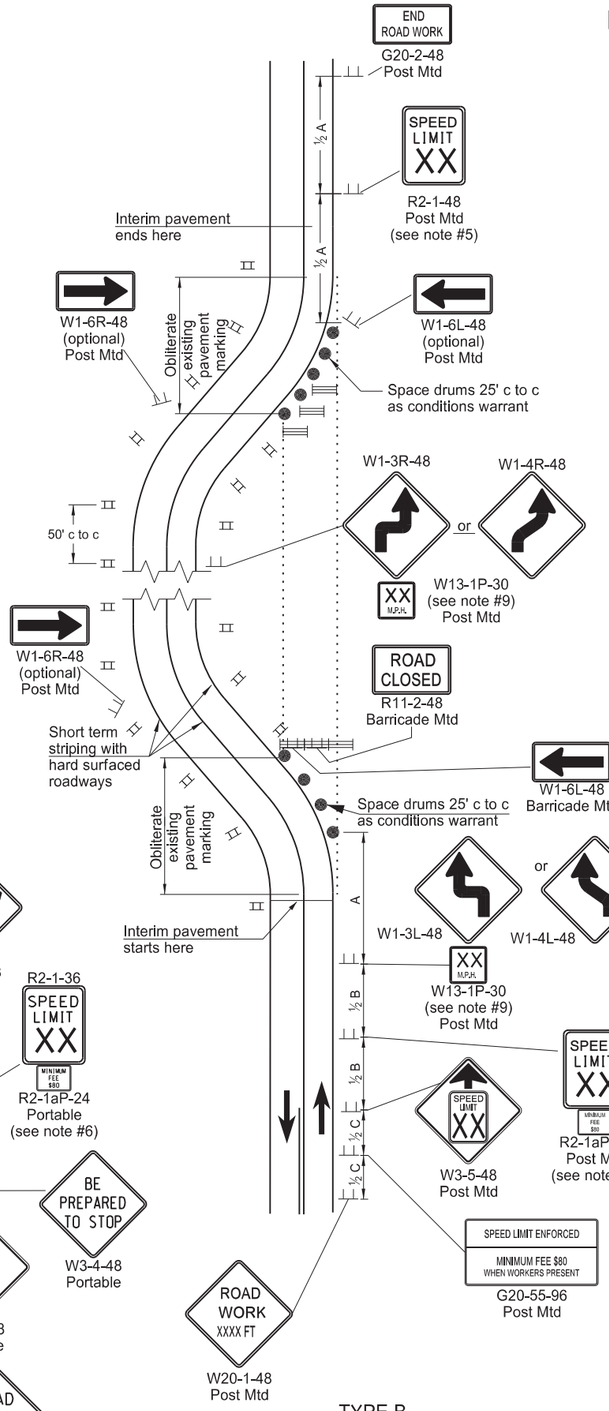
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/1/19 and the original document is stored at the North Dakota Department of Transportation

ROAD CLOSURE LAYOUTS

D-704-15

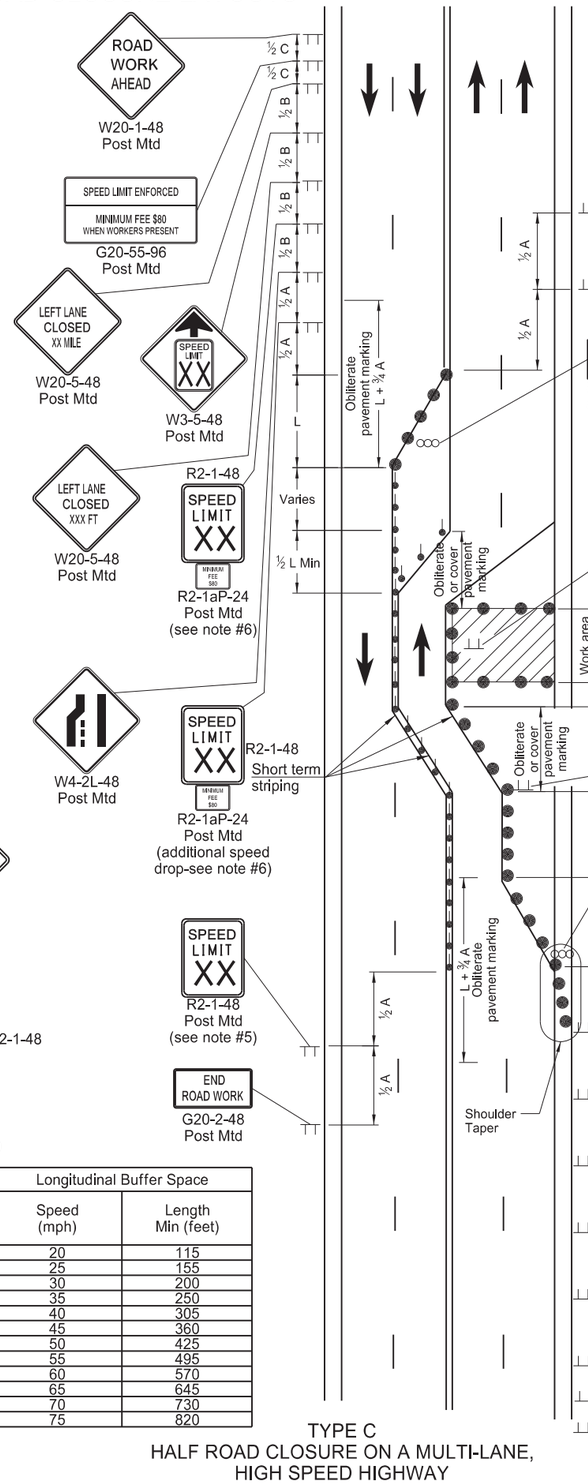


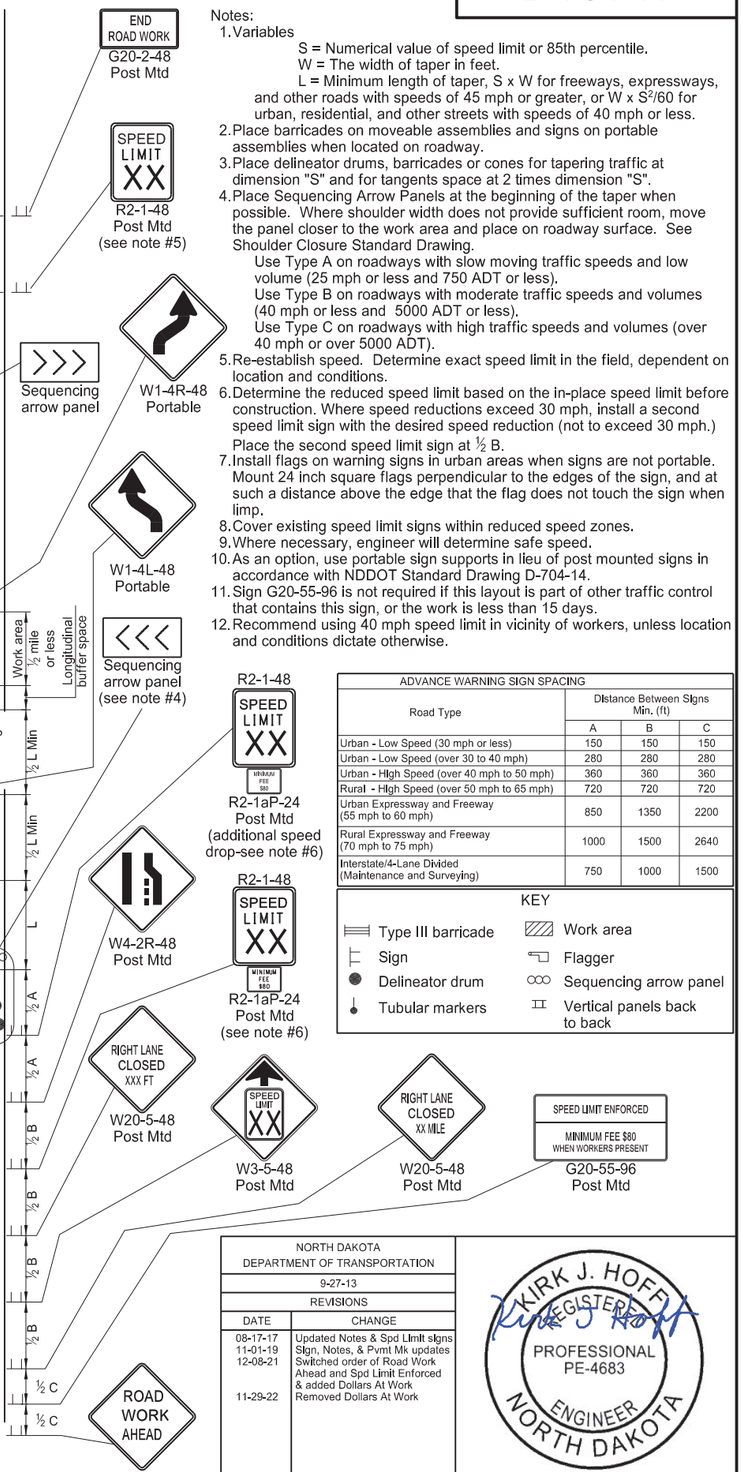
TYPE A
TEMPORARY ROAD CLOSURE
Sign R2-1aP-24 not needed on project using pilot car.



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

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





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

Notes:
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x S^2/60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this 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 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance and Surveying)	750	1000	1500

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

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
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

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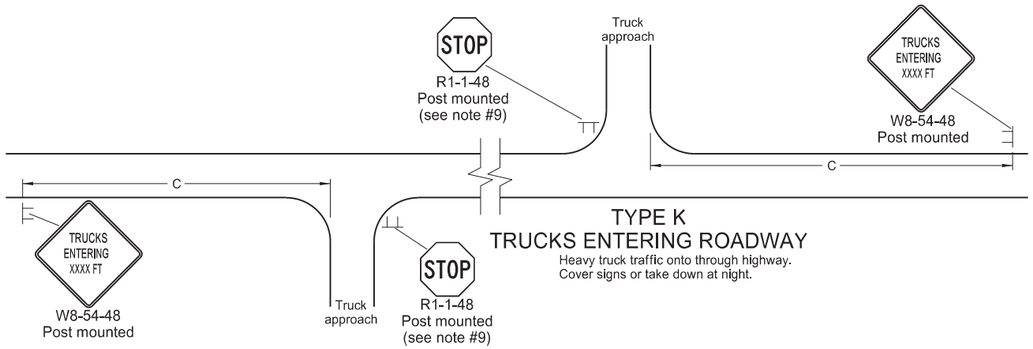
ENGINEER
NORTH DAKOTA

11/29/22

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

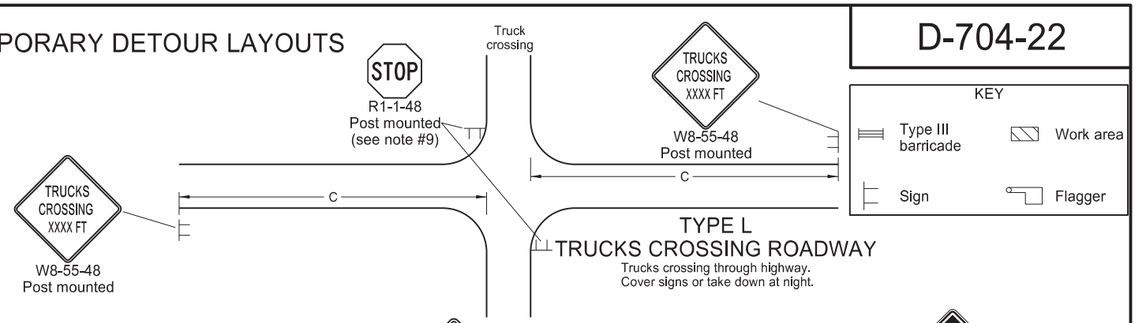
D-704-22

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



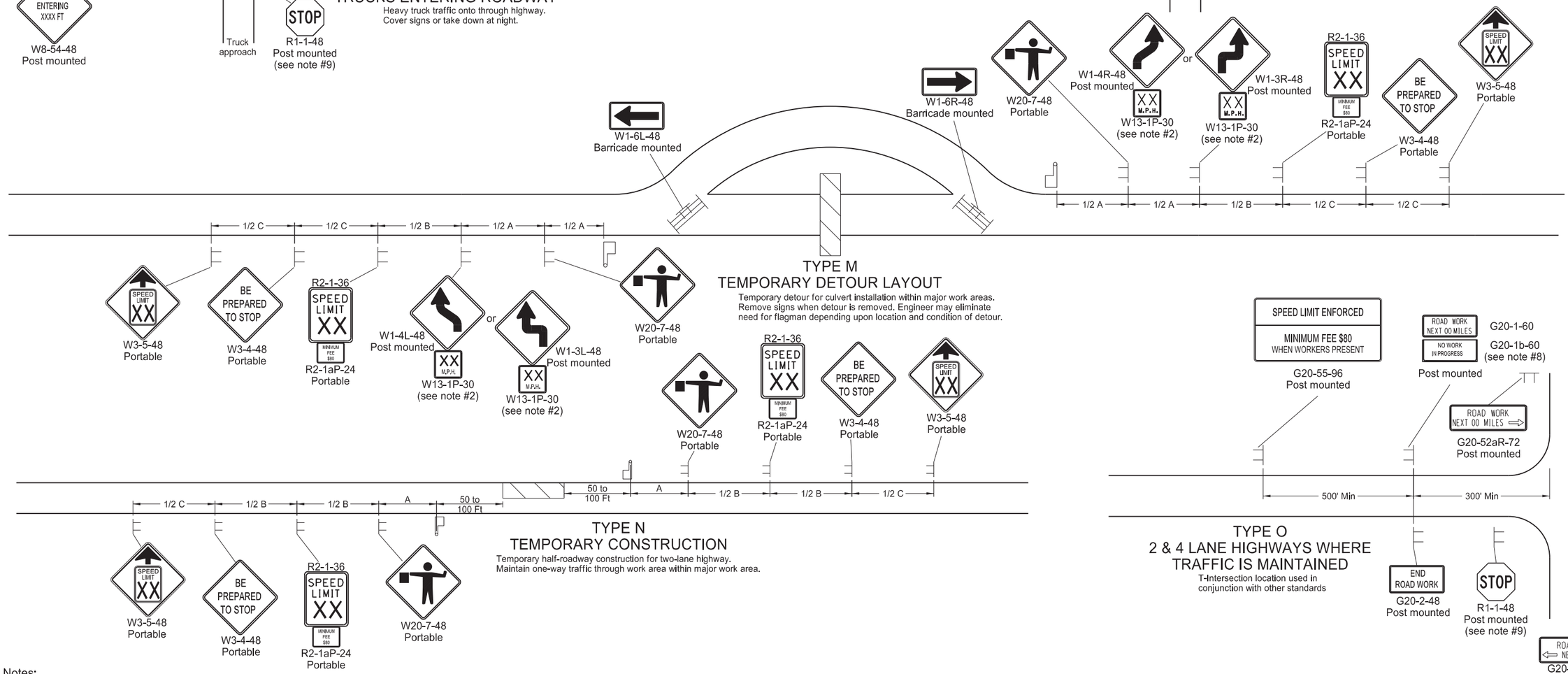
TYPE K
TRUCKS ENTERING ROADWAY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

DATE	CHANGE
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

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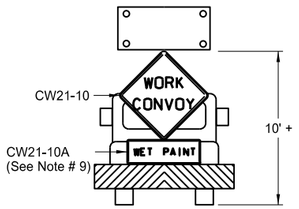
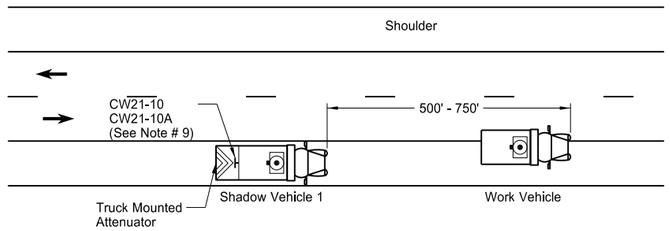
11/29/22

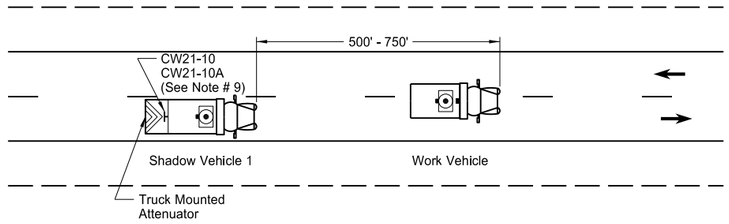
MOBILE OPERATION
(PAVEMENT MARKING)



Typical Shadow Vehicle 1
Two-Way Roaday

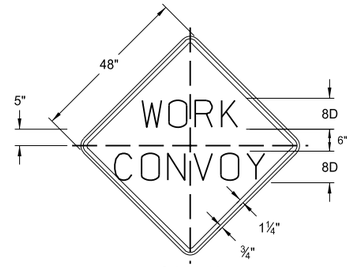


Two-Way Roadway with Paved Shoulders

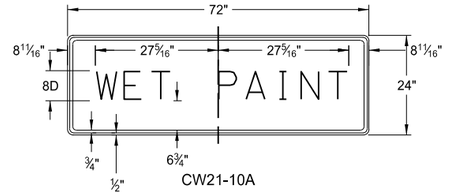


Two-Way Roadway without Paved Shoulders

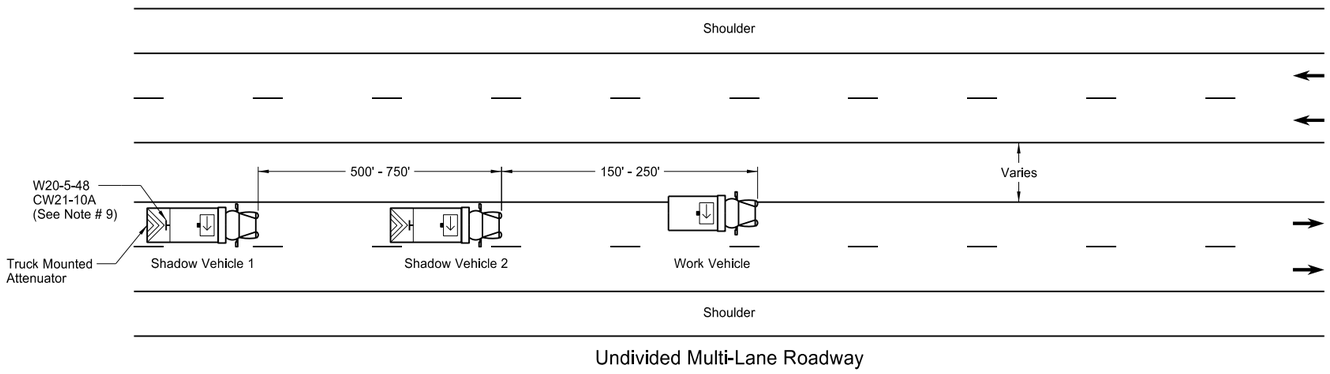
Sign Details



CW21-10

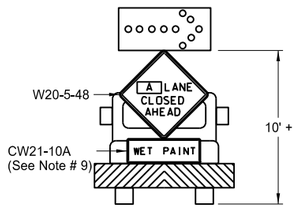


CW21-10A



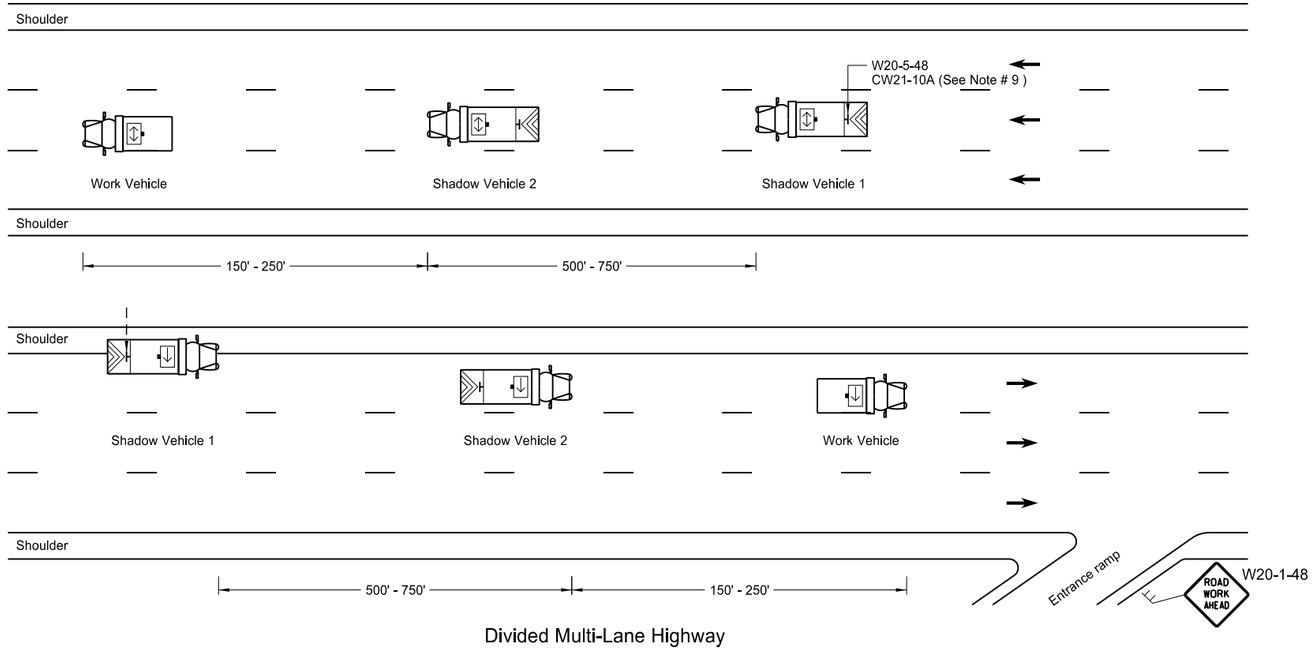
Undivided Multi-Lane Roadway

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

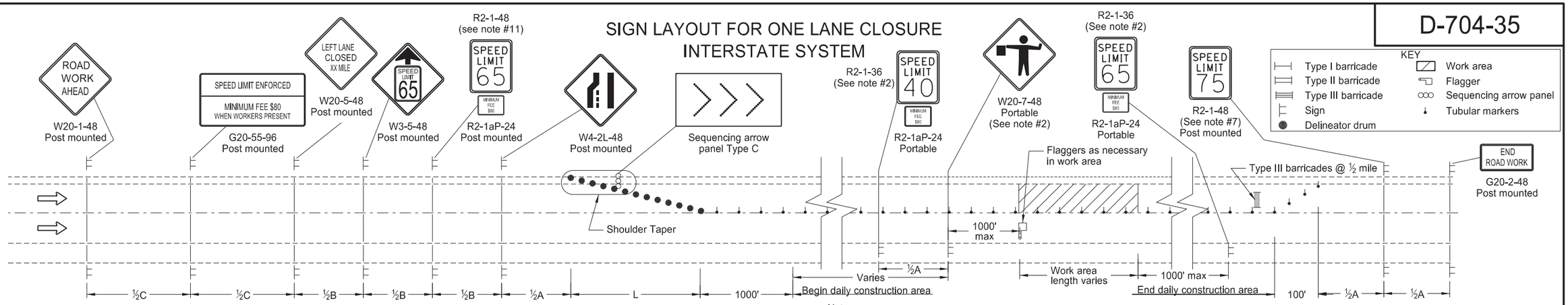
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

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

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/08/19 and the original document is stored at the North Dakota Department of Transportation

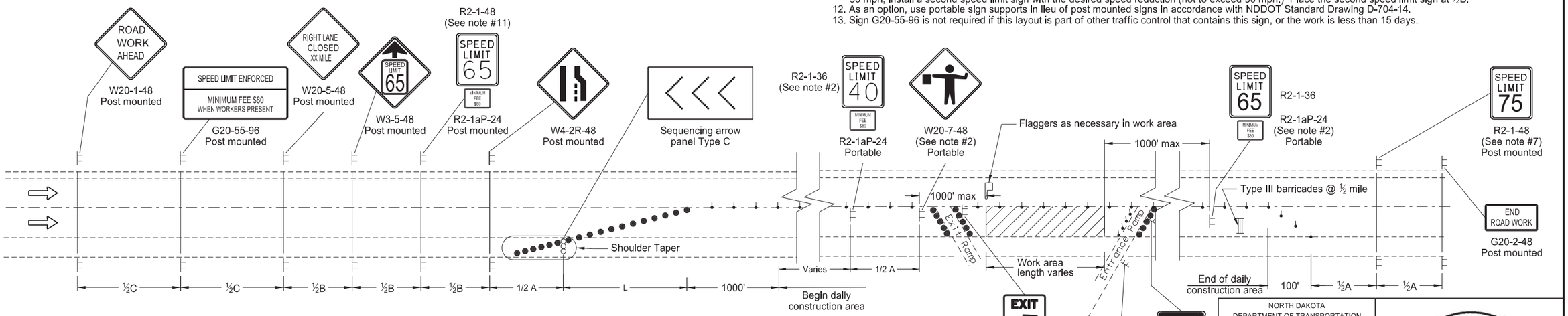
D-704-35

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



RIGHT LANE CLOSED
WORKERS IN WORK AREA

Notes:

1. Install advance signs for flagging when flaggers are flagging.
2. Move the advanced flagger sign and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Space the 40 mph speed limit sign at ½A in advance of the flagger sign and move the 65 mph speed limit sign. Cover or remove the 40 mph speed limit and Minimum Fee $80 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.

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

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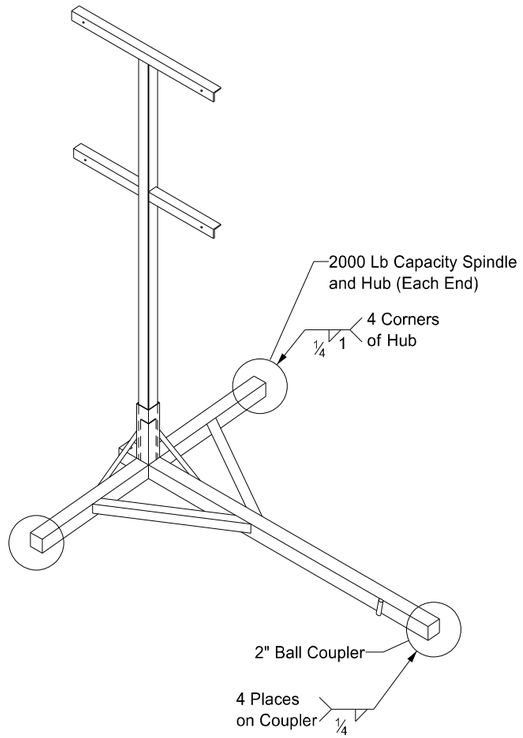
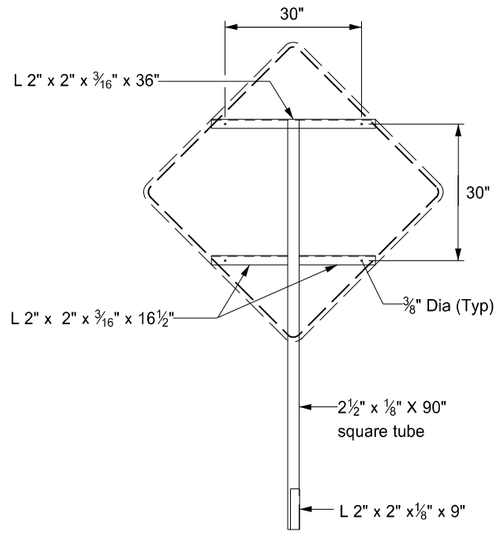
NORTH DAKOTA

11/29/22

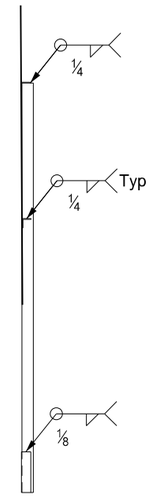
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

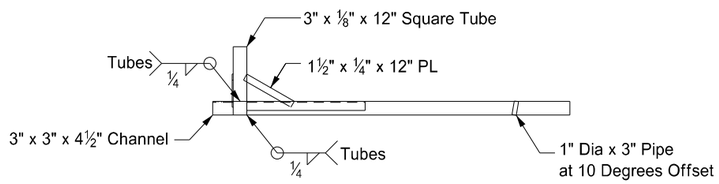


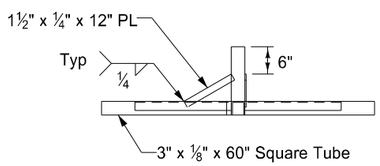
RIGHT

SIGN SUPPORT

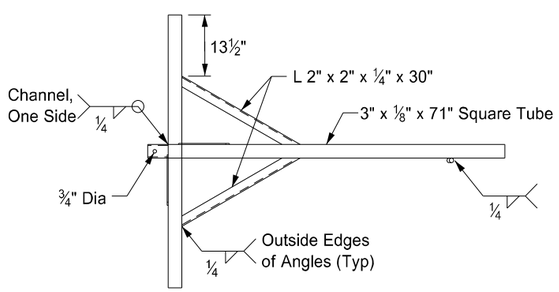
Notes:

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.

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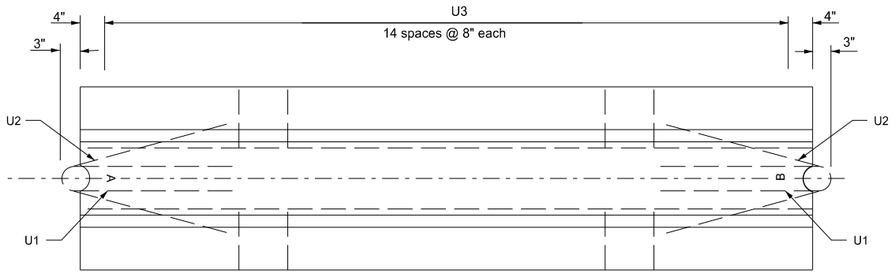
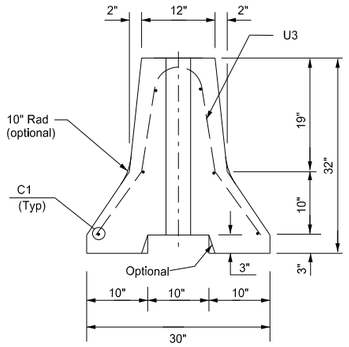
ENGINEER
NORTH DAKOTA
Kirk J Hoff
12 02 2020

PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)

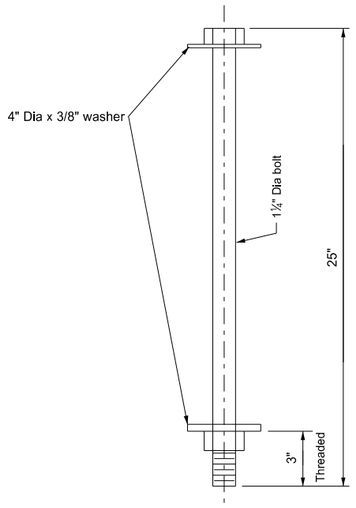
D-704-51



Plan View



End View

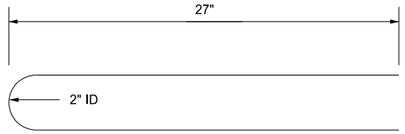


Connecting Bolt Detail

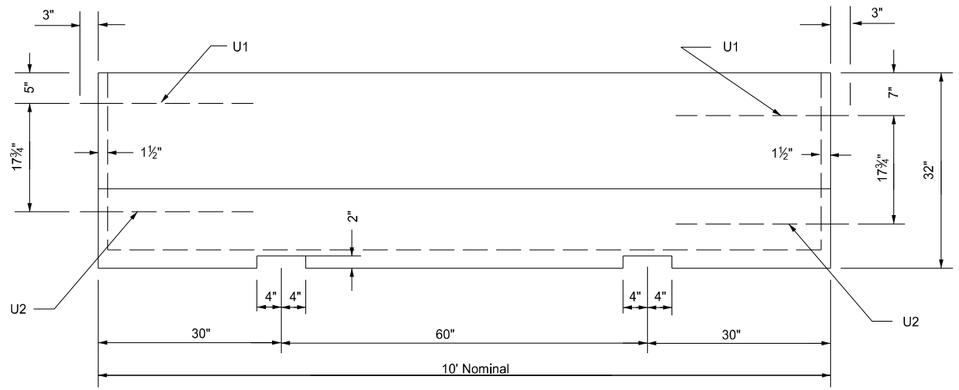
(One per 10 Ft section)

Notes:

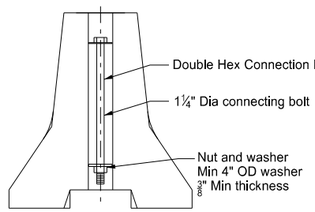
1. Galvanize all exposed hardware as per ASTM A153, except for the loop inserts.
2. Use AAE-3 Concrete.
3. Provide steel in accordance with Section 612 of NDDOT Standard Specifications.
4. Imprint barrier ends A and B as shown with 4 inch letters. Field match A end with B end.
5. Place barrier markers at the center of the barrier at 20' centers.
6. Connect barrier sections with 1 ¼" Dia A-307 double hex connecting bolt. Maintain bottom nut and washer connection for duration of barrier installation.
7. Place barrier to minimize openings between individual sections.



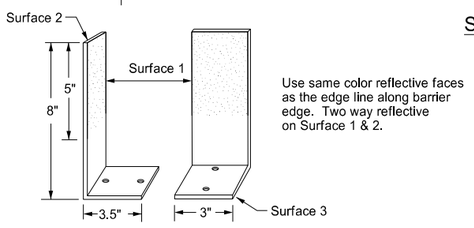
U1 Bar Detail



Side View

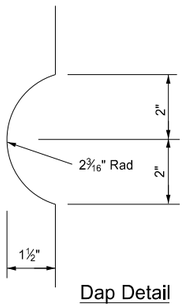


Bolt Connection Detail

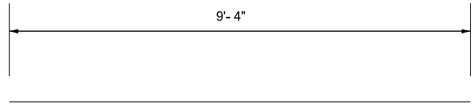


Use same color reflective faces as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

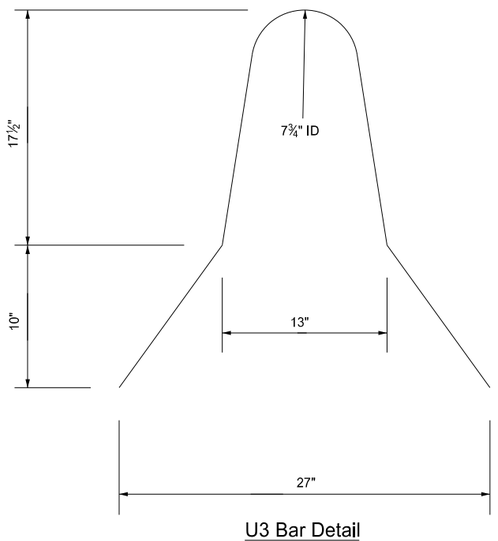
Barrier Marker Detail



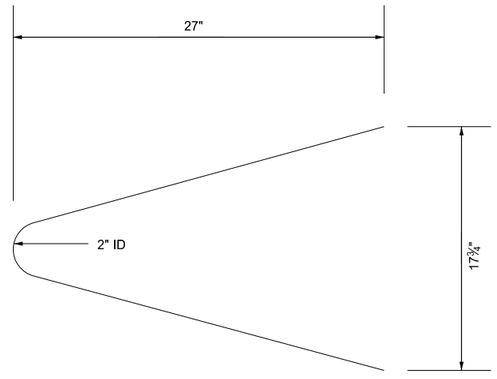
Dap Detail



C1 Bar Detail



U3 Bar Detail



U2 Bar Detail

Marker Body
Use high impact,weatherable engineering thermo-plastic material conforming to the following:

Property	Result	ASTM Test Method
Thickness (min)	.090"	——
Tensile strength (min psi) @ yield	5,500	D638
Impact strength @ -20°F (ft-lbs/in of notch)	3.2	D256 Method A
Impact strength @ 73°F (ft-lbs/in of notch)	14.0	D256 Method A
Flexural strength, PSI ¼" @ 73°F	8,000	D790
Flexural modulus, PSI ¼" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

Reflective Tape
Use retroreflective, acrylic microprism material with acrylic backing, 3" wide, providing the following minimum optical performance with an observation angle of 0.1° measured in candlepower for the reflector:

Entrance Angle	Specific Intensity
Yellow - 4"	136
White - 4"	200

Adhesive
Use factory applied solid butyl rubber ⅛" thick, 2" wide on 2¼" wide release paper on surface 3 to temporarily mount markers to portable concrete barrier.

Bar List

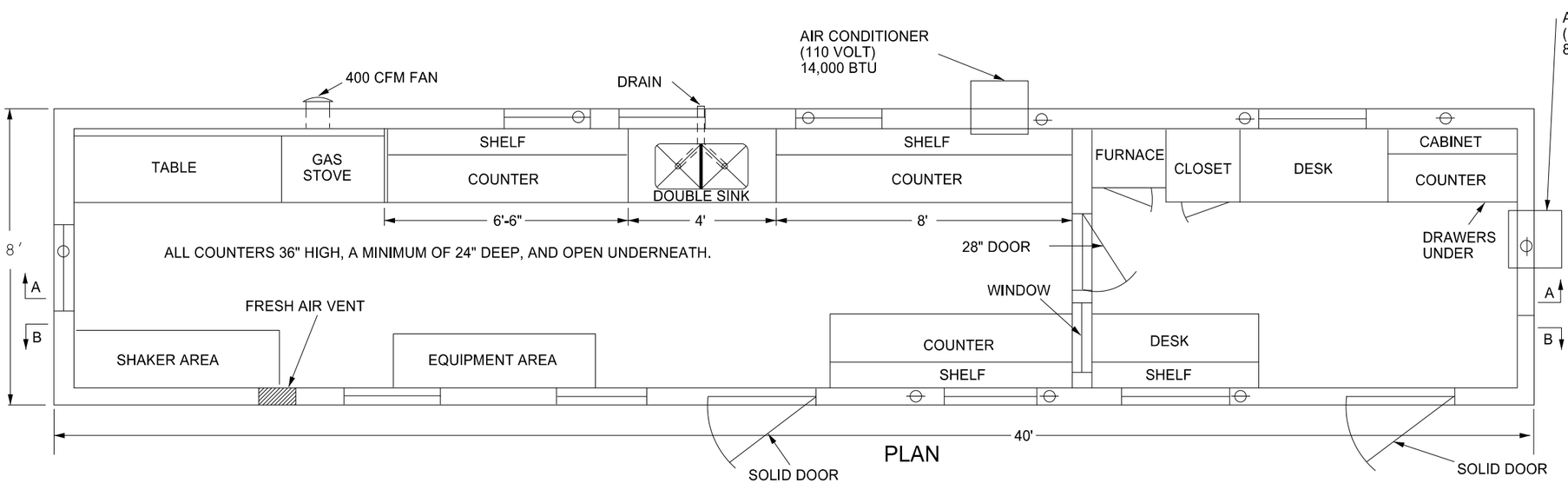
Mark	Size	No.	Length	Shape
C1	4	6	9'- 4"	Straight
U1	4	2	4'- 8"	Bent
U2	4	2	4'- 10¼"	Bent
U3	4	15	5'- 4"	Bent

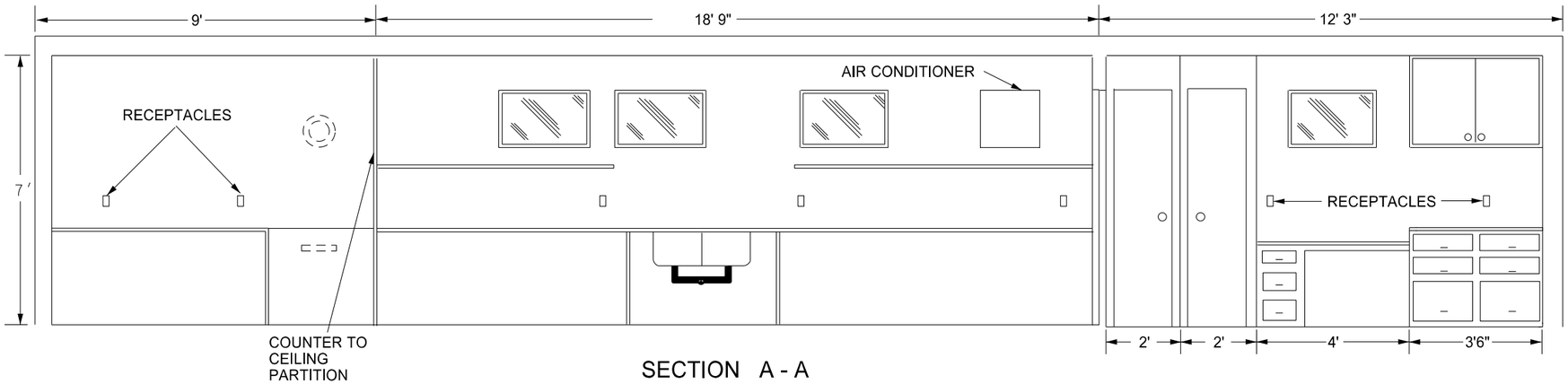
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	New Design Engr PE Stamp

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

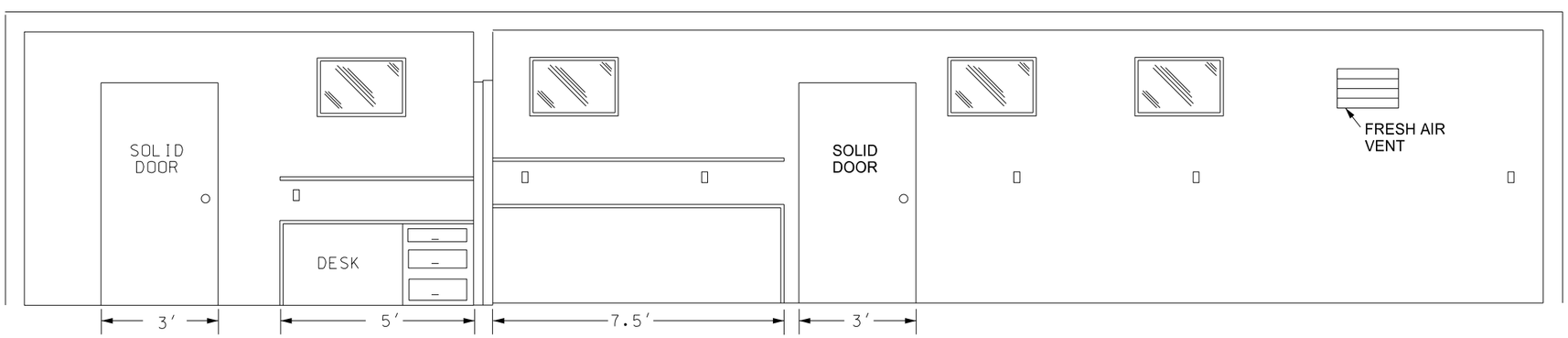
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

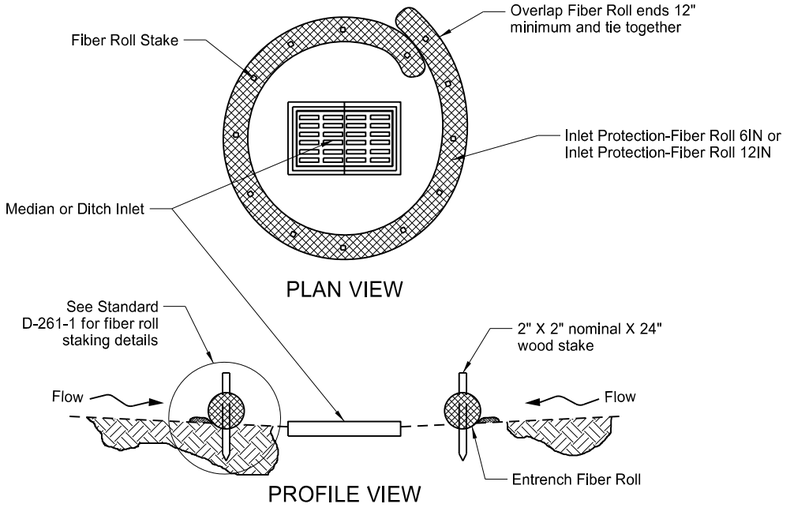
Provide a laboratory with the following:

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

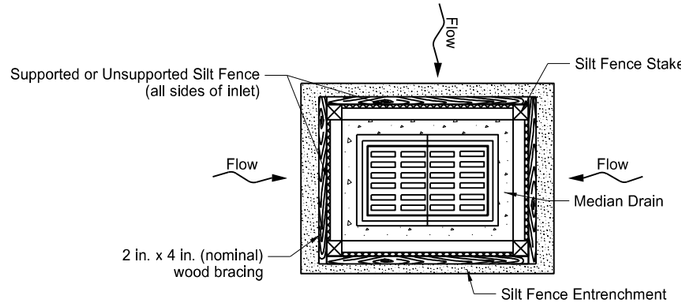
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

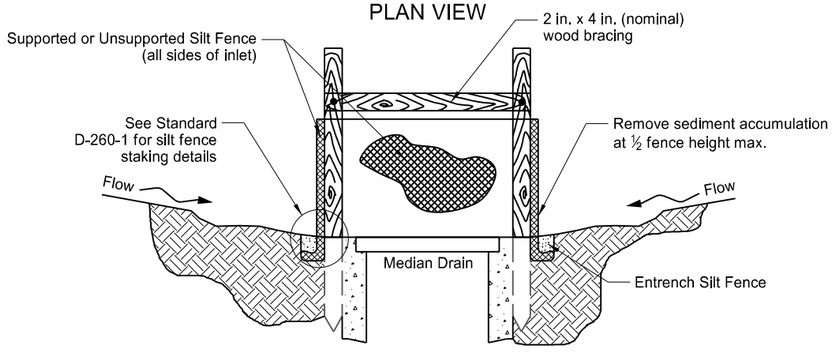
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 08/27/19 and the original document is stored at the North Dakota Department of Transportation

EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION

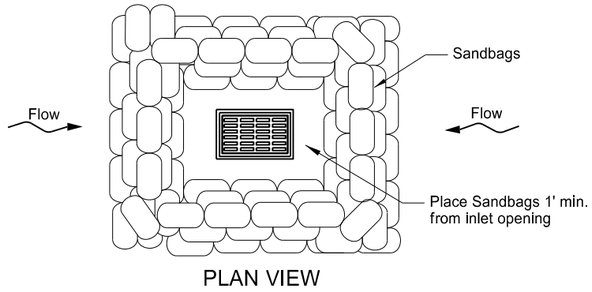


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)

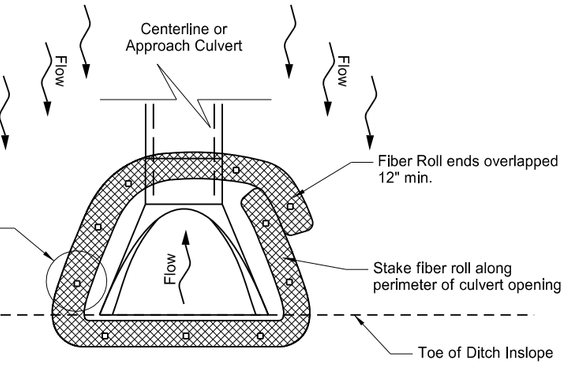




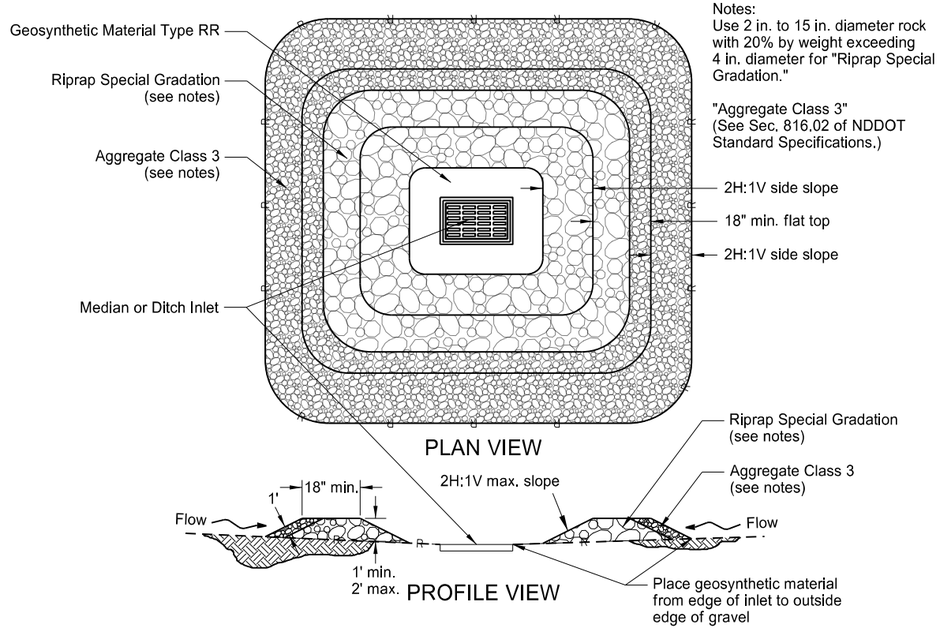
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



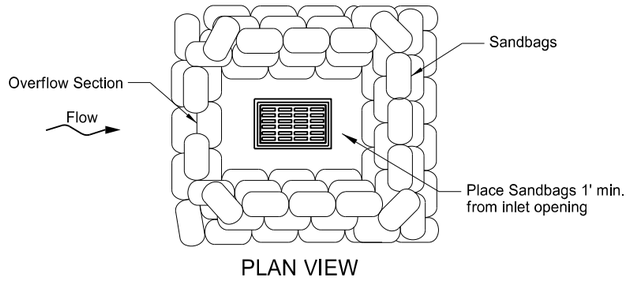
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



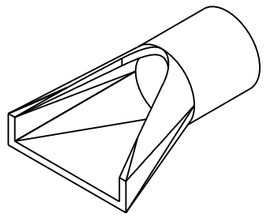
SANDBAG PROTECTION (ON SLOPE)

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

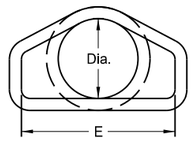
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8-27-19 and the original document is stored at the North Dakota Department of Transportation

REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

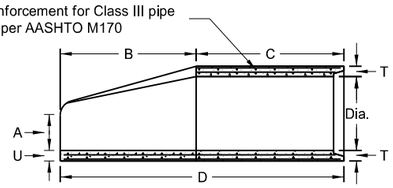
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30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



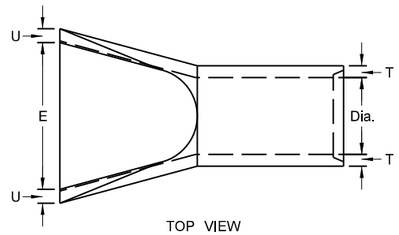
PERSPECTIVE



END VIEW



SIDE VIEW



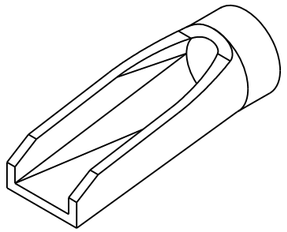
TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION
Reinforcement to be equivalent to Class III RCP

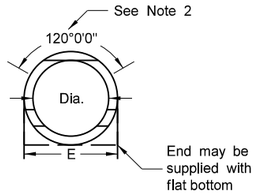
NOTES:

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.

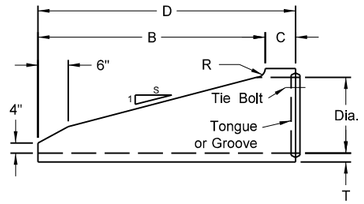
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



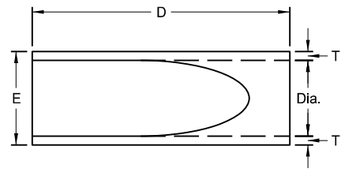
PERSPECTIVE



END VIEW



SIDE VIEW



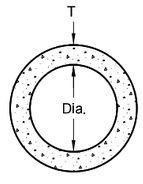
TOP VIEW

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION
Reinforcement to be equivalent to Class III RCP

NOTES (Traversable End Section):

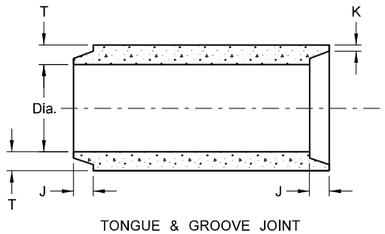
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

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	2¾-3¾	1⅛	3
27	3.98	322	2¾-4	1¼	3¼
30	4.91	384	3¼-4¼	1¼	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3¼-4¼	1½	4
42	9.62	685	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	3⅛	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

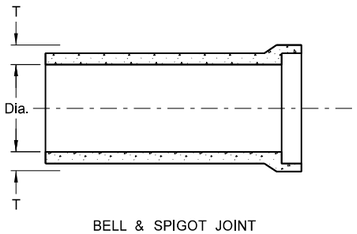


END VIEW

CIRCULAR PIPE

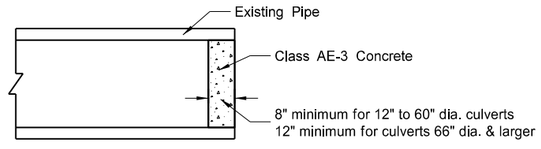


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

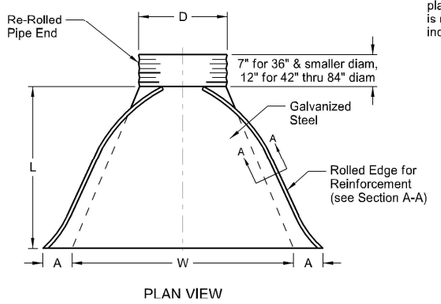
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

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

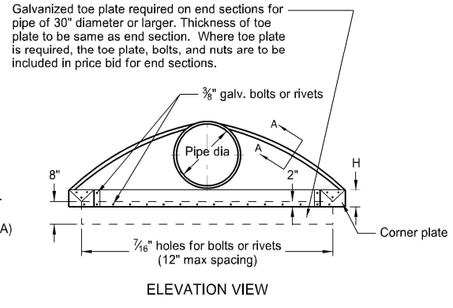
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

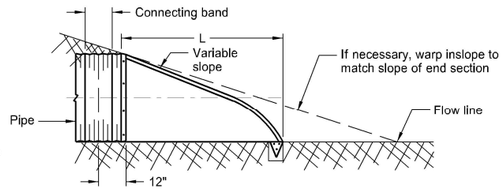
D-714-4



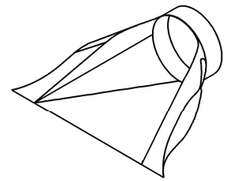
PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

** PIPE DIA.	GALVANIZED THICKNESS	END SECTION DIMENSIONS A	B	H	L	W	APPROX. SLOPE	BODY
IN	IN	IN	IN	IN	IN	IN	RATE	PIECE
15	0.064 - 0.079	7	8	6	26	30	2½:1	1
18	0.064 - 0.109	8	10	6	31	36	2½:1	1
24	0.064 - 0.109	10	13	6	41	48	2½:1	1
30	0.064 - 0.109	12	16	8	51	60	2½:1	1 or 2
36	0.064 - 0.109	14	19	9	60	72	2½:1	2
42	0.064 - 0.138	16	22	11	69	84	2½:1	2
48	0.064 - 0.168	18	27	12	78	90	2¼:1	2
54	0.064 - 0.168	18	30	12	84	102	2:1	2
*60	0.064 - 0.168	18	33	12	87	114	1¾:1	3
*66	0.064 - 0.168	18	36	12	87	120	1½:1	3
*72	0.064 - 0.168	18	39	12	87	126	1½:1	3
*78	0.064 - 0.168	18	42	12	87	132	1¼:1	3
*84	0.064 - 0.168	18	45	12	87	138	1⅛:1	3

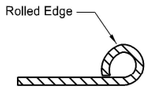
* These sizes have 0.109" sides and 0.138" center panels.

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

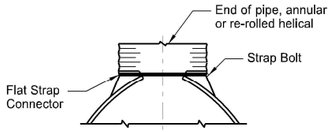
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

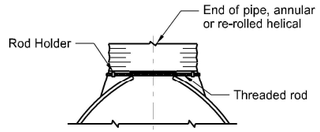
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



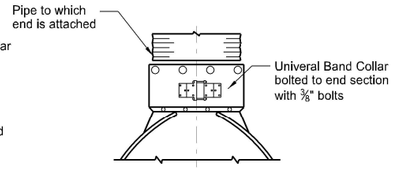
SECTION A-A



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



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

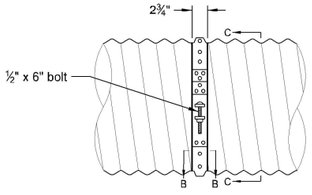


TYPE #3
For all pipe sizes

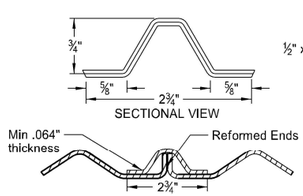
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"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

NOTES:

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



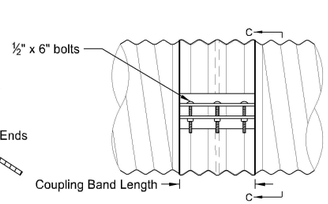
SIDE VIEW



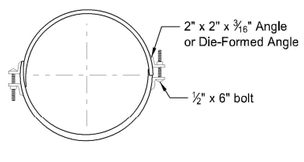
SECTIONAL VIEW

SECTION B-B

HAT BAND FOR FLANGED END PIPE

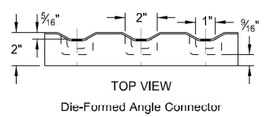


SIDE VIEW

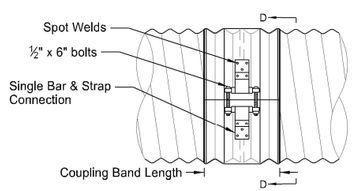


SECTION C-C
Angle Connection

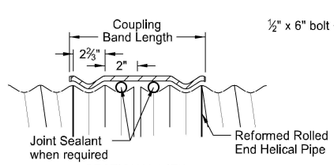
ANNULAR BAND



TOP VIEW
Die-Formed Angle Connector

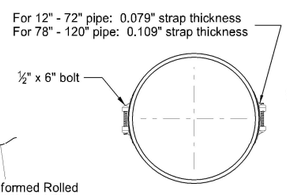


SIDE VIEW

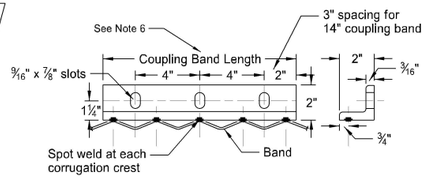


SECTIONAL VIEW

HUGGER COUPLING BAND



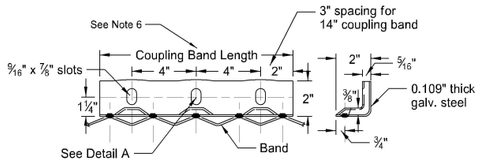
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

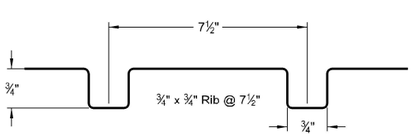
2" x 2" x 3/16" Angle Connector

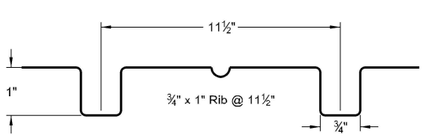


SIDE VIEW

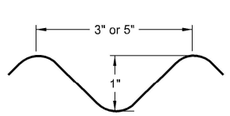
END VIEW

Die-Formed Angle Connector

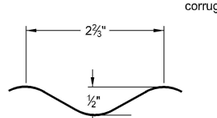




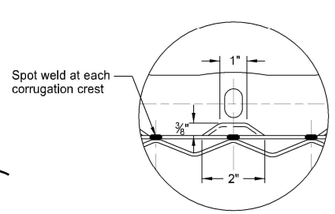
SPIRAL RIB CORRUGATIONS



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



2⅔" x ½" CORRUGATIONS



Detail A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-16-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail
09-18-19	Added Perspective View Detail
09-23-22	Galvanized Thickness Table

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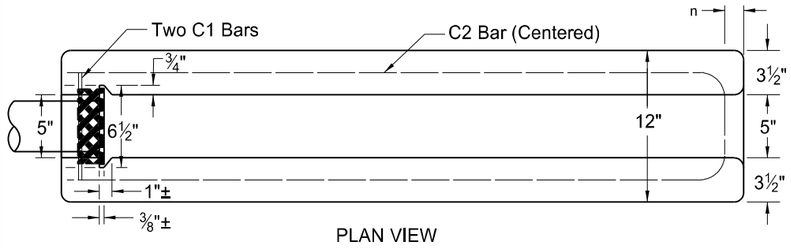
PROFESSIONAL
PE-4684
ENGINEER
NORTH DAKOTA

09/23/22

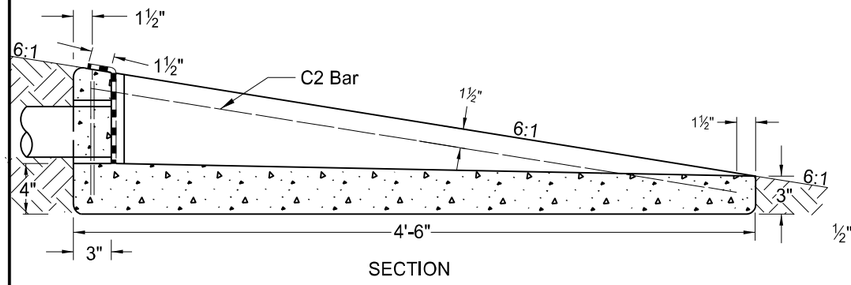
DocuSign

PRECAST CONCRETE HEADWALL DETAILS

D-714-18

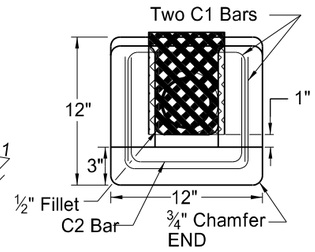


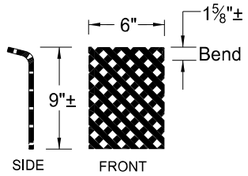
PLAN VIEW



SECTION

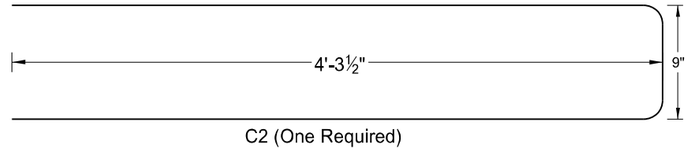
PRECAST CONCRETE HEADWALL (6:1 SLOPE)



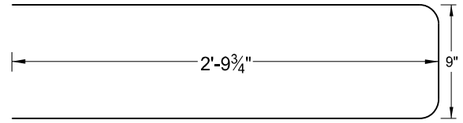


RODENT SCREEN

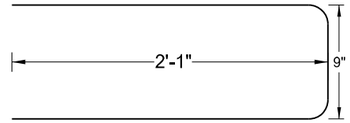
Dimensions are approximate to allow bend and a snug fit in headwall slot



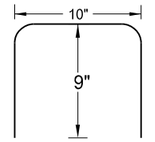
C2 (One Required)



C3 (One Required)

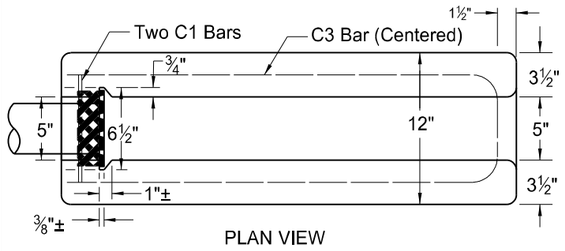


C4 (One Required)

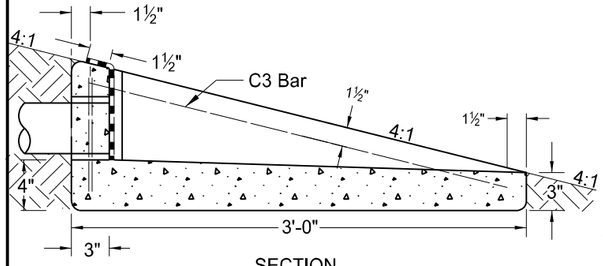


C1 (Two Required)

BENT BAR DETAILS

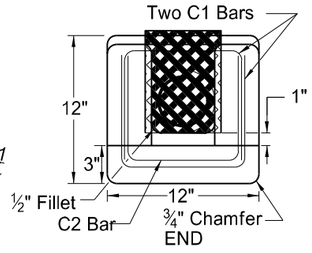


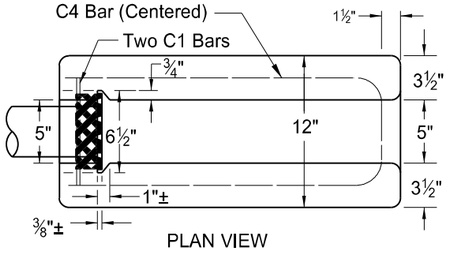
PLAN VIEW



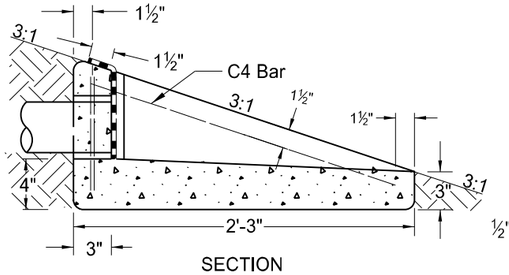
SECTION

PRECAST CONCRETE HEADWALL (4:1 SLOPE)



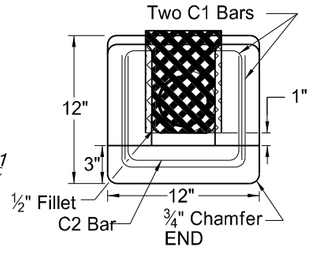


PLAN VIEW



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

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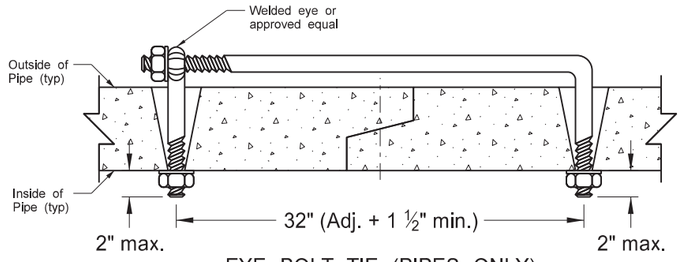
NORTH DAKOTA

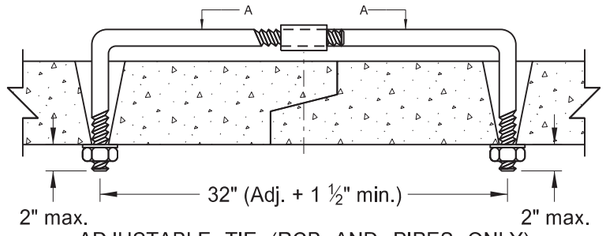
12 02 2020

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

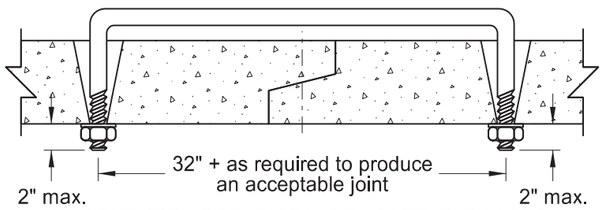
D-714-22



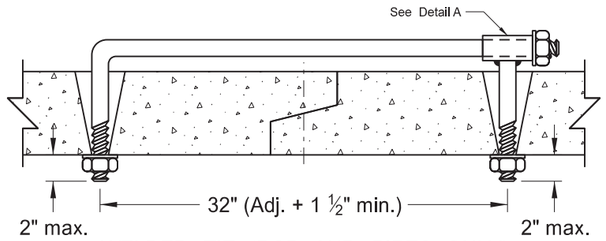
EYE BOLT TIE (PIPES ONLY)



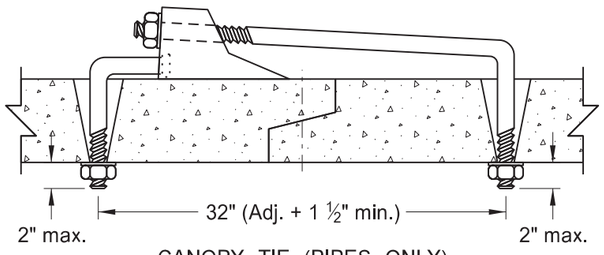
ADJUSTABLE TIE (RCB AND PIPES ONLY)



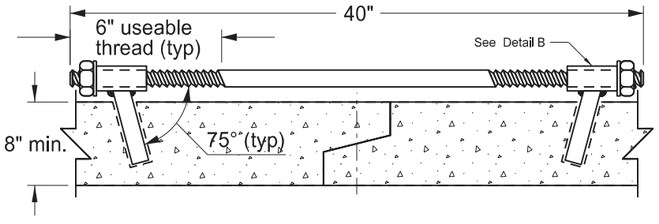
U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



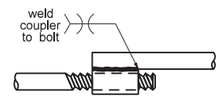
WELDED TIE (RCB AND PIPES ONLY)



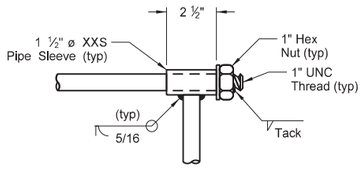
CANOPY TIE (PIPES ONLY)



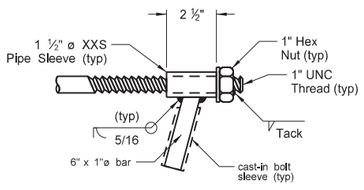
HIDDEN TIE (RCB ONLY)



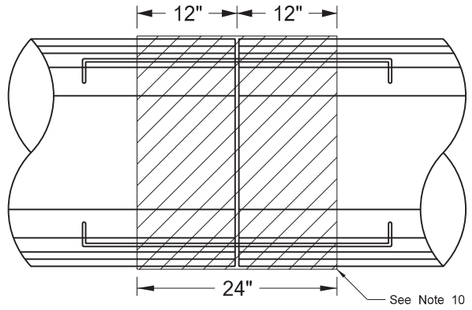
SECTION A-A



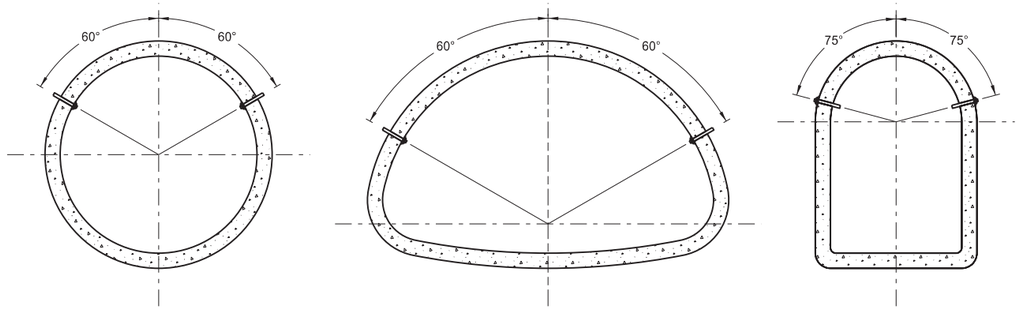
DETAIL A



DETAIL B



PLAN VIEW (PIPES ONLY)



END VIEW

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"	1 ¼"
RCB/Cattle Pass		

NOTES:

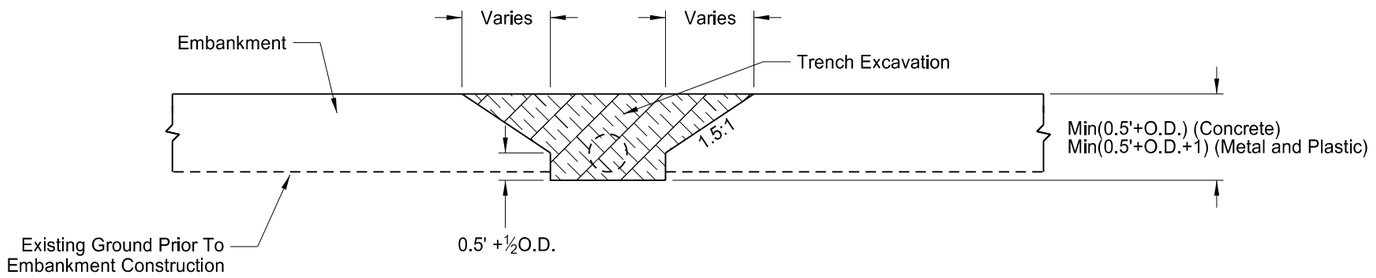
1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Insert pipe ties from the inside of the pipes and grout into place for Cattle Pass and Jacked and Bored pipes. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
3. Nuts 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 can be precast or drilled. Tapered holes are permitted when precast. 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 1 ¼".
7. Select the type of tie bolt used from those shown.
8. Include the cost of precasting or drilling the required holes and furnishing and installing the tie bolts in the price bid for the appropriate conduit or RCB pay item.
9. Tie all centerline and approach RCP culvert joints. Tie the first three joints including the end section 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.
10. Place joint wrap prior to installing ties. Firmly secure the wrap around the full perimeter. For concrete pipes, overlap the joint by 12" in both directions. For box culverts, use a waterproof membrane that meets ASTM C877 (Type III). 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.
11. 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.
12. Tie RCB's at locations shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11, Table, Title, Lables
8-11-21	Notes 2-12, Table, Lable

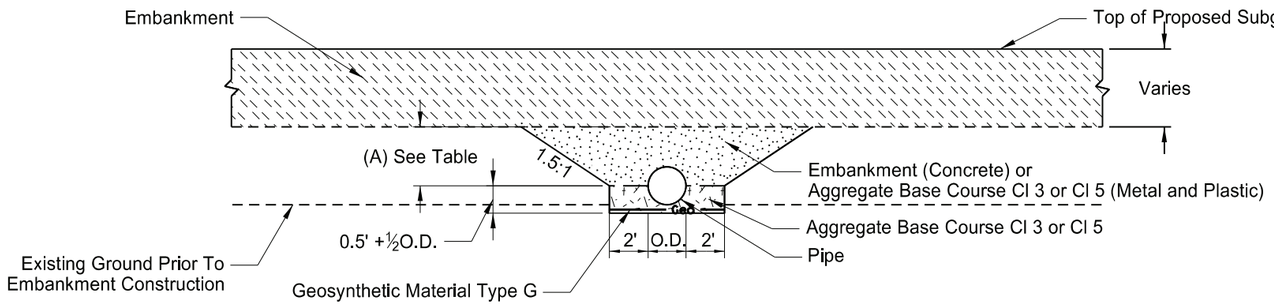
JONATHAN D KETTERLING
REGISTERED
PROFESSIONAL
PE-4684
ENGINEER
NORTH DAKOTA
08/11/21

DocuSign

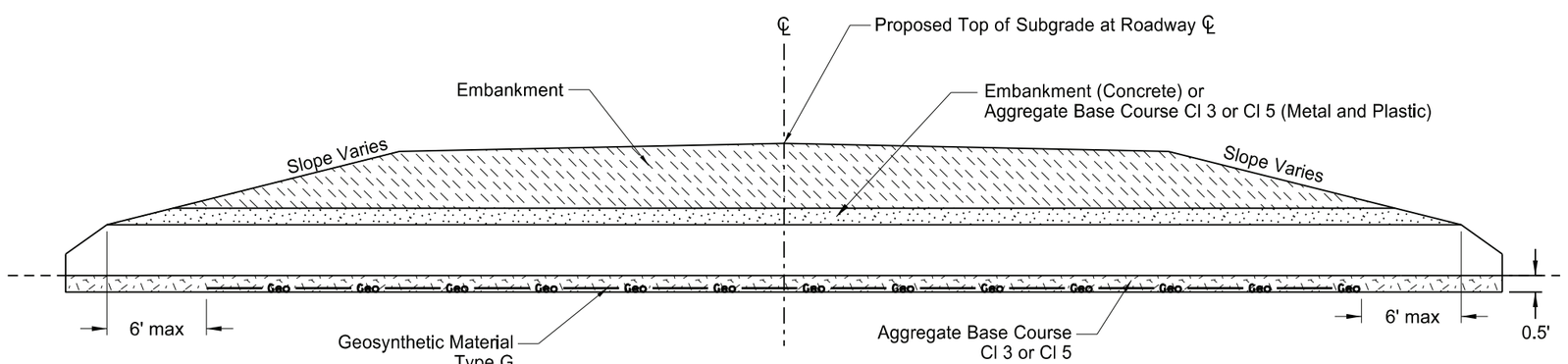
TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL FOR PIPES INSTALLED IN NEW EMBANKMENT AREAS



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

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

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

NOTES:

1) This drawing applies to new/extended mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches
2) Embankment may be 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

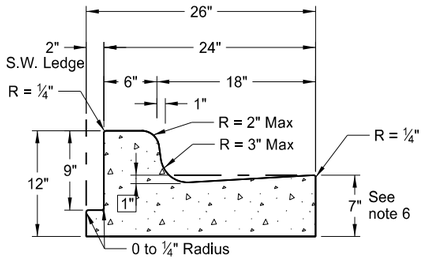
REVISIONS

DATE	CHANGE
10-15-13	Label Formatting
1-21-15	Nomenclature
12-10-15	Added Plastic Pipe
5-27-20	Replaced R1 fabric with Geogrid Changed bedding depth

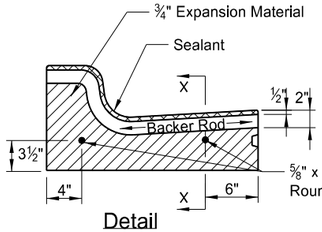
REGISTERED PROFESSIONAL ENGINEER
MATTHEW C KURLE
PE-8777
DATE
05/27/20
NORTH DAKOTA
DocuSign

Curb & Gutter and Valley Gutter

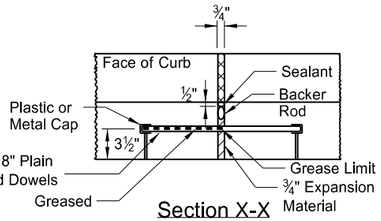
D-748-1



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

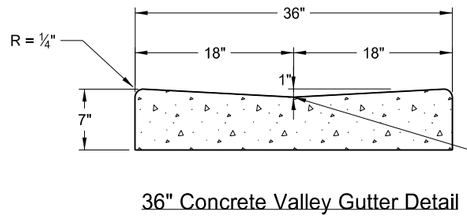


Detail

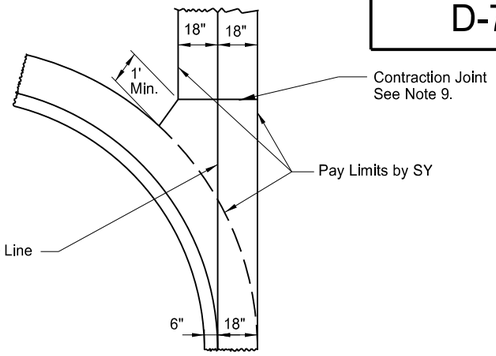


Section X-X

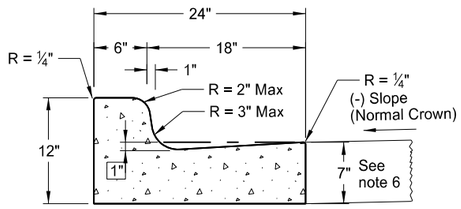
Isolation Joint



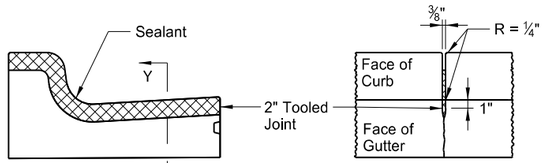
36" Concrete Valley Gutter Detail



36" Concrete Valley Gutter Plan



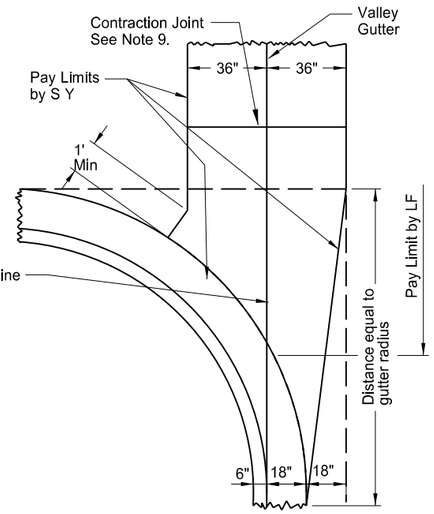
Curb & Gutter Type 1 (Sec. A)



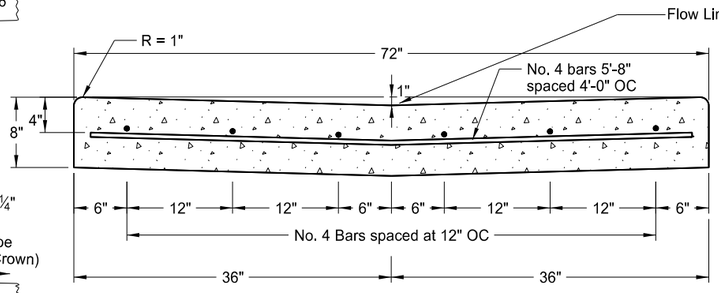
Detail
(10' Max Spacing)

Section Y-Y

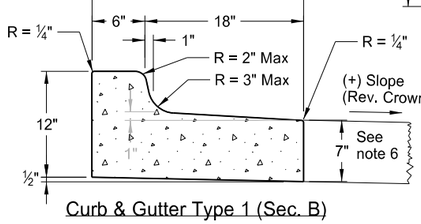
Contraction Joint



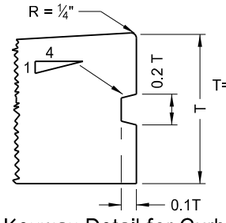
72" Concrete Valley Gutter Plan



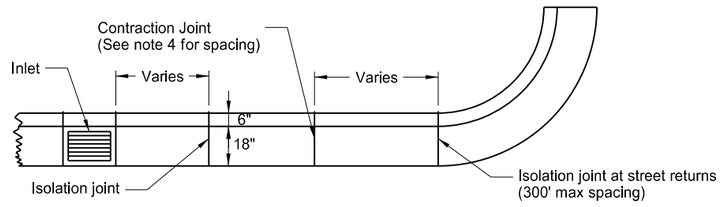
72" Concrete Valley Gutter Detail



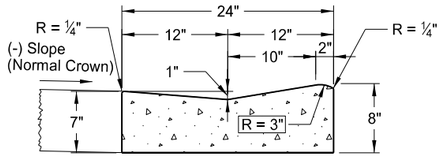
Curb & Gutter Type 1 (Sec. B)



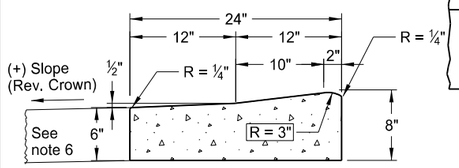
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



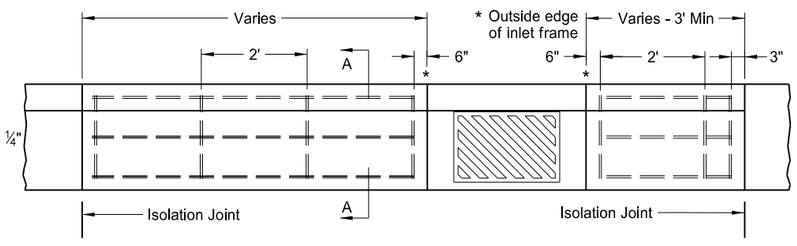
Joint Location Detail



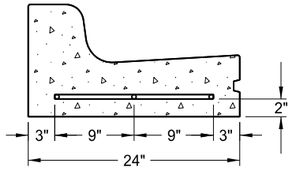
Mountable Curb & Gutter Type 1 (Sec. A)



Mountable Curb & Gutter Type 1 (Sec. B)



Curb & Gutter Reinforcing at Inlets



Section A-A

NOTE: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlet locations (even inlets located on radii) in the price bid for "Curb and Gutter - Type 1." Extend reinforcement to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.

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 filler for isolation joint material. 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 bituminous 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: Seal contraction and isolation joints as shown in the details. Use joint sealant for contraction joints 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. Face of Gutter Depth: For hot bituminous pavement use 7" gutter depth as shown. For PCC pavements, match the gutter depth to the depth of adjacent PCC pavement or to construct a 7" depth as shown.
7. Tie curb and gutter to abutting PCC pavement with No. 3 bars, 1'-6" in length, spaced at 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. Install an 18" tie 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.

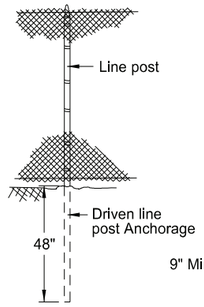
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.

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

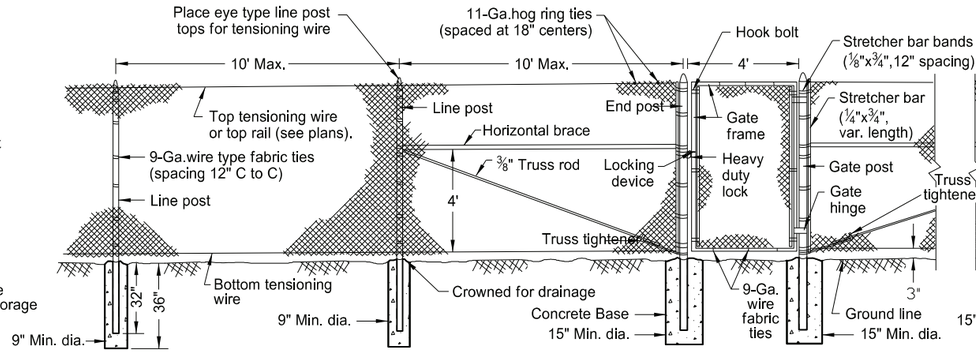
CHAIN LINK FENCE

D-752-2

ALTERNATE LINE POST ANCHORAGE

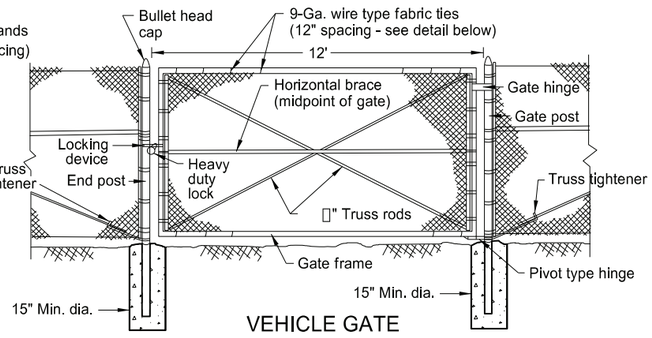


LINE POST

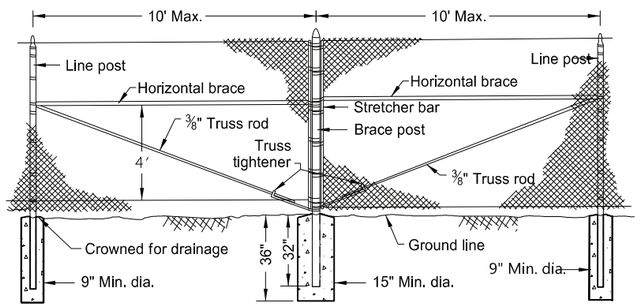


LINE POST

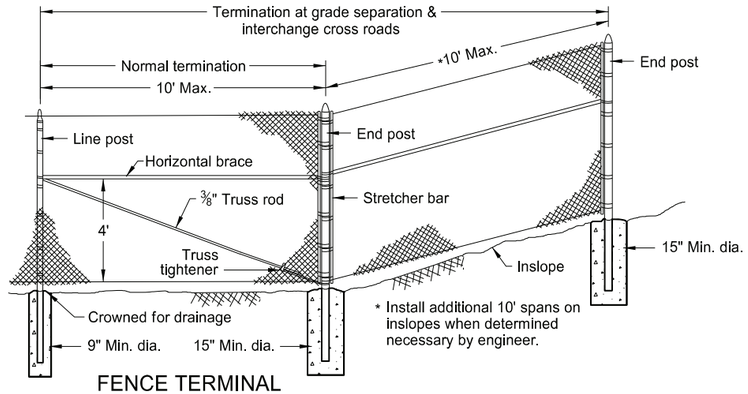
PEDESTRIAN GATE



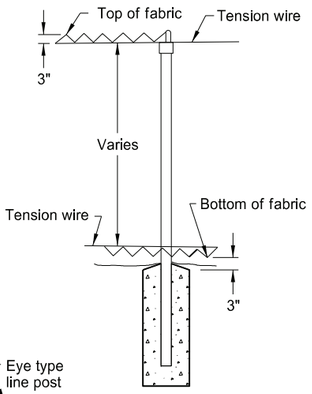
VEHICLE GATE

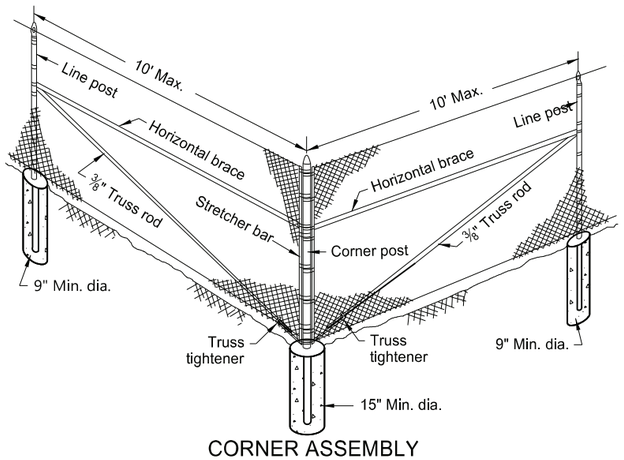


DOUBLE BRACE ASSEMBLY

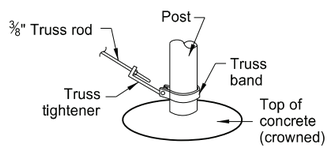


FENCE TERMINAL

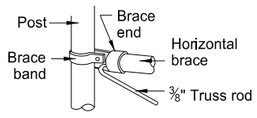




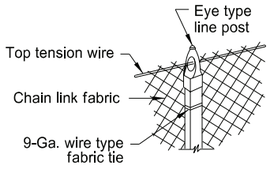
CORNER ASSEMBLY



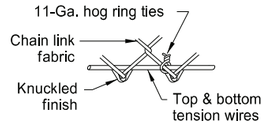
TRUSS ATTACHMENT AT TERMINAL POSTS



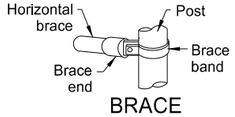
BRACE & TRUSS ATTACHMENT



LINE POST TOP DETAIL

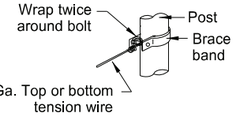


HOG RING FASTENER DETAIL

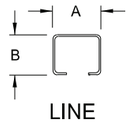


BRACE ATTACHMENT

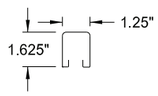
TOP VIEW



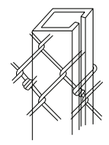
TENSION WIRE ANCHORAGE



LINE POST

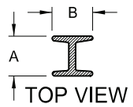


TOP & BRACE RAIL



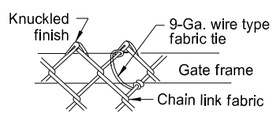
ROLL FORMED POST

ROLL FORMED POST



TOP VIEW

"H" COLUMN POST



WIRE TYPE FABRIC TIE DETAIL

STRETCHER BAR BAND

NOTES:

1. Install double brace assemblies at locations shown on the plans or established by the Engineer. Place adjacent fence terminals, corner assemblies, or double brace assemblies at a maximum spacing of 1000 feet. No deduction in measured pay length of chain link fence for gates, corner assemblies, double brace assemblies, or fence terminals.
2. Provide miscellaneous fittings of the type and size recommended by the manufacturer of the fence and approved by the Engineer.
3. Use 6' High fabric unless otherwise shown on the plans.
4. Use Class YE concrete for post bases in accordance with Sec. 802 of the Standard Specifications. Use size No. 4 or 5 course aggregate for concrete mix, but do not change during the work, except by Engineer's written permission.
5. Use any of the types of posts shown in the table of equivalent post sizes and weights for the specified use.
6. Do not connect private fences to highway right-of-way fence.
7. Use a concrete anchorage for all end, corner, and brace posts, and for first line post(s) adjacent to terminal posts.

EQUIVALENT POST SIZES AND WEIGHTS

USE OF POST	FABRIC HEIGHT	ROUND STEEL			ROLL FORMED			"H" COLUMN STEEL		
		Size	Weight - Lbs./Ft.		Size		Weight	Size		Weight
		Out. Dia.	Grade 1	Grade 2	A	B	Lbs./Ft.	A	B	Lbs./Ft.
LINE POST	6' or less	1.900"	2.72	2.28	1.875"	1.625"	2.40	2.25"	1.70"	3.26
	Over 6'	2.375"	3.65	3.12	2.25"	1.70"	2.78	2.25"	1.70"	3.26
END or CORNER	6' or less	2.375"	3.65	3.12	ROLL FORMED STEEL POSTS NOT PERMITTED			"H" COLUMN STEEL POSTS NOT PERMITTED		
	Over 6'	2.875"	5.79	4.64						
BRACE POST	6' or less	2.375"	3.65	3.12						
	Over 6'	2.875"	5.79	4.64						
GATE POST	6' or less	3.500"	7.58	5.71						
	Over 6'	4.000"	9.11	6.56						
EXTERIOR FRAME FOR GATE	Gate width 6' or less	1.660"	2.27	1.84						
	Gate width over 6'	1.900"	2.72	2.28						
HORIZONTAL BRACE	All	1.660"	2.27	1.84	1.625" x 1.25"		1.35			

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-5-09

REVISIONS

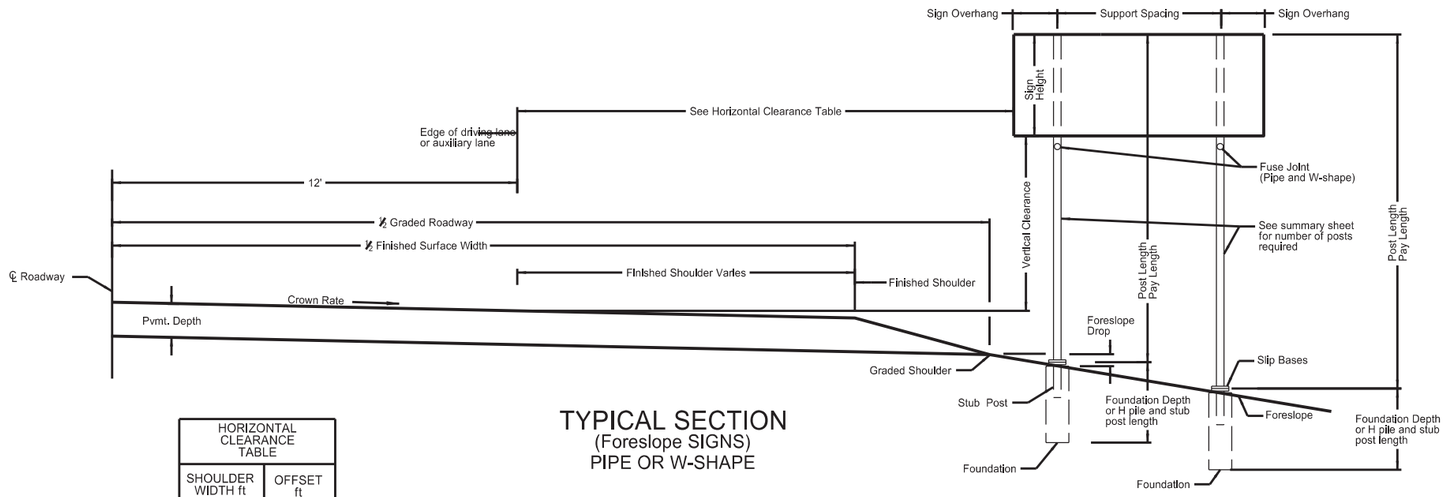
DATE	CHANGE
9-28-10	Revised Equivalent Post Sizes and Weights, details, & notes.
10-17-17	Updated to active voice.
8-07-23	Update Design Engr PE Stamp.

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

08/07/23

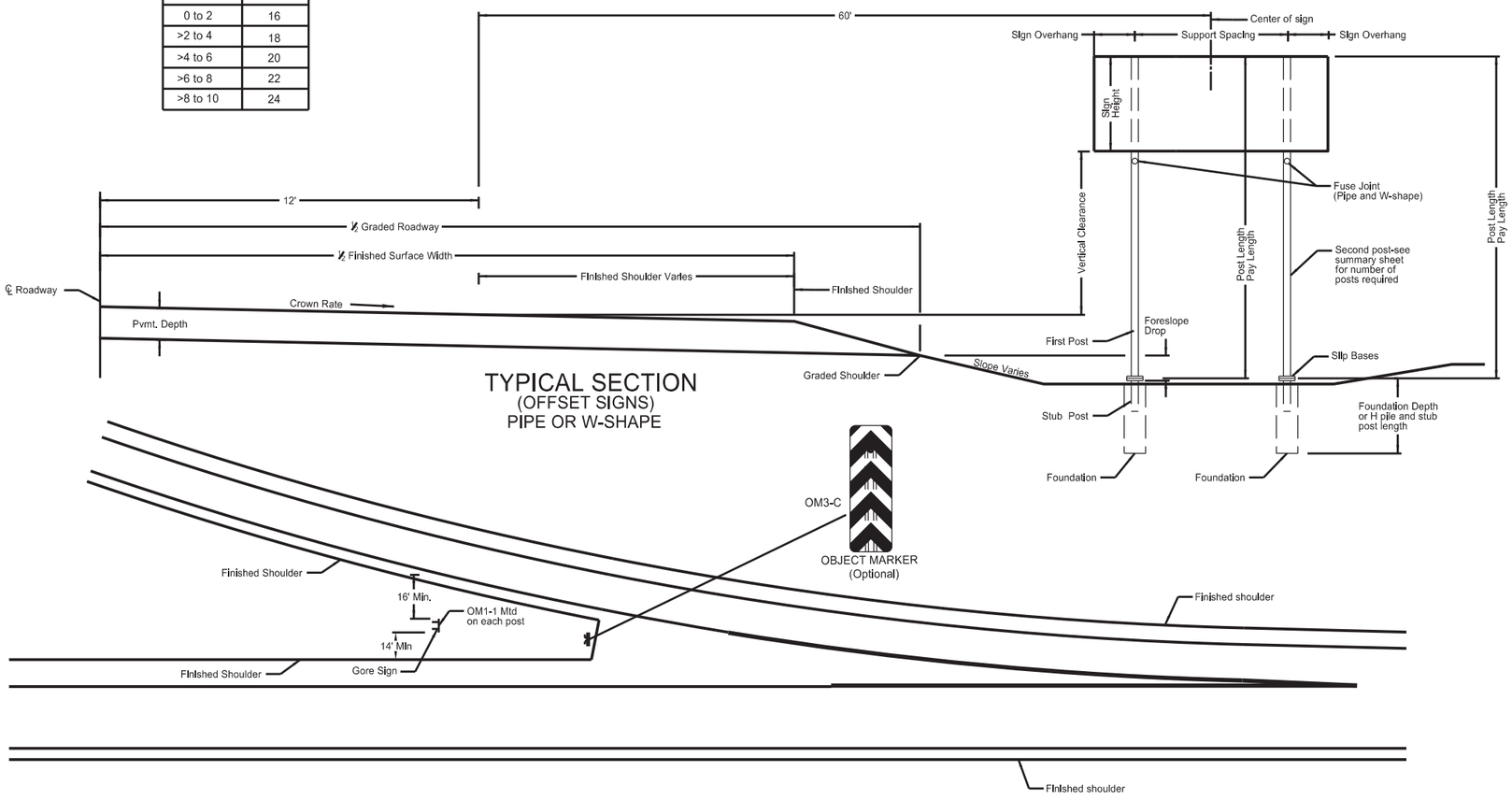
PIPE OR W-SHAPE ASSEMBLY DETAILS

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

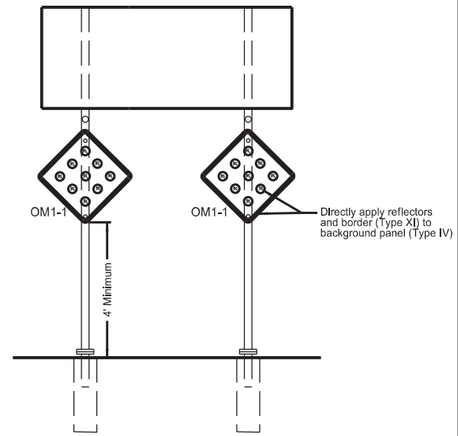
EXIT RAMP
GORE SIGN PLACEMENT

NOTES:

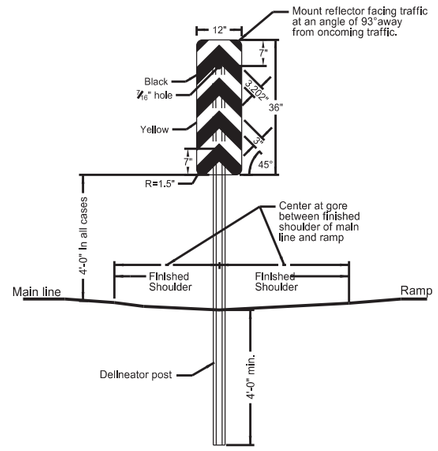
MINIMUM VERTICAL CLEARANCE:
Install signs with a minimum 5 foot vertical clearance from bottom of sign to top edge of the driving lane or auxiliary lane in rural locations. Provide a minimum 7 foot vertical clearance where parking or pedestrian movements occur. Install signs with a minimum 7 foot vertical 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
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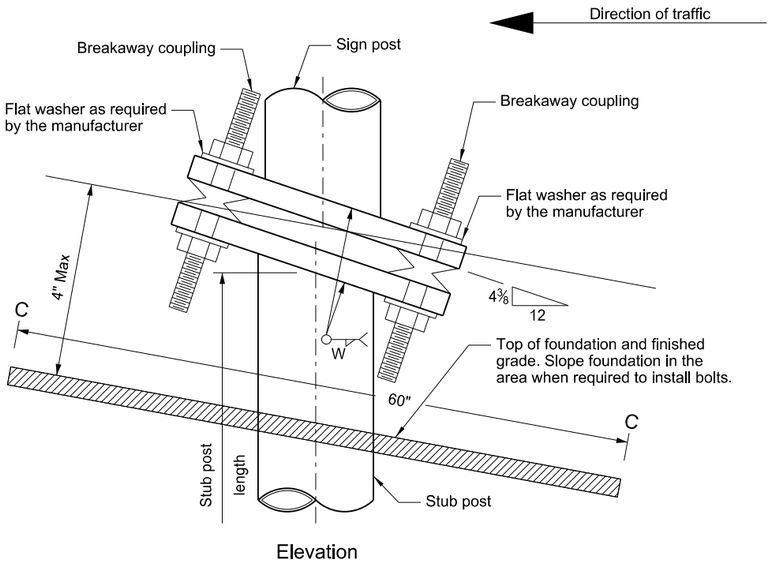
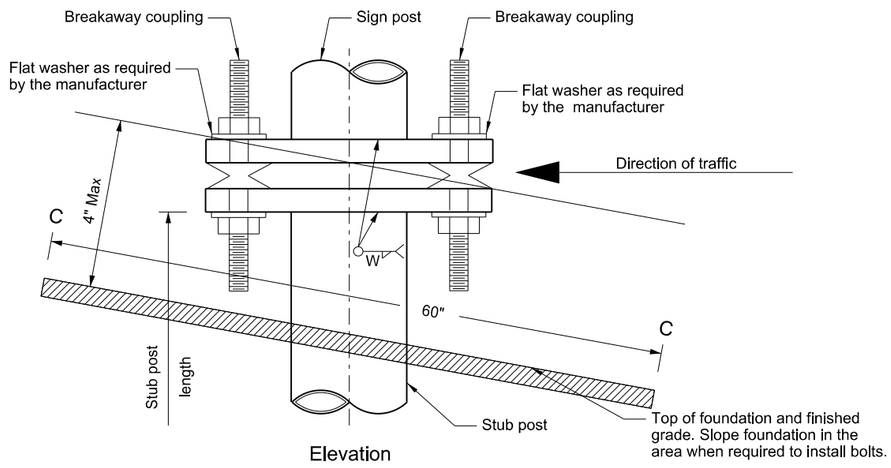
11/26/21



Elevation

Single Post Sign and Stub Post
Type A

Breakaway Coupler System for Standard Pipe Stub Post

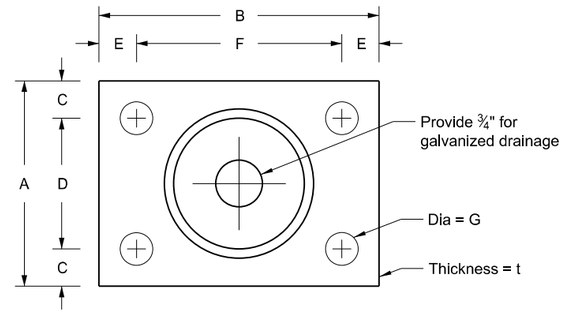


Elevation

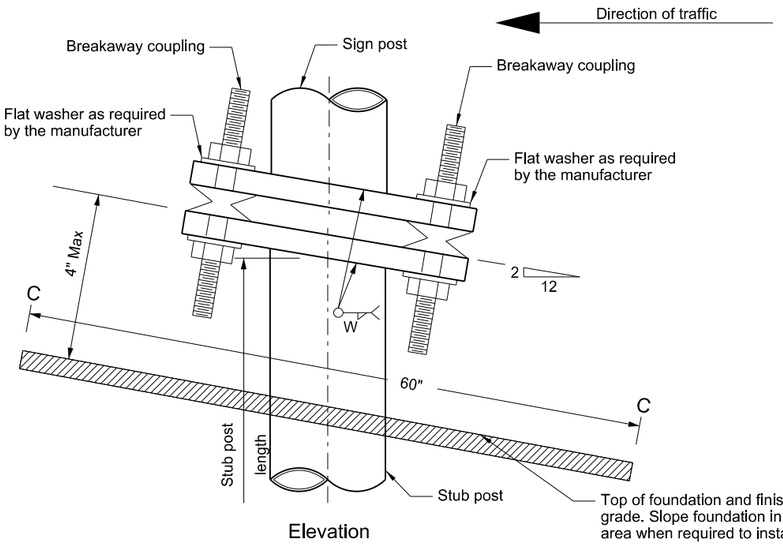
Two or More Post Sign and Stub Post
For two post signs with 8' or more post spacing and all three or more post signs
Type C

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.

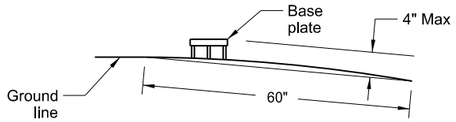


Plan Base Plate



Elevation

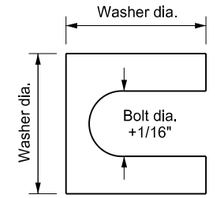
Two Post Sign and Stub Post
For signs with less than 8' post spacing
Type B



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	Base Table Data: 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"	1 1/16"	1¼"	7/16"	2'-0"
8"	1" x 5¼"	9½"	13¼"	1⅜"	6¾"	1⅜"	10½"	1 1/16"	1¼"	7/16"	2'-6"
10"	1" x 5¼"	11¾"	15¼"	1⅜"	9"	1⅜"	12½"	1 1/16"	1¼"	½"	3'-0"
12"	1" x 7"	13¾"	18"	1⅝"	10 ½"	1⅝"	14¾"	1 1/16"	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"	1 1/16"	1¼"	½"	2'-0"
8"	1" x 5¼"	9½"	13¼"	1⅜"	6¾"	1⅜"	10½"	1 1/16"	1¼"	½"	2'-6"
10"	1" x 5¼"	11¾"	15¼"	1⅜"	9"	1⅜"	12½"	1 1/16"	1½"	7/16"	3'-0"
12"	1" x 7"	13¾"	18"	1⅝"	10¼"	1⅝"	14¾"	1 1/16"	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 8-29-2019	Updated notes to active voice. New Design Engineer PE Stamp.

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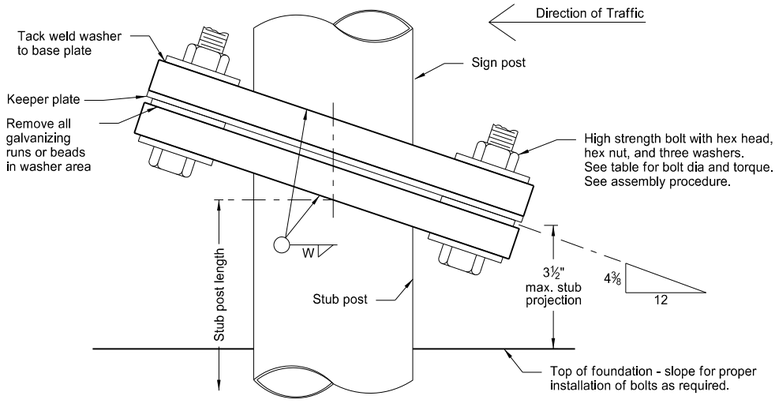
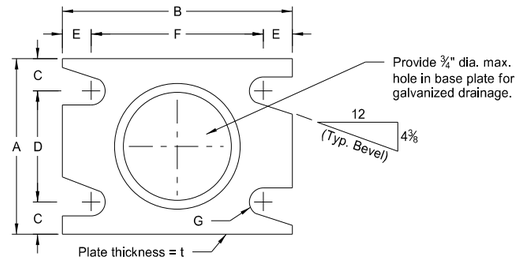
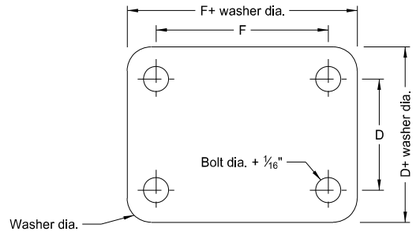
Breakaway System for Standard Pipe Stub Post



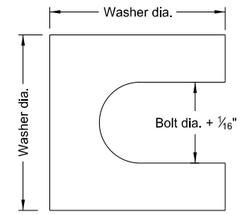
Stub Post Connection - Type A
Elevation View
(Single Post)



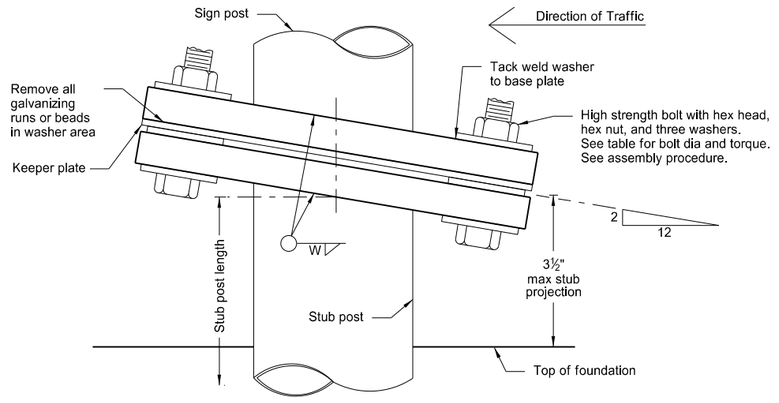
Base Plate Plan View
Place bevel toward roadway on approach side and away on the other side.



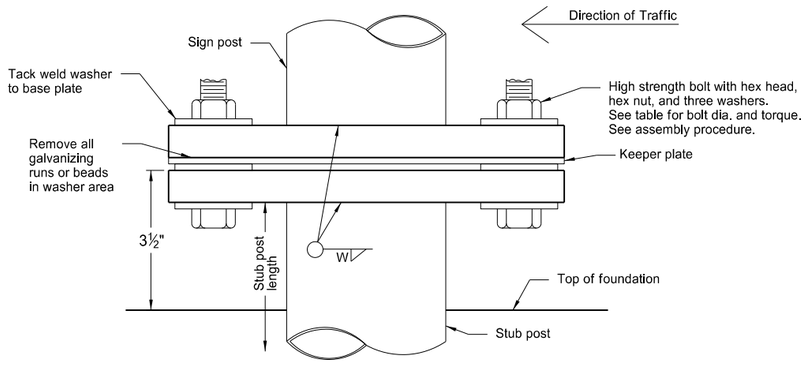
Keeper Plate Detail
Place keeper plate above center washer between top and bottom slip bases. Fabricate keeper plate from 28 gauge material and galvanize after fabrication in conformance with ASTM A653 G60 coating.



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 B
Elevation View
(Two Posts)



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"

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.

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.

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

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

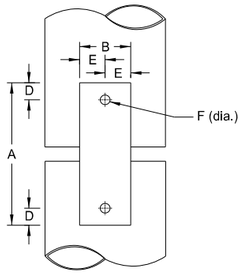
REVISIONS

DATE	CHANGE
8-30-18 8-29-19	Updated notes to active voice. New Design Engineer PE Stamp.

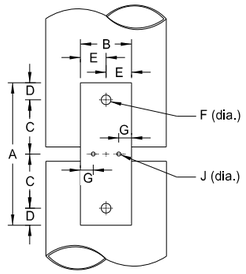
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

Hinge Plate, Fuse Plate and Foundation Details for Standard Pipe

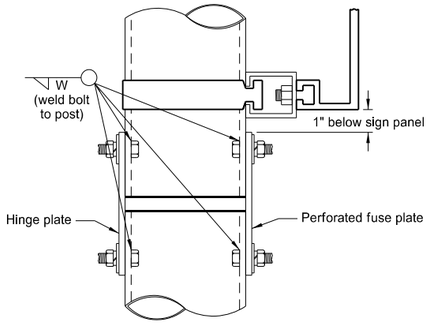
D-754-6



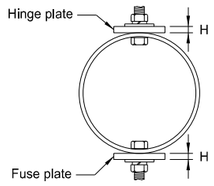
Hinge Plate



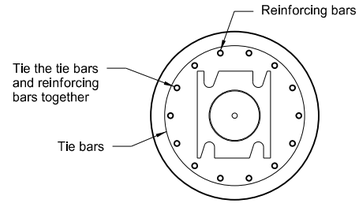
Perforated Fuse Plate



Side View

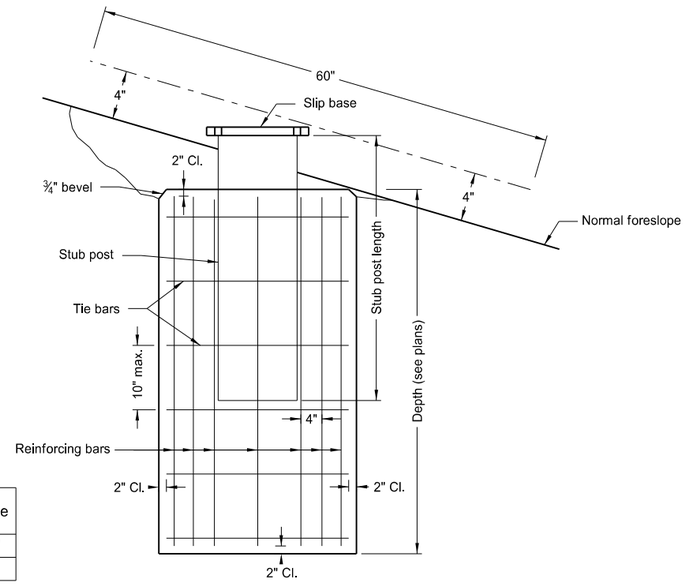


Top View



Top View

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



Foundation

Front View

Foundation detail for breakaway base with stub post connection.

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

Notes:
Fuse Joint Cuts - For steel posts cut after galvanizing, either galvanize cut after fabrication, or treat cut surface in accordance with ASTM A780. Aluminum posts need no treatment.

Use standard drawings D-754-2, D-754-3 and D-754-4 for information on breakaway base details.

Maintain the 4" vertical height and 60" diameter horizontal clearance of the break-away base at each post location.

Assembly Procedure:
1. Assemble hinge plate to post with bolts and one flat washer and lock washer under nut.

2. Tighten all bolts the maximum possible with 12" to 15" wrench.

Round Metal Posts							
Dimensions				Properties			
Nominal dia. in.	Outside dia. in.	Inside dia. in.	Wall Thickness in.	Weight per Foot Pound	Moment of Inertia in.^{4}	Cross Sec. Area in.^{2}	Section Diameter in.^{2}
Steel							
3½	4.000	3.548	.226	9.11	4.788	2.680	2.394
4	4.500	4.026	.237	10.79	7.233	3.174	3.215
5	5.563	5.047	.258	14.62	15.16	4.300	5.449
6	6.625	6.065	.280	18.97	28.14	5.581	8.495
Aluminum							
3½	4.000	3.548	.226	3.151	4.788	2.680	2.394
4	4.500	4.026	.237	3.733	7.232	3.174	3.214
5	5.563	5.047	.258	5.057	15.16	4.300	5.451
6	6.625	6.065	.280	6.564	28.14	5.581	8.496

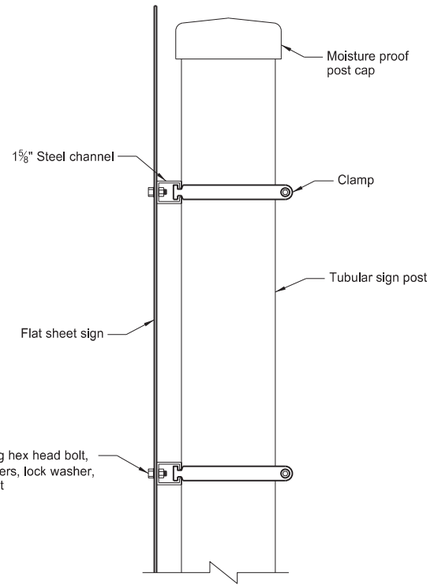
Nominal Pipe Size dia.	Fuse and Hinge Plate Data										
	Bolt Size	A	B	C	D	E	F	G	H	I	J
3½"	½"ø x 1½"	5"	1¾"	1 11/16"	13/16"	⅞"	9/16"	15/32"	¼"	13/32"	7/16"
4"	⅝"ø x 1½"	5¾"	2"	1⅞"	1"	1"	1 1/16"	17/32"	⅜"	15/32"	9/16"
5"	⅝"ø x 1¾"	5¾"	2"	1⅞"	1"	1"	1 1/16"	9/16"	½"	7/16"	⅝"
6"	¾"ø x 2¼"	6¼"	2¼"	2"	1⅛"	1⅛"	13/16"	⅝"	½"	½"	⅝"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
8-30-18 8-29-19	Updated notes to active voice. New Design Engineer PE Stamp.

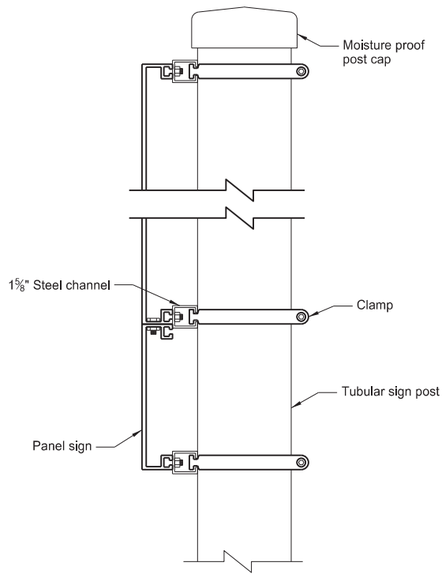
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

PIPE SUPPORT AND SIGN MOUNTING DETAILS

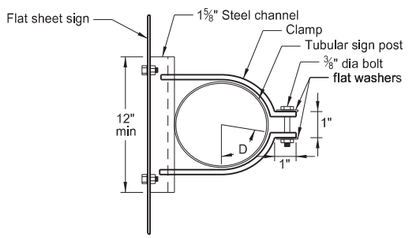
D-754-7



Side View

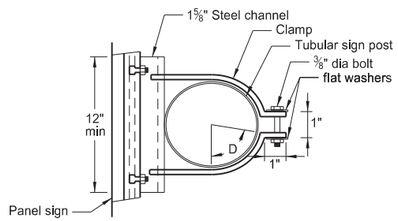


Side View



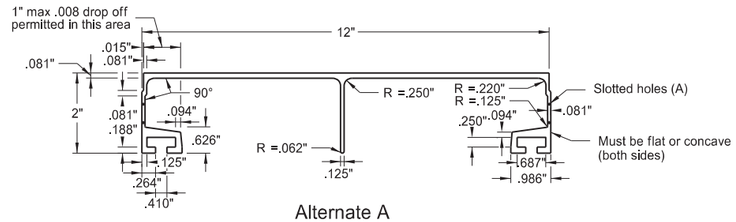
Top View

Flat Sheet Sign Clamp Mounting Details

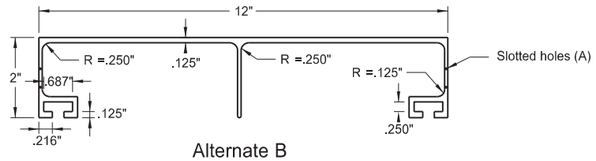


Top View

Panel Sign Clamp Mounting Details

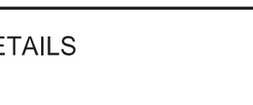


Alternate A
12" Extruded Panel



Alternate B
12" Extruded Panel

Slotted Hole Detail



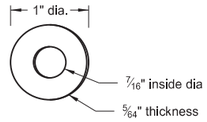
6" Extruded Panel

Aluminum Panel Details

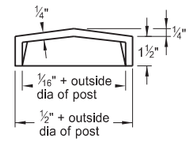
(A) Punch slotted holes in aluminum panels at 1'-0" on center, space from end as listed below:

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.

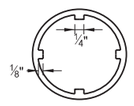
Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



Flat Washer Detail



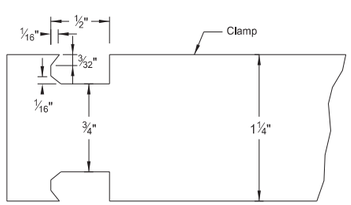
Side View



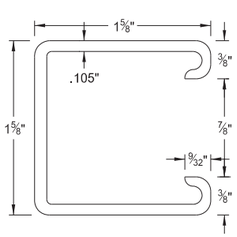
Top View

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

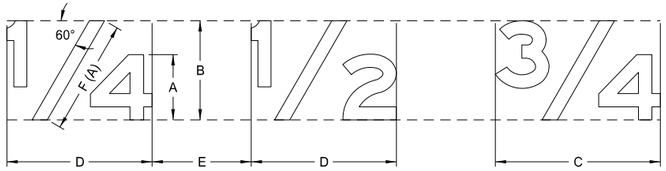
DATE	CHANGE
08-30-18	Updated to active voice, defined bolt & washer for fastening sign.
08-29-19	New Design Engineer PE Stamp.
10-19-22	Added washers to clamp.

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

10/20/22

LETTER AND ARROW DETAILS

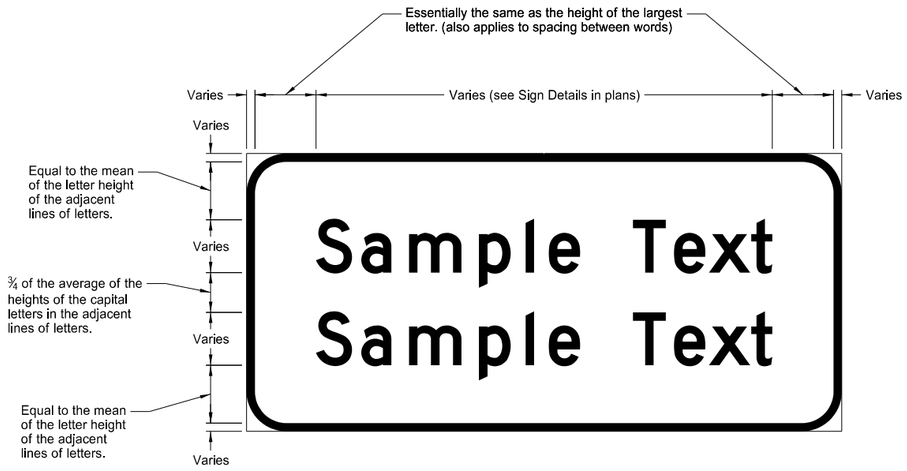
D-754-9



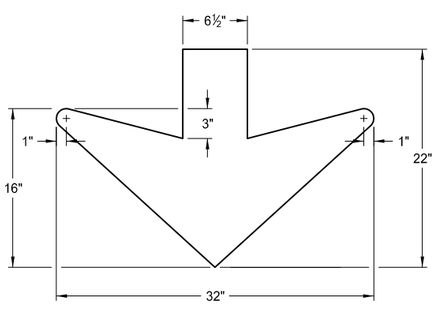
DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

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

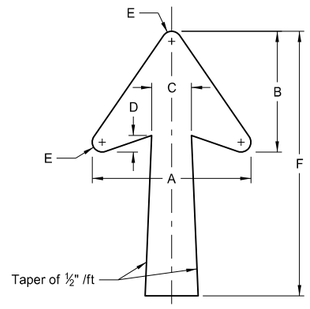
(A) Center diagonal stroke of fraction optically.



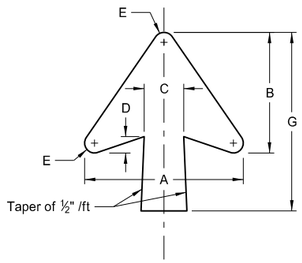
TYPICAL SPACING



DOWN ARROW



TYPE A

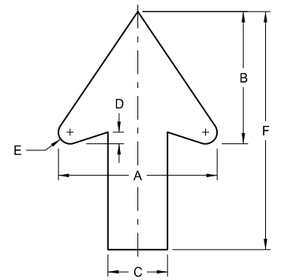


TYPE B

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"							

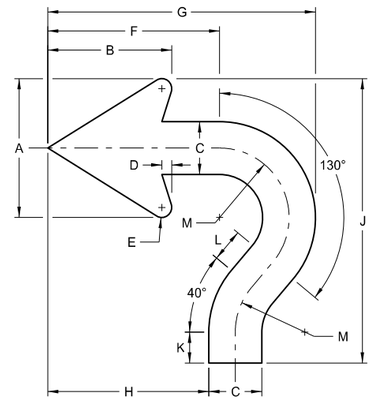
NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

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



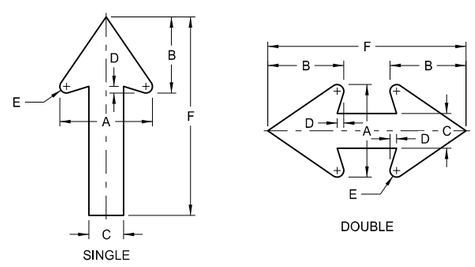
TYPE D

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

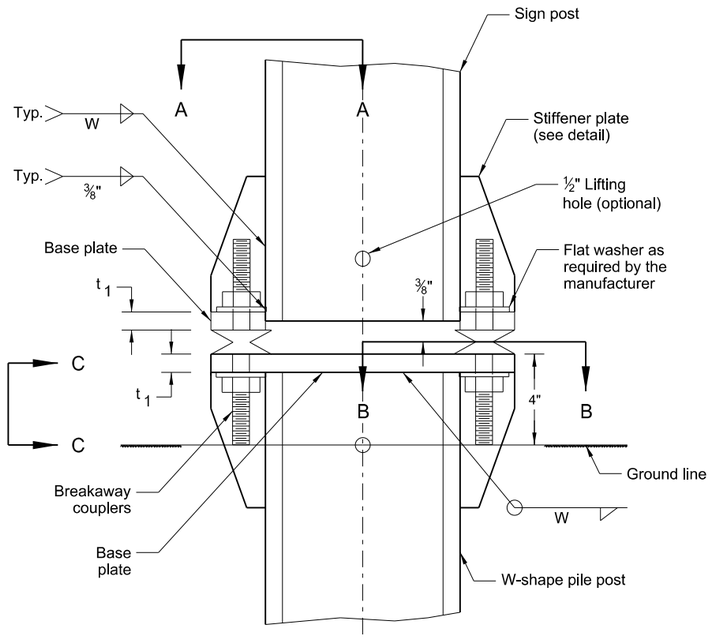
REVISIONS

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.

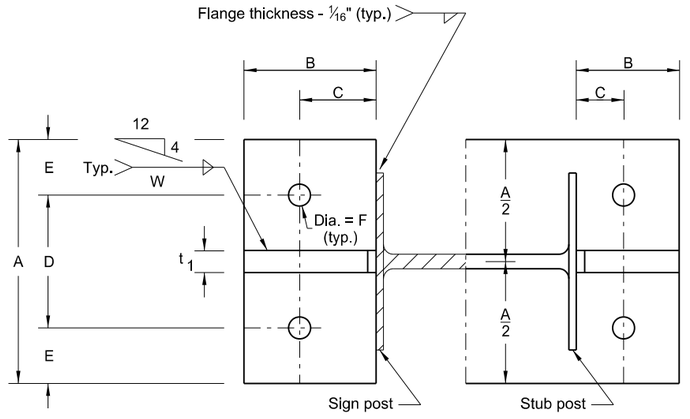
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

Breakaway Coupler System
Structural Details
for W-Shape Supports

D-754-12



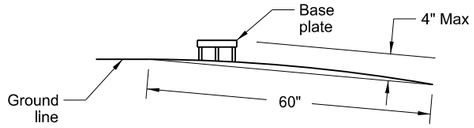
Sign Post and Stub Post
Elevation



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

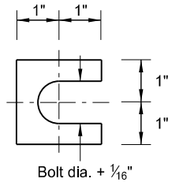
Notes:

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.

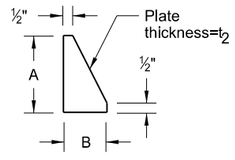


Section C - C

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.



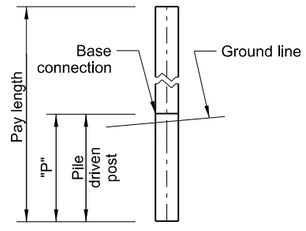
Shim Detail



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	¾" x 5¼"	6"	2½"	1½"	3½"	1¼"	1"	½"	¼"	13/16"	14'
W5X16											14'
W6X20	⅞" x 5¼"	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	15/16"	14'
W8X24											14'
W8X28	1" x 5¼"	8"	3"	2"	4"	2"	1½"	¾"	5/16"	1 1/16"	14'

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-2013	
REVISIONS	
DATE	CHANGE
7-8-14	Revised notes 2 and 3.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

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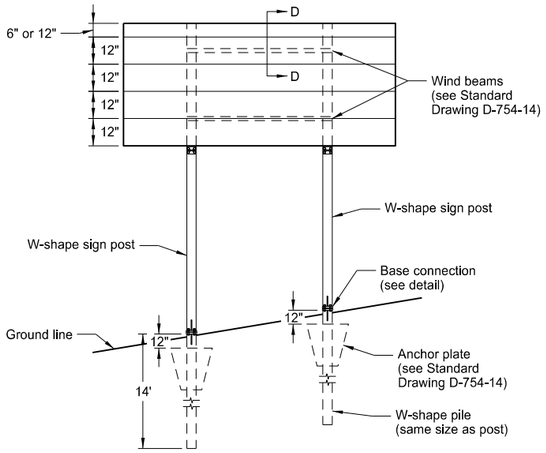
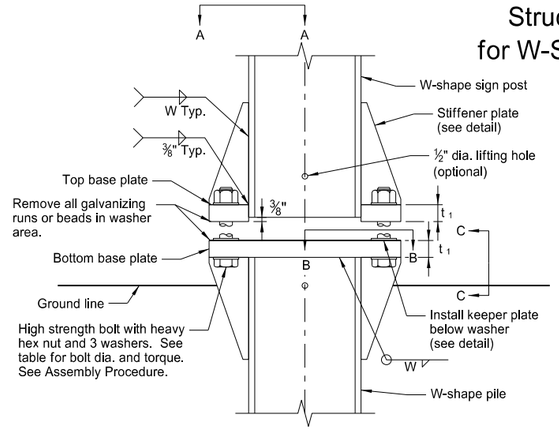
Breakaway System Structural Details for W-Shape Supports

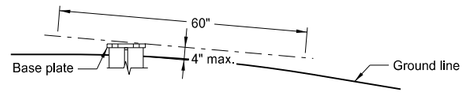
D-754-13



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.

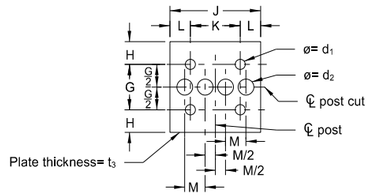
Notes:

Use structural steel conforming to Section 894.03 B.6 of the Standard Specifications and high strength bolts conforming to ASTM A325.

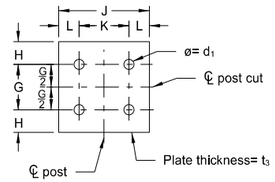
Refer to Sign Summary sheet for specific data on individual sign installation.

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.



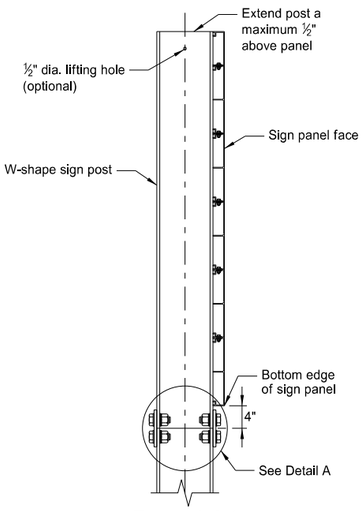
Perforated Fuse Plate



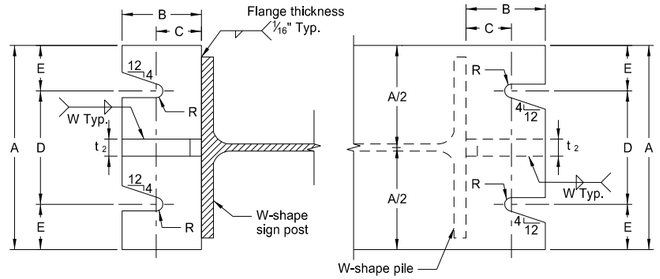
Hinge Plate

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.

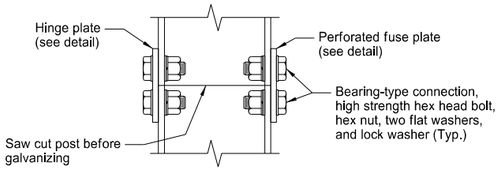


Fuse Joint
(Side View)

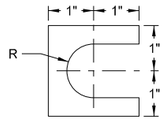


Section A-A Section B-B

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

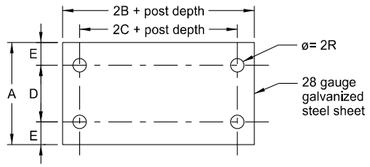


Detail A

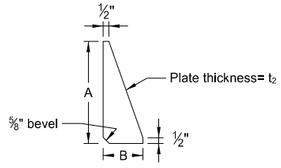


Shim Detail

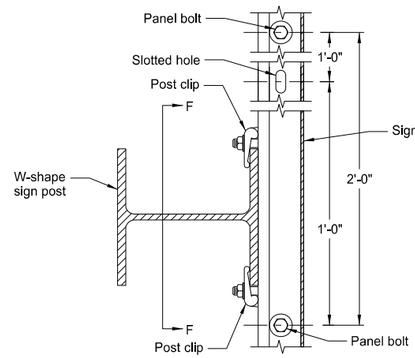
Furnish 2 each .012"± thick and 2 each .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



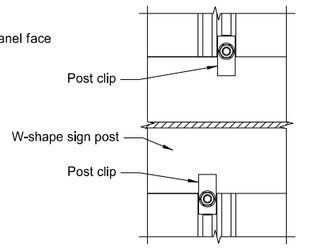
Keeper Plate



Stiffener Plate

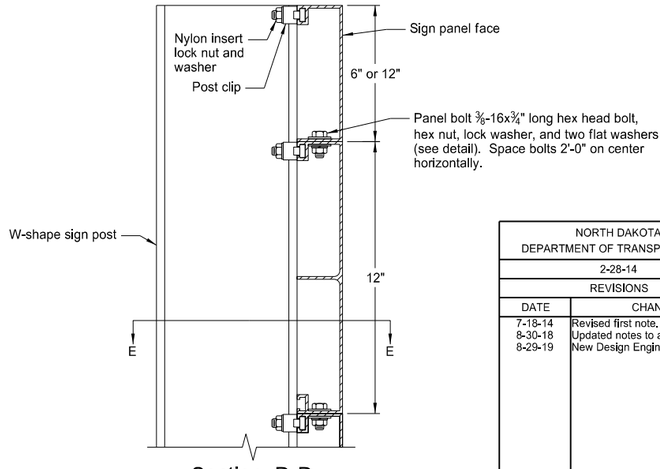


Section E-E

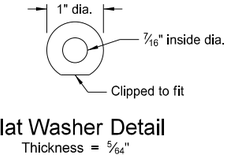


Section F-F

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.

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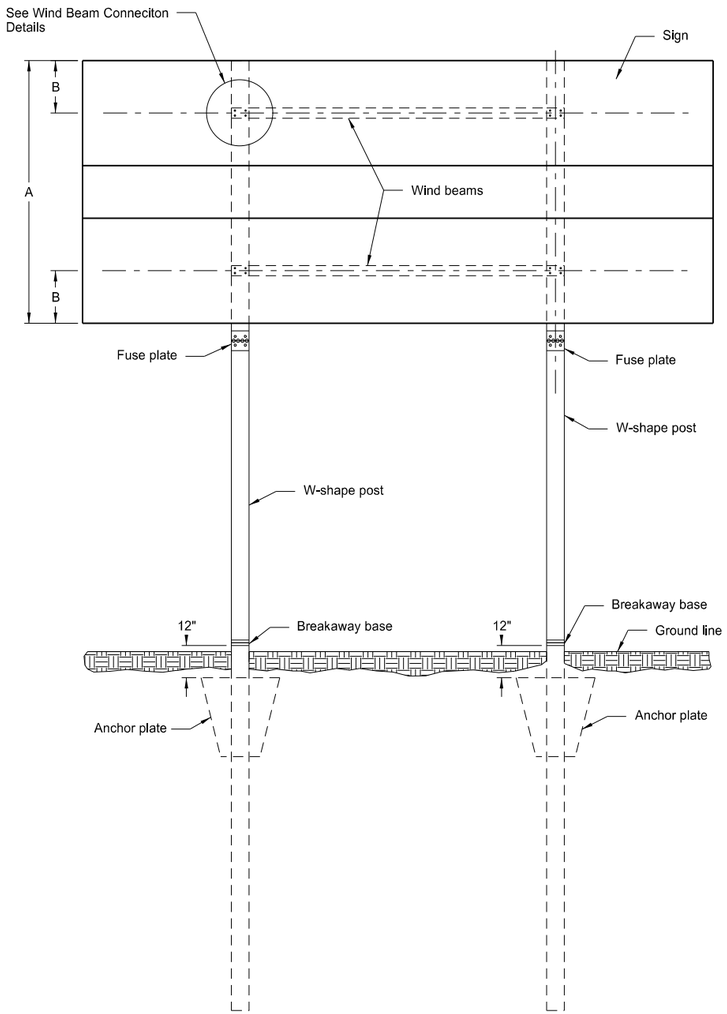
WIND BEAMS AND ANCHOR PLATES FOR W-SHAPE SUPPORTS



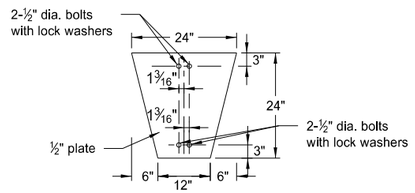
ASSEMBLY DETAIL FOR WIND BEAMS AND ANCHOR PLATES

Notes:

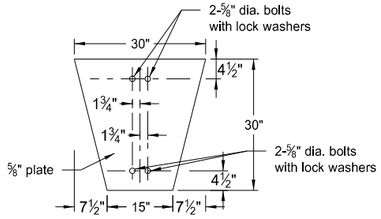
Calculate the B distance using the formula, B=A/4.

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

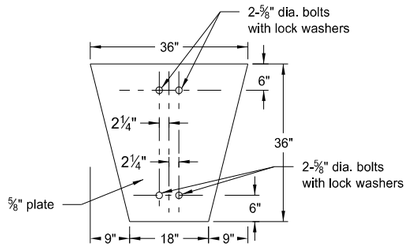
Use bolts conforming to ASTM A307 and galvanized according to ASTM A153.



W4-13 & W5-16

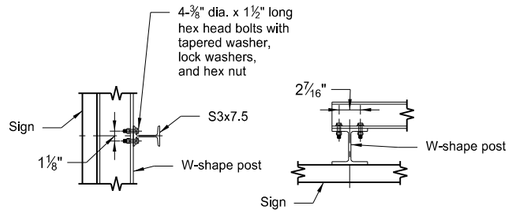


W6-20, W8-24 & W8-28



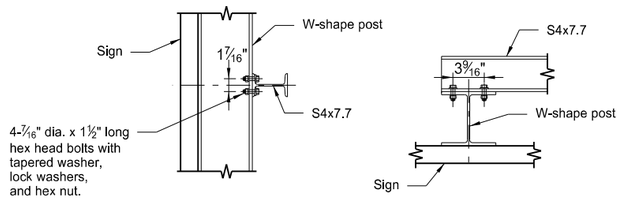
W8-31 & W10-39

ANCHOR PLATE DETAILS



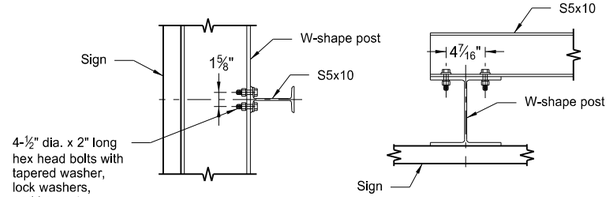
End View Top View

W4-13 & W5-16



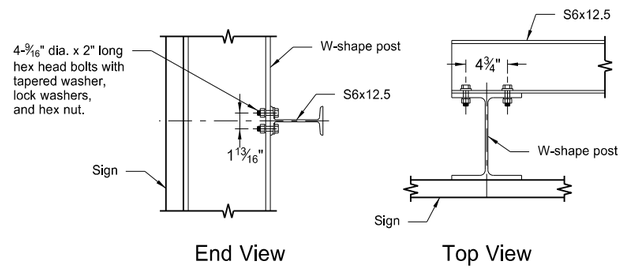
End View Top View

W6-20, W8-24 and W8-28



End View Top View

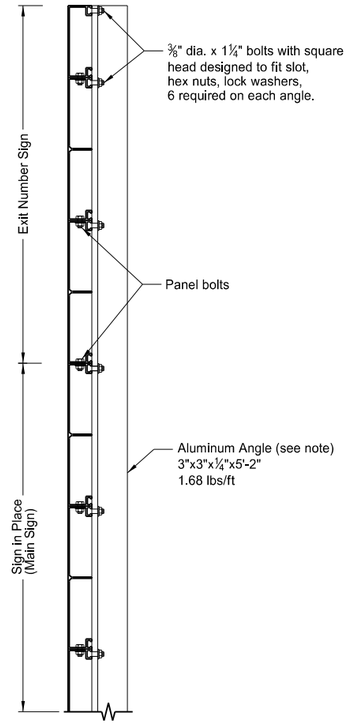
W8-31



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.

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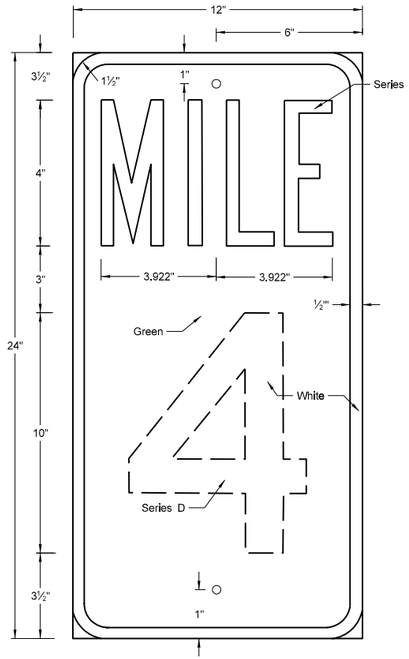
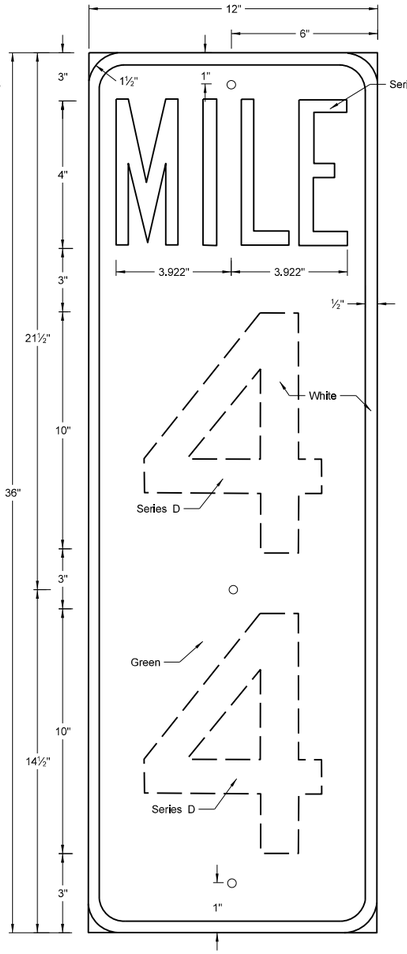
(EXPRESSWAY-FREEWAY USE) MILE POSTS

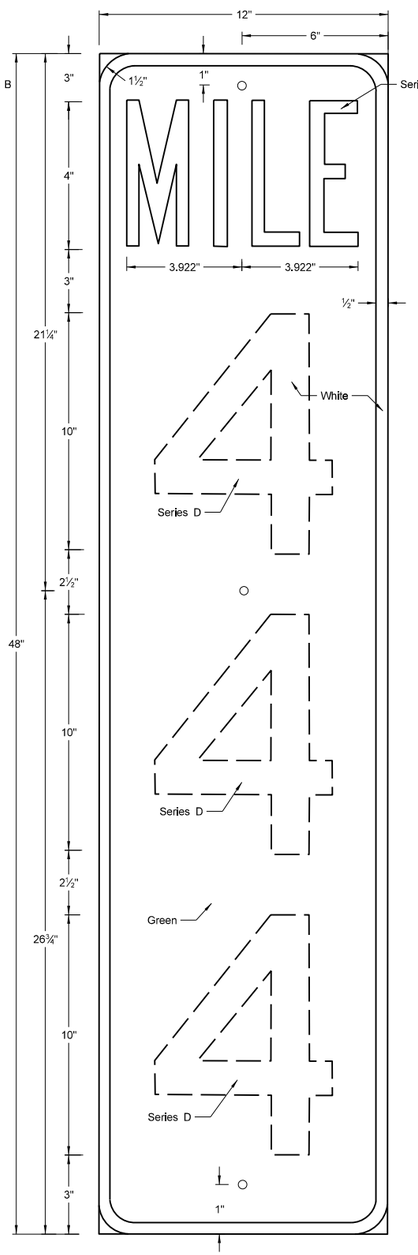
D-754-20



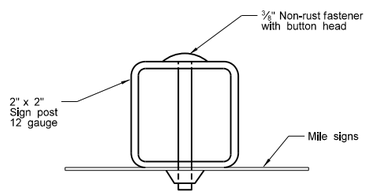
TYPE A
Area = 2.00 S.F.



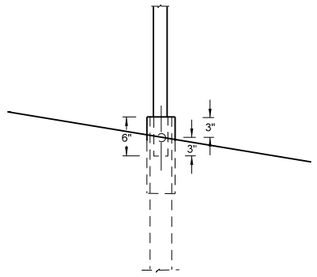
TYPE B
Area = 3.00 S.F.



TYPE C
Area = 4.00 S.F.

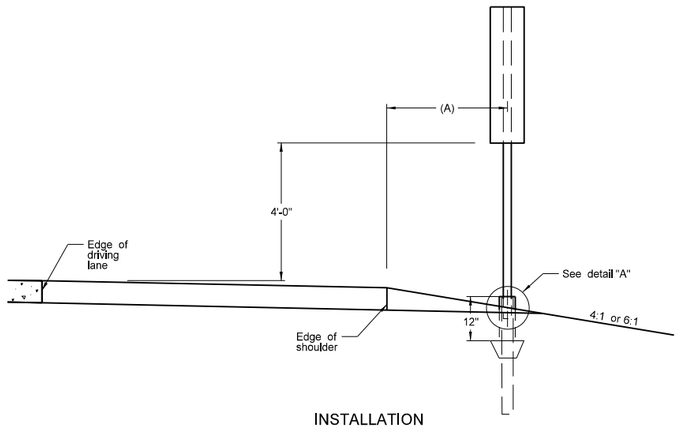


ASSEMBLY DETAIL

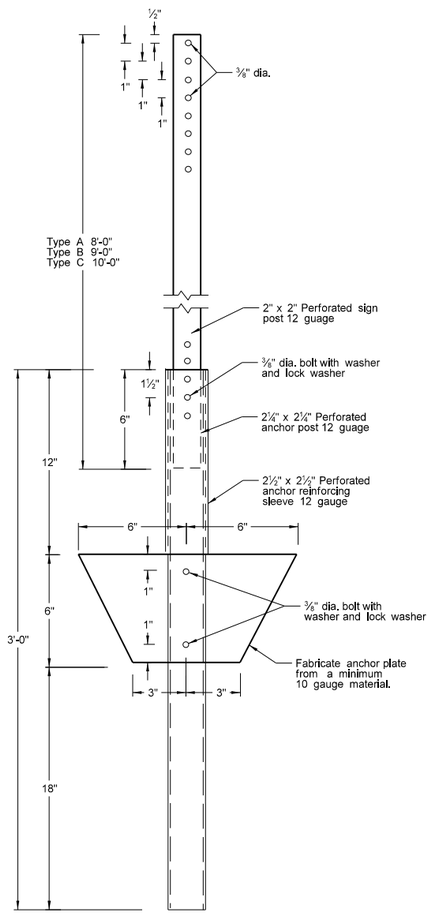


DETAIL "A"

(A) 8' Clearance to finished shoulder or in line with existing delineator posts.



INSTALLATION



POST AND ANCHOR PLATE DETAIL

NOTES:
Installation: Install posts along right shoulder in line with delineators.

Mile Sign Backing: Fabricate backing of 0.080 aluminum.

Fasteners: Attach signs to post with tension pin type fastener or other suitable vandal resistant non-rust fastener.

Reflective Sheeting: Use Type IV sheeting.

Numbers: Use screened or applied copy numbers of the series shown.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
7-8-14	Revised post and reflective sheeting notes.
8-30-18	Updated to active voice.
8-29-19	New Design Engineer PE Stamp

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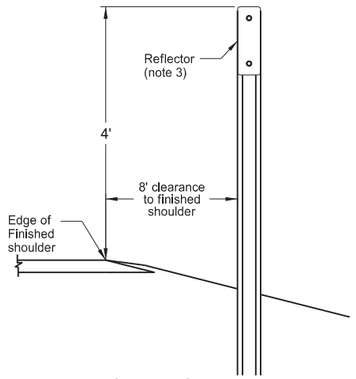
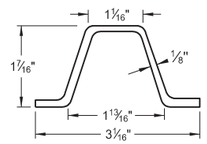
REFLECTORIZED DELINEATORS - DIVIDED HIGHWAY

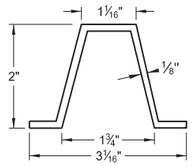
D-754-21



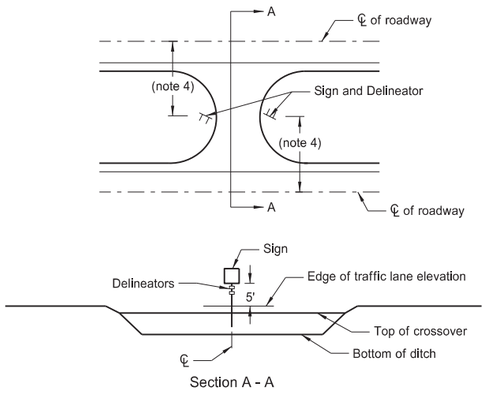
Installation
(Type A, B, and C)



Steel Post Detail
Approx. 2.0 lbs/ft

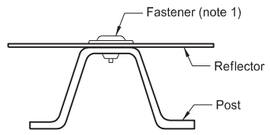


Aluminum Post Detail
Approx. 0.88 lbs/ft



Section A - A

Median Crossovers
Signing and Delineation system



Type A, Type B, and Type C
Delineator Attachment Detail

Delineator Details

Type A, B, and C

Installation: Install posts along the right shoulder line, in the direction of travel, unless shown otherwise on the plans.

Reflectors: Use reflector of the same color as the adjacent pavement marking with a 0.080 inch minimum thickness sign backing material.

Type E

Alternate: As an alternate, use one unit band consisting of two yellow stripes separated by a 2" black stripe in place of two 3" yellow bands.

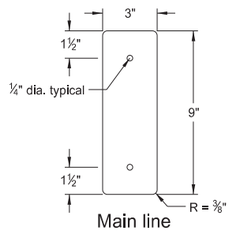
(1) Use fasteners that are a minimum ¼" diameter. Use double headed rivet or other non-rust vandal resistant fastener.

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

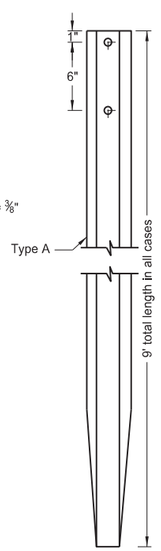
(3) Mount reflector facing traffic at an angle of 90° away from oncoming traffic.

(4) Median width may vary. Place sign and delineator assembly in the median crossover an equal distance from each roadway.

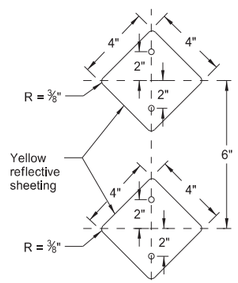
(5) Include all costs for materials, labor, and equipment to install single sided type A delineators in the unit price bid for "Delineators-Type A-Single Sided." Include all costs for materials, labor, and equipment to install single sided type B, type C, type D, and type E delineators in the unit price bid for "Delineators-Type B", "Delineators-Type C", "Delineators-Type D", and "Delineators-Type E."



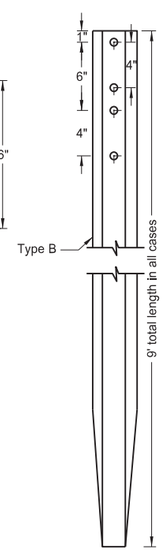
Main line
Single Sided Reflector
(Type A delineator)



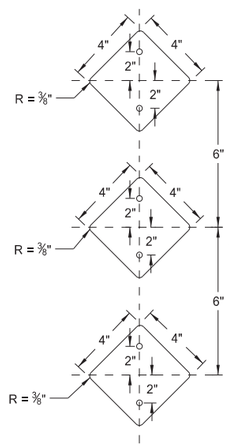
U-type Post
(Delineator-Type A-Single Sided)



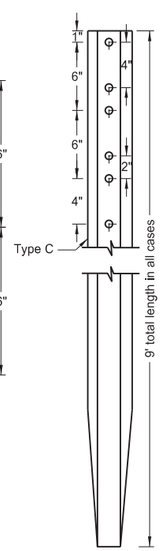
Ramps
Two reflectors
(Type B delineator)



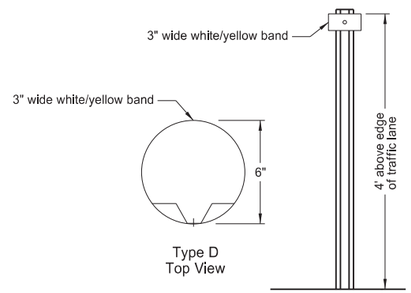
U-type Post
(Delineators-Type B)



Narrow Bridges
Three reflectors
(Type C delineator)

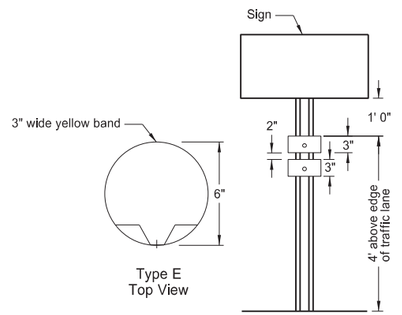


U-type Post
(Delineators-Type C)



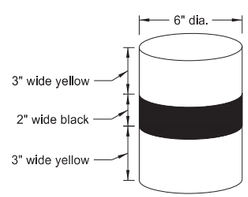
Type D
Top View

Median
One reflector
(Delineators-Type D)



Type E
Top View

Median
Two reflectors
(Delineators-Type E)



Alternate Type E delineator

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12/16/22	
REVISIONS	
DATE	CHANGE

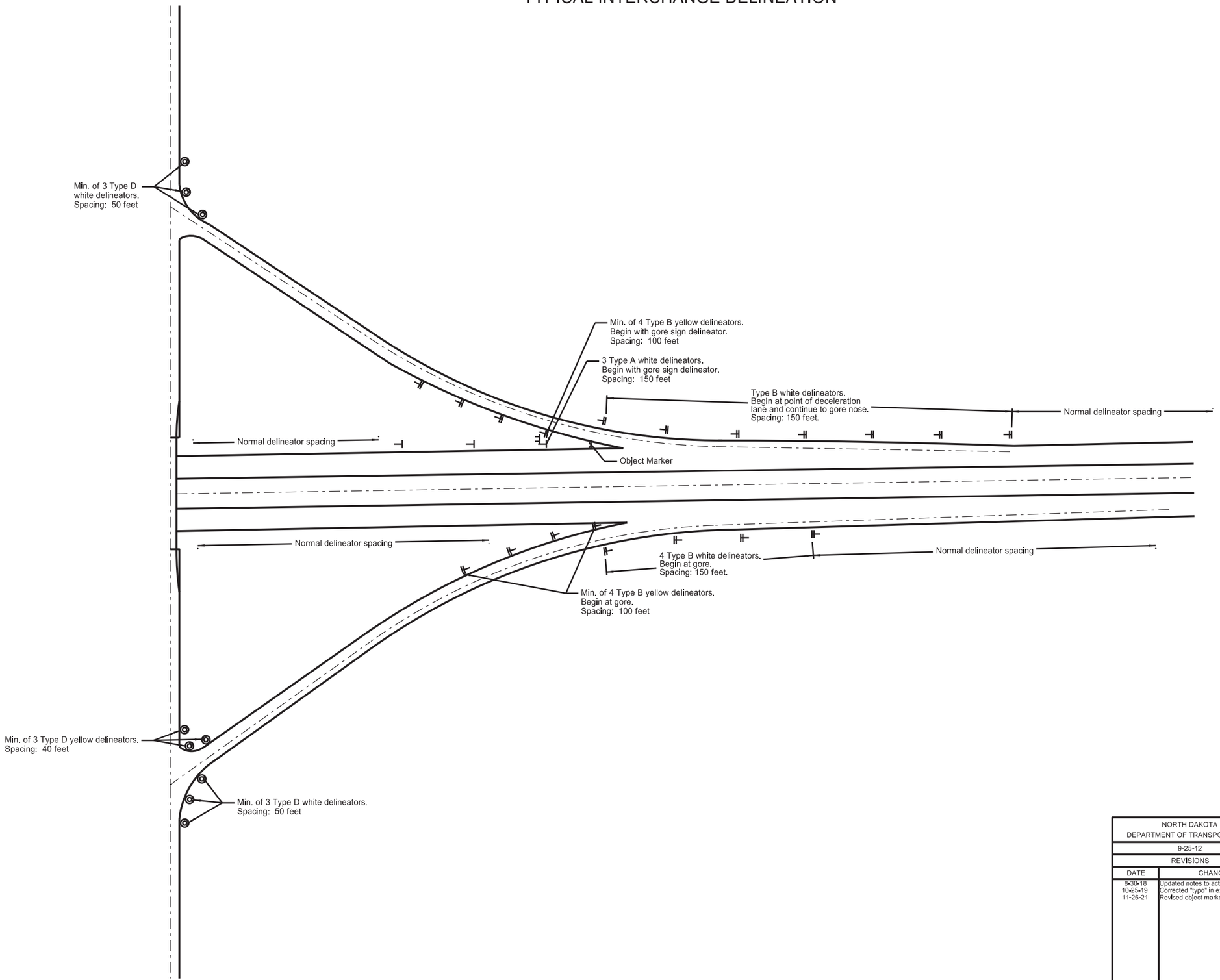
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

12/16/22

TYPICAL INTERCHANGE DELINEATION

D-754-22A

Interstate mainline delineator spacing:
528' on tangent and curves less than 0°30'
264' on curves 0°30' and greater.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
10-25-19	Corrected "typo" in exit ramp layout.
11-26-21	Revised object marker designation.

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

11/26/21

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

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

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

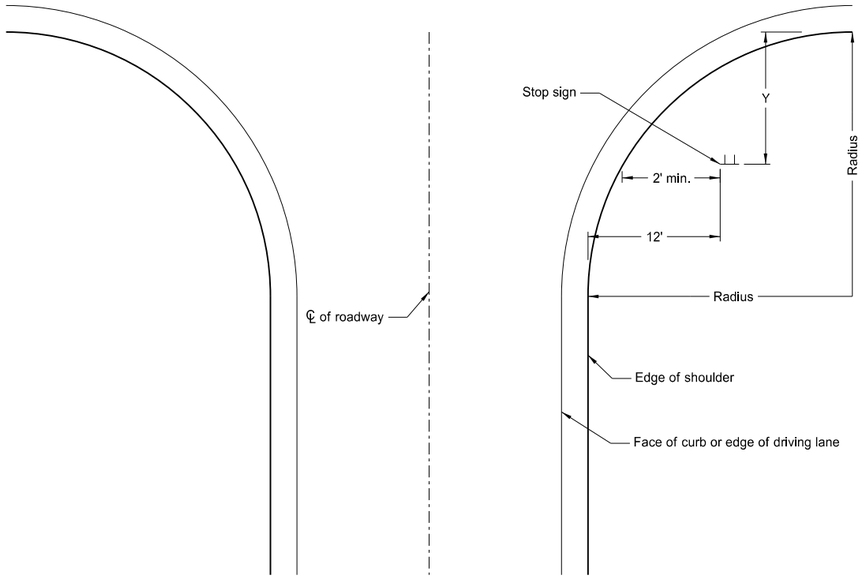
   Install signs on expressways a minimum height of 7'.

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

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

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

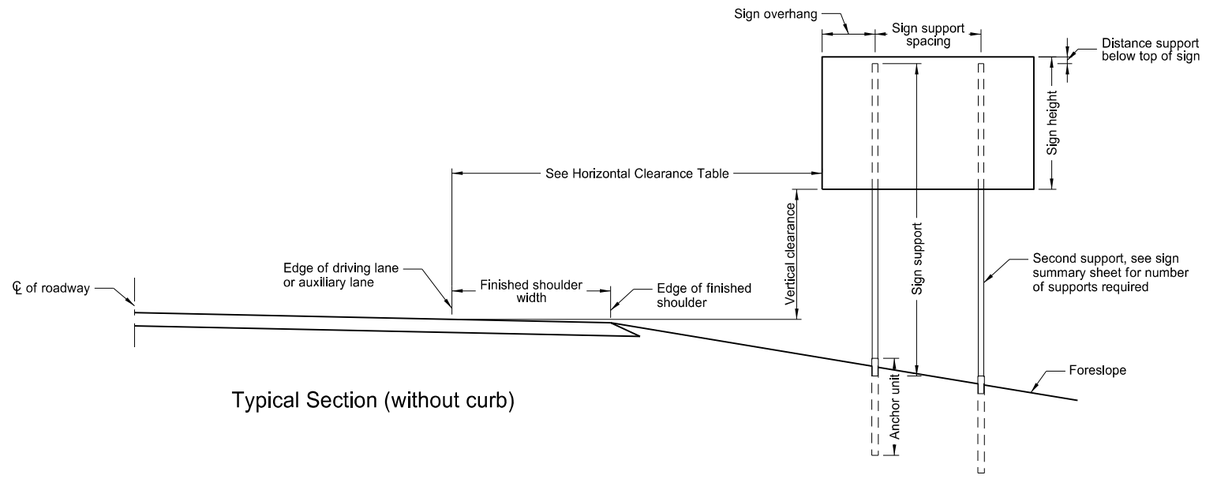
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

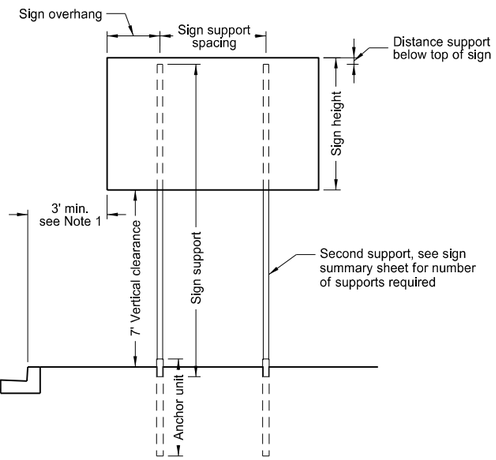
Use layout for the placement of "Stop" signs.

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



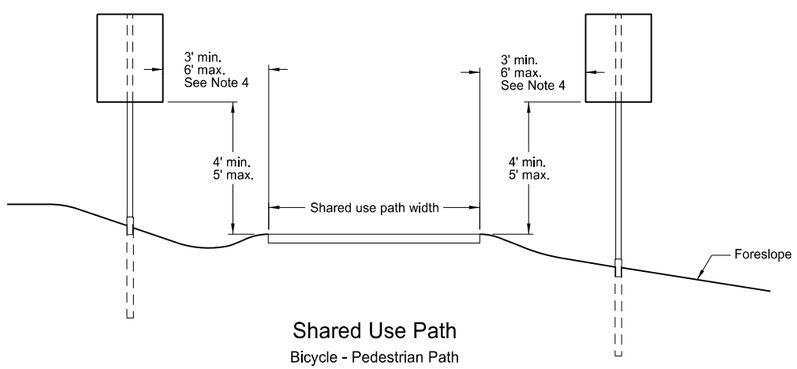
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

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

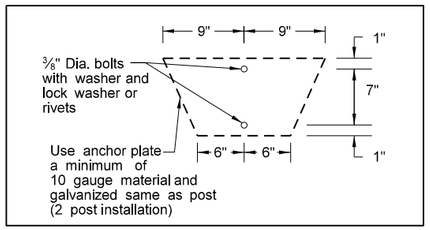
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

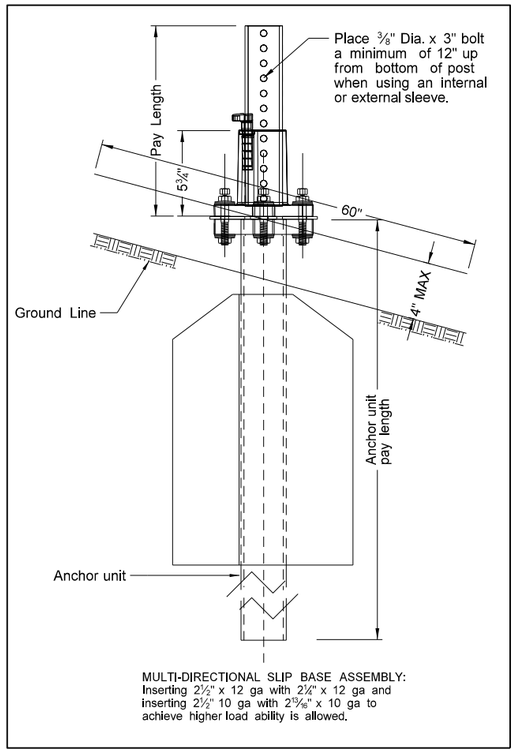
Mounting Details Perforated Tube

D-754-24

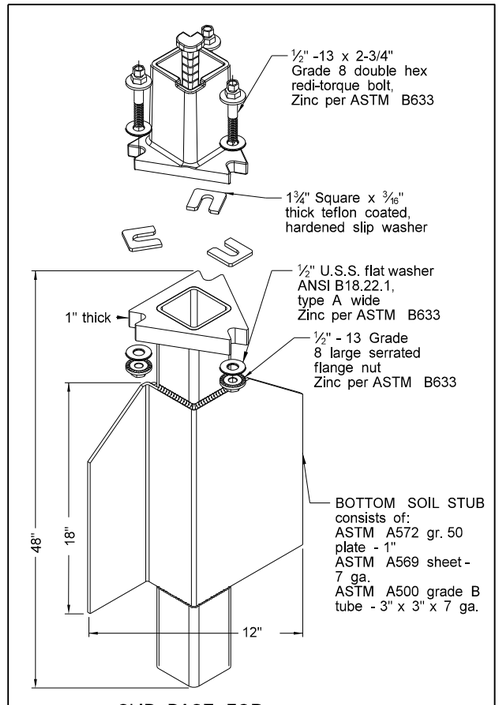
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2⅜16	10	Yes		7

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

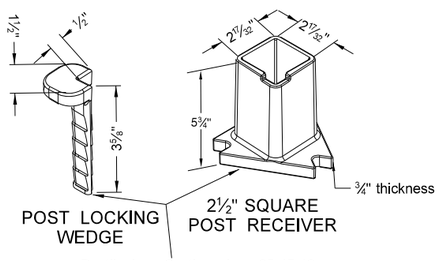




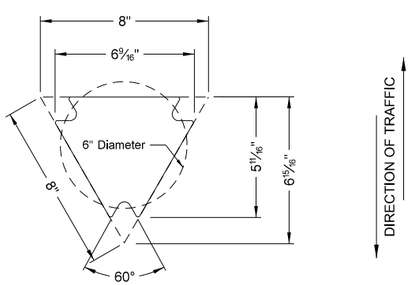
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2⅜16" x 10 ga to achieve higher load ability is allowed.



SLIP BASE FOR 2½" POST



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



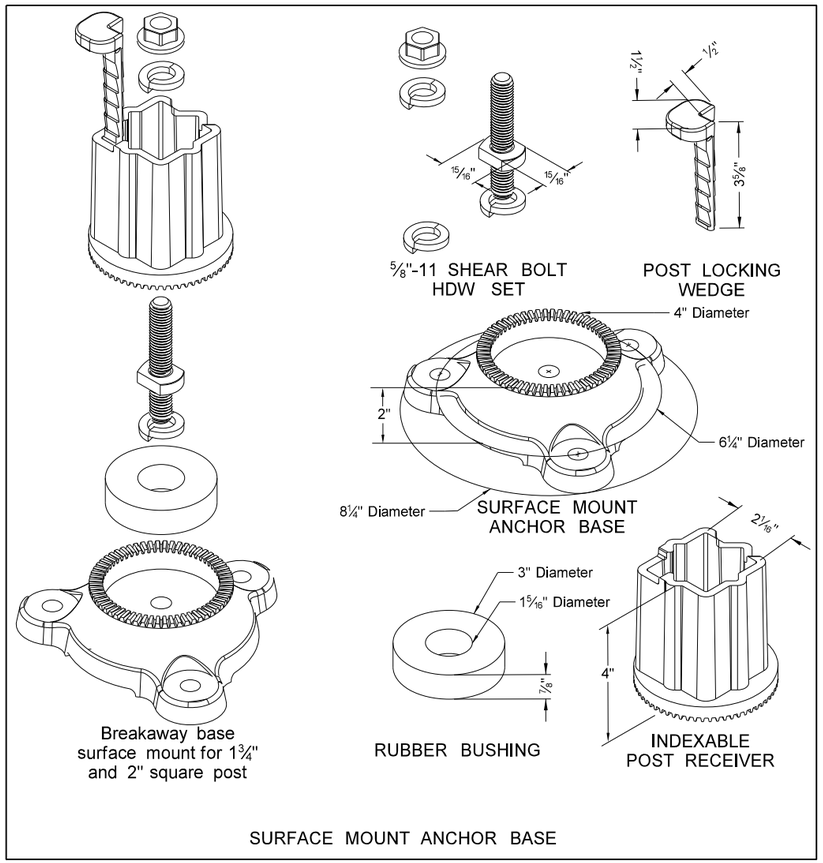
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜16 x 2⅜16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ⅜16" size 10 gauge is shown as 2.19" size on the plans;
The 2½" size is shown as 2.51" size on the plans.

NOTE:

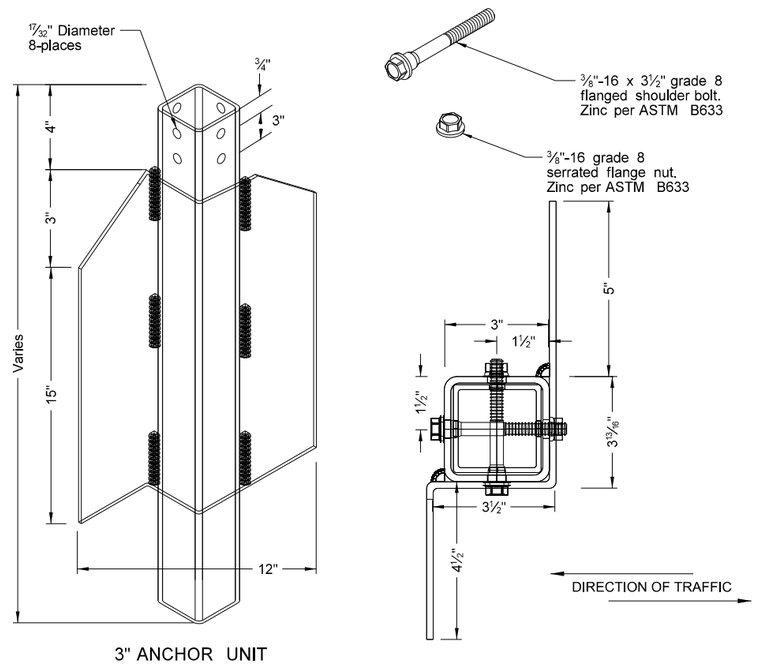
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

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



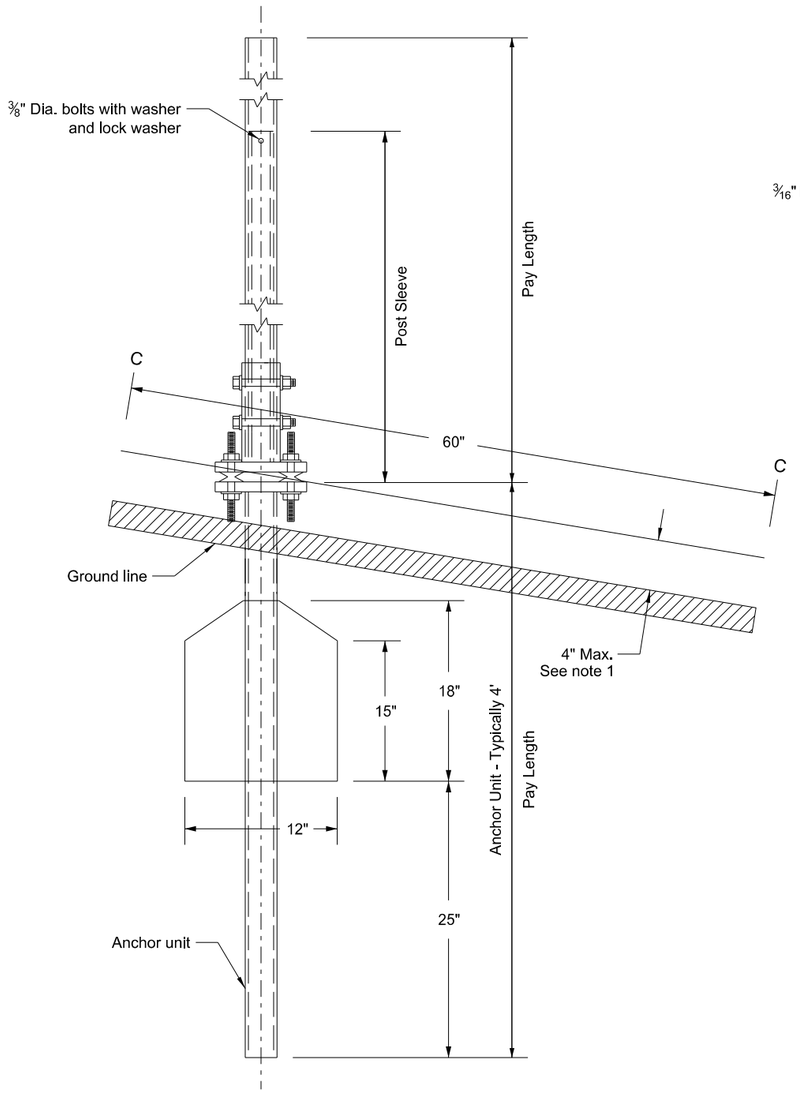
3" ANCHOR UNIT

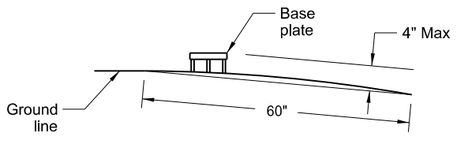
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

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

Breakaway Coupler System for Perforated Tubes

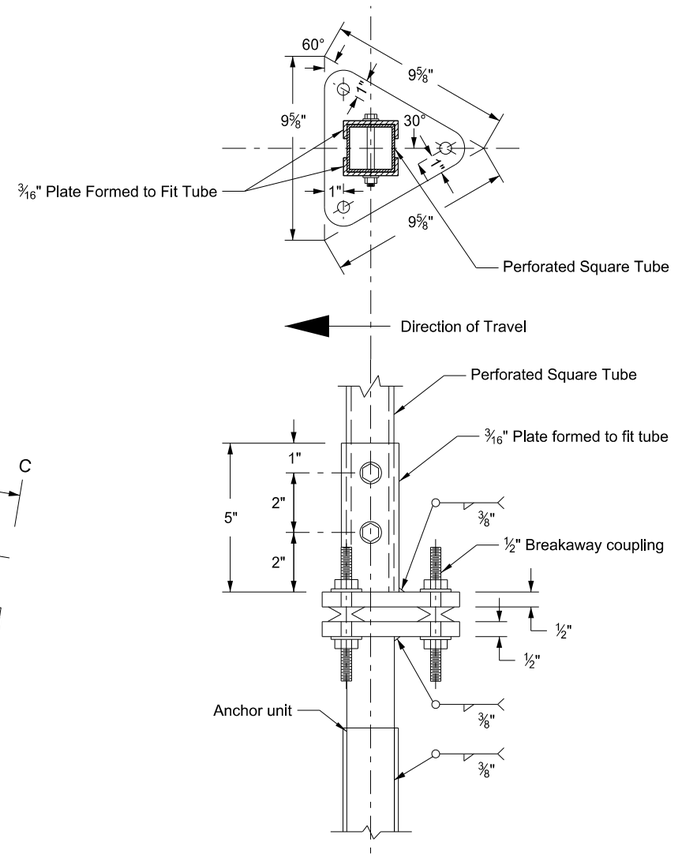
D-754-24A





Section C-C

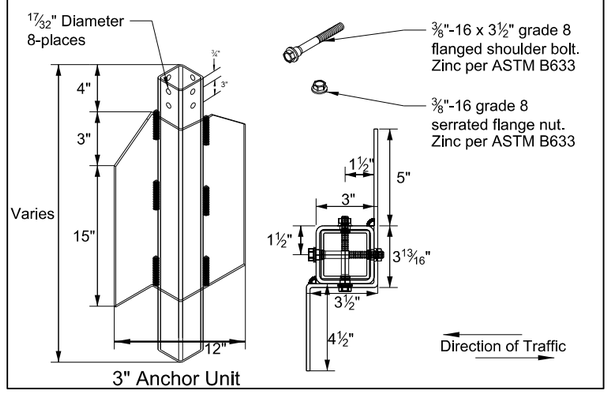
Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



Base Plate with Breakaway Coupler

Shoulder Bolt

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



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.

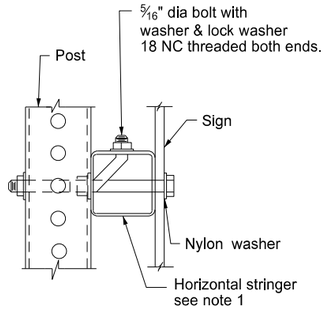
(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

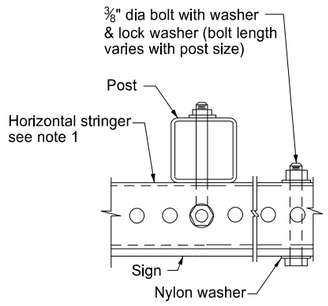
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

Mounting Details Perforated Tube

D-754-25

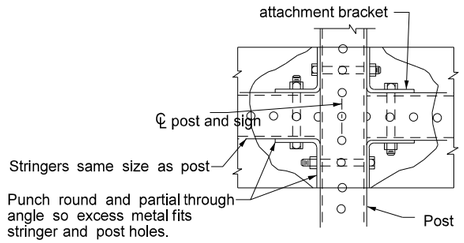


Side View



Top View

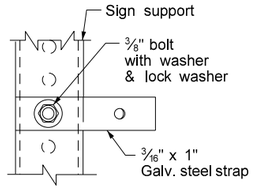
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



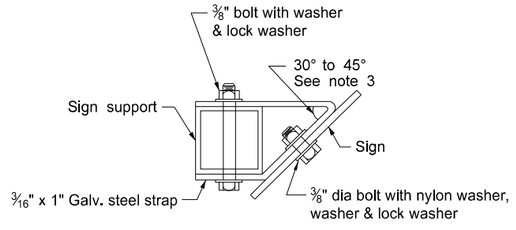
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

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.

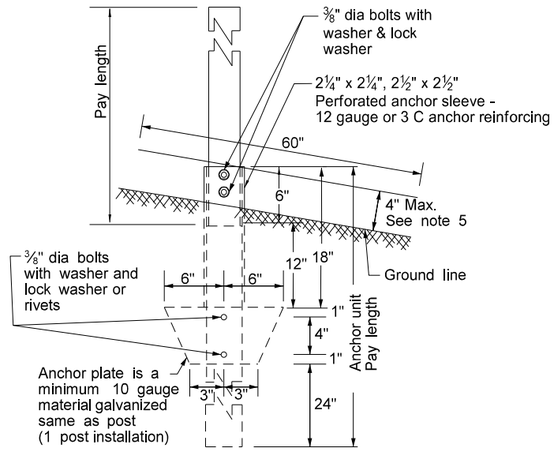


Side View



Top View

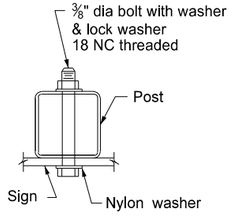
STRAP DETAIL



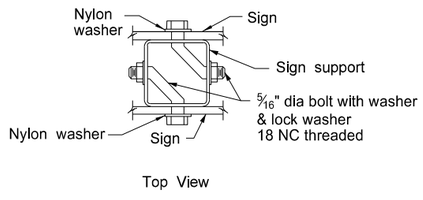
ANCHOR UNIT AND POST ASSEMBLY

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.

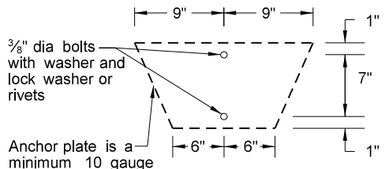


BOLT MOUNTING



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

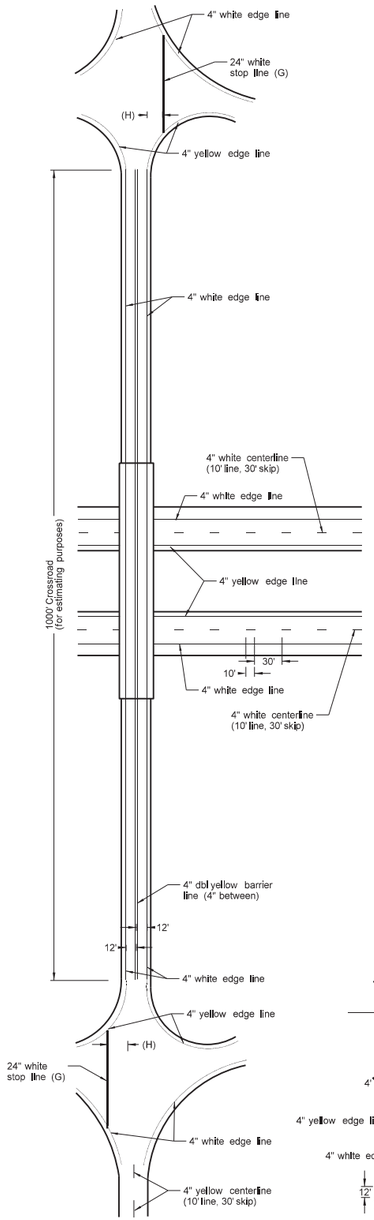
The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

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.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

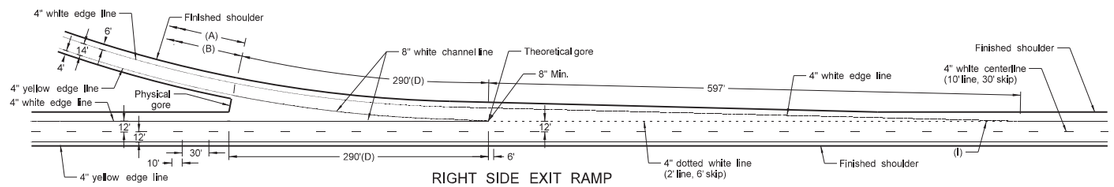
INTERSTATE PAVEMENT MARKING
4 LANE DIVIDED HIGHWAY

D-762-2

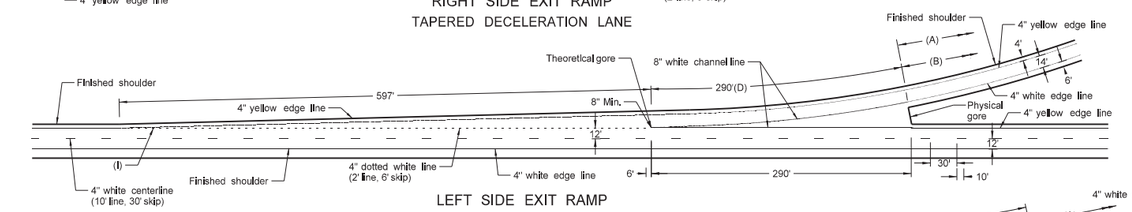


CROSS-ROAD & STRUCTURE

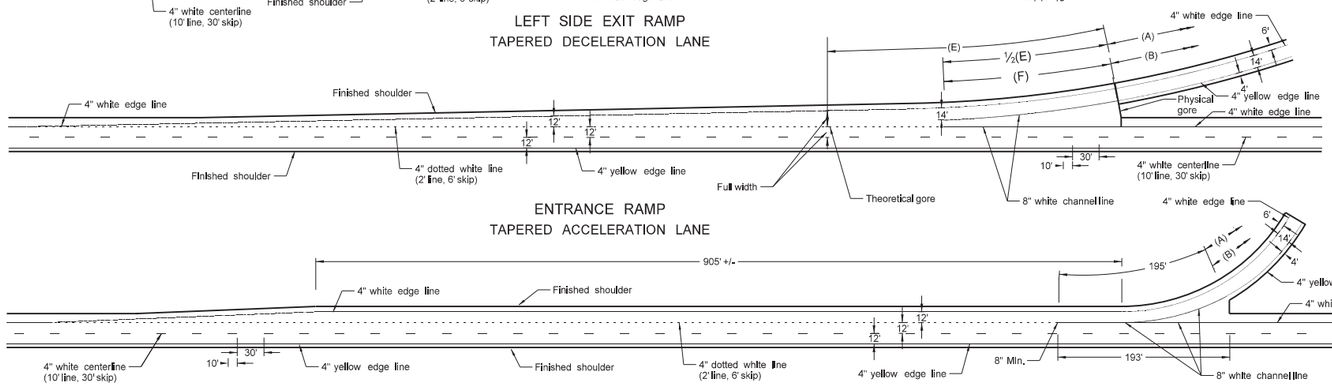
Engineer will determine length striped.



RIGHT SIDE EXIT RAMP
TAPERED DECELERATION LANE

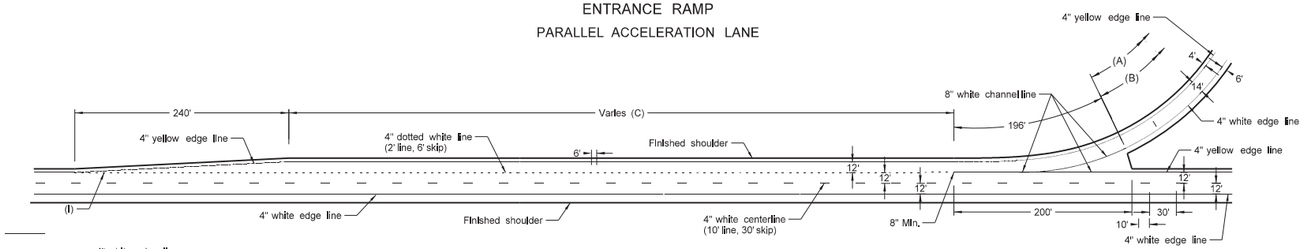


LEFT SIDE EXIT RAMP
TAPERED DECELERATION LANE

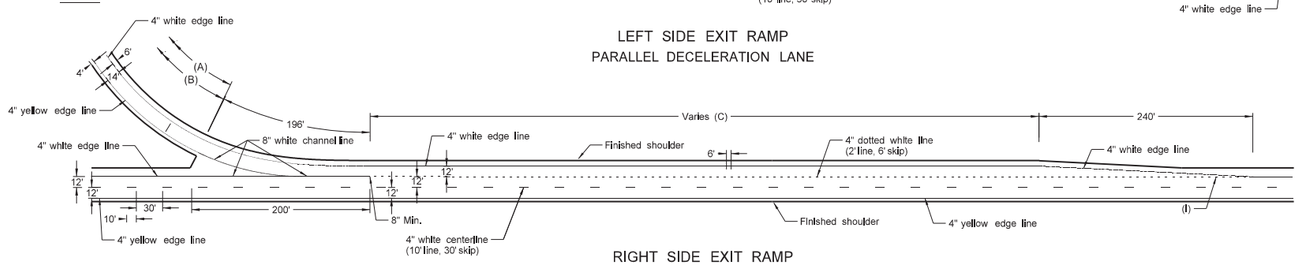


ENTRANCE RAMP
TAPERED ACCELERATION LANE

ENTRANCE RAMP
PARALLEL ACCELERATION LANE



LEFT SIDE EXIT RAMP
PARALLEL DECELERATION LANE



RIGHT SIDE EXIT RAMP
PARALLEL DECELERATION LANE

NOTE:

(A) 4" White edge line
(B) 4" Yellow edge line
(C) Assume "varies" equals 790' for purpose of estimate. Place pavement marking from beginning of taper to the 8" line.
(D) Beginning of physical gore to theoretical gore.
(E) If the distace is less than 350' extend the 8" 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.

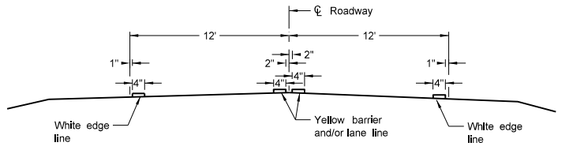
BASIS OF ESTIMATE		
LOCATION	ITEM	
Right or Left Side Exit Ramp TAPERED	8" White channel line	580 LF
	24" White stop line	60 LF
	4" White dotted line	148 LF
	4" White edge line	1115 LF
	4" Yellow edge line	1075 LF
Entrance Ramp TAPERED	8" White channel line	390 LF
	4" White dotted line	258 LF
	4" White edge line	1270 LF
	4" Yellow edge line	1075 LF
Right or Left Side Exit Ramp PARALLEL	8" White channel line	396 LF
	24" White stop line	60 LF
	4" White dotted line (C)	258 LF
	4" White edge line	1115 LF
	4" Yellow edge line	1075 LF
Entrance Ramp PARALLEL	8" White channel line	388 LF
	4" White dotted line	283 LF
	4" White edge line	1275 LF
	4" Yellow edge line	1075 LF
Main Line (Both Roadways)	4" White lane line, 10' line, 30' skip	2640 LF/MI
	4" White edge line	10,560 LF/MI
	4" Yellow edge line	10,560 LF/MI
Cross Road	4" White edge line	2000 LF
	4" 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

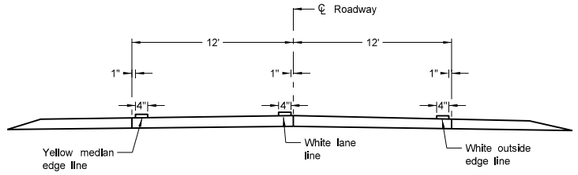
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA
11/05/21

PAVEMENT MARKING

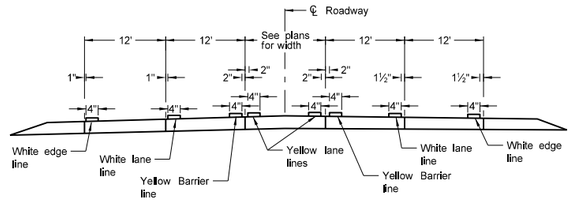
D-762-4



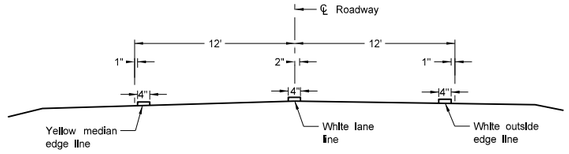
Two Lane Two Way
RURAL ROADWAY



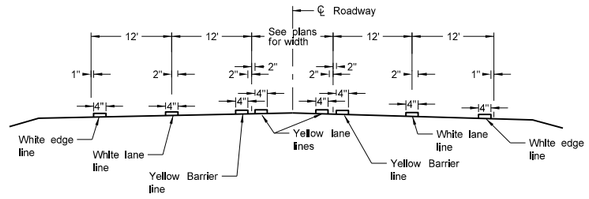
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



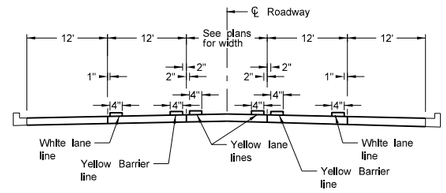
RURAL FIVE LANE ROADWAY
Concrete Section



Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



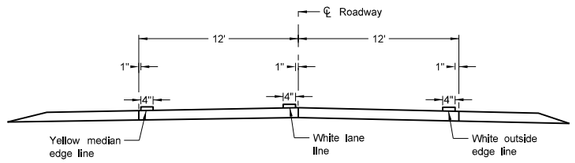
RURAL FIVE LANE ROADWAY
Asphalt Section



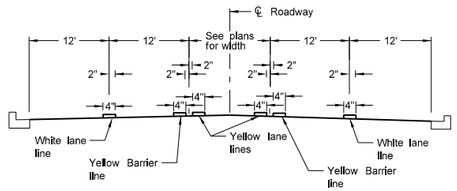
URBAN FIVE LANE SECTION
Concrete Section

NOTES:

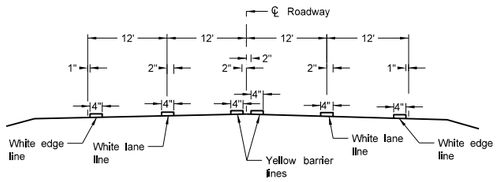
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



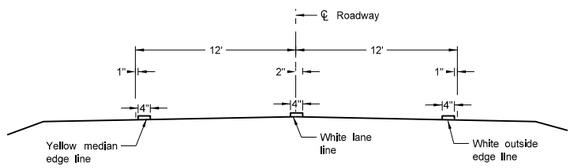
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



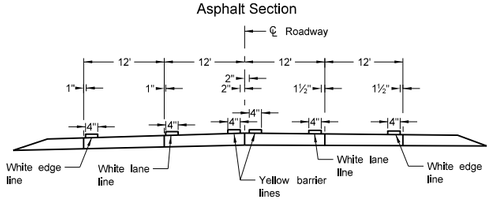
URBAN FIVE LANE SECTION
Asphalt Section



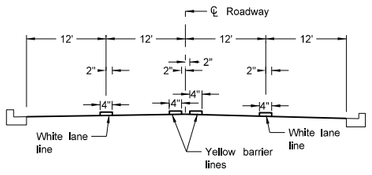
RURAL FOUR LANE ROADWAY
Asphalt Section



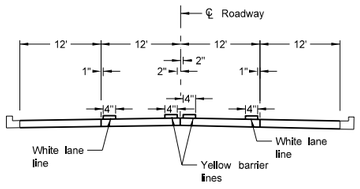
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



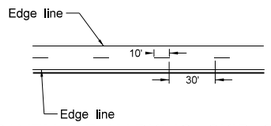
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



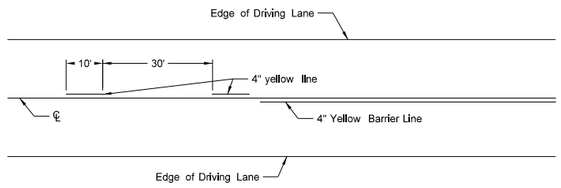
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17 08-27-19	Updated to active voice. New Design Engineer PE Stamp.

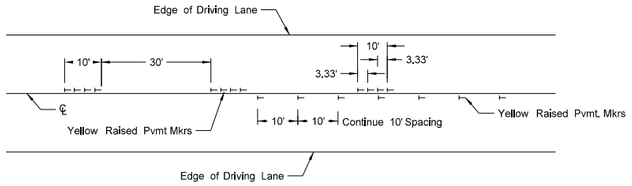
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

SHORT-TERM PAVEMENT MARKING

D-762-11

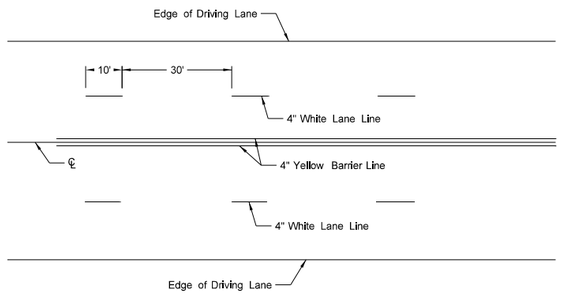


Painted or Tape Lines

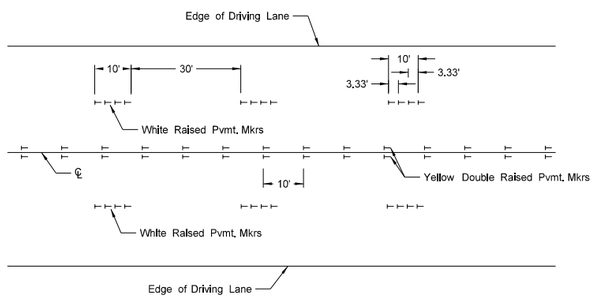


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

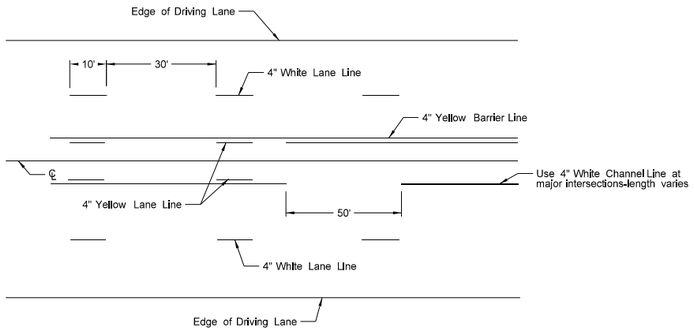


Painted or Tape Lines

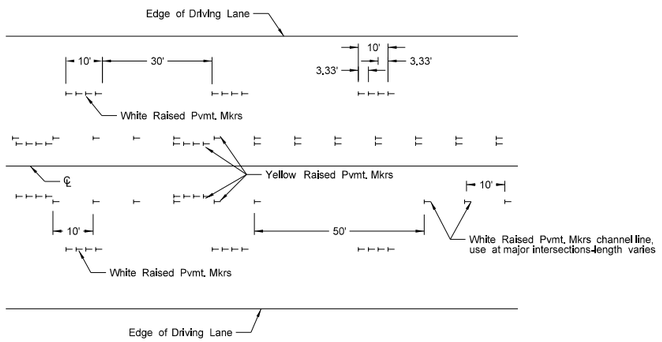


Raised Pavement Markers

FOUR LANE ROADWAY

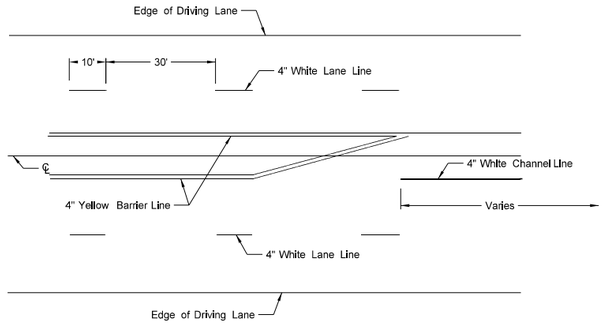


Painted or Tape Lines

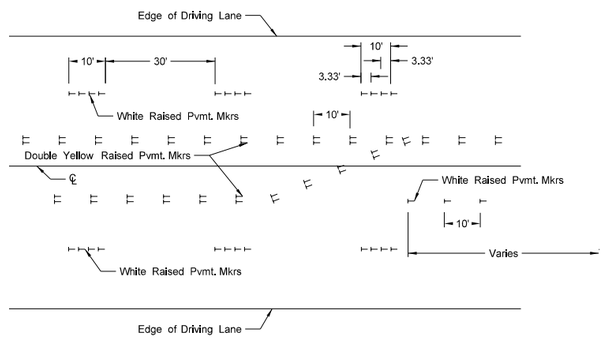


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

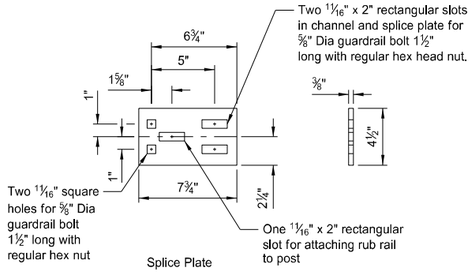
1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top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

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.

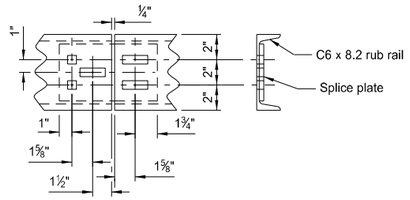
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

W-BEAM GUARDRAIL GENERAL DETAILS

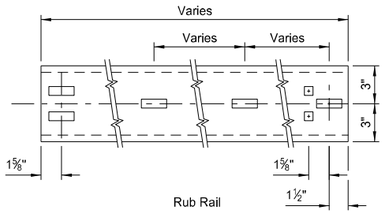
D-764-1



Splice Plate

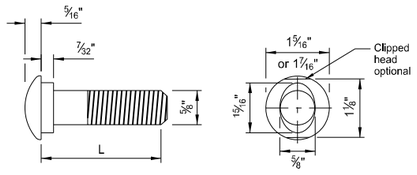


Splice Detail

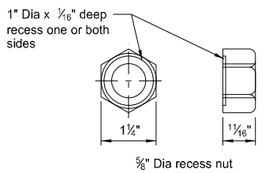


Rub Rail

C6x8 RUB RAIL AND SPLICE PLATE

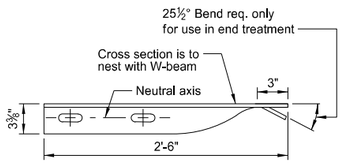


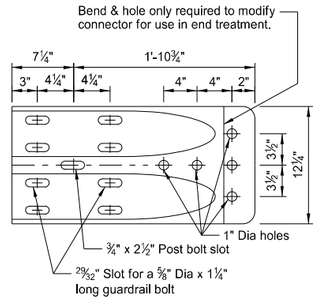
5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



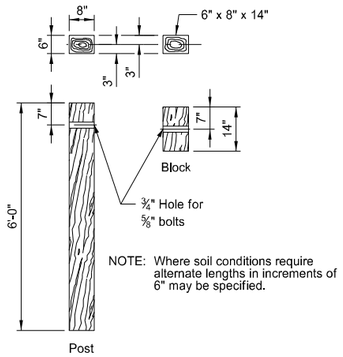
5/8" Dia recess nut

5/8" GUARDRAIL BOLT & RECESS NUT



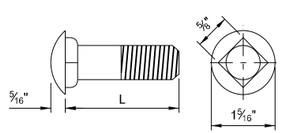


W BEAM TERMINAL CONNECTOR



Post

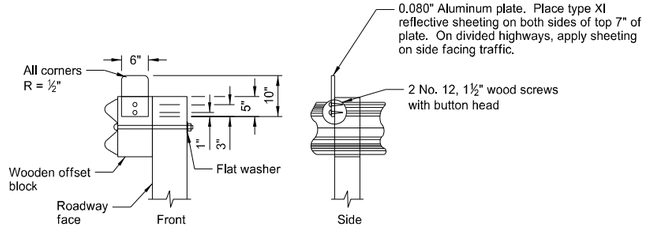
6"x8" TIMBER POST & BLOCK



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

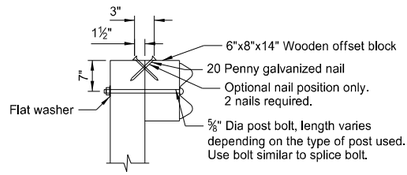
5/8" Hex nut

5/8" CARRIAGE BOLT & NUT

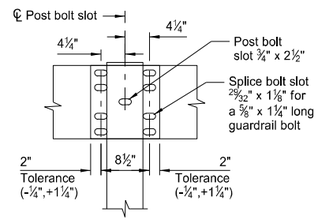


REFLECTORIZED PLATE DETAIL

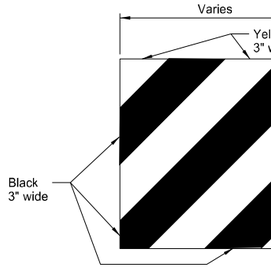
Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



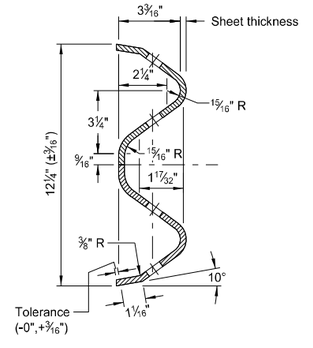
TYPICAL POST ATTACHMENT DETAIL



SPLICE DETAIL



IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION

NOTES:

1. Place reflector plates at the first post and spaced at 25' centers on guardrail less than 250' in length and at 50' centers for guardrail over 250' in length. Use reflector the same color as the pavement marking adjacent to that reflector unless noted otherwise on the plans.
2. Dispose of excess earth from excavations for guard posts as directed by the engineer. Replace bituminous material where guardrail is installed after mat is placed. Include cost of excavation and replacing of bituminous material in the price bid for other items.
3. Place Object Marker within the vertical edges of the Impact Plate. Use type XI retroreflective sheeting meeting the requirements of Section 894.02.E of the standard specifications. Apply sheeting to 0.100 Aluminum sheeting meeting the requirements Section 894.01.A. Attach the Object Marker to the Impact Head Plate with non-rust rivets or some other non-rust attachment device. Slope stripes downward toward the roadway side.
4. Guardrail installation height tolerance = - 1/4" , + 1".
5. Standard W-Beam rail post bolt slot spacing is 6'-3". Post bolt slot spacing of 3'-1 1/2" is acceptable.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-11-13

REVISIONS

DATE	CHANGE
10-25-19	Updated notes to active voice and added Note 5.
12-02-20	Updated clipped head to optional

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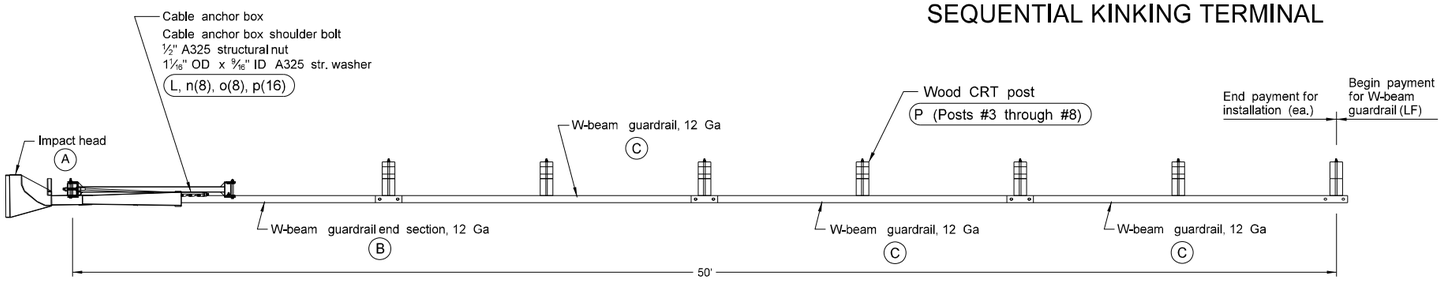
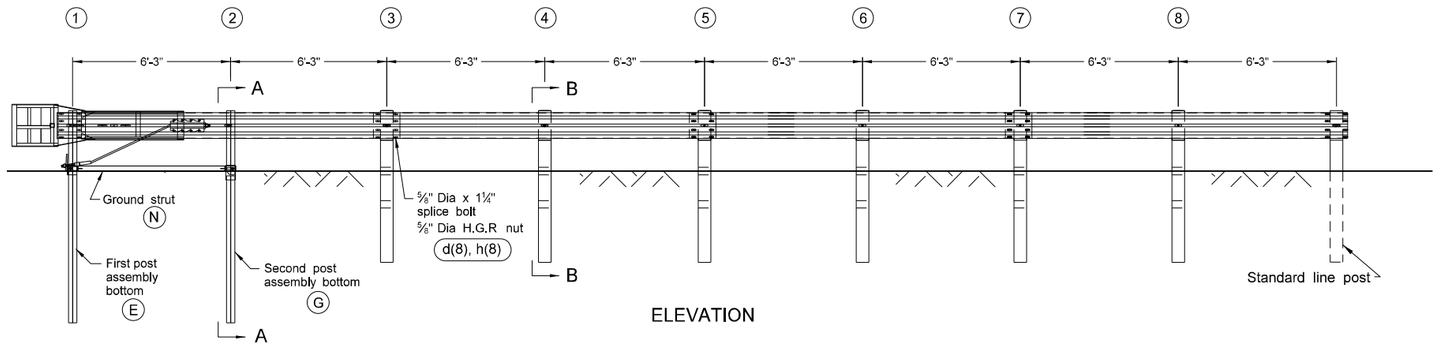
12 02 2020

SEQUENTIAL KINKING TERMINAL

D-764-5



PLAN

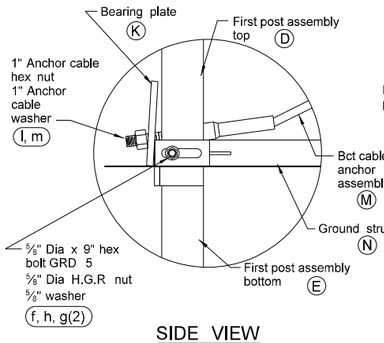


ELEVATION

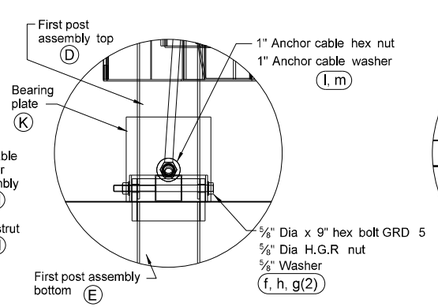
ITEM	QTY	BILL OF MATERIALS
A	1	IMPACT HEAD
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga
C	3	W-BEAM GUARDRAIL, 12 Ga
D	1	FIRST POST ASSEMBLY TOP
E	1	FIRST POST ASSEMBLY BOTTOM
F	1	SECOND POST ASSEMBLY TOP
G	1	SECOND POST ASSEMBLY BOTTOM
K	1	BEARING PLATE
L	1	CABLE ANCHOR BOX
M	1	BCT CABLE ANCHOR ASSEMBLY
N	1	GROUND STRUT HINGED POST
P	6	WOOD CRT POST
R	6	TIMBER BLOCKOUT/RCY EQUIVALENT
		HARDWARE
a	2	1/4 " x 4" HEX BOLT Grade 5
b	4	¼" WASHER
c	2	¼" HEX NUT
d	25	⅝" Dia X 1¼" SPLICE BOLT, POST #2
e	6	⅝" Dia X 18" H.G.R. BOLT (POSTS 3 THRU 8)
f	1	⅝" Dia X 9" HEX BOLT GRD 5
g	8	⅝" WASHER
h	32	⅝" Dia H.G.R. NUT
j	1	¾" Dia X 8½" HEX BOLT GRD A449
k	1	¾" Dia HEX NUT
l	2	1" ANCHOR CABLE HEX NUT
m	2	1" ANCHOR CABLE WASHER
n	8	GROUND STRUT HINGED POST
o	8	½" A325 STRUCTURAL NUT
p	16	1⅛" OD X ⅝" ID A325 STR. WASHER

GENERAL NOTES:

1. Use breakaway posts with the SKT.
2. Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Flare the SKT at a rate of up to 25:1 to prevent shoulder encroachment by the impact head.
4. Grade site as needed to prevent lower sections of the posts from protruding more than 4" above ground (measured along a 5' cord).
5. Drive 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 satisfactorily to prevent settlement.
6. When rock is encountered during excavation, use a 10" diameter post hole, 20" into the rock surface, if approved by the engineer. Place granular material in the bottom of the hole, approximately 2½" deep to provide drainage. Field cut posts 1 & 2 to length, place in the hole, and backfill with adequately compacted material excavated from the hole.
7. Place the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
8. "Toe nail" the wood blockouts on post #3 through post #8 with two 20 penny galvanized nails in each rectangular post, to prevent them from turning when the wood shrinks.

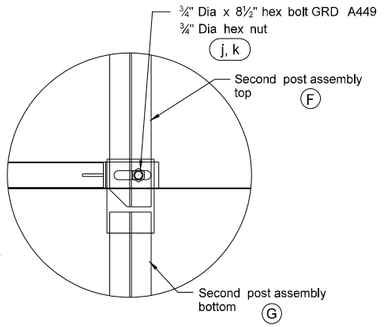


SIDE VIEW

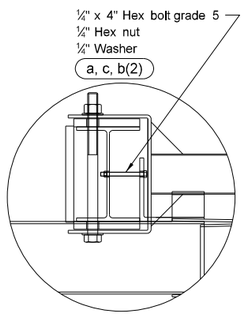


FRONT VIEW

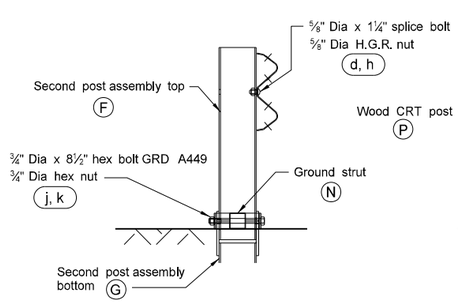
POST #1 CONNECTION DETAILS



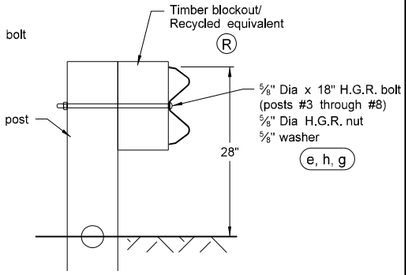
SIDE VIEW DETAIL OF POST #2



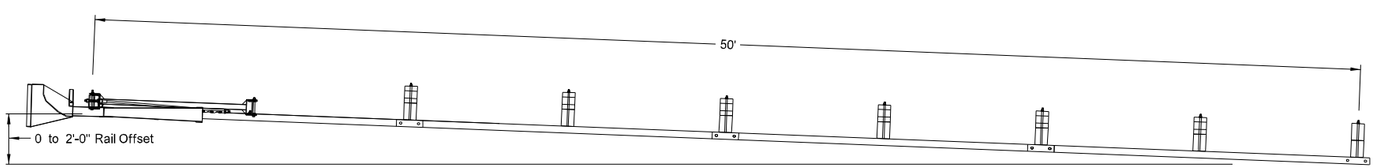
IMPACT HEAD CONNECTION DETAIL



SECTION A-A
Post #2



SECTION B-B
Posts #3 through #8



FLARED INSTALLATION
25:1 maximum flare rate

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

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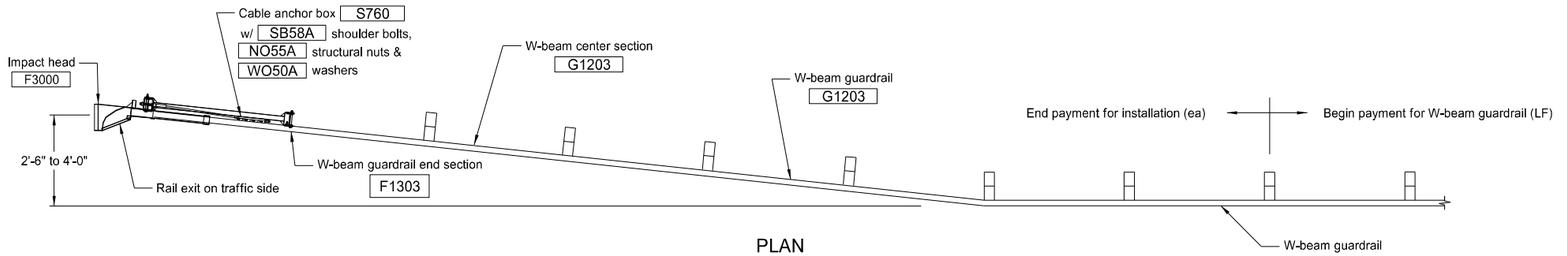
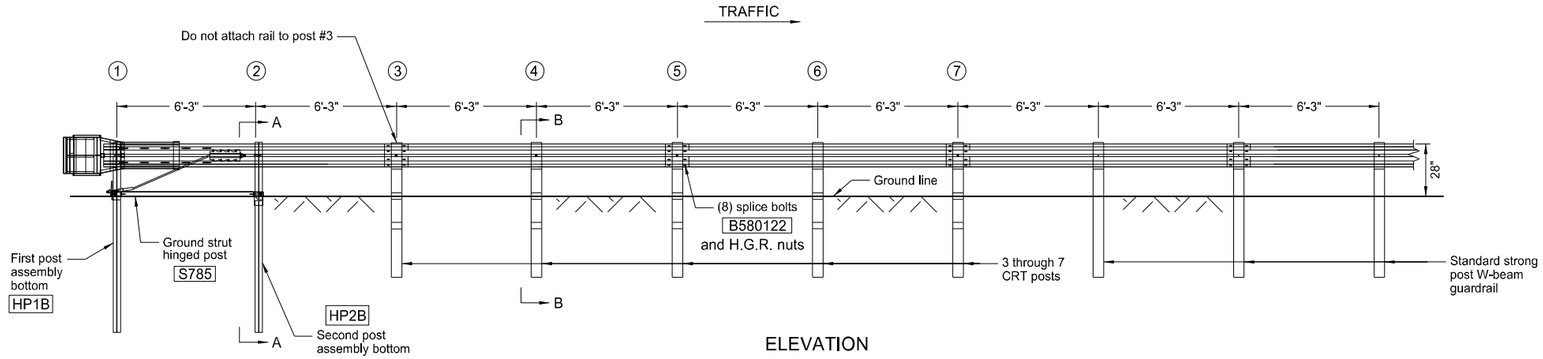
12 02 2020

FLARED ENERGY ABSORBING TERMINAL

D-764-6



PLAN

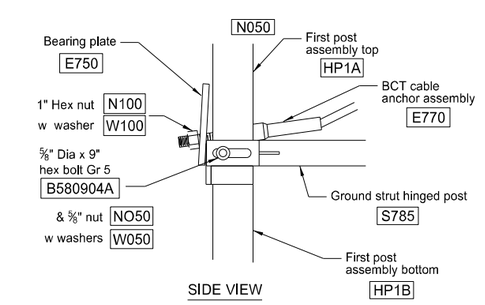


ELEVATION

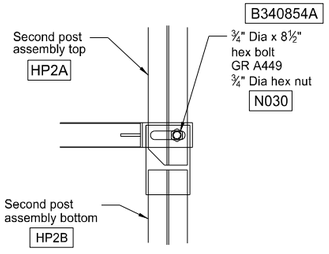
ITEM #	QTY	BILL OF MATERIALS
F3000	1	IMPACT HEAD
F1303	1	W-BEAM GUARDRAIL END SECTION, 12 GA
G1203	2	W-BEAM GUARDRAIL, 12 GA
HP1A	1	FIRST POST ASSEMBLY TOP
HP1B	1	FIRST POST ASSEMBLY BOTTOM
HP2A	1	SECOND POST ASSEMBLY TOP
HP2B	1	SECOND POST ASSEMBLY BOTTOM
P671	5	WOOD CRT POST
P675	5	TIMBER BLOCKOUT OR RECYCLED EQUIVALENT
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT HINGED POST
		HARDWARE
B140404	2	¼" Dia x 4" HEX BOLT
WO14	4	¼" WASHER
N014	2	¼" HEX NUT
B580122	17	⅝" Dia x 1¼" SPLICE BOLT
B581802	4	⅝ Dia x 10" H.G.R. BOLT (POSTS 3 THRU 6)
B580904A	1	⅝" Dia x 9" HEX BOLT GR 5
W050	5	⅝" WASHER
N050	22	⅝" Dia H.G.R. NUT
B340854A	1	¾" Dia x 8½" HEX BOLT GR A449
NO30	1	¾" Dia HEX NUT
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
SB58A	8	CABLE ANCHOR BOX SHOULDER BOLT
N055A	8	½" A325 STRUCTURAL NUT
W050A	16	1 1/16" OD x 3/16" ID A325 STR. WASHER

GENERAL NOTES

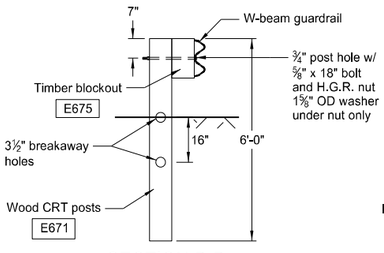
1. Use wood posts with the Flared Energy Absorbing Terminal except posts #1 and #2.
2. Use galvanized bolts, nuts, cable assemblies, cable anchors, and bearing plates.
3. Grade site as needed to prevent lower sections of the posts from protruding more than 4 inches above the ground (measured along a 60 inch cord).
4. Drive the lower section without the upper post attached. If the post is placed in a drilled hole, compact the backfill material satisfactorily to prevent settlement.
5. When rock is encountered during excavation, use a 12" diameter post hole 20" into the rock surface, if approved by the Engineer. Place granular material in the bottom of hole approximately 2½" deep to provide drainage. Field cut soil tubes to length, place in hole, and back fill with adequately compacted material excavated from hole.
6. Place the breakaway cable assembly taut. Use a locking device (vice grips or channel lock pliers) to prevent the cable from twisting when tightening nuts.
7. "Toe nail" the wood blockouts to the rectangular wood posts with two 20 penny galvanized nails in each post to prevent them from turning when the wood shrinks.
8. 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, flare the Flared Energy Absorbing Terminal at the flare rate of the guardrail. When the guardrail flare is between 10:1 and 7:1, turn the Flared Energy Absorbing Terminal parallel to the roadway.



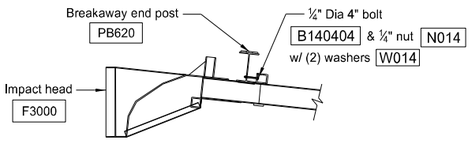
SIDE VIEW



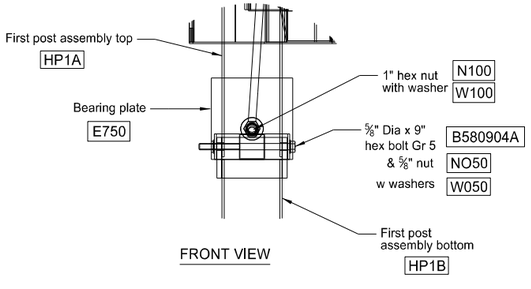
SIDE VIEW DETAIL OF POST #2



SECTION B-B
POST 3 THRU 7

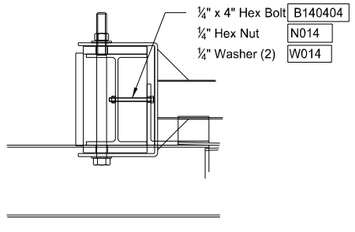


IMPACT HEAD CONNECTING DETAIL

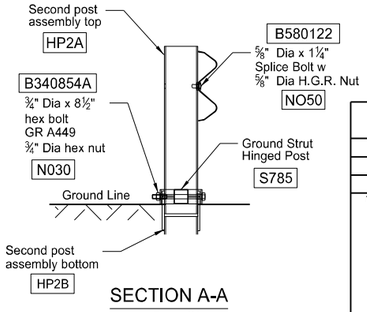


FRONT VIEW

POST #1 CONNECTION DETAILS



IMPACT HEAD CONNECTION DETAIL



SECTION A-A
at Post #2

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Update notes to active voice.

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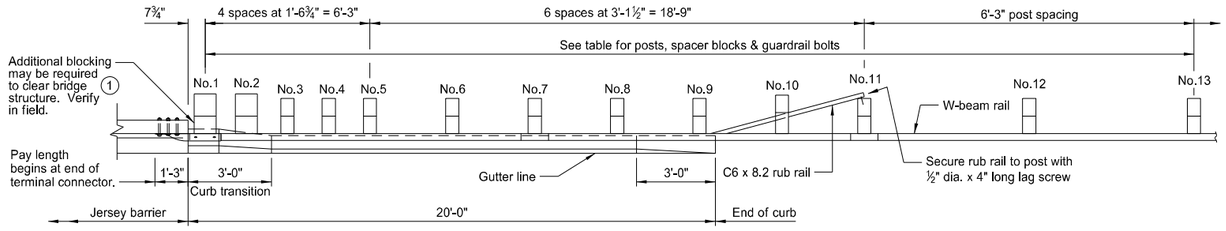
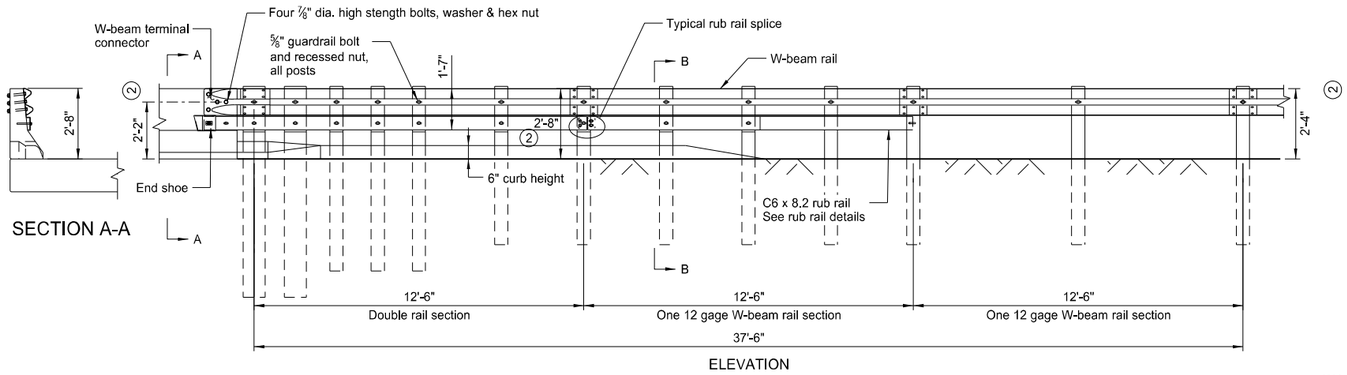
12 02 2020

W-BEAM TRANSITION TO CONCRETE JERSEY BARRIER WITH APPROACH CURB

D-764-9



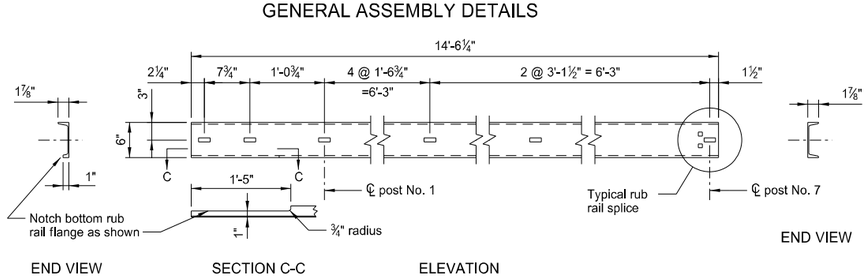
PLAN



ELEVATION

GENERAL ASSEMBLY DETAILS

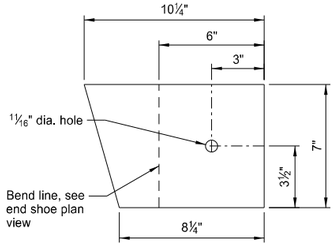
TOP PLATE



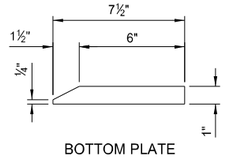
END VIEW SECTION C-C ELEVATION

END VIEW

RUB RAIL STRAIGHT SECTION



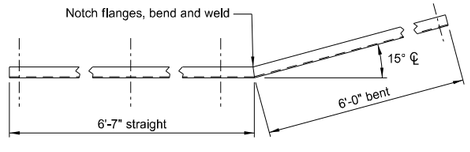
FRONT PLATE



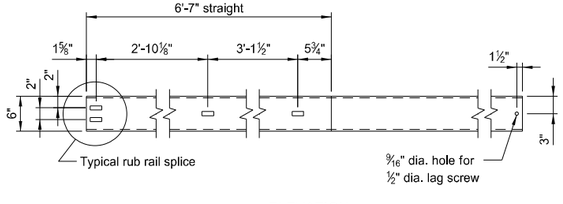
BOTTOM PLATE

END SHOE PLATE DETAILS

(¼" plate)

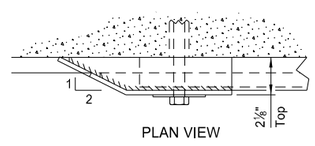


PLAN VIEW

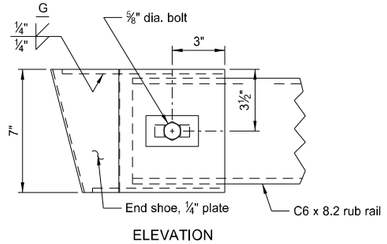


ELEVATION

RUB RAIL BENT SECTION

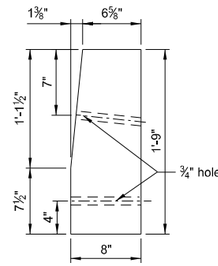


PLAN VIEW



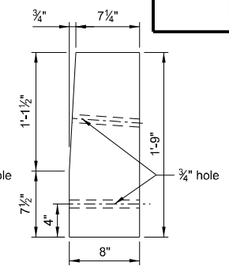
ELEVATION

RUB RAIL END SHOE ASSEMBLY



END VIEW

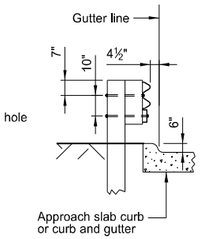
Block No. 1 (width = 10")



END VIEW

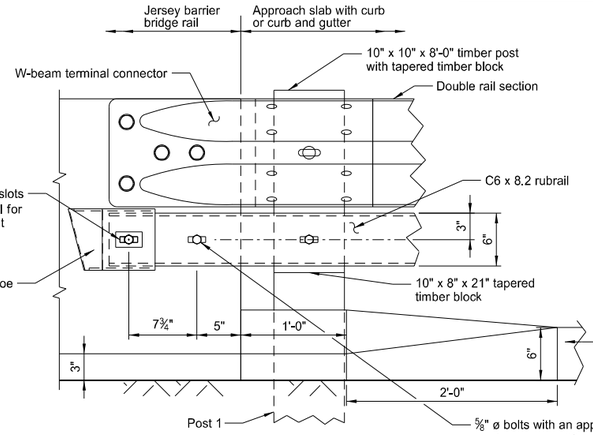
Block No. 2 (Width = 10")

TAPERED TIMBER BLOCK DETAILS

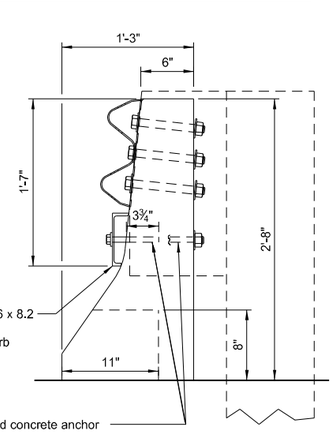


SECTION B-B

POST, TIMBER BLOCK & BOLT TABLE		
DESCRIPTION	POST NO.	SIZE
Post	1 & 2	10" X 10" X 8'-0" min long
	3-5	6" X 8"X 7'-0" min long
	6-13	6" X 8"X 6'-0" min long
Spacer block	1-2	10" X 8" X 21" tapered block
	3-9	6" X 8" X 21"
	10	6" X 9 3/4" X 14"
	11-13	6" X 8" X 14"
Guardrail bolt & recessed nut	1 & 2 & 10	5/8" Dia X 20" - guardrail
	3-9,11-13	5/8" Dia X 18" - guardrail
	1-2	5/8" Dia X 22"- rub rail
	3-9	5/8" Dia X 20"- rub rail



TRAFFIC SIDE ELEVATION



END VIEW

RAIL ATTACHMENT AND CURB DETAIL

(1) Additional blocking may be required at post No.1.

(2) Height is 2'-8" from 0' to 12'-6" from bridge. Height tapers from 2'-8" to 2'-4" between 12'-6" to 37'-6" from bridge.

NOTES:

Galvanize all hardware in accordance with AASHTO M232.

Use AASHTO 270M Grade 250 C6 x 8.2 rub rail and structural steel galvanized after fabrication in accordance with AASHTO M111.

All rub rail slotted holes are $^{1}1_{6}$"x 2".

All rub rail square holes are $^{1}1_{6}$".

Use timber posts and blocks for the W-beam guardrail.

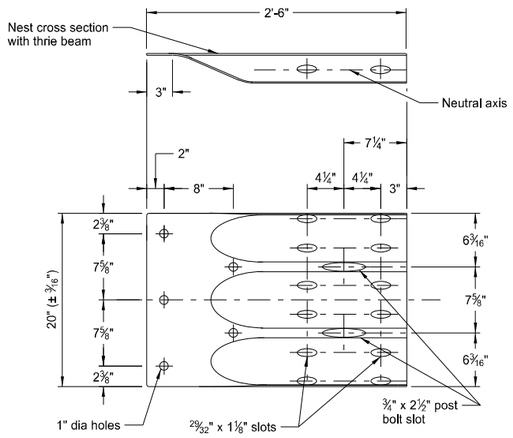
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12-02-20	Updated notes to active voice.

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

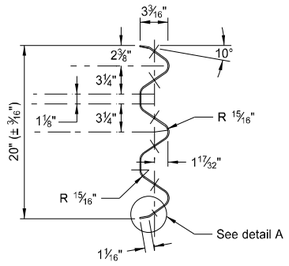
12 02 2020

THRIE BEAM TRANSITION TO DOUBLE BOX BEAM RETROFIT

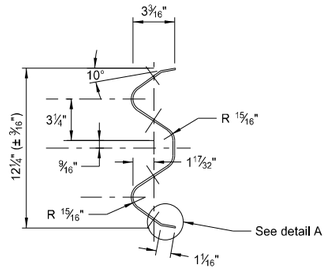
D-764-10



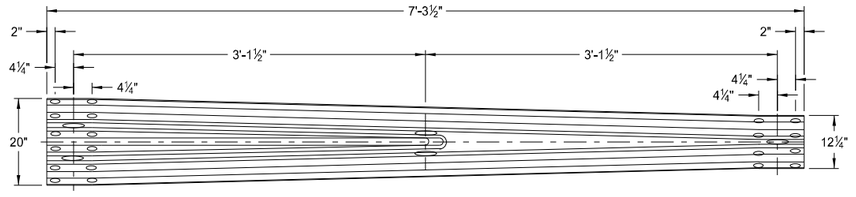
THRIE BEAM TERMINAL CONNECTOR



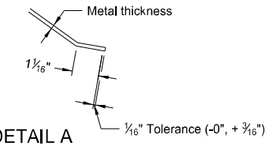
THRIE BEAM END VIEW



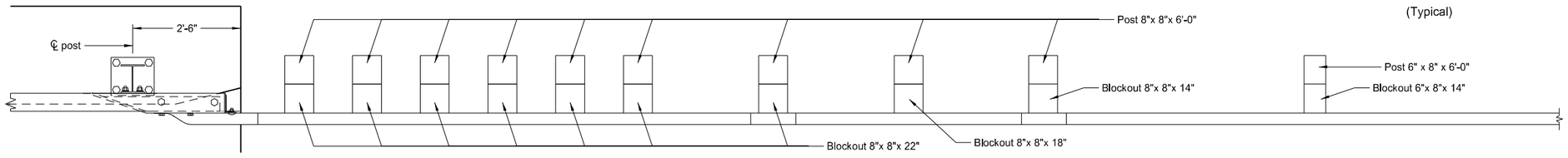
W-BEAM END VIEW



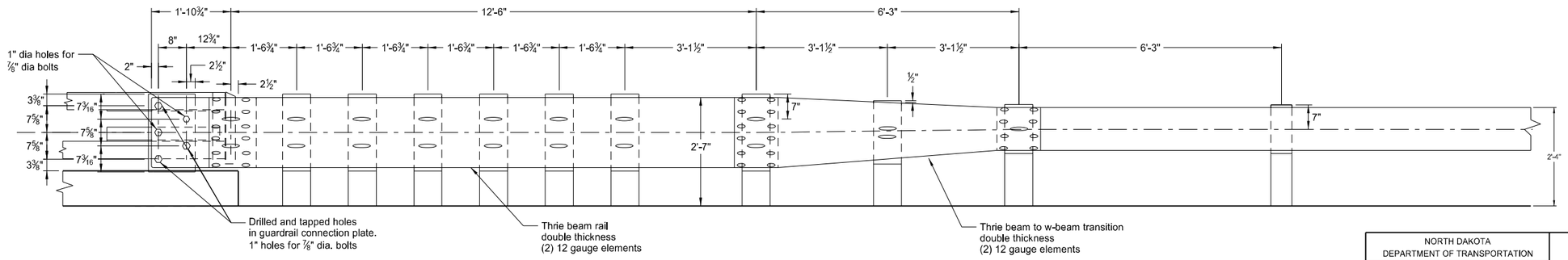
THRIE BEAM TO W-BEAM TRANSITION SECTION



DETAIL A
(Typical)



PLAN



ELEVATION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-11-13	
REVISIONS	
DATE	CHANGE
12/02/20	Updated text to active voice.

KIRK J. HOFF
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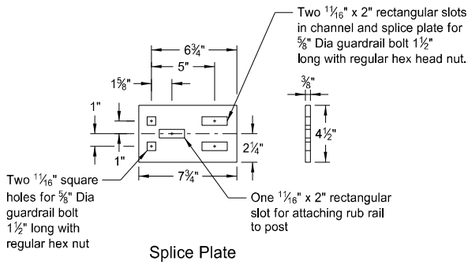
ENGINEER
NORTH DAKOTA

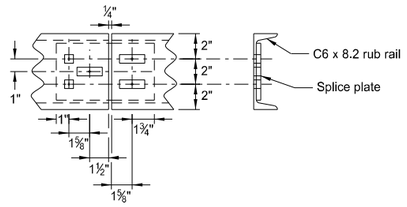
12 02 2020

MGS W-BEAM GUARDRAIL GENERAL DETAILS

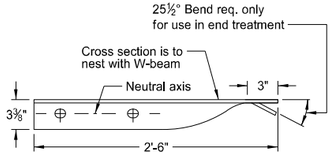
D-764-40

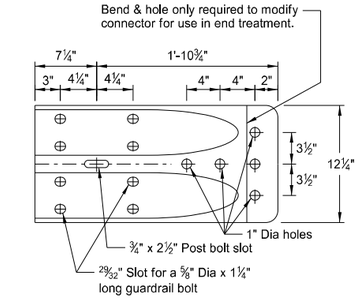


Splice Plate

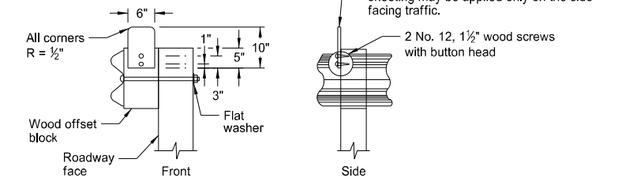


Splice Detail



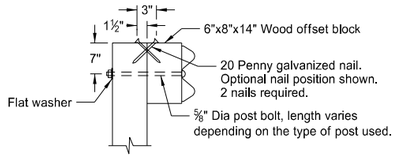


W BEAM TERMINAL CONNECTOR



REFLECTORIZED PLATE DETAIL

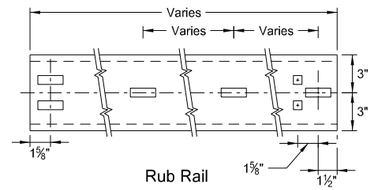
NOTE: Additional reflectors are added to the W-beam guardrail quantities for placement on end treatment.



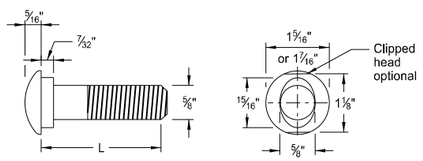
TYPICAL WOOD POST ATTACHMENT DETAIL

NOTES:

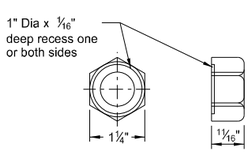
1. Begin reflector plates at the first post and space at 25' centers on guardrail less than 250' length and at 50' centers for guardrail over 250' length. Provide the reflector the same color as the pavement marking adjacent to it unless noted otherwise on the plans.
2. Replacing bituminous material 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".



C6x8.2 RUB RAIL AND SPLICE PLATE

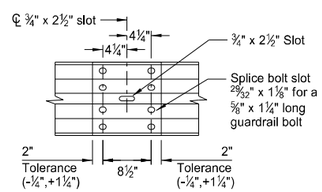


5/8" Diameter Guardrail Bolt	
L	Thread Length
1 1/4"	Full length thread
2"	1 3/4" Min thread length
9 1/2"	4" Min thread length
18"	4" Min thread length
20"	4" Min thread length
22"	4" Min thread length
25"	4" Min thread length



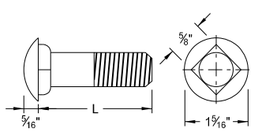
5/8" Dia recess nut

5/8" GUARDRAIL BOLT & RECESS NUT



SPLICE DETAIL

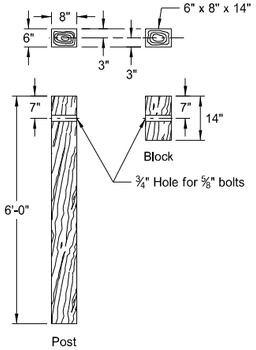
NOTE: Do not install center bolt in the 3/4" x 2 1/2" slot at mid span splices.



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

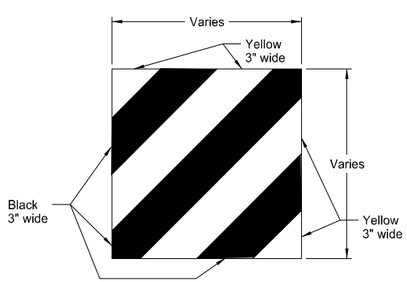
5/8" Dia hex nut

5/8" CARRIAGE BOLT & NUT

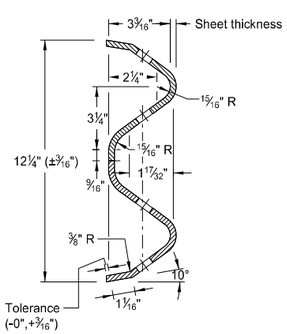


6" x 8" WOOD POST & BLOCK

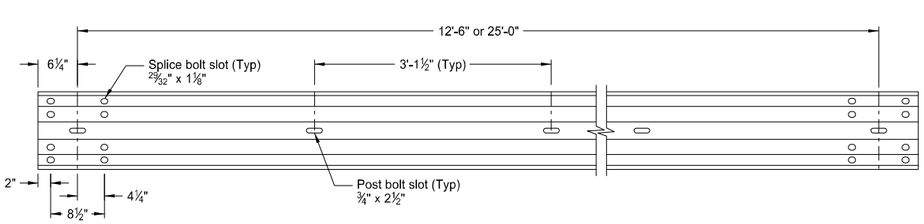
NOTE: Where soil conditions require, alternate lengths may be specified, in 6" increments.



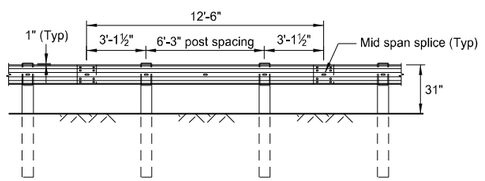
IMPACT HEAD OBJECT MARKER



W-BEAM CROSS SECTION



STANDARD MGS GUARDRAIL PANEL



STANDARD MGS GUARDRAIL SYSTEM

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
7-14-17	
REVISIONS	
DATE	CHANGE
12-02-20	Updated clipped head to optional

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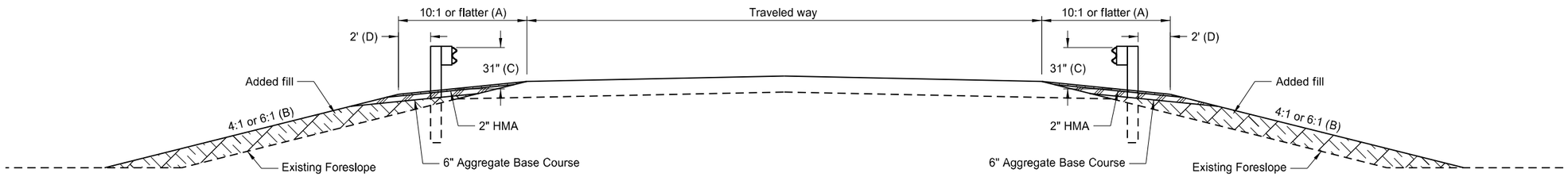
Kirk J Hoff

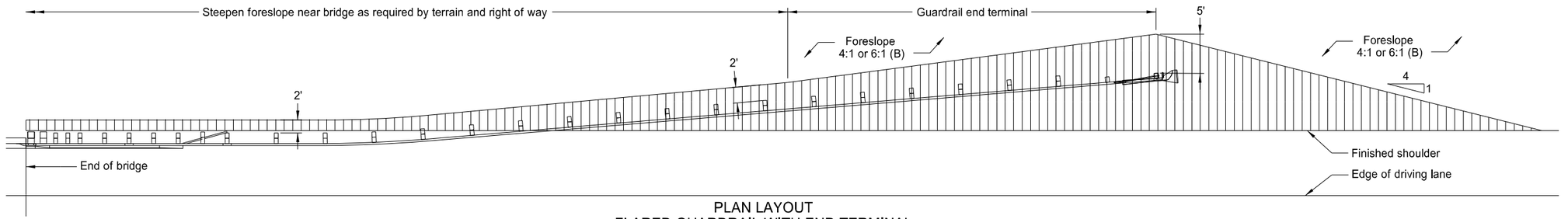
12 02 2020

D-764-48

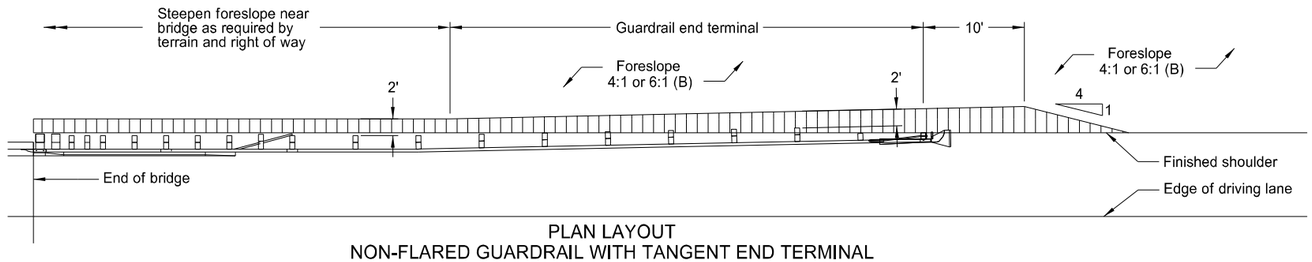
TYPICAL GRADING AT BRIDGE ENDS WITH MGS W-BEAM GUARDRAIL



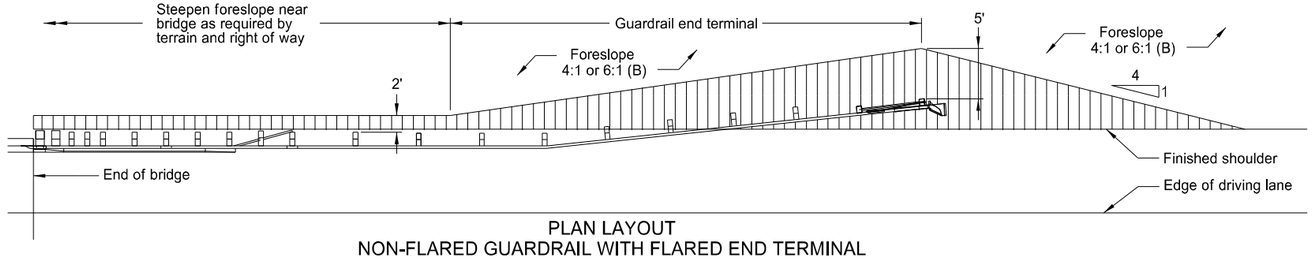
TYPICAL SECTION



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.

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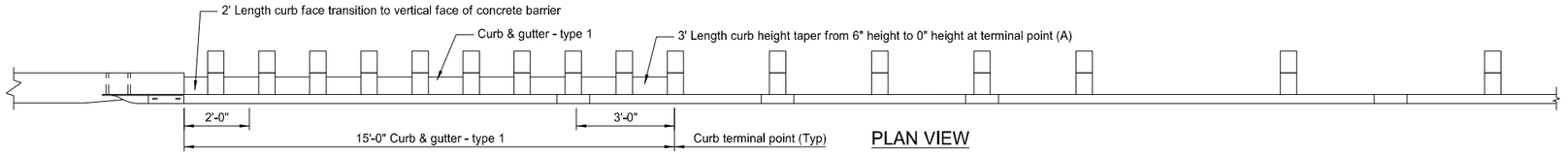
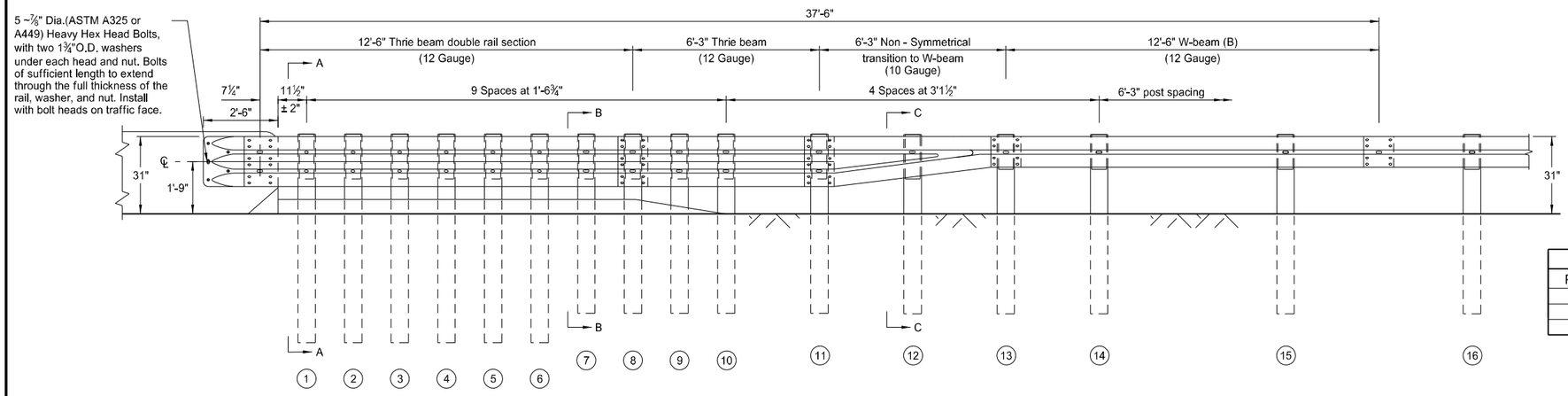
12 02 2020

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

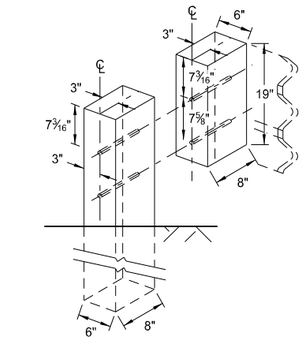
D-764-60



PLAN VIEW

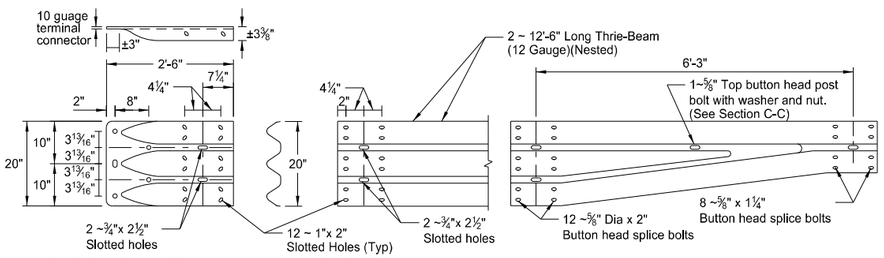


ELEVATION VIEW



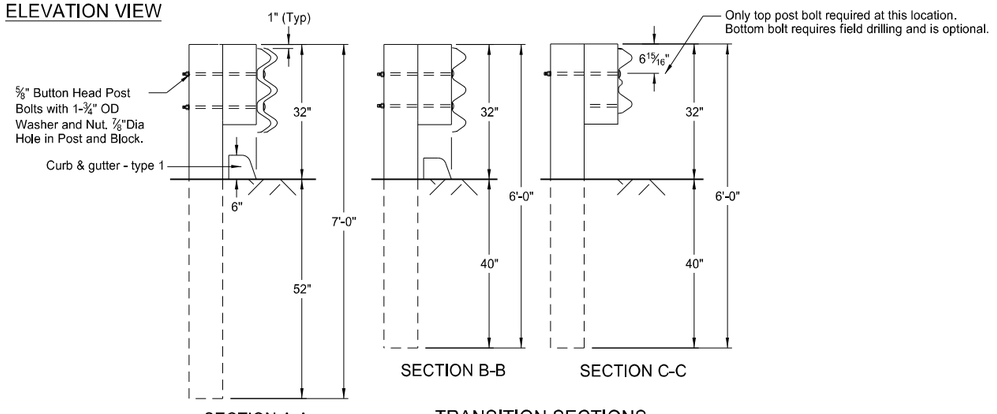
WOOD BLOCK
TO RECTANGULAR WOOD POST
(At posts 1 to 11)

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)

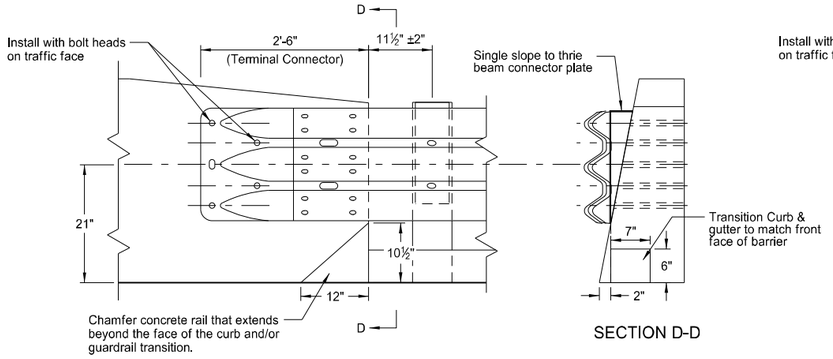


SECTION A-A

SECTION B-B

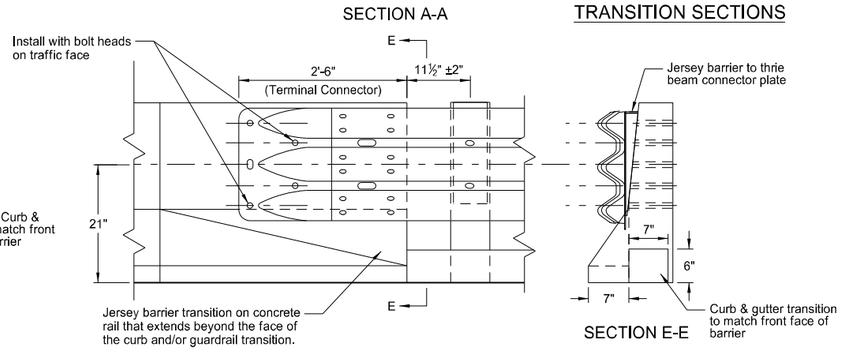
SECTION C-C

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.

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

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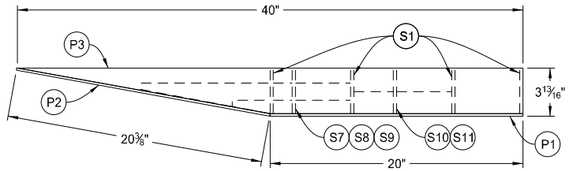
NORTH DAKOTA
12 02 2020

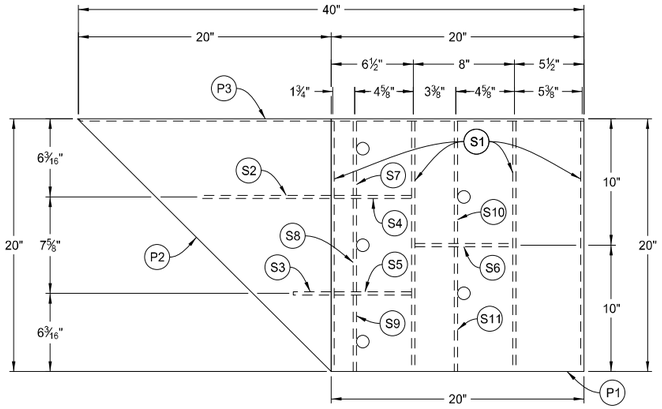
SINGLE SLOPE TO THRIE BEAM CONNECTOR PLATE DETAILS

D-764-61

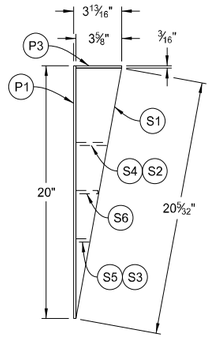


PLAN

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

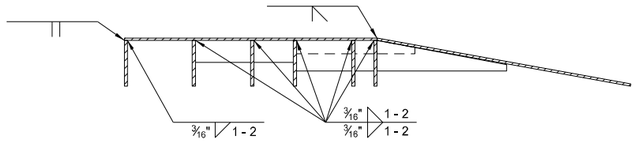


ELEVATION

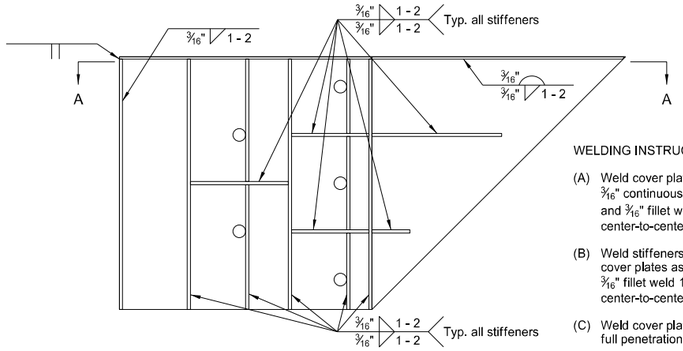


END

ASSEMBLY DETAIL
(Front View)

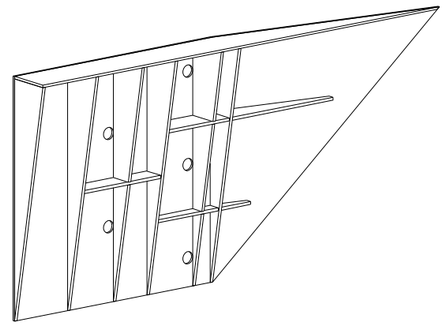


SECTION A-A



ELEVATION

WELDING DETAIL
(Back View)



PICTORIAL DRAWING
(Showing Back of Connector Plate)

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.

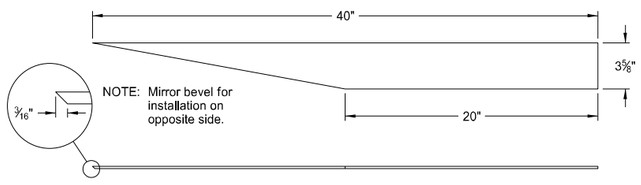


PLATE P3
Quantity: 1

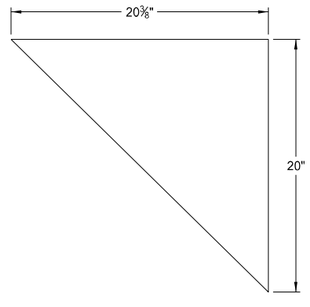


PLATE P2
Quantity: 1

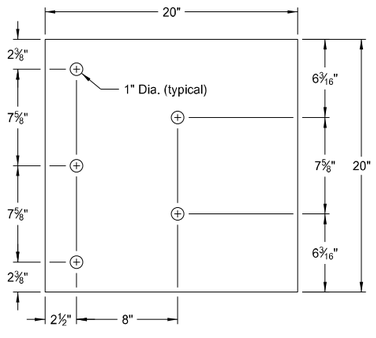
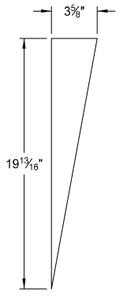
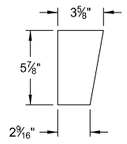


PLATE P1
Quantity: 1

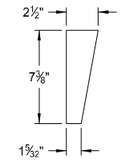
COVER PLATES



TYPE S1
Quantity: 4



TYPE S7
Quantity: 1



TYPE S8
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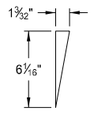
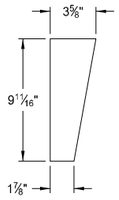
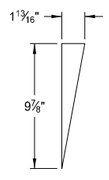


TYPE S9
Quantity: 1

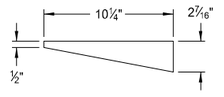
VERTICAL PLATES



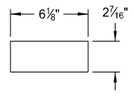
TYPE S10
Quantity: 1



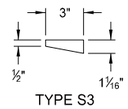
TYPE S11
Quantity: 1



TYPE S2
Quantity: 1



TYPE S4
Quantity: 1



TYPE S3
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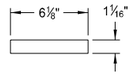

TYPE S5
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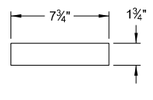

TYPE S6
Quantity: 1

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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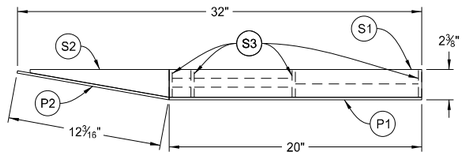
Kirk J Hoff
12 02 2020

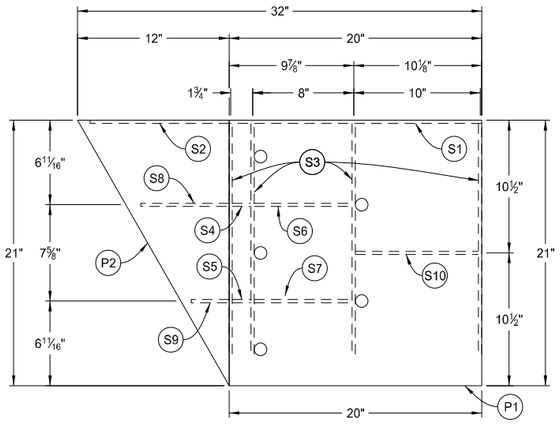
JERSEY BARRIER TO THRIE BEAM CONNECTOR PLATE DETAILS

D-764-62

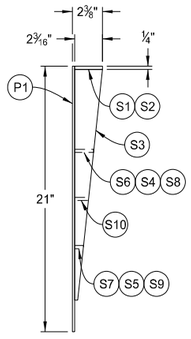


PLAN

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



ELEVATION



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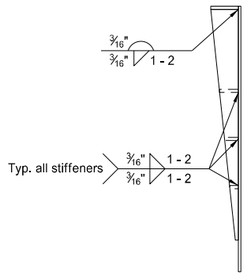

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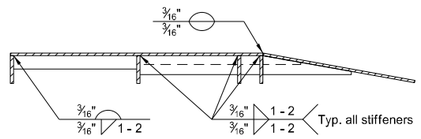
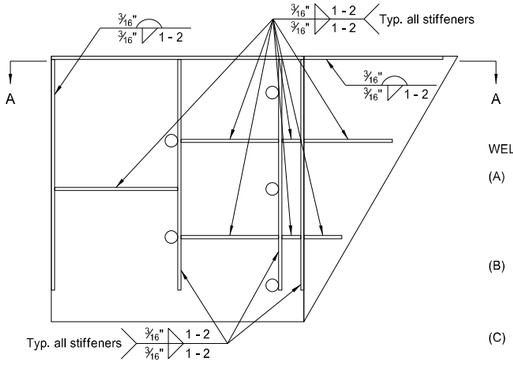
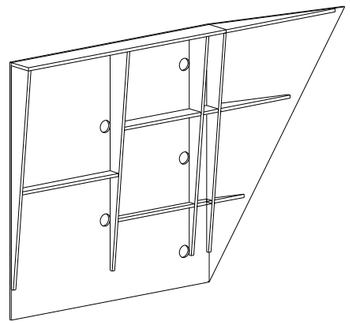


SECTION A-A



ELEVATION



PICTORIAL DRAWING
(Showing Back of Connector Plate)

WELDING INSTRUCTIONS:

(A) Weld stiffeners located on the outside edges of the cover plates as follows: ¾16" continuous back weld on exterior sides and ¾16" 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: ¾16" fillet weld 1" long spaced at 2" center-to-center.

(C) Weld cover plates P1 and P2 together with a ¾16" continuous back weld on both sides.

(D) Weld components with E60 rod.

ASSEMBLY DETAIL
(Front View)

WELDING DETAIL
(Back View)

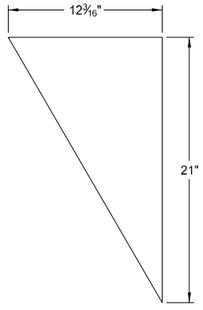


PLATE P2
Quantity: 1

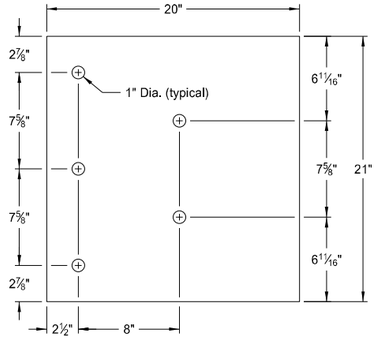
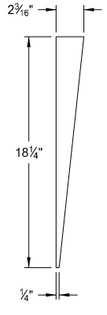


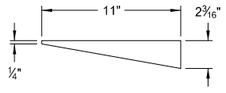
PLATE P1
Quantity: 1

COVER PLATES

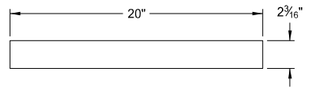


TYPE S3
Quantity: 4

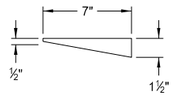
VERTICAL PLATES



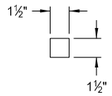
TYPE S2
Quantity: 1



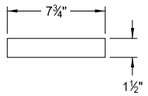
TYPE S1
Quantity: 1



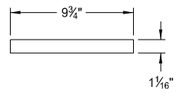
TYPE S8
Quantity: 1



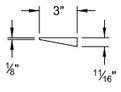
TYPE S4
Quantity: 1



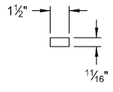
TYPE S6
Quantity: 1



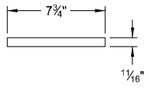
TYPE S10
Quantity: 1



TYPE S9
Quantity: 1



TYPE S5
Quantity: 1



TYPE S7
Quantity: 1

HORIZONTAL PLATES

STIFFENER PLATES

NOTES:

1. Fabricate cover plates P1 and P2 from ¾16" thick ASTM A36 Grade structural steel.
2. Fabricate stiffener plates from ¼" thick ASTM A36 Grade structural steel.
3. Galvanize connector plate in accordance with AASHTO M111.

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

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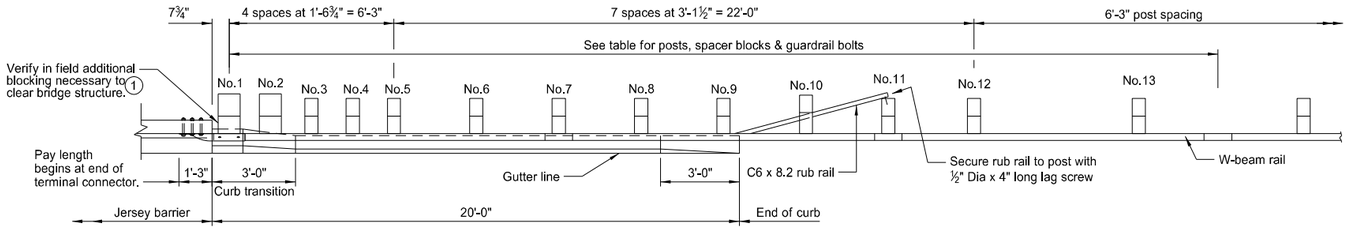
Kirk J Hoff

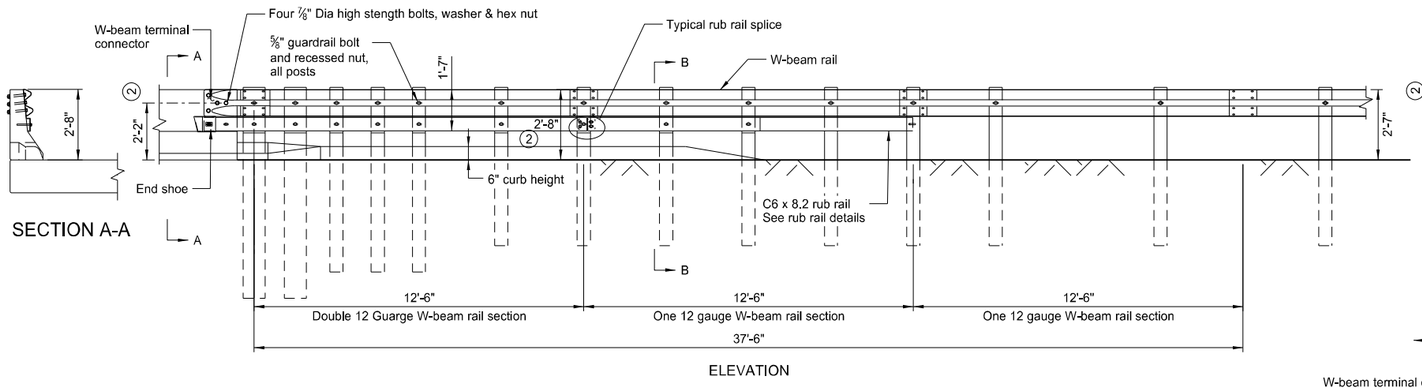
12 02 2020

MGS W-BEAM TRANSITION WITH APPROACH CURB TO IN PLACE CONCRETE JERSEY BARRIER

D-764-64



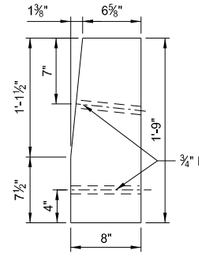
PLAN



SECTION A-A

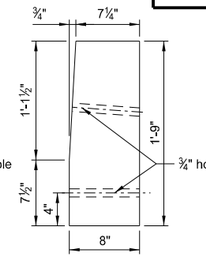
ELEVATION

GENERAL ASSEMBLY DETAILS



END VIEW

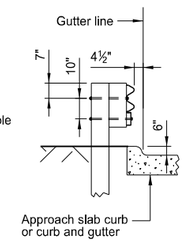
Block No. 1
(width = 10")



END VIEW

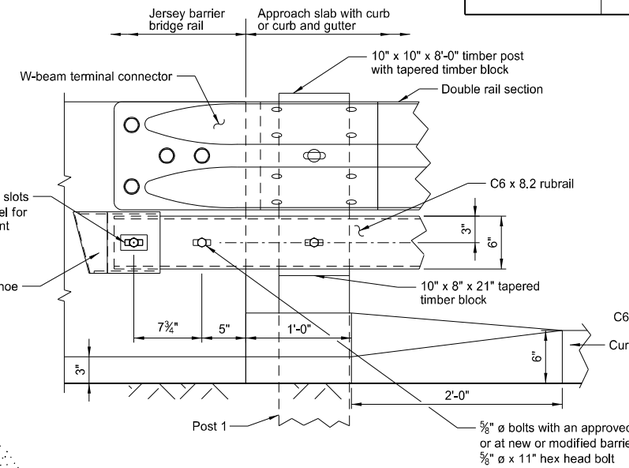
Block No. 2
(Width = 10")

TAPERED TIMBER BLOCK DETAILS

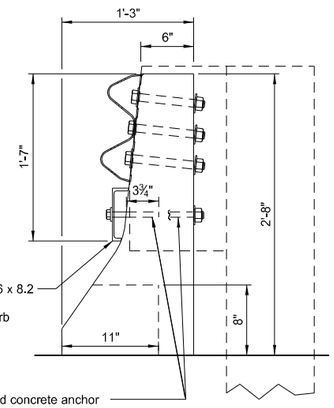


SECTION B-B

POST, TIMBER BLOCK & BOLT TABLE		
DESCRIPTION	POST NO.	SIZE
Post	1 & 2	10" X 10" X 8'-0" min long
	3-5	6" X 8"X 7'-0" min long
	6-13	6" X 8"X 6'-0" min long
Spacer block	1-2	10" X 8" X 21" tapered block
	3-9	6" X 8" X 21"
	10	6" X 9 3/4" X 14"
	11-13	6" X 8" X 14"
Guardrail bolt & recessed nut	1 & 2 & 10	5/8" Dia X 20" - guardrail
	3-9,11-13	5/8" Dia X 18" - guardrail
	1-2	5/8" Dia X 22"- rub rail
	3-9	5/8" Dia X 20"- rub rail

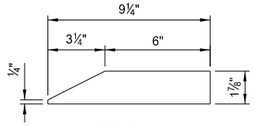


TRAFFIC SIDE ELEVATION

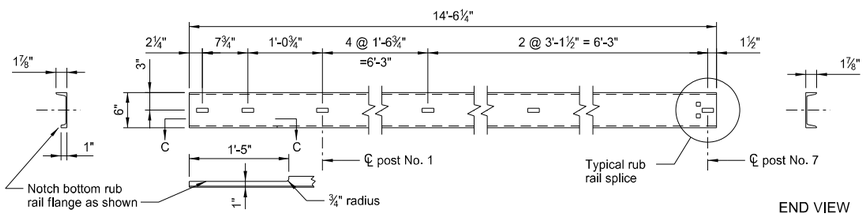


END VIEW

RAIL ATTACHMENT AND CURB DETAIL

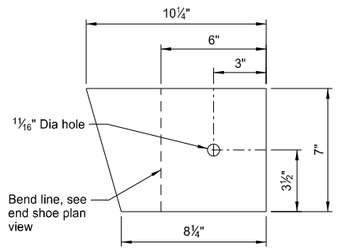


TOP PLATE

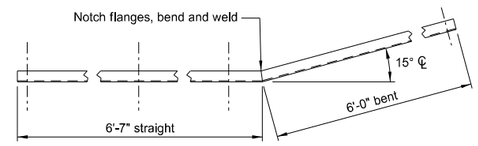


END VIEW SECTION C-C ELEVATION

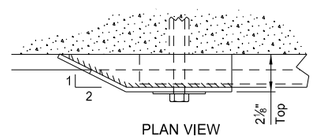
RUB RAIL STRAIGHT SECTION



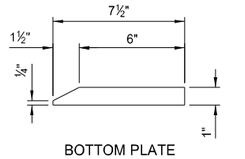
FRONT PLATE



PLAN VIEW



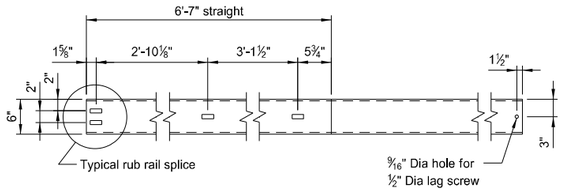
PLAN VIEW



BOTTOM PLATE

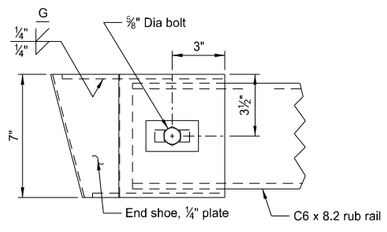
END SHOE PLATE DETAILS

(¼" plate)



ELEVATION

RUB RAIL BENT SECTION



ELEVATION

RUB RAIL END SHOE ASSEMBLY

NOTES:

Galvanize AASHTO 270M Grade 250 C6 x 8.2 rub rail and structural steel after fabrication

All rub rail slotted holes are 1¹⁄₁₆"x 2".

All rub rail square holes are 1¹⁄₁₆".

Use timber posts and blocks for W-beam guardrail.

(1) Verify need for additional blocking at post No.1 in the field.

(2) Height is 2'-8" from 0' to 12'-6" from bridge. Height tapers from 2'-8" to 2'-7" between 12'-6" to 37'-6" from bridge.

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

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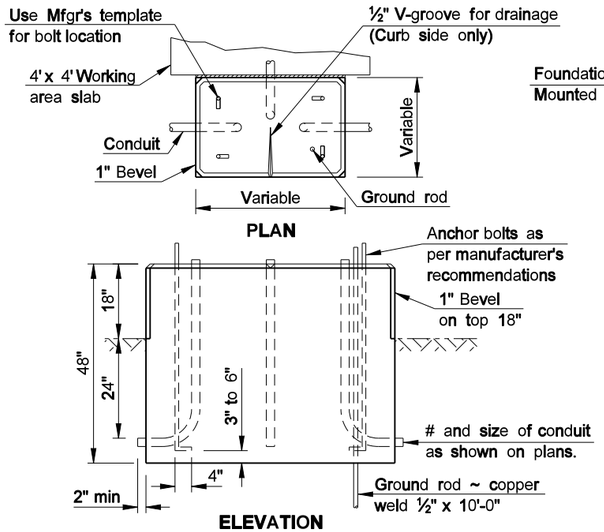
12 02 2020

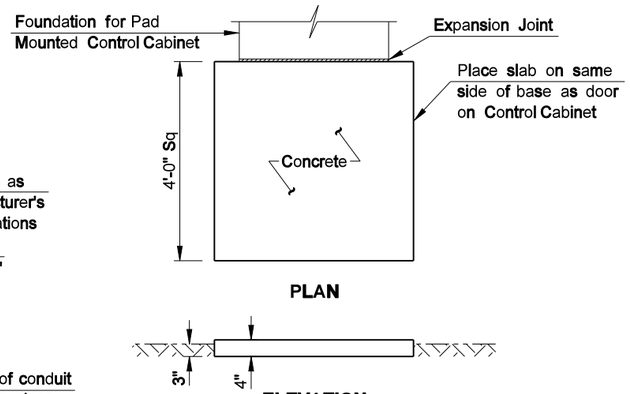
CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

D-770-1



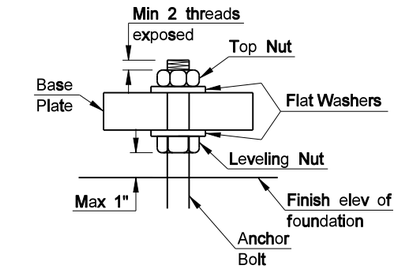
CONTROLLER CABINET FOUNDATION PAD MOUNT

The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.

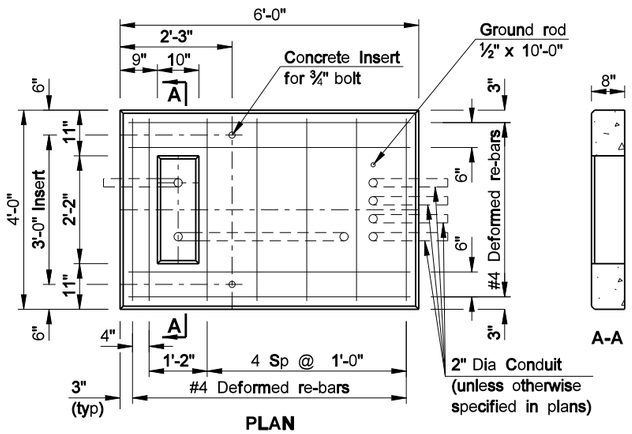


WORKING AREA SLAB

The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.

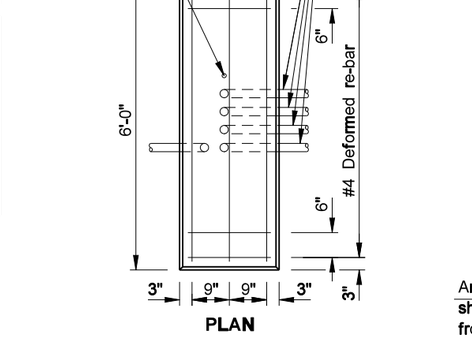


ANCHOR BOLT DETAIL



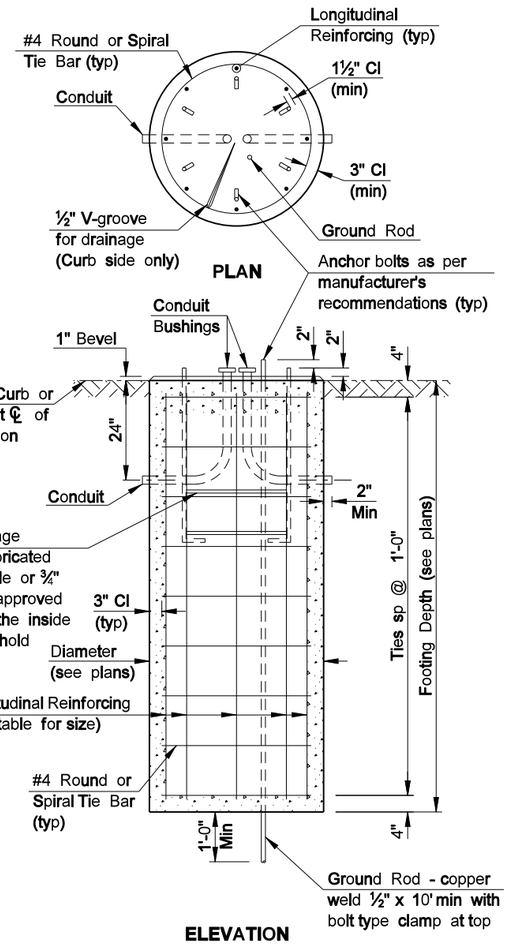
TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.



FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.



LIGHT & SIGNAL STANDARD FOUNDATION

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS: See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controler cabinet and the foundation by caulking, except for V-groove.

WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

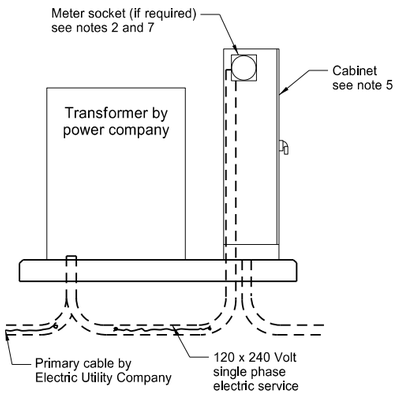
FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

LIGHT & SIGNAL FOUNDATION TABLE	
FOOTING DEPTH (ft)	LONGITUDINAL REINFORCING
≤ 12	8 - #5
13 - 14	8 - #6
15 - 16	8 - #7
17 - 19	8 - #8

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Terrence R. Udland Registration Number PE- 2674 , on 6/15/10 and the original document is stored at the North Dakota Department of Transportation

FEED POINTS
(ROADWAY LIGHTING)



Elevation

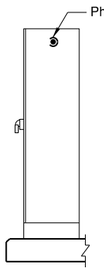
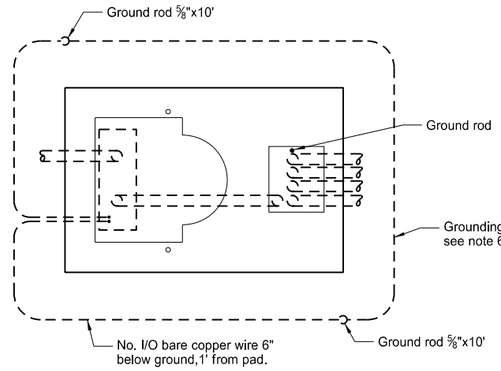
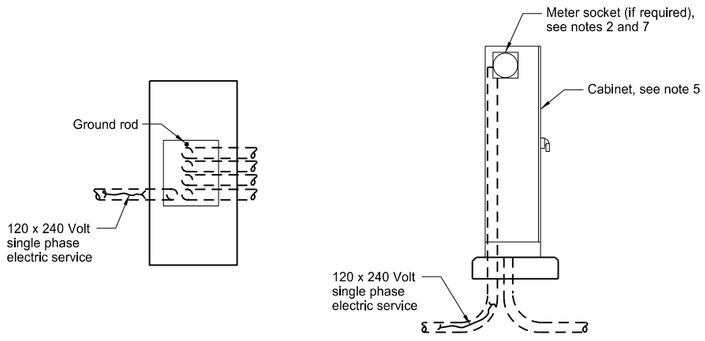


Photo Cell
Mounting Detail



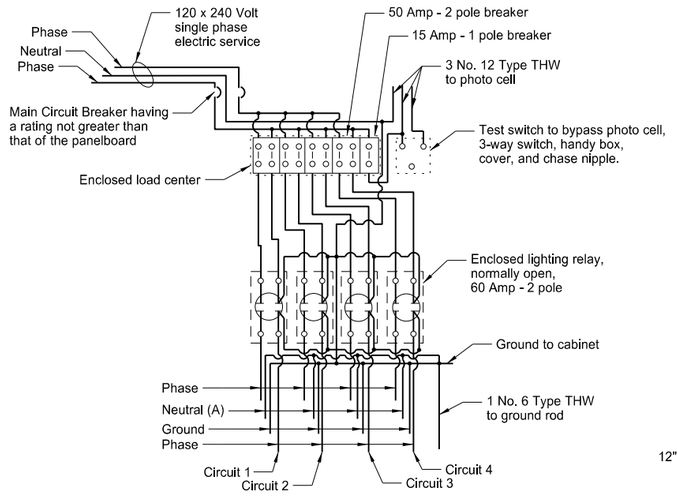
Plan

Transformer and Feed Point Cabinet Pad Mounted



Plan Elevation

Feed Point Cabinet Pad Mounted



Feed Point Type IV

Provide Type I feed point similar to Type IV, except with one electrical circuit, one 50 Amp - 2 pole breakers, and one lighting relay, normally open.

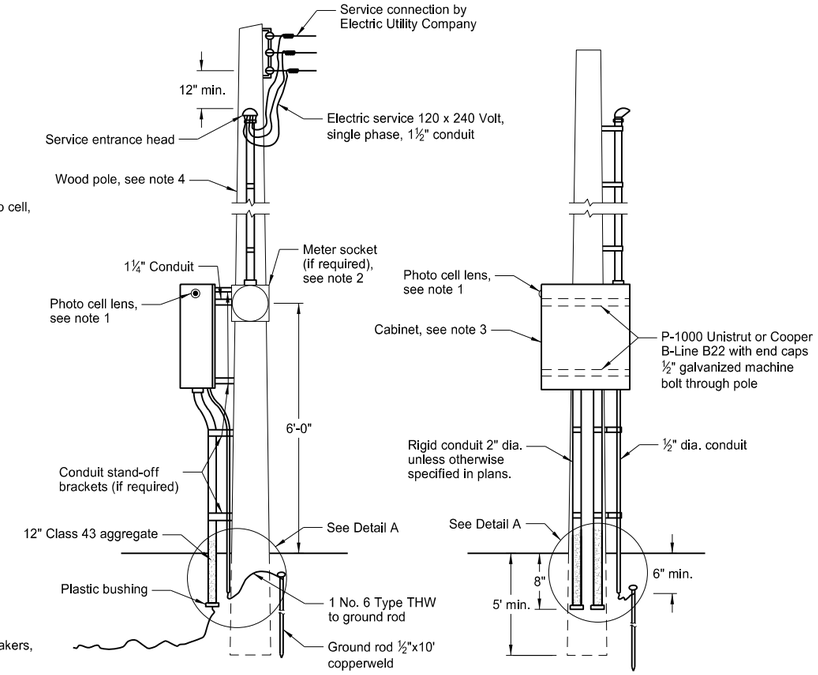
Provide Type II feed point similar to Type IV, except with two electrical circuit, two 50 Amp - 2 pole breakers, and two lighting relays, normally open.

Provide Type III feed point similar to Type IV, except with three electrical circuits, three 50 Amp - 2 pole breakers, and three lighting relays, normally open.

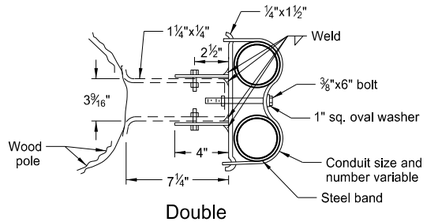
(A) Install when festoon circuit is required.

Detail A

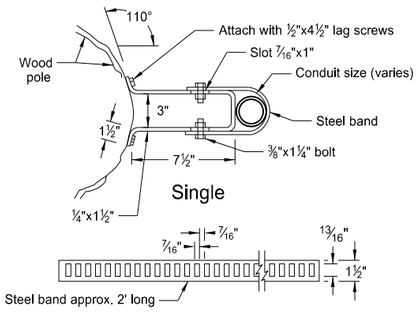
Use this detail for a continuous run of conduit from the feed point to the first light standard.



Feed Point Pole Mounted



Double



Single

Conduit Standoff Bracket

Omission of conduit standoff brackets allowed when not required by local utility company.

Notes:

1. Photo Cell: Furnish and install the photoelectric cell. Face photo lens north.
2. Meter Socket: Install meter socket and trim if the meter is required by local Utility Company. Meter furnished and installed by Utility Company.
3. Pole Mounted Cabinet: Provide cabinet with lock drip shield, factory installed steel backing, stainless steel hardware, and side hinge door. Shop coat cabinet with one coat of primer and two coats of exterior gray enamel.

   Provide 30" high x 24" wide x 8" deep Type I and II feed points. Provide 30" high x 42" wide x 10" deep or 36" high x 36" wide x 10" deep Type III and IV feed points.
4. Wood Pole: Provide minimum 20' Class VII full length penta pressure treated wood pole. (if required, see layout sheets)
5. Pad Mounted Cabinet: Provide 56" high x 26" wide x 14" deep weatherproof cabinet. Minimum 12 gauge steel or aluminum with provisions for padlock. Provide steel cabinet with one coat of primer and two coats of exterior dark green enamel.
6. Grounding Grid: Provide grounding grid with a maximum ground resistance of 25 ohms, using one or more ⅝"x10' copperweld ground rods in parallel or series at two corners. Provide a minimum distance between ground unit assemblies of 6'0".
7. Meter Location: Do not mount the meter (if required) on the same side of the cabinet as the photo cell.

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7-8-14 10-17-17 8-28-19	Revised note 3. Updated to active volce. New Design Engineer PE Stamp.

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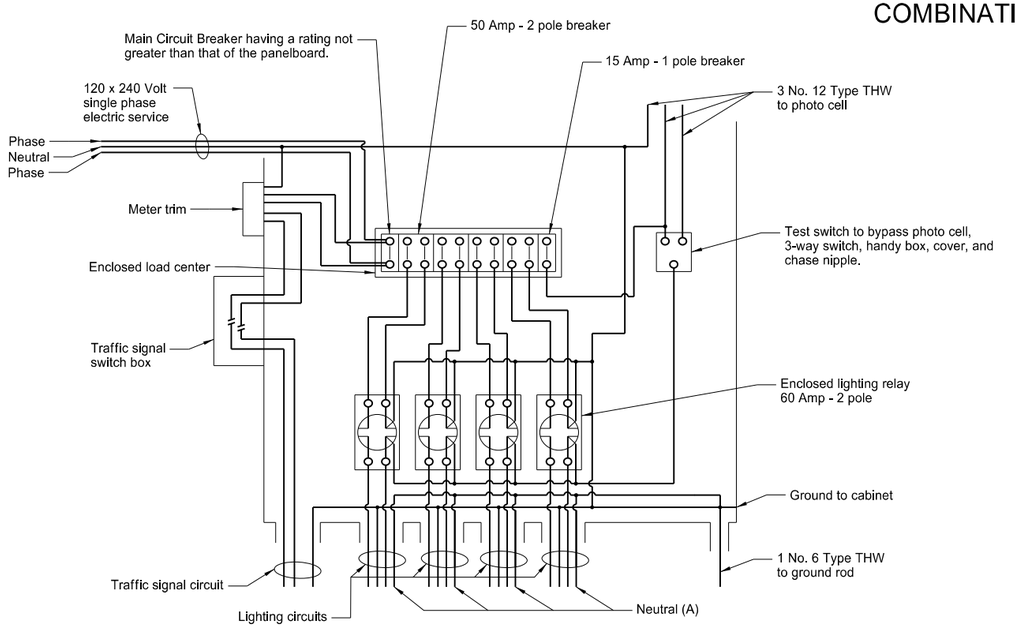
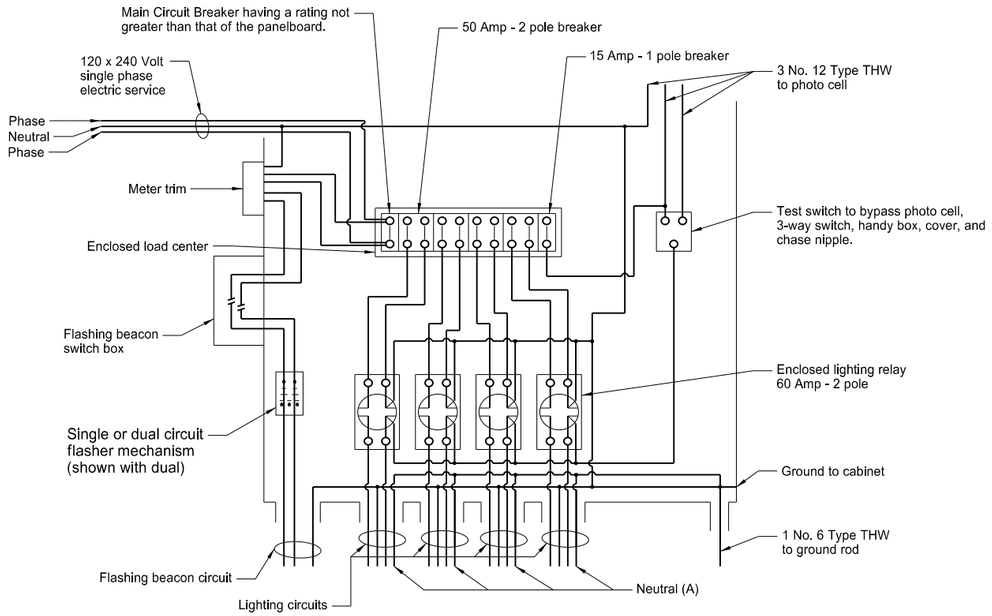
COMBINATION FEED POINT DETAILS

D-770-2A



Combination Lighting and Signal
Feed Point Type IV



Combination Lighting and Flashing Beacon
Feed Point Type IV

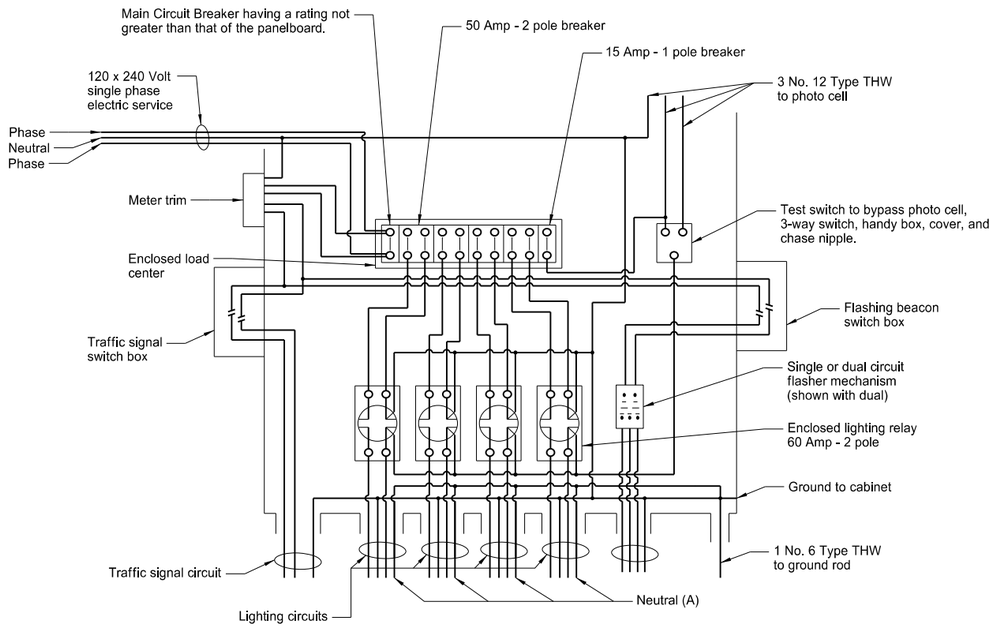
Notes:

Install Type I feed point similar to Type IV, except with one electrical circuit, one 50 Amp - 2 pole breaker, and one lighting relay, normally open.

Install Type II feed point similar to Type IV, except with two electrical circuits, two 50 Amp - 2 pole breakers, and two lighting relays, normally open.

Install Type III feed point similar to Type IV, except with three electrical circuits, three 50 Amp - 2 pole breakers, and three lighting relays, normally open.

(A) Install when festoon circuits are required



Combination Lighting, Signal, and Flashing Beacon
Feed Point Type IV

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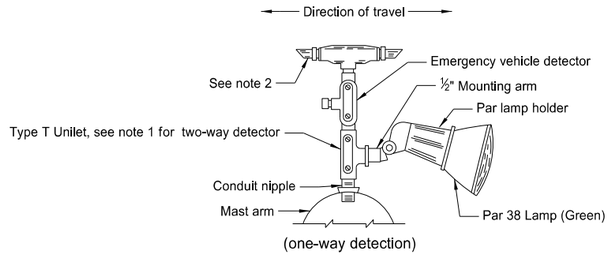
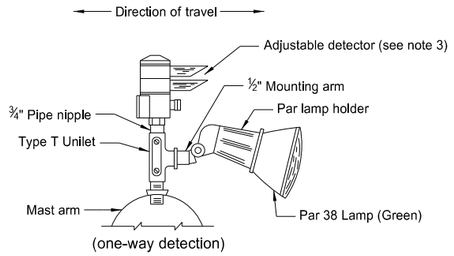
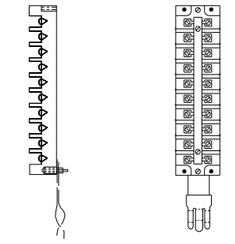
LIGHTING AND SIGNAL DETAILS



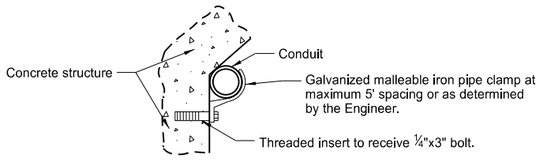
Emergency Vehicle Detector Detail



Alternate Emergency Vehicle Detector Detail (adjustable)

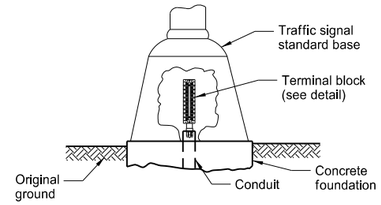


Terminal Block Detail

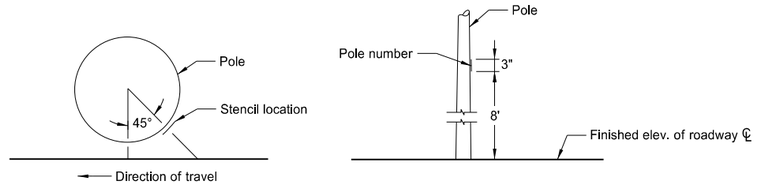


Bridge Mounted Conduit Hanger

Notes:
1. Use Type X Unilet with two Par lamp holders and lamps for Two-way Detectors. (one in each direction).
2. Plug unused end of One-way Detector with metal pipe plug.
3. Rotate detector lens to face direction of travel on Two-way Detectors.

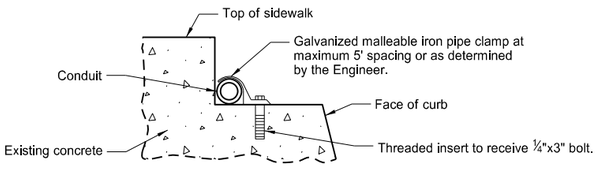


Terminal Block
(rigid mounted)

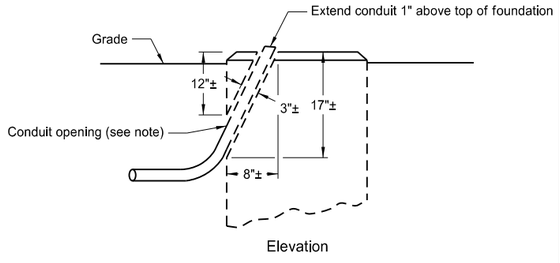


Light Standard Numbering

Note: On the roadway side of each light standard, stencil the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.

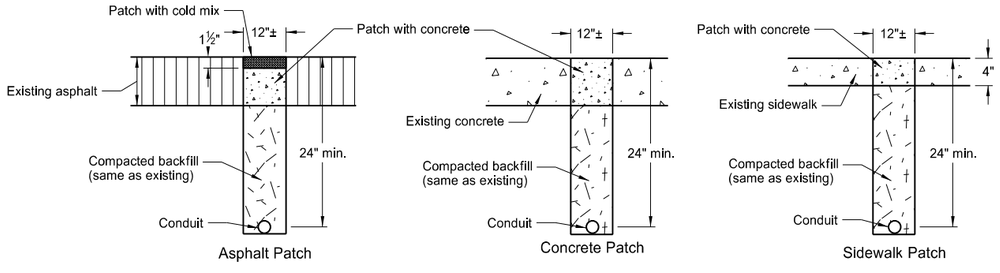


Bridge Curb Mounted Conduit



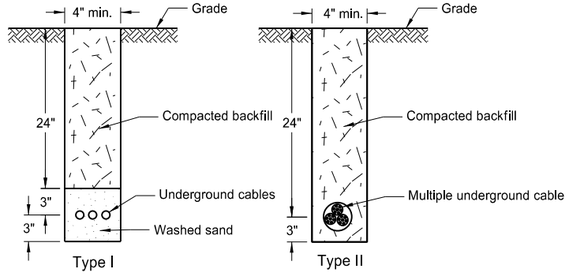
Revise Concrete Foundation

Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.



Surface Patch Details

Note: Saw cut trenches. Use PCC pavement for replacement concrete with the coarse aggregate gradation, maximum size and method of curing as approved by the Engineer. Immediately prior to pouring replacement concrete, paint all surfaces with an approved epoxy compound.



Cable Trench

Note: Sod entire area disturbed by trenching, unless directed otherwise by the Engineer.

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10-8-13	
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10-17-17 10-25-19	Updated to active voice. Removed conduit under RR detail.

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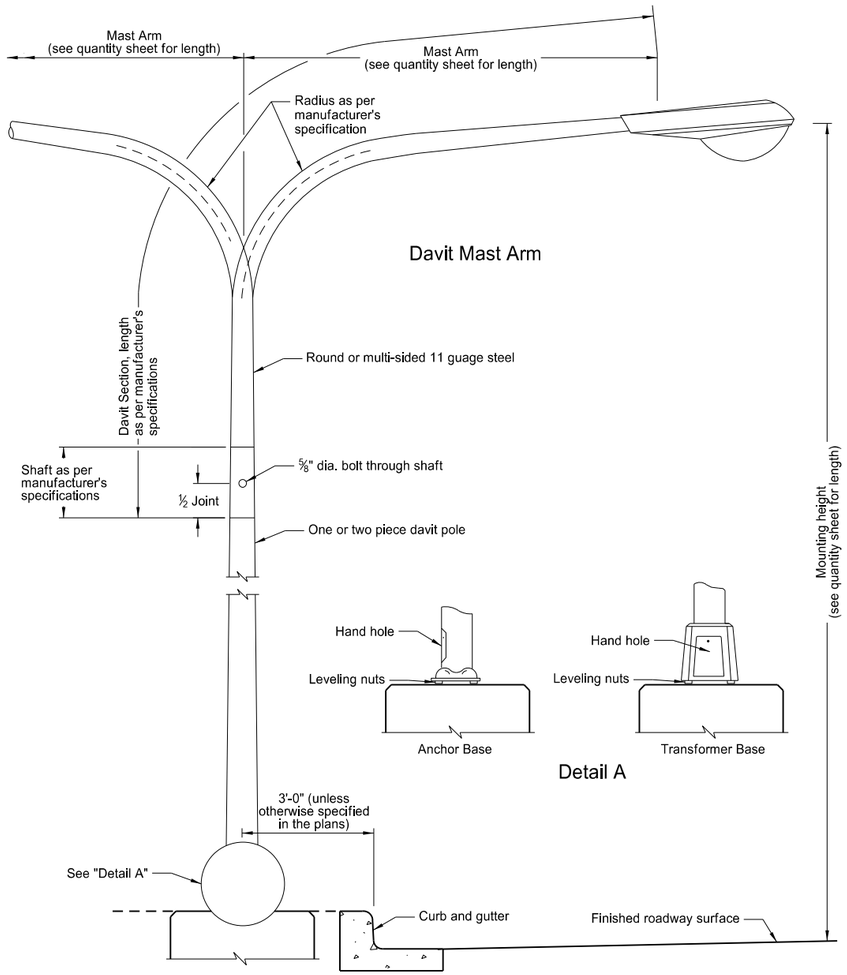
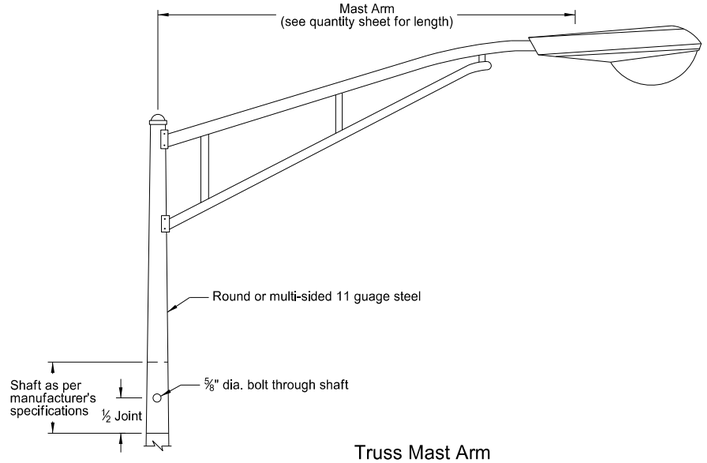
LIGHT STANDARD DETAILS



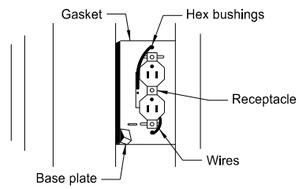
Davit Mast Arm

Detail A

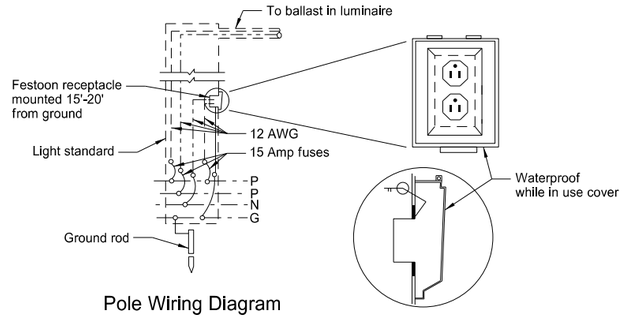
Light Standard Details



Truss Mast Arm



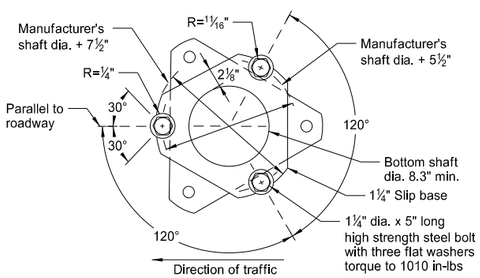
Optional: Festoon receptacle
mounted on multi-sided pole.



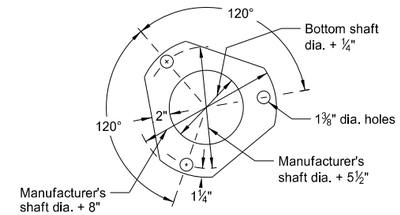
Pole Wiring Diagram

Receptacle Mounting Detail (B)

(B) Mount receptacle on side of pole that faces the street.
Install Festoon Receptacle only when specified in the plans.



Top View



Plan View

Keeper Plate Detail (A)

(A) ASTM A446 Grade "A" 28 gauge keeper plate on top of middle flat washer. Galvanize Keeper plate after fabrication.

Notes:

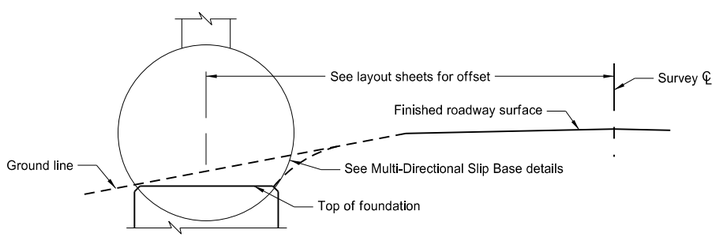
Light Standard Locations: The minimum offset distance from the curb face is 3 feet. Offset light standards at least 3 feet in urban areas and where speeds are less than 30 mph. Where speeds are 30 mph or more, place light standards at least 16 feet from the driving lane.

Steel Standards: Touch up marred or scratched areas after erection.

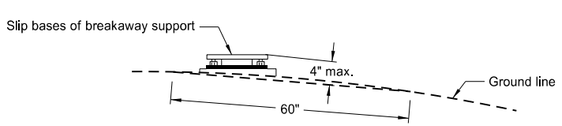
Luminaire: Use internal ballast-constant wattage 120x240 voltage. See layout sheets for type of luminaire, wattage, I.E.S. distribution, and operating system.

Fusing: Fusing in base, see specifications.

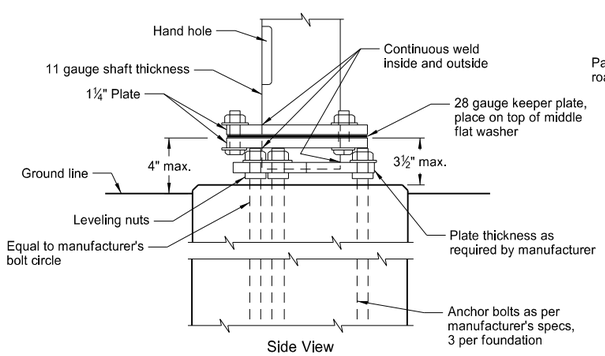
Slip Base Bolt Torque Procedure:
1. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and to clean bolt threads, then loosen.
2. Retighten bolts with a systematic order to prescribed torque.
3. Loosen each bolt and retighten to prescribed torque in the same order as initial retightening.
4. Burr threads of junction with nut using center punch to prevent nut loosening.



Concrete Foundation Location

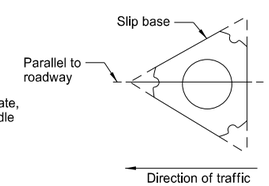


Breakaway Support Stub Clearance Diagram

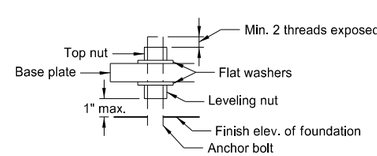


Side View

Steel Base Detail



Slip Base Placement Detail



Anchor Bolt Detail

Multi-Directional Slip Base

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10-17-17 8-28-19	Updated to active voice. New Design Engineer PE Stamp.

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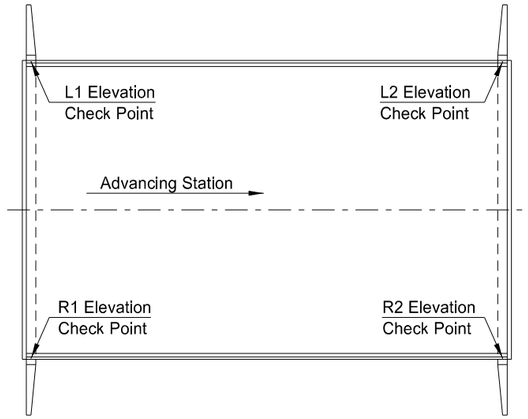
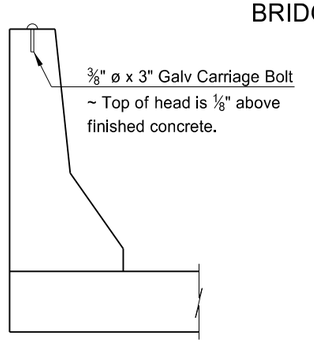
BRIDGE BENCH MARKS

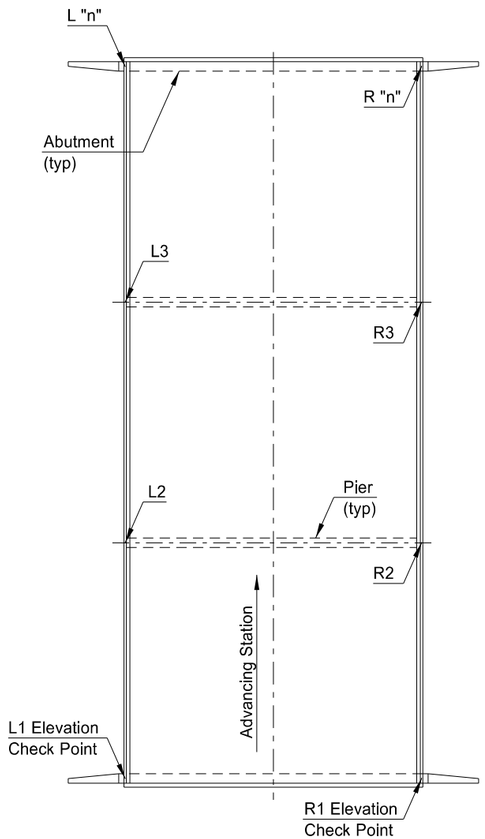
D-900-1



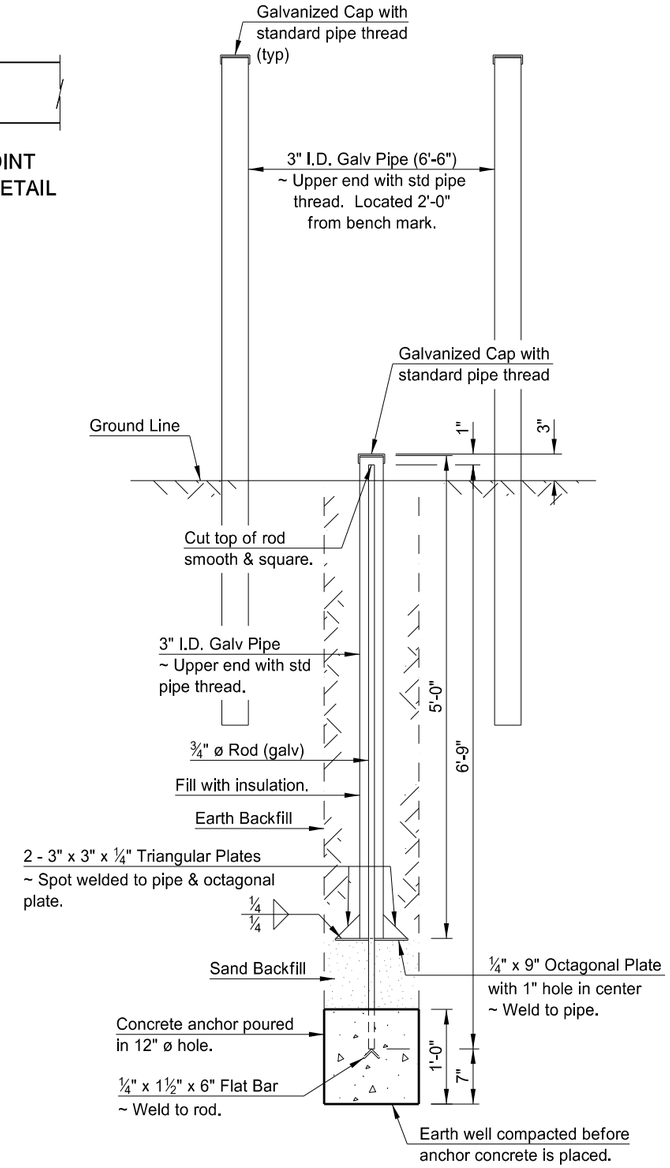
GENERAL LAYOUT FOR
SINGLE SPAN



CHECK POINT
LOCATION DETAIL



GENERAL LAYOUT FOR
MULTIPLE SPAN



BENCH MARK DETAIL

NOTES:

Elevation check points shall consist of ⅜" ø x 3" galvanized carriage bolts (or equal) set in the concrete barrier at the points indicated on the General Layout sketches. The top of the bolt head shall project above the finished concrete ⅛". Elevation check points shall be placed on each barrier over each unit of the substructure for each bridge at a structural location.

Two bench marks as detailed hereon shall be set at diagonal opposite positions away from the structure location and at least 300 feet from the nearest point on the bridge or bridges (if more than one at a location). These bench marks shall be constructed as detailed on this sheet and located near the Highway Right of Way lines. The two pipes shall extend 4'-0" above ground and be painted with two coats of white paint suitable for galvanized steel surfaces.

The Project Engineer shall run a set of levels determining the elevation of each check point on the structure and the two bench marks immediately after the completion of the bridge. Bench Mark #1 can be listed as having elevation 1000 or the actual surveyed elevation. This information shall be recorded on SFN 13420 and submitted to the Bridge Engineer with adequate information locating each check point and bench mark.

All metal parts are to be hot dip galvanized after punching, shearing, welding and fabrication.

Threads of cap and pipe are not to be galvanized. At the time of installation these threads are to be coated with synthetic grease with teflon and cap screwed to a snug fit.

METHOD OF MEASUREMENT:

Each set of Bridge Bench Marks consisting of two bench marks and the required number of elevation check points shall be considered as one unit for bidding purposes and the quantity to be paid for shall be the number of sets of bridge bench marks which have been installed complete in place and accepted by the Engineer.

BASIS OF PAYMENT:

Bridge Bench Marks shall be paid for at the contract price bid for each set of Bridge Bench Marks, which price shall be full compensation for all excavation, backfill and clean-up, and for furnishing, hauling and placing all elevation check points, galvanized pipe, caps, rods, sand backfill, concrete, rock equipment, tools and incidentals, including galvanizing and greasing, necessary to complete this item.

GALVANIZING:

After fabrication the complete assembly shall be hot-dip galvanized.

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09/14/11	
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DATE	CHANGE
09/03/19	UPDATED SIGNATURE

This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 09/03/19 and the original document is stored at the North Dakota Department of Transportation