

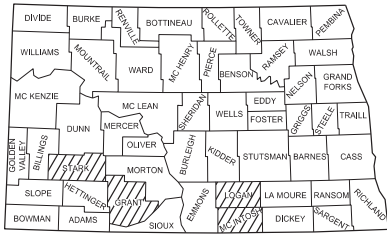
DESIGN DATA - Structure No. 0003-011.402			
Traffic	Average Daily		
Current 2024	Pass: 475	Trucks: 50	Total: 525
Forecast 2044	Pass: 580	Trucks: 85	Total: 665
Clear Zone Distance: 26'	Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645'	Bridges: HL-93		
Sight Dist. for No Passing Zone: 1,100'			
Pavement Design Life 20 (years)			
Design Accumulated One-way Flexible ESALs: 23,725			

DESIGN DATA - Structure No. 0003-050.623			
Traffic	Average Daily		
Current 2024	Pass: 485	Trucks: 55	Total: 540
Forecast 2044	Pass: 595	Trucks: 90	Total: 685
Clear Zone Distance: 26'	Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645'	Bridges: HL-93		
Sight Dist. for No Passing Zone: 1,100'			
Pavement Design Life 20 (years)			
Design Accumulated One-way Flexible ESALs: 23,725			

DESIGN DATA - Structure No. 0008-087.236			
Traffic	Average Daily		
Current 2024	Pass: 455	Trucks: 200	Total: 655
Forecast 2044	Pass: 555	Trucks: 245	Total: 800
Clear Zone Distance: 36'	Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645'	Bridges: HL-93		
Sight Dist. for No Passing Zone: 1,100'			
Pavement Design Life 20 (years)			
Design Accumulated One-way Flexible ESALs: 54,750			

DESIGN DATA - Structure No. 0031-029.200			
Traffic	Average Daily		
Current 2024	Pass: 320	Trucks: 100	Total: 420
Forecast 2044	Pass: 415	Trucks: 135	Total: 550
Clear Zone Distance: 26'	Design Speed: 65 MPH		
Minimum Sight Dist. for Stopping: 645'	Bridges: HL-93		
Sight Dist. for No Passing Zone: 1,100'			
Pavement Design Life 20 (years)			
Design Accumulated One-way Flexible ESALs: 40,150			

DESIGNER Isaac Berg, EI
DESIGNER Austin Chmielewski, EI
DESIGNER Kathryn Dewitt, EI
DESIGNER Freddy Moran
DESIGNER Brad Pfeifer, PE
DESIGNER Joshua R. Schroeder, PE
DESIGNER Colton J. Smith, EI



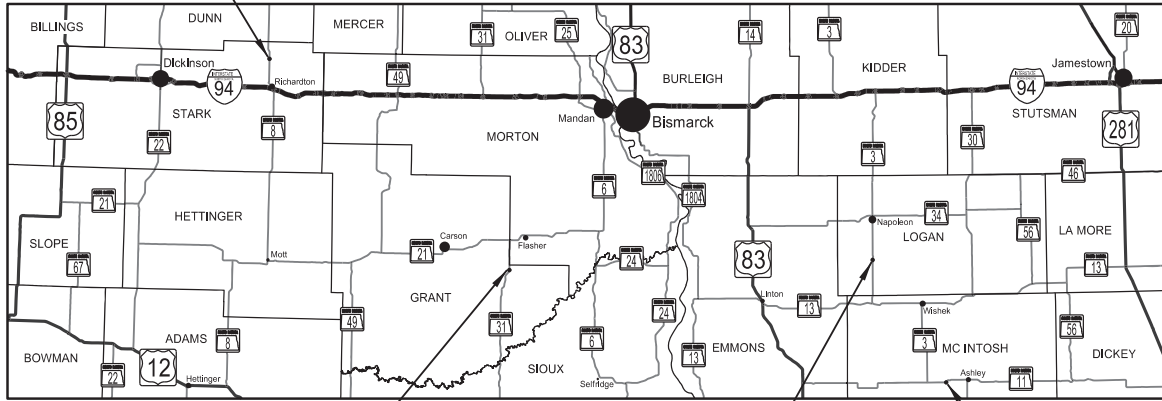
STATE COUNTY MAP

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

SS-9-999(478)

McIntosh, Logan, Stark, & Grant County
 Structure No. 0003-011.402 ~ 4 Miles West of Ashley on ND 3/11
 Structure No. 0003-050.623 ~ 8 Miles South of Napoleon on ND 8
 Structure No. 0008-087.236 ~ 6 Miles North of Richardson on ND 8
 Structure No. 0031-029.200 ~ Raleigh on ND 31
 Structure Replacement, Grading, Hot Mix Asphalt, Aggregate Base
 Guardrail Removal, Signing, Pavement Markings & Incidentals

Structure No. 0008-087.236
Sec 7 & 8, T-140-N, R-92-W



Structure No. 0031-029.200
Sec 1 & 12, T-133-N, R-85-W
Sec 6 & 7, T-133-N, R-84-W

Structure No. 0003-050.623
Sec 30 & 29, T-134-N, R-72-W

Structure No. 0003-011.402
Sec 5, T-129-N, R-70-W
Sec 32, T-130-N, R-70-W

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ND	SS-9-999(478)	23342	1	1

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
Structure No. 0003-011.402	0.033	0.033
Structure No. 0003-050.623	0.055	0.055
Structure No. 0008-087.236	0.069	0.069
Structure No. 0031-029.200	0.054	0.054
	<u>0.211</u>	<u>0.211</u>

ND DEPARTMENT OF TRANSPORTATION
 OFFICE OF PROJECT DEVELOPMENT
 Thorenson, Jason R.
 8/4/2023
Jason Thorenson 09/13/23

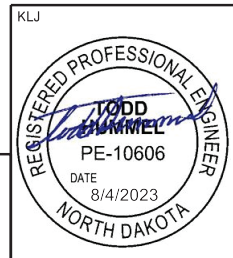


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11	1	Data Tables
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200	5 - 24	Structure 0003-050.623
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200	29 - 53	Structure 0031-029.200

SPECIAL PROVISIONS

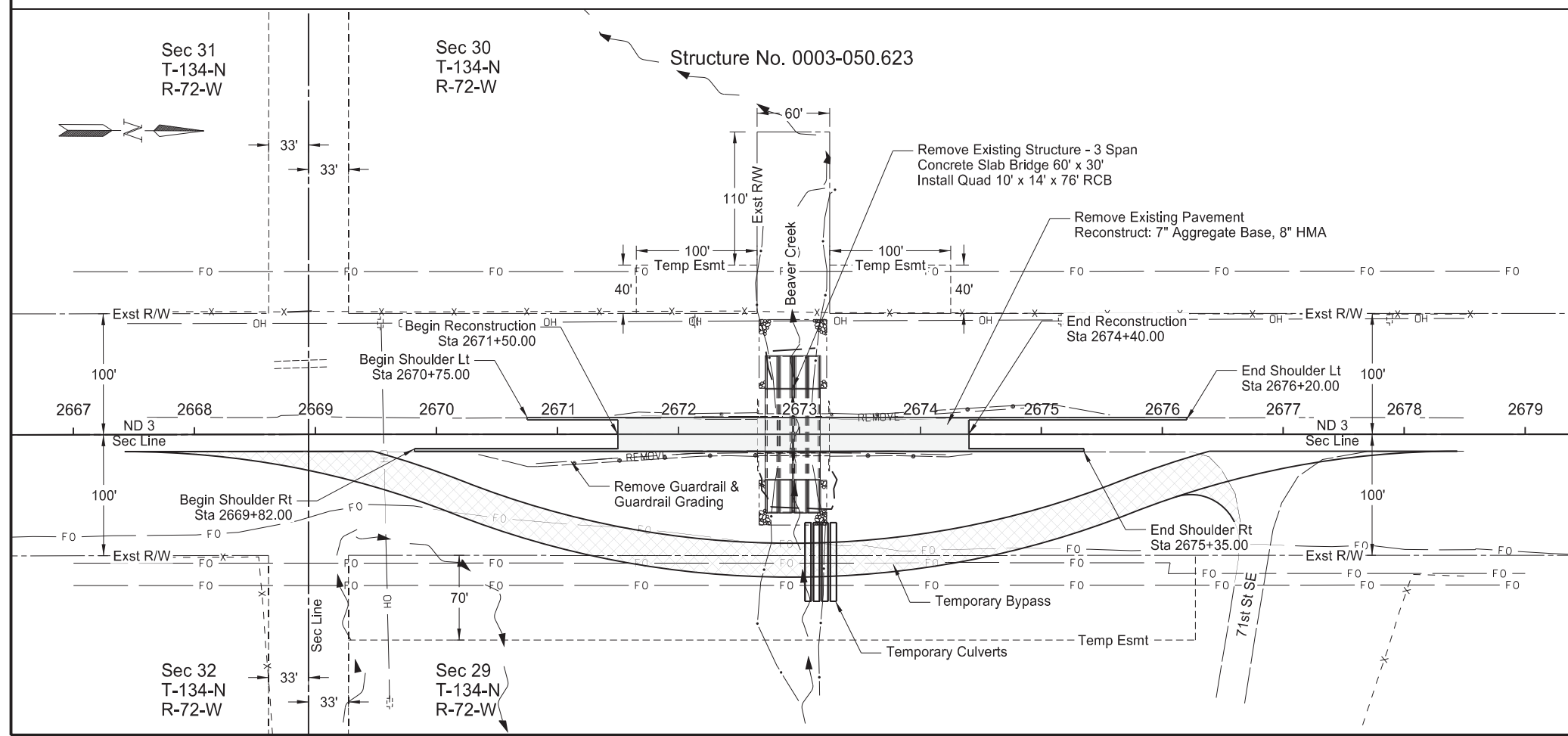
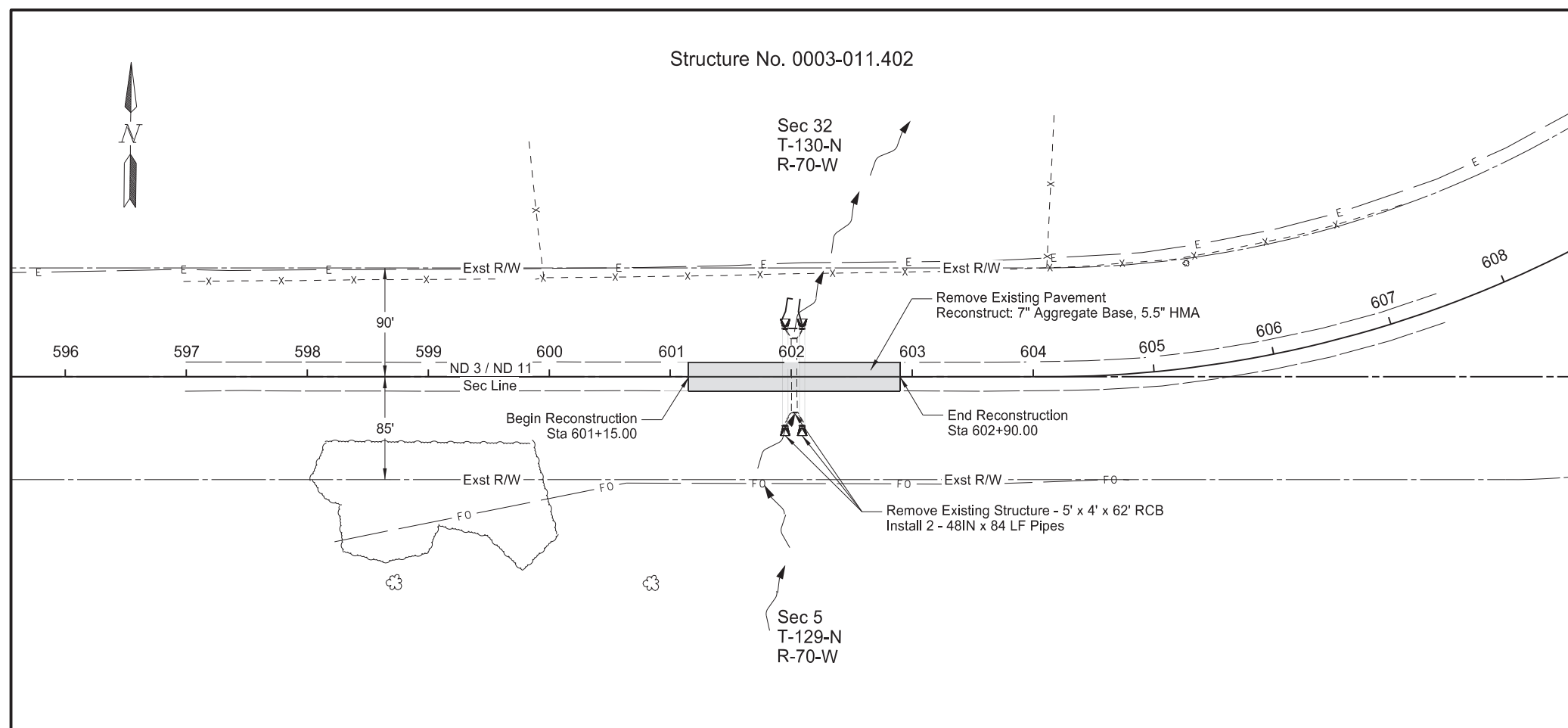
Number	Description
SSP 1	Temporary Erosion and Sediment Best Management Practices
SSP 2	Federal Migratory Bird Treaty Act
SSP 4	Longitudinal Joint Density
SSP 10	E-Ticketing
SP 42(23)	Temporary Water Diversion
SP 43(23)	Utility Coordination
SP 44(23)	Commercial Grade Hot Mix Asphalt
PSP 4(23)	Permits and Environmental Considerations

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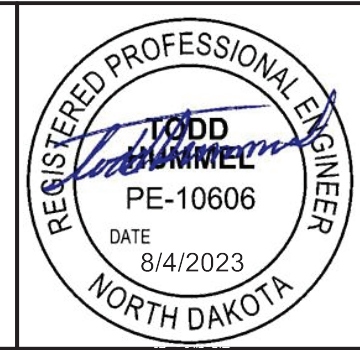
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Number	Description	Number	Description
D-101-1, 2,3,4	NDDOT Abbreviations	D-760-4	Rumble Strips Undivided Highways (Shoulders Less Than 4')
D-101-10	NDDOT Utility Company and Organization Abbreviations	D-762-4	Pavement Marking
D-101-20, 21	Line Styles	D-762-11	Short-Term Pavement Marking
D-101-30, 31,32,33	Symbols		
D-101-40	Cross Section Legend		
D-203-8	Standard Rural Approaches		
D-255-2	Erosion And Siltation Control - Erosion Control Blanket Installation		
D-260-1	Erosion And Siltation Controls - Silt Fence		
D-261-1	Erosion Control - Fiber Roll Placement Details		
D-704-2	Traffic Control For Coring Of Hot Bituminous Pavement		
D-704-7	Breakaway Systems For Construction Zone Signs - Perforated Tube		
D-704-8	Breakaway Systems For Construction Zone Signs - U-Channel Post		
D-704-9	Construction Sign Details - Terminal And Guide Signs		
D-704-10	Construction Sign Details - Regulatory Signs		
D-704-11, 11A	Construction Sign Details - Warning Signs		
D-704-13	Barricade And Channelizing Device Details		
D-704-14	Construction Sign Punching And Mounting Details		
D-704-15	Road Closure Layouts		
D-704-16	Lane Closure On A Two Lane Road Using Traffic Control Signals		
D-704-17	Sign Layout For One Lane Closure Two Lane Roadway		
D-704-19	Road Closure And Lane Closure On A Two Way Road Layouts		
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D-714-1	Reinforced Concrete Pipe Culverts And End Sections (Round Pipe)		
D-714-4	Round Corrugated Steel Pipe Culverts And End Sections		
D-714-22	Concrete Pipe, Cattle Pass, or Precast Concrete Box Culvert Ties		
D-714-25M	Transverse Mainline Pipe Installation Detail - Multiple Pipes More Than 4 Feet Below Top of Subgrade		
D-720-1	Standard Monuments And Right Of Way Markers		
D-752-1	Standard Barbed Wire Fence		
D-754-23	Perforated Tube Assembly Details		
D-754-26, 29,32	Sign Punching, Stringer and Support Location Details Regulatory, Warning and Guide Signs		
D-754-47, 48,50	Sign Punching, Stringer and Support Location Details For Variable Length Signs		
D-754-51	Sign Punching, Stringer and Support Location Details - Route Marker Signs		
D-754-82	Object Markers		
D-754-83	Object Markers - Culverts		
D-754-86	911 Sign Support Information And Sign Details		
D-754-87	Sign Punching, Stringer And Support Location Details For Street Name Signs And 911 Signs		

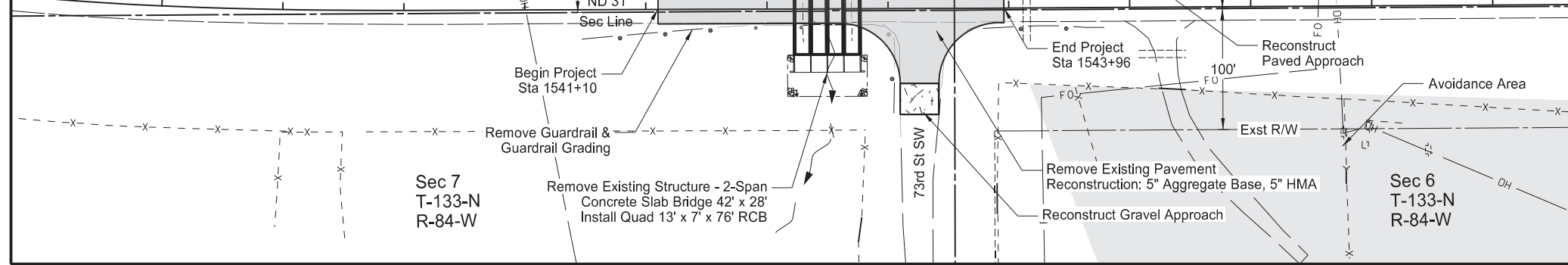
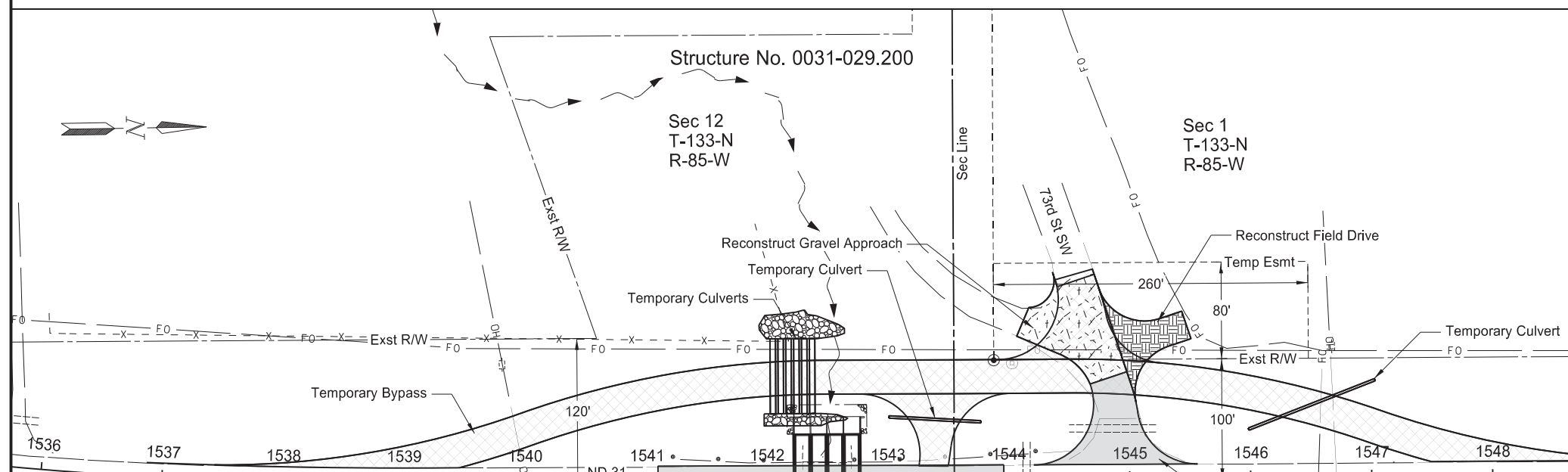
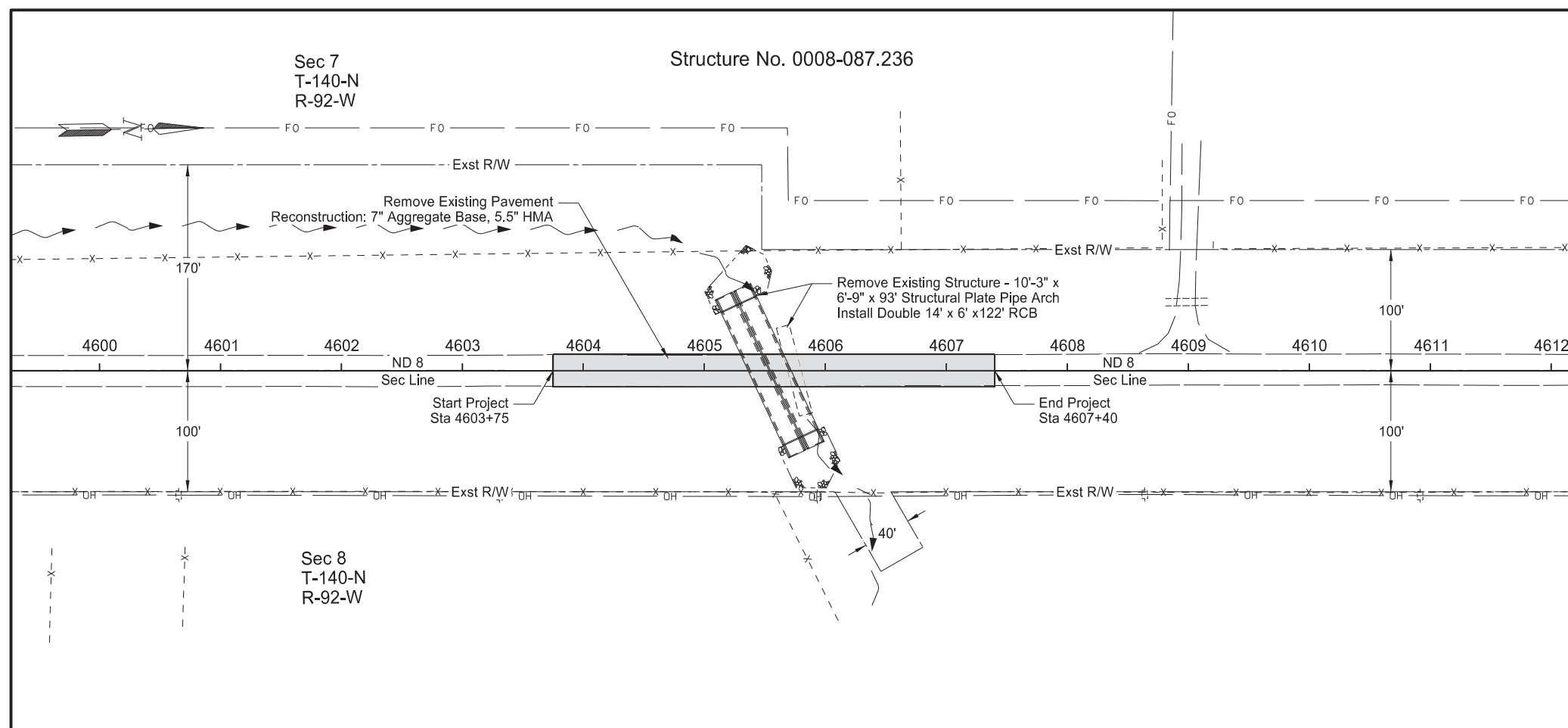
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Various Structures - Statewide
 Scope of Work
 Structure 0003-011.402
 ND 3 - McIntosh County
 Structure 0003-050.623
 ND 3 - Logan County



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Various Structures - Statewide

Scope of Work

Structure 0008-087.236
ND 8 - Stark County

Structure 0031-029.200
ND 31- Grant County



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

107-P01 MAINTAINING TRAFFIC – UNEVEN SHOULDER: If a shoulder and the adjacent lane are uneven due to milling or paving operations, the requirements of Section 704.04 O, “Traffic Control for Uneven Pavement” apply. If the uneven shoulder and adjacent lane are due to other circumstances, the contents of this note apply.

If, at the end of the work-day, drop-offs greater than 2 inches and less than 18 inches or slopes steeper than 4:1 exist between the edge of a traffic lane and the outside edge of the proposed roadway, perform one of the following actions:

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

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

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

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

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

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

107-P02 STORM WATER PERMITS: Obtain permits as specified in Section 107.01 C “Storm Water Permits” measuring each structure location individually for the total area of disturbance. Up to four separate permits may be required.

108-100 WEEKLY PLANNING & REPORTING MEETING: A weekly planning and reporting meeting is required.

108-P01 CONTRACT TIME FOR COMPLETION: A site will be considered open until all work, including but not limited to the installation of temporary roadway bypass, temporary culverts, temporary stream diversion, structure removal, structure replacement, backfill, removal of temporary bypass, aggregate base course, hot mix asphalt, grading, permanent erosion control, rumble strips, signing and striping, is complete.

The Maximum Calendar Days and daily charge for Liquidated Damages (LD) for each respective structure are shown in the below table:

Structure Number	Highway	County	Maximum Calendar Days	LD Rate (\$)
0003-011.402	3	McIntosh	14 Calendar Days	\$450
0003-050.623	3	Logan	49 Calendar Days	\$850
0008-087.236	8	Stark	80 Calendar Days	\$850
0031-029.200	31	Grant	49 Calendar Days	\$850

The Engineer will measure calendar days for each respective structure location separately, beginning the day that traffic has been switched onto any of the traffic control layouts identified in Plan Note 704-P01. Measurement of calendar days will end when all work at each individual site is complete.

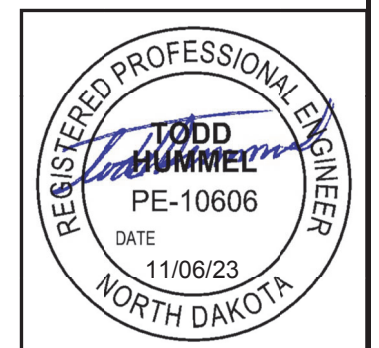
For each respective site, liquidated damages will be assessed by the Daily Charge for each calendar day that the work remains incomplete after the Maximum Calendar Days have been reached.

109-P01 MEASUREMENT OF QUANTITIES: A prismatic method was used for volume calculations of the earthwork items.

202-P01 REMOVAL OF BITUMINOUS SURFACING: Removal of Bituminous Surfacing consists of removing bituminous pavement, underlying aggregate base (except for the bottom 2 inches), and aggregate surfacing material (except for the bottom 2 inches). Existing pavement and underlying aggregate base thicknesses are based on the existing typical sections shown in Section 30, which were created from previous construction plans and maintenance data. The bottom two inches of the existing base is included in the excavation volumes listed in Section 11.

202-P02 REMOVE EXISTING FENCE: Notify landowners in writing, with a copy to the Engineer, a minimum of 30 days in advance of fence removal. Just prior to removing fence, coordinate verbally with the adjacent landowners. Install the new fence before the removal of the old fence. Additional information, including the property owners’ contact information, will be available from the Engineer.

Payment for fence removal will be paid based upon the length of fence removed regardless of the presence of gates, corner assemblies, brace assemblies, and depression fencing. Include all costs associated with removing the aforementioned items in the contract unit price bid for “REMOVE EXISTING FENCE”.



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202-P03 REMOVAL OF TEMPORARY BYPASS: Remove temporary bypass as described in note 704-P05 after the State Highway has been re-opened to traffic. Remove in a manner that prevents soil/water interaction. Restore the area affected by the temporary bypass in accordance with this plan set. Include the removal of all aggregate, embankment, erosion control, and culverts in the unit price bid for "REMOVAL OF TEMPORARY BYPASS".

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: The Engineer will pay plan quantity for Common Excavation-Type A. Field measurements will not be taken.

203-P02 COMMON EXCAVATION-WASTE: The Engineer will pay plan quantity for Common Excavation-Waste. Field measurements will not be taken.

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

261-P01 TEMPORARY EROSION CONTROL WITHIN WETLANDS: Fiber Rolls and Silt Fence have been provided for placement between the earthen berm at the perimeter of the work area and adjacent wetlands. Do not place fiber roll inside a wetland. Use silt fence if installation area is inside a wetland. Apply temporary seed and mulch to the berm according to permit timelines. Temporary seed mix and mulch for this use will be paid for as "TEMPORARY COVER CROP" and "STRAW MULCH".

302-P01 TRAFFIC SERVICE AGGREGATE MAINTENANCE: Maintain a smooth and compacted surface on the temporary bypass at all times. Provide dust control as necessary utilizing water or similar methods. Water will be paid for separately at the contract unit price for "WATER". Include all remaining costs for maintenance in the contract unit price for "TRAFFIC SERVICE AGGREGATE".

704-200 STATE FURNISHED MEDIAN BARRIER: Obtain (41) 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".

704-450 LANE CLOSURE – SIGNAL CONTROL/FLAGGING CONTROL: Install either the signal controlled lane closure on Standard D-704-16 or the flagging controlled lane closure on Standard D-704-17.

Obtain an electrical source for traffic signals. Solar powered signals may be used. Place generators a minimum of 60 feet from the roadway centerline, unless the generator and signal are part of a trailer mounted unit.

Place utility poles and equipment a minimum of 60 feet from the roadway centerline and place power conductors a minimum of 6 inches below the ground surface. Remove poles after they are no longer necessary.

The Engineer will measure individual traffic control devices, other than the signal system and flaggers, shown on the standards. Payment will be made at the respective contract unit price. Include the cost of either a traffic signal system or flaggers in the contract unit price for "LANE CLOSURE – SIGNAL CONTROL/FLAGGING CONTROL".

704-500 PORTABLE RUMBLE STRIPS (PRS): Use PRS made of rubber or engineered polymers.

Install PRS as part of the temporary traffic control when the following signs are also part of the required traffic control set up:

- "Be Prepared to Stop" (W3-4); and
- "Flagger" symbol (W20-7)

Install PRS that meet the following criteria:

- Have no adhesives or fasteners required for placement;
- Have a manufacture's speed rating that meets or exceeds the posted speed limit; and
- Each strip in the array must weigh a minimum of 100 pounds.

Use individual PRS constructed in one of the following manners:

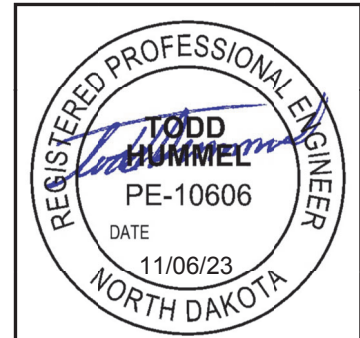
- A single piece;
- Interlocking segments; or
- Two pieces hinged at the midpoint.

An installed array of PRS consists of a minimum of 3 individual strips.

Move rumble strips with the flagging operation. Do not place rumble strips on horizontal curves.

The Engineer will count and measure each array as one unit. Include the cost of providing, installing, maintaining, and relocating PRS in the unit price bid for "PORTABLE RUMBLE STRIPS".

704-511 OBLITERATION OF PAVEMENT MARKINGS: Mask pavement markings designated for obliteration as specified in Section 704.04 N.2, "Masking".



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704-P01 TRAFFIC CONTROL DEVICES: The traffic control devices list has been developed using the following layouts shown in the Standard Drawings and layouts provided in the plans.

- All Sites
 - D-704-15 Type A Temporary Road Closure with Flaggers
 - D-704-26 Miscellaneous Sign Layouts (As Needed)
 - D-704-33 Two-Lane Roadway Portable Rumble Strips
- ND Highway 3, Structure 0003-011.402
 - D-704-19 Type F – Lane Closure on a Two Lane Road Using Flaggers
 - Section 100, Sheets 2-4
- ND Highway 3, Structure 0003-050.623
 - D-704-15 Type B – Road Closure with a Diversion
 - Section 100, Sheet 5
- ND Highway 8, Structure 0008-087.236
 - D-704-16 – Lane Closure on a Two Lane Road Using Traffic Control Signals
 - Section 100, Sheet 6-10
- ND Highway 31, Structure 0031-029.2
 - D-704-15 Type B – Road Closure with a Diversion
 - Section 100, Sheet 11-12

The Traffic Control Device List Phase Nos. 1, 2, 3, and 4 represent the four site locations 0003-011.402, 0003-050.623, 0008-087.236, and 0031-029.200 respectively. The quantities in Phase Nos 1, 2, 3, and 4 are the maximum total quantity required at any moment for each individual site. Phase ‘T’ on the Traffic Control Devices List represents the sum of all traffic control devices required for all four sites concurrently. Traffic control sign units and devices will be paid for when installed at each individual site regardless of the number of sites being worked on concurrently.

704-P02 SITE 1 TRAFFIC CONTROL PHASING (STRUCTURE 0003-011.402): Replace Structure 0003-011.402 in the following phases:

Phase 1: Shift traffic to project left, maintaining a minimum of 15’ of the existing pavement surface following D-704-19 Type F – Lane Closure on a Two Lane Road Using Flaggers. Remove existing hot mix asphalt surfacing and aggregate base course on project right. Remove and grade subgrade on project right to a minimum width of 15’, a maximum profile grade of 7%, and a minimum of 1’ of cover over the existing structure. Place a minimum of 2” of traffic service aggregate for the driving surface of the temporary roadway on project right. Install all traffic control signs and devices along the temporary roadway following Section 100 Sheet 2.

Phase 2: Shift traffic to project right onto the temporary roadway. Remove remaining existing hot mix asphalt surfacing and aggregate base course on project left. Excavate and remove existing structure on project left to a minimum of centerline. Install proposed culverts on project left to a minimum of centerline. Backfill over proposed culverts and place aggregate base course on project left. Install all traffic control signs and devices along the temporary roadway on project left following Section 100 Sheet 2.

Phase 3: Shift traffic to project left onto the proposed aggregate base course. Excavate and remove remaining existing structure on project right. Install remaining proposed culverts on project right. Backfill over proposed culverts and place remaining aggregate base course.

Phase 4: Pave the proposed hot mix asphalt. Install permanent pavement markings, signing, and erosion control measures.

704-P03 SITE 2 & 4 TRAFFIC CONTROL PHASING (STRUCTURE 0003-050.623 AND 0031-029.200): Replace Structure 0003-050.623 and 0031-029.200 in the following phases:

Phase 1: Construct the temporary bypass. Utilize D-704-15 Type A Temporary Road Closure with Flaggers. Install all traffic control signs and devices along the bypass following Section 100 Plan sheets and D-704-15 Type B – Road Closure with a Diversion.

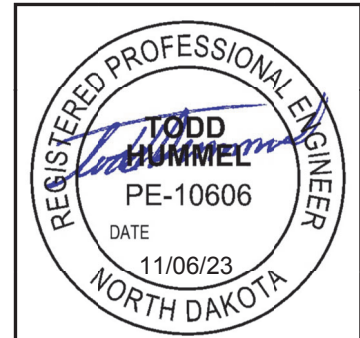
Phase 2: Shift traffic to the temporary bypass. Remove the existing pavement and structure, complete the box culvert excavation, place foundation fill, install all box culvert cells, backfill, place aggregate course, pave hot mix asphalt, and install pavement markings. Where possible, install the entire wing wall and proposed riprap.

Phase 3: Open roadway to traffic. Install the remaining wing wall(s), proposed riprap, and channel grading if not completed in Phase 2. Removed temporary bypass. Complete any remaining seeding and permanent erosion control required for the removal of the temporary bypass. Utilize D-704-15 Type A Temporary Road Closure with Flaggers.

704-P04 SITE 3 TRAFFIC CONTROL PHASING (STRUCTURE 0008-087.236): Replace Structure 0008-087.236 in the following phases:

Phase 1: Shift traffic to project right, maintaining a minimum of 15’ of the existing pavement surface. Remove existing hot mix asphalt surfacing and aggregate base course on project left. Remove and grade subgrade to a minimum width of 15’, a maximum profile grade of 7%, and a minimum of 1’ of cover over the existing structure. Provide a minimum of 2” of traffic service aggregate for the driving surface of the temporary roadway on project left. Install all traffic control signs and devices along the temporary roadway following D-704-16 – Lane Closure on a Two Lane Road Using Traffic Control Signals.

Phase 2: Shift traffic to project left onto the temporary roadway. Remove remaining existing hot mix asphalt surfacing and aggregate base course on project right. Excavate and install a minimum of 60’ of the southern barrel of the proposed box culvert on project right. Backfill over proposed culvert and grade subgrade to a minimum width of 15’, a maximum profile grade of 7%, and a minimum of 1’ of cover over the proposed & existing structure. Provide a minimum of 2” of traffic service aggregate for the driving surface of the temporary roadway on project right. Install all traffic control signs and devices along the temporary roadway following D-704-16 – Lane Closure on a Two Lane Road Using Traffic Control Signals.



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Phase 3: Shift traffic to project right onto the temporary roadway. Excavate and remove existing structure on project left to a minimum of 3' RT of centerline (approximately 42'). Install remaining length of southern barrel and a minimum of 64' of the northern barrel of the proposed box culvert on project left. Backfill over proposed culvert and grade subgrade to a minimum width of 15', a maximum profile grade of 7%, and a minimum of 1' of cover over the proposed structures. Provide a minimum of 2" of traffic service aggregate for the driving surface of the temporary roadway on project left. Install all traffic control signs and devices along the temporary roadway following D-704-16 – Lane Closure on a Two Lane Road Using Traffic Control Signals.

Phase 4: Shift traffic to project left onto the temporary roadway over the proposed box culverts. Excavate and remove remaining existing structure on project right. Install remaining length of northern barrel of the proposed box culvert on project right. Backfill over proposed culverts and place the proposed aggregate base course on project right to a minimum width of 15'.

Phase 5: Shift traffic to project right onto the proposed aggregate base course. Backfill to subgrade and place the proposed aggregate base course on project left. Open the roadway to traffic. Pave the proposed hot mix asphalt. Install permanent pavement markings, signing, and erosion control measures.

- 704-P05 TEMPORARY BYPASS SEQUENCING: Construct the temporary bypass in the following sequence:
1. Strip topsoil from areas where the temporary bypass will be constructed.
 2. Construct the temporary bypass starting at the shoulders of the State Highway. Place soil wrapped with Geosynthetic Material Type R1 fabric to prevent soil/water interaction in wetlands and streambed.
 3. Install temporary culverts on top of fabric as shown in the plans to provide positive drainage from the upstream to the downstream ends of the culverts.
 4. Construct temporary bypass across the stream and culverts. Minimize streambed and streambank impacts to the extent practicable.
 5. Place riprap on the temporary bypass embankment to elevation 1924.50' for Structure 0003+050.632 and to elevation 2024.75' for Structure 0031-029.200 upstream and downstream or 1' above the observed water elevation during construction, whichever is higher. Install straw mulch upstream and downstream on the temporary bypass, see Section 76 for more details.
 6. After the State Highway has been reopened to traffic, remove erosion control items, riprap, fabric, culverts, and temporary bypass while minimizing the streambed and streambank impacts to the extent practicable.
 7. Restore impacted areas to original contours.
 8. Improve/restore all approaches as specified in the plans. Maintain existing access while temporary bypass is in use.

- 709-P01 GEOSYNTHETIC MATERIAL TYPE R1: Begin and end fabric outside wetland boundaries to ensure complete separation from proposed soil throughout the stream bed and wetland areas. Secure Geosynthetic Material Type R1 along inslopes of the temporary bypass 10 feet horizontally from the bottom of the inslope or to the bottom of the aggregate roadway, if 10 feet is not attainable. Potential methods of securing the liner may include:
1. Staples;
 2. Pins;
 3. Sandbags; or
 4. Riprap

Include placement, wrapping, and securing materials in the contract unit price for "GEOSYNTHETIC MATERIAL TYPE R1".

- 714-P01 PIPE CONDUIT FOR TEMPORARY BYPASSES: The allowable pipe list for temporary roadway bypass pipe conduit was designed for a single conduit diameter and quantity of conduit runs required for corrugated steel pipe only. Other pipe conduit options that meet the relevant design criteria, including salvaged or used conduit in acceptable condition, may be substituted at the discretion of the Engineer. Request in writing any substitution of size, length, diameter, quantity of conduit runs, material, coatings, corrugations/spiral ribs, thicknesses, location, or other modifications to the Engineer at least 14 calendar days prior to the proposed project start date for review. Include all costs associated with the temporary roadway bypass pipe conduit in the respective unit price bid for "PIPE CONDUIT __IN-APPROACH".

- 714-P02 PIPE WORK: Provide dewatering if necessary according to site conditions. Include all costs associated with dewatering in the price bid for pipe installation.

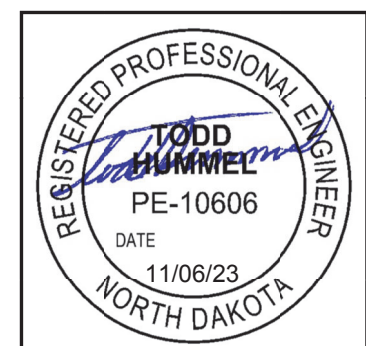
- 754-P01 OBJECT MARKERS - CULVERTS: Remove existing object markers located at culvert end sections that are impacted by earthwork activities and pipe replacements. Include the cost for removal and disposal in the price bid for "OBJECT MARKERS – CULVERTS".

- 764-P01 REMOVE W-BEAM GUARDRAIL & POSTS: Deliver all removed W-Beam guardrail deemed salvageable by the Engineer to the following NDDOT Bismarck District Sections and neatly stack them at a location designated by the Engineer.

For 0031-029.200, deliver to:
6590 Co Rd 84
Flasher, ND 58535

For 0003-050.623, deliver to:
59 Broadway
Napoleon, ND 58561

Include all costs to remove and deliver guardrail and end terminal material in the contract unit price bid for "REMOVE W-BEAM GUARDRAIL & POSTS" and "REMOVE END TREATMENT & TRANSITION".



ENVIRONMENTAL NOTES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	6	5

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

EN-1 SPAWNING RESTRICTION: Do not work within Beaver Creek at Structure No. 0003-050.623 from April 15 to June 1.

EN-2 AVOIDANCE AREAS: The Project Engineer will contact Jeani Borchert of the Environmental and Transportation Services Division to coordinate any meetings needed to identify the limits of the avoidance area. The site is Raleigh Rodeo Grounds adjacent to Structure No. 0031-029.200 near Raleigh, ND (approximately Sta 1544+15 Rt to 1551+35 Rt). This avoidance area within the right-of-way must not be disturbed and is currently surrounded by an existing fence.

EN-3 AQUATIC NUISANCE SPECIES (ANS): Equipment that was last used outside of North Dakota or within a Class I infested waterbody (identified on the North Dakota Game and Fish Department (NDGFD) website) requires an inspection by NDGFD. Notify the NDGFD at least 10 business days prior to pumps, watercraft, or any equipment entering a public water to allow the NDGFD sufficient time to inspect any and all such equipment for ANS. Contact the NDGFD ANS Coordinator, Ben Holen by e-mail - bholen@nd.gov for equipment inspections. Supply one of the following to the engineer as proof of compliance prior to work taking place in the water: (1) the NDGFD inspection report, (2) documented NDGFD correspondence (email or signed letter).

EN-4 TEMPORARY WETLAND IMPACT: Temporary impact areas within wetlands and or other waters are incorporated into the plans for this project. Remove temporary fill placed and sedimentation in wetlands or other waters. Restore these wetlands to preconstruction contours.

Estimated Quantities

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline: Funding A	TOTAL
103	0100	CONTRACT BOND	L SUM	1	1
202	0104	REMOVAL OF STRUCTURE	EA	4	4
202	0132	REMOVAL OF BITUMINOUS SURFACING	SY	4714	4714
202	0312	REMOVE EXISTING FENCE	LF	753	753
202	0350	REMOVAL OF TEMPORARY BYPASS	EA	2	2
202	0400	REMOVAL OF RIPRAP - LOOSE ROCK	CY	379	379
203	0101	COMMON EXCAVATION-TYPE A	CY	1160	1160
203	0109	TOPSOIL	CY	4670	4670
203	0113	COMMON EXCAVATION-WASTE	CY	3614	3614
203	0140	BORROW-EXCAVATION	CY	11279	11279
210	0050	BOX CULVERT EXCAVATION	EA	3	3
210	0210	FOUNDATION FILL	CY	5850	5850
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	3	3
216	0100	WATER	M GAL	242	242
230	0165	SUBGRADE PREPARATION-TYPE A-12IN	STA	5.8	5.8
251	0200	SEEDING CLASS II	ACRE	7	7
251	1000	WETLAND SEED	ACRE	0.16	0.16
251	2000	TEMPORARY COVER CROP	ACRE	6.36	6.36
253	0101	STRAW MULCH	ACRE	13.52	13.52
255	0103	ECB TYPE 3	SY	1486	1486
256	0200	RIPRAP GRADE II	CY	920	920
260	0100	SILT FENCE UNSUPPORTED	LF	2285	2285
260	0101	REMOVE SILT FENCE UNSUPPORTED	LF	2285	2285
261	0112	FIBER ROLLS 12IN	LF	7159	7159
261	0113	REMOVE FIBER ROLLS 12IN	LF	3223	3223
262	0100	FLOTATION SILT CURTAIN	LF	58	58
262	0101	REMOVE FLOTATION SILT CURTAIN	LF	58	58
302	0050	TRAFFIC SERVICE AGGREGATE	TON	3046	3046
302	0120	AGGREGATE BASE COURSE CL 5	TON	1745	1745
401	0160	BLOTTER MATERIAL CL 44	TON	42	42
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	TON	1492	1492
606	1406	14FT X 6FT PRECAST RCB CULVERT	LF	244	244
606	3014	DBL 10FT X 14FT PRECAST RCB CULVERT	LF	152	152
606	3307	DBL 13FT X 7FT PRECAST RCB CULVERT	LF	152	152
606	5307	13FT X 7FT PRECAST RCB END SECTION	EA	4	4
606	5406	14FT X 6FT PRECAST RCB END SECTION	EA	4	4
606	7014	DBL 10FT X 14FT PRECAST RCB END SECTION	EA	4	4
702	0100	MOBILIZATION	L SUM	1	1
704	0100	FLAGGING	MHR	520	520
704	1000	TRAFFIC CONTROL SIGNS	UNIT	3562	3562
704	1018	LANE CLOSURE-SIGNAL CONTROL/FLAGGING CONTROL	EA	1	1
704	1035	ATTENUATION DEVICE-TYPE B-25	EA	2	2
704	1048	PORTABLE RUMBLE STRIPS	EA	8	8
704	1052	TYPE III BARRICADE	EA	19	19
704	1060	DELINEATOR DRUMS	EA	103	103
704	1067	TUBULAR MARKERS	EA	48	48
704	1080	STACKABLE VERTICAL PANELS	EA	91	91

Estimated Quantities

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	8	2

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline: Funding A	TOTAL
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	567	567
704	3511	STATE FURNISHED MEDIAN BARRIER	LF	410	410
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	2233	2233
709	0151	GEOSYNTHETIC MATERIAL TYPE R1	SY	1450	1450
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	973	973
714	4106	PIPE CONDUIT 24IN-APPROACH	LF	188	188
714	4125	PIPE CONDUIT 48IN	LF	168	168
714	4132	PIPE CONDUIT 54IN-APPROACH	LF	372	372
714	4137	PIPE CONDUIT 60IN-APPROACH	LF	264	264
720	0110	RIGHT OF WAY MARKERS	EA	1	1
720	0130	IRON PIN R/W MONUMENTS	EA	1	1
752	0200	FENCE BARBED WIRE 4 STRAND	LF	424	424
752	3140	CORNER ASSEMBLY BARBED WIRE	EA	3	3
752	4100	DOUBLE BRACE ASSEMBLY BARBED WIRE	EA	4	4
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	29	29
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	71	71
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	182	182
754	0592	RESET SIGN PANEL	EA	1	1
754	0593	RESET SIGN SUPPORT	EA	1	1
754	0803	OBJECT MARKERS - TYPE III	EA	12	12
754	0805	OBJECT MARKERS - CULVERTS	EA	4	4
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	MILE	0.43	0.43
760	0007	RUMBLE STRIPS - ASPHALT CENTERLINE	MILE	0.23	0.23
762	0426	SHORT TERM 24IN LINE-TYPE R	LF	24	24
762	1104	PVMT MK PAINTED 4IN LINE	LF	8920	8920
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS	LF	745	745
764	2081	REMOVE END TREATMENT & TRANSITION	EA	10	10
900	1000	TEMPORARY STREAM DIVERSION	EA	3	3

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	10	1

MAINLINE PAVING SUMMARY											
Site Location	Begin Station	End Station	Length (LF)	Cross-Sectional Area (See Typical Sections)		302 0120 AGGREGATE BASE COURSE CL 5 (TON)	TACK COAT** (GAL)	PRIME COAT** (GAL)	FOG SEAL** (GAL)	401 0160 BLOTTER MATERIAL CL 44 (TON)	430 0500 COMMERCIAL GRADE HOT MIX ASPHALT (TON)
				Aggregate Base (SF)	HMA (SF)						
Structure 0003-011.402	601+15	602+90	175	17.82	11.92	217	51	191	47	5	155
Structure 0003-050.623	2671+50	2674+40	290	21.22	20.61	428	150	382	91	9	443
	2669+82 Rt*	2671+50 Rt*	168	3.61	2.30	43	10	31	4	1	29
	2670+75 Lt*	2671+50 Lt*	75	3.61	2.30	19	5	14	2	1	13
	2674+40 Rt*	2675+35 Rt*	95	3.61	2.30	24	6	18	3	1	17
Structure 0003-050.623	2674+40 Lt*	2676+20 Lt*	180	3.61	2.30	46	11	33	4	1	31
	Structure 0008-087.236	4603+75	4607+40	365	20.15	13.75	511	122	455	-	10
Structure 0031-029.200	1541+10	1543+96	286	12.53	10.76	249	84	315	77	7	228
TOTAL =						1,537	439	1,439	228	35	1,288

*Shoulder Paving


**Include in the Unit Bid Price for "COMMERCIAL GRADE HOT MIX ASPHALT"

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5	1,745	TON
401	0160	BLOTTER MATERIAL CL 44	42	TON
430	0500	COMMERCIAL GRADE HOT MIX ASPHALT	1,492	TON

APPROACH PAVING SUMMARY								
Site Location	Station	Offset	302 0120 AGGREGATE BASE COURSE CL 5	TACK COAT*	PRIME COAT*	FOG SEAL*	401 0160 BLOTTER MATERIAL CL 44	430 0500 COMMERCIAL GRADE HOT MIX ASPHALT
			(TON)	(GAL)	(GAL)	(GAL)	(TON)	(TON)
Structure 0031-029.200	1543+26	Rt	89	32	115	32	3	87
	1544+88	Lt	119	42	153	42	4	117
TOTAL =			208	74	268	74	7	204

*Include in the Unit Bid Price for "COMMERCIAL GRADE HOT MIX ASPHALT"

Pavement
Aggregate Base Course Cl 5 @ 1.875 Tons / CY
Tack Coat @ 0.05 Gal / SY
Prime Coat @ 0.35 Gal / SY
Fog Seal @ 0.10 Gal / SY
Blotter Material @ 15 lbs / SY
Commercial Grade Hot Mix Asphalt @ 2 Tons / CY

Various Structures - Statewide	
Basis of Estimate	

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	10	2

TRAFFIC SERVICE AGGREGATE & TEMPORARY BYPASS REMOVAL					
Site Location	Chain	Begin Station	End Station	202 0350 REMOVAL OF TEMPORARY BYPASS	302 0050 TRAFFIC SERVICE AGGREGATE
				(EA)	(TON)
Structure 0003-011.402	SCL3	601+15	602+90	-	63
Structure 0003-050.623	PR3_TempBypass	2+00	13+27	1	1,229
Structure 0008-087.236	SCL8	4603+75	4607+40	-	203
Structure 0031-029.200	PR31_TempBypass	2+00	14+53	1	1,551
TOTAL =				2	3,046

230 0165 SUBGRADE PREPARATION - TYPE A - 12IN			
Site Location	Begin Station	End Station	230 0165 SUBGRADE PREPARATION - TYPE A - 12IN
			(STA)
Structure 0003-011.402	601+15	602+90	1.8
Structure 0003-050.623	2671+50	2672+07	0.6
	2673+84	2674+40	0.6
Structure 0008-087.236	4603+75	4604+78	1.1
	4606+30	4607+40	1.1
Structure 0031-029.200	1541+10	1541+65	0.6
	1543+36	1543+96	0.6
TOTAL =			5.8

SPEC	CODE	BID ITEM	QTY	UNIT
202	0350	REMOVAL OF TEMPORARY BYPASS	2	EA
216	0100	WATER	242	M GAL
230	0165	SUBGRADE PREPARATION-TYPE A-12IN	5.8	STA
302	0050	TRAFFIC SERVICE AGGREGATE	3,046	TON
704	1500	OBLITERATION OF PAVEMENT MARKING	567	SF
720	0110	RIGHT OF WAY MARKERS	1	EA
720	0130	IRON PIN R/W MONUMENTS	1	EA
760	0005	RUMBLE STRIPS - ASPHALT SHOULDER	0.43	MILE
760	0007	RUMBLE STRIPS - ASPHALT CENTERLINE	0.23	MILE

216 0100 WATER		
Site Location	Total Quantity	
	(M GAL)	
Structure 0003-011.402	13	
Structure 0003-050.623	96	
Structure 0008-087.236	27	
Structure 0031-029.200	106	
TOTAL =		242


RUMBLE STRIPS				
Site Location	Begin Station	End Station	760 0005 RUMBLE STRIPS - ASPHALT SHOULDER	760 0007 RUMBLE STRIPS - ASPHALT CENTERLINE
			(MILE)	(MILE)
Structure 0003-011.402	601+15	602+90	0.07	0.04
Structure 0003-050.623	2671+50	2674+40	0.11	0.06
Structure 0008-087.236	4603+75	4607+40	0.14	0.07
Structure 0031-029.200	1541+10	1543+96	0.11	0.06
TOTAL =			0.43	0.23

704 1500 OBLITERATION OF PAVEMENT MARKING					
Site Location	Begin Station	End Station	Marking Type	Basis	Quantity (SF)
Structure 0003-050.623	2667+42	2669+82	White Rt Edge Line	1760 SF / mile	80
		2670+75	White Lt Edge Line	1760 SF / mile	111
		2671+50	Yellow CL Dash	440 SF / mile	34
	2674+40	2678+44	Yellow CL Dash	440 SF / mile	34
	2675+35		White Rt Edge Line	1760 SF / mile	103*
Structure 0031-029.200	1537+20	1541+10	White Lt Edge Line	1760 SF / mile	130
			Yellow CL Double Barrier	3520 SF / mile	260
	1543+96	1549+54	White Rt Edge Line	1760 SF / mile	130
			White Lt Edge Line	1760 SF / mile	155
			Yellow CL Double Barrier	3520 SF / mile	372
			White Rt Edge Line	1760 SF / mile	186
TOTAL =					567

Water
Dust Palliative @ 25 M Gal / Mile
Aggregate @ 20 Gal / Ton
Embankment @ 10 Gal / Ton
Subgrade Prep @ 25 M Gal / Mile

* Quantity includes obliteration of approach pavement markings on 71st St SE to a distance of 95' from centerline

RIGHT OF WAY MONUMENTS						
Site Location	Northing	Easting	Station	Offset	720 0110 RIGHT OF WAY MARKERS	720 0130 IRON PIN R/W MONUMENTS
Structure 0031-029.200	252829.6022	1766904.7599	1543+88.21	-98.51	1	1
TOTAL =					1	1

<p>Various Structures - Statewide</p> <p>Basis of Estimate</p>	
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	11	1

SPEC	CODE	BID ITEM	QTY	UNIT
203	0101	COMMON EXCAVATION-TYPE A		
		Earthwork Summary	652	CY
		Temporary Earthwork Summary	508	CY
203	0109	TOPSOIL		
		Earthwork Summary	4,670	CY
203	0113	COMMON EXCAVATION-WASTE		
		Earthwork Summary	3,614	CY
203	0140	BORROW-EXCAVATION		
		Earthwork Summary	1,456	CY
		Temporary Earthwork Summary	9,823	CY

Site Location	EARTHWORK SUMMARY					TOPSOIL SUMMARY
	Excavation	Embankment (1)	203 0101 COMMON EXCAVATION-TYPE A (2)	203 0113 COMMON EXCAVATION-WASTE (3)	203 0140 BORROW-EXCAVATION	203 0109 TOPSOIL
	(CY)	(CY)	(CY)	(CY)	(CY)	(CY)
	A	B	C = B	D = A - B	E = B - C	
Structure 0003-011.402	-	509	-	-	509	215
Structure 0003-050.623	2,166	117	117	2,049	-	1,798
Structure 0008-087.236	-	947	-	-	947	479
Structure 0031-029.200	2,100	535	535	1,565	-	2,178
TOTAL =	4,266	2,108	652	3,614	1,456	4,670

Notes:

- (1) Additional 25% volume include for shrinkage
- (2) Paid as Plan Quantity. See Plan Note 203-P01
- (3) Paid as Plan Quantity. See Plan Note 203-P02

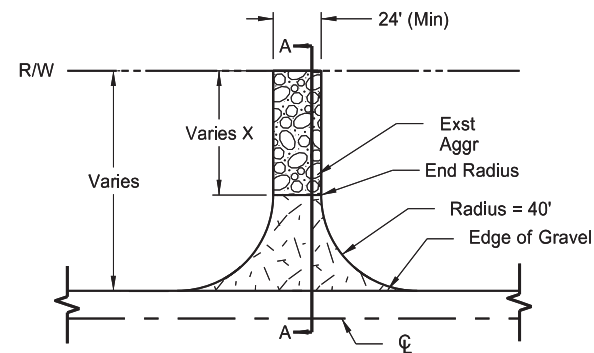
Site Location	TEMPORARY EARTHWORK SUMMARY			
	Excavation	Embankment (1)	203 0101 COMMON EXCAVATION-TYPE A (2)	203 0140 BORROW-EXCAVATION
	(CY)	(CY)	(CY)	(CY)
	A	B	C = A	D = B - A
Structure 0003-011.402	-	-	-	-
Structure 0003-050.623	197	4,873	197	4,676
Structure 0008-087.236	-	-	-	-
Structure 0031-029.200	310	5,458	310	5,148
TOTAL =	508	10,331	508	9,823

Notes:

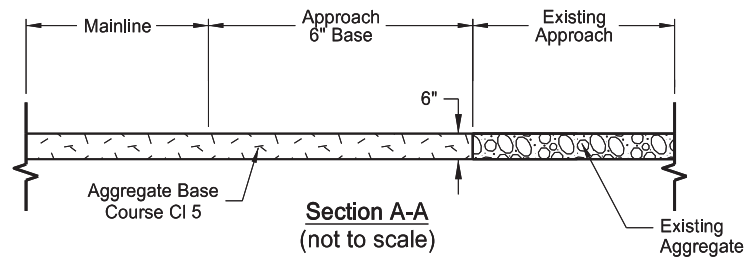
- (1) Additional 25% volume include for shrinkage
- (2) Paid as Plan Quantity. See Plan Note 203-P01

<p>Various Structures - Statewide</p> <p>Data Tables</p> <p>Earthwork Summary</p>	
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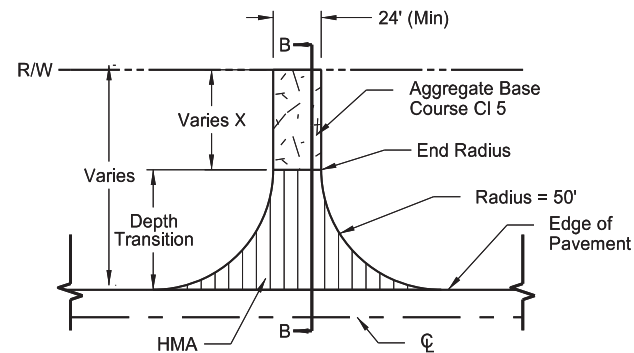
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	20	1



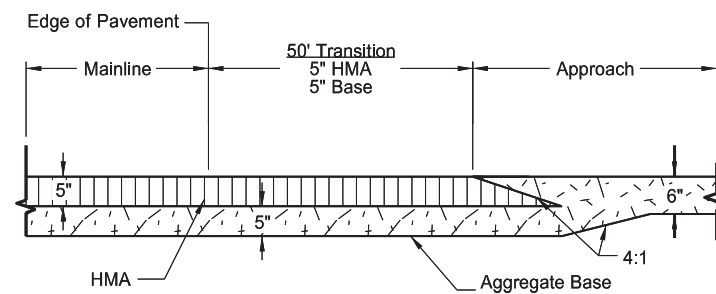
(1) Gravel Private Drive Approach



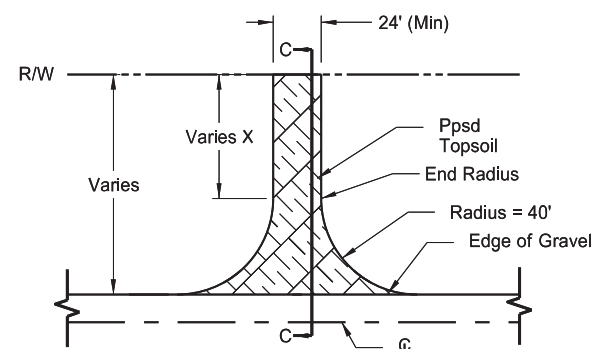
Approach Details				
Roadway	Alignment	Station	Offset	Approach Type
ND 31	SCL 154492	1+52	Rt	1
	SCL 154492	1+54	Lt	3
	OCL31	1543+26	Rt	2
	OCL31	1544+88	Lt	2



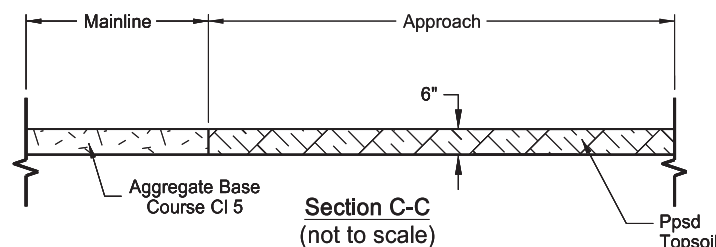
(2) Gravel Section Line, County Road, or Street Approach



Section B-B
(not to scale)



(3) Field Drive Approach



Section C-C
(not to scale)

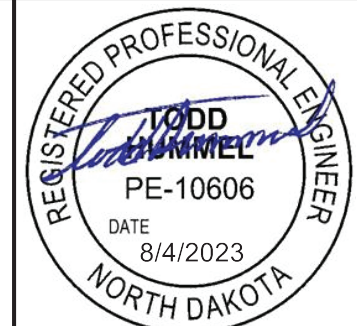
Notes:

1. Actual asphalt paving and aggregate base course locations may vary in the field, as approved by the Engineer.
2. Refer to Standard Drawing D-203-8, and Section 200 Cross Sections for grading details.
3. See Section 10 for approach paving quantities.
4. See Section 60 for approach type locations.

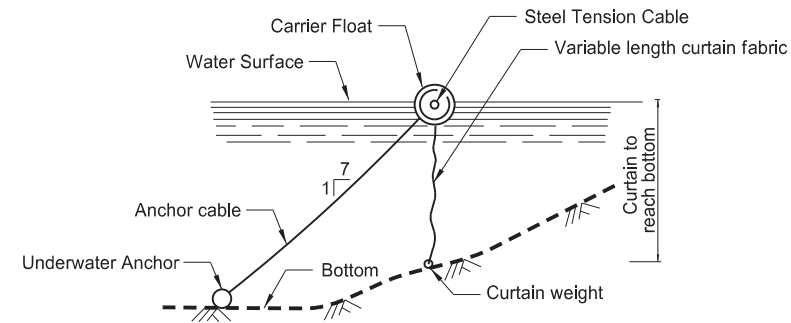
Various Structures - Statewide

General Details

Approach Detail

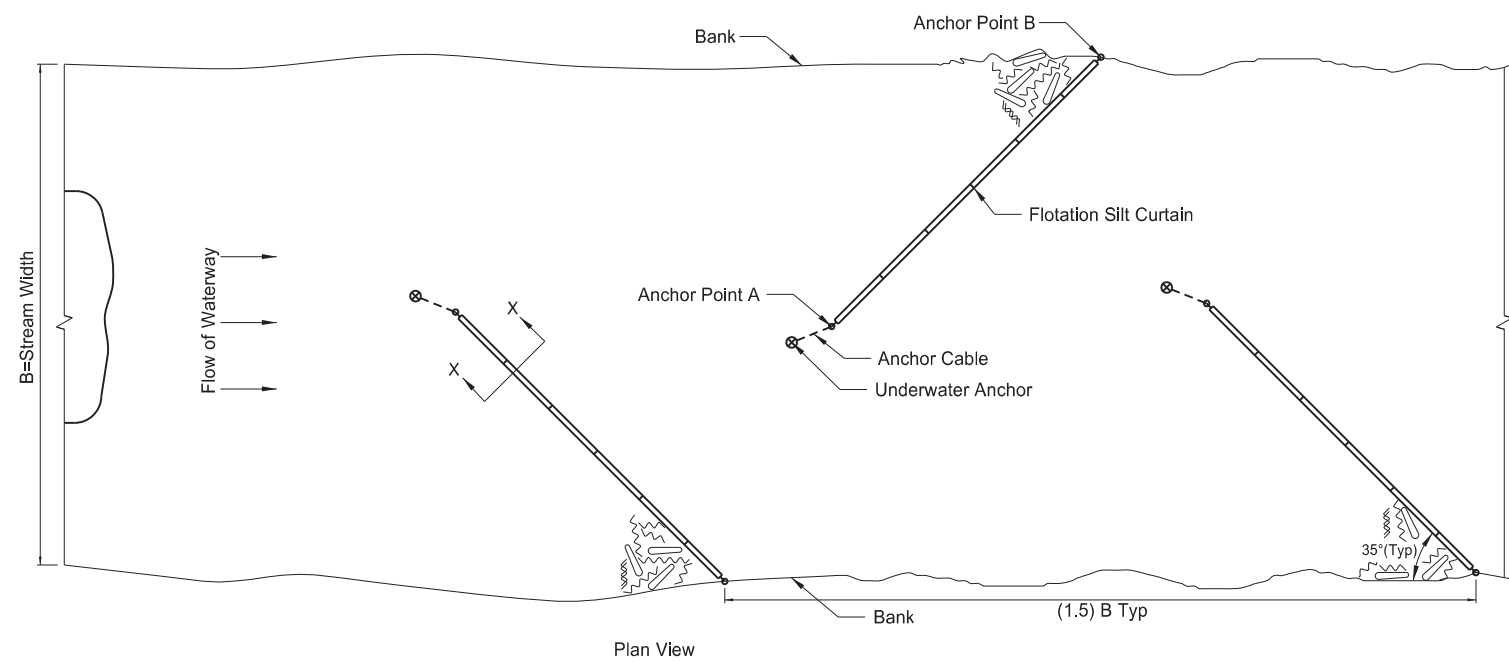


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	20	2



SECTION X-X
FLOTATION SILT CURTAINS

Note:
Maximum water velocity for moving water = 5 ft/sec



FLOTATION SILT CURTAIN - TYPE HERRING BONE PATTERN

DESIGN GUIDELINES:
When temporary work encroaches more than 1/3 width of the stream
or where stream width doesn't allow use of Type Moving Water

Various Structures - Statewide

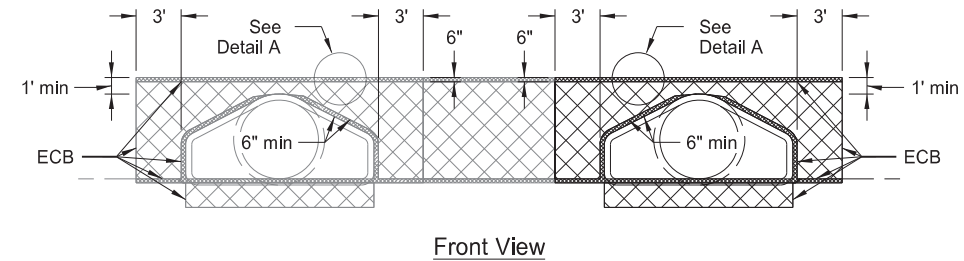
General Details
Flotation Silt Curtain Detail



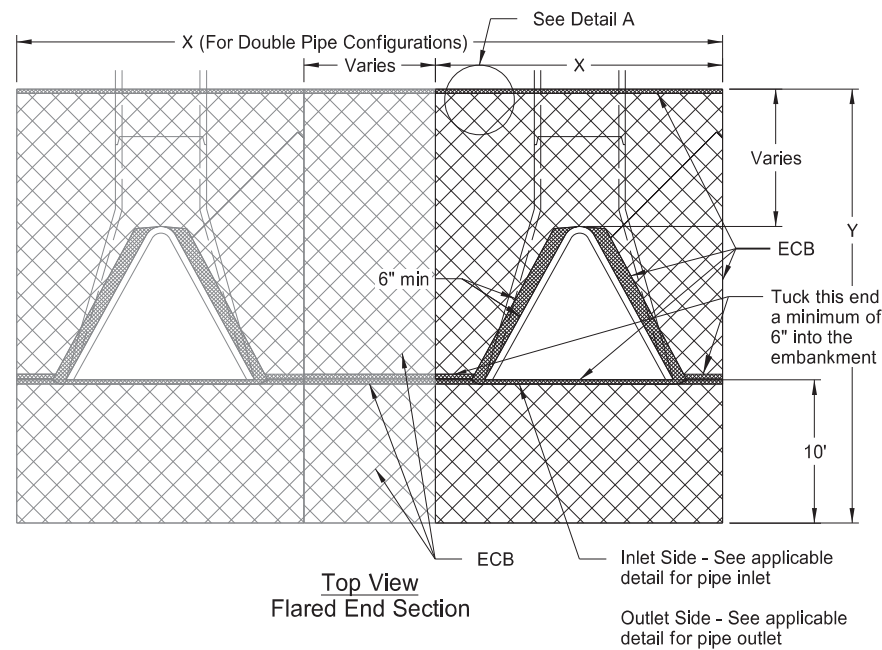
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	20	3

255 0103 ECB TYPE 3								
Roadway	Location of Surface Area		Pipe Diameter	No.	X	Y	Unit Quantity	Total Quantity
	Station	Offset	(IN)		(FT)	(FT)	(SY)	(SY)
0003-011.402	602+02	CL	54	2	31.5	21.5	37	74
0031-029.200	1544+15	CL	24	2	10.5	19.6	22	44
	1544+86	Lt	24	2	10.5	21.6	24	48
TOTAL =							166	

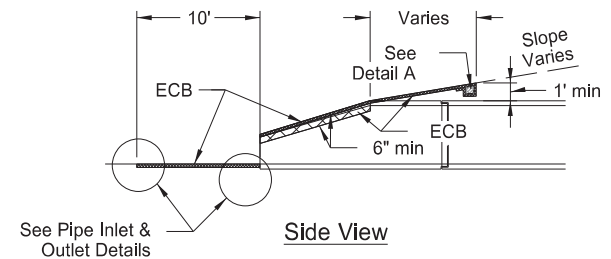
SPEC	CODE	BID ITEM	QTY	UNIT
255	0103	ECB TYPE 3		
Culvert End Sections			166	SY



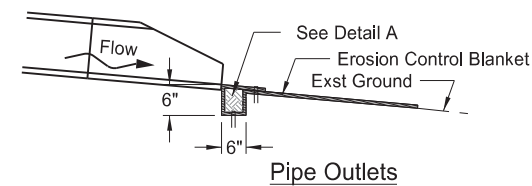
Front View



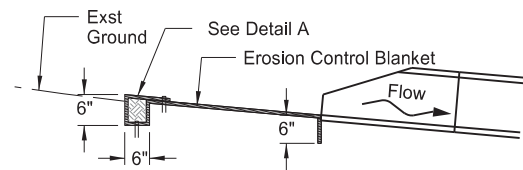
Top View
Flared End Section



Side View



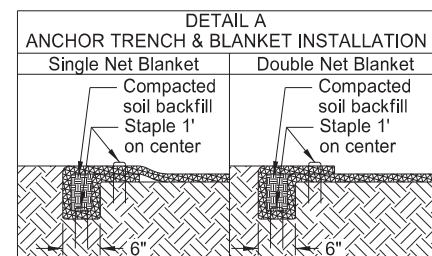
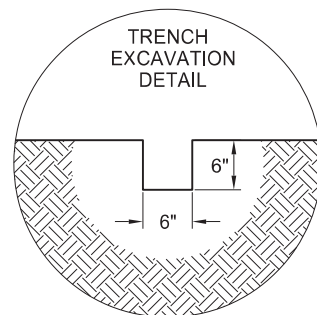
Pipe Outlets



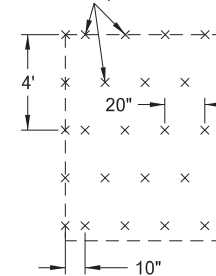
Pipe Inlets

Notes:

- Quantities based on 8:1 inslopes for approach culverts.
- Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.



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



Staple Pattern

Various Structures - Statewide

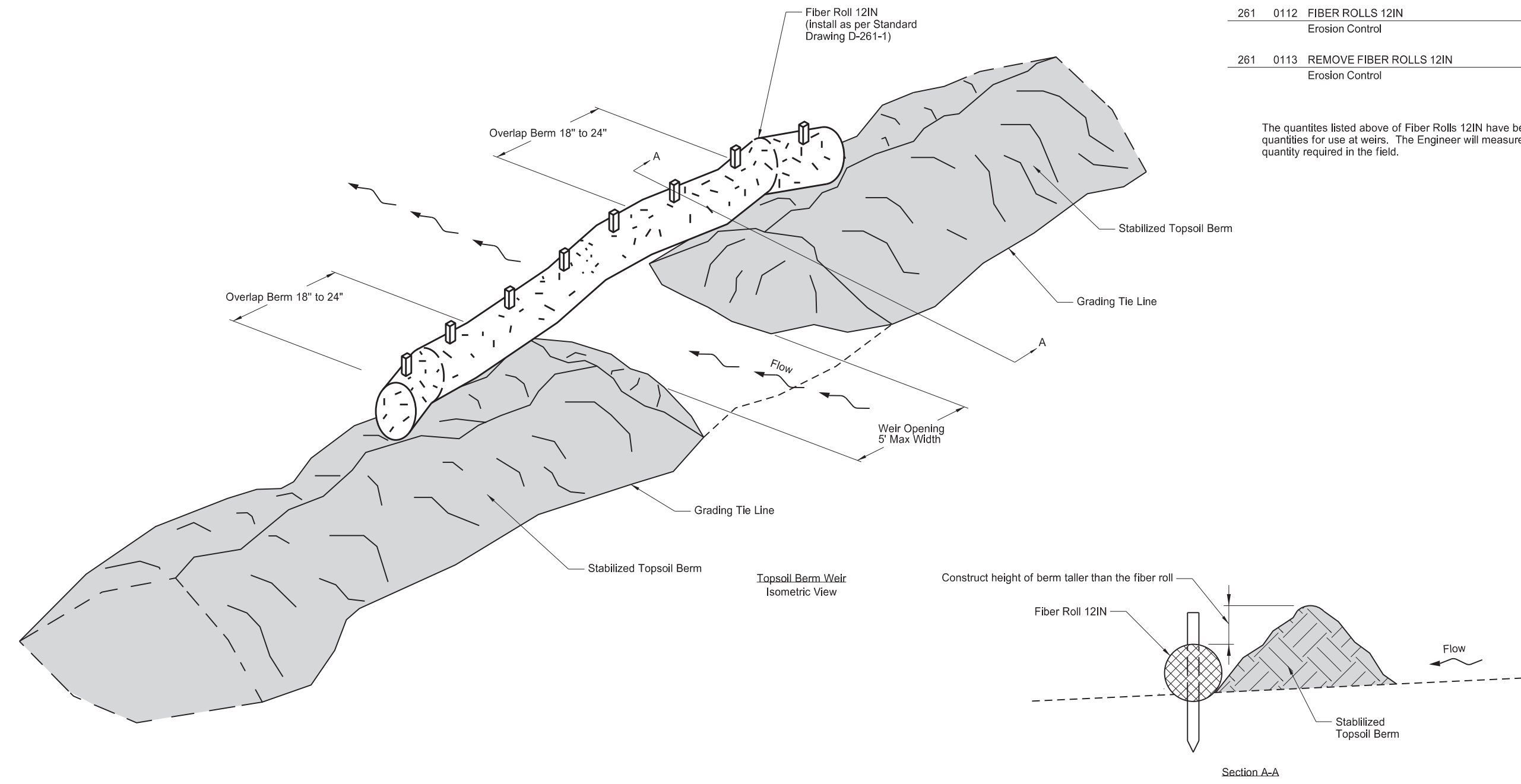
General Details
Erosion Control Blanket Detail



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	20	4

SPEC	CODE	BID ITEM	QTY	UNIT
261	0112	FIBER ROLLS 12IN Erosion Control	300	LF
261	0113	REMOVE FIBER ROLLS 12IN Erosion Control	300	LF

The quantities listed above of Fiber Rolls 12IN have been included in the quantities for use at weirs. The Engineer will measure the actual quantity required in the field.



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

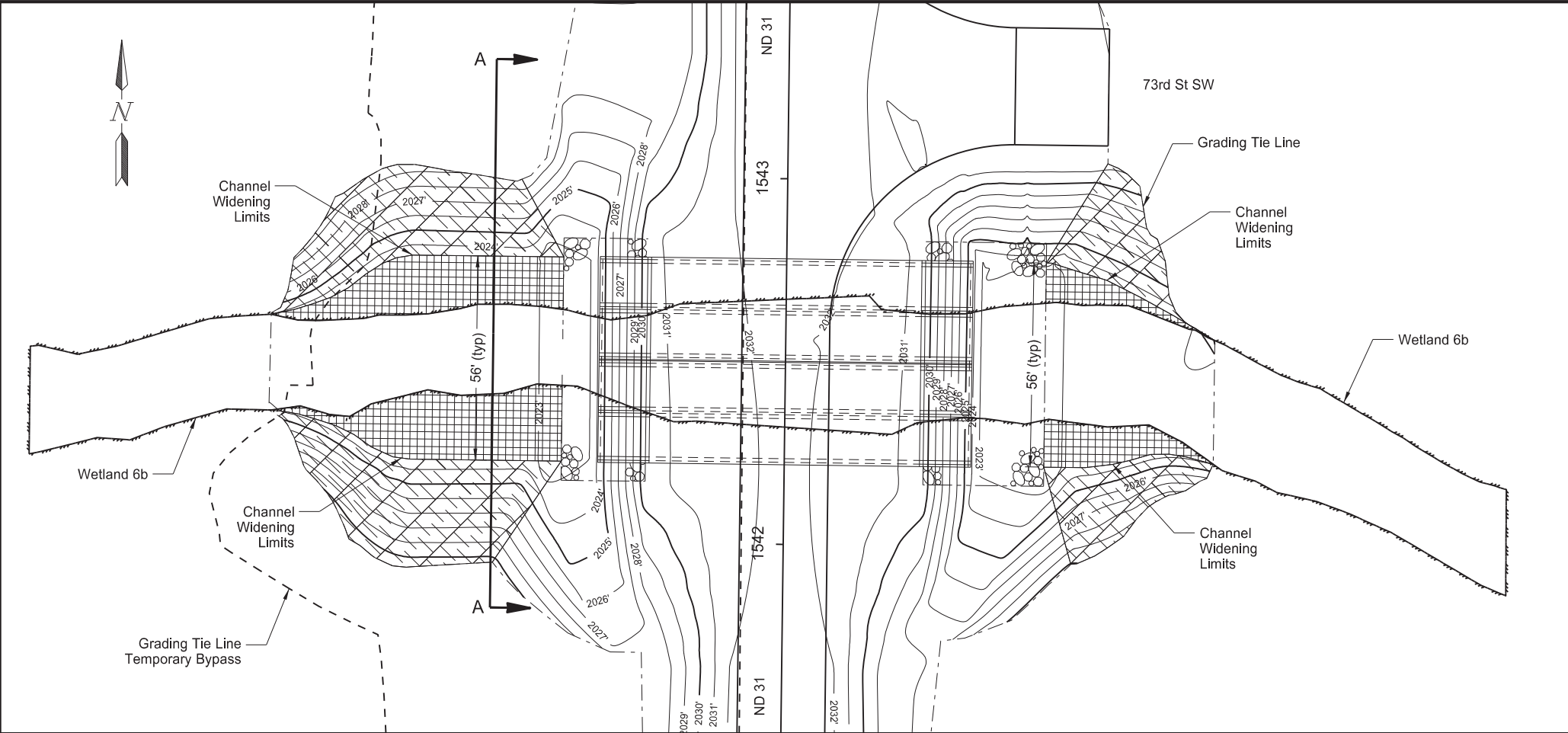
Various Structures - Statewide

General Details

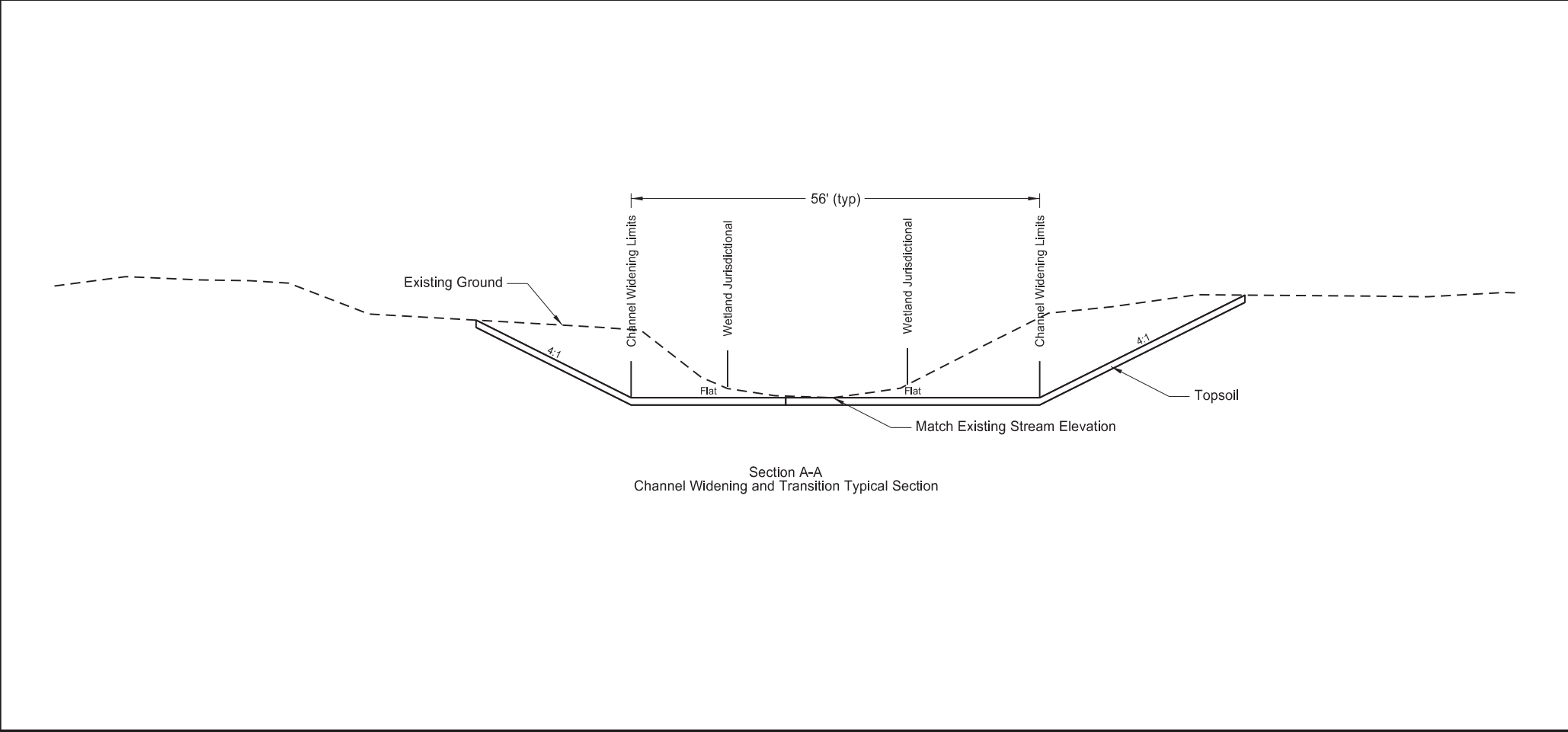
Topsoil Berm Weir Detail



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	20	5

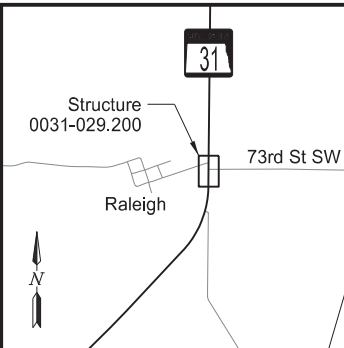


Notes:
Widen existing stream channel to a typical width of 56' tapering down to existing channel. The Engineer with stake the channel widening limits boundary. Excavations have been included in the Earthwork Tables in Section 11. Include all costs in the unit price bid for "COMMON EXCAVATION-TYPE A".



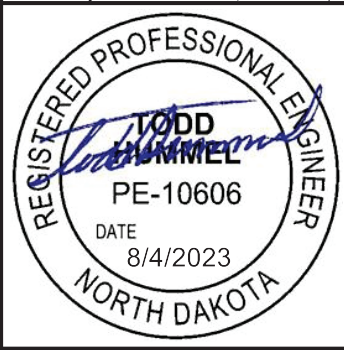
LEGEND

	Channel Widening Bottom		Contour (1' Intervals)
	Channel Inslope Transition		Proposed Riprap

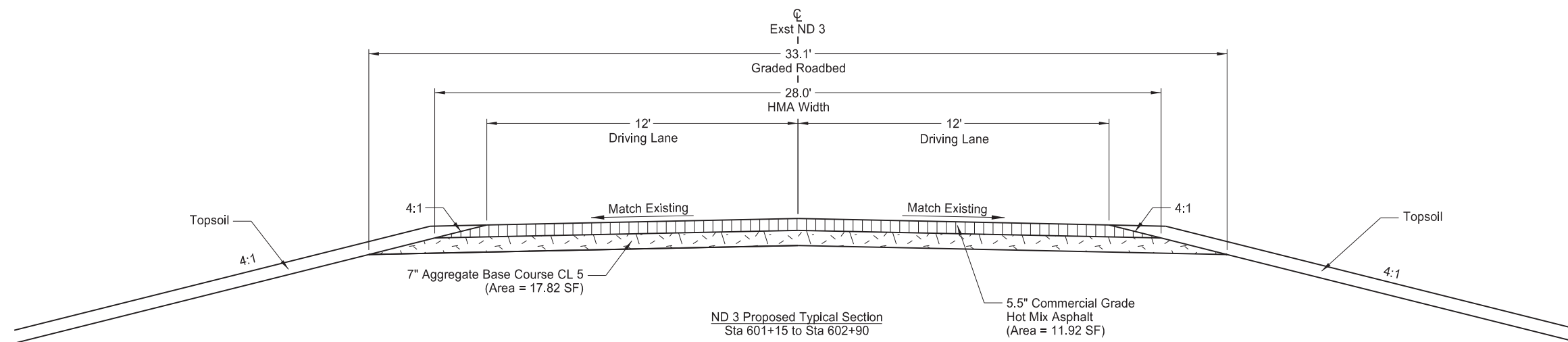
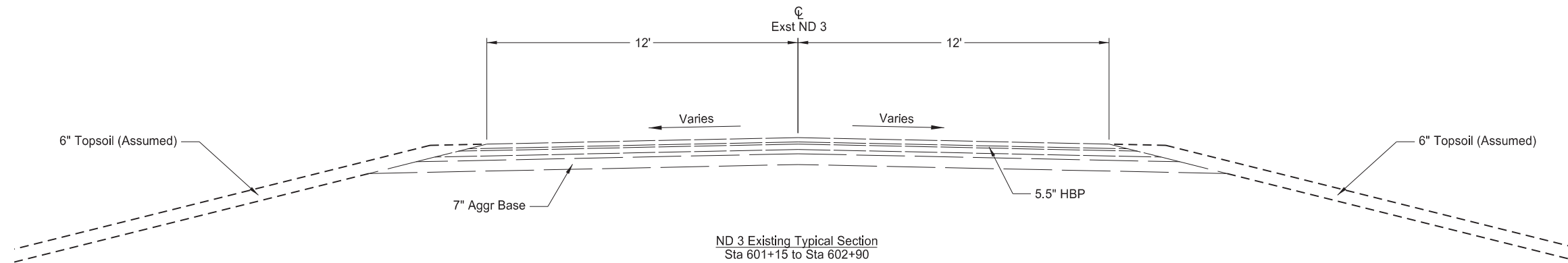


Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

General Details
Channel Typical Grading

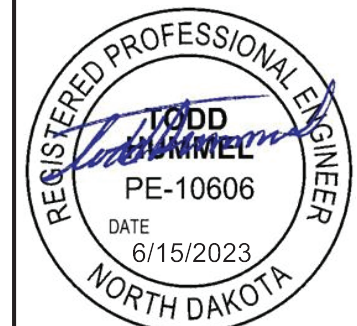


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	30	1

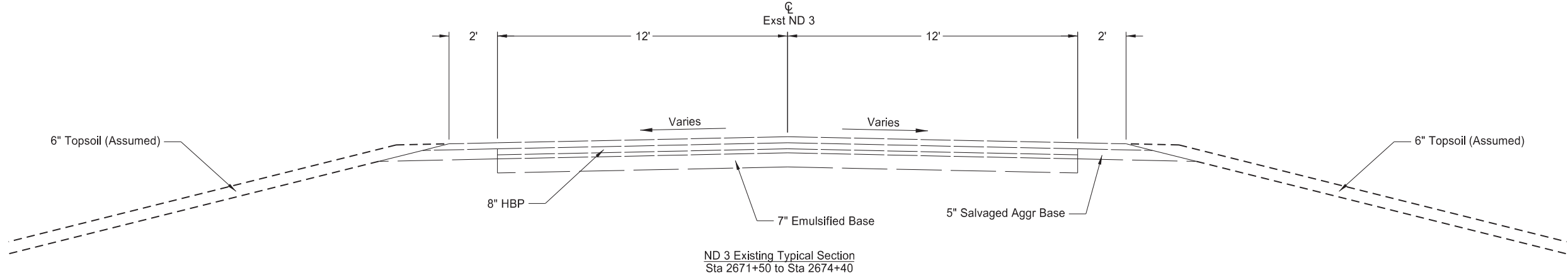
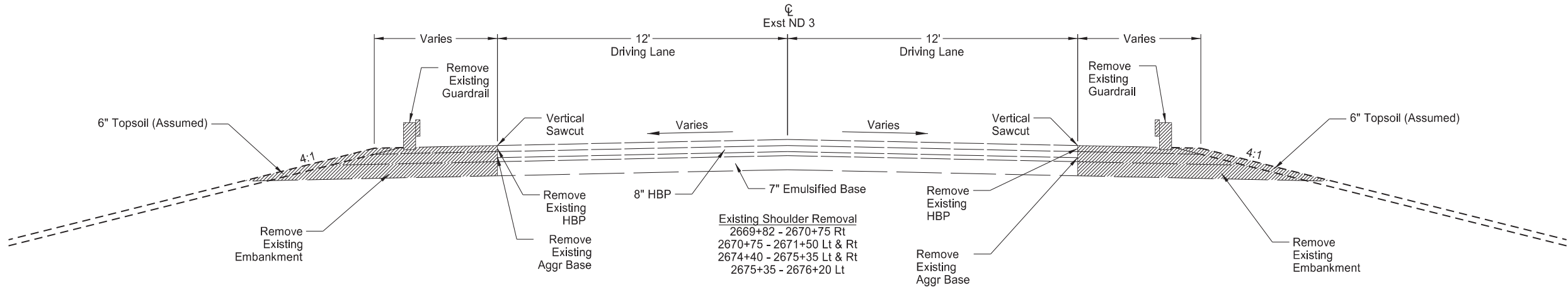


Various Structures - Statewide
Structure 0003-011.402
ND 3 - McIntosh County

Typical Sections



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	30	2

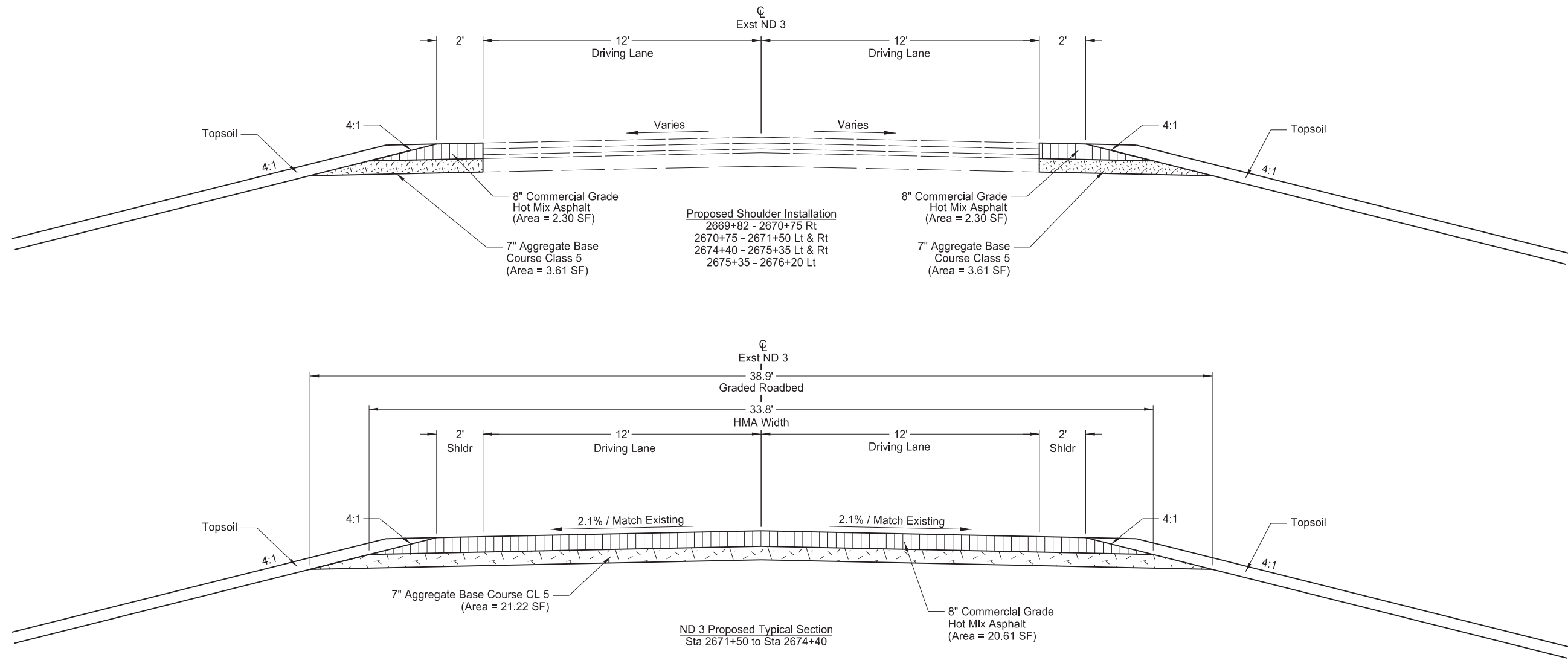


Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Typical Sections

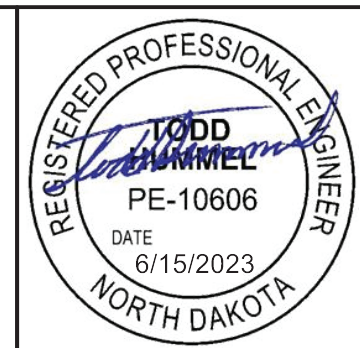


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	30	3

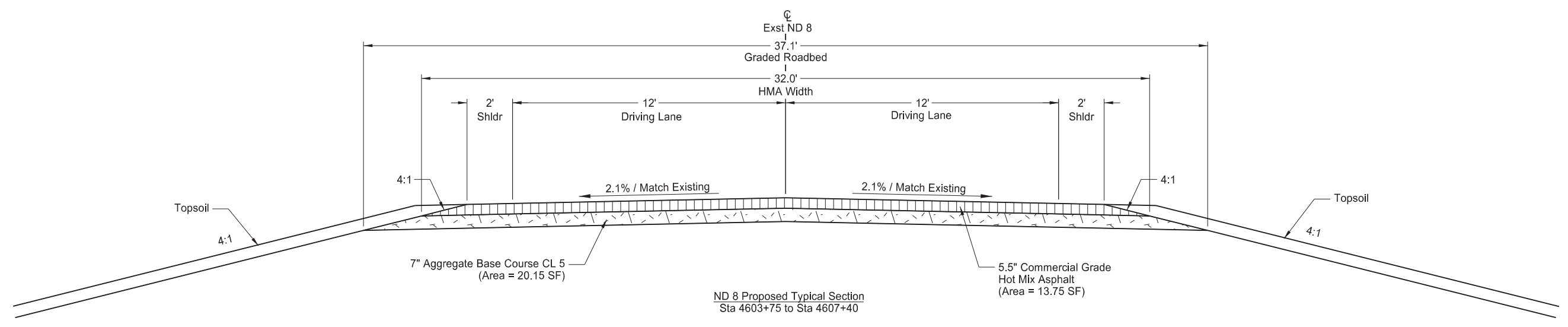
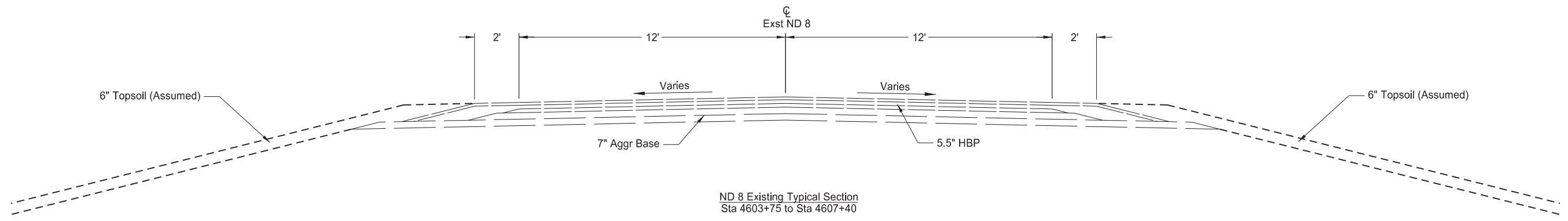


Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Typical Sections

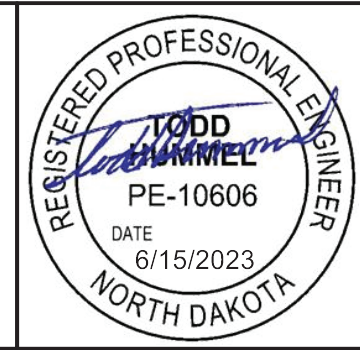


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	30	4

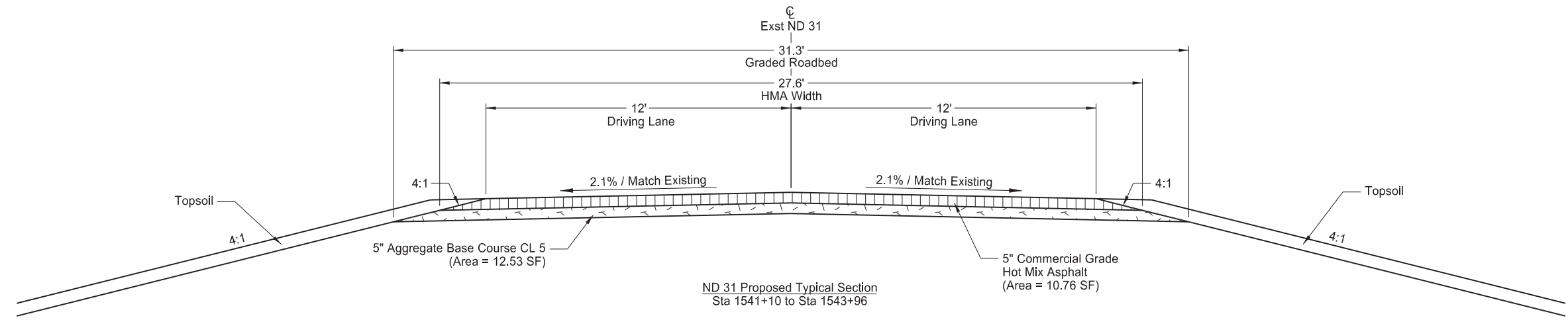
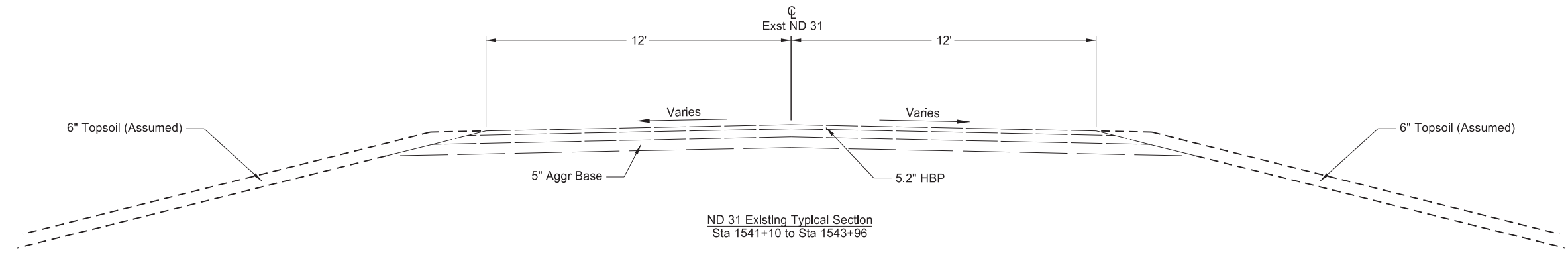


Various Structures - Statewide
Structure 0008-087.236
ND 8 - Stark County

Typical Sections

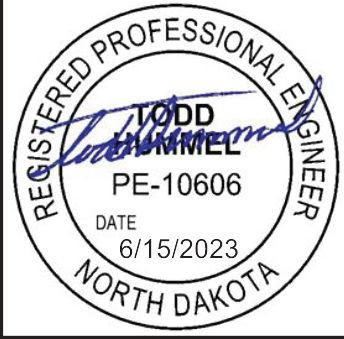


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	30	5

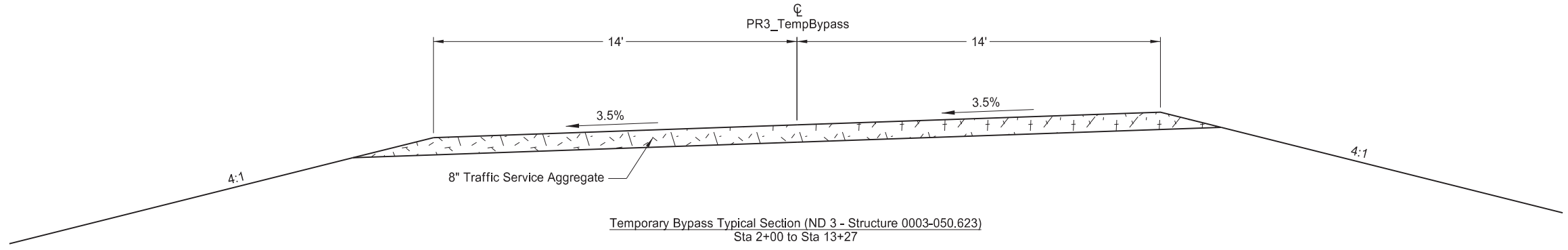
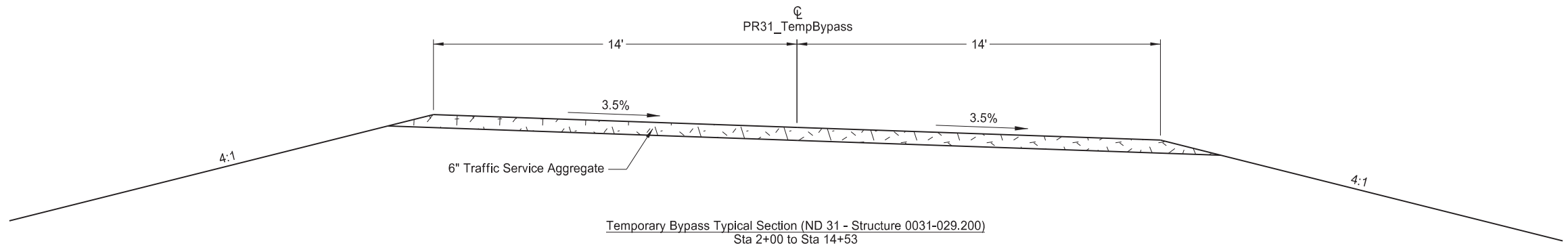


Various Structures - Statewide
 Structure 0031-029.200
 ND 31 - Grant County

Typical Sections

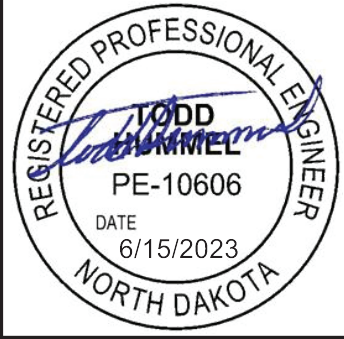


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	30	6



Various Structures - Statewide
Structure 0031-029.200 (ND 31)
Structure 0003-050.623 (ND 3)

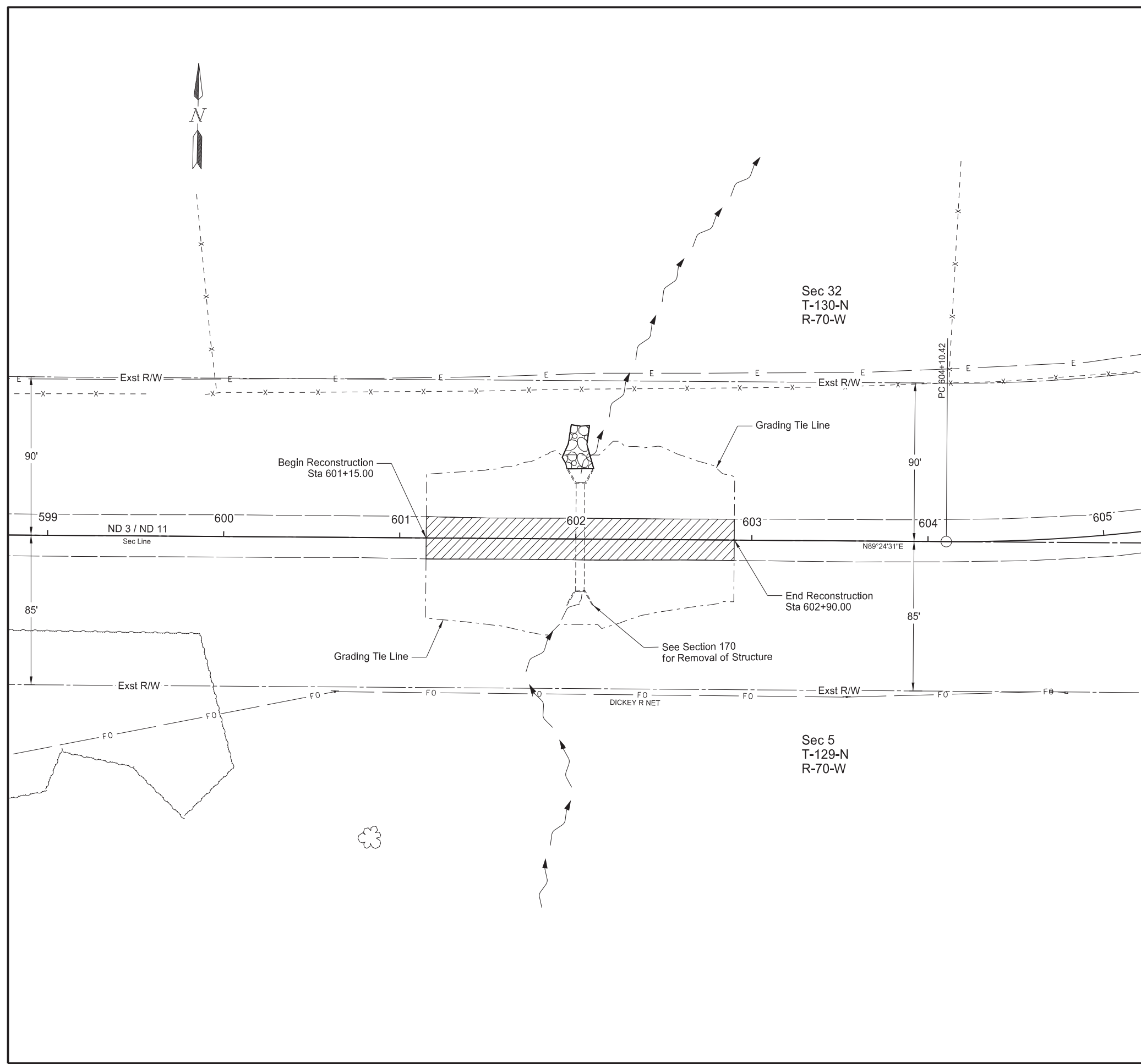
Typical Sections
Temporary Bypasses



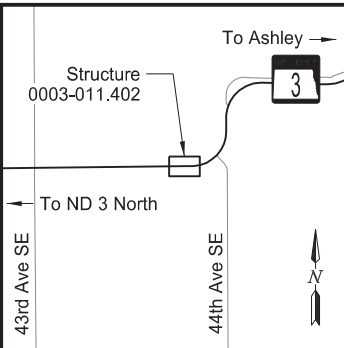
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	40	1

SPEC	CODE	BID ITEM	QTY	UNIT
202	0132	REMOVAL OF BITUMINOUS SURFACING Sta 601+15.00 to 602+90.00	457	SY
202	0400	REMOVAL OF RIPRAP - LOOSE ROCK Riprap	23	CY

Note: Quantities for Pavement Removals are Based on the Existing Typical Section for ND 3 (See Section 30) and as Noted Below:
 - Hot Mix Asphalt: 5.5 Inches
 - Aggregate Base Course: 5 Inches (Bottom 2 Inches Disregarded)
 - Riprap: 2 Feet



LEGEND	
	Removal of Bituminous Surfacing (HMA & Base)
	Removal of Bituminous Surfacing (Aggregate Surfacing)
	REMOVE - Removal of W-Beam Guardrail & Posts / Remove End Treatment & Transition
	Removal of Riprap

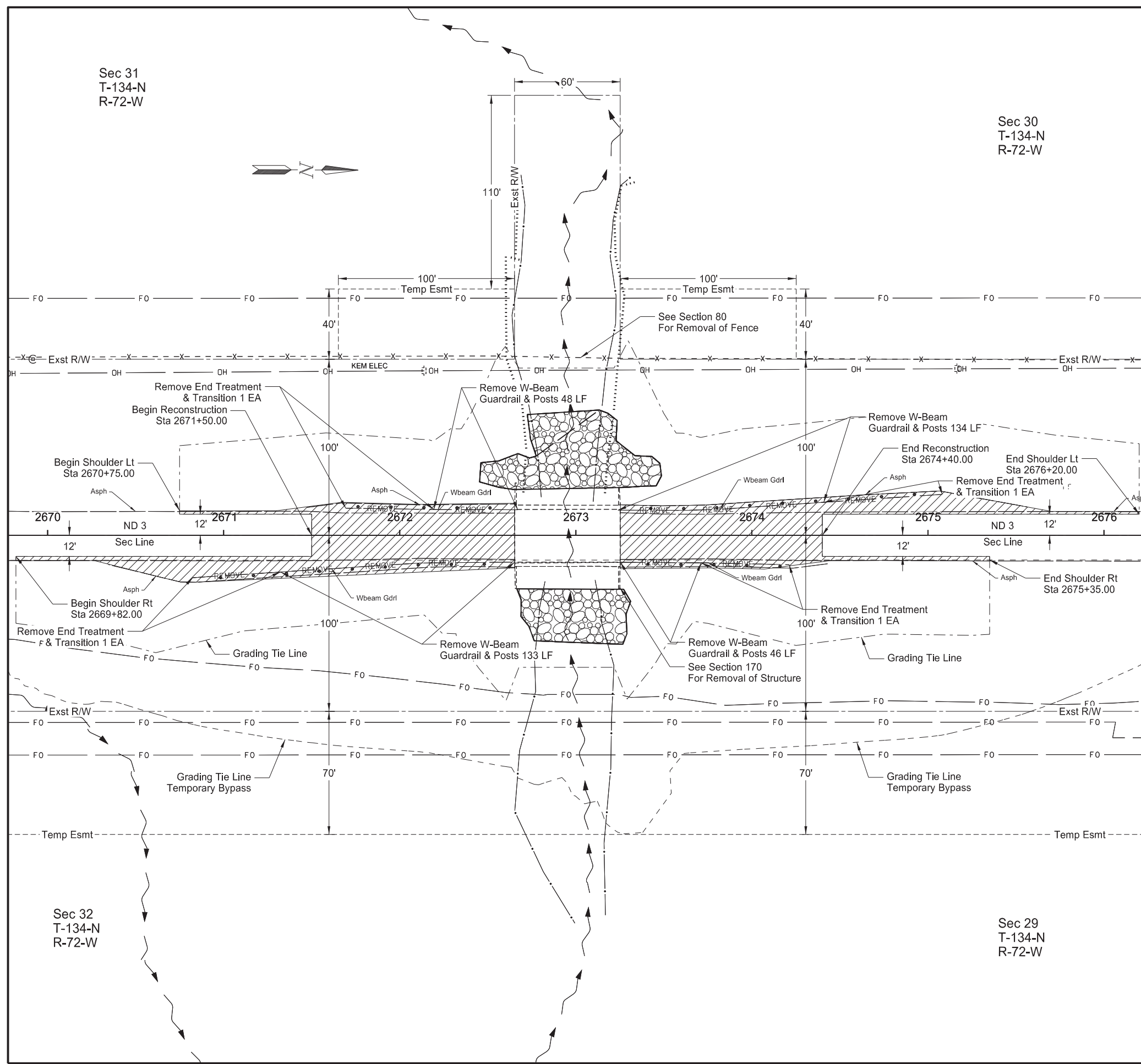


Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

Removals



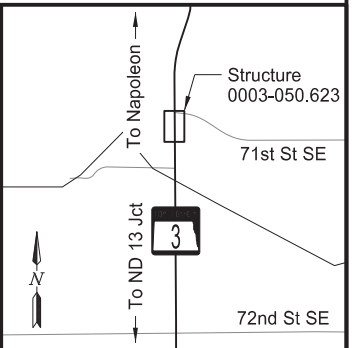
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	40	2



SPEC	CODE	BID ITEM	QTY	UNIT
202	0132	REMOVAL OF BITUMINOUS SURFACING		
		Sta 2669+82.00 to 2672+65.24	687	SY
		Sta 2673+25.23 to 2676+20.00	638	SY
202	0400	REMOVAL OF RIPRAP - LOOSE ROCK		
		Riprap	356	CY
764	0151	REMOVE W-BEAM GUARDRAIL & POSTS		
		Sta 2671+32.34 Rt to 2672+65.18 Rt	133	LF
		Sta 2672+19.36 Lt to 2672+67.04 Lt	48	LF
		Sta 2673+25.26 Rt to 2673+71.15 Rt	46	LF
		Sta 2673+23.99 Lt to 2674+40.85 Lt	134	LF
764	2081	REMOVE END TREATMENT & TRANSITION		
		Sta 2670+82.45 Rt to 2671+32.34 Rt	1	EA
		Sta 2671+69.37 Lt to 2672+19.36 Lt	1	EA
		Sta 2673+71.15 Rt to 2674+21.14 Rt	1	EA
		Sta 2674+40.85 Lt to 2674+85.75 Lt	1	EA

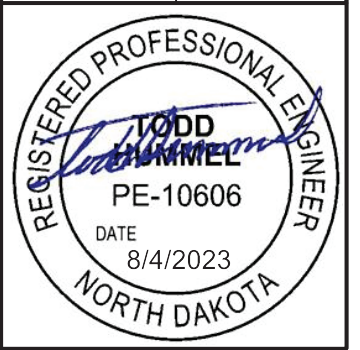
Note: Quantities for Pavement Removals are Based on the Existing Typical Section for ND 3 (See Section 30) and as Noted Below:
 - Hot Mix Asphalt: 8 Inches
 - Aggregate Base Course (Mainline): 5 Inches (Bottom 2 Inches Disregarded)
 - Aggregate Base Course (Shoulders): 3 Inches (Bottom 2 Inches Disregarded)
 - Riprap: 2 Feet

LEGEND	
	Removal of Bituminous Surfacing (HMA & Base)
	Removal of Bituminous Surfacing (Aggregate Surfacing)
	REMOVE - Removal of W-Beam Guardrail & Posts / Remove End Treatment & Transition
	Removal of Riprap



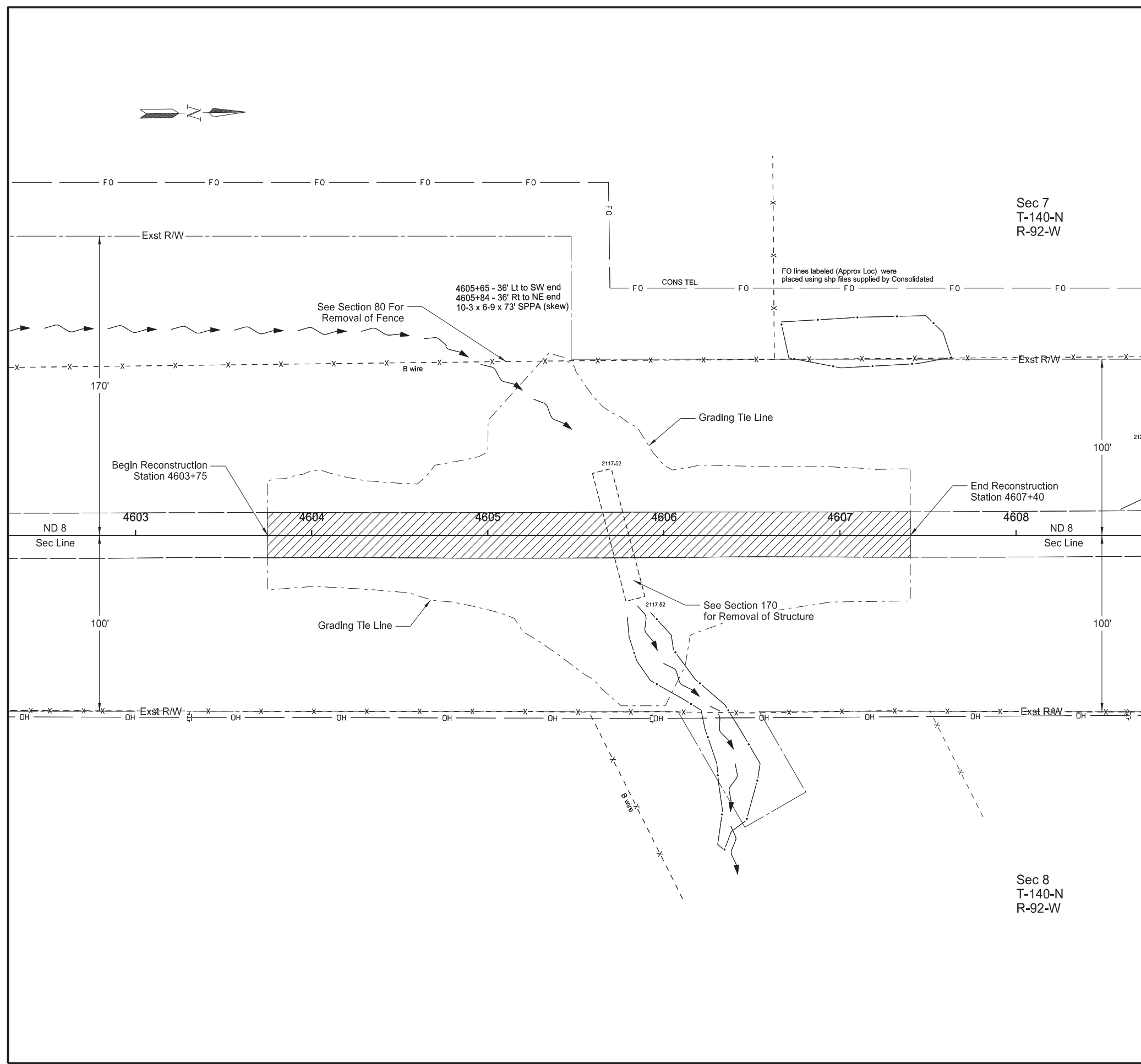
Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Removals



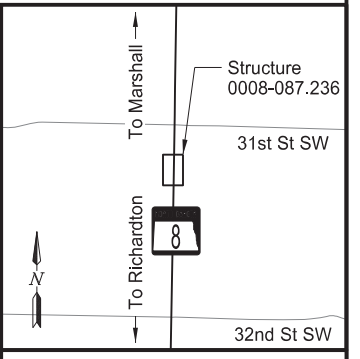
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	40	3

SPEC	CODE	BID ITEM	QTY	UNIT
202	0132	REMOVAL OF BITUMINOUS SURFACING Sta 4603+75 to 4607+40	1,044	SY



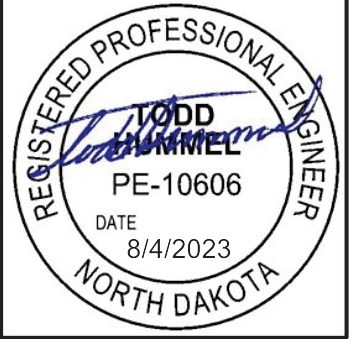
Note: Quantities for Pavement Removals are Based on the Existing Typical Section for ND 8 (See Section 30) and as Noted Below:
 - Hot Mix Asphalt: 5.5 Inches
 - Aggregate Base Course: 5 Inches
 (Bottom 2 Inches Disregarded)

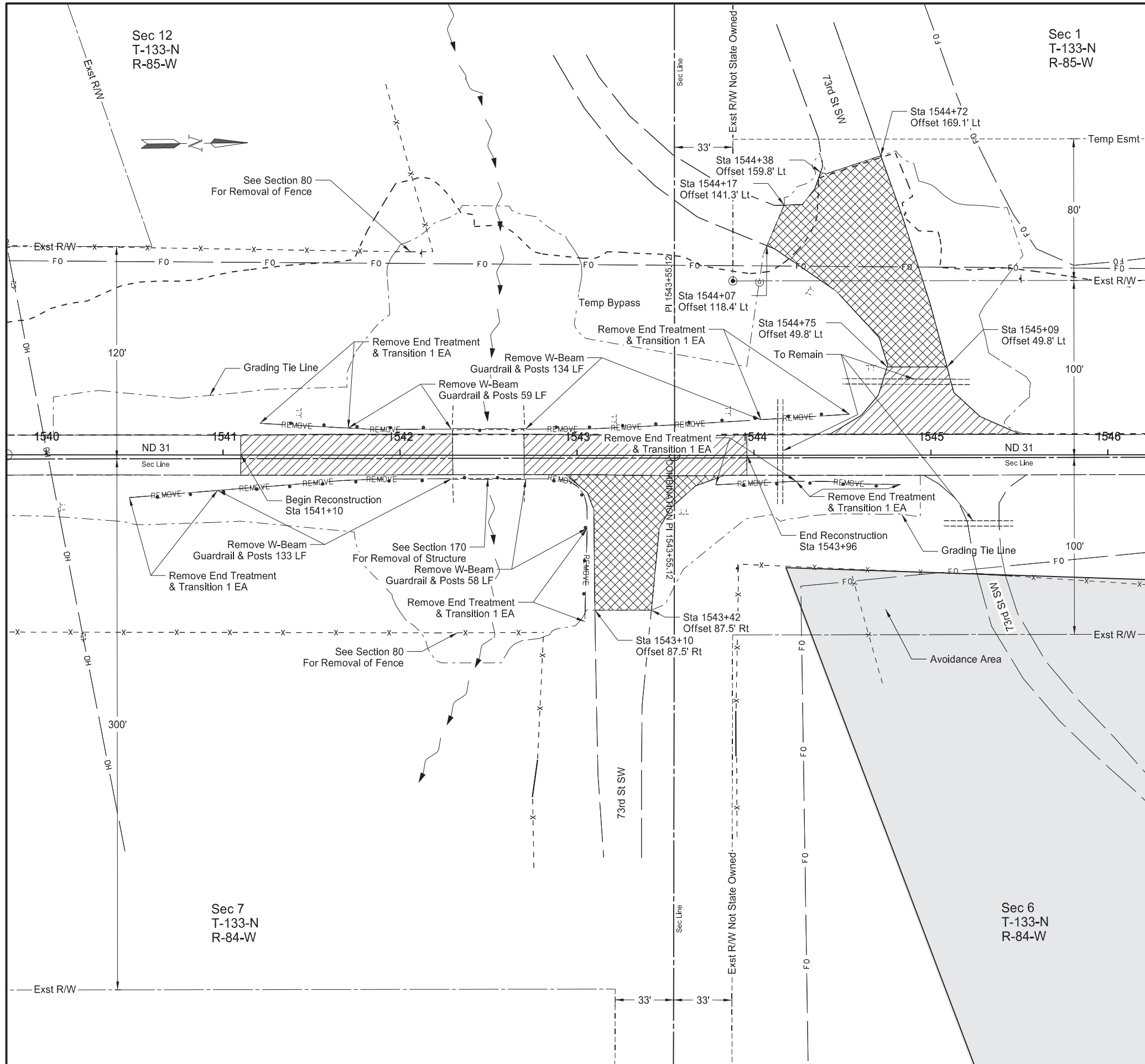
LEGEND	
	Removal of Bituminous Surfacing (HMA & Base)
	Removal of Bituminous Surfacing (Aggregate Surfacing)
	REMOVE
	Removal of W-Beam Guardrail & Posts / Remove End Treatment & Transition
	Removal of Riprap



Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Removals





STATE		PROJECT NO.		SECTION NO.	SHEET NO.
ND		SS-9-999(478)		40	4

SPEC CODE	BID ITEM	QTY	UNIT
202 0132	REMOVAL OF BITUMINOUS SURFACING		
	Sta 1541+10.00 to 1542+29.77 (Mainline)	306	SY
	Sta 1542+70.08 to 1543+96.00 (Mainline)	317	SY
	Sta 1452+93.60 Rt to 1453+83.24 Rt (Aggr Approach)	355	SY
	Sta 1544+07.48 Lt to 1545+09.17 Lt (Aggr Approach)	668	SY
	Sta 1544+42.80 Lt to 1545+50.48 Lt (HMA Approach)	242	SY
764 0151	REMOVE W-BEAM GUARDRAIL & POSTS		
	Sta 1540+96.93 Rt to 1542+29.16 Rt	133	LF
	Sta 1541+70.70 Lt to 1542+28.93 Lt	59	LF
	Sta 1542+71.15 Rt to 1543+05.72 Rt	58	LF
	Sta 1542+70.96 Lt to 1544+04.01 Lt	134	LF
764 2081	REMOVE END TREATMENT & TRANSITION		
	Sta 1540+47.10 Rt to 1540+96.93 Rt	1	EA
	Sta 1541+20.77 Lt to 1541+70.70 Lt	1	EA
	Sta 1543+04.52 Rt to 1543+05.72 Rt	1	EA
	Sta 1543+78.40 Rt to 1544+23.80 Rt	1	EA
	Sta 1544+32.77 Rt to 1544+82.71 Rt	1	EA
	Sta 1544+04.01 Lt to 1544+53.91 Lt	1	EA

Note: Quantities for Pavement Removals are Based on the Existing Typical Section for ND 31 (See Section 30) and as Noted Below:
 - Hot Mix Asphalt: 5.2 Inches
 - Aggregate Base Course: 3 Inches (Bottom 2 Inches Disregarded)
 - Aggregate Surface Course: 4 Inches (Bottom 2 Inches Disregarded)

LEGEND			
	Removal of Bituminous Surfacing (HMA & Base)		Removal of W-Beam Guardrail & Posts / Remove End Treatment & Transition
	Removal of Bituminous Surfacing (Aggregate Surfacing)		Removal of Riprap

Structure 0031-029.200
 73rd St SW
 Raleigh

Various Structures - Statewide
 Structure 0031-029.200
 ND 31 - Grant County

Removals

REGISTERED PROFESSIONAL ENGINEER
 TODD HUMMEL
 PE-10606
 DATE 8/4/2023
 NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	50	1

HYDRAULIC DATA FOR SS-9-999(478) (A)									
STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	25-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	DISCHARGE (CFS)	STAGE (NAVD 88)
601+95	5' X 4' X 62' RCB	48" (B)	602	63.0	2.25	6.57	2020.95	101.0	2021.90
602+09		48" (B)							

(A) Hydraulic data provided is for smooth-walled type conduits
(B) Culvert has been sunk based on 2021 Nationwide Permit Regional Conditions

Various Structures - Statewide
Structure 0003-011.402
ND 3 - McIntosh County

Hydraulic Data



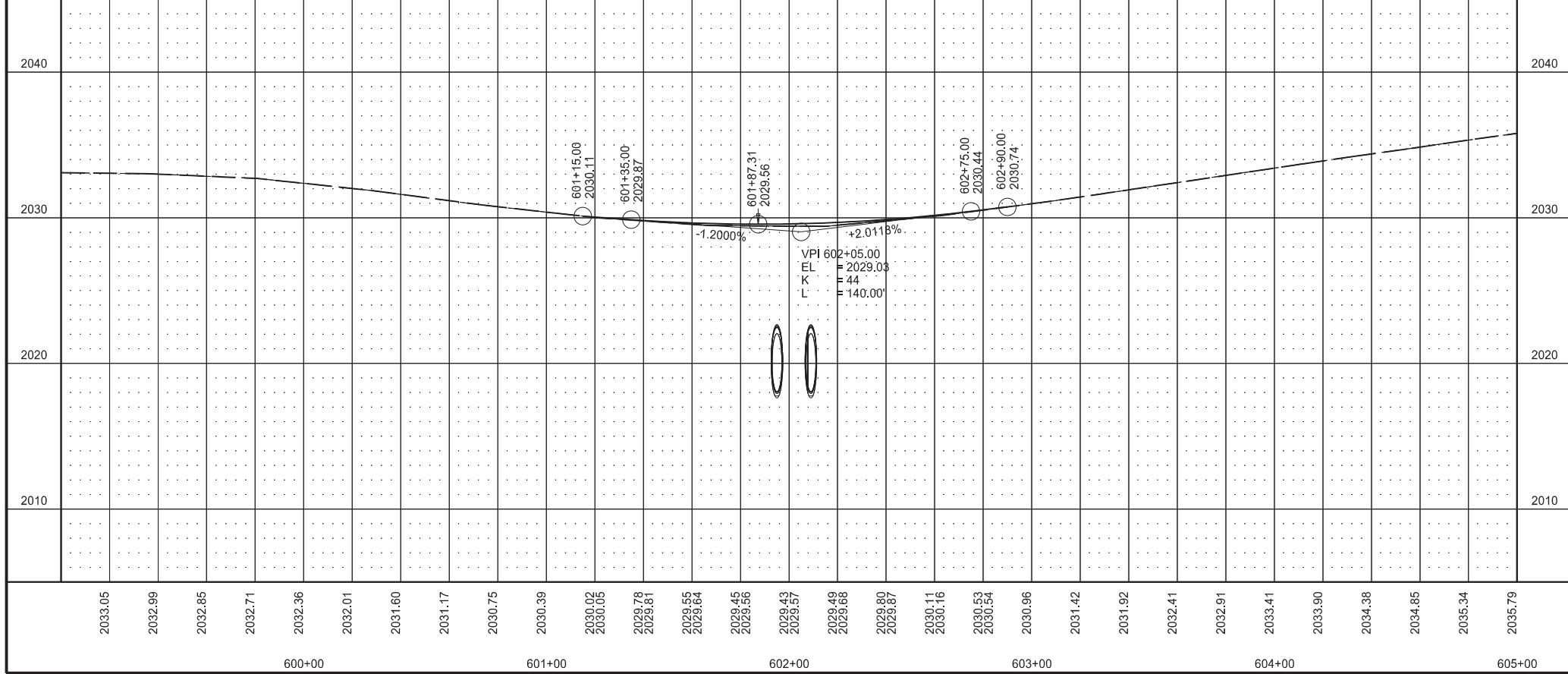
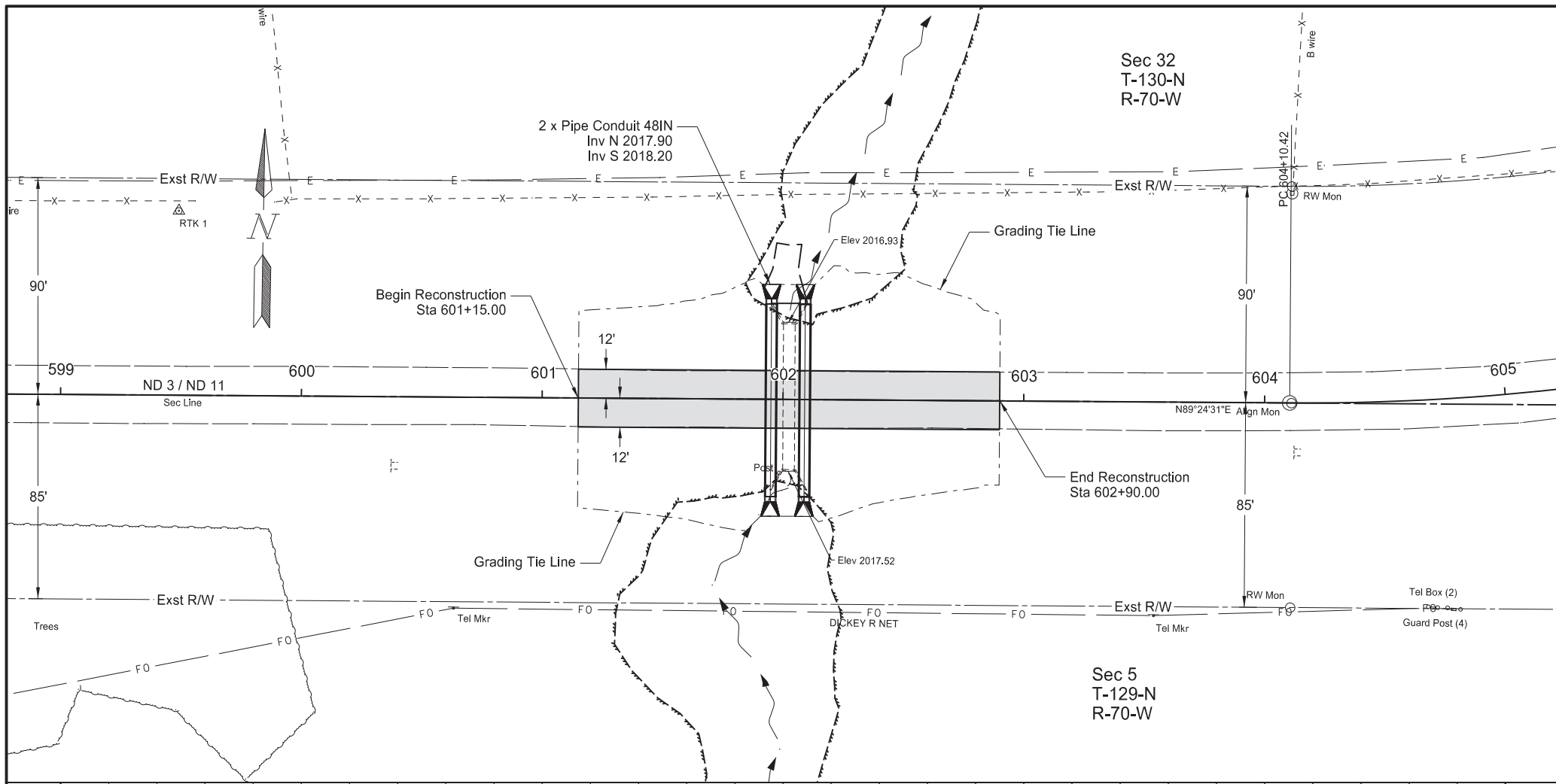
BEGIN STATION	BEGIN OFFSET	END STATION	END OFFSET	PIPE INSTALLATION PAY ITEM			ALLOWABLE MATERIAL	REQUIRED DIAMETER	STEEL PIPE COATINGS	STEEL PIPE CORRUGATIONS OF SPIRAL RIBS	MINIMUM THICKNESS	GEOSYNTHETIC MATERIAL TYPE G	END SECTIONS		APPLICABLE BACKFILL DETAIL
				(IN)	(BID ITEM)	(LF)							BEGIN (EA)	END (EA)	
Structure 0003-011.402 Proposed Pipes (Chain = SCL11)															
601+95.0	41.6' Lt	601+95.0	42.4' Rt	48	Pipe Conduit	84	Reinforced Concrete Pipe - Class III (Barrel Length = 80 LF)	48				184	FES	FES	Standard D-714-25M
							Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.168				
							Corrugated Steel Pipe	54	A, P	2, 3, 5	0.138				
							Corrugated Steel Pipe	54	P	2, 3, 5	0.064				
							Spiral Rib Steel Pipe	54	P	3/4, 1	0.064				
602+09.0	41.6' Lt	602+09.0	42.4' Rt	48	Pipe Conduit	84	Reinforced Concrete Pipe - Class III (Barrel Length = 80 LF)	48				184	FES	FES	Standard D-714-25M
							Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.168				
							Corrugated Steel Pipe	54	A, P	2, 3, 5	0.138				
							Corrugated Steel Pipe	54	P	2, 3, 5	0.064				
							Spiral Rib Steel Pipe	54	P	3/4, 1	0.064				
Structure 0003-050.623 Temporary Bypass Pipes (Chain = PR3_TempBypass)															
7+77.2	34.1' Rt	7+78.3	30.9' Lt	60	Pipe Conduit-Approach	66	Corrugated Steel Pipe	60	Z, A, P	2, 3, 5	0.064, 0.109	-	-	-	Specification 714.04A
7+83.9	34.2' Rt	7+85.5	30.8' Lt	60	Pipe Conduit-Approach	66	Corrugated Steel Pipe	60	Z, A, P	2, 3, 5	0.064, 0.109	-	-	-	Specification 714.04A
7+90.6	34.4' Rt	7+92.8	30.5' Lt	60	Pipe Conduit-Approach	66	Corrugated Steel Pipe	60	Z, A, P	2, 3, 5	0.064, 0.109	-	-	-	Specification 714.04A
7+97.3	34.6' Rt	8+00.1	30.3' Lt	60	Pipe Conduit-Approach	66	Corrugated Steel Pipe	60	Z, A, P	2, 3, 5	0.064, 0.109	-	-	-	Specification 714.04A
Structure 0031-029.200 Temporary Bypass Pipes (Chain = PR31_TempBypass)															
6+93.3	28.8' Rt	6+96.9	33.1' Lt	54	Pipe Conduit-Approach	62	Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.064, 0.079	-	-	-	Specification 714.04A
7+00.1	29.1' Rt	7+03.1	32.8' Lt	54	Pipe Conduit-Approach	62	Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.064, 0.079	-	-	-	Specification 714.04A
7+06.8	29.4' Rt	7+09.4	32.6' Lt	54	Pipe Conduit-Approach	62	Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.064, 0.079	-	-	-	Specification 714.04A
7+13.6	29.6' Rt	7+15.6	32.4' Lt	54	Pipe Conduit-Approach	62	Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.064, 0.079	-	-	-	Specification 714.04A
7+20.4	29.8' Rt	7+21.8	32.2' Lt	54	Pipe Conduit-Approach	62	Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.064, 0.079	-	-	-	Specification 714.04A
7+27.1	29.9' Rt	7+28.0	32.1' Lt	54	Pipe Conduit-Approach	62	Corrugated Steel Pipe	54	Z, A, P	2, 3, 5	0.064, 0.079	-	-	-	Specification 714.04A
7+91.0	33.0' Rt	8+66.8	37.3' Rt	24	Pipe Conduit-Approach	76	Corrugated Steel Pipe	24	Z, A, P	2	0.064	-	-	-	Specification 714.04A
10+95.2	29.7' Rt	11+85.2	36.6' Lt	24	Pipe Conduit-Approach	112	Corrugated Steel Pipe	24	Z, A, P	2	0.064	-	-	-	Specification 714.04A

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

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

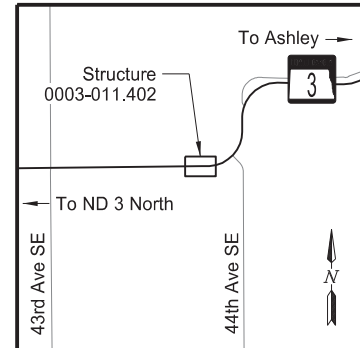
FES = Flared End Section

<p>Various Structures - Statewide</p> <p>Allowable Pipe List</p>	
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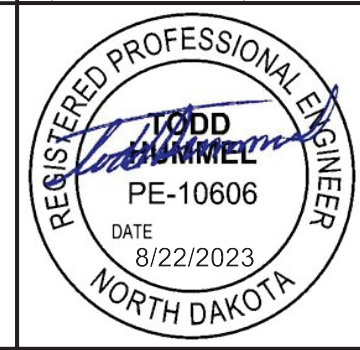
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	1

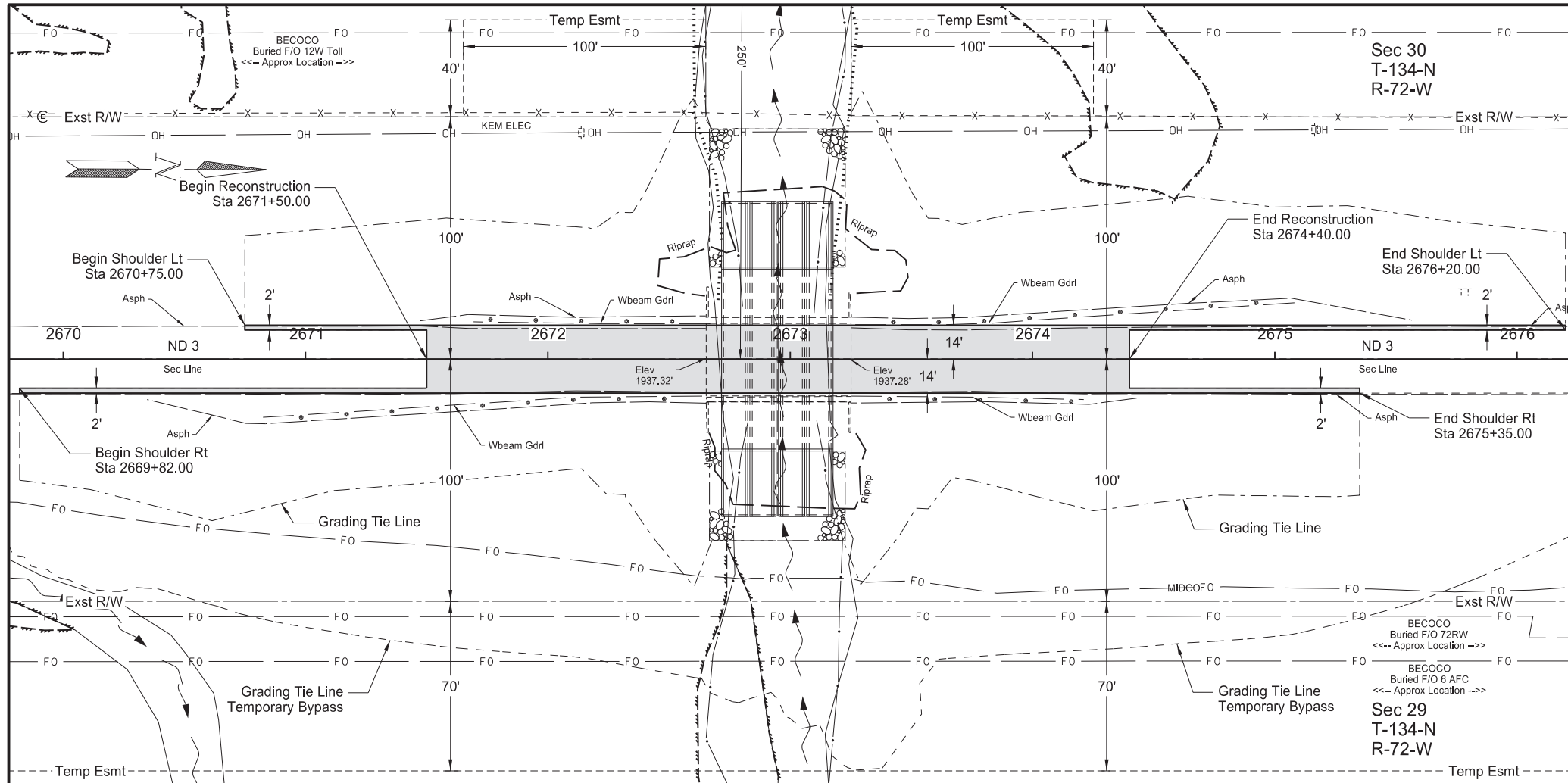
SPEC	CODE	BID ITEM	QTY	UNIT
714	4125	PIPE CONDUIT 48IN		
		Sta 601+95 ~ 41.6' Lt to Sta 601+95 ~ 42.4' Rt	84	LF
		Sta 602+09 ~ 41.6' Lt to Sta 602+09 ~ 42.4' Rt	84	LF



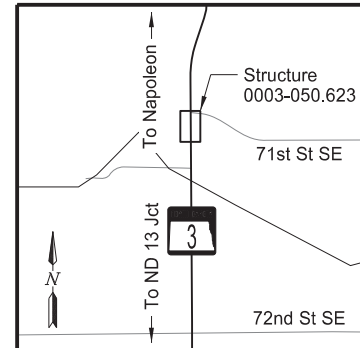
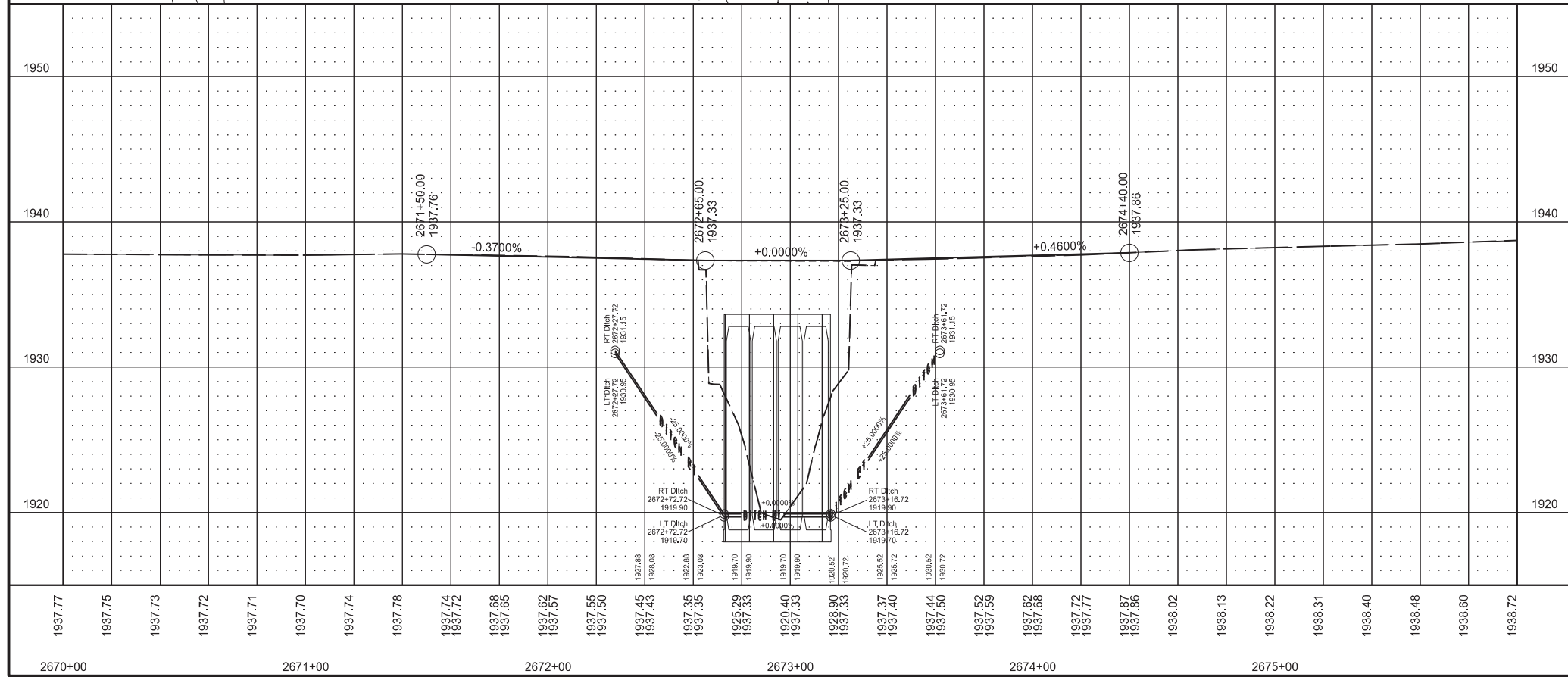
Various Structures - Statewide
Structure 0003-011.402
ND 3 - McIntosh County

Plan & Profile



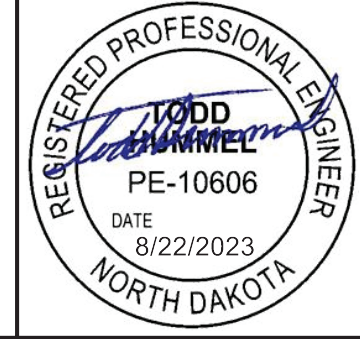


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	2

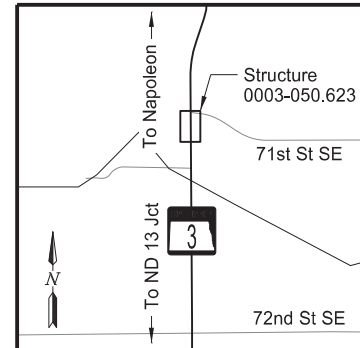
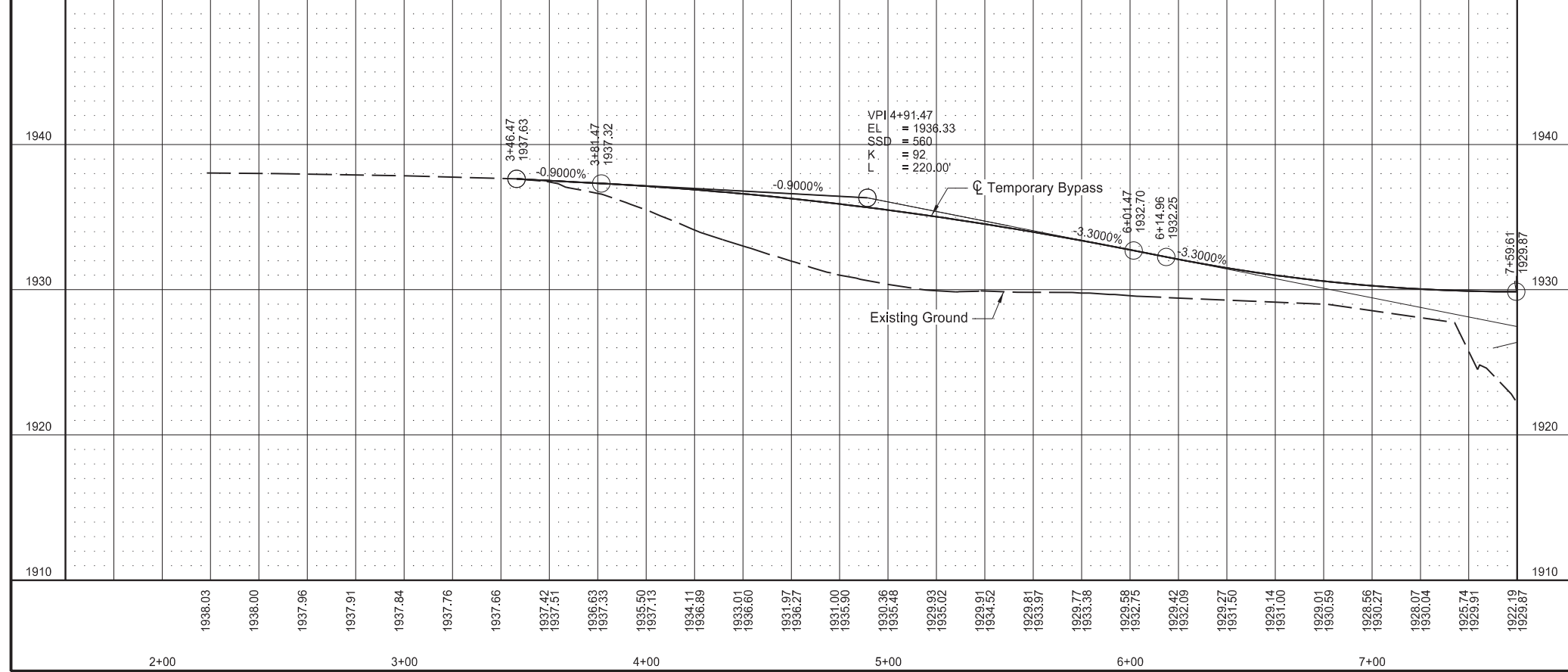
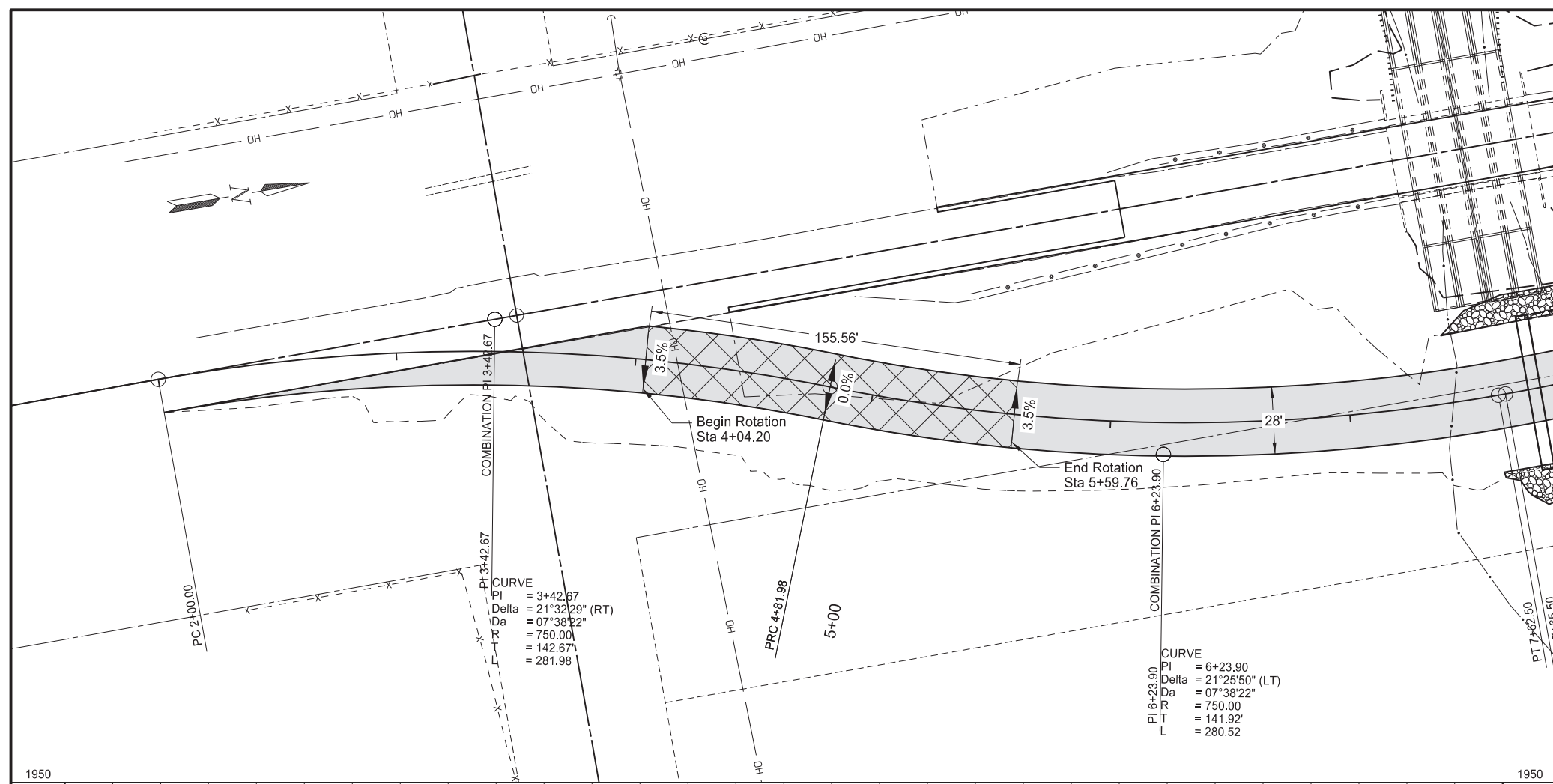


Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

Plan & Profile

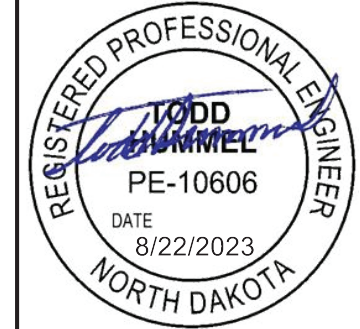


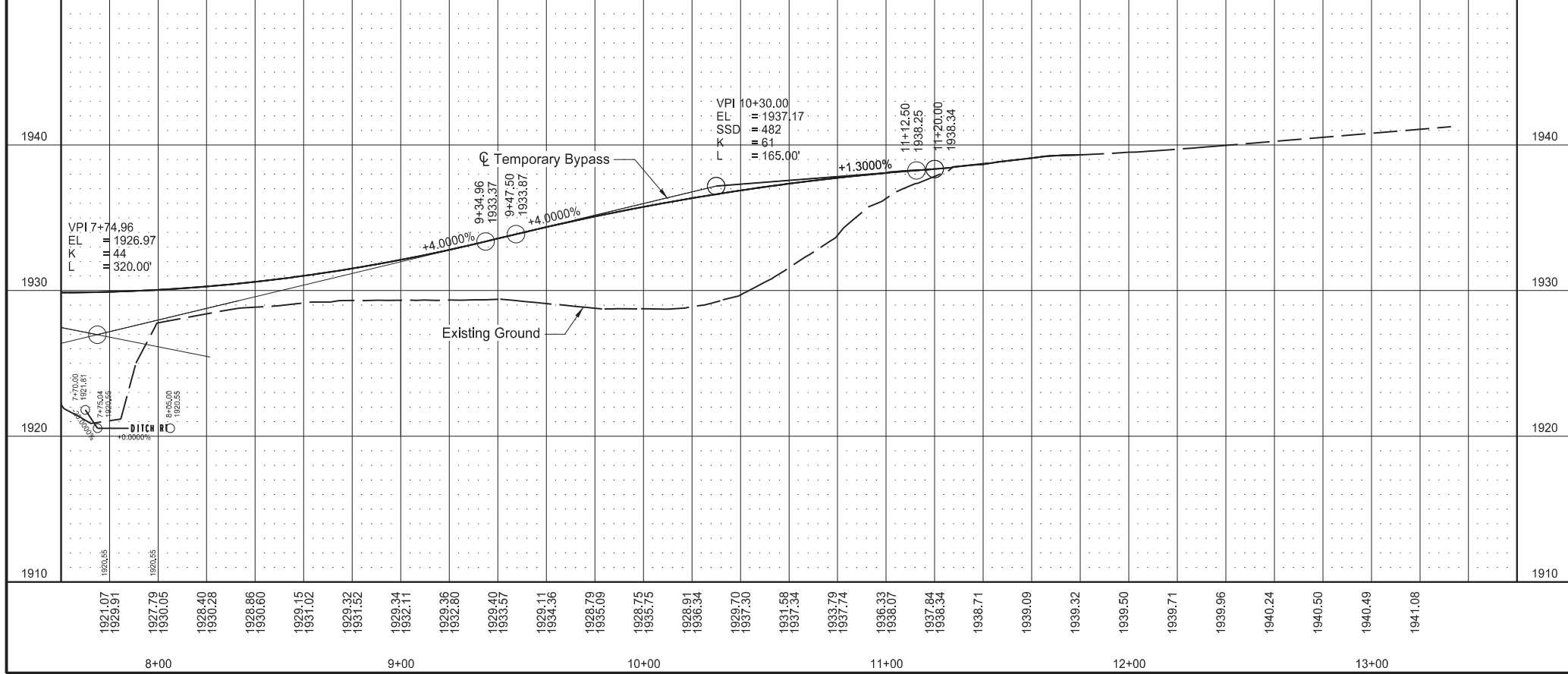
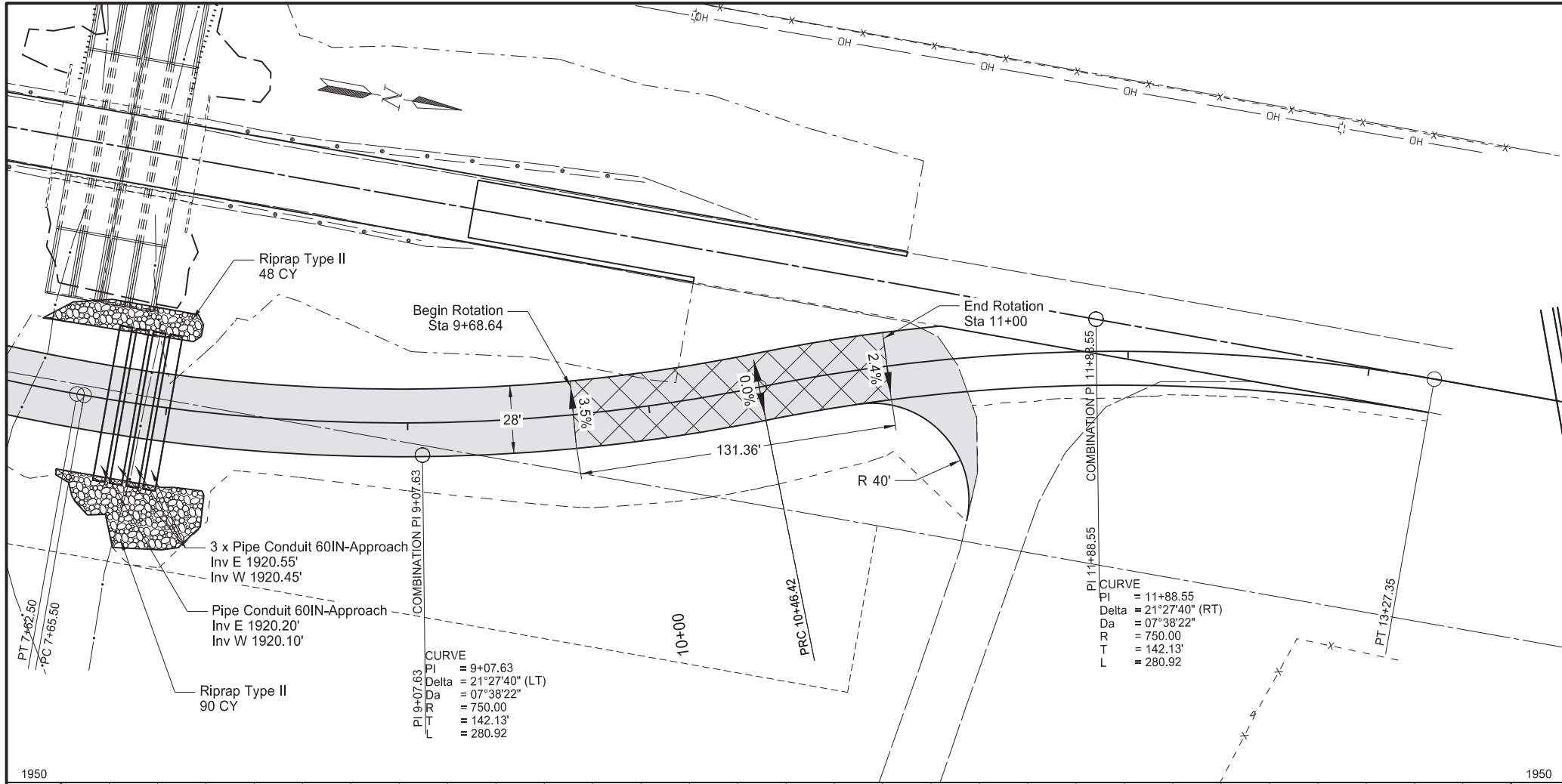
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	3



Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

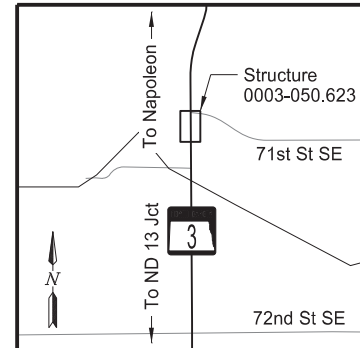
Plan & Profile
Temporary Bypass





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	4

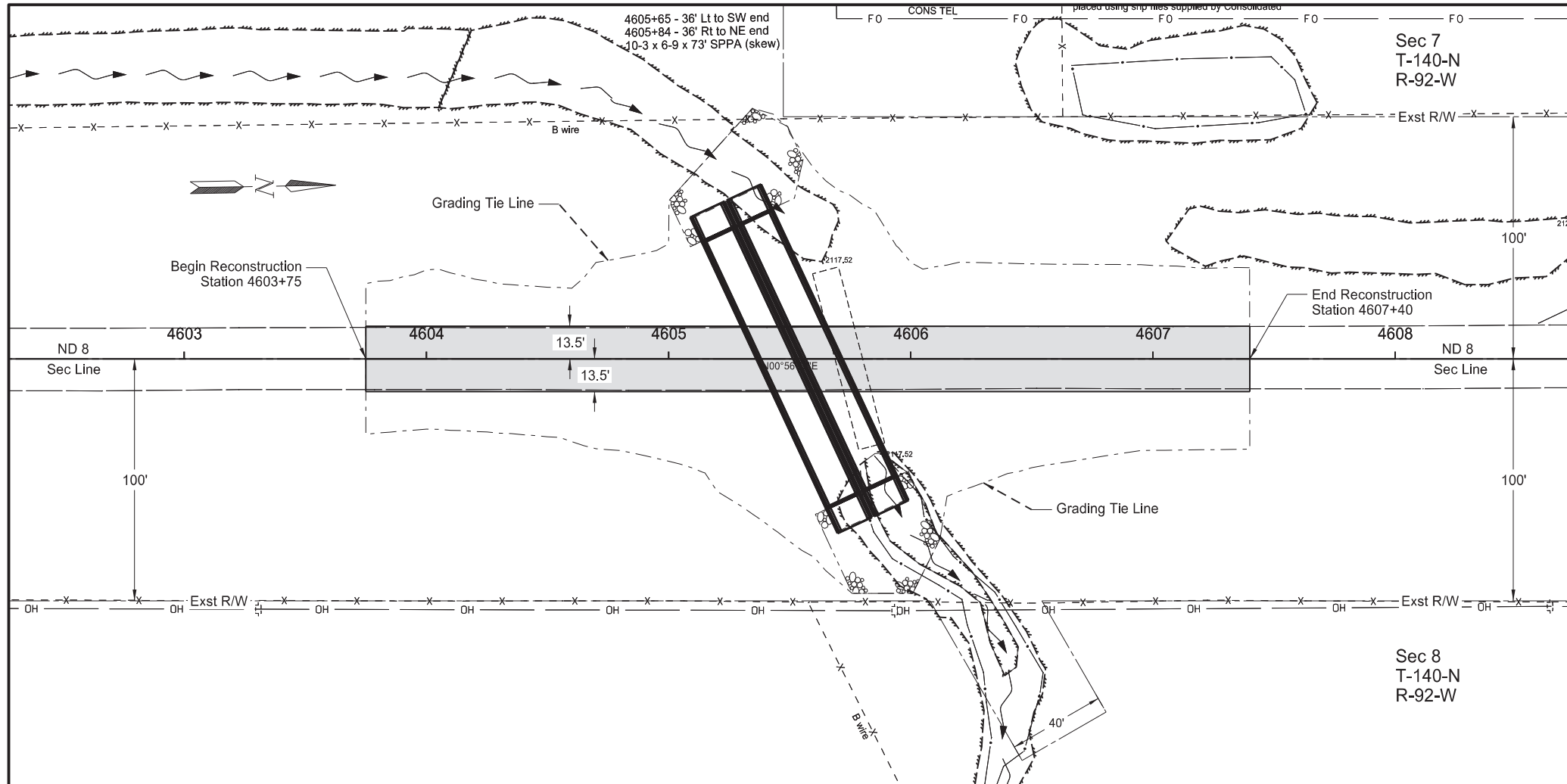
SPEC	CODE	BID ITEM	QTY	UNIT
256	0200	RIPRAP GRADE II		
		Temp Pipe Inlet	90	CY
		Temp Pipe Outlet	48	CY
714	4137	PIPE CONDUIT 60IN-APPROACH		
		Sta 7+77.2 ~ 34.1' Rt to Sta 7+78.3 ~ 30.9' Lt	66	LF
		Sta 7+83.9 ~ 34.2' Rt to Sta 7+85.5 ~ 30.8' Lt	66	LF
		Sta 7+90.6 ~ 34.4' Rt to Sta 7+92.8 ~ 30.5' Lt	66	LF
		Sta 7+97.3 ~ 34.6' Rt to Sta 8+00.1 ~ 30.3' Lt	66	LF



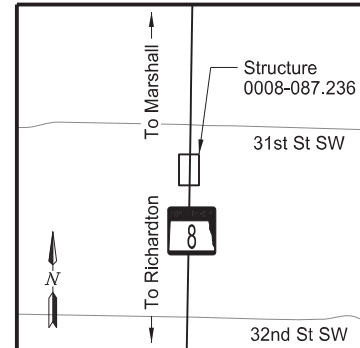
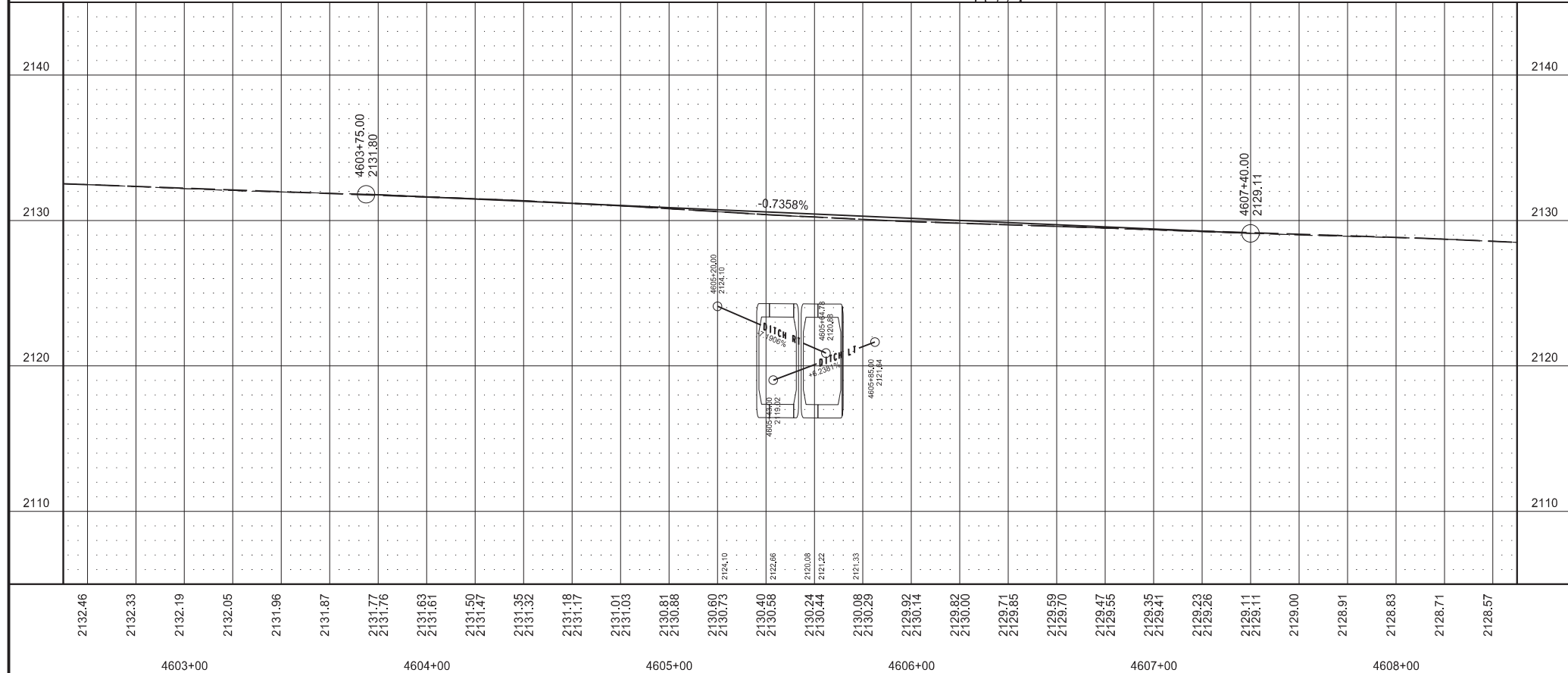
Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

Plan & Profile
Temporary Bypass



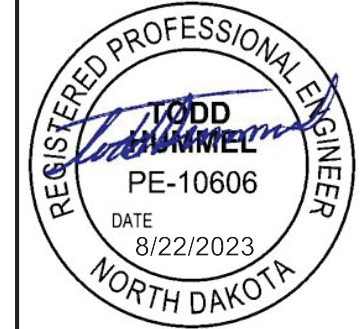


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	5

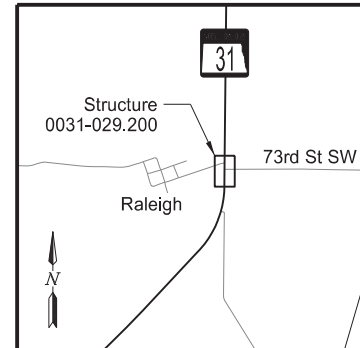
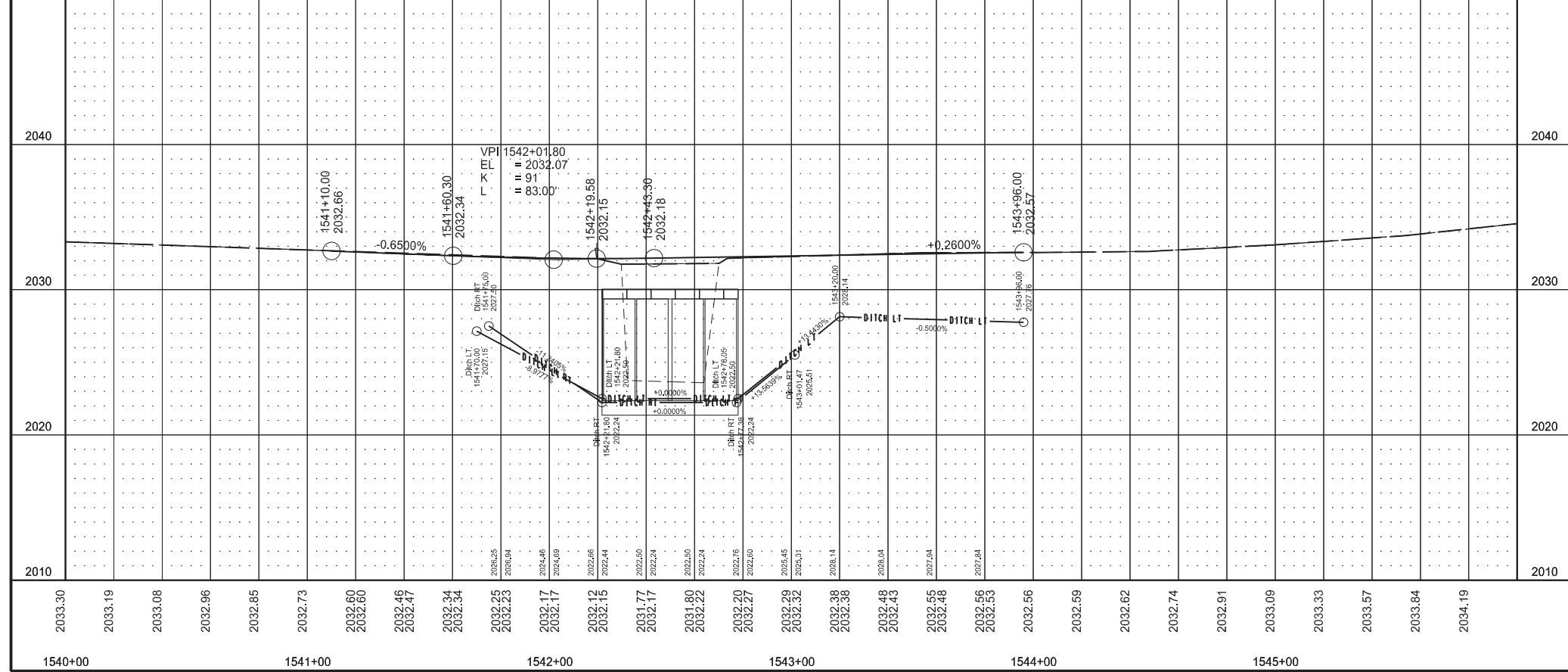
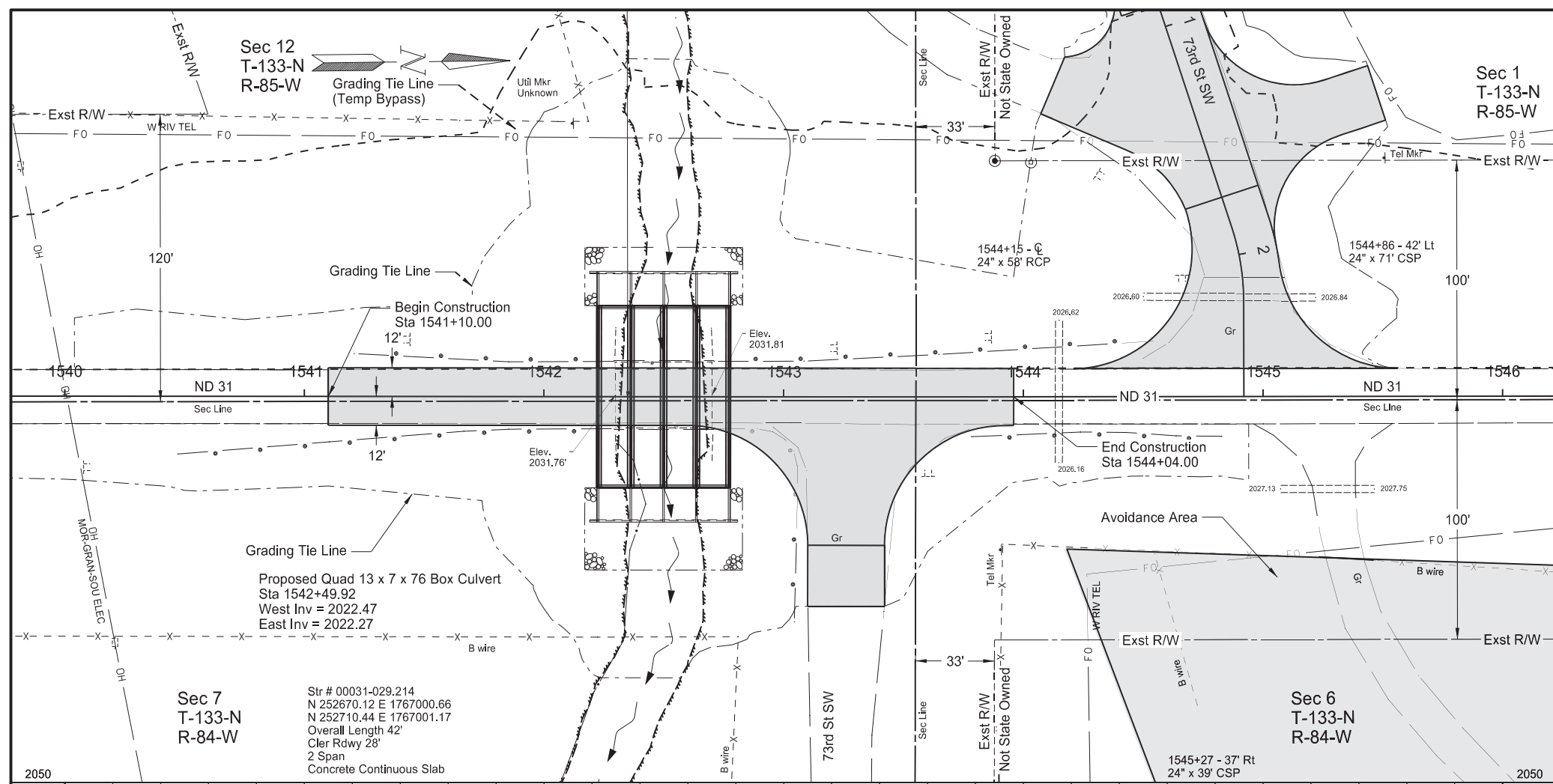


Various Structures - Statewide
Structure 0008-087.236
ND 8 - Stark County

Plan & Profile

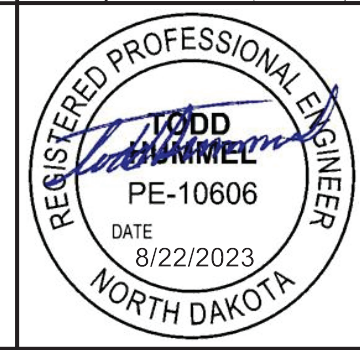


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	6

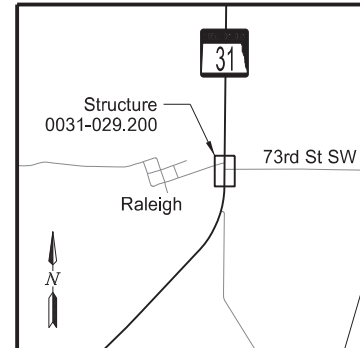
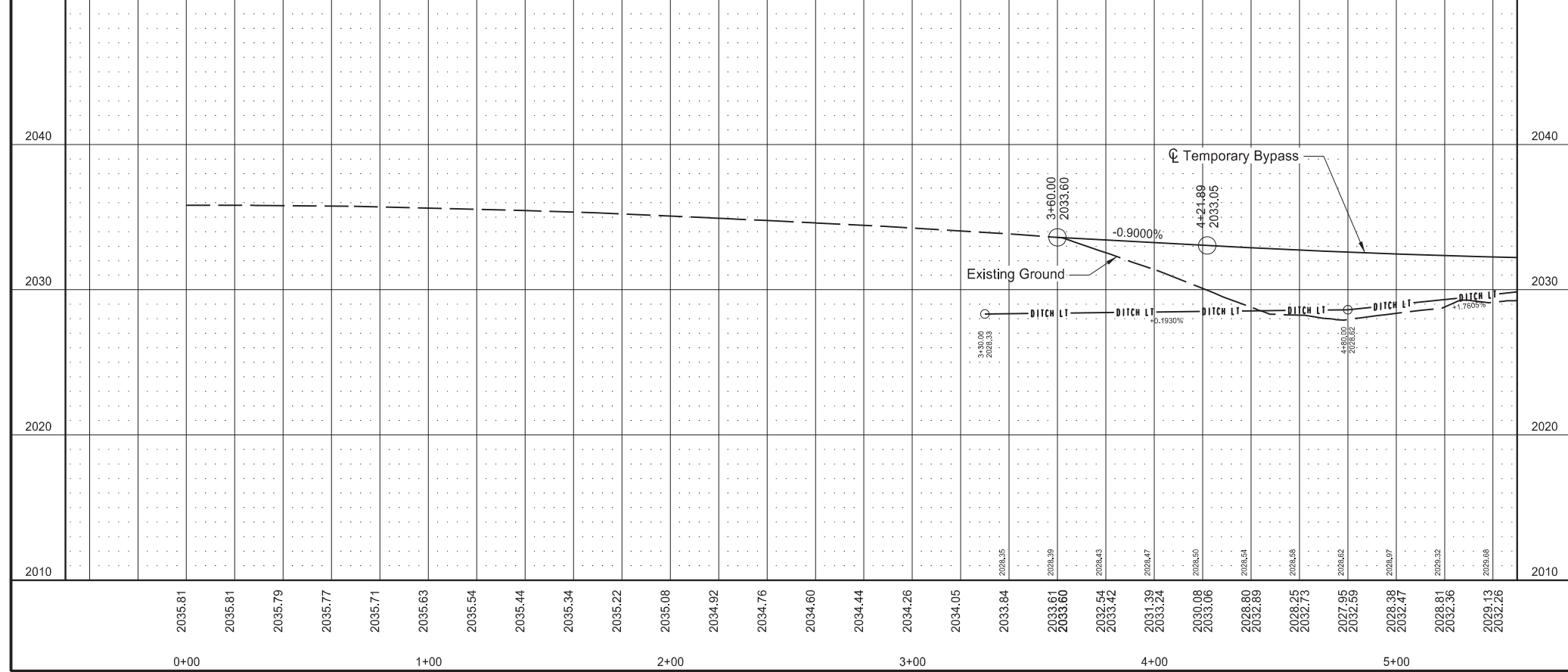
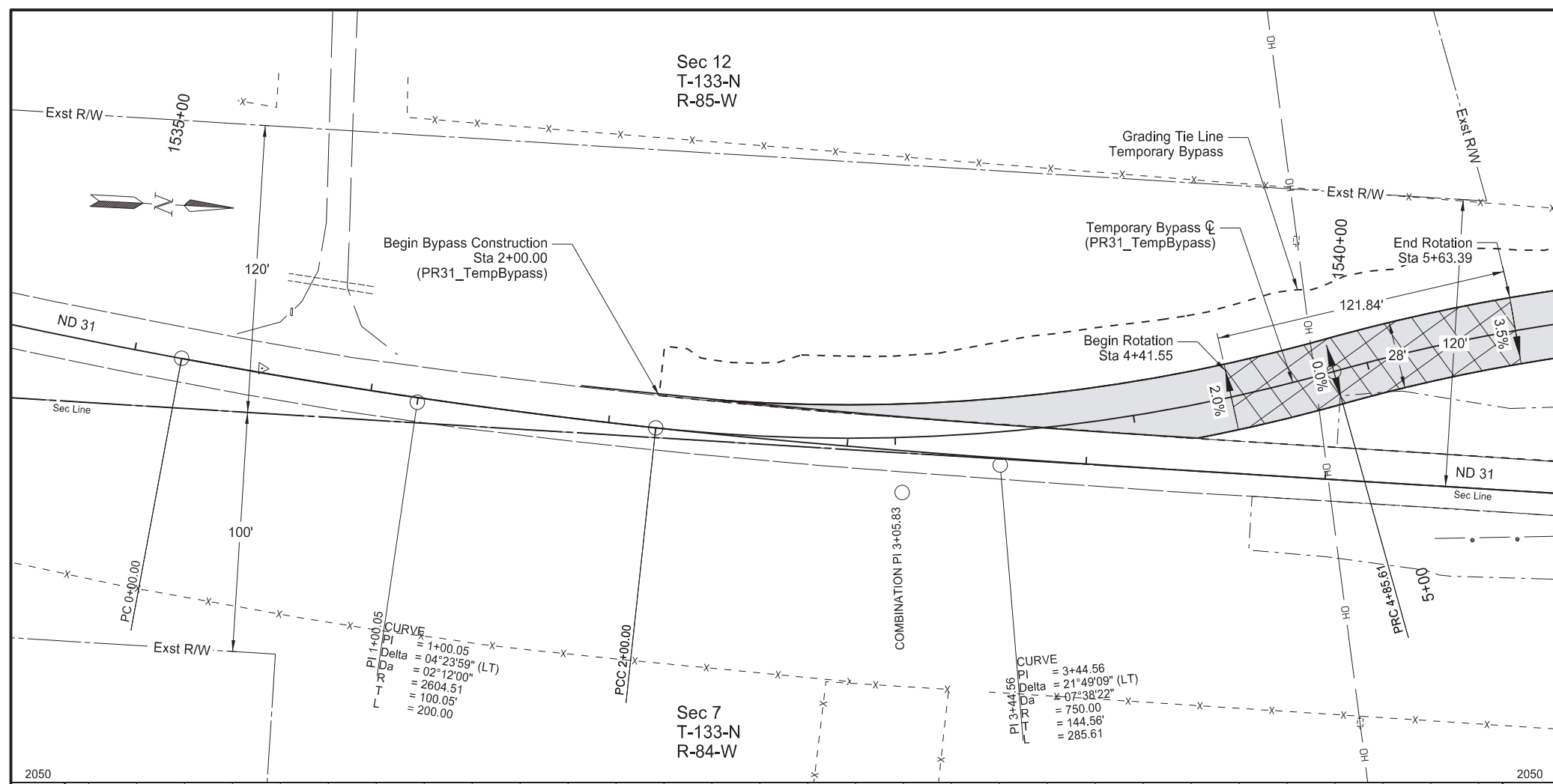


Various Structures - Statewide
Structure 00031-029.200
ND 31 - Grant County

Plan & Profile

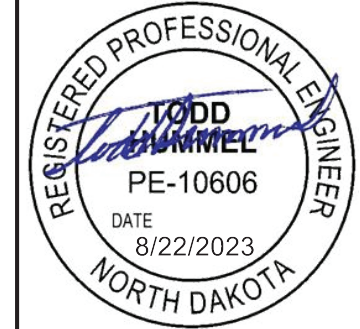


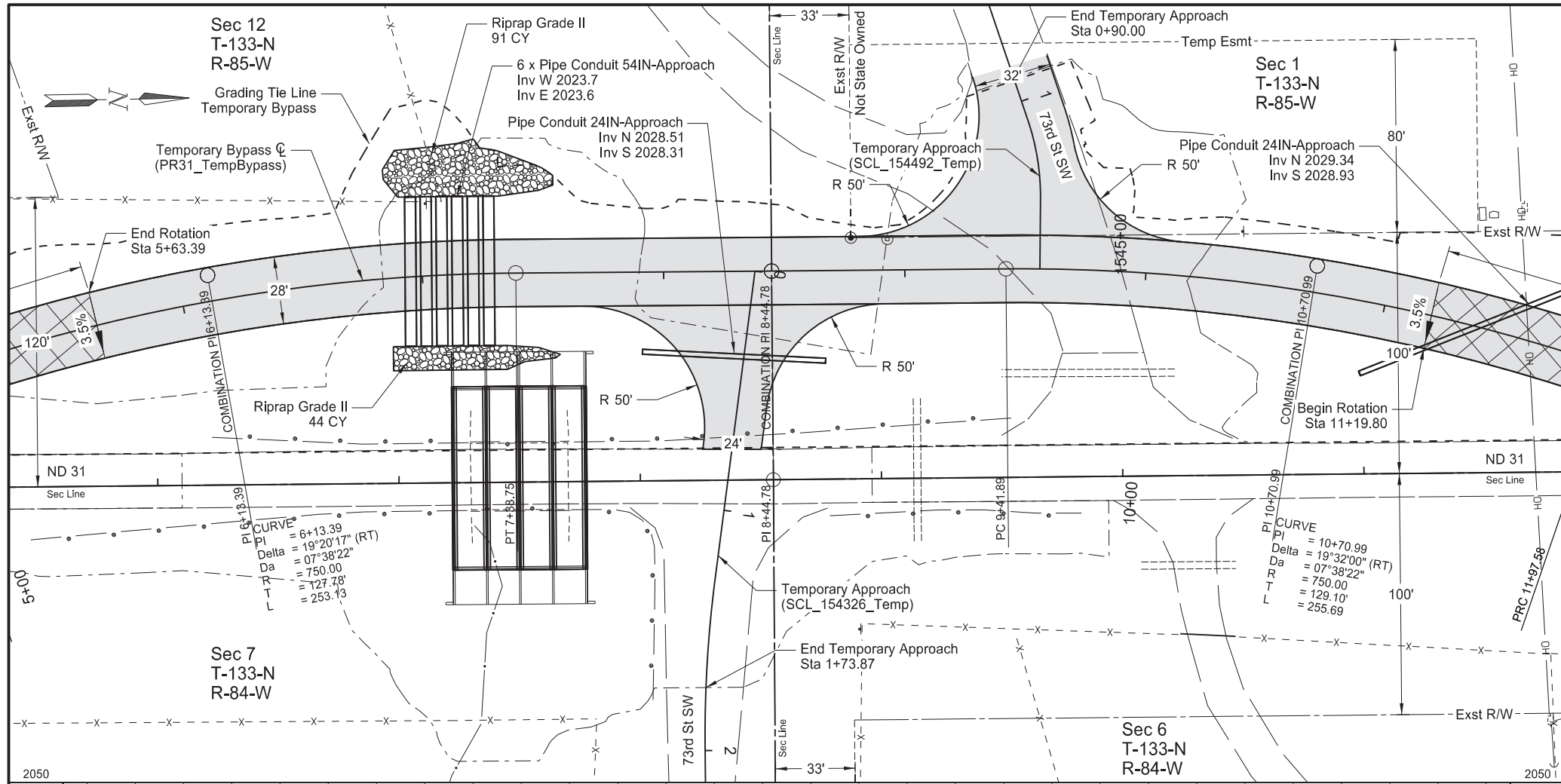
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	7



Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

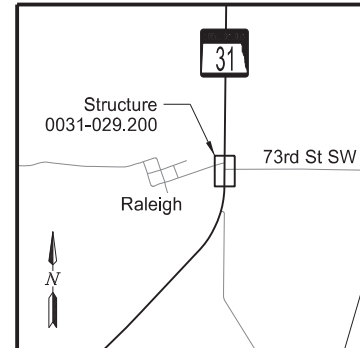
Plan & Profile
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	8

SPEC	CODE	BID ITEM	QTY	UNIT
256	0200	RIPRAP GRADE II		
		Temp Pipe Inlet	91	CY
		Temp Pipe Outlet	44	CY
714	4106	PIPE CONDUIT 24IN-APPROACH		
		Sta 7+91.0 ~ 33.0' Rt to Sta 8+66.8 ~ 37.3' Rt	76	LF
		Sta 10+95.2 ~ 29.7' Rt to Sta 11+85.2 ~ 36.6' Lt	112	LF
714	4132	PIPE CONDUIT 54IN-APPROACH		
		Sta 6+93.3 ~ 28.8' Rt to Sta 6+96.9 ~ 33.1' Lt	62	LF
		Sta 7+00.1 ~ 29.1' Rt to Sta 7+03.1 ~ 32.8' Lt	62	LF
		Sta 7+06.8 ~ 29.4' Rt to Sta 7+09.4 ~ 32.6' Lt	62	LF
		Sta 7+13.6 ~ 29.6' Rt to Sta 7+15.6 ~ 32.4' Lt	62	LF
		Sta 7+20.4 ~ 29.8' Rt to Sta 7+21.8 ~ 32.2' Lt	62	LF
		Sta 7+27.1 ~ 29.9' Rt to Sta 7+28.0 ~ 32.1' Lt	62	LF

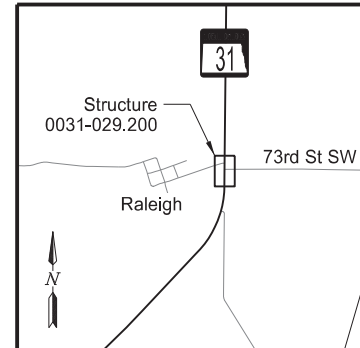
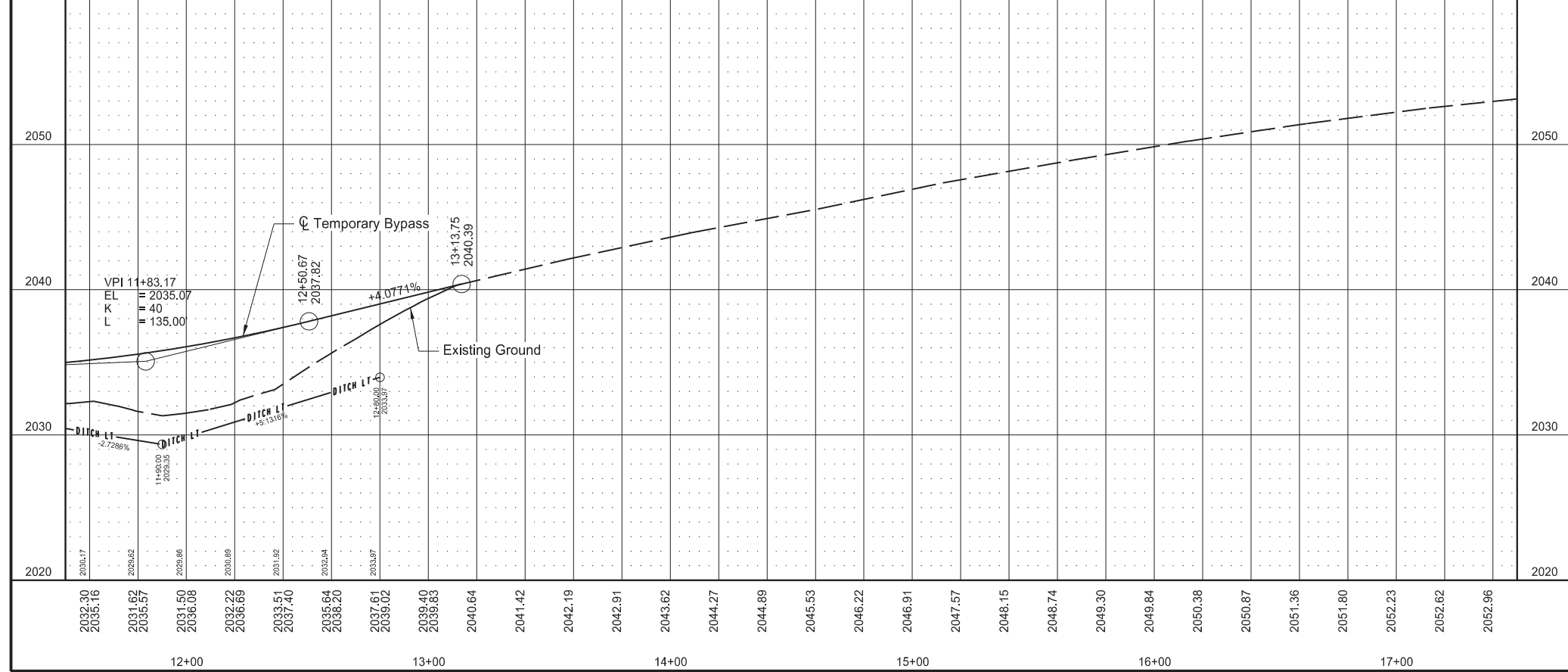
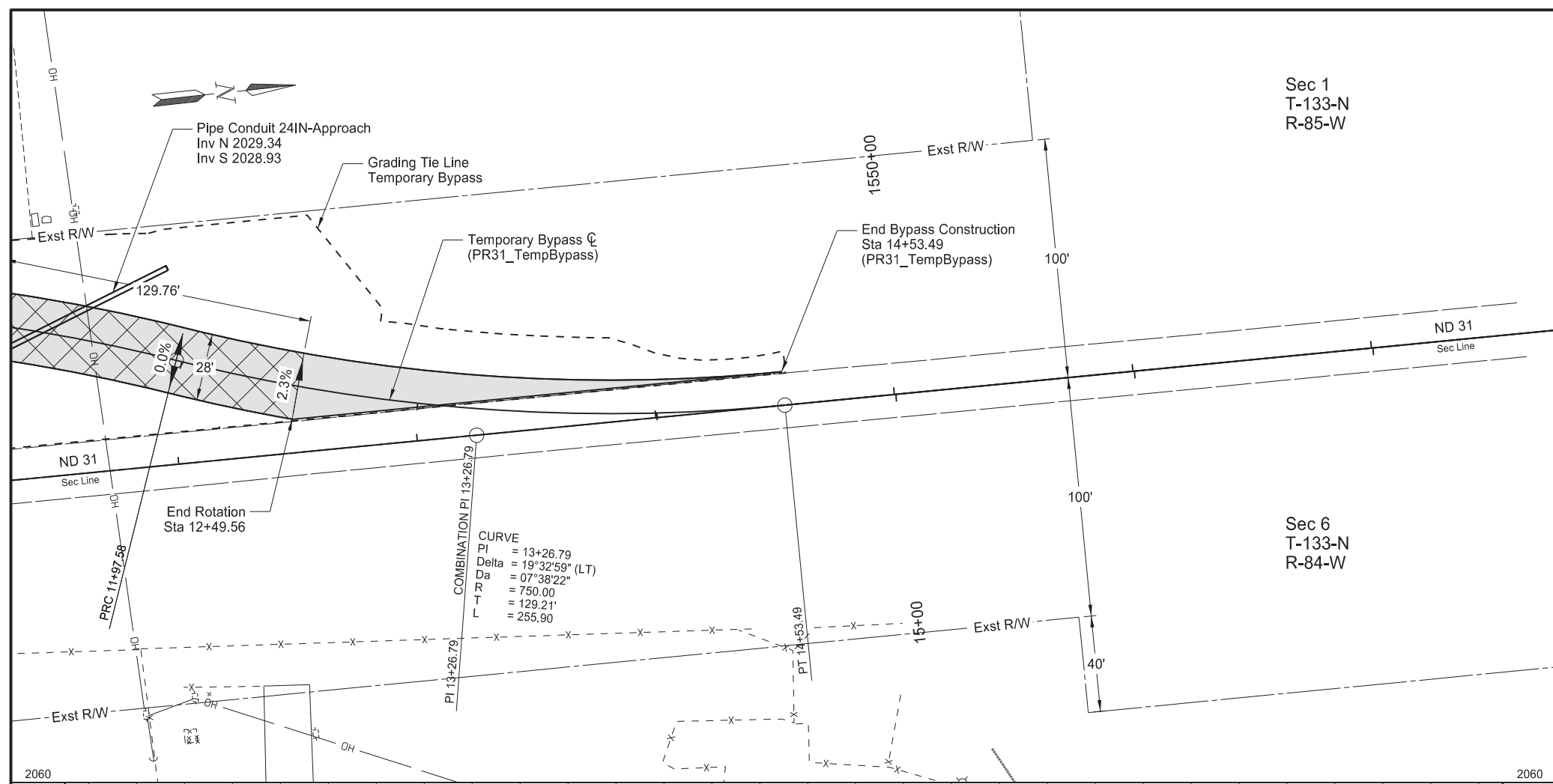


Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

Plan & Profile
Temporary Bypass

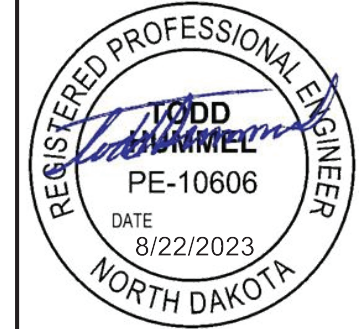


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	60	9



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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			11990 Bank	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)
1a	Sec 5 T-131-N R-70-W	Slope	Natural	Yes	0.018	0.016	-			Y	N	N	Anderson Wetland Mitigation Bank; 1:1	0.016
1b	Sec 32 T-132-N R-70-W	Slope	Natural	Yes	0.012	0.013	-			Y	N	N	Anderson Wetland Mitigation Bank; 1:1	0.013
2	Sec 32 T-132-N R-70-W	Ditch	Created	No	-	-	-			N	N	N		
Totals					0.030	0.029	-							0.029

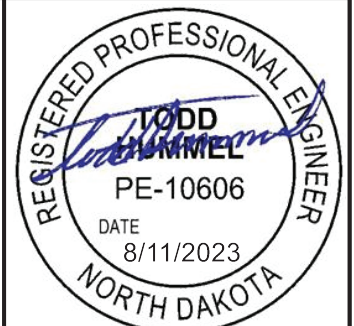
1) A wetland Jurisdictional Determination was issued by the USACE on 11/29/2022; NWO-2022-1663-BIS.

Impact Summary Table			
Permanent Impact Summary		Temporary Impacts and Additional information	
Wetland Type	Total Acre(s)	Water Type	Total Acre(s)
Natural/JD (Fill/Drain)	0.029	Temporary Wetland JD	0.030
Natural/Non-JD (Fill/Drain)	-	Non-JD Wetland Temporary	0.000
Artificial/JD (Fill/Drain)	-		
Artificial /Non-JD (Fill/Drain)	-	Permanent OW	-
Total	0.029	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		

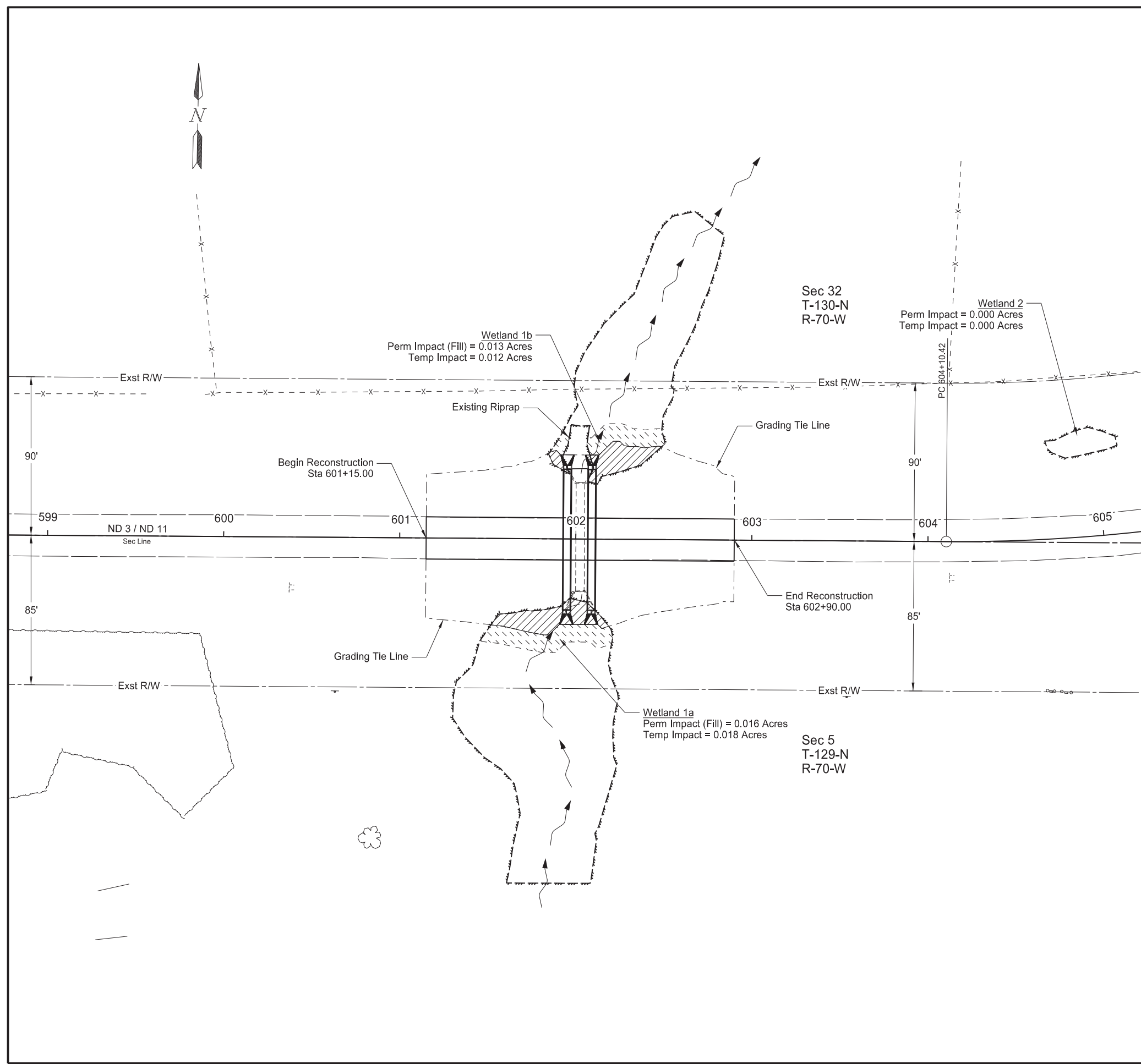
Mitigation Summary Table		
	Location	11990 Bank Acre(s)
EO 11990 Only	Anderson Wetland Mitigation Bank	0.029
	Total	0.029

Various Structures - Statewide
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ND 3 - McIntosh County

Wetlands, Mitigation, & Environmental

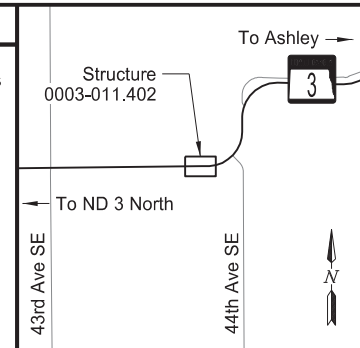


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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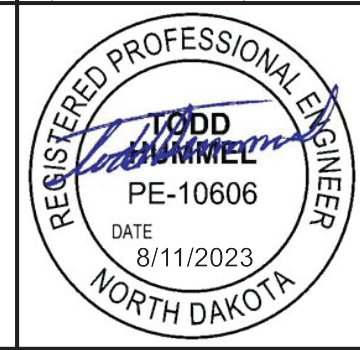
LEGEND

	Wetland Impact Permanent (Fill)		Other Water Impacts Permanent (Fill)
	Wetland Impact Permanent (Cut)		Other Water Impacts Permanent (Cut)
	Wetland Impact Temporary		Other Water Impacts Temporary
	Existing Delineated Wetland		Existing Other Waters



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 ND 3 - McIntosh County

Wetlands, Mitigation, & Environmental



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
3	Sec 32 T-134-N R-72-W	Basin	Natural	No	-	-	-			N	N	N
4a	Sec 31 T-134-N R-972-W and Sec 30 T-134-N R-72-W	Slope	Natural	Yes	-	-	-			N	N	N
4b	Sec 29 T-134-N R-72-W	Riverine	Natural	Yes	-	-	-			N	N	N
4e	Sec 30 T-134-N R-72-W	Riverine	Natural	Yes	0.005	-	-			N	N	N
4f	Sec 29 T-134-N R-72-W	Riverine	Natural	Yes	0.033	-	-			N	N	N
5	Sec 30 T-134-N R-72-W	Slope	Natural	No	-	-	-			N	N	N
Totals					0.038	-	-					

Other Waters Impact Table															
Number	Location	Type	Feature	USACE Jurisdictional (1)	Impacts to Other Waters						Other Water Mitigation				
					Acres			Linear Feet			Mitigation Proposed			USACE Mitigation Bank	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm. (Fill/Drain)	Perm. (Cut)	EO 11990	USACE	USFWS	Location	Acre(s)
OW4c	Sec 29 T-134-N R-72-W	Creek	Natural	Yes	-	-	-	-	-	-	N	N	N		
OW4d	Sec 29 T-134-N R-72-W	Creek	Natural	Yes	0.089	0.185 (2)	-	90	740	-	N	Y	N	Koenig Wetland Mitigation Bank; 2:1	0.288
Totals					0.089	0.185	0.000	90	740	0					0.288

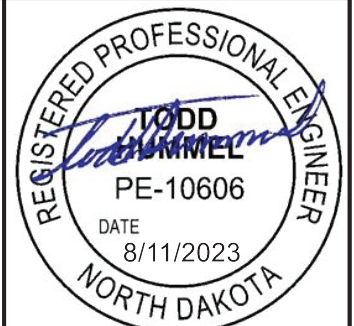
- 1) A wetland Jurisdictional Determination was issued by the USACE on 11/29/2022; NWO-2009-2455-BIS.
2) Impacts to Other Waters OW4d include 0.144 acres permanent impact (box culvert footprint) and 0.041 acres permanent impact not resulting in loss (riprap footprint)

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total Acre(s)	Water Type	Total Acre(s)
Natural/JD (Fill/Drain)	0.000	Temporary Wetland JD	0.038
Natural/Non-JD (Fill/Drain)	-	Non-JD Wetland Temporary	-
Artificial/JD (Fill/Drain)	-		
Artificial/Non-JD	-	Permanent OW	0.185
Total	0.000	Temporary OW	0.089
JD Natural (Cut)	-	Permanent OW-d	-
JD Artificial (Cut)	-	Temporary OW-d	-
Non-JD Natural (Cut)	-		
Non-JD Artificial (Cut)	-		
Total	0.000		

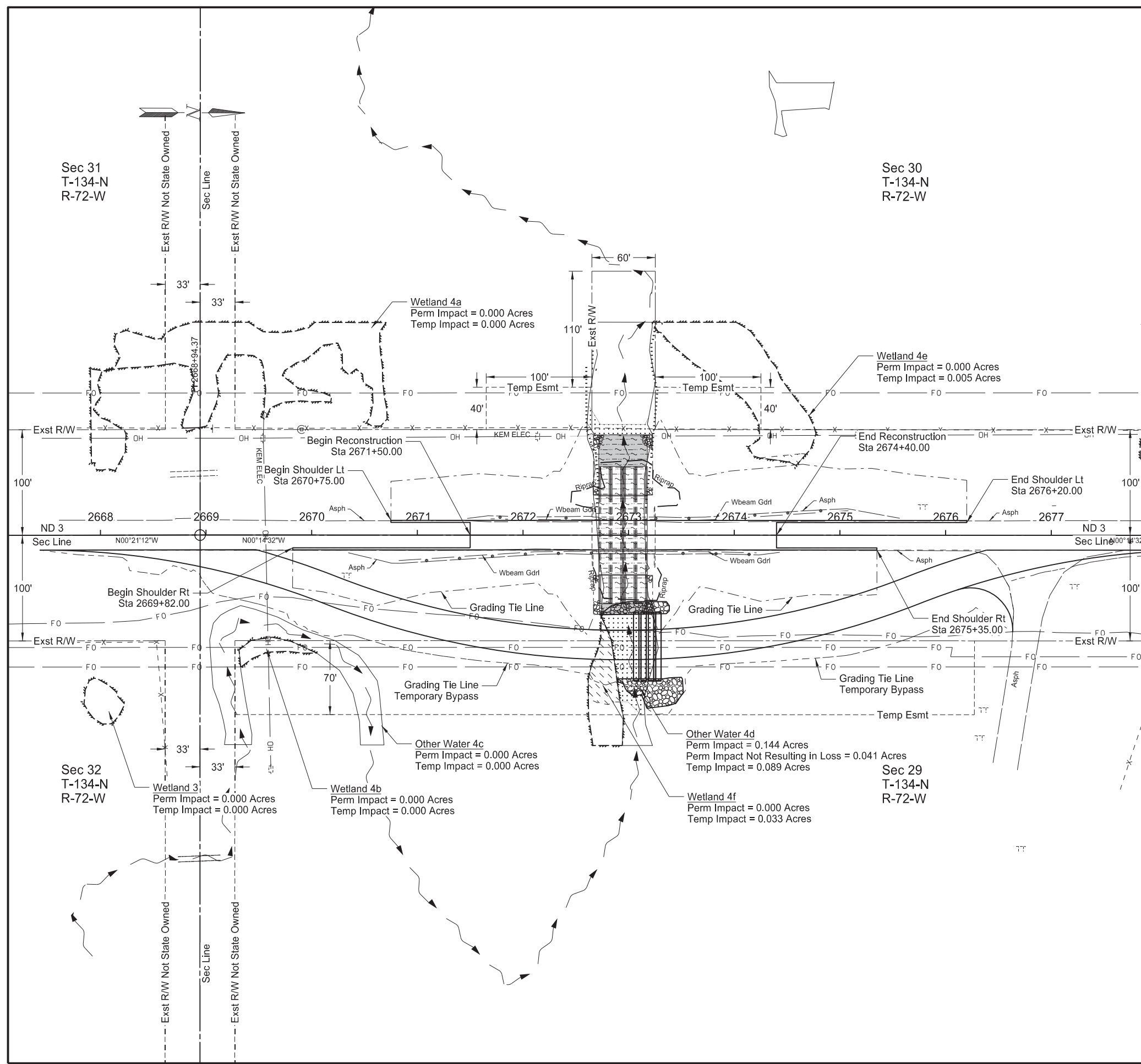
Mitigation Summary Table		
	Location	USACE Bank Acre(s)
USACE Only	Koenig Wetland Mitigation Bank	0.288
Total		0.288

Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

Wetlands, Mitigation, & Environmental

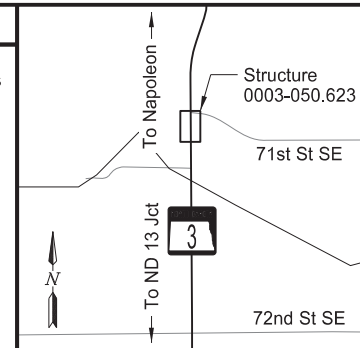


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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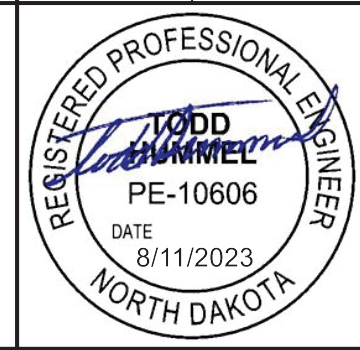
LEGEND

	Wetland Impact Permanent (Fill)		Other Water Impacts Permanent (Fill)
	Wetland Impact Permanent (Cut)		Other Water Impacts Permanent (Cut)
	Wetland Impact Temporary		Other Water Impacts Temporary
	Existing Delineated Wetland		Existing Other Waters



Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Wetlands, Mitigation, & Environmental



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			11990 Bank	
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)
7	Sec 7 T-140-N R-92-W	Slope	Natural	Yes	-	-	-	-	-	N	N	N	-	-
8a	Sec 7 T-140-N R-92-W	Ditch	Created	Yes	-	-	-	-	-	N	N	N	-	-
8b	Sec 7 T-140-N R-92-W	Slope	Natural	Yes	0.006	0.033	-	-	-	Y	N	N	Anderson Wetland Mitigation Bank; 1:1	0.033
8d	Sec 8 T-140-N R-92-W	Slope	Natural	Yes	0.003	0.017	-	-	-	Y	N	N	Anderson Wetland Mitigation Bank; 1:1	0.017
9	Sec 7 T-140-N R-92-W	Basin	Natural	Yes	-	-	-	-	-	N	N	N	-	-
10	Sec 7 T-140-N R-92-W	Ditch	Created	Yes	-	-	-	-	-	N	N	N	-	-
Totals					0.009	0.050	0.000	-	-					0.050

Other Waters Impact Table													
Number	Location	Type	Feature	USACE Jurisdictional (1)	Impacts to Other Waters						Other Water Mitigation		
					Acres			Linear Feet			Mitigation Proposed		
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)	Temp.	Perm. (Fill/Drain)	Perm. (Cut)	EO 11990	USACE	USFWS
OW-8c	Sec 8 T-140-N R-92-W	Creek	Natural	Yes	0.003	0.018	-	10	50	-	N	N	N
Totals					0.003	0.018	0.000						

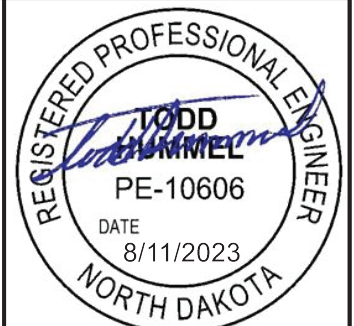
1) A wetland Jurisdictional Determination was issued by the USACE on 11/29/2022; NWO-2004-60768-BIS.

Impact Summary Table			
Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total Acre(s)	Water Type	Total Acre(s)
Natural/JD (Fill/Drain)	0.050	Temporary Wetland JD	0.009
Natural/Non-JD (Fill/Drain)	-	Non-JD Wetland Temporary	-
Artificial/JD (Fill/Drain)	-		
Artificial /Non-JD (Fill/Drain)	-	Permanent OW	0.018
Total	0.050	Temporary OW	0.003
JD Natural (Cut)	-	Permanent OW-d	-
JD Artificial (Cut)	-	Temporary OW-d	-
Non-JD Natural (Cut)	-		
Non-JD Artificial (Cut)	-		

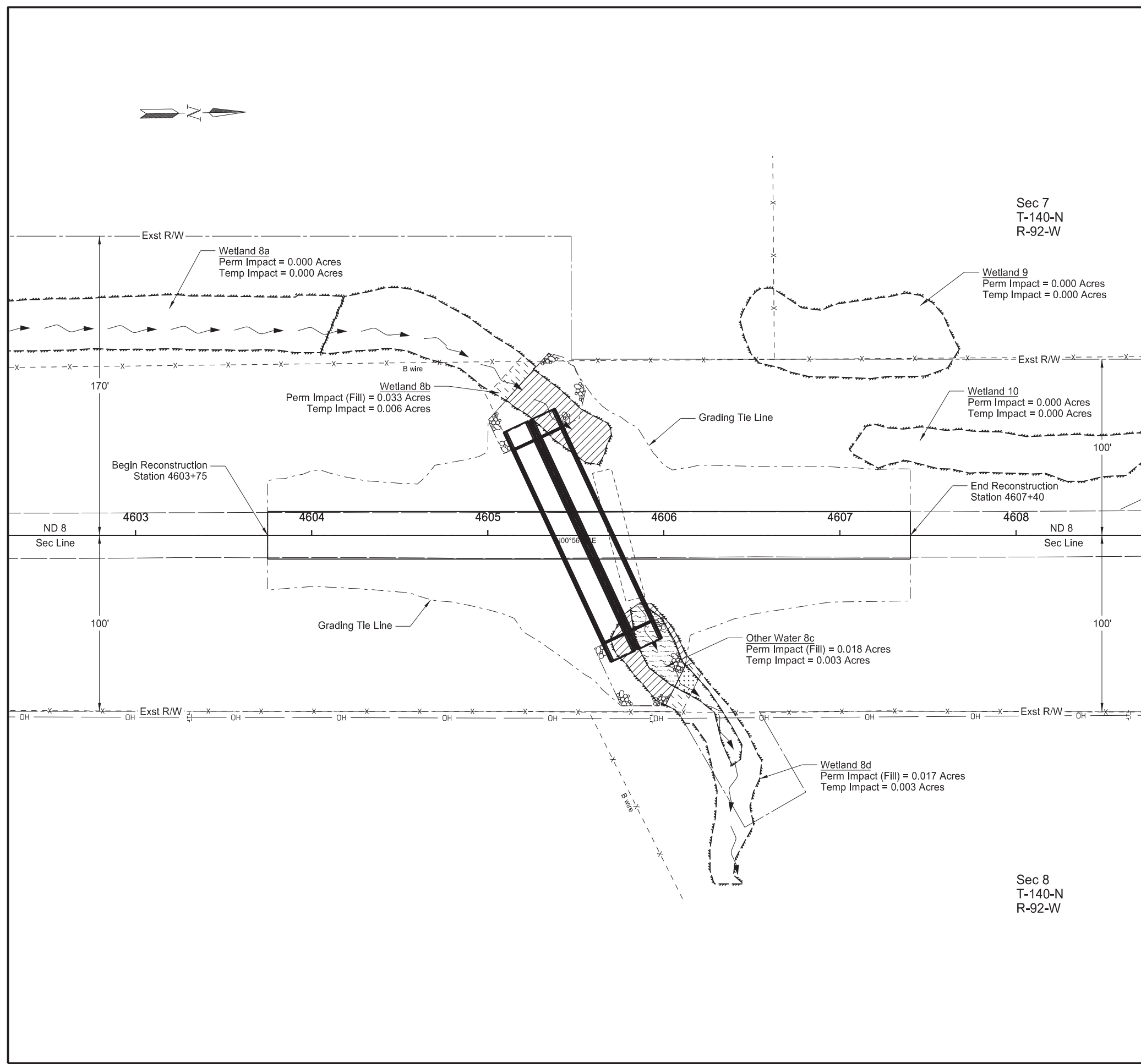
Mitigation Summary Table		
	Location	11990 Bank Acre(s)
EO 11990 Only	Anderson Wetland Mitigation Bank	0.050
Total		0.050

Various Structures - Statewide
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ND 8 - Stark County

Wetlands, Mitigation, & Environmental

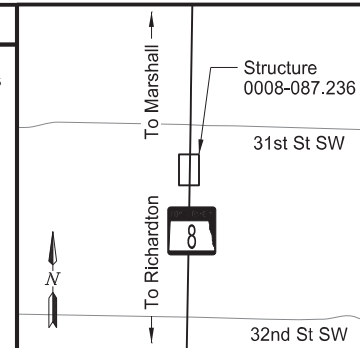


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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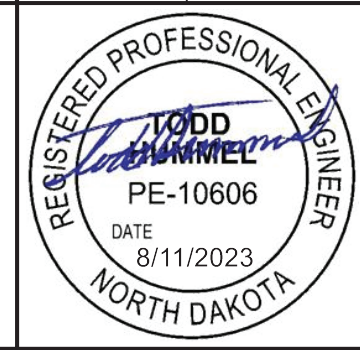
LEGEND

	Wetland Impact Permanent (Fill)		Other Water Impacts Permanent (Fill)
	Wetland Impact Permanent (Cut)		Other Water Impacts Permanent (Cut)
	Wetland Impact Temporary		Other Water Impacts Temporary
	Existing Delineated Wetland		Existing Other Waters



Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Wetlands, Mitigation, & Environmental



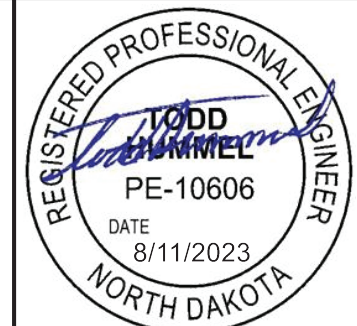
Wetland Impact Table														
Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands (1)	Wetland Impact					Wetland Mitigation				
					Wetland Impacts Acre(s)			USFWS Easement Impacts Acre(s)		Mitigation Proposed			11990 Bank	
					Temp.	Perm. (Fill/Drain) (2)	Perm. (Cut)	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)
6a	Sec 7 T-133-N R-84-W	Slope	Natural	Yes	-	-	-			N	N	N		
6b	Sec 12 T-133-N R-85-W and Sec 7 T-133-N R-84-W	Slope	Natural	Yes	0.053	0.095 (3)	-			N	N	N		
Totals					0.053	0.095	0.000							0

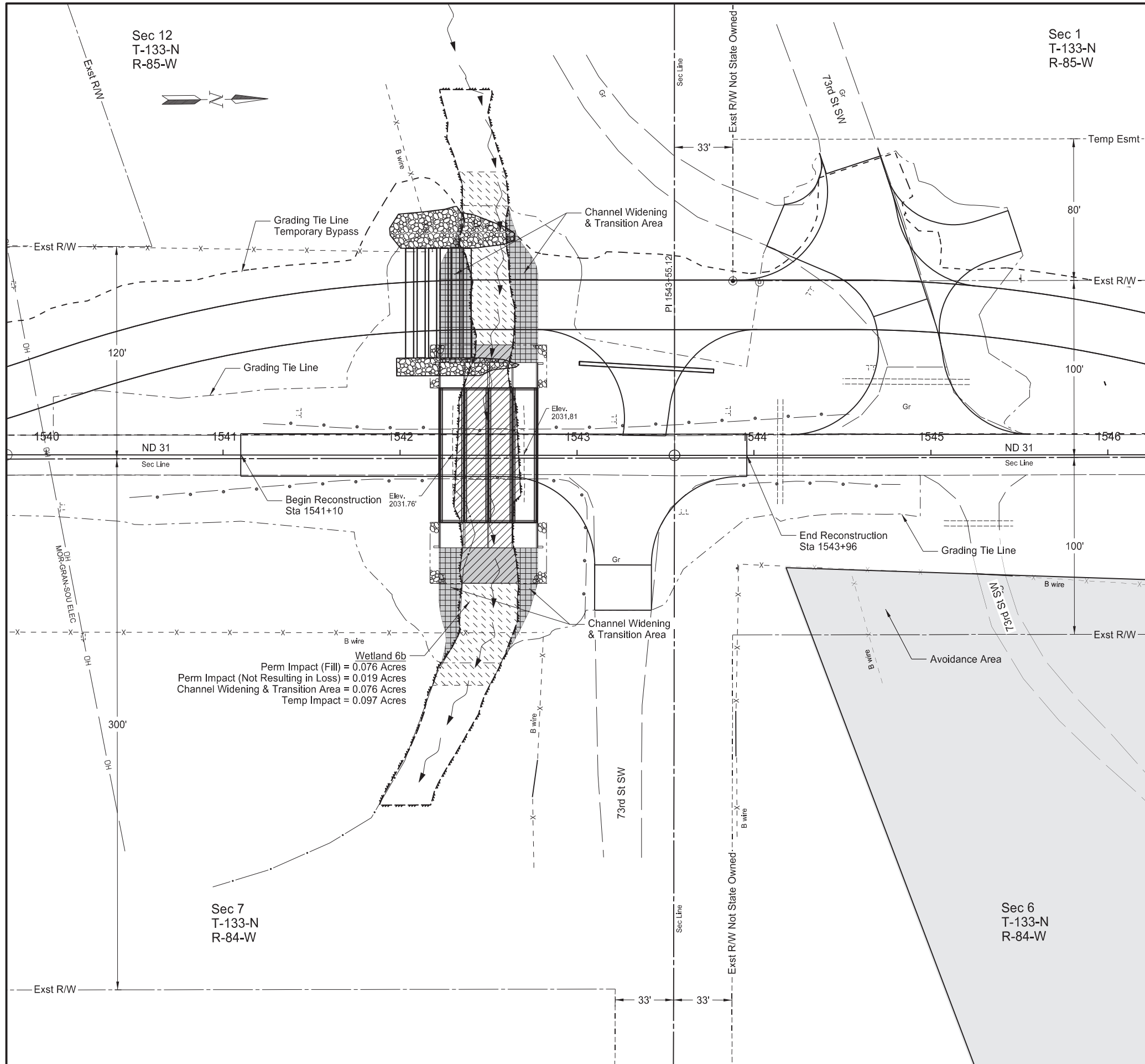
- 1) A wetland Jurisdictional Determination was issued by the USACE on 11/18/2022; NWO-2004-60129-BIS.
- 2) Permanent losses to the stream bed are offset by the channel transition and widening area to the proposed box culvert width as part of the project.
- 3) Impacts to Wetland 6b include 0.076 acres permanent impact (fill) and 0.019 acres permanent impact not resulting in loss for a total of 0.095 acres

Impact Summary Table			
Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total Acre(s)	Water Type	Total Acre(s)
Natural/JD (Fill/Drain)	0.095	Temporary Wetland JD	0.053
Natural/Non-JD (Fill/Drain)	-	Non-JD Wetland Temporary	-
Artificial/JD (Fill/Drain)	-		
Artificial /Non-JD	-	Permanent OW	-
Total	0.095	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		

Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

Wetlands, Mitigation, & Environmental



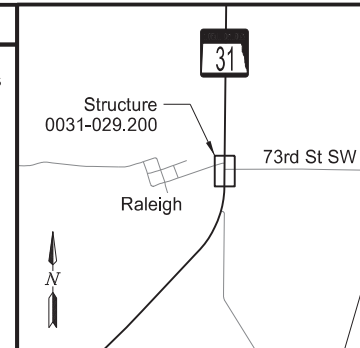


Wetland 6b
 Perm Impact (Fill) = 0.076 Acres
 Perm Impact (Not Resulting in Loss) = 0.019 Acres
 Channel Widening & Transition Area = 0.076 Acres
 Temp Impact = 0.097 Acres

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	75	8

LEGEND

	Wetland Impact Permanent (Fill)		Other Water Impacts Permanent (Fill)
	Wetland Impact Permanent (Cut)		Other Water Impacts Permanent (Cut)
	Wetland Impact Temporary		Other Water Impacts Temporary
	Existing Delineated Wetland		Existing Other Waters



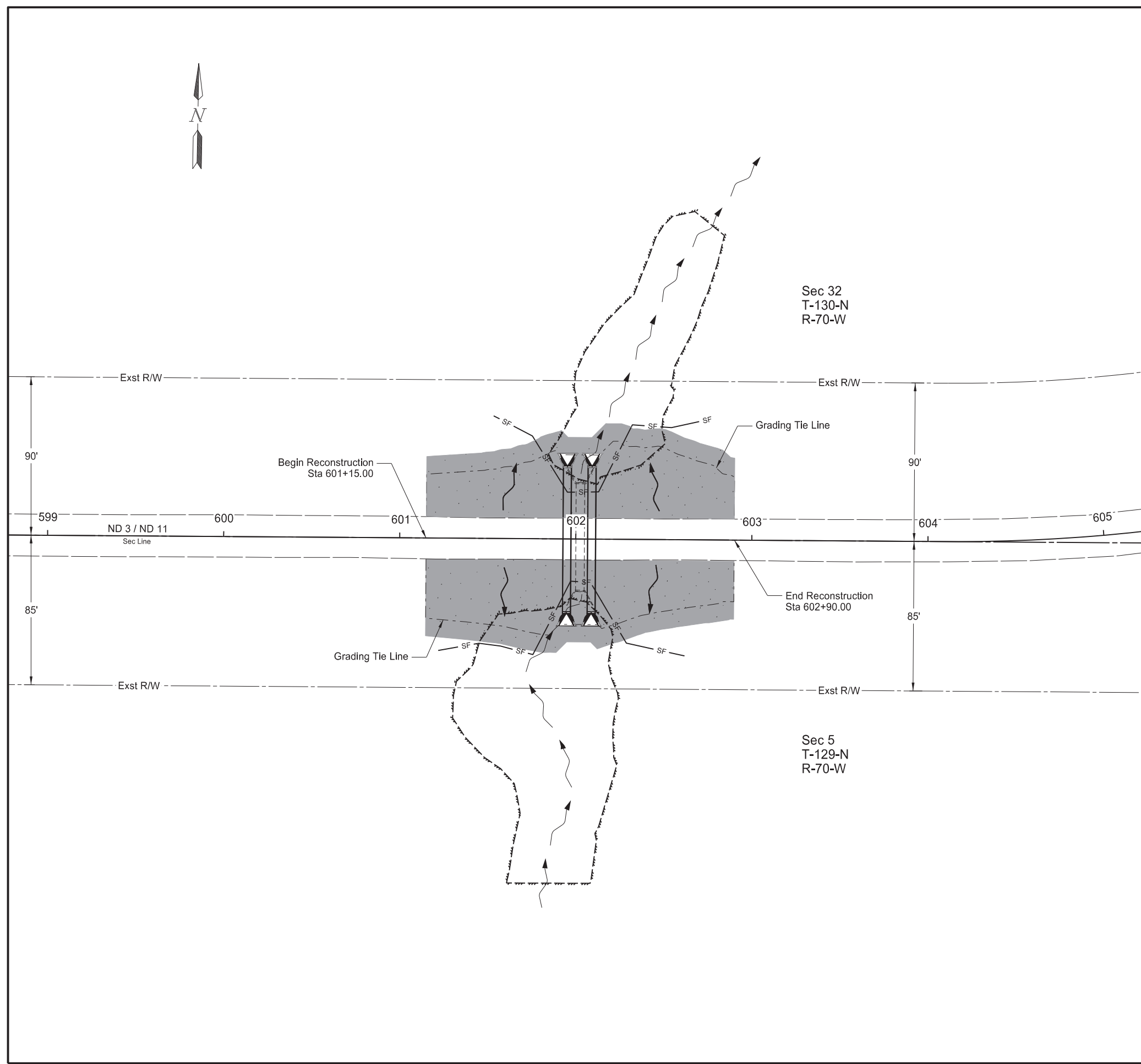
Various Structures - Statewide
 Structure 0031-029.200
 ND 31 - Grant County

Wetlands, Mitigation, & Environmental



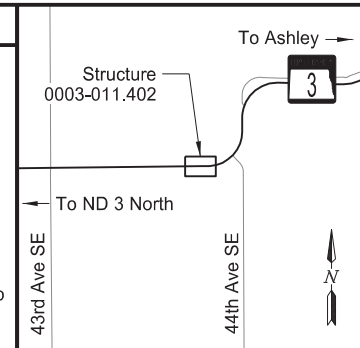
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	76	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP Sta 601+15 to Sta 602+90	0.35	ACRE
253	0101	STRAW MULCH Sta 601+15 to Sta 602+90	0.35	ACRE
260	0100	SILT FENCE UNSUPPORTED Sta 601+15 to Sta 602+90	356	LF
260	0101	REMOVE SILT FENCE UNSUPPORTED Sta 601+15 to Sta 602+90	356	LF



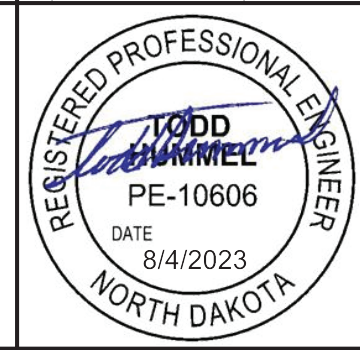
For ditch grades encountered in the field not listed, use the following spacing:
 Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

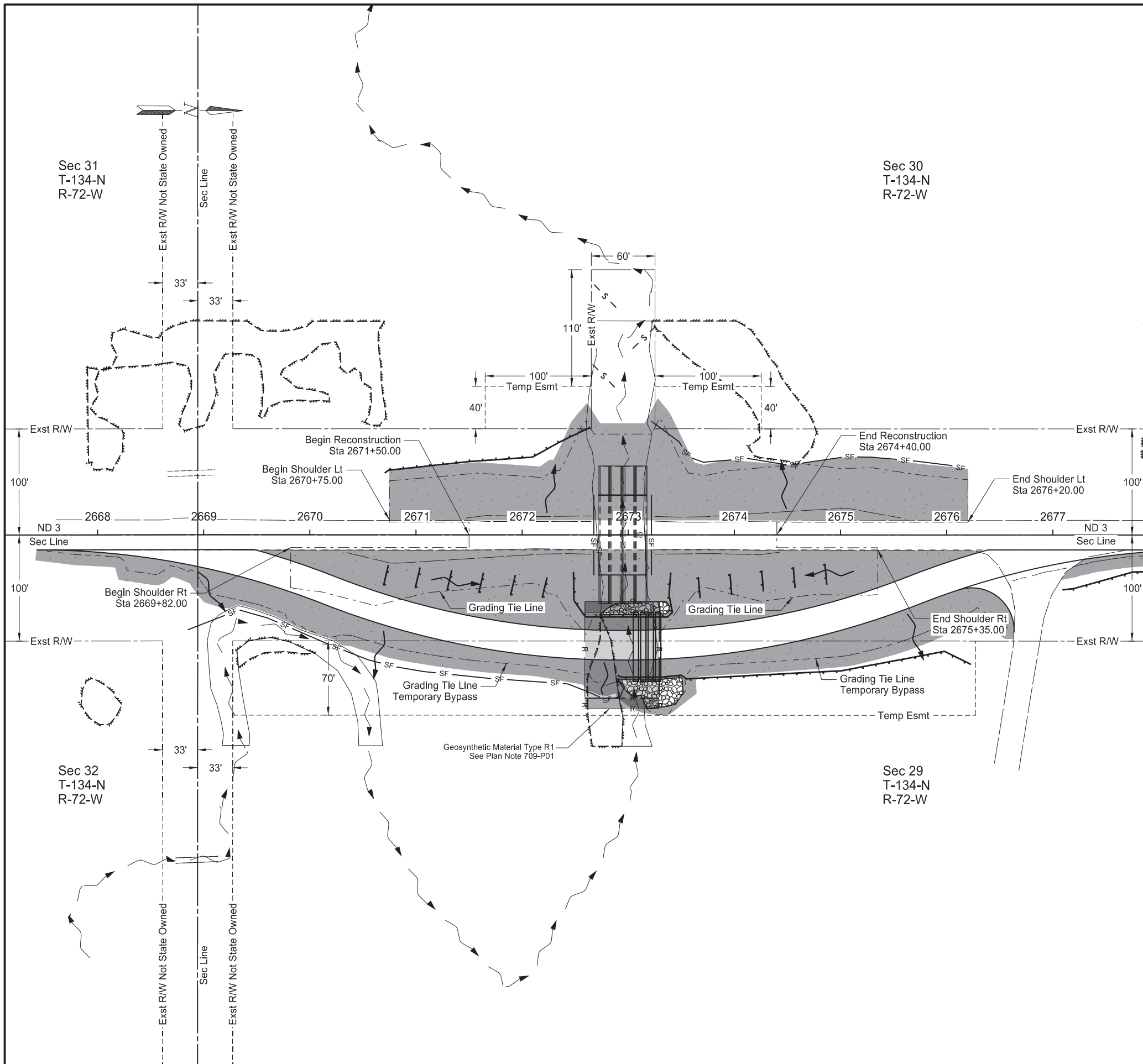
DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	<ul style="list-style-type: none"> Fiber Rolls Silt Fence Supported Flotation Silt Curtain Existing Delineated Wetland Temporary Cover Crop & Straw Mulch
2%	40	
3%	30	
4%	20	



Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

Temporary Erosion Control



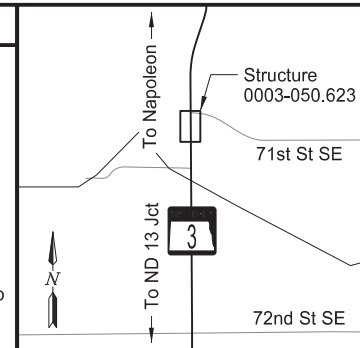


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	76	2

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP Sta 2669+82 to Sta 2676+20	2.15	ACRE
253	0101	STRAW MULCH Sta 2669+82 to Sta 2676+20	2.15	ACRE
260	0100	SILT FENCE UNSUPPORTED Sta 2669+82 to Sta 2676+20	1,031	LF
260	0101	REMOVE SILT FENCE UNSUPPORTED Sta 2669+82 to Sta 2676+20	1,031	LF
261	0112	FIBER ROLLS 12IN Sta 2669+82 to Sta 2676+20	1,070	LF
261	0113	REMOVE FIBER ROLLS 12IN Sta 2669+82 to Sta 2676+20	1,070	LF
262	0100	FLOTATION SILT CURTAIN Sta 2669+82 to Sta 2676+20	58	LF
262	0101	REMOVE FLOTATION SILT CURTAIN Sta 2669+82 to Sta 2676+20	58	LF
709	0151	GEOSYNTHETIC MATERIAL TYPE R1 Sta 2669+82 to Sta 2676+20	942	SY

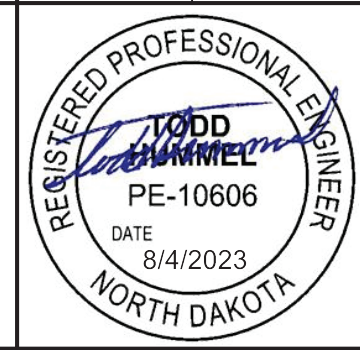
For ditch grades encountered in the field not listed, use the following spacing:
 Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	<ul style="list-style-type: none"> — — — — — Fiber Rolls — SF — Silt Fence Supported — S — Flotation Silt Curtain - - - - - Existing Delineated Wetland Temporary Cover Crop & Straw Mulch
2%	40	
3%	30	
4%	20	



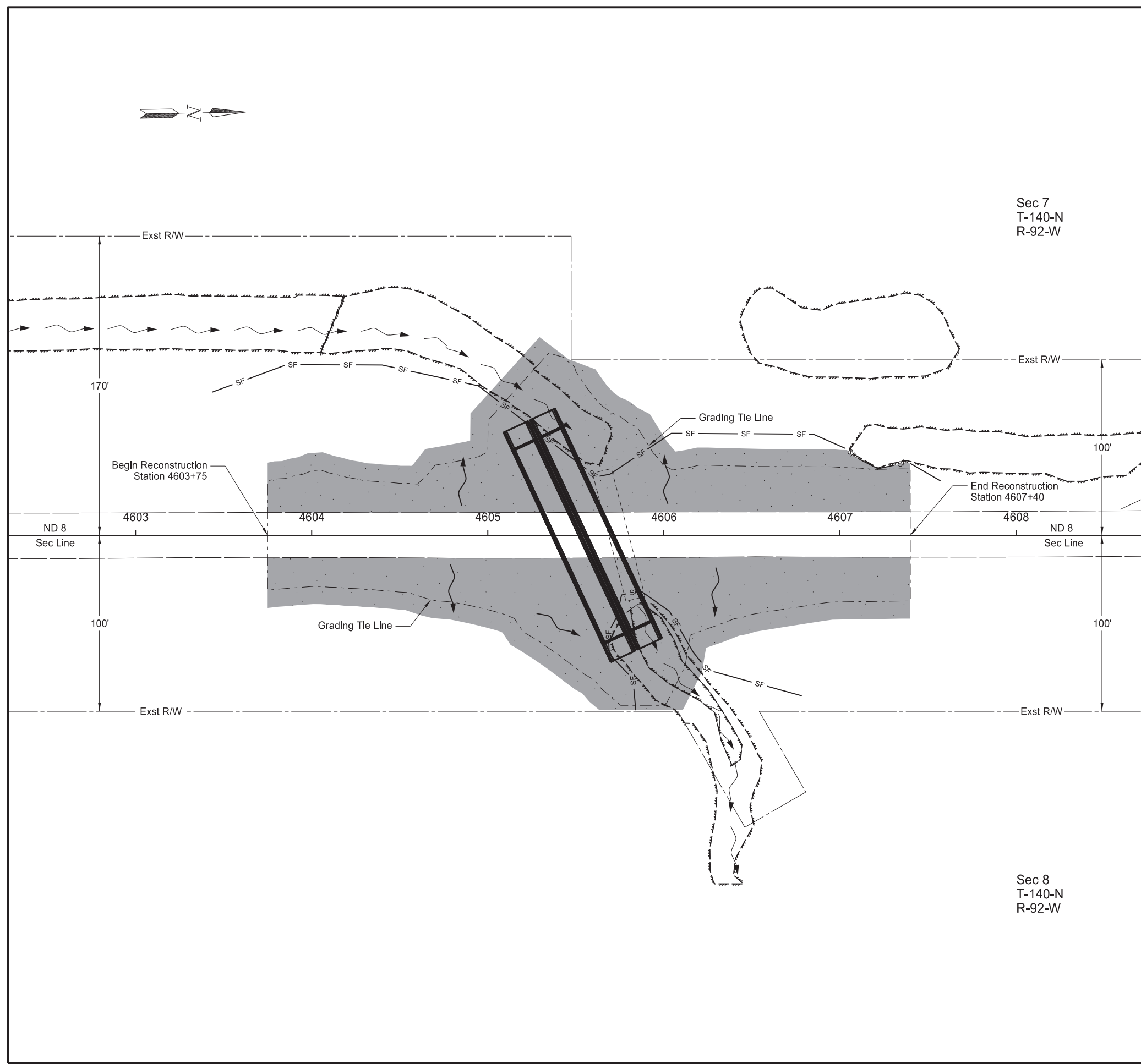
Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Temporary Erosion Control



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	76	3

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP Sta 4603+75 to Sta 4607+40	0.78	ACRE
253	0101	STRAW MULCH Sta 4603+75 to Sta 4607+40	0.78	ACRE
260	0100	SILT FENCE UNSUPPORTED Sta 4604+45 to Sta 4606+75	650	LF
260	0101	REMOVE SILT FENCE UNSUPPORTED Sta 4604+45 to Sta 4606+75	650	LF

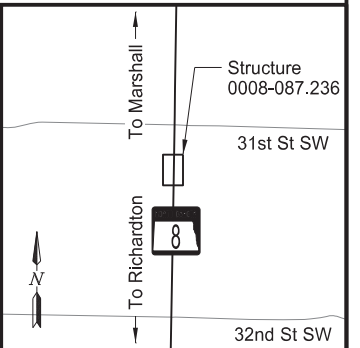


Sec 7
T-140-N
R-92-W

Sec 8
T-140-N
R-92-W

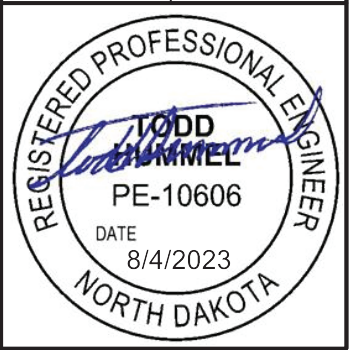
For ditch grades encountered in the field not listed, use the following spacing:
Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

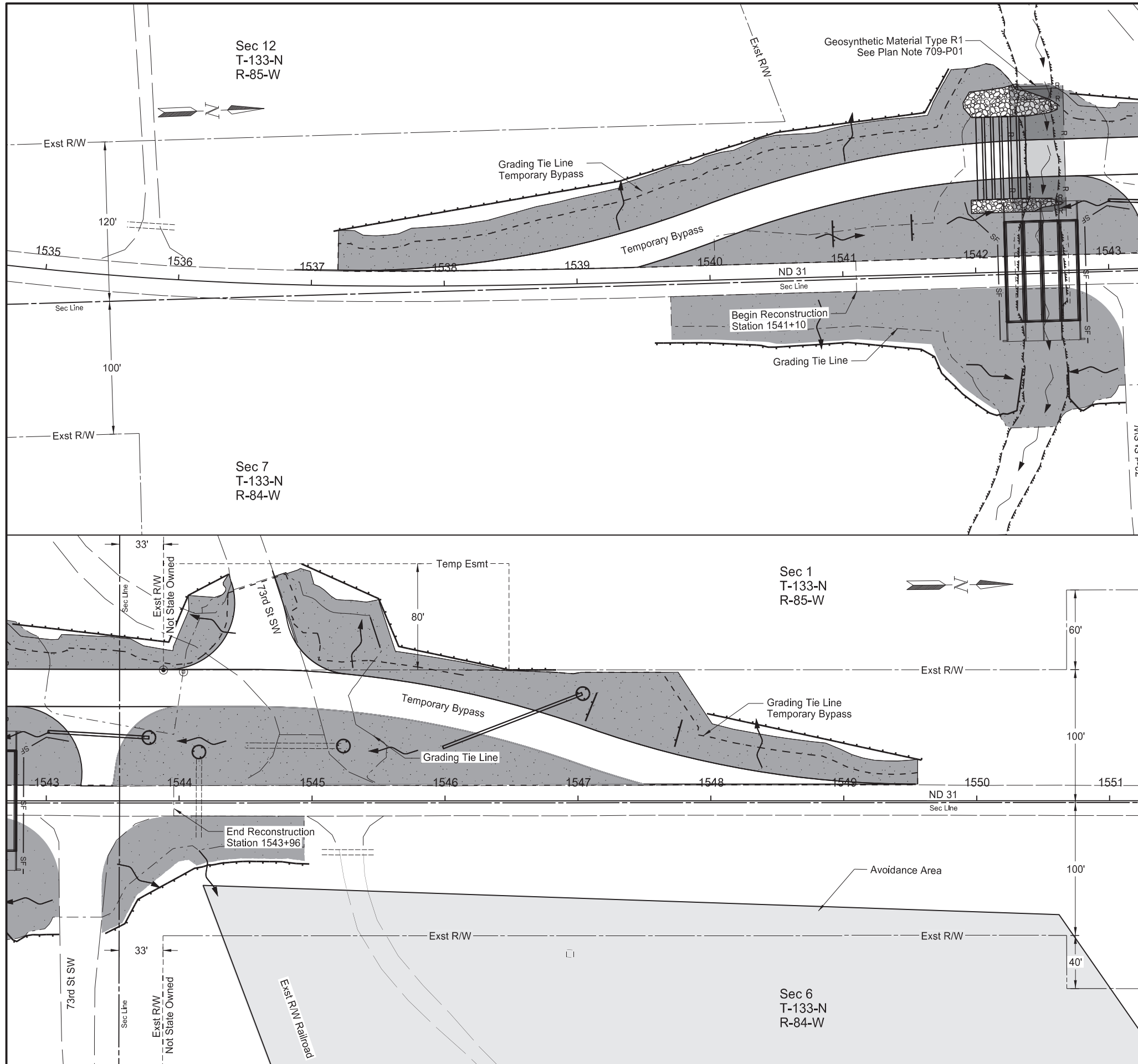
DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	<ul style="list-style-type: none"> Fiber Rolls Silt Fence Supported Flotation Silt Curtain Existing Delineated Wetland Temporary Cover Crop & Straw Mulch
2%	40	
3%	30	
4%	20	



Various Structures - Statewide
Structure 0008-087.236
ND 8 - Stark County

Temporary Erosion Control





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	76	4

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP Sta 1537+20 to Sta 1549+56	3.08	ACRE
253	0101	STRAW MULCH Sta 1537+20 to Sta 1549+56	3.08	ACRE
260	0100	SILT FENCE UNSUPPORTED Sta 1537+20 to Sta 1549+56	248	LF
260	0101	REMOVE SILT FENCE UNSUPPORTED Sta 1537+20 to Sta 1549+56	248	LF
261	0112	FIBER ROLLS 12IN Sta 1537+20 to Sta 1549+56	1,853	LF
261	0113	REMOVE FIBER ROLLS 12IN Sta 1537+20 to Sta 1549+56	1,853	LF
709	0151	GEOSYNTHETIC MATERIAL TYPE R1 Sta 1537+20 to Sta 1549+56	508	SY

For ditch grades encountered in the field not listed, use the following spacing:
Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

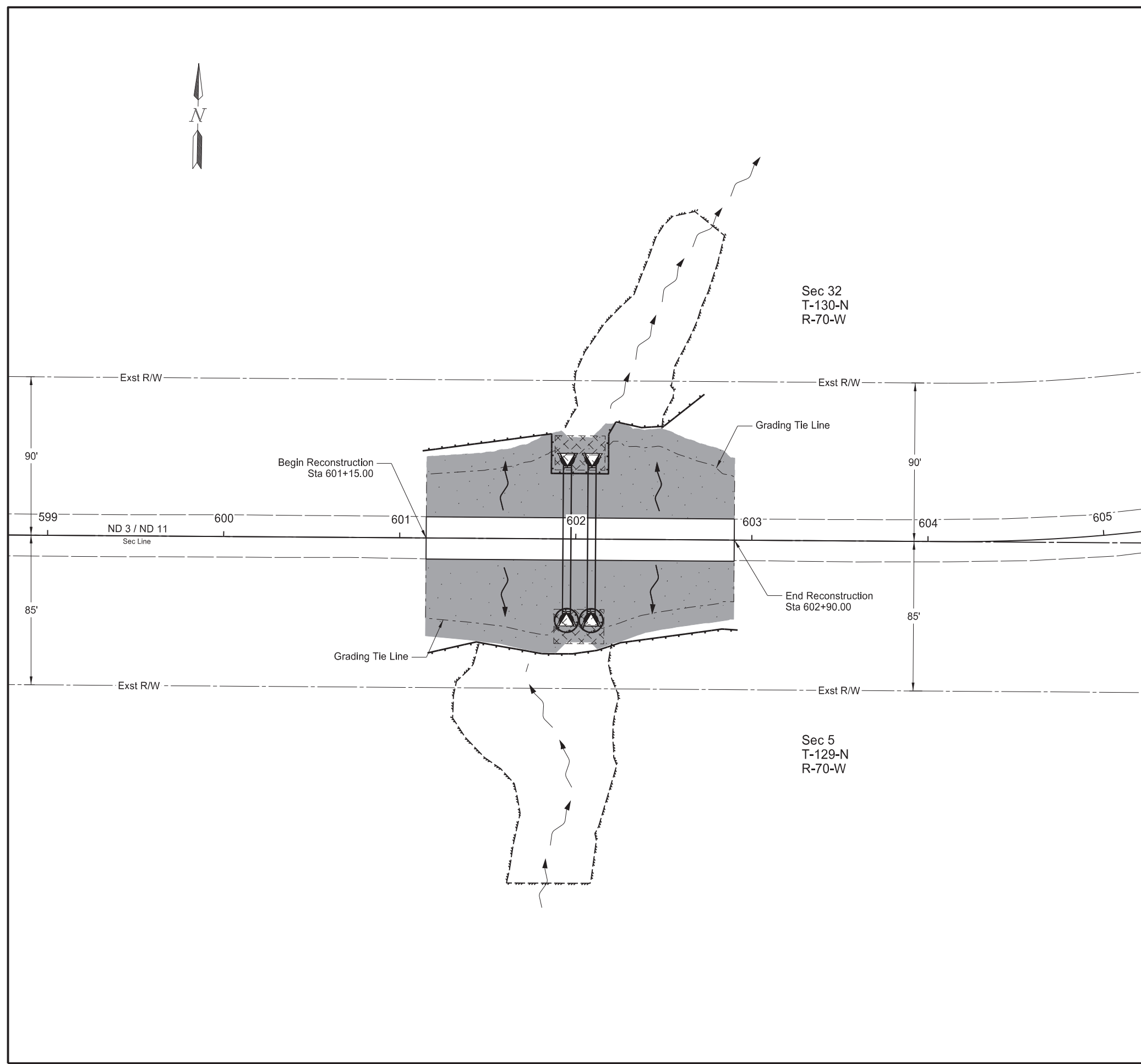
DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	<ul style="list-style-type: none"> Fiber Rolls Silt Fence Supported Flotation Silt Curtain Existing Delineated Wetland Temporary Cover Crop & Straw Mulch
2%	40	
3%	30	
4%	20	

Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

Temporary Erosion Control

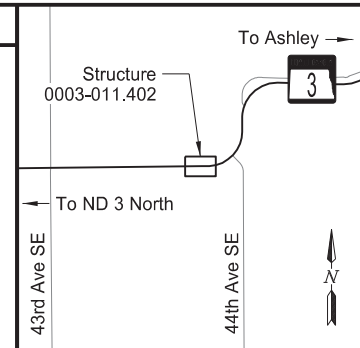
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	77	1

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II Sta 601+15 to Sta 602+90	0.35	ACRE
253	0101	STRAW MULCH Sta 601+15 to Sta 602+90	0.35	ACRE
261	0112	FIBER ROLLS 12IN Sta 601+15 to Sta 602+90	480	LF



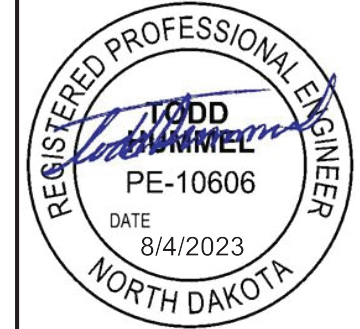
For ditch grades encountered in the field not listed, use the following spacing:
 Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

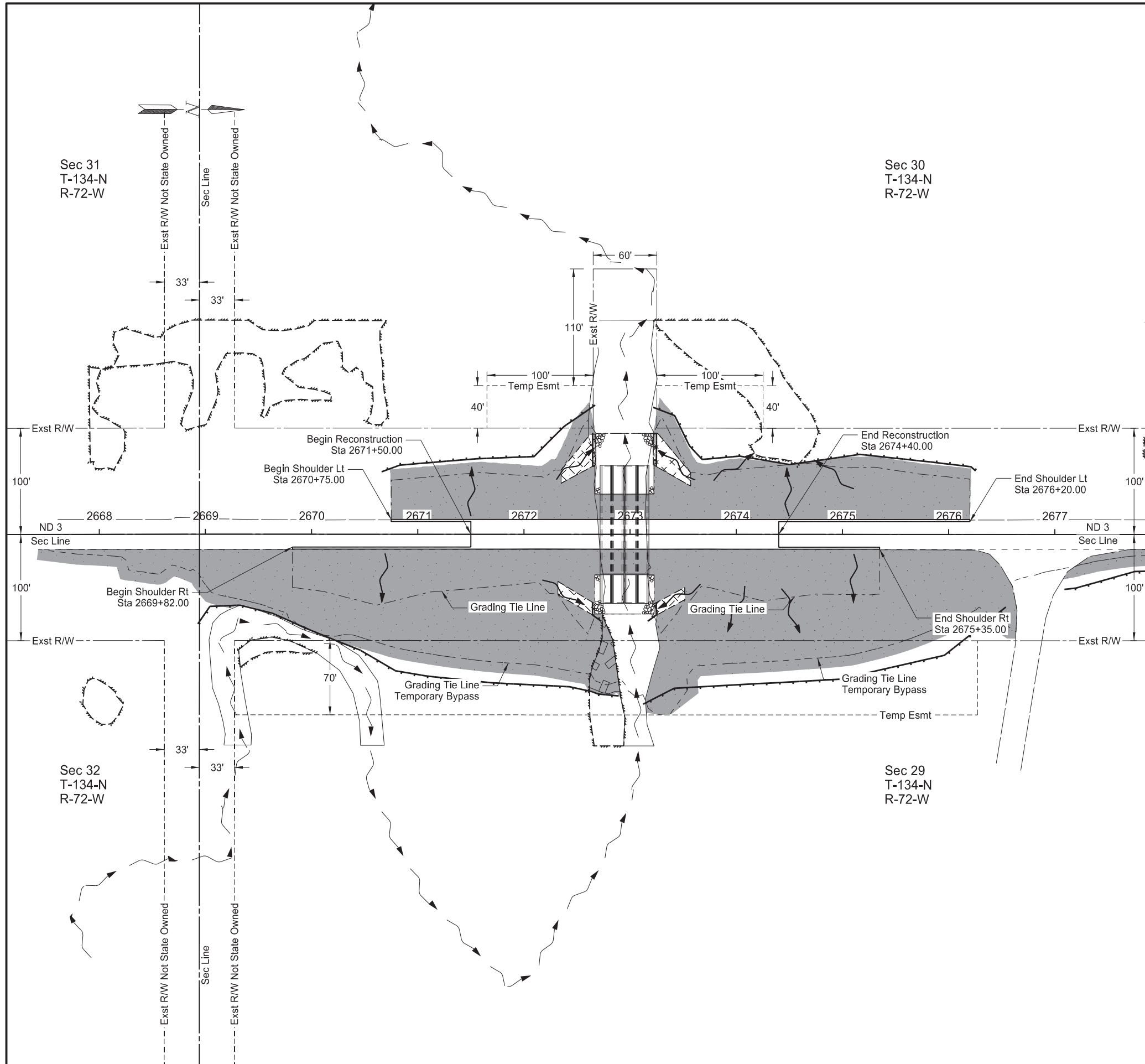
DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	<ul style="list-style-type: none"> Seeding Class II & Straw Mulch Fiber Rolls Wetland Seed & Straw Mulch Riprap (See Section 170) ECB Type III
2%	40	
3%	30	
4%	20	



Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

Permanent Erosion Control



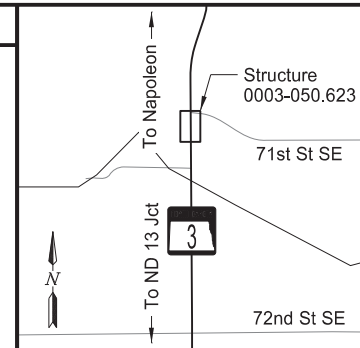


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	77	2

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II Sta 2669+82 to Sta 2676+20	2.48	ACRE
251	1000	WETLAND SEED Sta 2669+82 to Sta 2676+20	0.03	ACRE
253	0101	STRAW MULCH Sta 2669+82 to Sta 2676+20	2.51	ACRE
255	0103	ECB TYPE 3 Sta 2669+82 to Sta 2676+20	801	SY
261	0112	FIBER ROLLS 12IN Sta 2669+82 to Sta 2676+20	1,678	LF

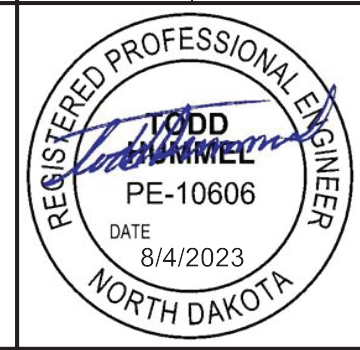
For ditch grades encountered in the field not listed, use the following spacing:
 Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	Seeding Class II & Straw Mulch Fiber Rolls Wetland Seed & Straw Mulch Riprap (See Section 170) ECB Type III
2%	40	
3%	30	
4%	20	



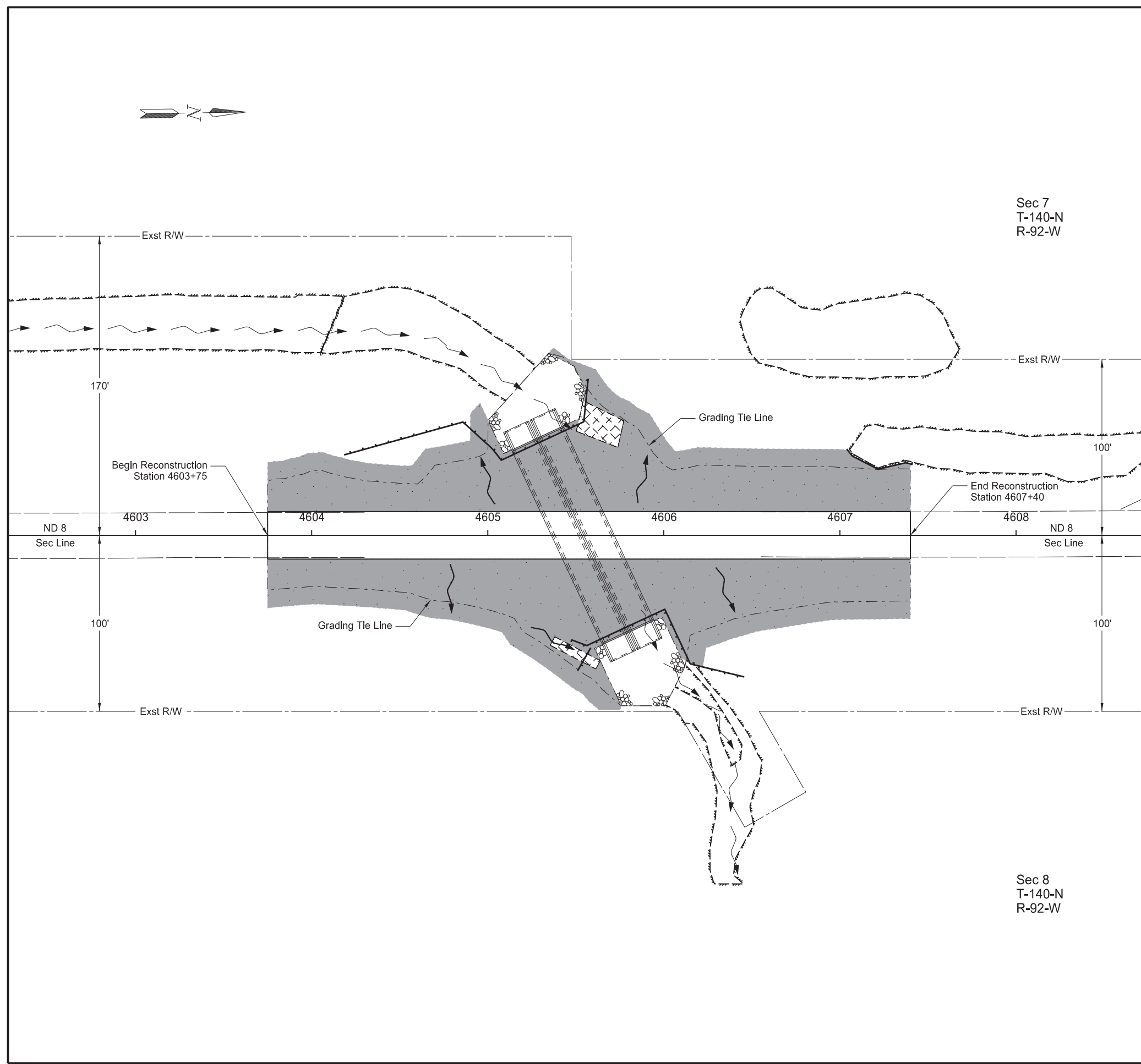
Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Permanent Erosion Control



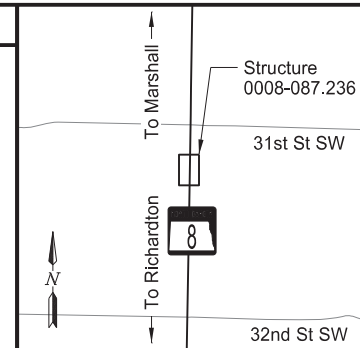
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	77	3

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II Sta 4603+75 to Sta 4607+40	0.66	ACRE
253	0101	STRAW MULCH Sta 4603+75 to Sta 4607+40	0.66	ACRE
255	0103	ECB TYPE 3 Sta 4603+75 to Sta 4607+40	64	SY
261	0112	FIBER ROLLS 12IN Sta 4603+75 to Sta 4607+40	316	LF



For ditch grades encountered in the field not listed, use the following spacing:
 Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

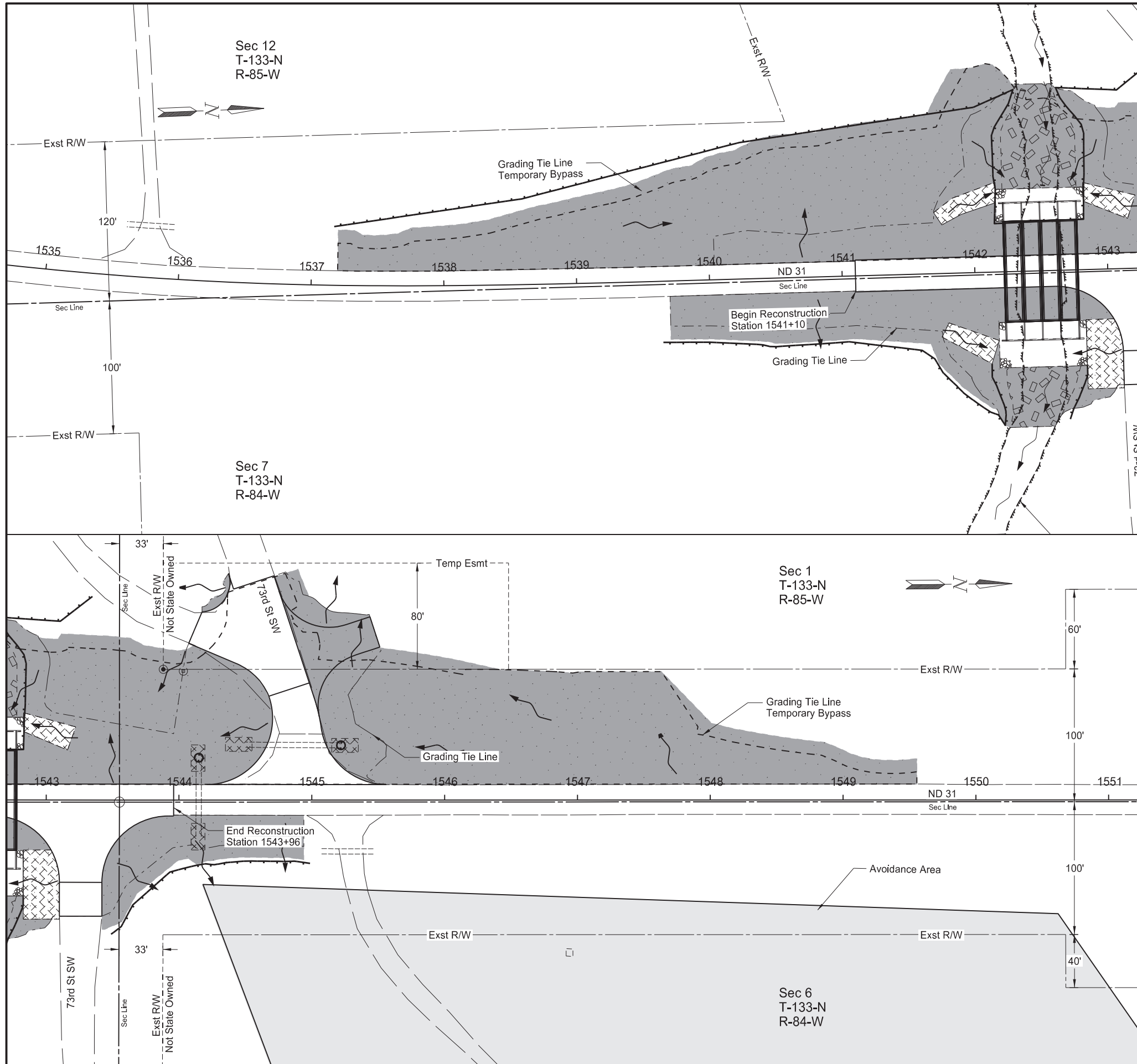
DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	<ul style="list-style-type: none"> Seeding Class II & Straw Mulch Fiber Rolls Wetland Seed & Straw Mulch Riprap (See Section 170) ECB Type III
2%	40	
3%	30	
4%	20	



Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Permanent Erosion Control



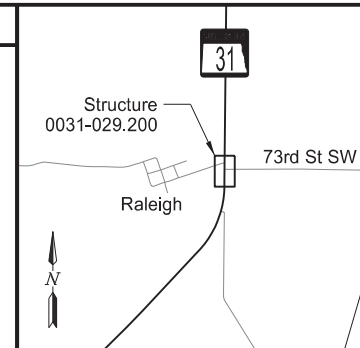


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	77	4

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II Sta 1541+10 to Sta 1543+96	3.51	ACRE
251	1000	WETLAND SEED Sta 1541+10 to Sta 1543+96	0.13	ACRE
253	0101	STRAW MULCH Sta 1541+10 to Sta 1543+96	3.64	ACRE
255	0103	ECB TYPE 3 Sta 1541+10 to Sta 1543+96	455	SY
261	0112	FIBER ROLLS 12IN Sta 1541+10 to Sta 1543+96	1,462	LF

For ditch grades encountered in the field not listed, use the following spacing:
 Spacing = { Diameter of Roll (ft) - Entrenchment (ft) } / Slope (ft/ft)

DITCH FIBER SPACING		LEGEND
Ditch Grade	Spacing (ft)	
1%	85	Seeding Class II & Straw Mulch Fiber Rolls Wetland Seed & Straw Mulch Riprap (See Section 170) ECB Type III
2%	40	
3%	30	
4%	20	



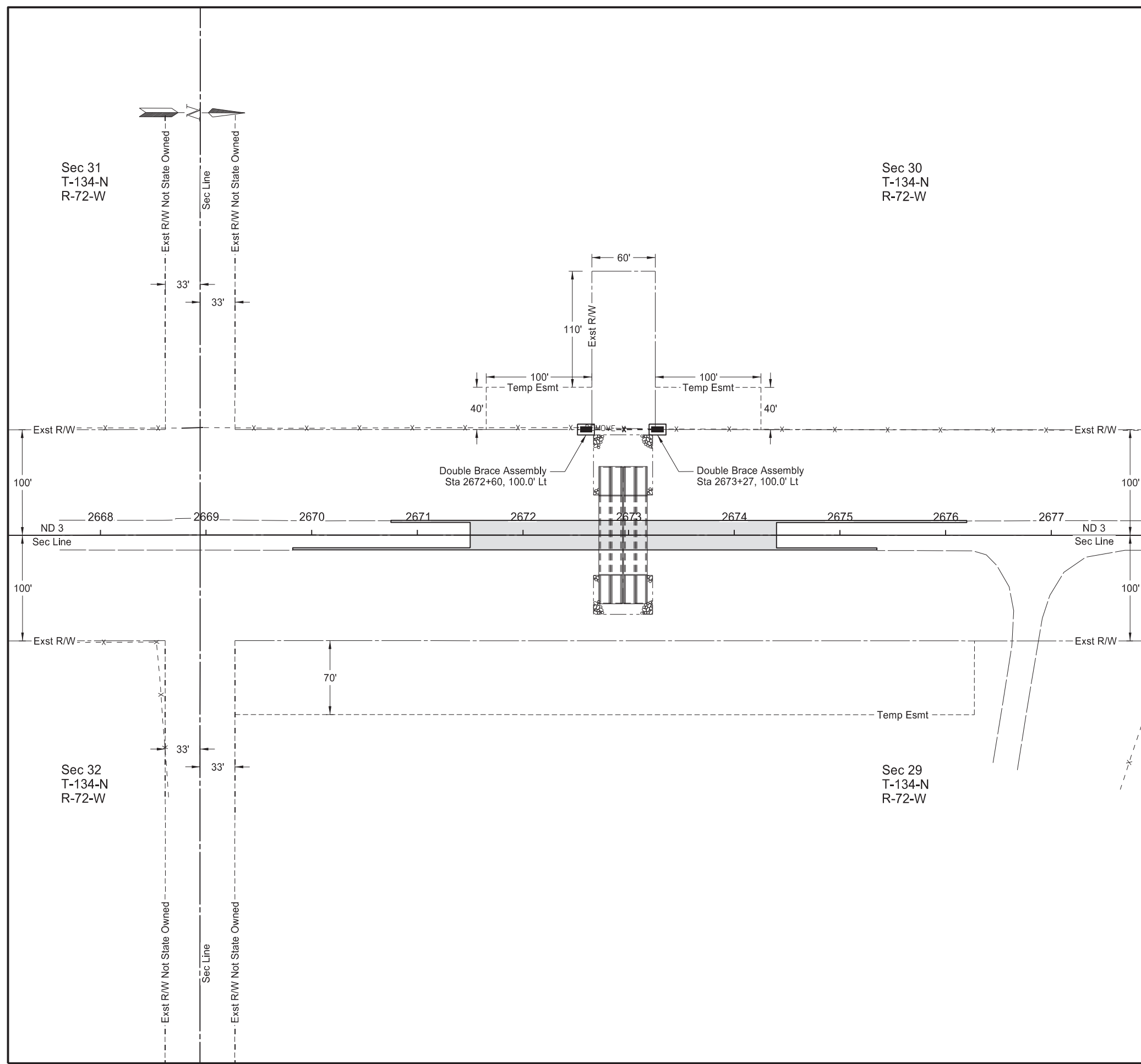
Various Structures - Statewide
 Structure 0031-029.200
 ND 31 - Grant County

Permanent Erosion Control



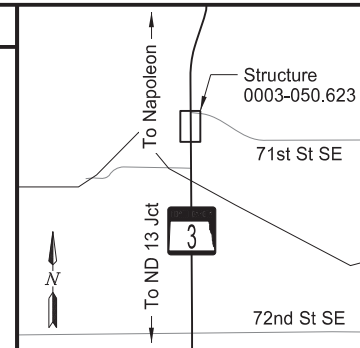
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	80	1

SPEC	CODE	BID ITEM	QTY	UNIT
202	0312	REMOVE EXISTING FENCE Sta 2672+52 to 2673+35 Lt	84	LF
752	0200	FENCE BARBED WIRE 4 STRAND Sta 2672+52 to 2673+35 Lt	84	LF
752	4100	DOUBLE BRACE ASSEMBLY BARBED WIRE Sta 2672+60 ~ 100' Lt	1	EA
		Sta 2673+27 ~ 100' Lt	1	EA



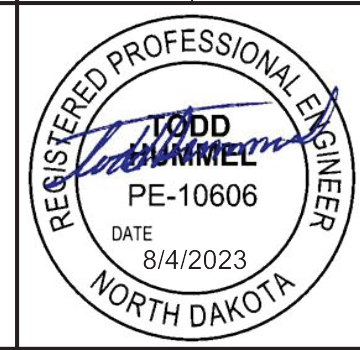
LEGEND

- REMOVE -	Remove Fence	▲	Fence Terminal
-x-x-	Barbed Wire Fence	●	Corner Assembly
-x-x-	Temporary Fence	■	Double Brace Assembly



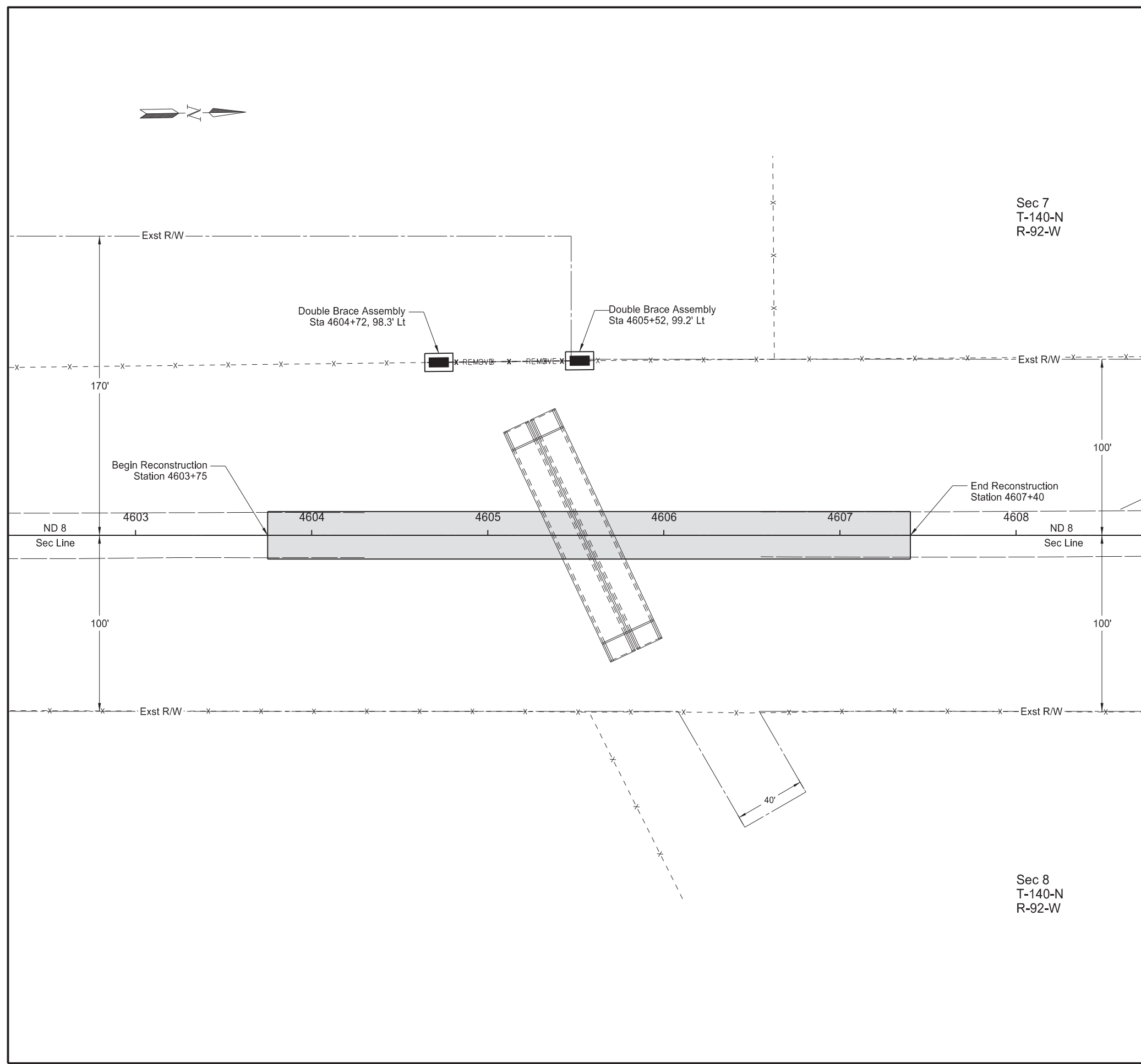
Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

Fencing Layout

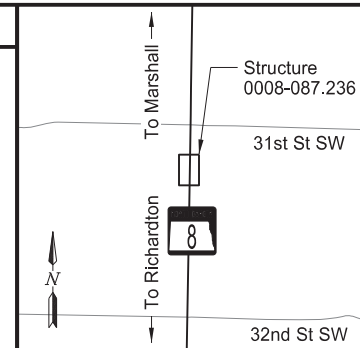


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	80	2

SPEC	CODE	BID ITEM	QTY	UNIT
202	0312	REMOVE EXISTING FENCE Sta 4604+64 to 4605+60 Lt	96	LF
752	0200	FENCE BARBED WIRE 4 STRAND Sta 4604+64 to 4605+60 Lt	96	LF
752	4100	DOUBLE BRACE ASSEMBLY BARBED WIRE Sta 4604+72 ~ 98.3' Lt Sta 4605+52 ~ 99.2' Lt	1 1	EA EA

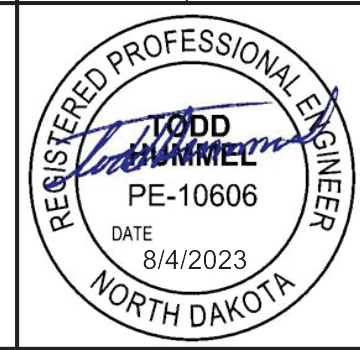


LEGEND	
- REMOVE -	Remove Fence
- -x- -	Barbed Wire Fence
- -x- -	Temporary Fence
▲	Fence Terminal
●	Corner Assembly
■	Double Brace Assembly



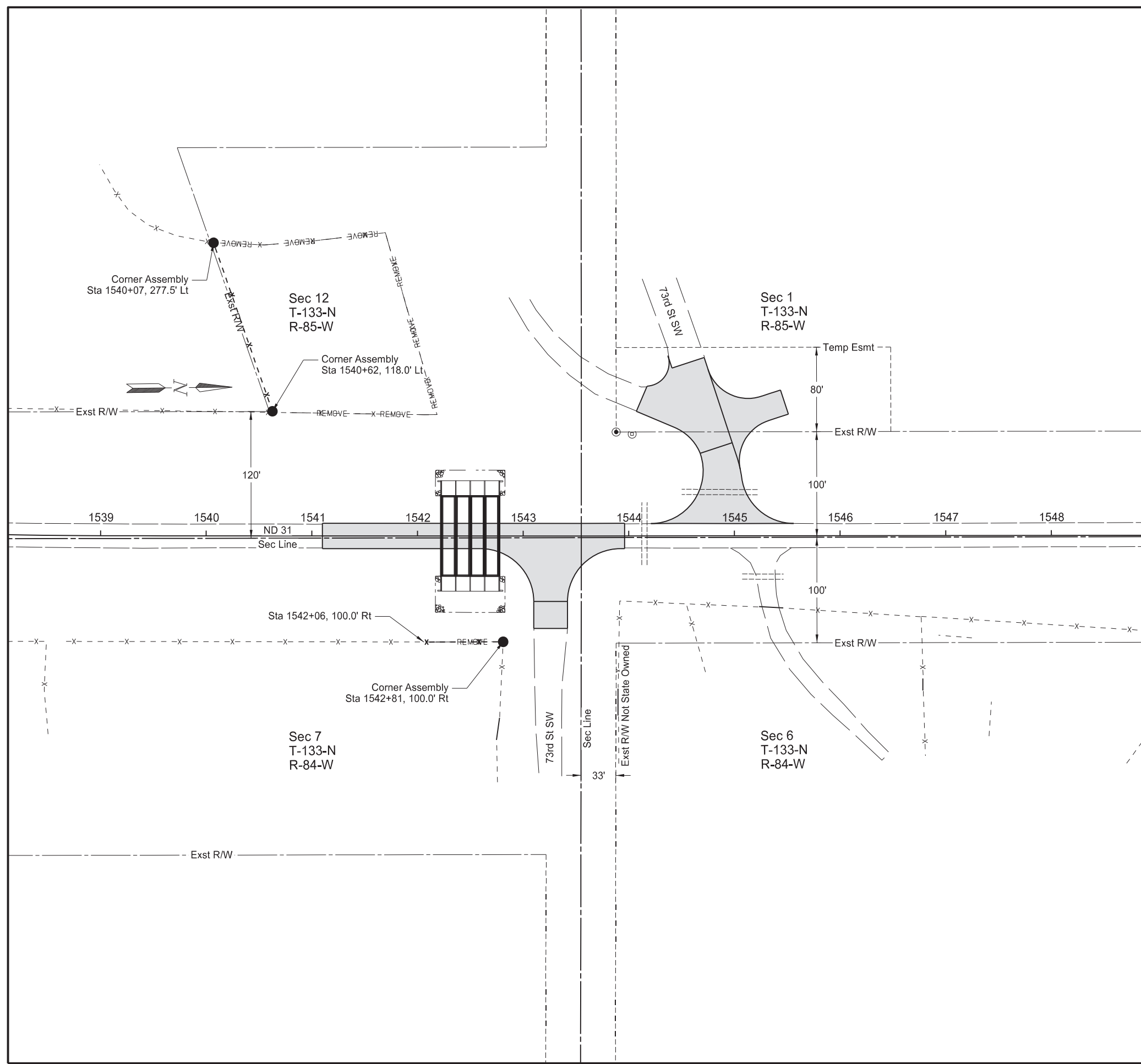
Various Structures - Statewide
Structure 0008-087.236
ND 8 - Stark County

Fencing Layout



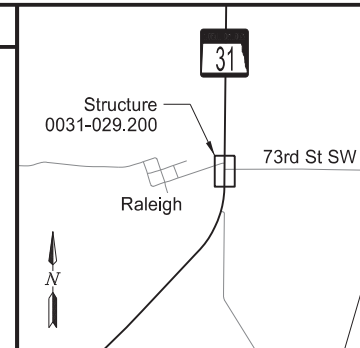
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	80	3

SPEC	CODE	BID ITEM	QTY	UNIT
202	0312	REMOVE EXISTING FENCE		
		Sta 1540+07 to 1540+62 Lt	498	LF
		Sta 1542+06 to 1542+81 Rt	75	LF
752	0200	FENCE BARBED WIRE 4 STRAND		
		Sta 1540+07 to 1540+62 Lt	169	LF
		Sta 1542+06 to 1542+81 Rt	75	LF
752	3140	CORNER ASSEMBLY BARBED WIRE		
		Sta 1540+07 ~ 277.5' Lt	1	EA
		Sta 1540+62 ~ 118.0' Lt	1	EA
		Sta 1542+81 ~ 100.0 Rt	1	EA



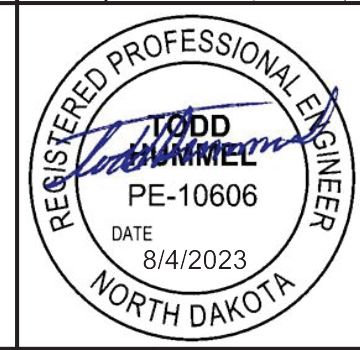
LEGEND

- REMOVE -	Remove Fence	▲	Fence Terminal
- -x- -	Barbed Wire Fence	●	Corner Assembly
- -x- -	Temporary Fence	▣	Double Brace Assembly



Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

Fencing Layout



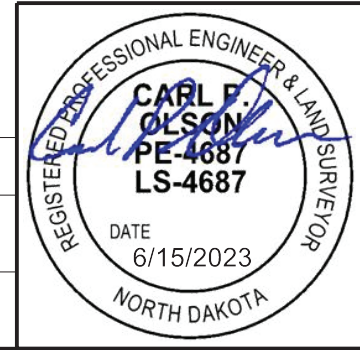
PRELIMINARY SURVEY COORDINATE AND CURVE DATA - ND 3 / ND 11, 4.5 MILES WEST OF ASHLEY (McINTOSH COUNTY)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	81	1

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
ND Highway 11(CHAIN SCL11)				ND Highway 11		T-130-N R-70-W				Primary Control (Station/Offset from Chain SCL11)					
BEGIN	Rec Sec Cor 560+81.12	133,252.62	2,226,965.95	CUR		SW Cor Sec 32	3-N	133,252.62	2,226,965.95	RTK 1	133,369.14	2,230,832.45	2,033.46	599+49	77' LT
PC	604+10.42	133,297.31	2,231,295.03	PI Sta	= 613+61.90	SE Cor Sec 32	5-N	133,307.13	2,232,246.46	#5 x 18" Rebar w/ Plastic Cap					
PI	CUR Rec Sec Cor 613+61.90	133,307.13	2,232,246.46	Delta	= 89° 45' 58" (LT)					RTK 2	133,307.14	2,232,246.51	2,042.26	611+59	393' RT
PT	619+07.21	134,258.59	2,232,240.52	Da	= 5° 59' 50"					T-Iron - 7 In Down - SE Cor Sec 32-132-70					
END	621+55.74	134,507.10	2,232,238.97	R	= 955.37'										
				L	= 1496.79'										
				T	= 951.48'										

- All coordinates and measurements on this document derived from the International Foot definition.
- INITIALIZING BENCH MARK
VRS Station
- NAVD-88
 - _____
 - GEOID12A _____
 - GEOID18

- Assumed Coordinates
- All coordinates on this sheet are McIntosh County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9999400



NOTES: Sheet 1 of 4
Control was set from TVN base and verified against OPUS values from static session on RTK 1.

Date Survey Completed 7/12/2022

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - ND 3 - 9 MILES WEST OF ND 34 (LOGAN COUNTY)

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	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
ND Highway 3 (CHAIN SCL3)				ND Highway 3		T-134-N R-72-W				Primary Control (Station/Offset from Chain SCL11)					
BEGIN	Rec Sec Cor 2616+13.79	257,703.32	2,153,156.12	CUR		SW Cor Sec 29	3-L	262,983.80	2,153,123.55	GPS 1	257,729.20	2,153,266.72	2,045.27	2616+39	111' RT
	Rec Sec Cor 2668+94.38	262,983.80	2,153,123.55	PI Sta = 2691+63.37		SW Cor Sec 32	3-N	257,703.32	2,153,156.12	#6 X 24" Rebar w/ Aluminum Cap 30-1					
	PC 2686+56.98	264,746.39	2,153,116.10	Delta = 19° 03' 52" (RT)		W 1/4 Cor Sec 29	3-K	265,618.40	2,153,112.41	RTK 2	264,044.02	2,153,078.55	1,938.74	2679+55	41' LT
	PI CUR 2691+63.38	265,252.78	2,153,113.96	Da = 1° 54' 00"		NE Cor Sec 32	5-L	263,005.79	2,158,395.30	#5 X 18" Rebar w/ Plastic Cap					
	PT 2696+60.41	265,732.10	2,153,277.34	R = 3015.71'		SE Cor Sec 32	5-N	257,736.60	2,158,411.94	RTK 3	262,703.56	2,158,364.33	1,999.66	2665+82	5239' RT
	END 2700+94.11	266,142.61	2,153,417.26	L = 1003.44'											
				T = 506.40'											

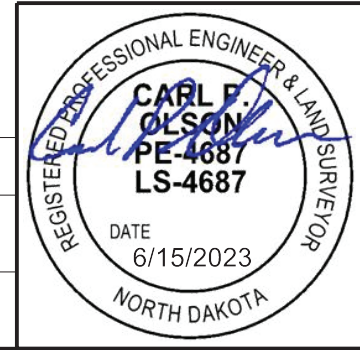
All coordinates and measurements on this document derived from the International Foot definition.

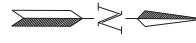
- INITIALIZING BENCH MARK VRS Station
- NAVD-88
 - _____
 - GEOID12A _____
 - GEOID18

- Assumed Coordinates
- All coordinates on this sheet are Logan County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998720

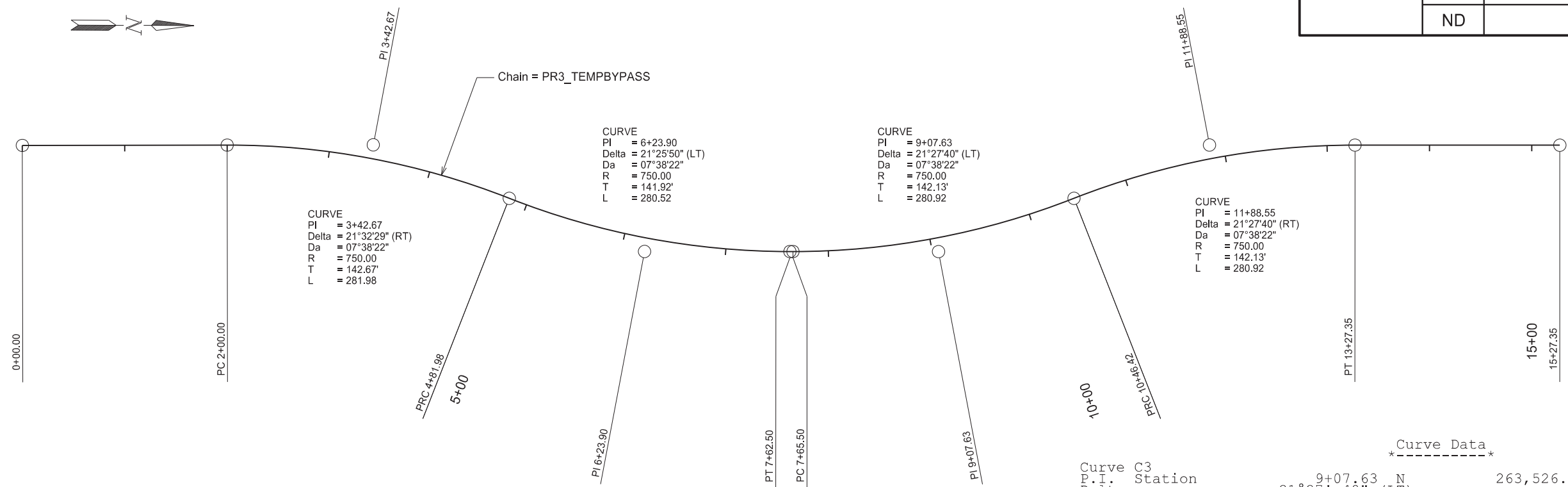
Date Survey Completed 7/27/2022

NOTES: Sheet 2 of 4
Control was set from TVN base and verified against OPUS values from static session on RTK 1.





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	82	1



Beginning chain PR3 TEMPYPASS description

Point 1 N 262,631.93 E 2,153,125.72 Sta 0+00.00
 Course from 1 to PC C1 N 0°21' 12" W Dist 200.00

Curve Data

Curve C1	P.I. Station	3+42.67 N	262,974.59 E	2,153,123.61
	Delta	21°32' 29" (RT)		
	Degree	7°38' 22"		
	Tangent	142.67		
	Length	281.98		
	Radius	750.00		
	External	13.45		
	Long Chord	280.32		
	Mid. Ord.	13.21		
	P.C. Station	2+00.00 N	262,831.92 E	2,153,124.49
	P.T. Station	4+81.98 N	263,107.62 E	2,153,175.18
	C.C. Station		262,836.55 E	2,153,874.48
	Back	= N 0°21' 12" W		
	Ahead	= N 21°11' 17" E		
	Chord Bear	= N 10°25' 03" E		

Curve Data

Curve C2	P.I. Station	6+23.90 N	263,239.95 E	2,153,226.47
	Delta	21°25' 50" (LT)		
	Degree	7°38' 22"		
	Tangent	141.92		
	Length	280.52		
	Radius	750.00		
	External	13.31		
	Long Chord	278.89		
	Mid. Ord.	13.08		
	P.C. Station	4+81.98 N	263,107.62 E	2,153,175.18
	P.T. Station	7+62.50 N	263,381.87 E	2,153,225.87
	C.C. Station		263,378.69 E	2,152,475.88
	Back	= N 21°11' 17" E		
	Ahead	= N 0°14' 32" W		
	Chord Bear	= N 10°28' 22" E		

Course from PT C2 to PC C3 N 0°14' 32" W Dist 3.00

Curve Data

Curve C3	P.I. Station	9+07.63 N	263,526.99 E	2,153,225.26
	Delta	21°27' 40" (LT)		
	Degree	7°38' 22"		
	Tangent	142.13		
	Length	280.92		
	Radius	750.00		
	External	13.35		
	Long Chord	279.28		
	Mid. Ord.	13.11		
	P.C. Station	7+65.50 N	263,384.87 E	2,153,225.86
	P.T. Station	10+46.42 N	263,659.04 E	2,153,172.70
	C.C. Station		263,381.69 E	2,152,475.87
	Back	= N 0°14' 32" W		
	Ahead	= N 21°42' 12" W		
	Chord Bear	= N 10°58' 22" W		

Curve Data

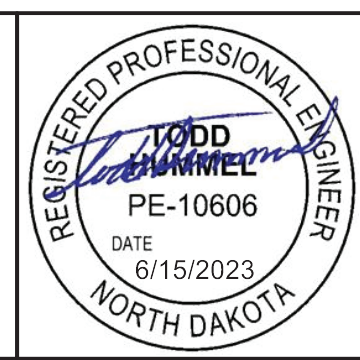
Curve C4	P.I. Station	11+88.55 N	263,791.10 E	2,153,120.14
	Delta	21°27' 40" (RT)		
	Degree	7°38' 22"		
	Tangent	142.13		
	Length	280.92		
	Radius	750.00		
	External	13.35		
	Long Chord	279.28		
	Mid. Ord.	13.11		
	P.C. Station	10+46.42 N	263,659.04 E	2,153,172.70
	P.T. Station	13+27.35 N	263,933.22 E	2,153,119.54
	C.C. Station		263,936.40 E	2,153,869.53
	Back	= N 21°42' 12" W		
	Ahead	= N 0°14' 32" W		
	Chord Bear	= N 10°58' 22" W		

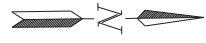
Course from PT C4 to 2 N 0°14' 32" W Dist 200.00
 Point 2 N 264,133.22 E 2,153,118.69 Sta 15+27.35

Ending chain PR3_TEMPYPASS description

Various Structures - Statewide
 Structure 0003-050.623
 ND 3 - Logan County

Survey Data Layout
 PR3_TEMPYPASS





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	82	2

Beginning chain OCL31 description

Point 3 N 249,002.23 E 1,764,872.67 Sta 1498+22.25
 Course from 3 to TS S1 N 43°05' 35" E Dist 1,929.67
 Spiral S1 Type 1 Spiral Element
 Angle 3°17' 59" (LT) P 1.44 BK N 43°05' 35" E
 LS 300.00 K 149.98 AH N 39°47' 36" E
 R 2,604.51 LT 200.03 CB N 41°59' 35" E
 YS 5.76 ST 100.03 Defl 1°06' 00"
 XS 299.90 LC 299.96 Deg 2°12' 00"

Spiral Coordinates

Point	North	East	Station
TS	250,411.36	1,766,190.99	1517+51.92
PI	250,557.44	1,766,327.66	1519+51.96
SC	250,634.30	1,766,391.68	1520+51.92
CC	252,301.23	1,764,390.48	

Curve Data

Curve C5
 P.I. Station 1528+92.31 N 251,280.02 E 1,766,929.54
 Delta = 35°45' 58" (LT)
 Degree = 2°12' 00"
 Tangent = 1,840.38
 Length = 1,625.83
 Radius = 2,604.51
 External = 132.22
 Long Chord = 1,599.56
 Mid. Ord. = 125.84
 P.C. Station 1520+51.92 N 250,634.30 E 1,766,391.68
 P.T. Station 1536+77.75 N 252,118.32 E 1,766,988.56
 C.C. = N 252,301.23 E 1,764,390.48
 Back = N 39°47' 36" E
 Ahead = N 4°01' 38" E
 Chord Bear = N 21°54' 37" E

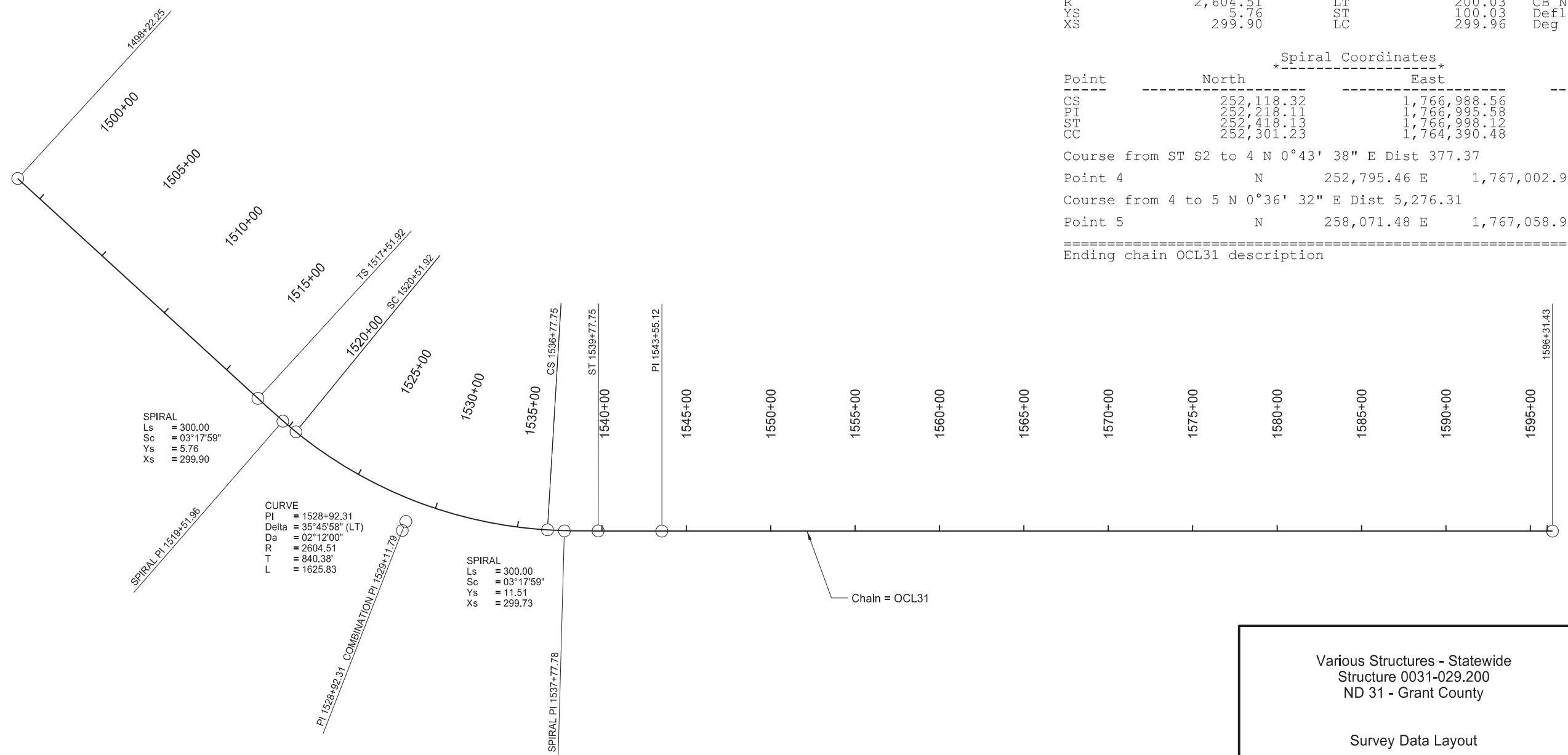
Spiral S2 Type 2 Spiral Element
 Angle 3°17' 59" (LT) P 1.44 BK N 4°01' 38" E
 LS 300.00 K 149.98 AH N 0°43' 38" E
 R 2,604.51 LT 200.03 CB N 1°49' 38" E
 YS 5.76 ST 100.03 Defl 1°06' 00"
 XS 299.90 LC 299.96 Deg 2°12' 00"

Spiral Coordinates

Point	North	East	Station
CS	252,118.32	1,766,988.56	1536+77.75
PI	252,218.11	1,766,995.58	1537+77.78
ST	252,418.13	1,766,998.12	1539+77.75
CC	252,301.23	1,764,390.48	

Course from ST S2 to 4 N 0°43' 38" E Dist 377.37
 Point 4 N 252,795.46 E 1,767,002.91 Sta 1543+55.12
 Course from 4 to 5 N 0°36' 32" E Dist 5,276.31
 Point 5 N 258,071.48 E 1,767,058.98 Sta 1596+31.43

Ending chain OCL31 description



SPIRAL
 Ls = 300.00
 Sc = 03°17'59"
 Ys = 5.76
 Xs = 299.90

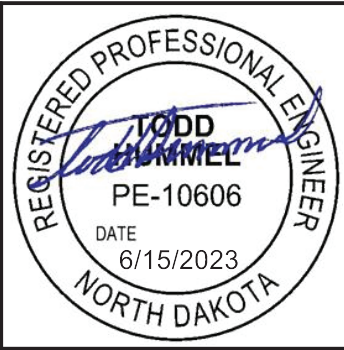
CURVE
 PI = 1528+92.31
 Delta = 35°45'58" (LT)
 Da = 02°12'00"
 R = 2604.51
 T = 840.38'
 L = 1625.83

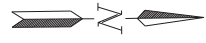
SPIRAL
 Ls = 300.00
 Sc = 03°17'59"
 Ys = 11.51
 Xs = 299.73

Chain = OCL31

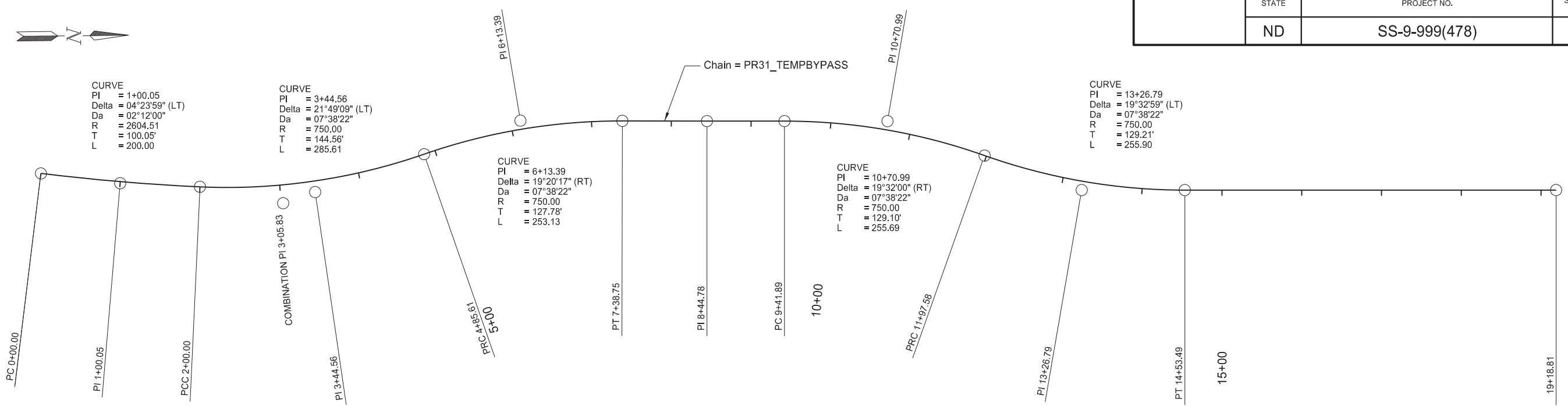
Various Structures - Statewide
 Structure 0031-029.200
 ND 31 - Grant County

 Survey Data Layout
 OCL31





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	82	3



Beginning chain PR31_TEMPBYPASS description

Curve Data

Curve	P.I. Station	Delta	Length	Radius	External	Long Chord	Mid. Ord.	P.C. Station	P.T. Station	C.C.	Back	Ahead	Chord Bear
Curve C7	1+00.05 N	4°23'59" (LT)	200.00	2,604.51	1.92	199.95	1.92	0+00.00 N	2+00.00 N	N	7°36'28" E	3°12'29" E	5°24'29" E
								251,961.17 E	252,160.23 E	N			
								252,305.99 E		N			

Curve Data

Curve	P.I. Station	Delta	Length	Radius	External	Long Chord	Mid. Ord.	P.C. Station	P.T. Station	C.C.	Back	Ahead	Chord Bear
Curve C8	3+44.56 N	21°49'09" (LT)	285.61	750.00	13.80	283.89	13.55	2+00.00 N	4+85.61 N	N	3°12'29" E	18°36'40" W	7°42'05" W
								252,441.56 E	252,690.43 E	N			
								252,202.20 E		N			

Curve Data

Curve	P.I. Station	Delta	Length	Radius	External	Long Chord	Mid. Ord.	P.C. Station	P.T. Station	C.C.	Back	Ahead	Chord Bear
Curve C9	6+13.39 N	19°20'17" (RT)	253.13	750.00	10.81	251.93	10.65	4+85.61 N	7+38.75 N	N	18°36'38" W	0°43'38" E	8°56'30" W
								252,441.56 E	252,690.43 E	N			
								252,680.91 E		N			

Course from PT C9 to 10 N 0°43' 38" E Dist 106.03
 Point 10 N 252,796.45 E 1,766,917.92 Sta 8+44.78
 Course from 10 to PC C10 N 0°36' 32" E Dist 97.11

Curve Data

Curve C10

P.I. Station	Delta	Length	Radius	External	Long Chord	Mid. Ord.	P.C. Station	P.T. Station	C.C.	Back	Ahead	Chord Bear
10+70.99 N	19°32'00" (RT)	255.69	750.00	11.03	254.45	10.87	9+41.89 N	11+97.58 N	N	0°36'32" E	20°08'32" E	10°22'32" E
							252,893.56 E	253,143.86 E	N			
							252,885.59 E		N			

Curve Data

Curve C11

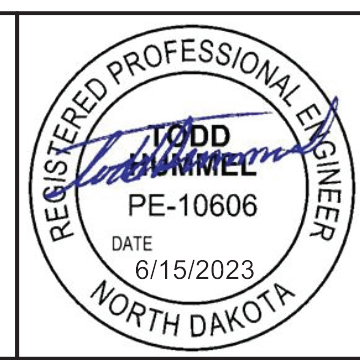
P.I. Station	Delta	Length	Radius	External	Long Chord	Mid. Ord.	P.C. Station	P.T. Station	C.C.	Back	Ahead	Chord Bear
13+26.79 N	19°32'59" (LT)	255.90	750.00	11.05	254.67	10.89	11+97.58 N	14+53.49 N	N	20°08'32" E	0°35'33" E	10°22'02" E
							253,143.86 E	253,394.36 E	N			
							253,402.12 E		N			

Course from PT C11 to 11 N 0°35' 33" E Dist 465.33
 Point 11 N 253,859.66 E 1,767,015.42 Sta 19+18.81

Ending chain PR31_TEMPBYPASS description

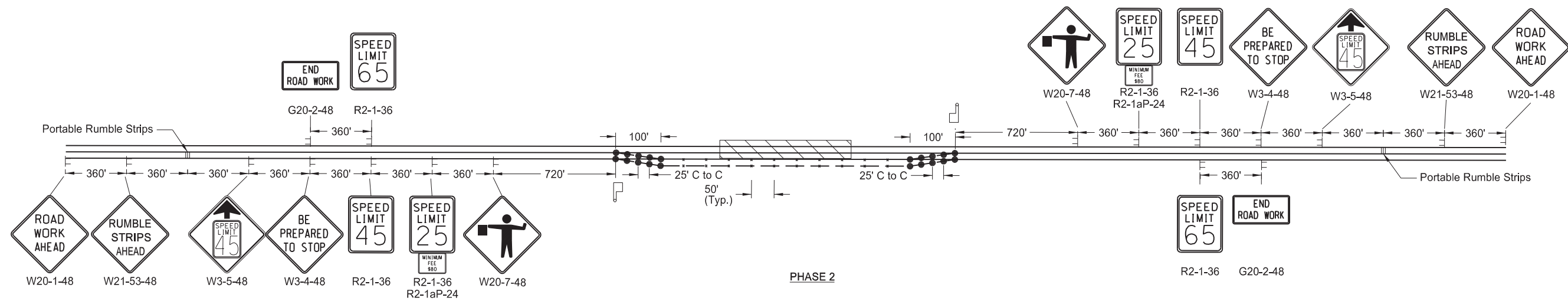
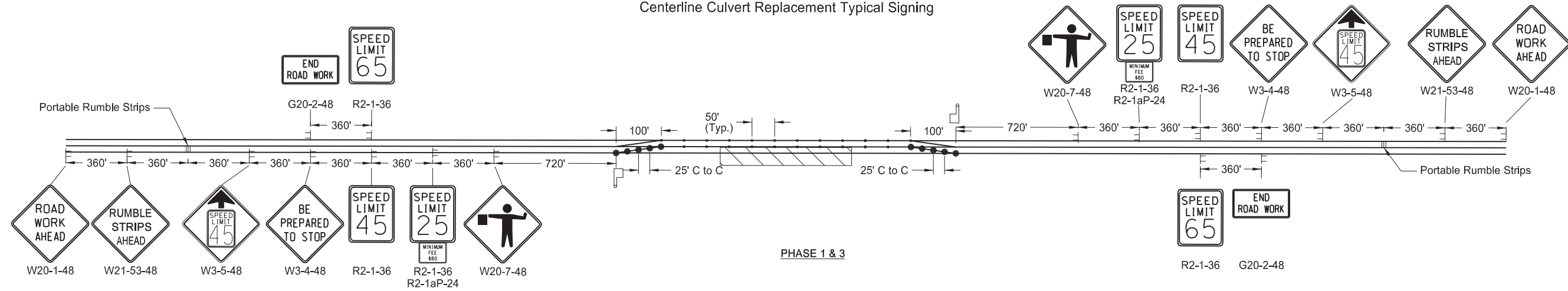
Various Structures - Statewide
 Structure 0031-029.200
 ND 31 - Grant County

Survey Data Layout
 PR31_TEMPBYPASS



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	2

Centerline Culvert Replacement Typical Signing



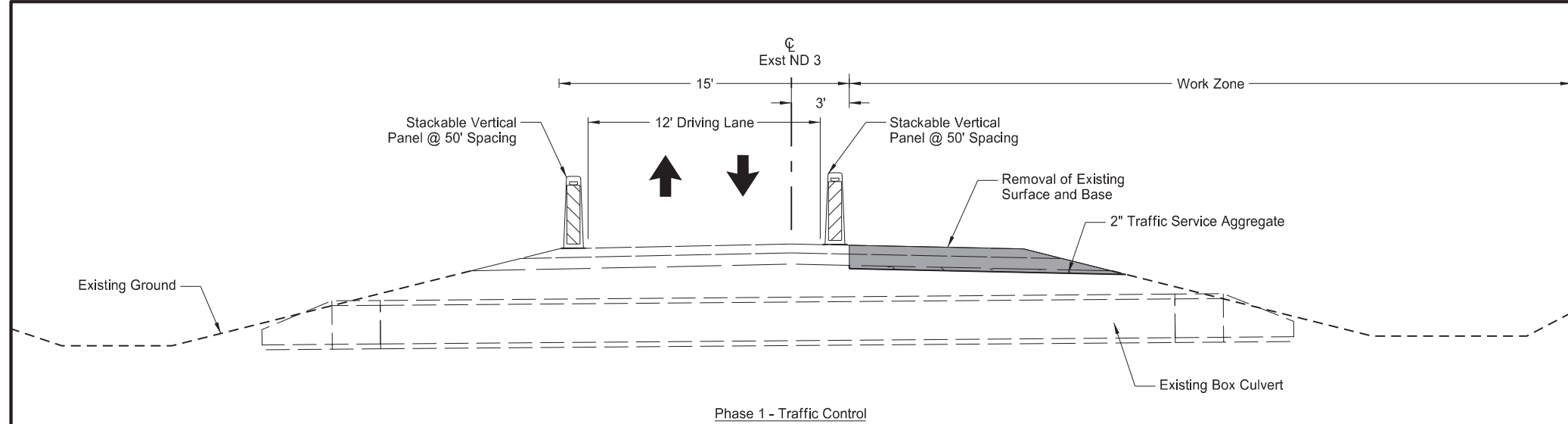
Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

Work Zone Traffic Control

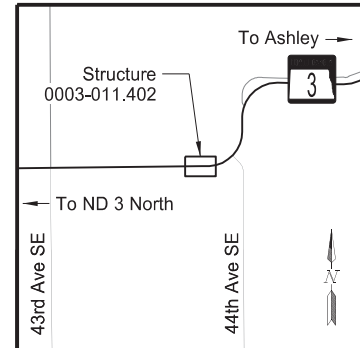
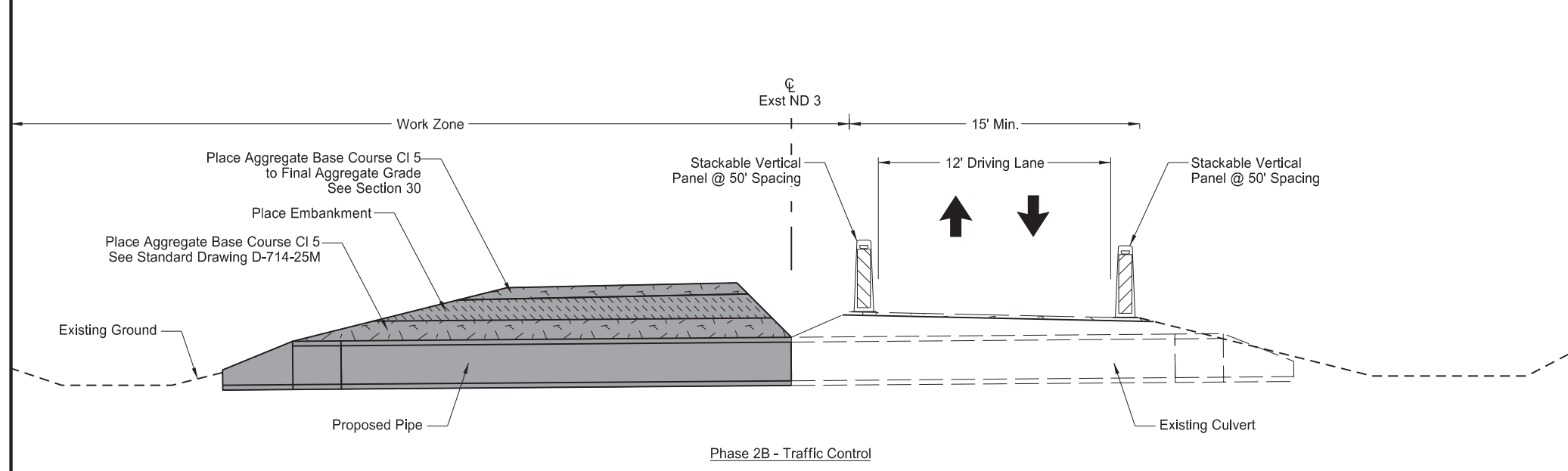
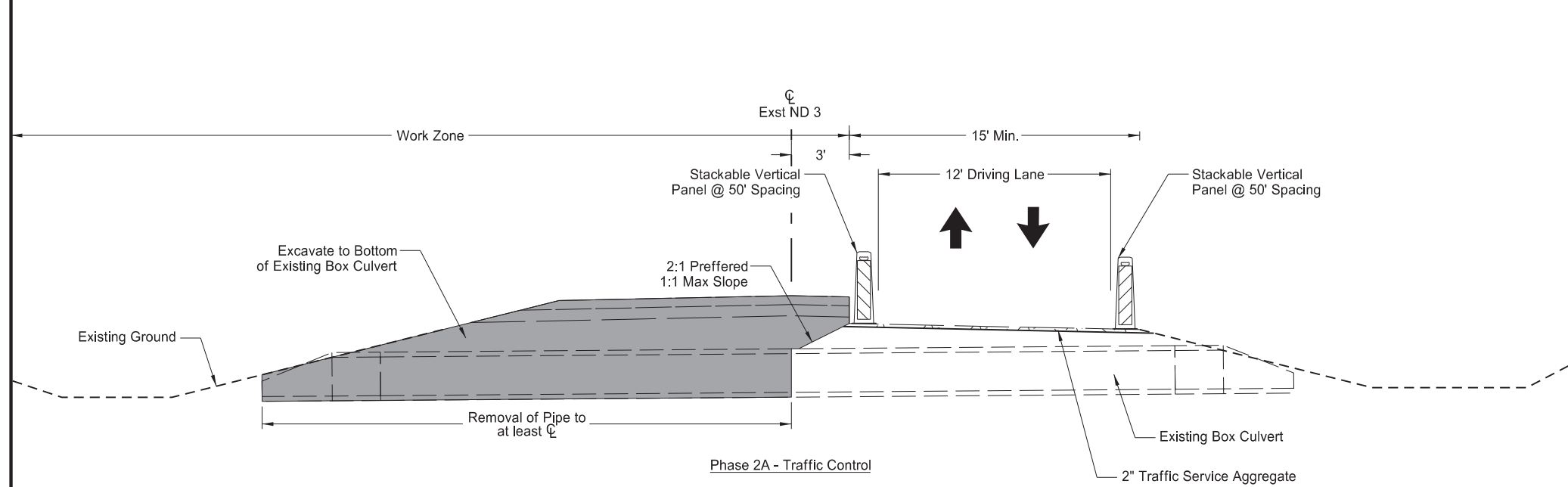
Construction Sign Layout
 One Lane Closure / Half at a Time
 Phases 1, 2, & 3



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	3



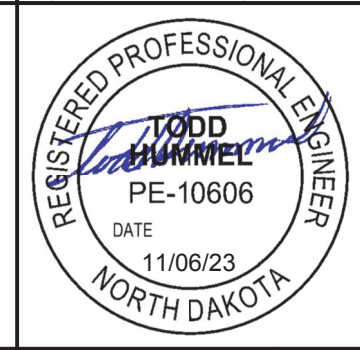
- Notes:
- All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Use flaggers to control traffic.
 - Refer to Standard Drawing D-704-19 for traffic control layout.
 - Drawing not to scale.
 - Phase 1
 - Shift one-lane traffic to left side of ND 3.
 - Remove existing surfacing and base to bottom of aggregate base course on right side of ND 3.
 - Phase 2A
 - Shift one-lane traffic to right side of ND 3.
 - Excavate left side of centerline to remove existing centerline pipe.
 - Maintain a 2:1 preferred slope (1:1 slope if necessary).
 - Phase 2B
 - Maintain one-lane traffic on right side of ND 3.
 - Construct proposed centerline pipe left of ND 3 centerline.
 - Construct permanent embankment on left side of ND 3.
 - Place Aggregate Base Course to final aggregate grade on left side of ND 3.



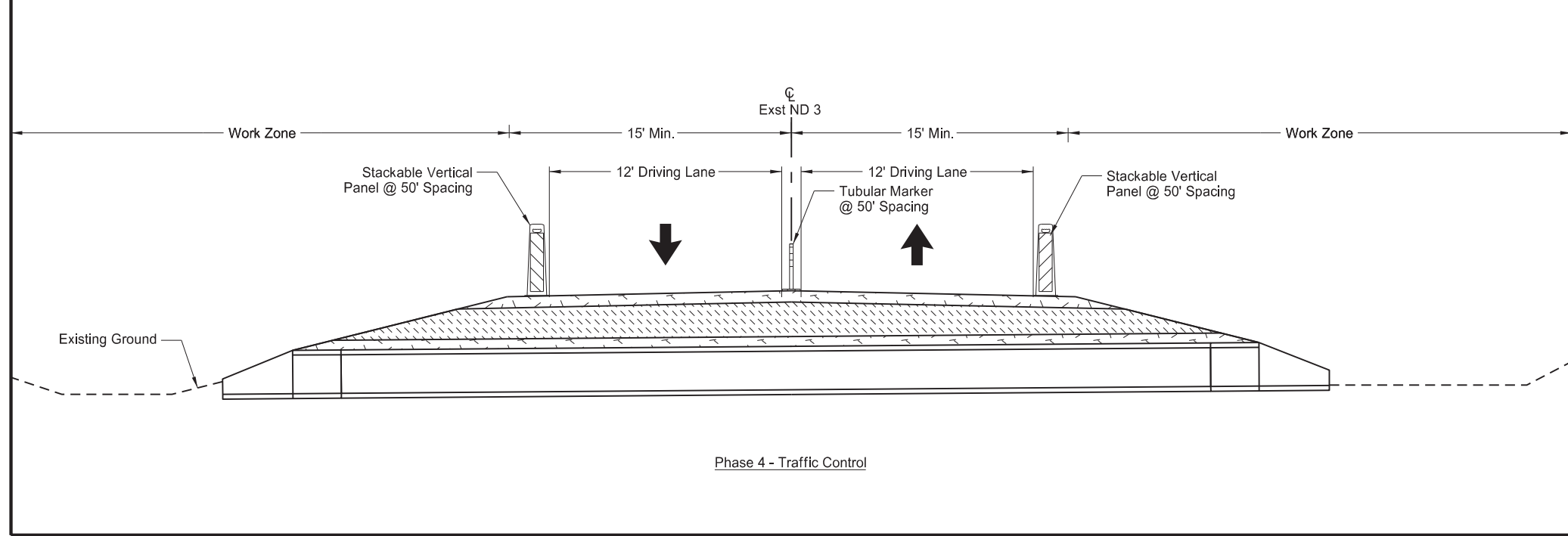
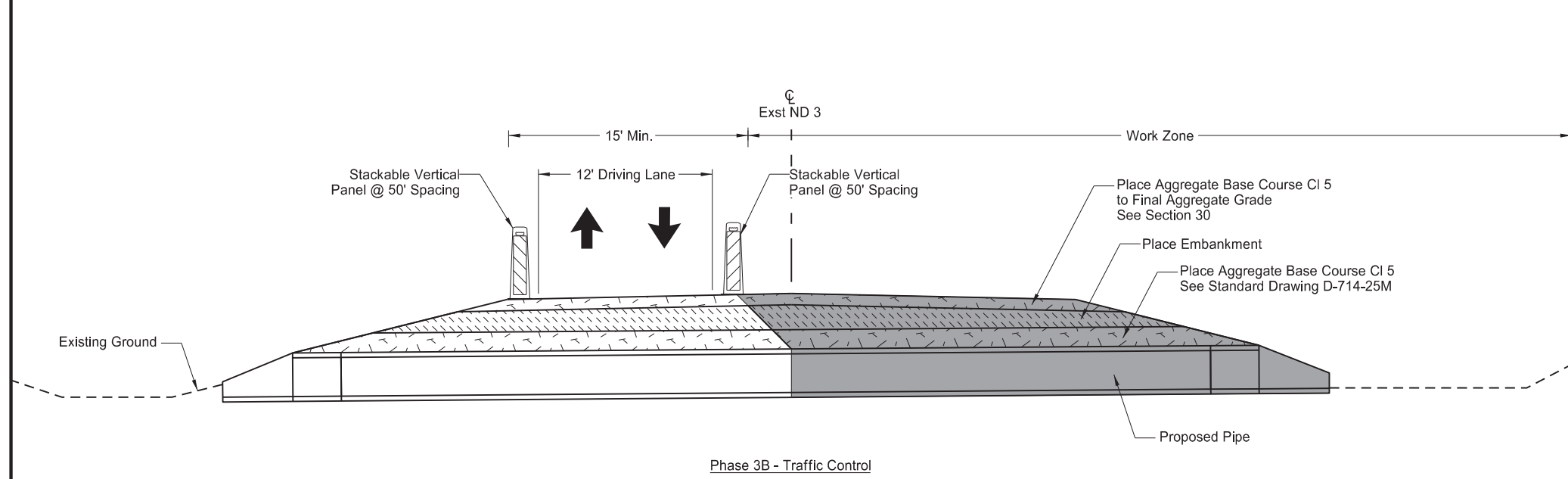
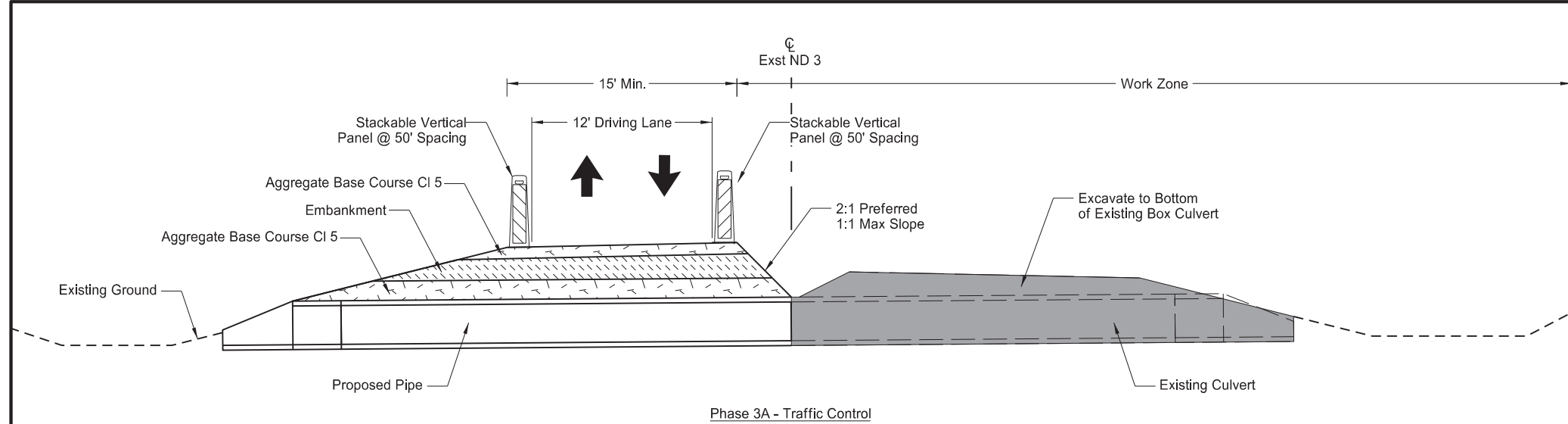
Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

Work Zone Traffic Control

Typical Sections
 One Lane Closure / Half at a Time
 Phases 1, 2A, 2B

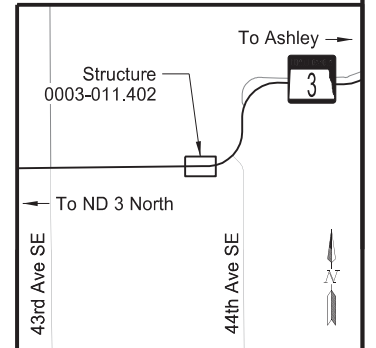


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	4



Notes:

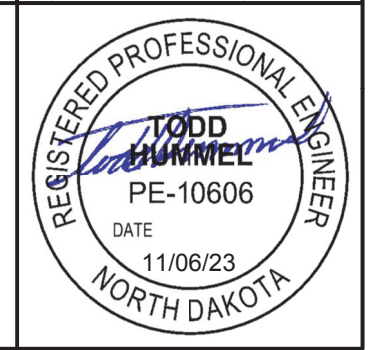
- All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Use flaggers to control traffic.
 - Refer to Standard Drawing D-704-19 for traffic control layout.
 - Drawing not to scale.
- Phase 3A
 - Shift one-lane traffic to left side of ND 3.
 - Excavate to bottom of existing centerline pipe on right side of ND 3.
 - Maintain a 2:1 preferred slope (1:1 slope if necessary).
- Phase 3B
 - Maintain one-lane traffic on left side of ND 3.
 - Construct proposed centerline pipe right of ND 3 centerline.
 - Construct permanent embankment on right side of ND 3.
 - Place Aggregate Base Course to final aggregate grade on right side of ND 3.
- Phase 4
 - Maintain two-way traffic at the end of workday.
 - Shift traffic to mainline ND 3.

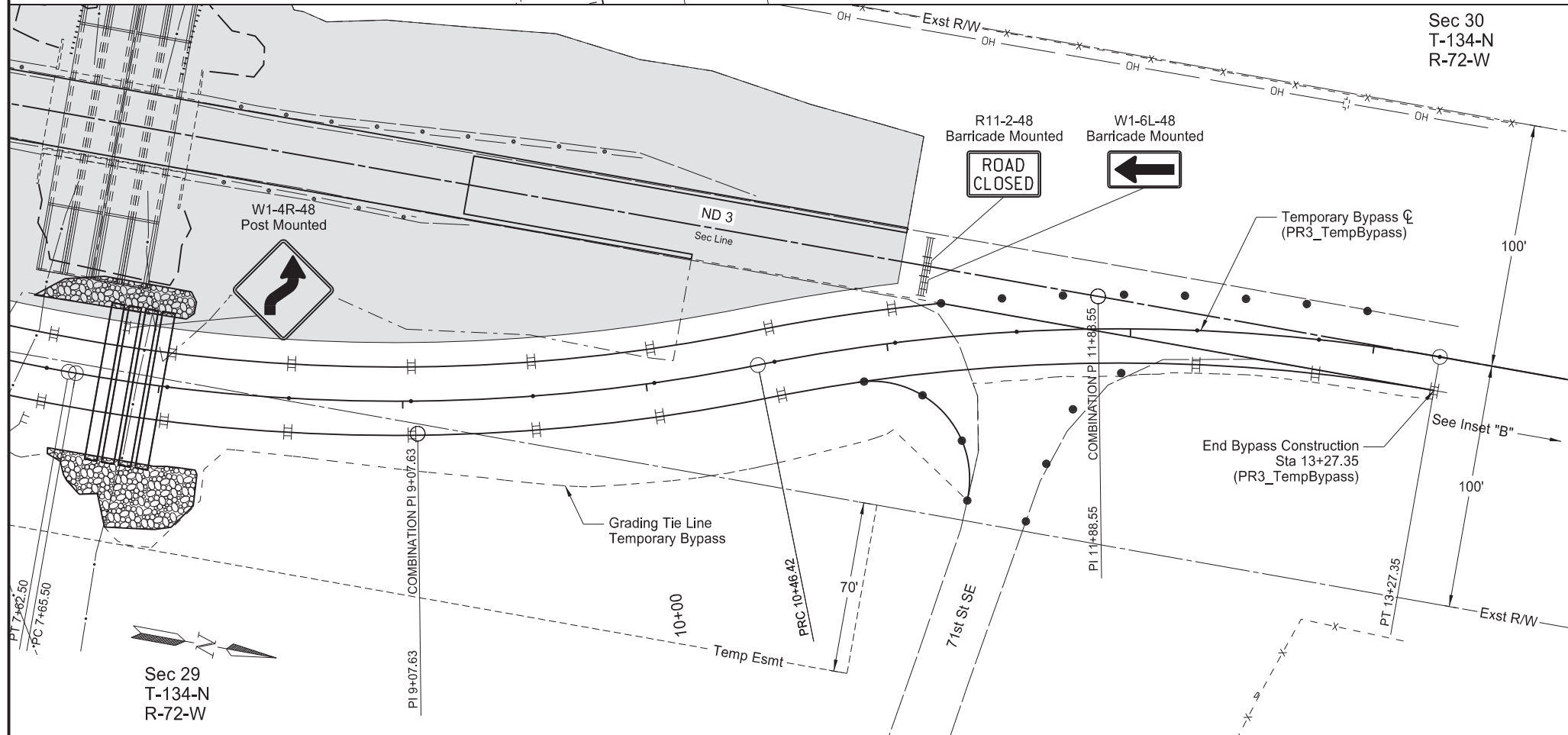
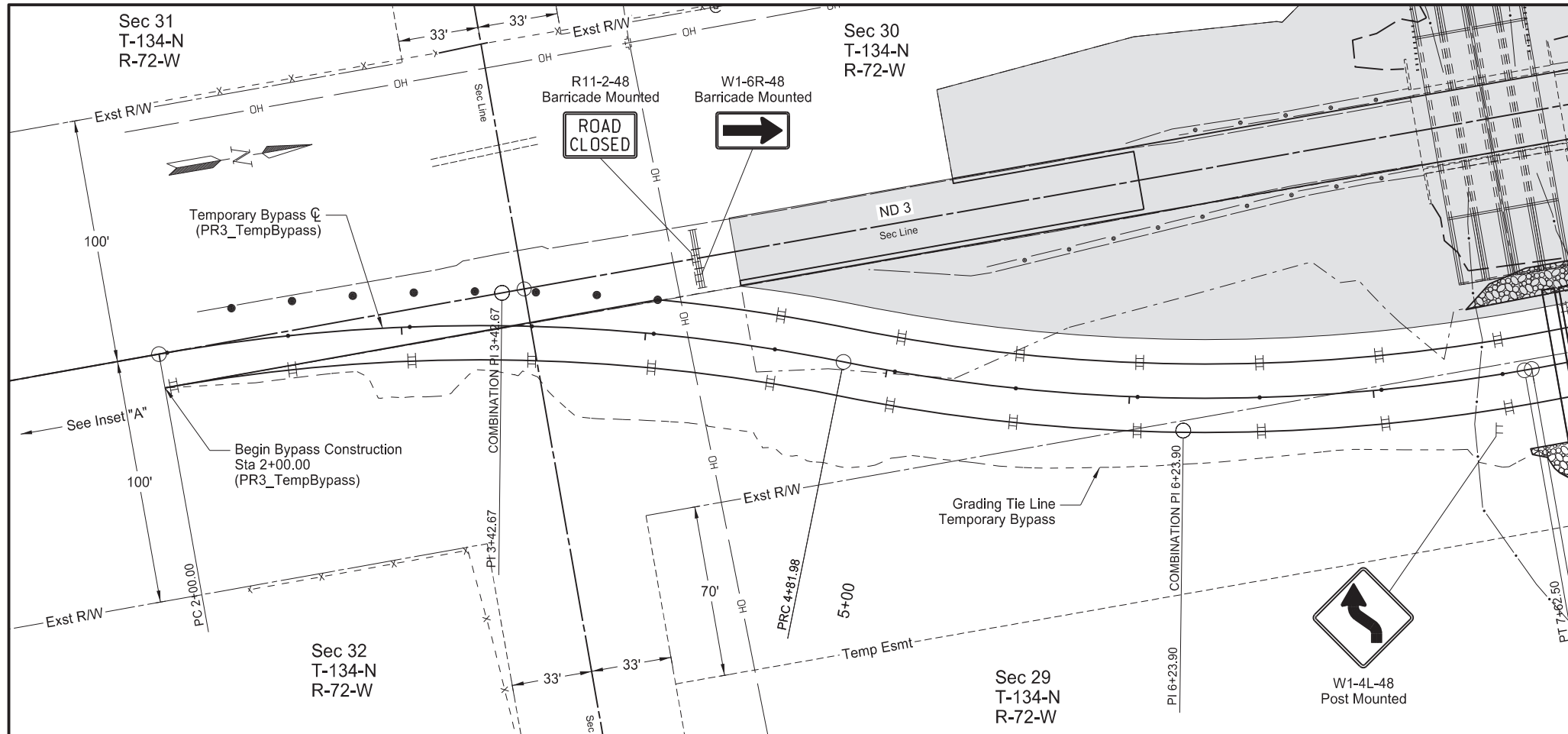


Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

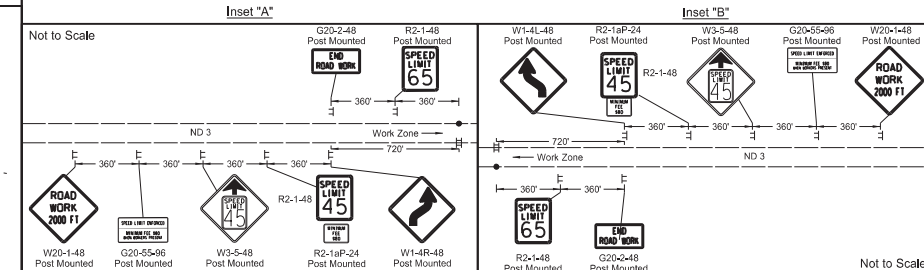
Work Zone Traffic Control

Typical Sections
 One Lane Closure / Half at a Time
 Phases 3A, 3B, 4



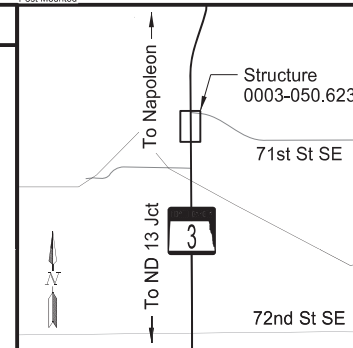


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	5



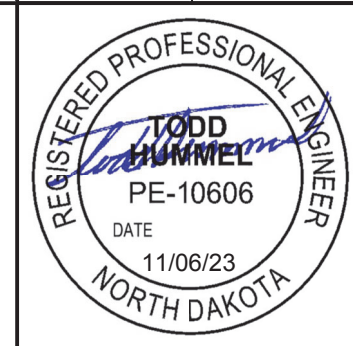
LEGEND

	Type III Barricade		Delineator Drum
	Traffic Control Sign		Tubular Marker
	Stackable Vertical Panel		Work Zone

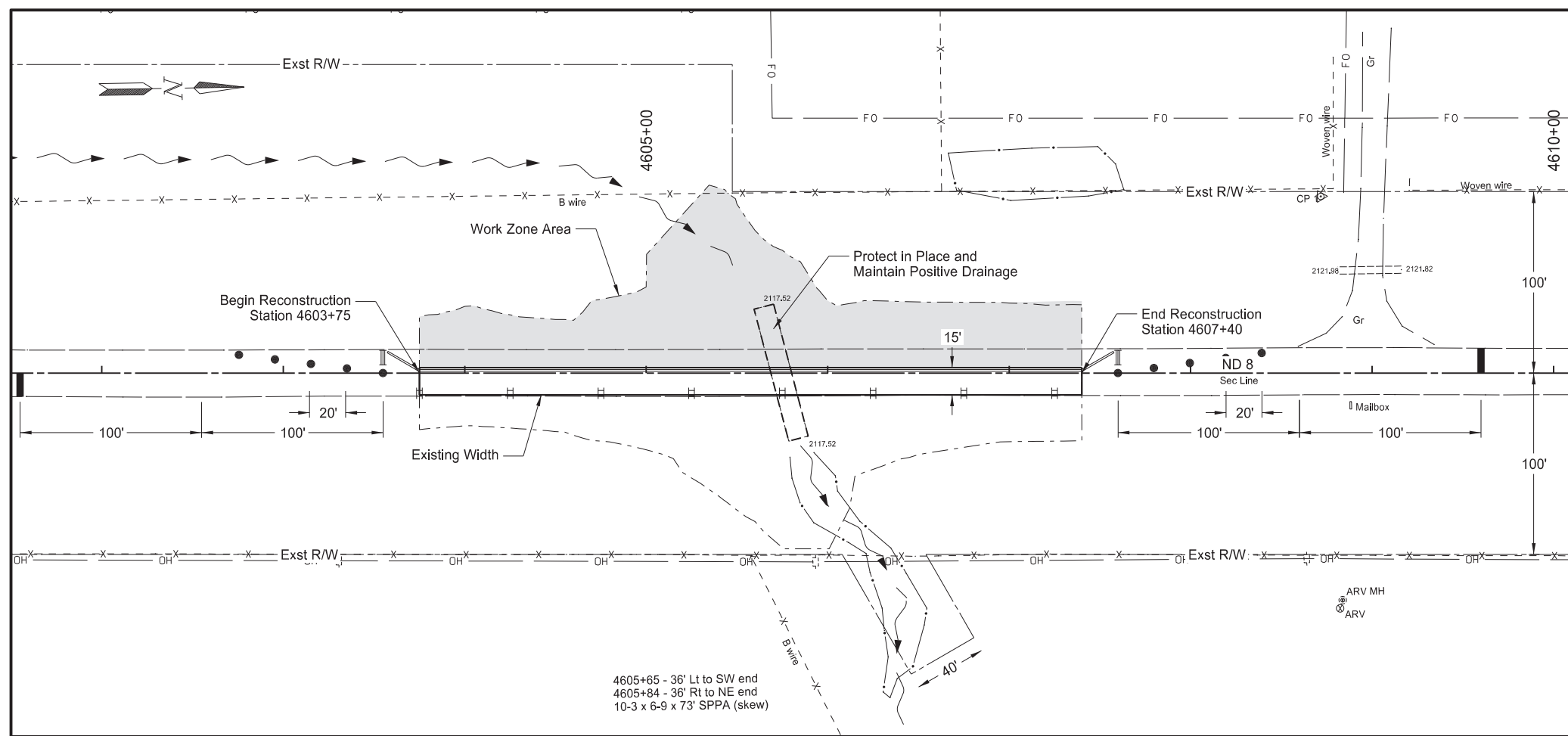


Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

Work Zone Traffic Control
Construction Signing
Temporary Bypass

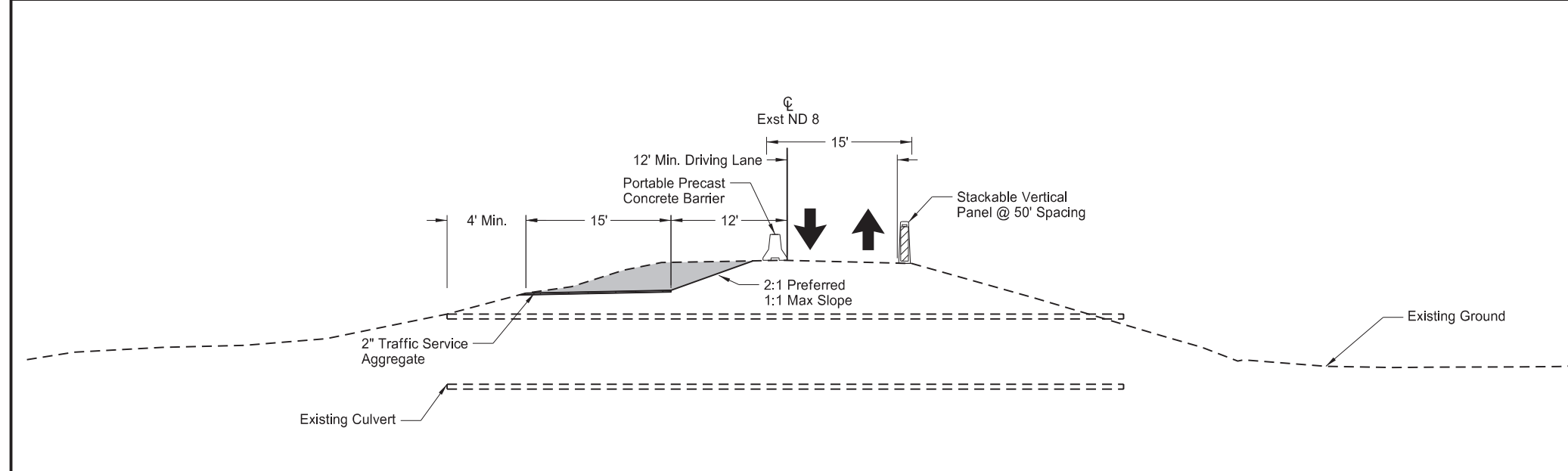


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	6



Notes:

1. All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Refer to Note 702-P04 for phasing details.
 - Refer to Standard Drawing D-704-16 for traffic control layout.
 - Drawing not to scale.
2. Phase 1
 - Install all traffic control signs and devices along the temporary roadway following D-704-16 - Lane Closure on a Two Lane Road Using Traffic Control Signals.
 - Shift traffic to project right, maintaining a minimum of 15' of the existing pavement surface.
 - Remove existing hot mix asphalt surfacing and aggregate base course on project left.
 - Remove and grade subgrade to a minimum width of 15' beginning at an offset of 12' left of centerline, a maximum profile grade of 6%, and a minimum of 1' of cover over the existing structure.
 - Provide a minimum of 2" of traffic service aggregate for the driving surface of the temporary roadway on project left.



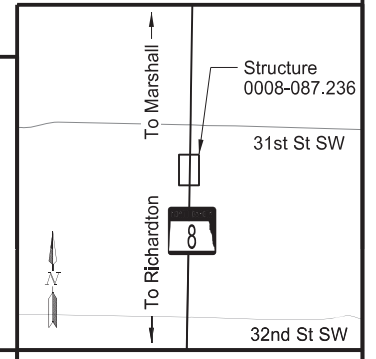
General Note:

Temporary bypass taper transitions must conform to MUTCD Table 6C-3 & Table 6C-4.

Shifting Taper = $0.5 L$ (minimum)

$L = W^2 / 60$ (40 mph or less)

Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit (25 mph)



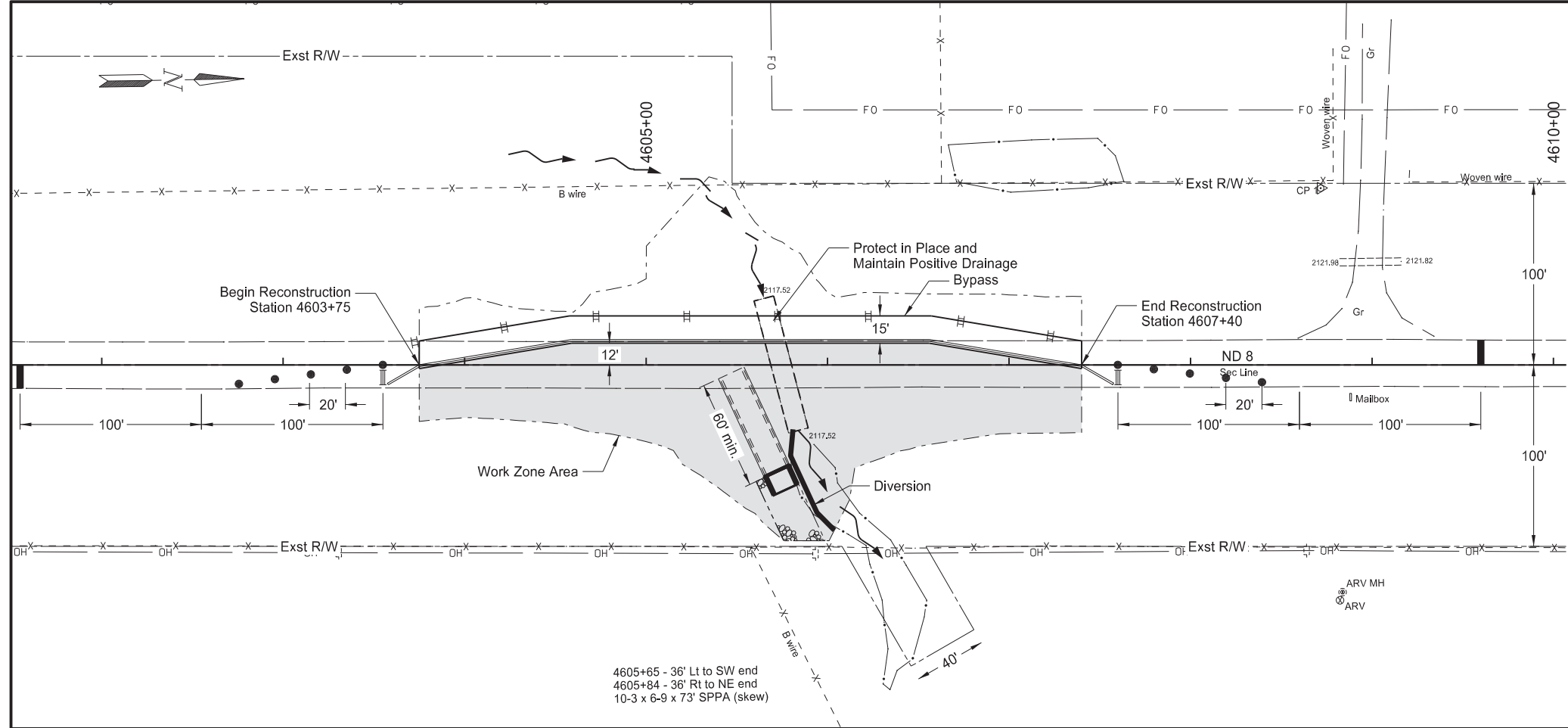
Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Work Zone Traffic Control

Plan & Typical
 Signalized Bypass
 Phase 1

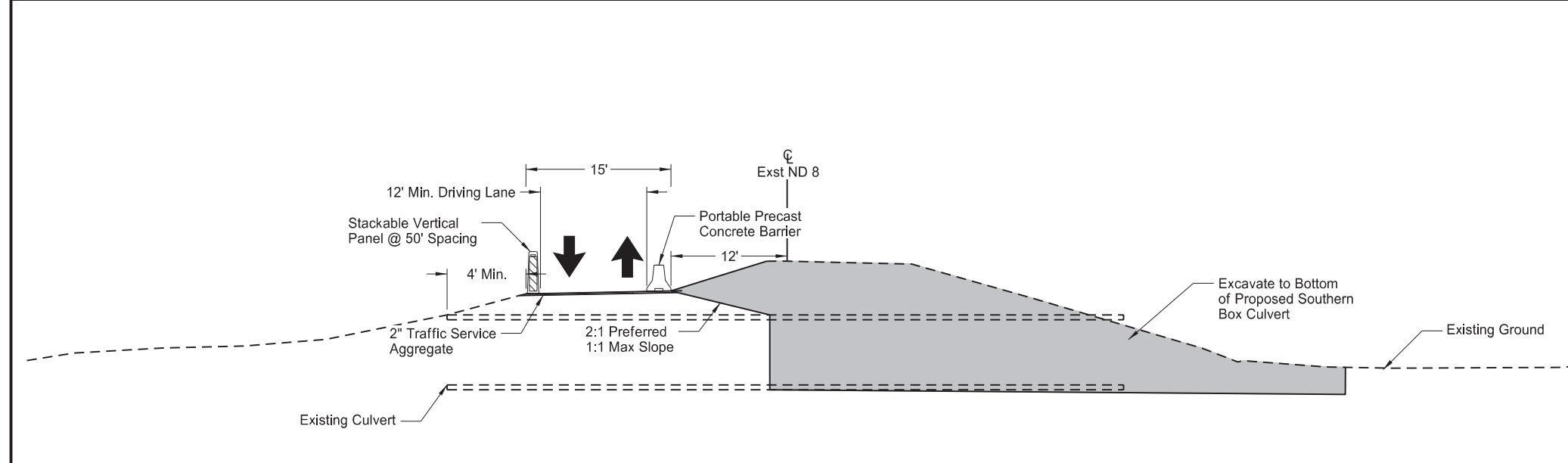


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	7



Notes:

- All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Refer to Note 702-P04 for phasing details.
 - Refer to Standard Drawing D-704-16 for traffic control layout.
 - Drawing not to scale.
- Phase 2
 - Shift traffic to project left onto the temporary roadway.
 - Remove remaining existing hot mix asphalt surfacing and aggregate base course on project right. Excavate and install a minimum of 60" of the southern barrel of the proposed box culvert on project right.
 - Backfill over proposed culvert. Provide a minimum of 2" of traffic service aggregate for the driving surface of the temporary roadway on project right.
 - Install all traffic control signs and devices along the temporary roadway following D-704-16 - Lane Closure on a Two Lane Road Using Traffic Control Signals.



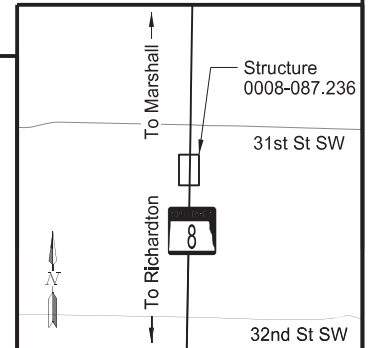
General Note:

Temporary bypass taper transitions must conform to MUTCD Table 6C-3 & Table 6C-4.

Shifting Taper = 0.5 L (minimum)

$L = W^2 / 60$ (40 mph or less)

Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit (25 mph)

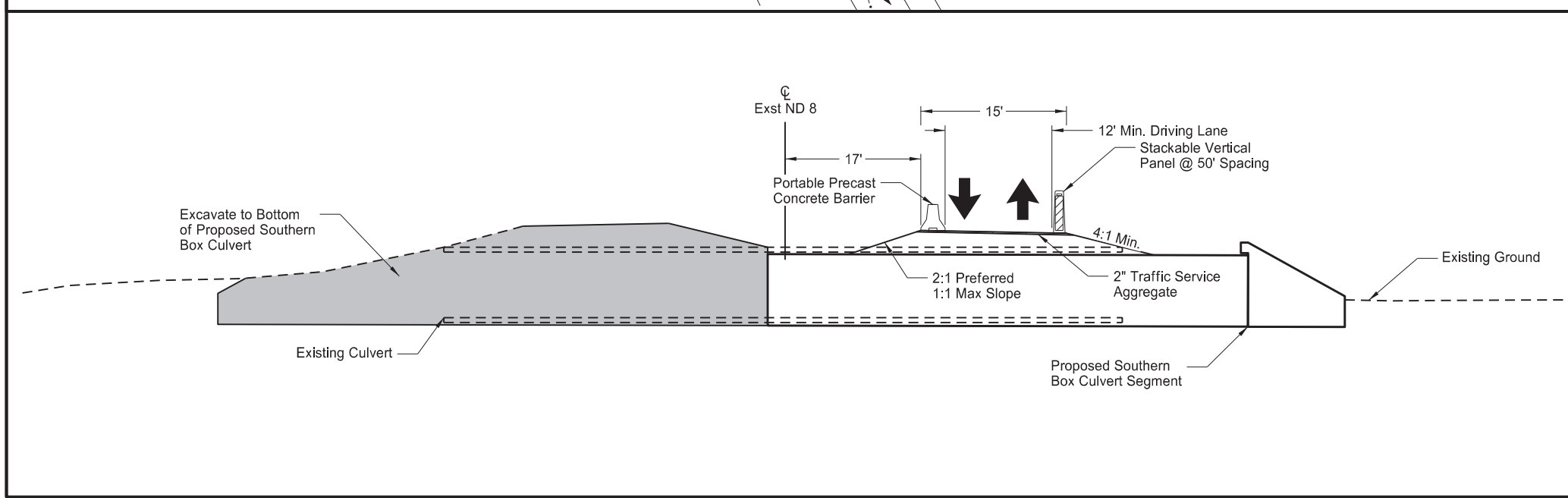
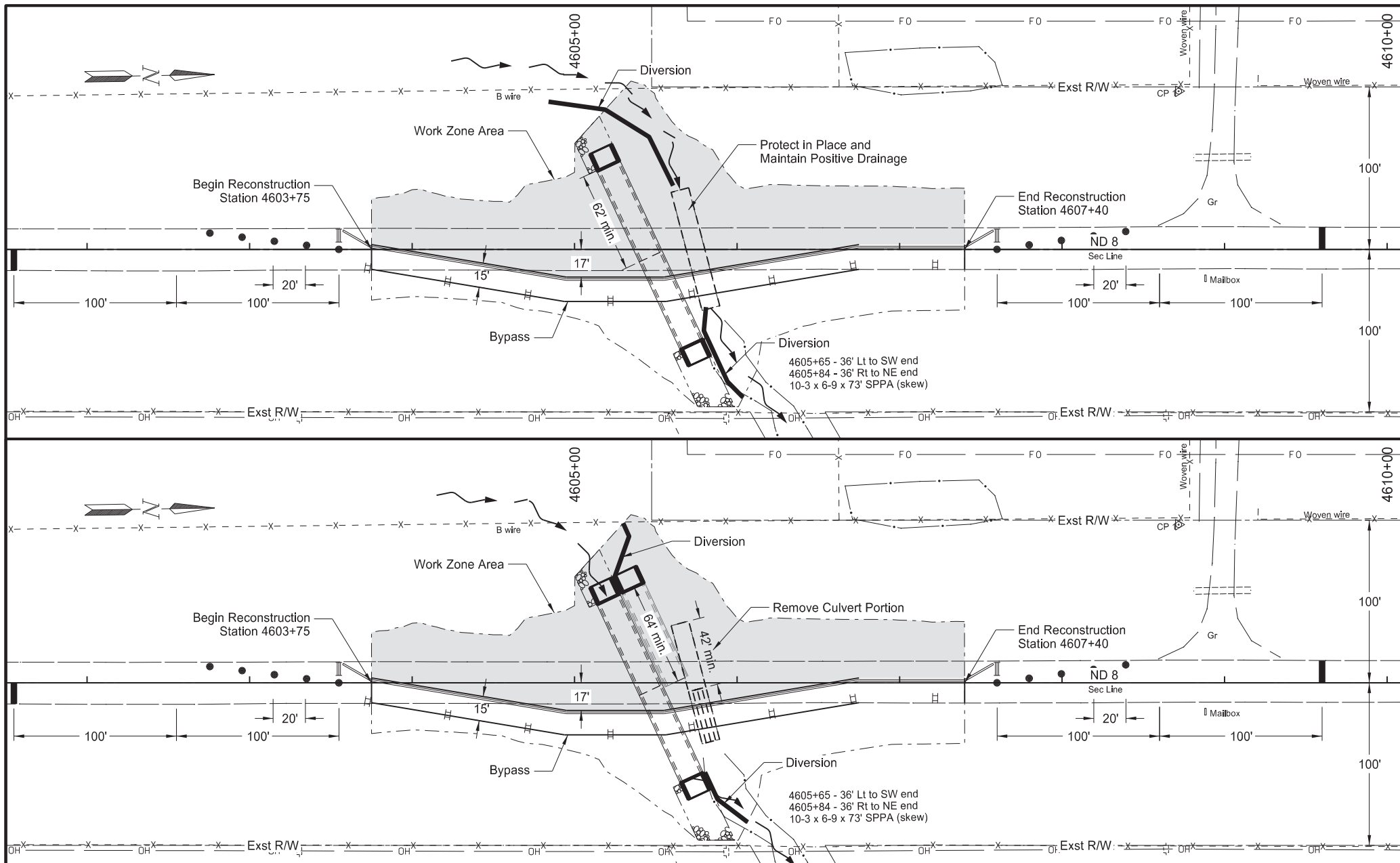


Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Work Zone Traffic Control

Plan & Typical
 Signalized Bypass
 Phase 2

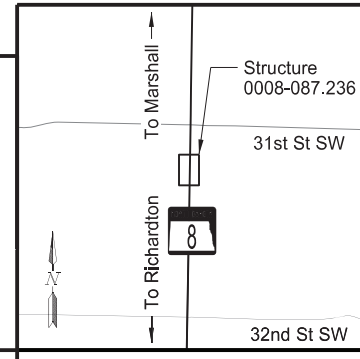




STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	8

- Notes:
- All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Refer to Note 702-P04 for phasing details.
 - Refer to Standard Drawing D-704-16 for traffic control layout.
 - Drawing not to scale.
 - Phase 3A
 - Shift traffic to project right onto the temporary roadway.
 - Install remaining length of southern barrel.
 - Divert drainage into completed southern box cell.
 - Phase 3B
 - Excavate and remove existing structure on project left to a minimum of 3' right of centerline.
 - Install a minimum of 64' of the northern barrel of the proposed box culvert on project left. Backfill over proposed culvert.
 - Provide a minimum of 2" of traffic service aggregate for the driving surface of the temporary roadway on project left.
 - Install all traffic control signs and devices along the temporary roadway following D-704-16 - Lane Closure on a Two Lane Road Using Traffic Control Signals.

General Note:
 Temporary bypass taper transitions must conform to MUTCD Table 6C-3 & Table 6C-4.
 Shifting Taper = 0.5 L (minimum)
 $L = W^2 / 60$ (40 mph or less)
 Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit (25 mph)

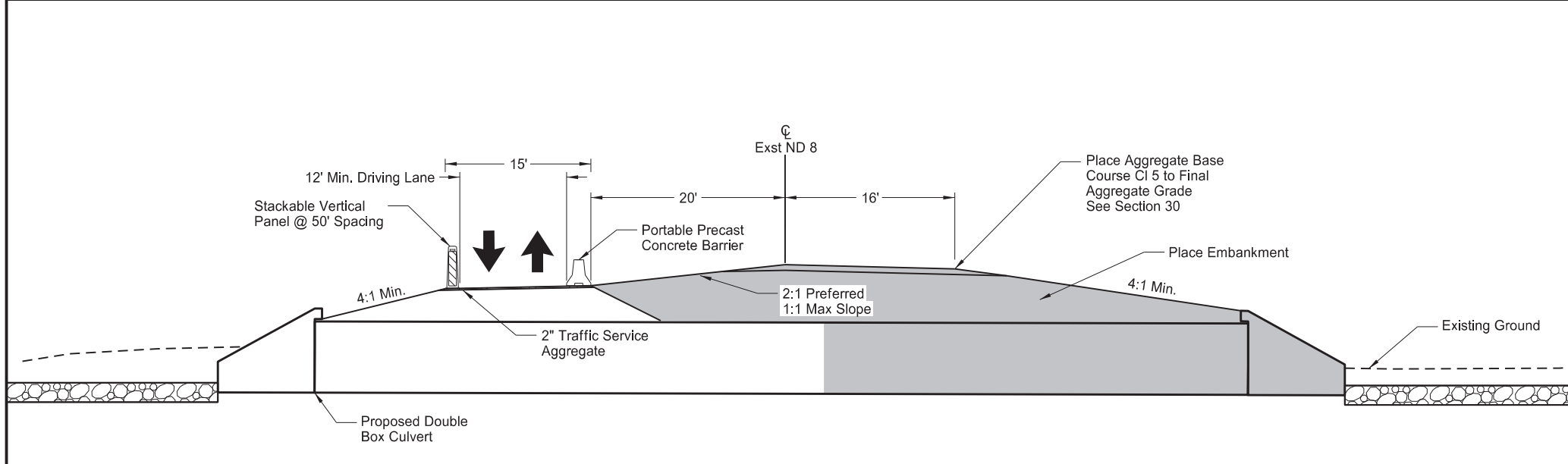
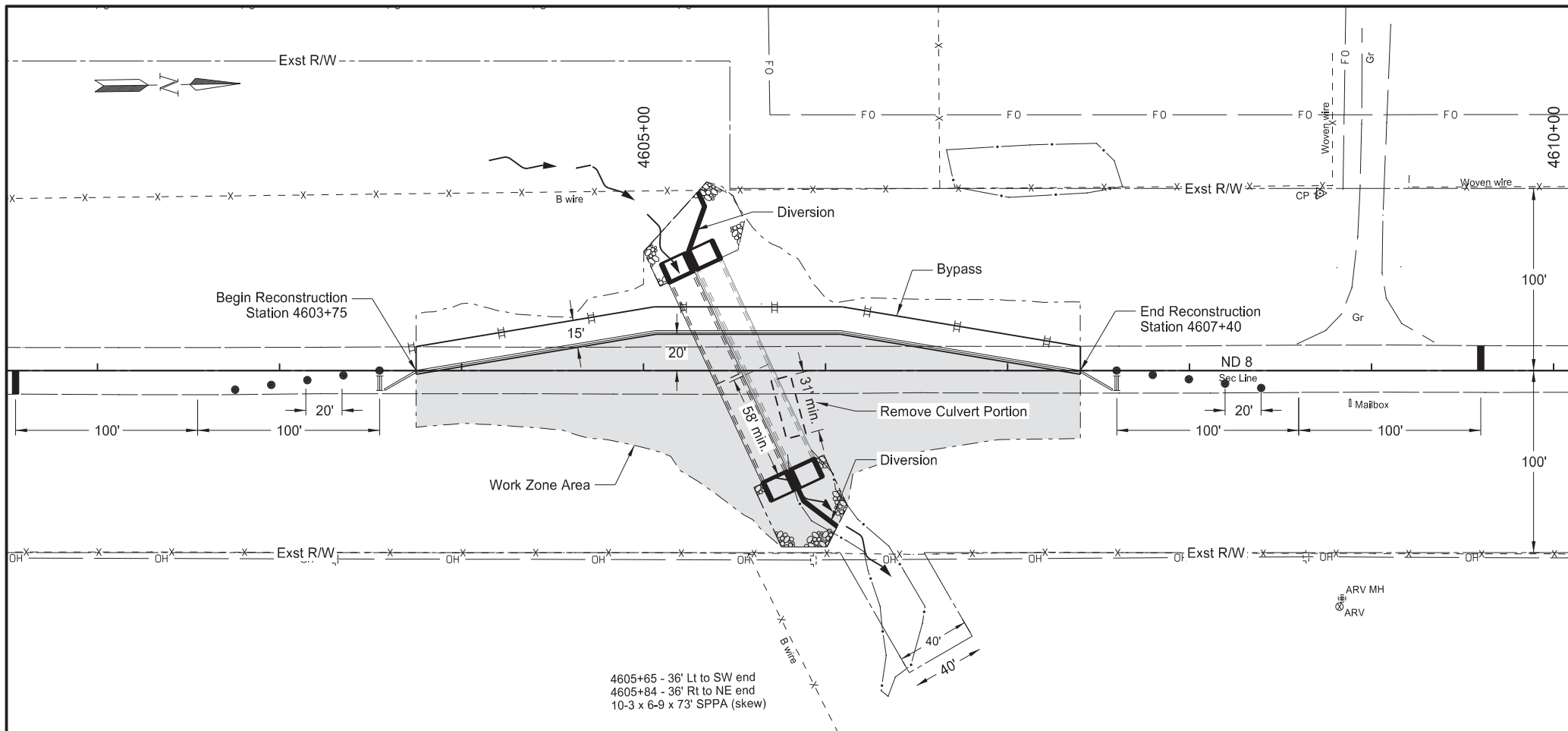


Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Work Zone Traffic Control

Plan & Typical
 Signalized Bypass
 Phase 3A & 3B

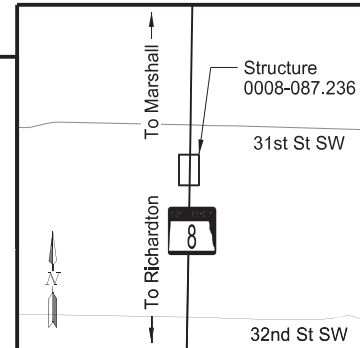




STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	9

- Notes:
- All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Refer to Note 702-P04 for phasing details.
 - Refer to Standard Drawing D-704-16 for traffic control layout.
 - Drawing not to scale.
 - Phase 4
 - Shift traffic to project left onto the temporary roadway over the proposed box culverts.
 - Excavate and remove remaining existing structure on project right.
 - Install remaining length of northern barrel of the proposed box culvert on project right.
 - Backfill over proposed culverts and place aggregate base course on project right.

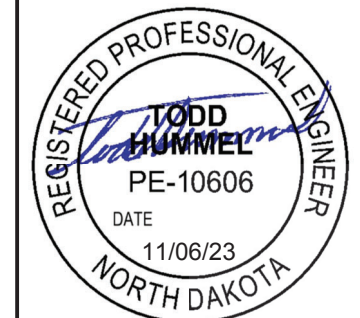
General Note:
 Temporary bypass taper transitions must conform to MUTCD Table 6C-3 & Table 6C-4.
 Shifting Taper = 0.5 L (minimum)
 $L = W^2 / 60$ (40 mph or less)
 Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit (25 mph)

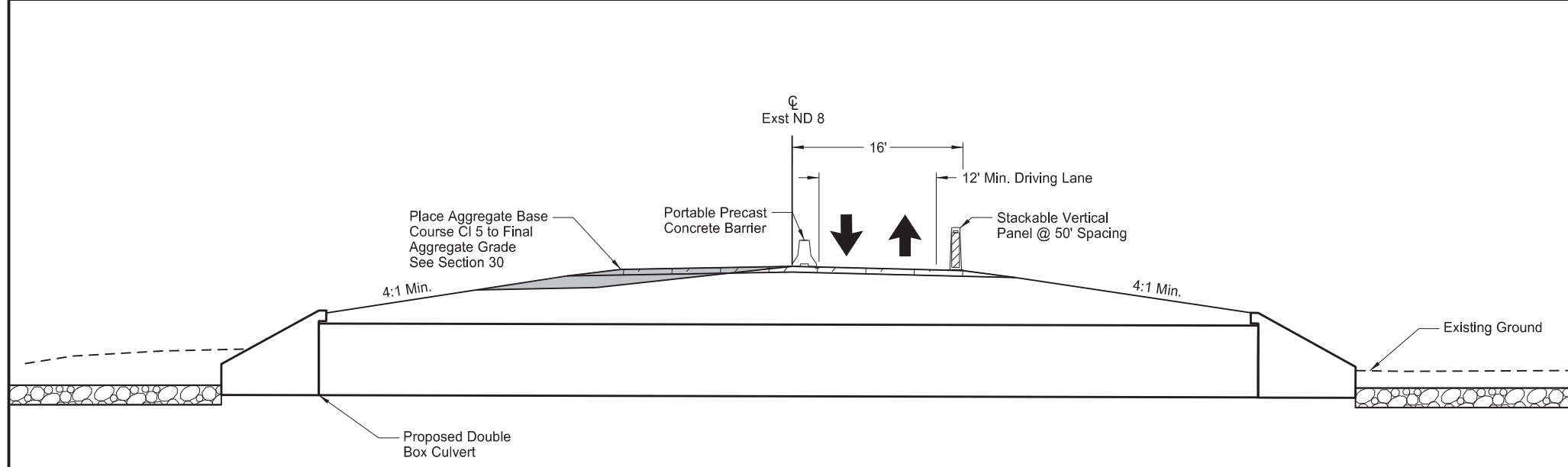
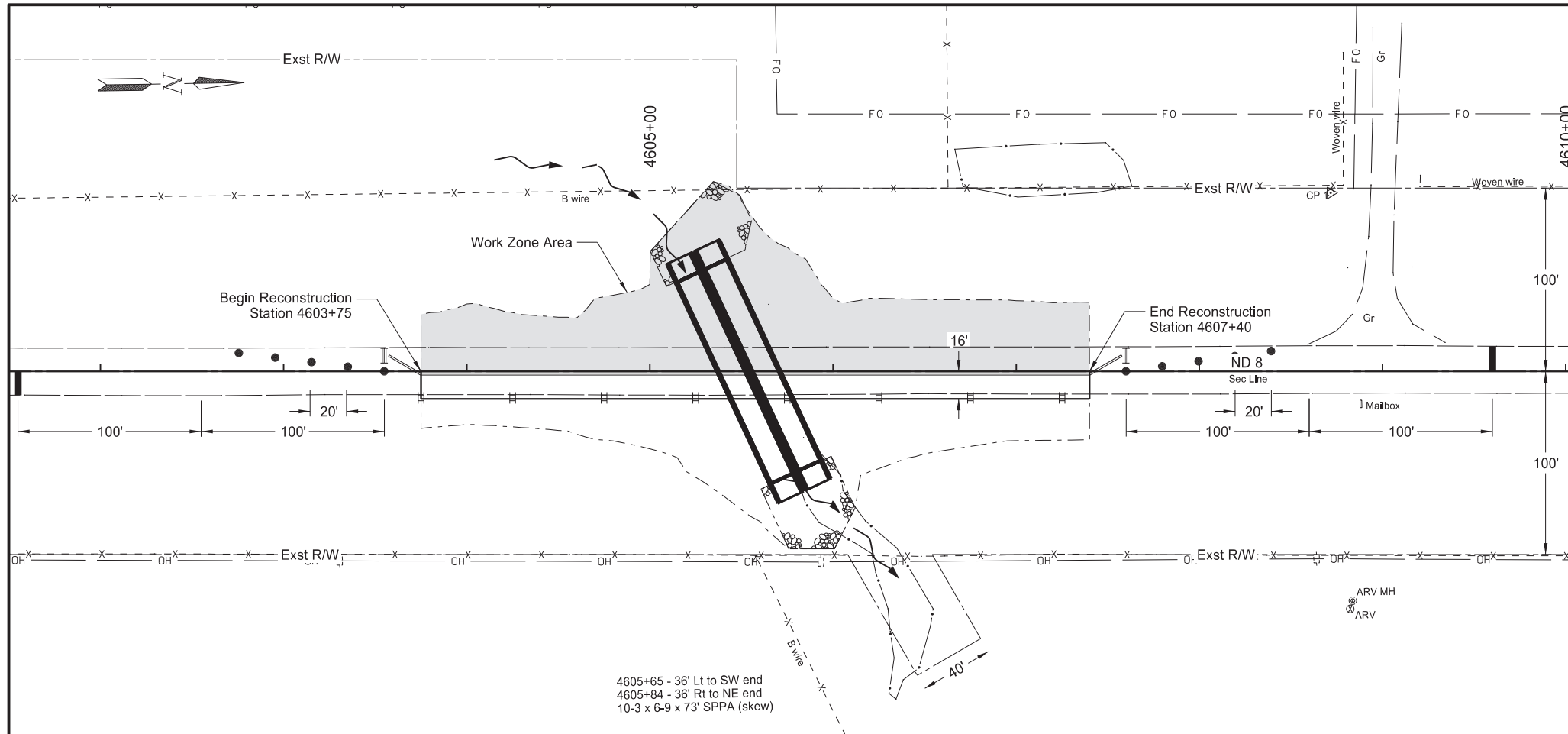


Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Work Zone Traffic Control

Plan & Typical
 Signalized Bypass
 Phase 4

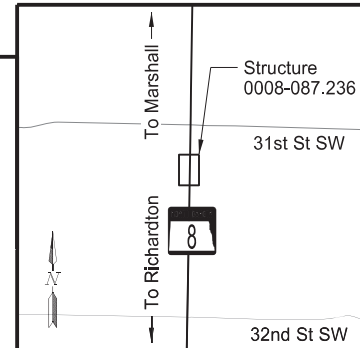




STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	10

- Notes:
- All Phases
 - Maintain posted speed limit of 25 mph.
 - Maintain access to adjacent properties.
 - Refer to Note 702-P04 for phasing details.
 - Refer to Standard Drawing D-704-16 for traffic control layout.
 - Drawing not to scale.
 - Phase 5
 - Shift traffic to project right onto the propose aggregate base course.
 - Backfill to subgrade and install aggregate base course on project left. Open the roadway to traffic. Pave the proposed hot mix asphalt.
 - Install permanent pavement markings, signing, and erosion control measures.

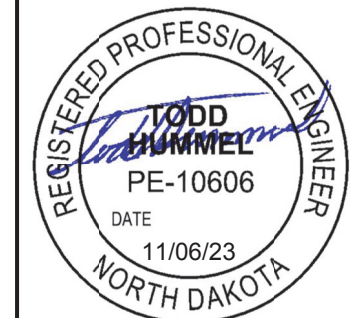
General Note:
 Temporary bypass taper transitions must conform to MUTCD Table 6C-3 & Table 6C-4.
 Shifting Taper = 0.5 L (minimum)
 $L = W S^2 / 60$ (40 mph or less)
 Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit (25 mph)



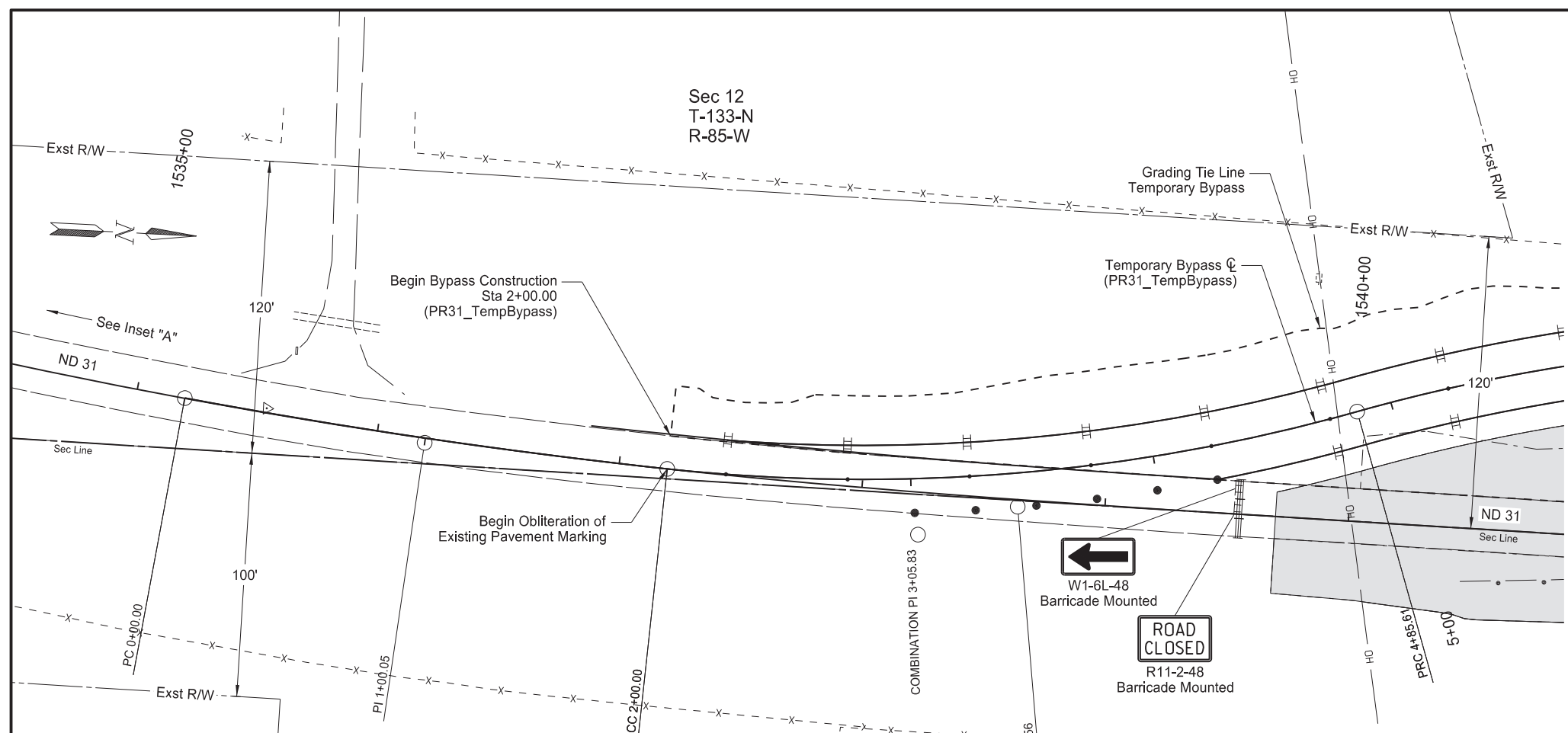
Various Structures - Statewide
 Structure 0008-087.236
 ND 8 - Stark County

Work Zone Traffic Control

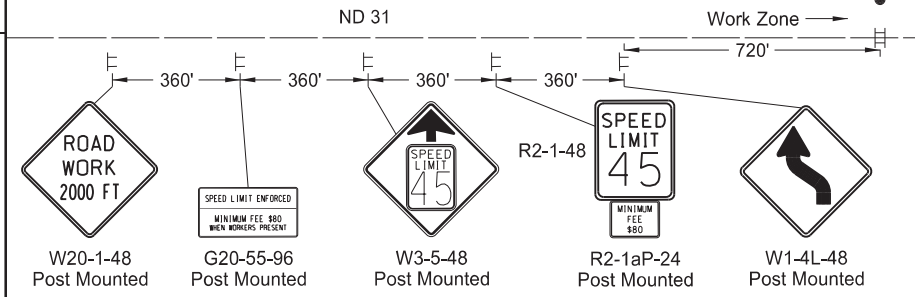
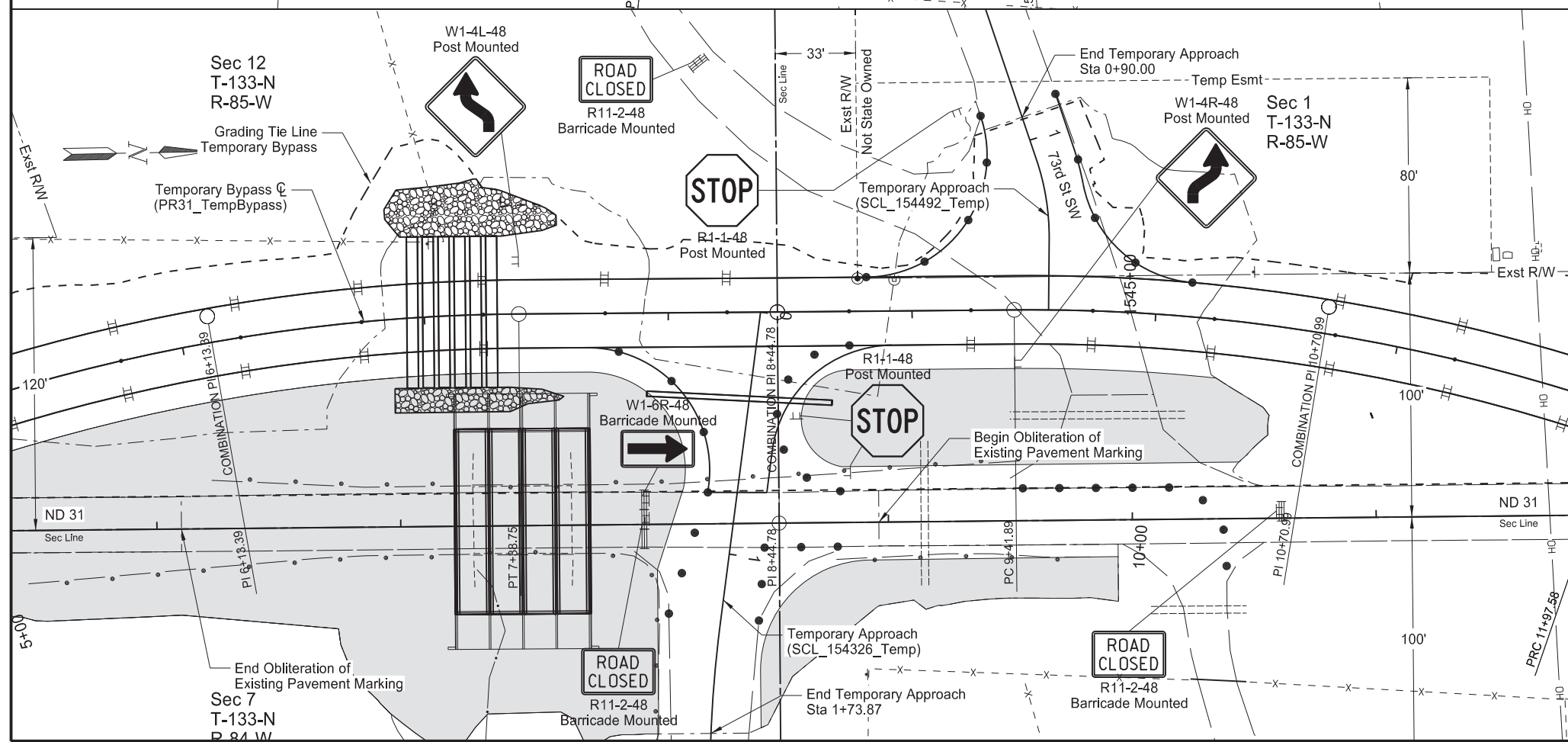
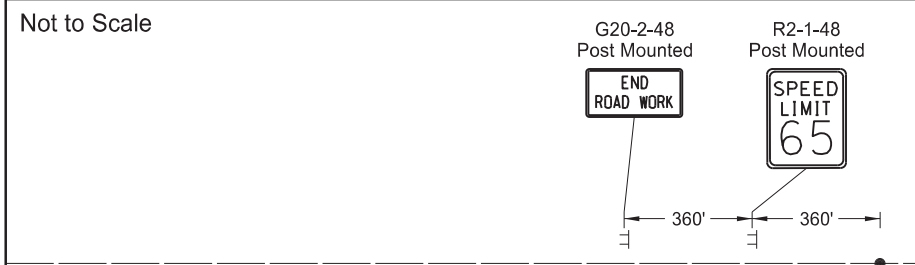
Plan & Typical
 Signalized Bypass
 Phase 5



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	100	11

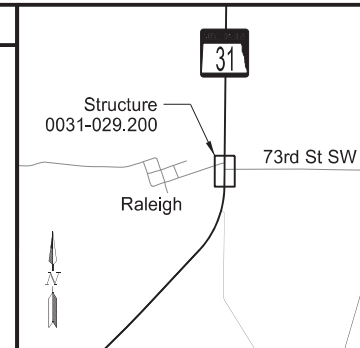


Inset "A"



LEGEND

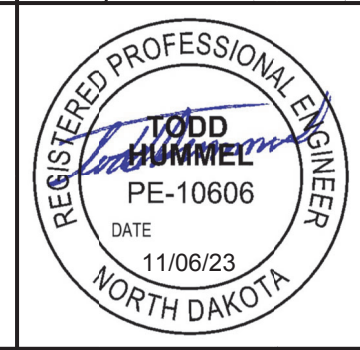
	Type III Barricade		Delineator Drum
	Traffic Control Sign		Tubular Marker
	Stackable Vertical Panel		Work Zone

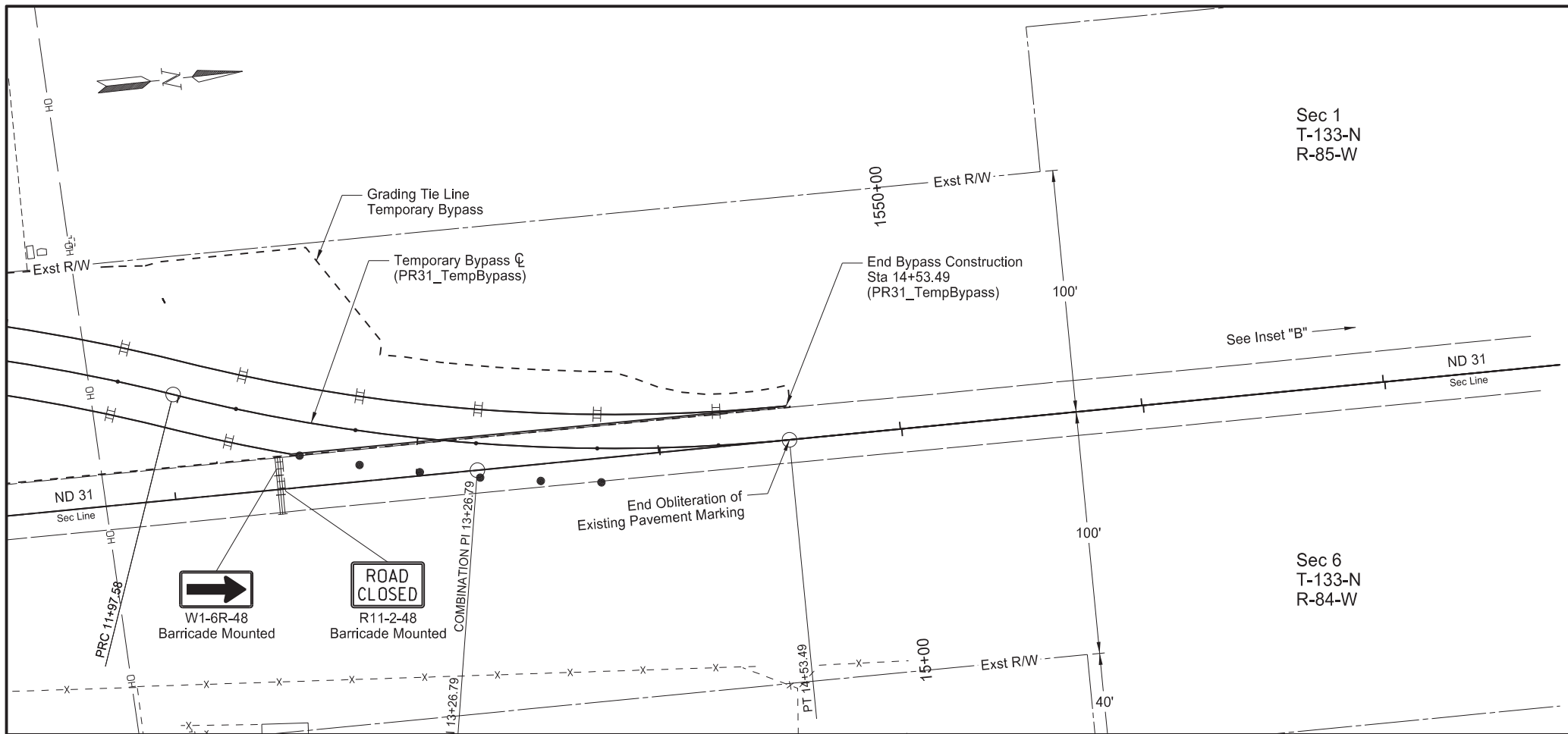


Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

Work Zone Traffic Control

Construction Signing
Temporary Bypass





Sheet View Intentionally Left Blank

	STATE ND	PROJECT NO. SS-9-999(478)	SECTION NO. 100	SHEET NO. 12
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Inset "B"

Work Zone ND 3

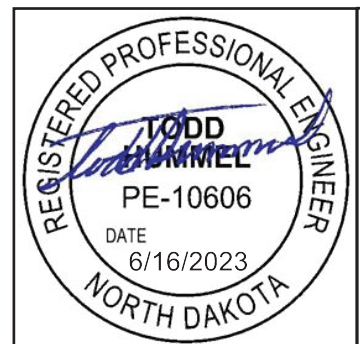
Not to Scale

LEGEND	
<ul style="list-style-type: none"> Type III Barricade Traffic Control Sign Stackable Vertical Panel 	<ul style="list-style-type: none"> Delineator Drum Tubular Marker Work Zone

<p style="text-align: center;">Various Structures - Statewide Structure 0031-029.200 ND 31 - Grant County</p> <p style="text-align: center;">Work Zone Traffic Control</p> <p style="text-align: center;">Construction Signing Temporary Bypass</p>	
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	SS-9-999(478)	110	1

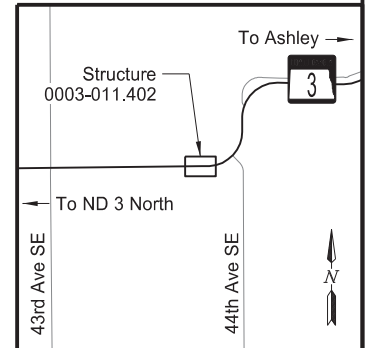
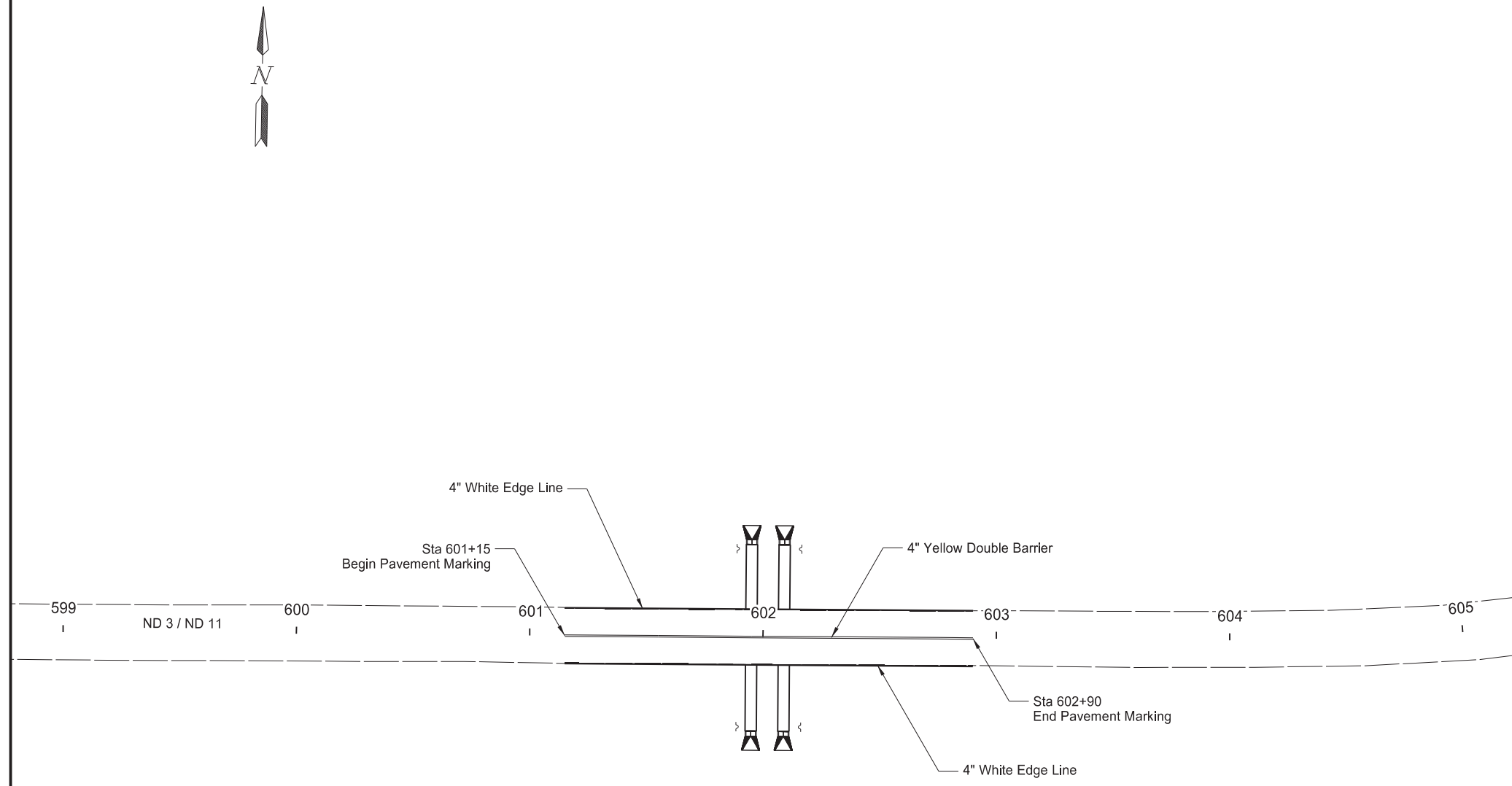
Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs		Sign Support Length				Vert Clearance	Support Size	Max Post Len	Sleeve Length				Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
			IV SF	XI SF	1st LF	2nd LF	3rd LF	4th LF	FT		LF	1st LF	2nd LF	3rd LF	4th LF				EA	EA	EA		
Structure 0003-050.623																							
2668+25 Rt																							
2674+25 Lt		371	6.0		11.5				5.0	2.25 x 2.25 12 ga	12.9							1	4	2.5 x 2.5 12 ga			
Sub Total			6.0	0.0	Total 11.5							Total 4.0						1	1	0			
Structure 0031-029.200																							
1537+50 Lt	SS2		16.3		11.6	12.4			5.0	2.5 x 2.5 10 ga	13.6							2	4	3 x 3 7 ga		2	
1539+50 Lt		371	6.0		12.6				5.0	2.25 x 2.25 12 ga	12.9							1	4	2.5 x 2.5 12 ga			
1540+00 Rt	SS3		6.0		10.4				5.0	2.25 x 2.25 12 ga	11.4							1	4	2.5 x 2.5 12 ga			
1541+50 Lt		19		6.3	12.2				5.0	2.5 x 2.5 12 ga	14.5							1	4	3 x 3 7 ga			
1543+26 Lt		34		8.0	10.3				5.0	2.5 x 2.5 12 ga	11.3							1	4	3 x 3 7 ga			
1543+56 Rt	SA 2D		12.5	5.2	10.3				5.0	2.5 x 2.5 10 ga	20.6	1.5				2.19 x 2.19 10 ga		1	4	3 x 3 7 ga		1	
1544+11 Lt		4		3.9	9.9				5.0	2 x 2 12 ga	13.6							1	4	2.25 x 2.25 12 ga			
1544+62 Lt	SA 2D		12.5	5.2	10.3				5.0	2.5 x 2.5 10 ga	20.6	1.5				2.19 x 2.19 10 ga		1	4	3 x 3 7 ga		1	
1546+50 Lt		371	6.0		11.7				5.0	2.25 x 2.25 12 ga	12.9							1	4	2.5 x 2.5 12 ga			
1549+25 Lt	SS3		6.0		10.0				5.0	2.25 x 2.25 12 ga	11.4							1	4	2.5 x 2.5 12 ga			
Sub Total			65.3	28.6	Total 122.6							Total 44.0						0	0	4			
Grand Total			71.3	28.6	Total 134.1							Total 48		0				1	1	4			



Sign Summary
Perforated Tube
Various Structures - Statewide

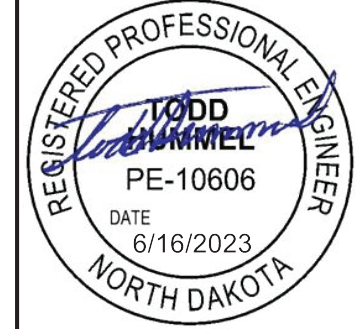
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	110	2

SPEC	CODE	BID ITEM	QTY	UNIT
754	0805	OBJECT MARKERS - CULVERTS		
		Sta 601+89 Rt/Lt	2	EA
		Sta 602+15 Rt/Lt	2	EA
762	1104	PVMT MK PAINTED 4IN LINE		
		White Edge Line	350	LF
		Yellow Double Barrier	350	LF



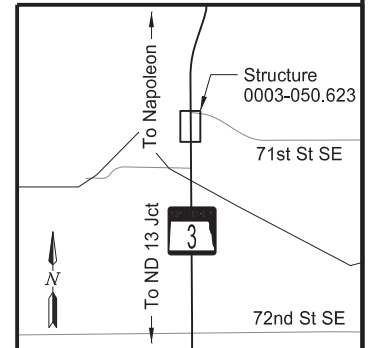
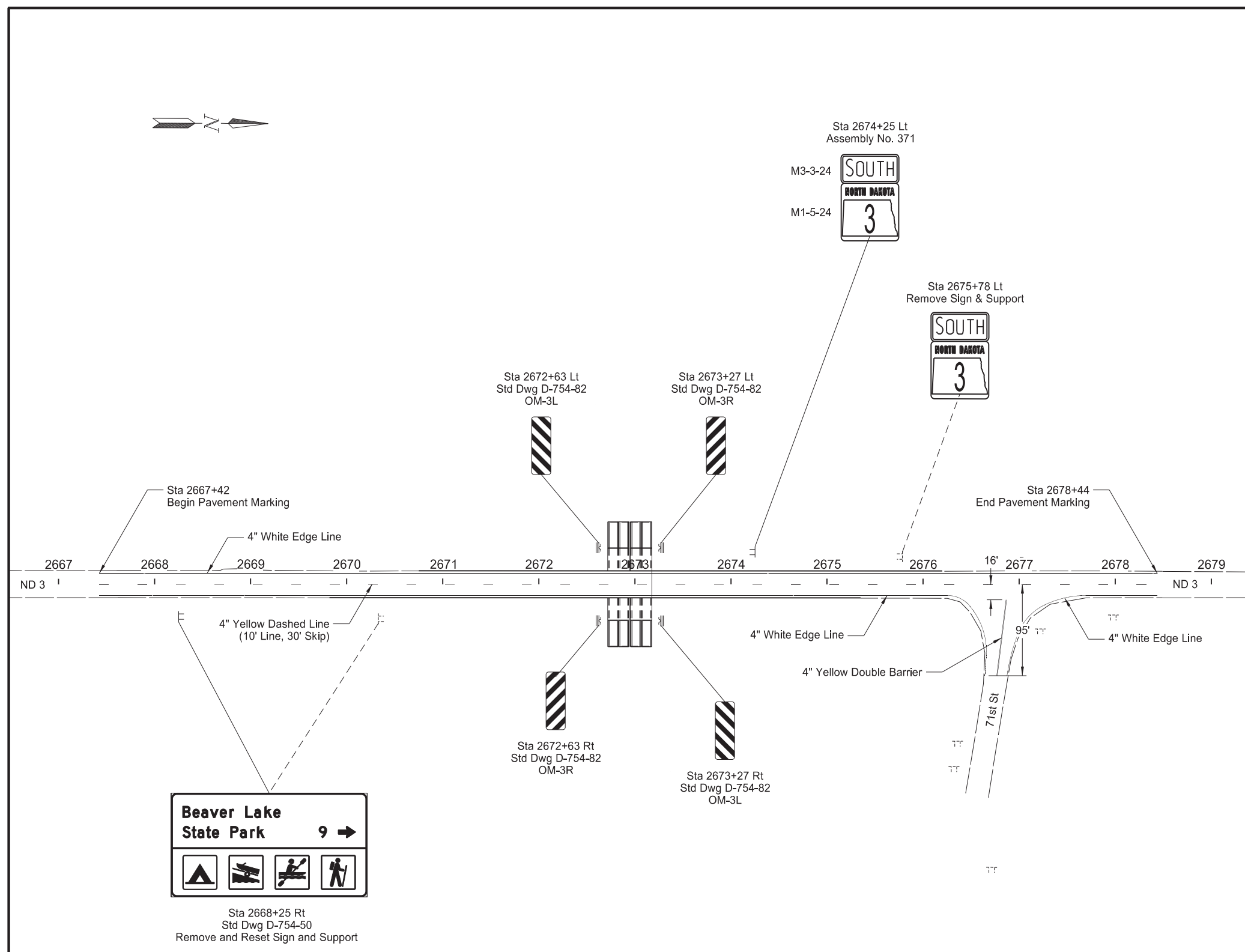
Various Structures - Statewide
 Structure 0003-011.402
 ND 3 - McIntosh County

Signing and Pavement Marking



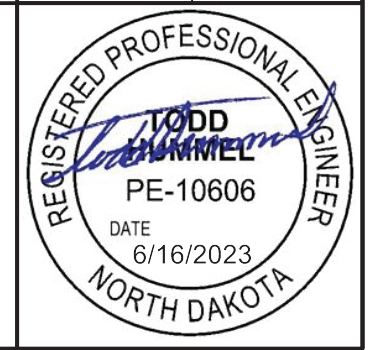
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	110	3

SPEC	CODE	BID ITEM	QTY	UNIT
754	0803	OBJECT MARKERS - TYPE III		
		OM-3R	2	EA
		OM-3L	2	EA
762	1104	PVMT MK PAINTED 4IN LINE		
		White Edge Line	2,293	LF
		Yellow Double Barrier	160	LF
		Yellow Dashed Line	276	LF



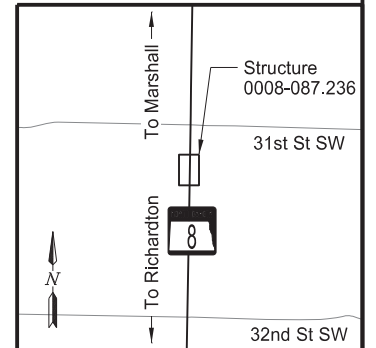
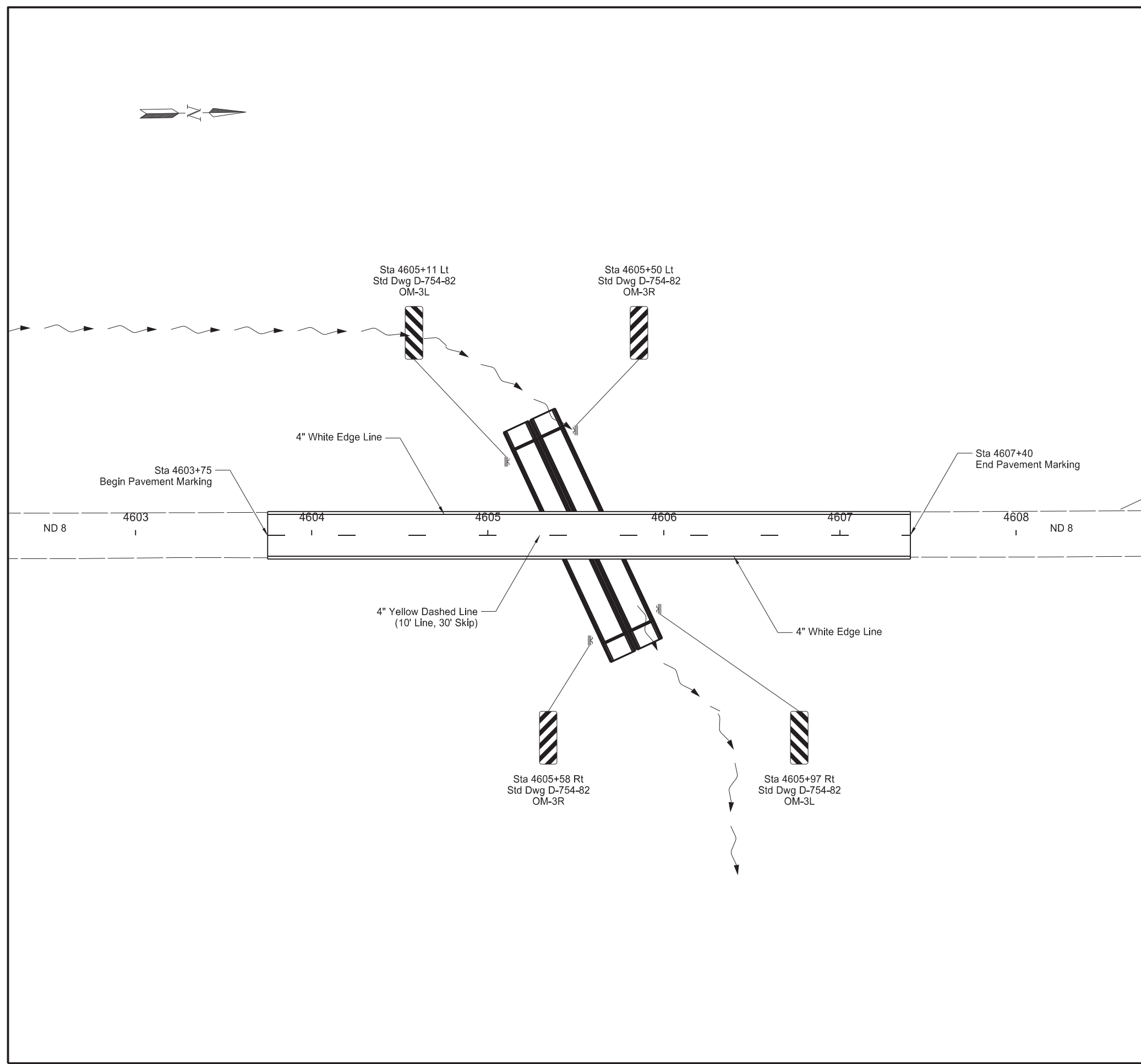
Various Structures - Statewide
Structure 0003-050.623
ND 3 - Logan County

Signing & Pavement Marking



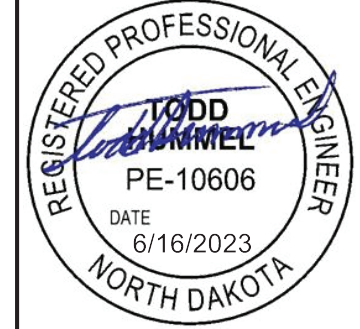
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	110	4

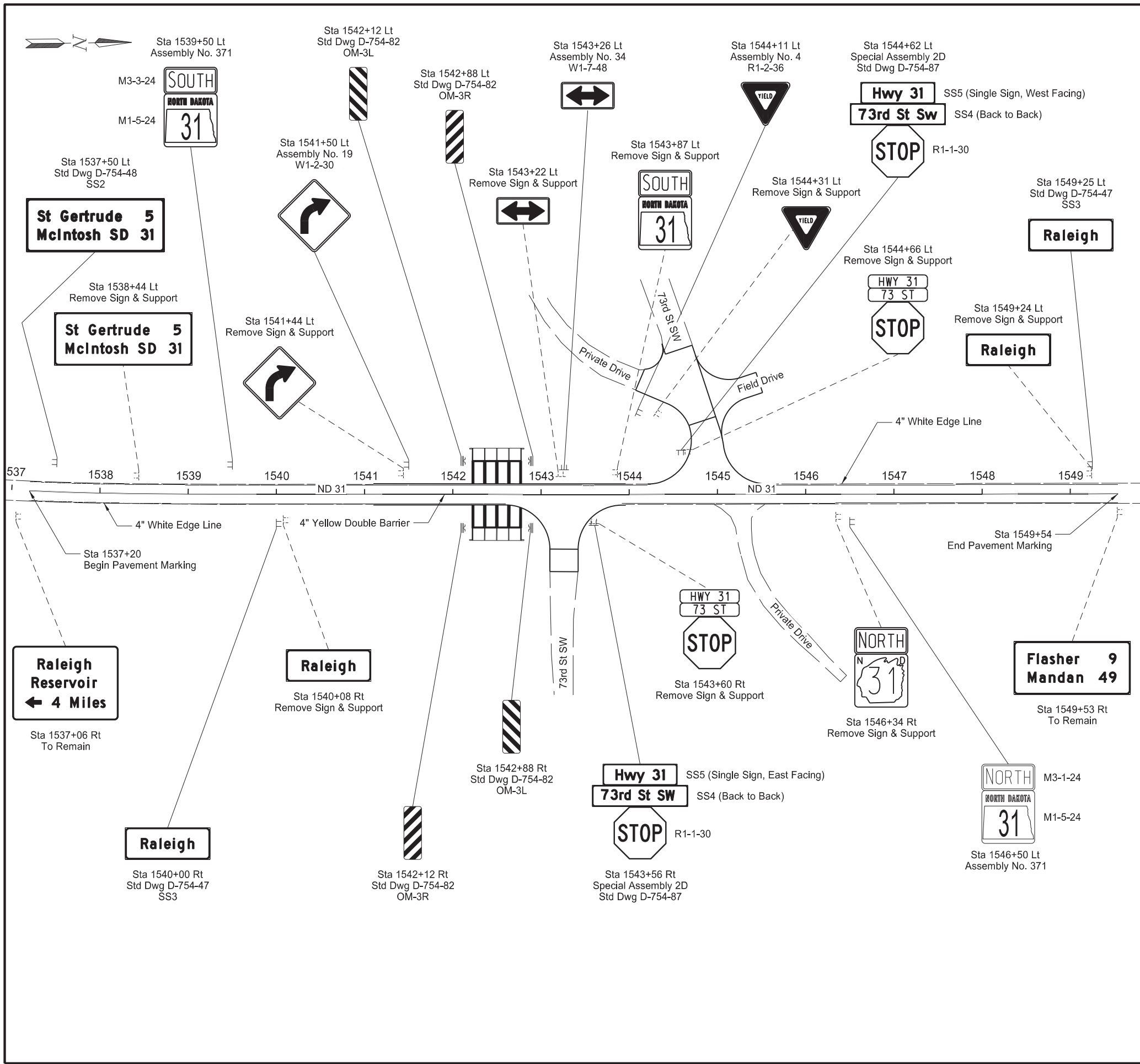
SPEC	CODE	BID ITEM	QTY	UNIT
754	0803	OBJECT MARKERS - TYPE III		
		OM-3R	2	EA
		OM-3L	2	EA
762	1104	PVMT MK PAINTED 4IN LINE		
		White Edge Line	730	LF
		Yellow Dashed Line	91	LF



Various Structures - Statewide
Structure 0008-087.236
ND 8 - Stark County

Signing & Pavement Marking





		STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	SS-9-999(478)	110	5

SPEC	CODE	BID ITEM	QTY	UNIT
754	0803	OBJECT MARKERS - TYPE III		
		OM-3R	2	EA
		OM-3L	2	EA
762	1104	PVMT MK PAINTED 4IN LINE		
		White Edge Line	2,202	LF
		Yellow Double Barrier	2,468	LF

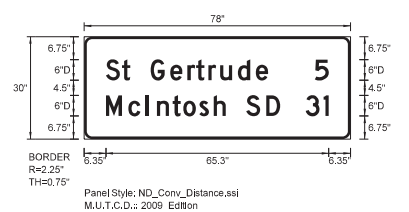
Various Structures - Statewide
Structure 0031-029.200
ND 31 - Grant County

Signing & Pavement Marking

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	110	6

SIGN NUMBER	SS2
WIDTH X HEIGHT	6'-6" x 2'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective COLOR: White

STATION(S): 1537+50 Lt - Structure 0031-029.200
 AREA: 16.3 Sq.Ft.

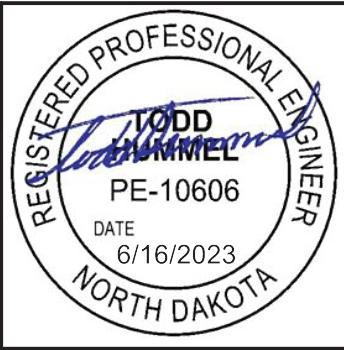


SYMBOL	X	Y	WID	HT	ANGLE

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

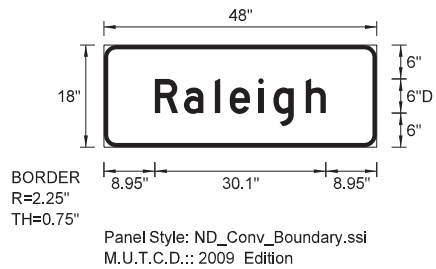
LETTER POSITION (X)											LENGTH	SIZE	SERIES				
S	t		G	e	r	t	r	u	d	e					47.5	6/4.5	D 2000
6.3	11.1	13.5	19.5	25.2	30.2	32.8	36.4	39.8	45	50.3							
5															4.1	6	D 2000
67.6																	
M	c	I	n	t	o	s	h		S	D					51.1	6/4.5	D 2000
6.3	12.9	18	21.3	25.9	29	33.7	37.9	41.5	47.5	53.3							
3	1														6.8	6	D 2000
64.9	70.2																

Various Structures - Statewide
 Special Sign Details



SIGN NUMBER	SS3
WIDTH X HEIGHT	4'-0" x 1'-6"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	2.25"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective COLOR: White

STATION(S): 1540+00 Rt - Structure 0031-029.200
1549+25 Lt - Structure 0031-029.200
AREA: 6.0 Sq.Ft.



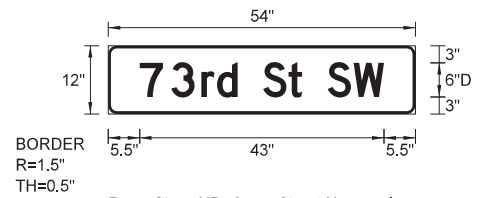
Dimensions are in inches.tenths Letter locations are panel edge to lower left corner
Panel Style: ND_Conv_Boundary.ssi
M.U.T.C.D.: 2009 Edition

SYMBOL	X	Y	WID	HT	ANGLE

LETTER POSITION (X)								LENGTH	SIZE	SERIES
R	a	l	e	i	g	h		30.1	6/4.5	D 2000
9	14.1	19.5	22.1	27.2	29.8	35.5				

SIGN NUMBER	SS4
WIDTH X HEIGHT	4'-6" x 1'-0"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective COLOR: White

STATION(S): 1543+55 Rt - Structure 0031-029.200
1544+63 Lt - Structure 0031-029.200
AREA: 4.5 Sq.Ft.



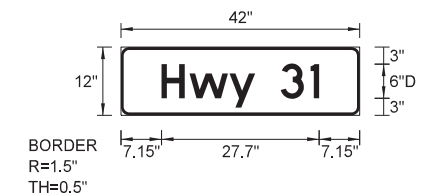
Dimensions are in inches.tenths Letter locations are panel edge to lower left corner
Panel Style: ND_Conv_Street Name.ssi
M.U.T.C.D.: 2009 Edition

SYMBOL	X	Y	WID	HT	ANGLE

LETTER POSITION (X)										LENGTH	SIZE	SERIES
7	3	r	d	S	t	S	W			43	6/4.5	D 2000
5.5	11.1	16.4	19.1	22.7	27.2	31.7	34.1	38.6	43.1			

SIGN NUMBER	SS5
WIDTH X HEIGHT	3'-6" x 1'-0"
BORDER WIDTH	0.5" (inset 0")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective COLOR: White

STATION(S): 1543+55 Rt - Structure 0031-029.200
1544+63 Lt - Structure 0031-029.200
AREA: 3.5 Sq.Ft.



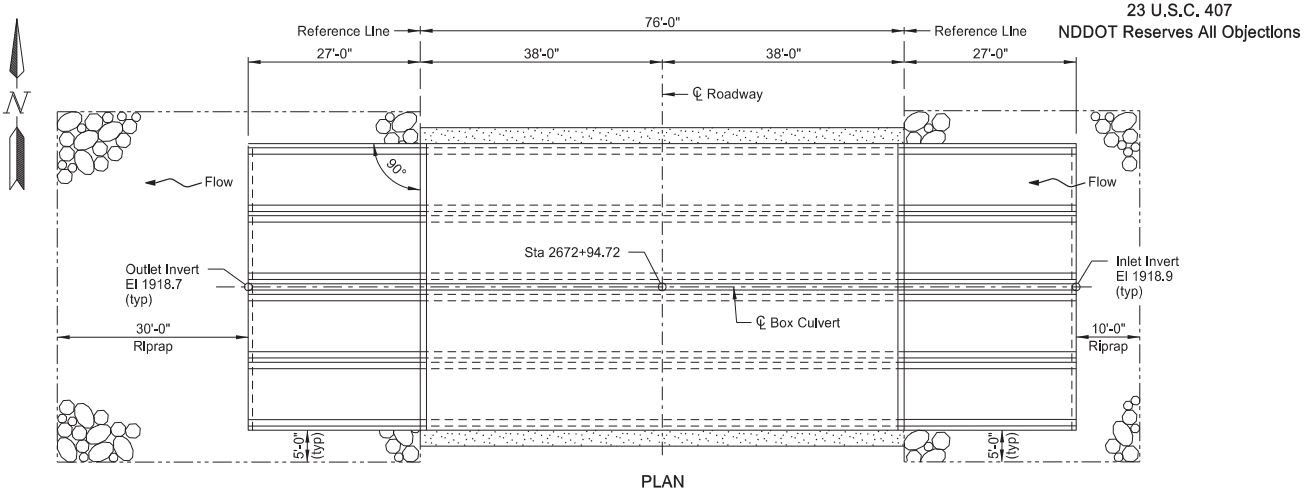
Dimensions are in inches.tenths Letter locations are panel edge to lower left corner
Panel Style: ND_Conv_Street Name.ssi
M.U.T.C.D.: 2009 Edition

SYMBOL	X	Y	WID	HT	ANGLE

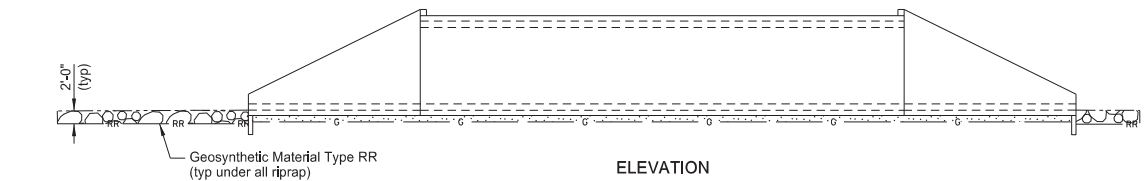
LETTER POSITION (X)								LENGTH	SIZE	SERIES
H	w	y	3	1				27.7	6/4.5	D 2000
7.1	12.1	19.1	23.6	28.1	33.4					

Various Structures - Statewide
Special Sign Details





PLAN



ELEVATION

For a single barrel box culvert with 10" thick roof, 10" floor and 9" walls, the following total factored moments and shears would result from the application of the required loads:

FACTORED DESIGN MOMENTS (SINGLE)		FACTORED DESIGN SHEARS (SINGLE)	
WALL MOMENT	13,240 ft-lbs	WALL SHEAR	8,960 lbs
ROOF MOMENTS		ROOF SHEARS	
CORNER	15,010 ft-lbs	CORNER	8,810 lbs
BOTTOM	15,730 ft-lbs		
FLOOR MOMENTS		FLOOR SHEARS	
CORNER	17,320 ft-lbs	CORNER	10,060 lbs
TOP	16,890 ft-lbs		

For a double barrel box culvert with 10" thick roof, 10" floor, 9" exterior walls, and 8" interior walls, the following total factored moments and shears would result from the application of the required loads:

FACTORED DESIGN MOMENTS (DOUBLE)		FACTORED DESIGN SHEARS (DOUBLE)	
WALL MOMENT	10,650 ft-lbs	WALL SHEAR	9,020 lbs
ROOF MOMENTS		ROOF SHEARS	
CORNER	16,390 ft-lbs	CORNER	9,520 lbs
BOTTOM	11,260 ft-lbs	WALL	9,580 lbs
TOP	14,540 ft-lbs	FLOOR SHEARS	
FLOOR MOMENTS		CORNER	8,830 lbs
CORNER	18,050 ft-lbs	WALL	9,340 lbs
TOP	8,070 ft-lbs		
BOTTOM	16,040 ft-lbs		

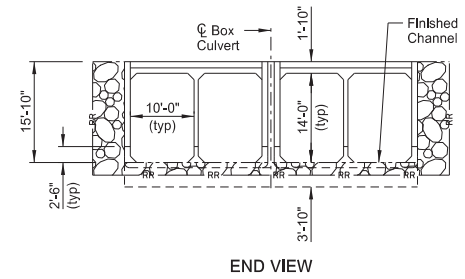
HYDRAULIC DATA:

Drainage Area	207.82	sq mi
Stream Gradient	0.0014	ft/ft
Design Frequency	50	yr
Design Discharge	3,490	cfs
Design Headwater Stage	1931.45	ft
Design Tailwater Stage	1929.86	ft
Velocity Through Culvert	8.3	fps
100-Year Frequency Discharge	4,305	cfs
100-Year Frequency Headwater	1932.48	ft
Overtopping Stage	1937.32	ft
Overtopping Discharge	6,887	cfs

* Inverts shown include culvert and associated riprap being sunk 1 ft below existing stream bed elevation.

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

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	1



END VIEW

BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0104	REMOVAL OF STRUCTURE	EA	1
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	3,138
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
256	0200	RIPRAP GRADE II	CY	205
606	3014	DBL 10FT X 14FT PRECAST RCB CULVERT	LF	152
606	7014	DBL 10FT X 14FT PRECAST RCB END SECTION	EA	4
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	772
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	307

SPECIAL PROVISIONS

SSP 2	MIGRATORY BIRD TREATY ACT
-------	---------------------------

STANDARD DRAWINGS

D-714-22

HL-93 DESIGN LOADING

ND-3 OVER BEAVER CREEK 9 MI SOUTH OF ND 34
CLEAR SPAN 3 x 10' CLEAR HEIGHT 14' MAXIMUM FILL 4' STATION: 2672+94.72
PRECAST CONCRETE QUADRUPLE BOX CULVERT LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION
Thorenson, Jason R.
09/13/23



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	2

NOTES

- 100 SCOPE OF WORK: Work at this site consists of removing an existing structure and building a new quadruple barrel 10' x 14' x 76'-0" precast concrete box culvert.
- 202 REMOVAL OF STRUCTURE: The existing structure is a 3-span concrete slab bridge, 60'-0" long with a clear roadway width of 30'-0". Include all work required to remove the bridge in the contract unit price for "Removal of Structure."
- 606 JOINTS: Provide joints in accordance with Section 606.E.3, with the exception that a 12" minimum width waterproof membrane is allowable around the exterior surfaces of the box culvert walls and roof.
- 606 PRECAST SECTION: Tie the barrel sections together with 1"φ tie bolts as shown on Standard Drawing D-714-22. Place two ties per exterior wall joint, located at third points of the wall clear height.

Include the controlled density backfill and material used for the 12" cap in the price bid for "Dbl 10Ft X 14Ft Precast RCB Culvert."

Install the barrel sections with a maximum gap of 3/4 inch wide. Install each line of barrels to terminate within 1" of the begin and end points of the adjacent barrel lines.

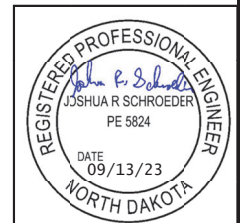
Cast holes at 3'-0" centers through the last end section and into the cutoff wall to receive 3/4" diameter reinforcing bars. Cast holes in the first end section at 2'-0" centers for 3/4" diameter reinforcing bars to attach the parapet. Cast parapet against the sections. Install the bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Section 806.02. Payment for "Dbl 10Ft X 14Ft Precast RCB End Section" includes the cutoff wall and parapet.

Provide a distance of 1'-0" between separate precast box and end section units. Fill the gap between precast barrel sections with controlled density backfill material meeting the mix design in Note 910. Fill the gap between precast end sections as shown on Section 170 Sheet 3 with either controlled density backfill or Class 41 aggregate. If controlled density backfill is selected, use material meeting the mix design in note 910. Use AE-3 concrete for the cap material. Include the AE-3 concrete, controlled density backfill or Class 41, and rebar used for the 12" cap in the price bid for "Dbl 10Ft X 14Ft Precast RCB Culvert."

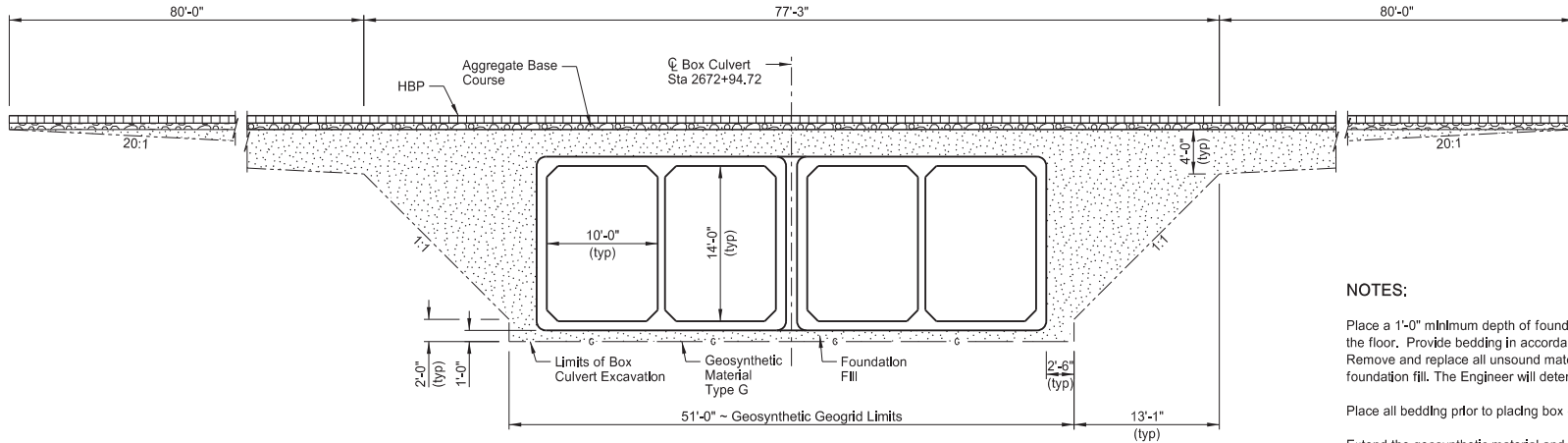
- 910 CONTROLLED DENSITY BACKFILL: Controlled density backfill consists of cement, water, fly ash, and aggregate at the ratio specified below. Place controlled density backfill as shown in the plans. Mix the material continuously during pumping or placement to keep the solution from separating.

Mix Design 1

Cement	75 lbs
Fly Ash	125 lbs
Fine Aggregate	2600 lbs
Water	416.5 gals



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	3



(SHOWING SECTION ALONG \bar{C} ROADWAY)
**GEOSYNETHIC GEOGRID PLACEMENT AND FOUNDATION FILL
 THROUGH EXISTING EMBANKMENT**

NOTES:

Place a 1'-0" minimum depth of foundation fill and bedding under the floor. Provide bedding in accordance with Section 606.04 E.1. Remove and replace all unsound material under the box with foundation fill. The Engineer will determine the depth required.

Place all bedding prior to placing box culvert sections.

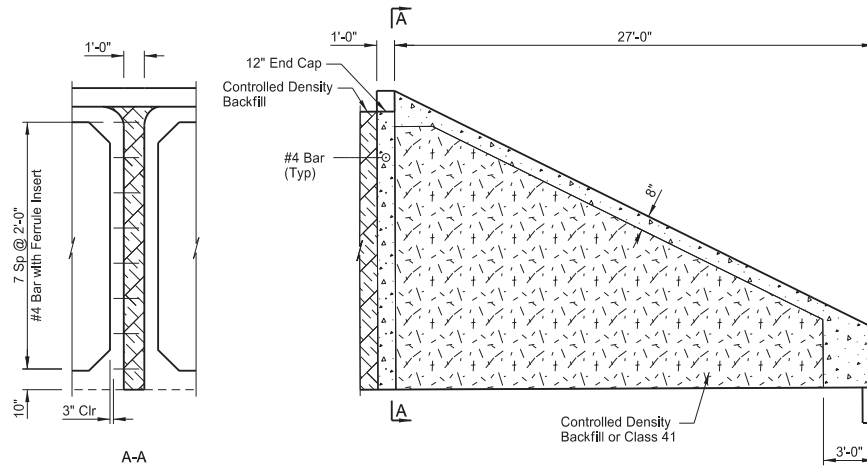
Extend the geosynthetic material and foundation fill to the end of the apron.

NOTES:

The intent of this detail is to show only the placement of the controlled density backfill between adjacent barrels. The representation of the size of barrels is arbitrary.

Embed the ferrule Insert with #4 bar into the side of the last barrel section maintaining a 3" minimum clearance from the other box culvert. Spacing measured 1'-0" from bottom of box and spaced at 2'-0" up the front face.

Install the #4 bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage and that meets the requirements of Section 806.02.



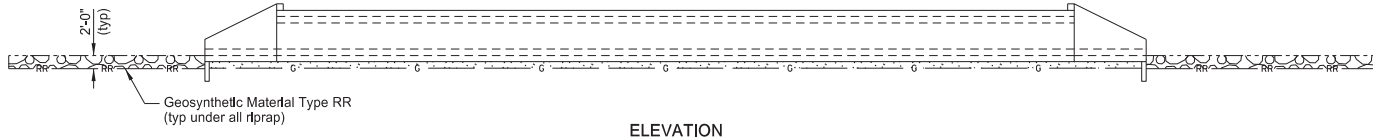
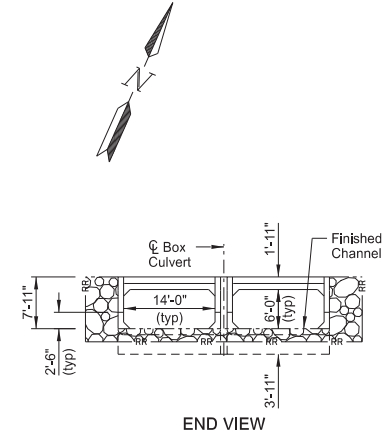
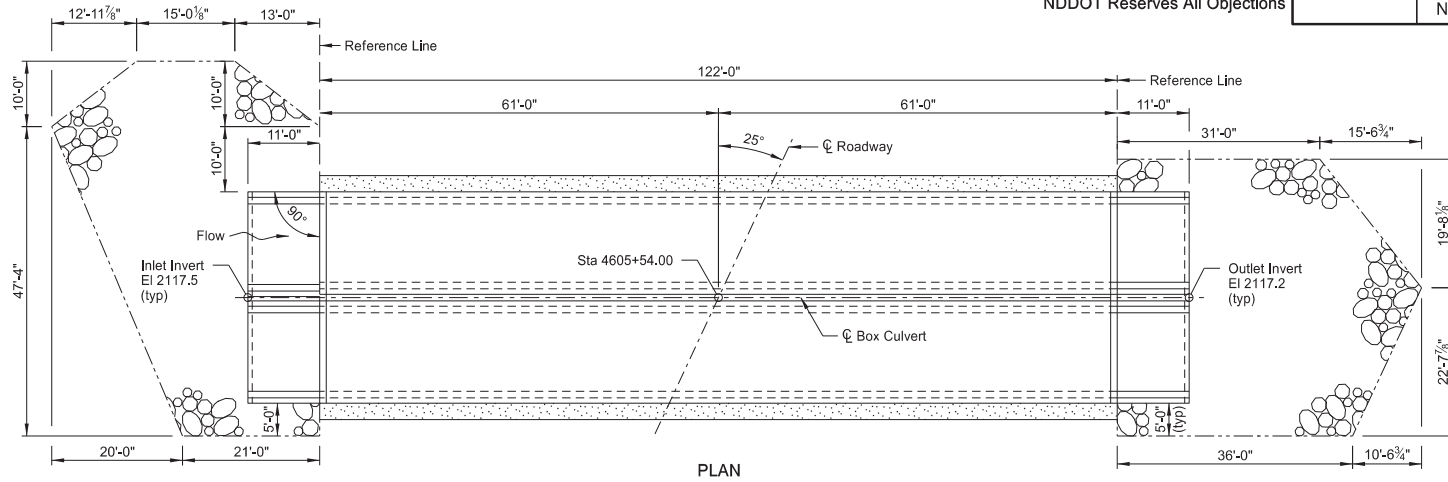
**ELEVATION
 CONTROLLED DENSITY BACKFILL DETAIL**



ND-3 OVER BEAVER CREEK
 9 MI SOUTH OF ND 34

EXCAVATION & FOUNDATION
 FILL DETAIL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	4



For a single barrel box culvert with 10" thick roof, 10" floor and 10" walls, the following total factored moments and shears would result from the application of the required loads:

FACTORED DESIGN MOMENTS (SINGLE)		FACTORED DESIGN SHEARS (SINGLE)	
WALL MOMENT	29,450 ft-lbs	WALL SHEAR	3,160 lbs
ROOF MOMENTS		ROOF SHEARS	
CORNER	29,670 ft-lbs	CORNER	13,220 lbs
BOTTOM	24,850 ft-lbs		
FLOOR MOMENTS		FLOOR SHEARS	
CORNER	31,020 ft-lbs	CORNER	13,420 lbs
TOP	25,120 ft-lbs		

* Inverts shown include culvert and associated r/rap being sunk 1.4 ft below existing stream bed elevation.

BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0104	REMOVAL OF STRUCTURE	EA	1
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	845
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
256	0200	RIPRAP GRADE II	CY	273
606	1406	14FT X 6FT PRECAST RCB CULVERT	LF	244
606	5406	14FT X 6FT PRECAST RCB END SECTION	EA	4
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	584
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	412

HYDRAULIC DATA:

Drainage Area	4.36	sq mi
Stream Gradient	0.0024	ft/ft
Design Frequency	50	yr
Design Discharge	727	cfs
Design Headwater Stage	2123.44	ft
Design Tailwater Stage	2122.60	ft
Velocity Through Culvert	5.3	fps
100-Year Frequency Discharge	899	cfs
100-Year Frequency Headwater	2124.06	ft
Overtopping Stage	2127.20	ft
Overtopping Discharge	1,617	cfs



SPECIAL PROVISIONS	
SSP 2	MIGRATORY BIRD TREATY ACT
STANDARD DRAWINGS	
D-714-22	
HL-93 DESIGN LOADING	
ND-8 7 MI NORTH OF I-94 25° SKEW	
CLEAR SPAN 2 x 14' CLEAR HEIGHT 6' MAXIMUM FILL 7' STATION: 4605+70.00	
PRECAST CONCRETE DOUBLE BOX CULVERT LAYOUT	

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION
Thorenson, Jason R.
09/13/23

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	5

NOTES

100 SCOPE OF WORK: Work at this site consists of removing an existing structure and building a new double barrel 14' x 6' x 122'-0" precast concrete box culvert.

Mix Design 1

202 REMOVAL OF STRUCTURE: The existing structure is a single 10'-3" x 6'-9" x 93' structural plate pipe arch. This structure has a paved concrete invert. Include all work required to remove the structure in the contract unit price for "Removal of Structure".

Cement	75 lbs
Fly Ash	125 lbs
Fine Aggregate	2600 lbs
Water	416.5 gals

210 ORDINARY BACKFILL: Compact material as specified in Section 203.04 G.2.a, "ND T 180."

Include the controlled density backfill and material used for the 12" cap in the price bid for "14Ft X 6Ft Precast RCB Culvert."

606 JOINTS: Provide joints in accordance with Section 606.E.3, with the exception that a 12" minimum width waterproof membrane is allowable around the exterior surfaces of the box culvert walls and roof.

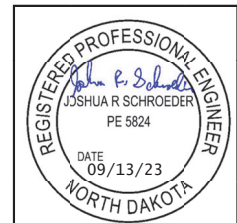
606 PRECAST SECTION: Tie the barrel sections together with 1"φ tie bolts as shown on Standard Drawing D-714-22. Place two ties per exterior wall joint, located at third points of the wall clear height.

Install the barrel sections with a maximum gap of ¼ inch wide. Install each line of barrels to terminate within 1" of the begin and end points of the adjacent barrel lines.

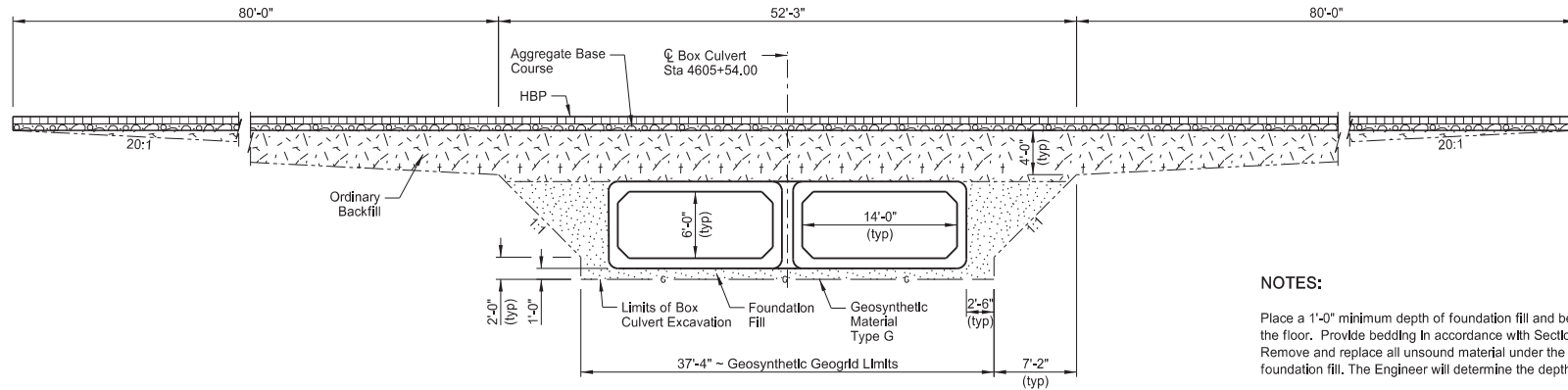
Cast holes at 3'-0" centers through the last end section and into the cutoff wall to receive ¾" diameter reinforcing bars. Cast holes in the first end section at 2'-0" centers for ¾" diameter reinforcing bars to attach the parapet. Cast parapet against the sections. Install the bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Section 806.02. Payment for "14Ft X 6Ft Precast RCB End Section" includes the cutoff wall and parapet.

Provide a distance of 1'-0" between separate precast box and end section units. Fill the gap between precast barrel sections with controlled density backfill material meeting the mix design in Note 910. Fill the gap between precast end sections as shown on Section 170 Sheet 6 with either controlled density backfill or Class 41 aggregate. If controlled density backfill is selected, use material meeting the mix design in note 910. Use AE-3 concrete for the cap material. Include the AE-3 concrete, controlled density backfill or Class 41, and rebar used for the 12" cap in the price bid for "14Ft X 6Ft Precast RCB Culvert."

910 CONTROLLED DENSITY BACKFILL: Controlled density backfill consists of cement, water, fly ash, and aggregate at the ratio specified below. Place controlled density backfill as shown in the plans. Mix the material continuously during pumping or placement to keep the solution from separating.



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	6



(SHOWING SECTION ALONG \bar{C} ROADWAY)
GEOSYNETHIC GEOGRID PLACEMENT AND FOUNDATION FILL THROUGH EXISTING EMBANKMENT

NOTES:

Place a 1'-0" minimum depth of foundation fill and bedding under the floor. Provide bedding in accordance with Section 606.04 E.1. Remove and replace all unsound material under the box with foundation fill. The Engineer will determine the depth required.

Place all bedding prior to placing box culvert sections.

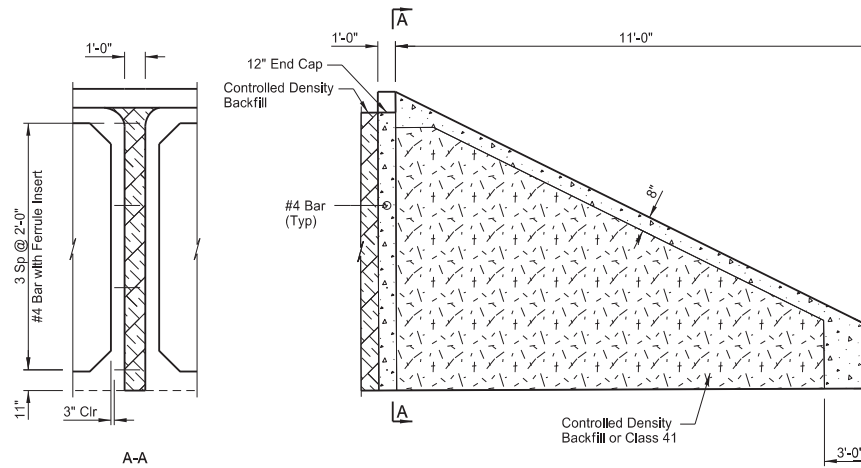
Extend the geosynthetic material and foundation fill to the end of the apron.

NOTES:

The intent of this detail is to show only the placement of the controlled density backfill between adjacent barrels. The representation of the size of barrels is arbitrary.

Embed the ferrule insert with #4 bar into the side of the last barrel section maintaining a 3" minimum clearance from the other box culvert. Spacing measured 1'-0" from bottom of box and spaced at 2'-0" up the front face.

Install the #4 bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage and that meets the requirements of Section 806.02.



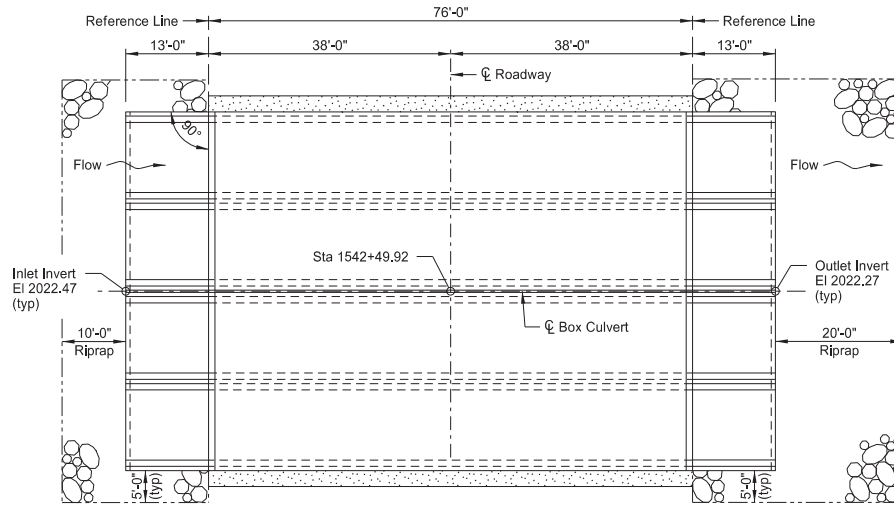
ELEVATION
CONTROLLED DENSITY BACKFILL DETAIL



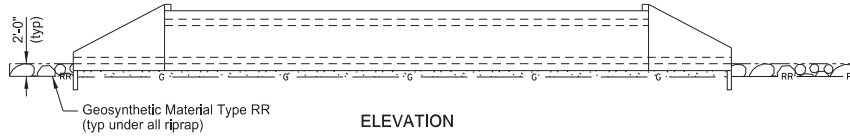
ND-8 7 MI NORTH OF I-94
25° SKEW

EXCAVATION & FOUNDATION
FILL DETAIL

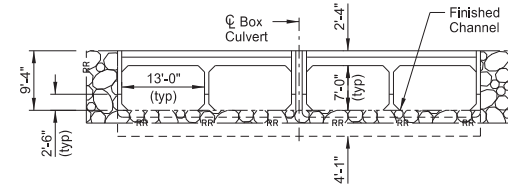
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	7



PLAN



ELEVATION



END VIEW

For a single barrel box culvert with 12" thick roof, 10" floor and 8" walls, the following total factored moments and shears would result from the application of the required loads:

FACTORED DESIGN MOMENTS (SINGLE)		FACTORED DESIGN SHEARS (SINGLE)	
WALL MOMENT	11,210 ft-lbs	WALL SHEAR	3,840 lbs
ROOF MOMENTS		ROOF SHEARS	
CORNER	10,590 ft-lbs	CORNER	12,990 lbs
BOTTOM	38,240 ft-lbs	FLOOR SHEARS	
FLOOR MOMENTS		CORNER	10,870 lbs
CORNER	13,700 ft-lbs		
TOP	27,910 ft-lbs		

For a double barrel box culvert with 13" thick roof, 9" floor and 8" walls, the following total factored moments and shears would result from the application of the required loads:

FACTORED DESIGN MOMENTS (DOUBLE)		FACTORED DESIGN SHEARS (DOUBLE)	
WALL MOMENT	1,330 ft-lbs	WALL SHEAR	1,420 lbs
ROOF MOMENTS		ROOF SHEARS	
CORNER	6,740 ft-lbs	CORNER	11,490 lbs
BOTTOM	30,500 ft-lbs	WALL	14,890 lbs
TOP	27,370 ft-lbs	FLOOR SHEARS	
FLOOR MOMENTS		CORNER	7,630 lbs
CORNER	9,330 ft-lbs	WALL	9,920 lbs
TOP	14,600 ft-lbs		
BOTTOM	18,650 ft-lbs		

* Inverts shown include culvert and associated riprap being sunk 1 ft below existing stream bed elevation.

HYDRAULIC DATA:

Drainage Area	23.49 sq mi
Stream Gradient	0.0014 ft/ft
Design Frequency	50 yr
Design Discharge	1,997 cfs
Design Headwater Stage	2030.82 ft
Design Tailwater Stage	2029.82 ft
Velocity Through Culvert	6.4 fps
100-Year Frequency Discharge	2,480 cfs
100-Year Frequency Headwater	2032.11 ft
Overtopping Stage	2032.30 ft
Overtopping Discharge	2,512 cfs

BOX CULVERT BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0104	REMOVAL OF STRUCTURE	EA	1
210	0050	BOX CULVERT EXCAVATION	EA	1
210	0210	FOUNDATION FILL	CY	1,867
210	0405	FOUNDATION PREPARATION-BOX CULVERT	EA	1
256	0200	RIPRAP GRADE II	CY	169
606	3307	DBL 13FT X 7FT PRECAST RCB CULVERT	LF	152
606	5307	DBL 13FT X 7FT PRECAST RCB END SECTION	EA	4
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	693
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	254



SPECIAL PROVISIONS

SSP 2	MIGRATORY BIRD TREATY ACT
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STANDARD DRAWINGS

D-714-22

HL-93 DESIGN LOADING

ND-31 OVER DOGTOOTH CREEK
RALEIGH

CLEAR SPAN 4 x 13' CLEAR HEIGHT 7'
MAXIMUM FILL 4' STATION: 1542+49.92

PRECAST CONCRETE
QUADRUPLE BOX CULVERT LAYOUT

ND DEPARTMENT OF TRANSPORTATION
BRIDGE DIVISION

Thorenson, Jason R.
09/13/23

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	S-9-999(478)	170	8

NOTES

- 100 SCOPE OF WORK: Work at this site consists of removing an existing structure and building a new quadruple barrel 13' x 7' x 76'-0" precast concrete box culvert.
- 202 REMOVAL OF STRUCTURE: The existing structure is a 2-span concrete slab bridge, 42'-0" long with a clear roadway width of 28'-0". Include all work required to remove the bridge in the contract unit price for "Removal of Structure".
- 210 ORDINARY BACKFILL: Compact material as specified in Section 203.04 G.2.a, "ND T 180."
- 606 JOINTS: Provide joints in accordance with Section 606.E.3, with the exception that a 12" minimum width waterproof membrane is allowable around the exterior surfaces of the box culvert walls and roof.
- 606 PRECAST SECTION: Tie the barrel sections together with 1"φ tie bolts as shown on Standard Drawing D-714-22. Place two ties per exterior wall joint, located at third points of the wall clear height.

Mix Design 1

Cement	75 lbs
Fly Ash	125 lbs
Fine Aggregate	2600 lbs
Water	416.5 gals

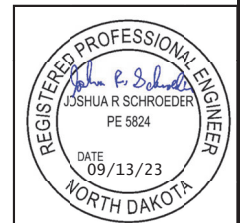
Include the controlled density backfill and material used for the 12" cap in the price bid for "Dbl 13Ft X 7Ft Precast RCB Culvert."

Install the barrel sections with a maximum gap of ¼ inch wide. Install each line of barrels to terminate within 1" of the begin and end points of the adjacent barrel lines.

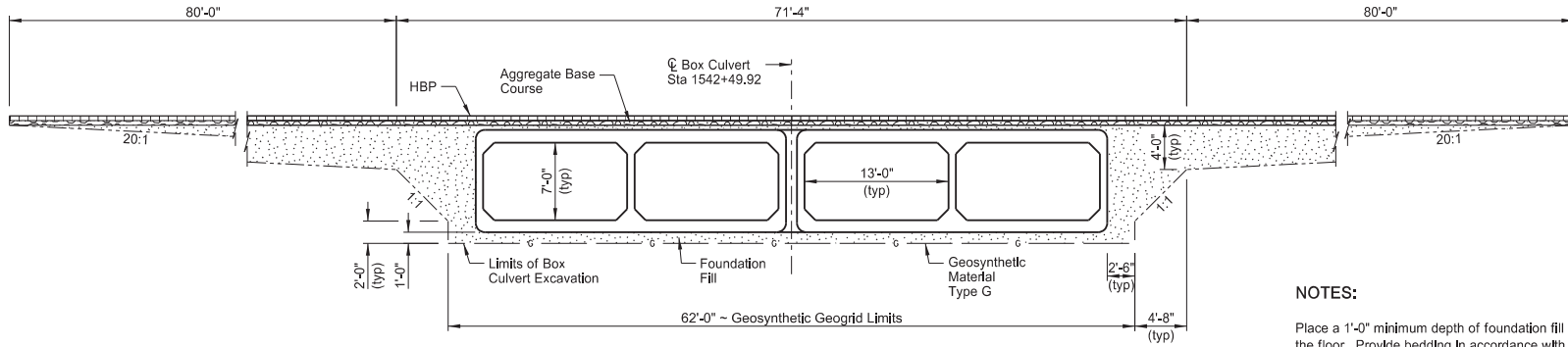
Cast holes at 3'-0" centers through the last end section and into the cutoff wall to receive ¾" diameter reinforcing bars. Cast holes in the first end section at 2'-0" centers for ¾" diameter reinforcing bars to attach the parapet. Cast parapet against the sections. Install the bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage, in accordance with Section 806.02. Payment for "Dbl 13Ft X 7Ft Precast RCB End Section" includes the cutoff wall and parapet.

Provide a distance of 1'-0" between separate precast box and end section units. Fill the gap between precast barrel sections with controlled density backfill material meeting the mix design in Note 910. Fill the gap between precast end sections as shown on Section 170 Sheet 9 with either controlled density backfill or Class 41 aggregate. If controlled density backfill is selected, use material meeting the mix design in note 910. Use AE-3 concrete for the cap material. Include the AE-3 concrete, controlled density backfill or Class 41, and rebar used for the 12" cap in the price bid for "Dbl 13Ft X 7Ft Precast RCB Culvert."

- 910 CONTROLLED DENSITY BACKFILL: Controlled density backfill consists of cement, water, fly ash, and aggregate at the ratio specified below. Place controlled density backfill as shown in the plans. Mix the material continuously during pumping or placement to keep the solution from separating.



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	170	9



(SHOWING SECTION ALONG \bar{C} ROADWAY)
**GEOSYNTHETIC GEOGRID PLACEMENT AND FOUNDATION FILL
 THROUGH EXISTING EMBANKMENT**

NOTES:

Place a 1'-0" minimum depth of foundation fill and bedding under the floor. Provide bedding in accordance with Section 606.04 E.1. Remove and replace all unsound material under the box with foundation fill. The Engineer will determine the depth required.

Place all bedding prior to placing box culvert sections.

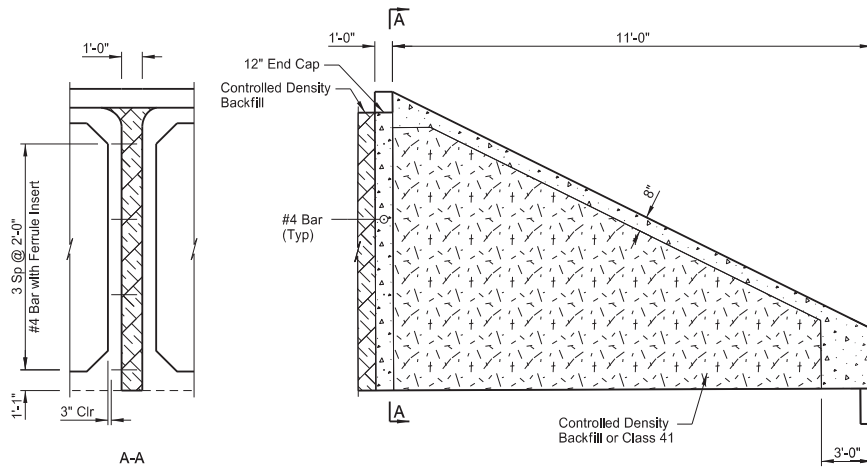
Extend the geosynthetic material and foundation fill to the end of the apron.

NOTES:

The intent of this detail is to show only the placement of the controlled density backfill between adjacent barrels. The representation of the size of barrels is arbitrary.

Embed the ferrule insert with #4 bar into the side of the last barrel section maintaining a 3" minimum clearance from the other box culvert. Spacing measured 1'-0" from bottom of box and spaced at 2'-0" up the front face.

Install the #4 bars according to the manufacturer's recommendations, with a high strength adhesive specifically intended for concrete anchorage and that meets the requirements of Section 806.02.



**ELEVATION
 CONTROLLED DENSITY BACKFILL DETAIL**

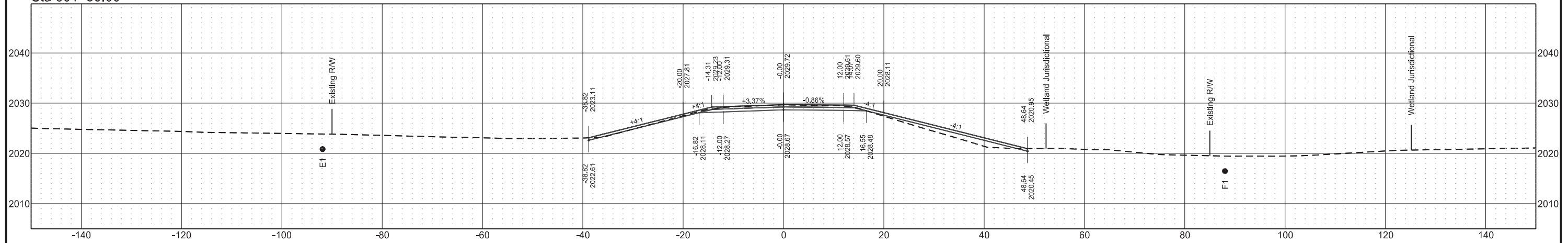


ND-31 OVER DOGTOOTH CREEK
 RALEIGH

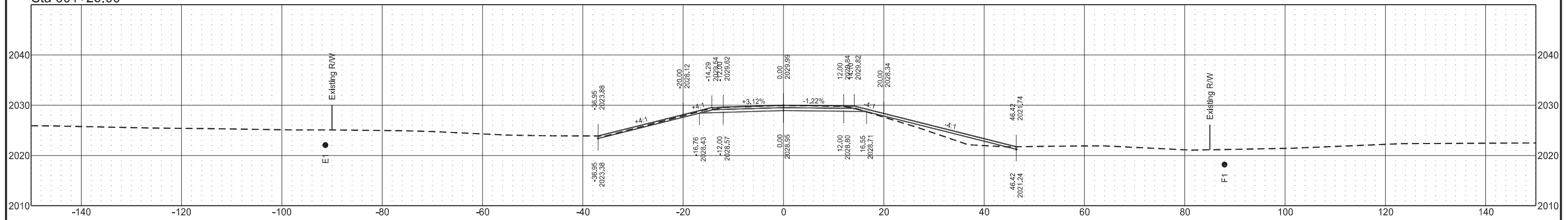
EXCAVATION & FOUNDATION
 FILL DETAIL

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	1

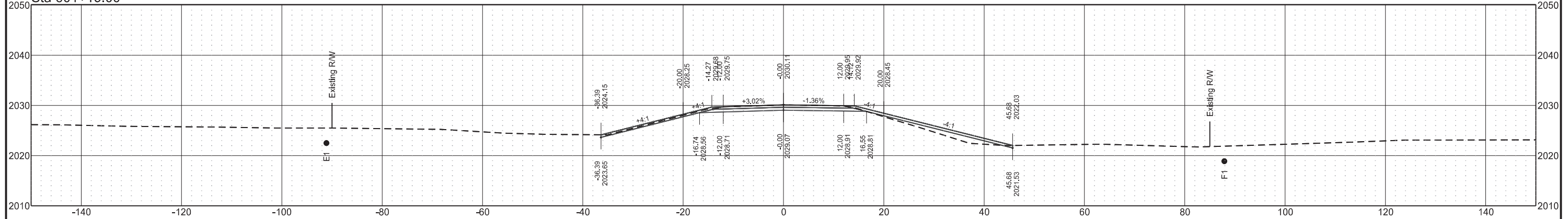
Sta 601+50.00



Sta 601+25.00

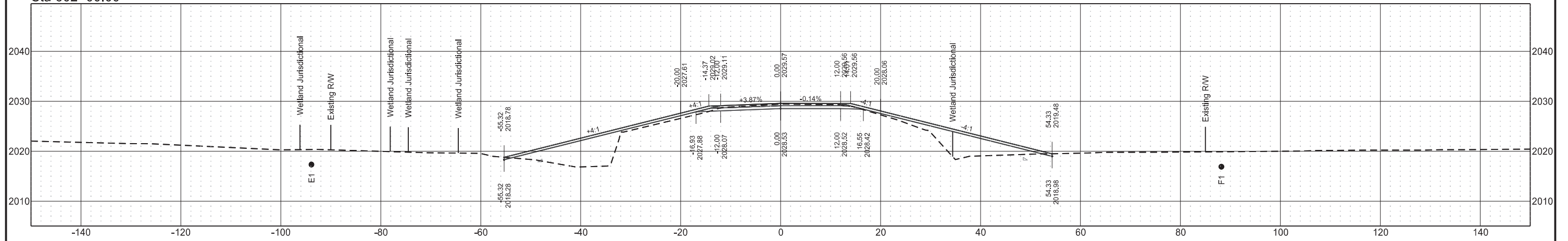


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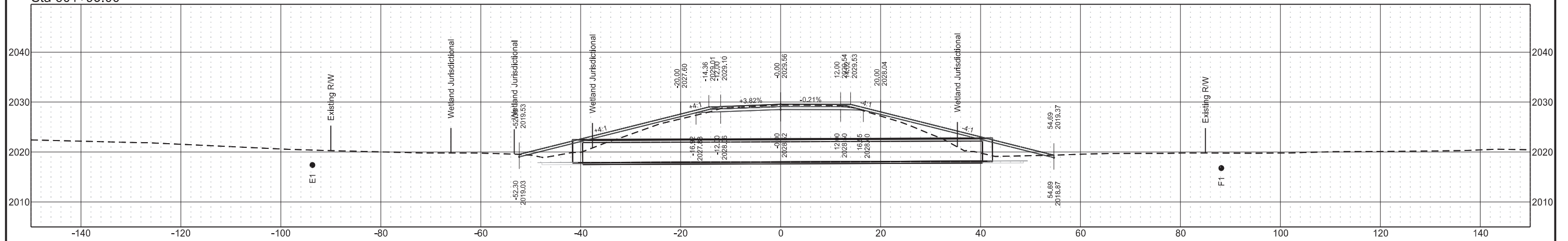


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	2

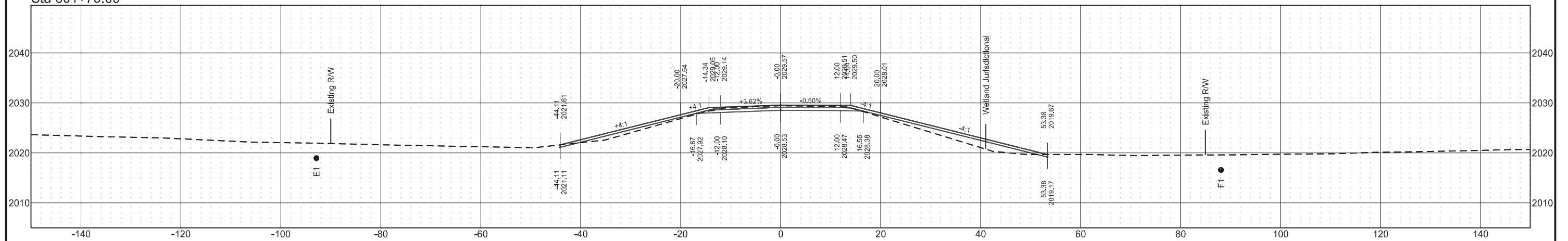
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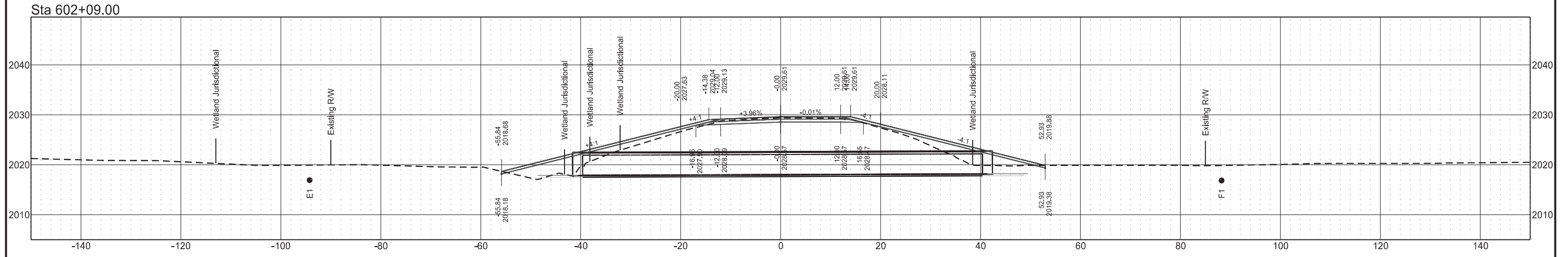
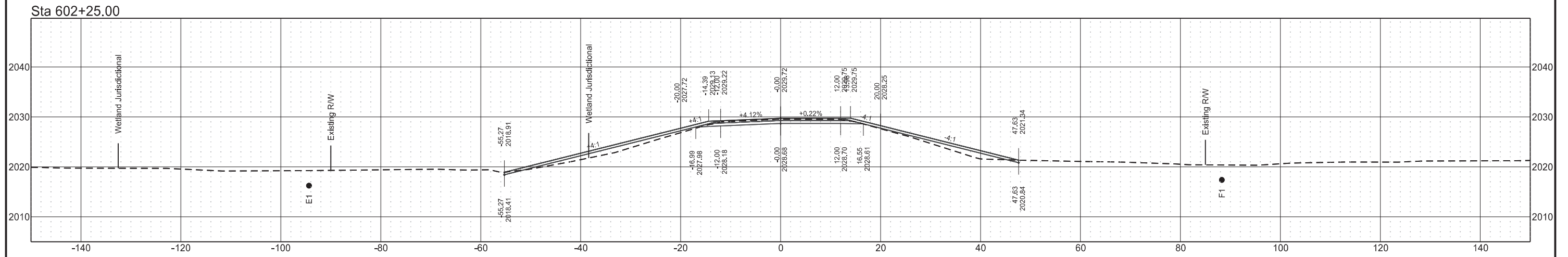
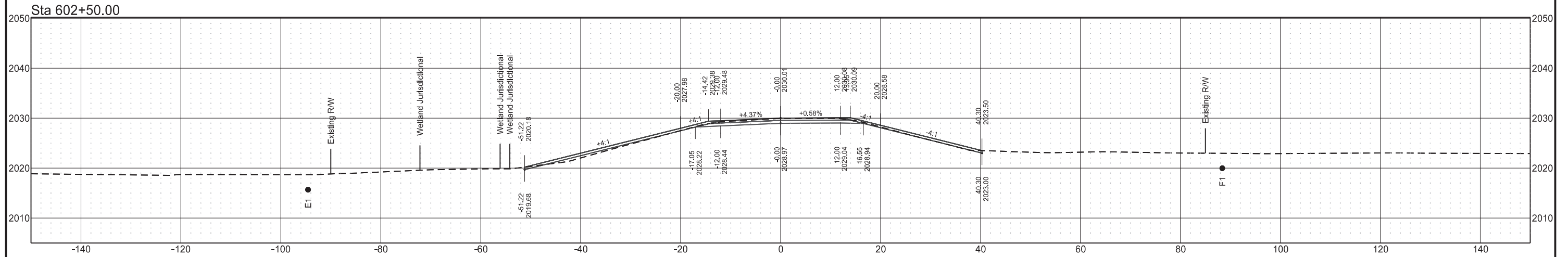
Sta 601+95.00



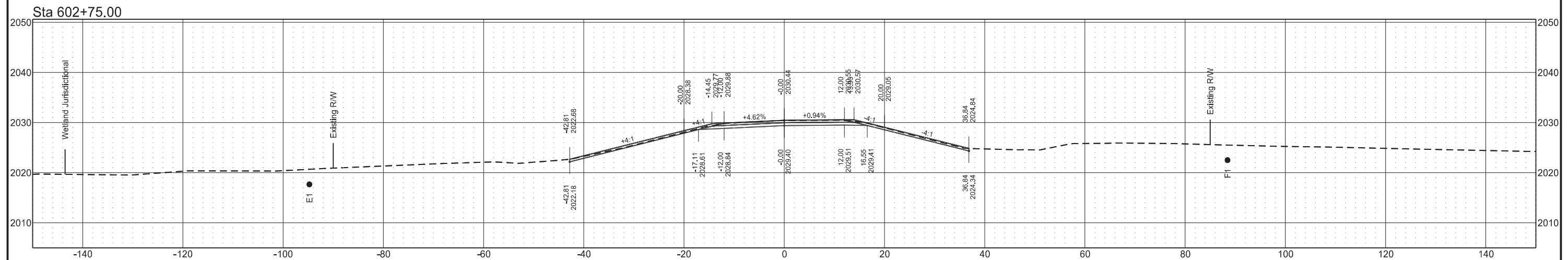
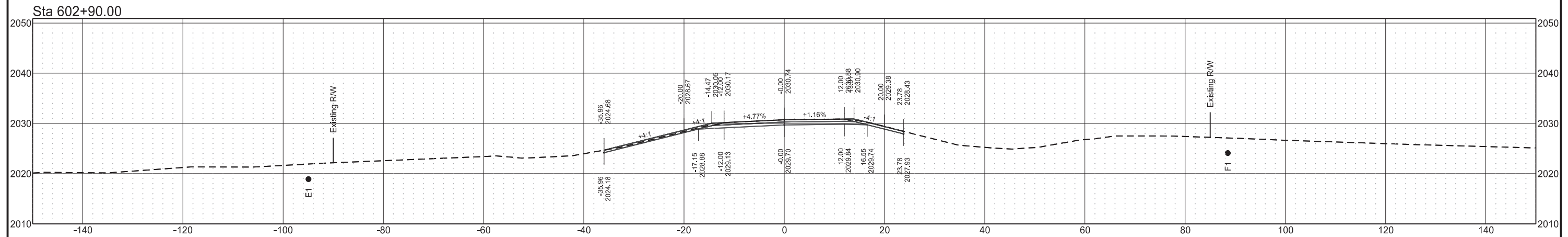
Sta 601+75.00



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	3

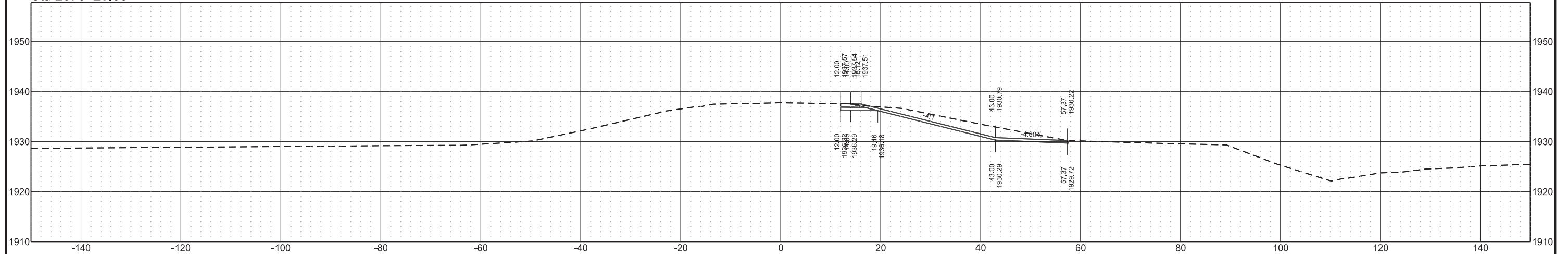


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	4

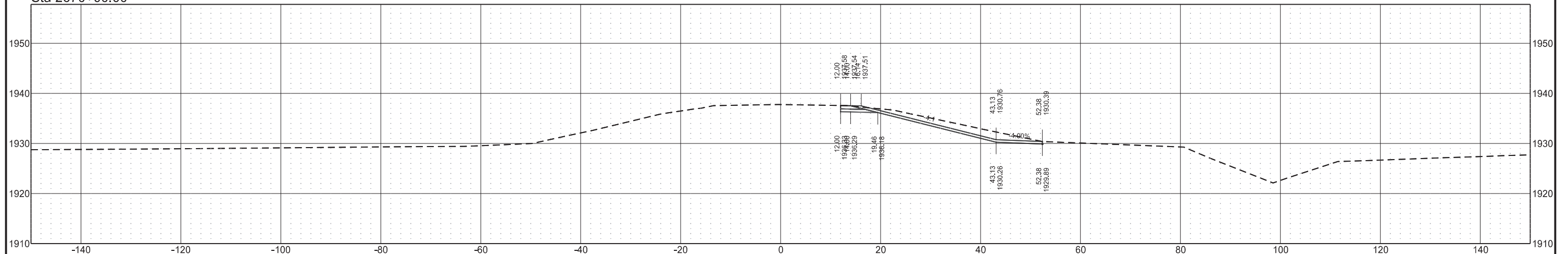


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	5

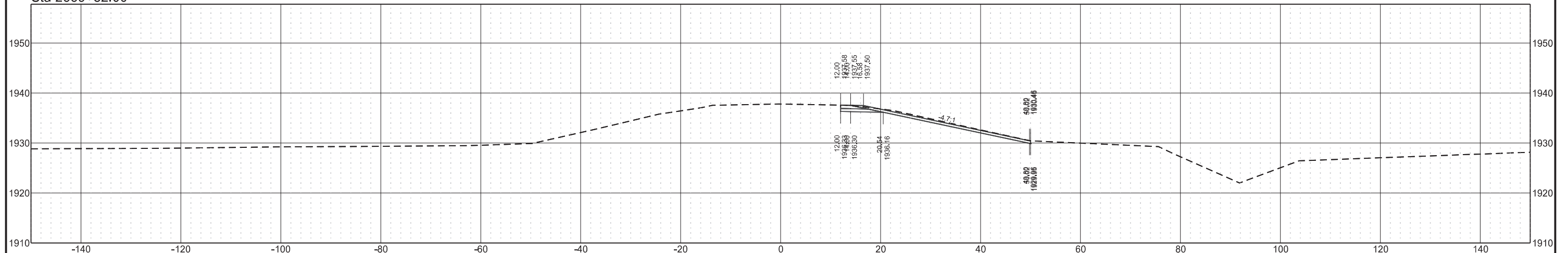
Sta 2670+25.00



Sta 2670+00.00

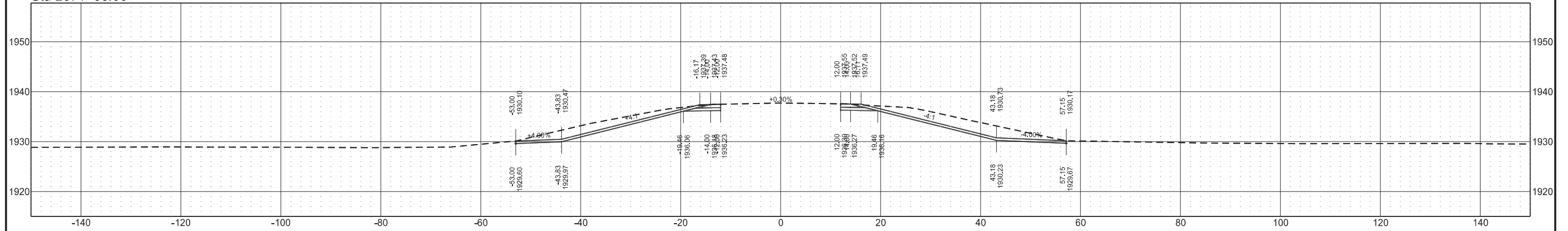


Sta 2669+82.00

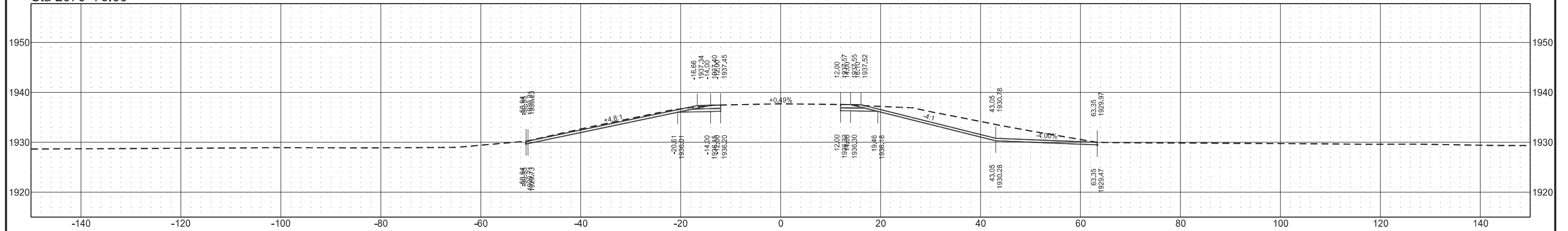


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	6

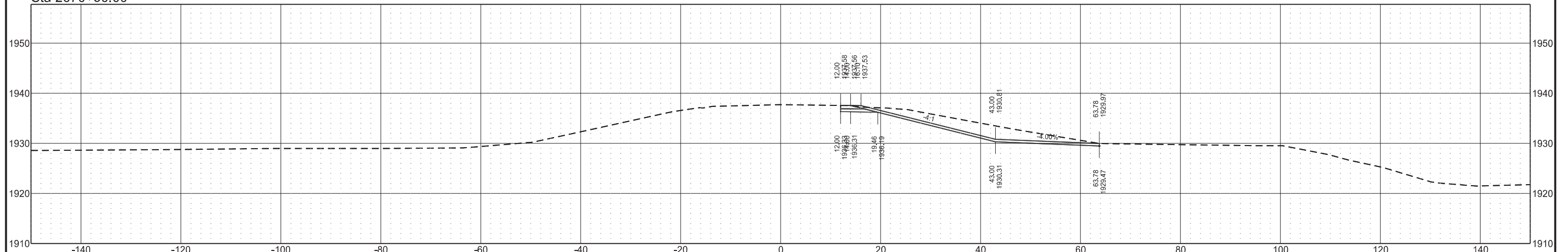
Sta 2671+00.00



Sta 2670+75.00

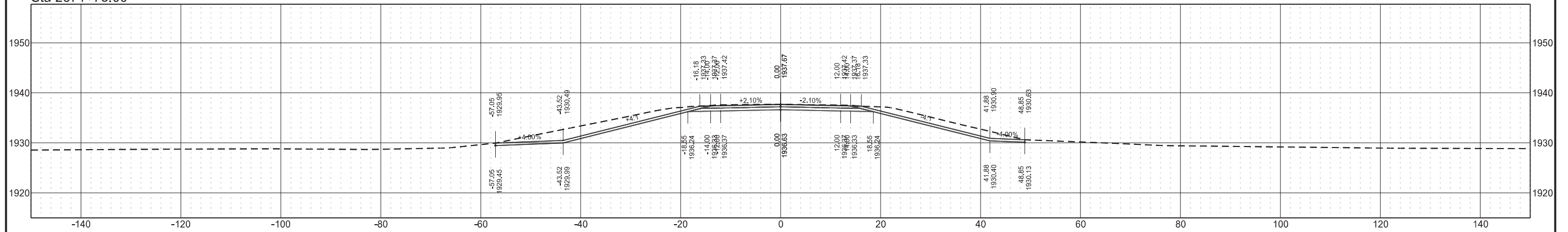


Sta 2670+50.00

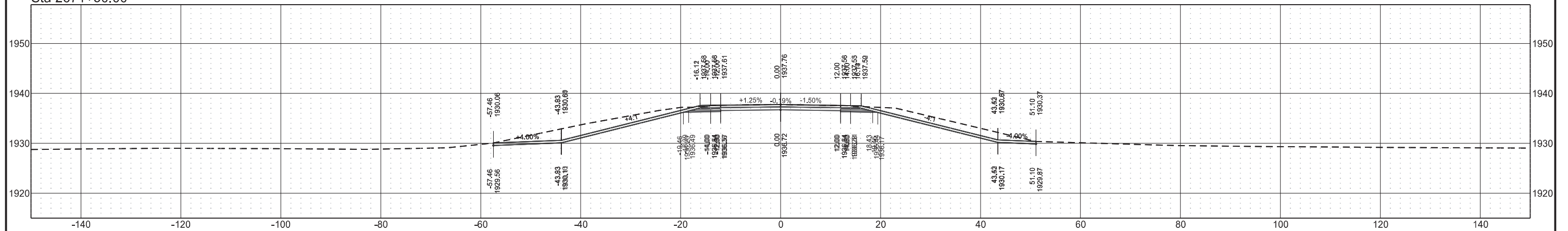


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	7

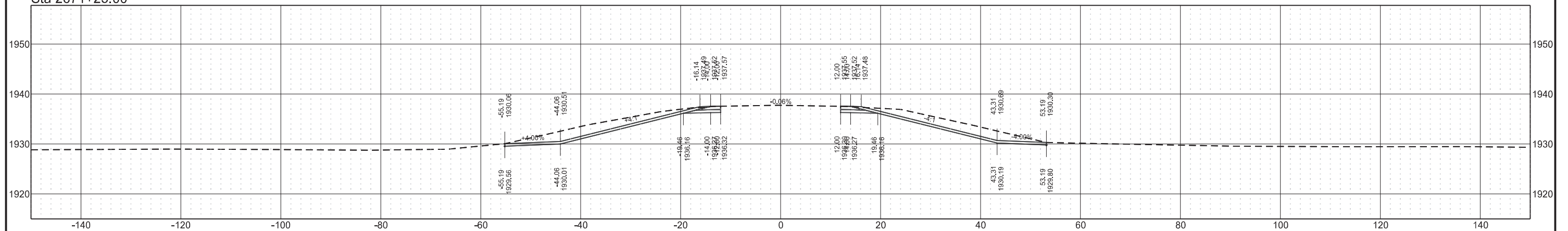
Sta 2671+75.00



Sta 2671+50.00

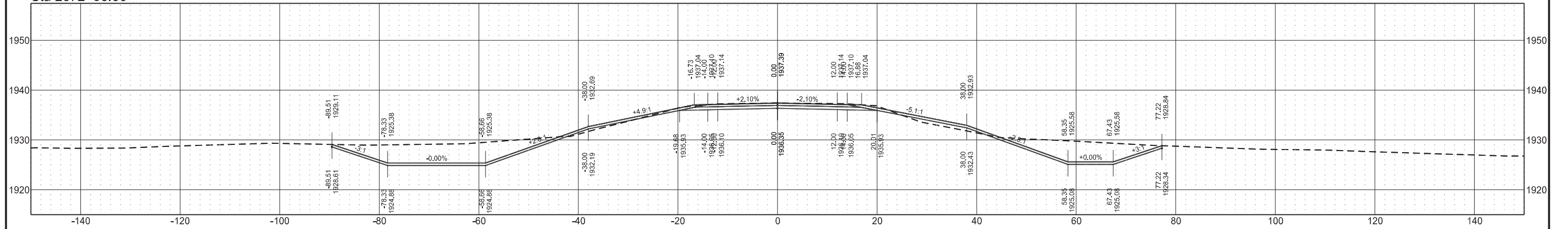


Sta 2671+25.00

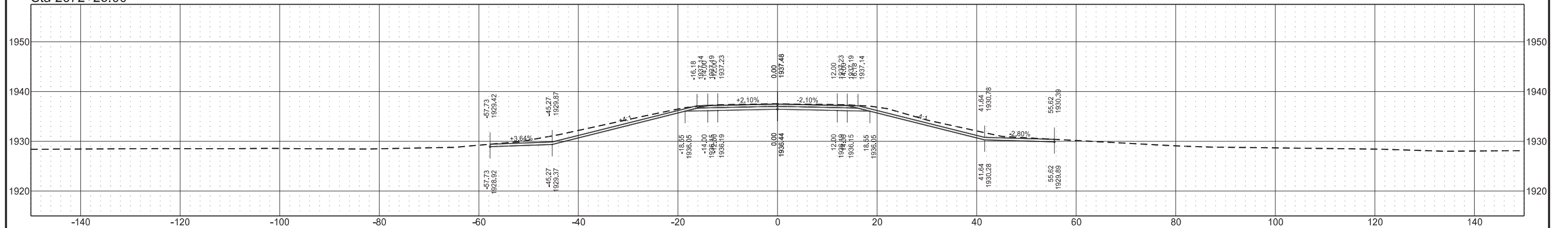


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	8

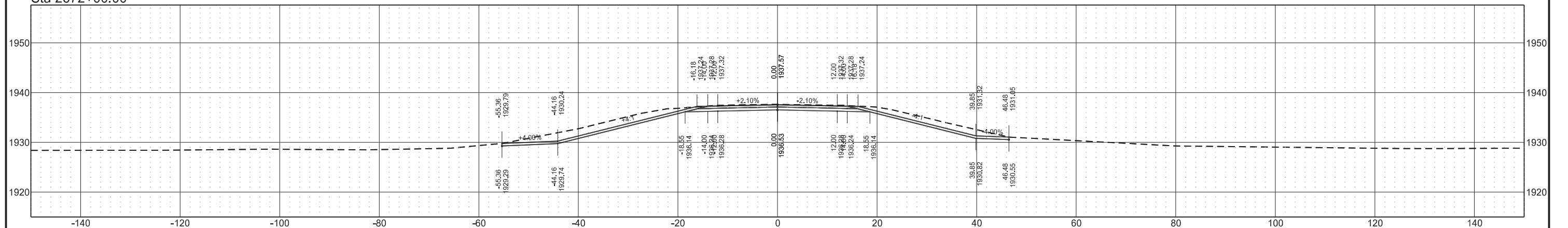
Sta 2672+50.00



Sta 2672+25.00

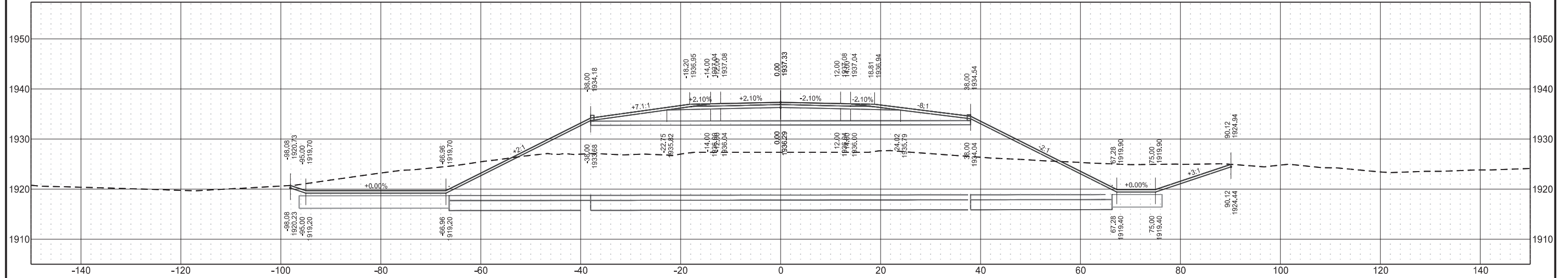


Sta 2672+00.00

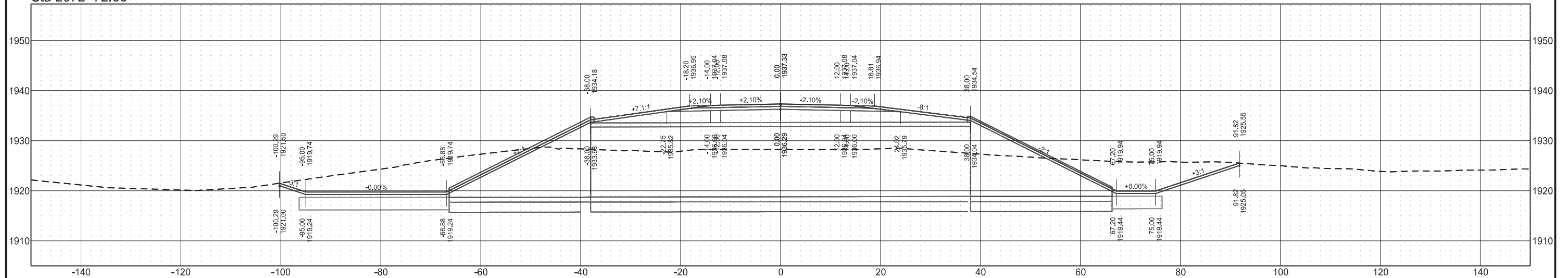


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	9

Sta 2672+75.00

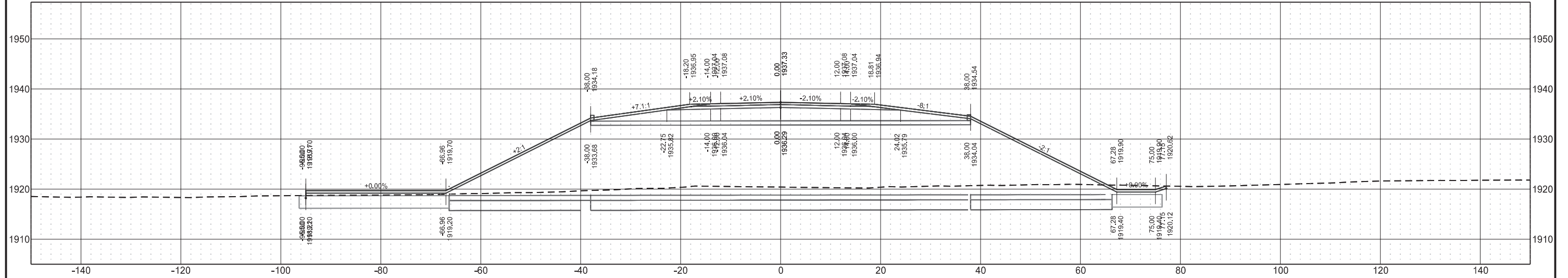


Sta 2672+72.55

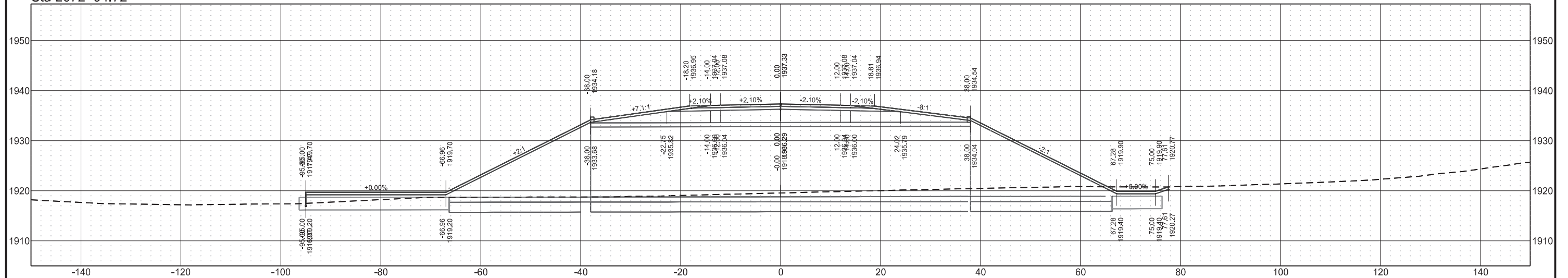


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	10

Sta 2673+00.00

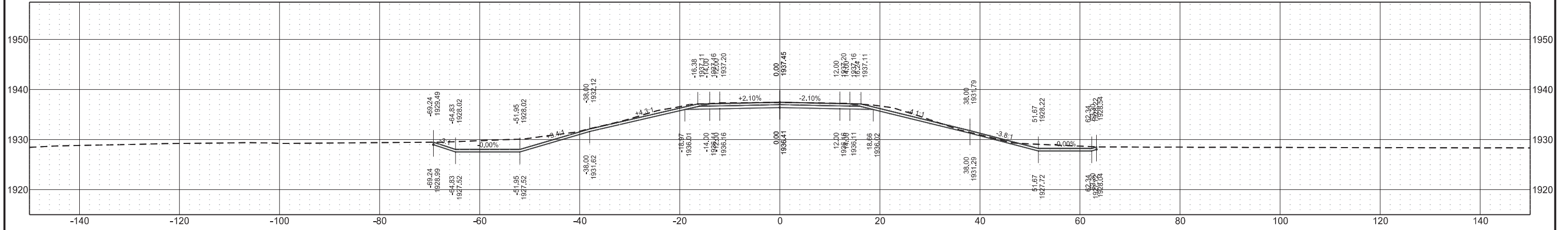


Sta 2672+94.72

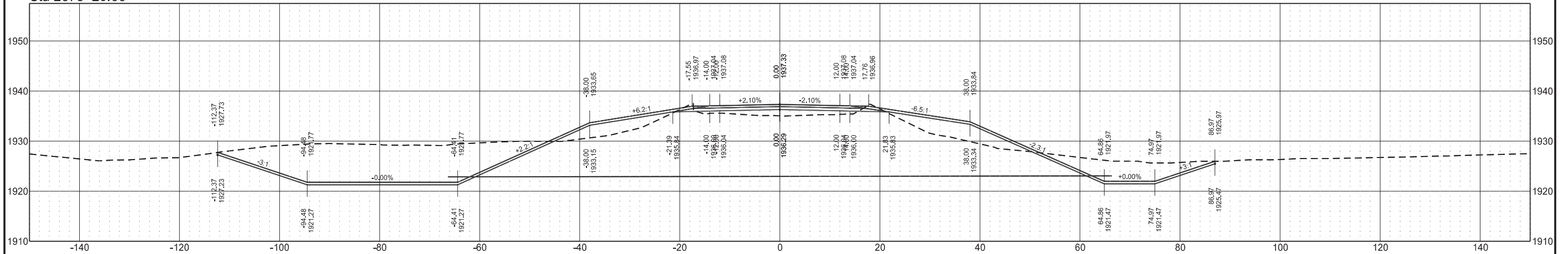


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	11

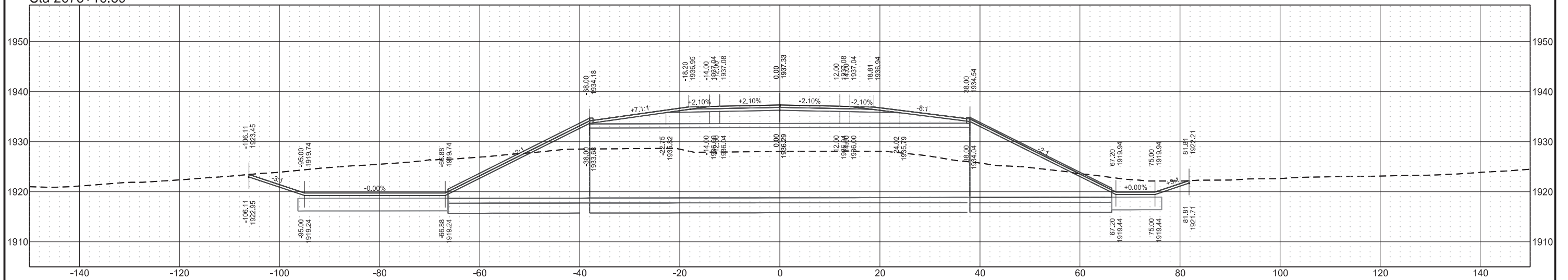
Sta 2673+50.00



Sta 2673+25.00

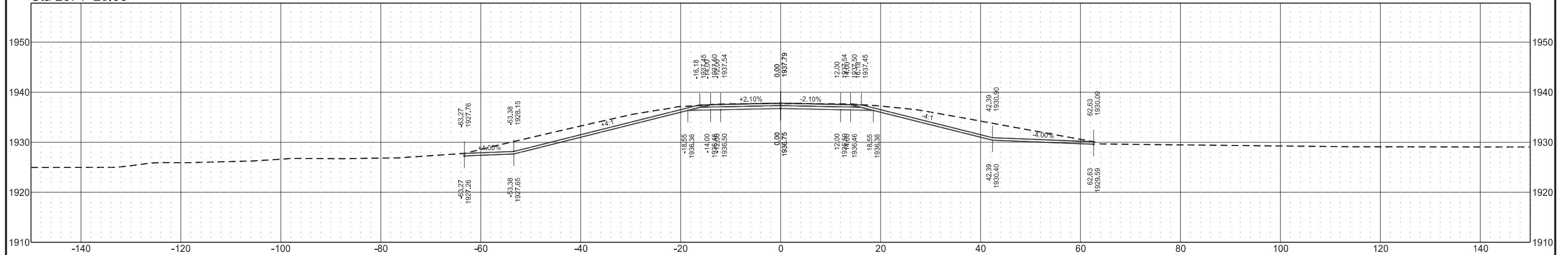


Sta 2673+16.89

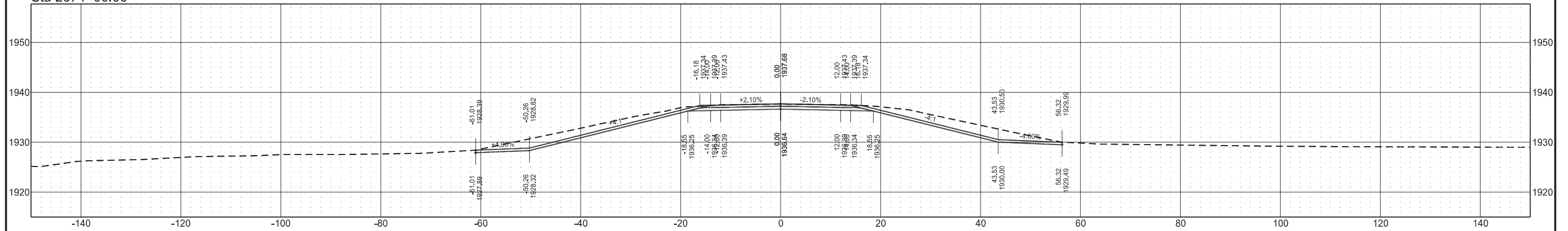


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	12

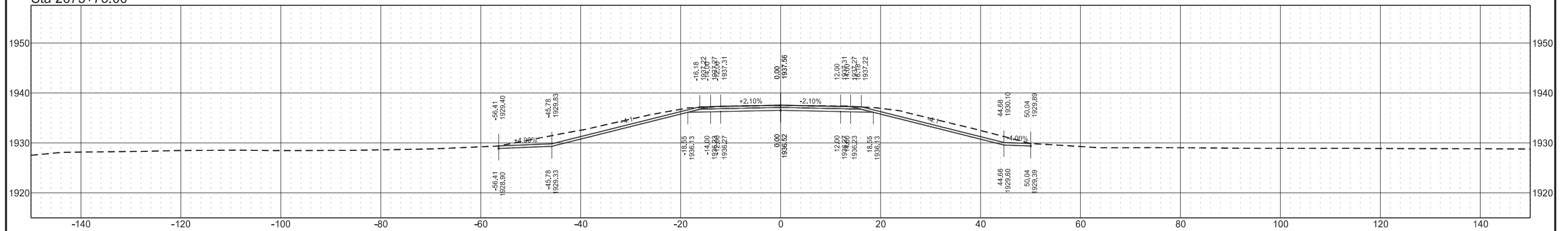
Sta 2674+25.00



Sta 2674+00.00

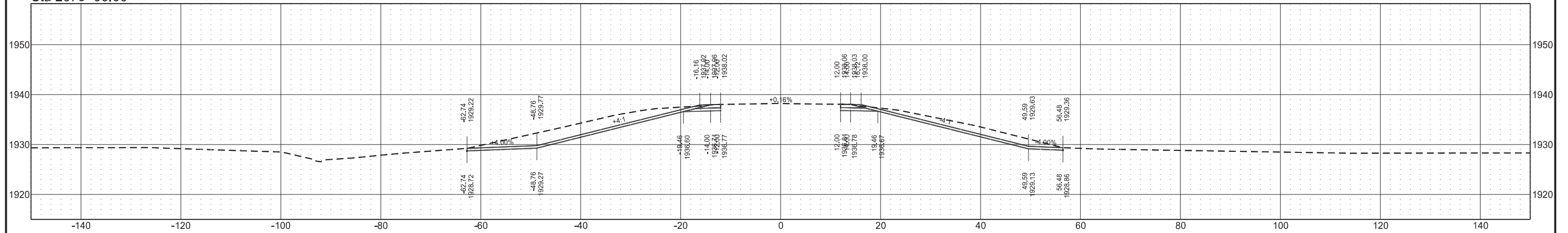


Sta 2673+75.00

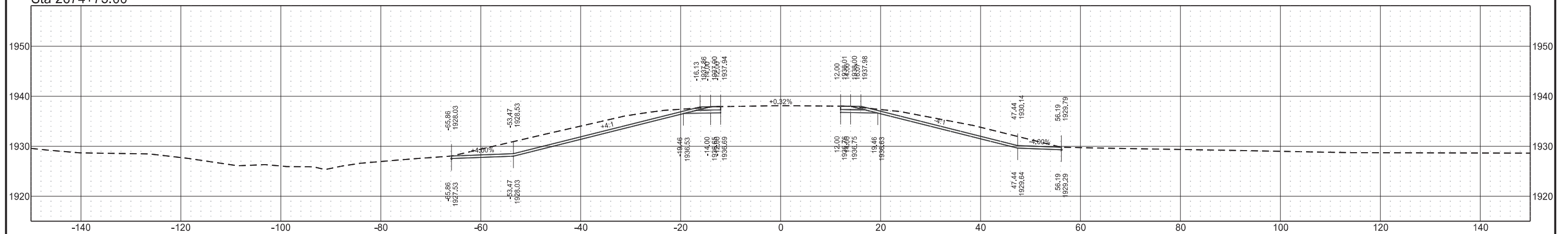


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	13

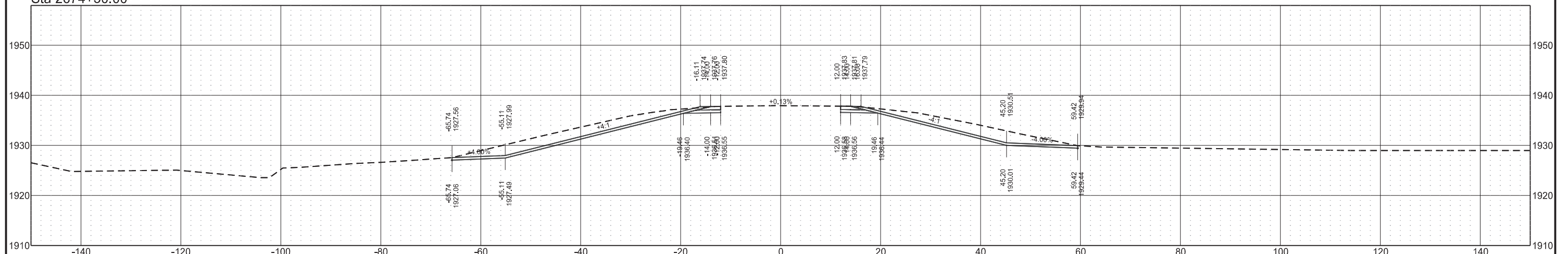
Sta 2675+00.00



Sta 2674+75.00

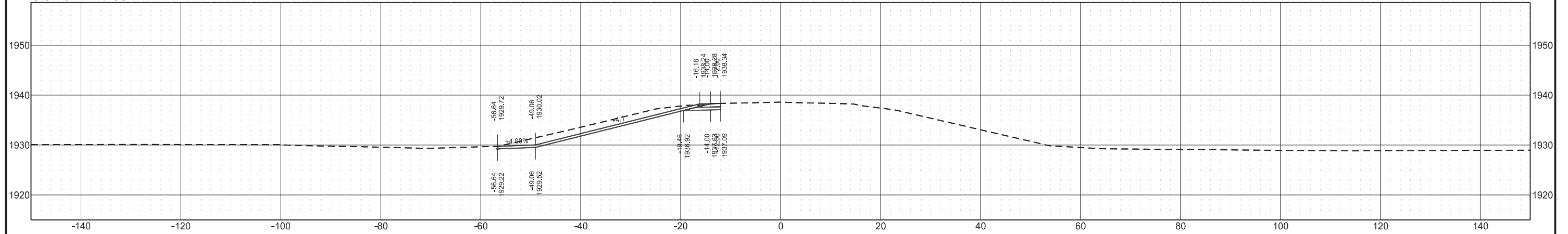


Sta 2674+50.00

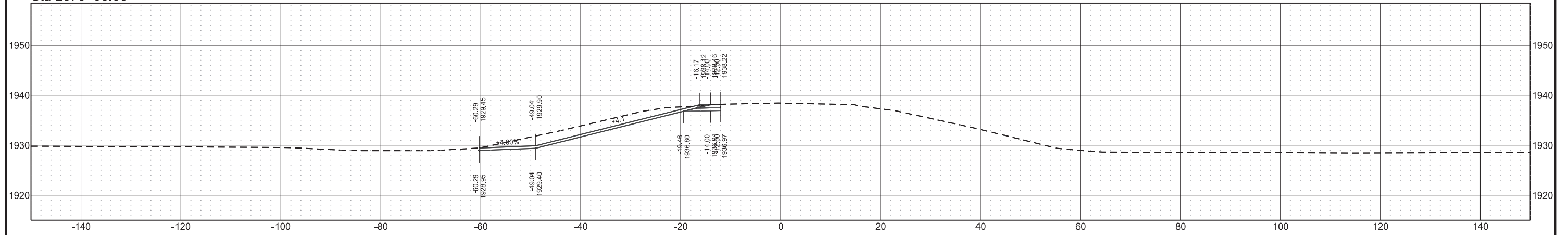


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	14

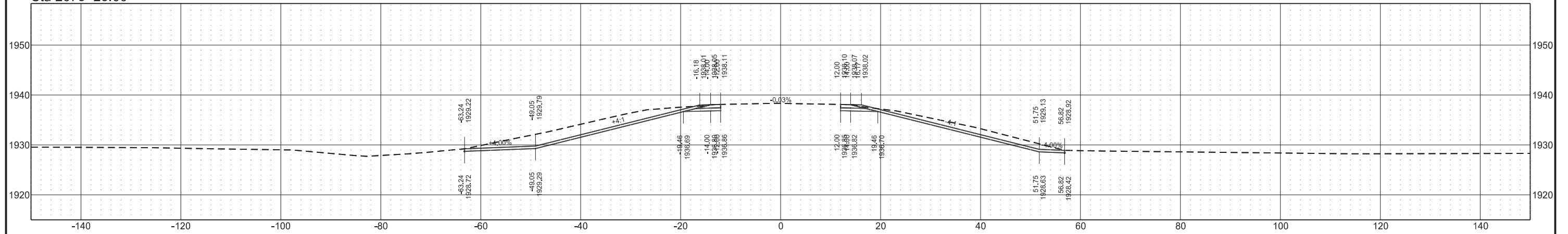
Sta 2675+75.00



Sta 2675+50.00

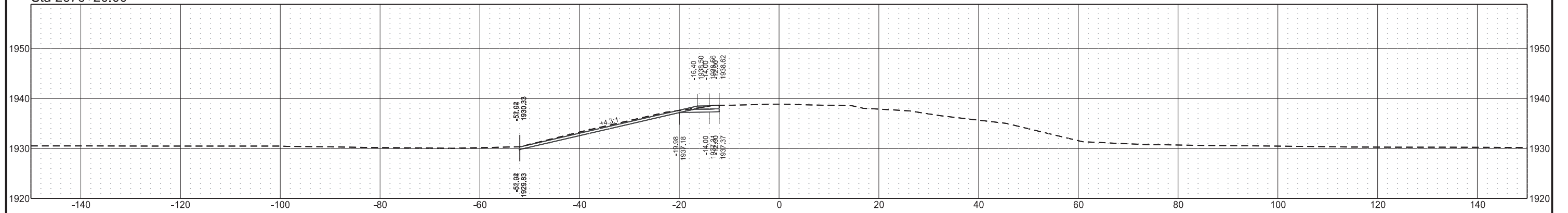


Sta 2675+25.00

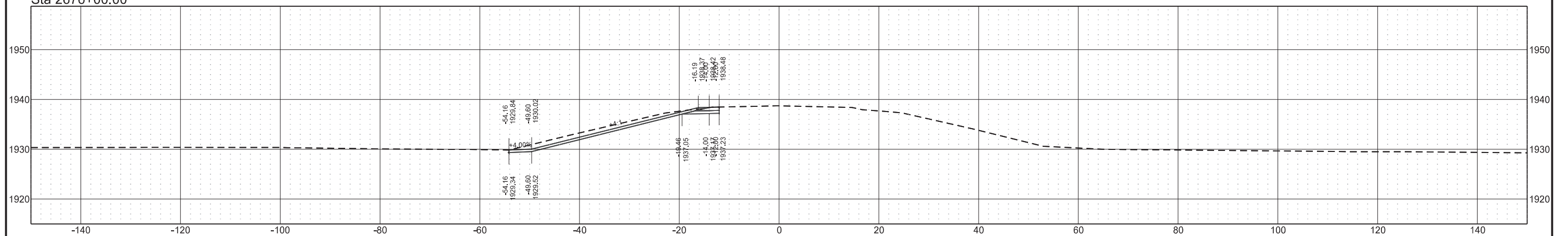


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	15

Sta 2676+20.00

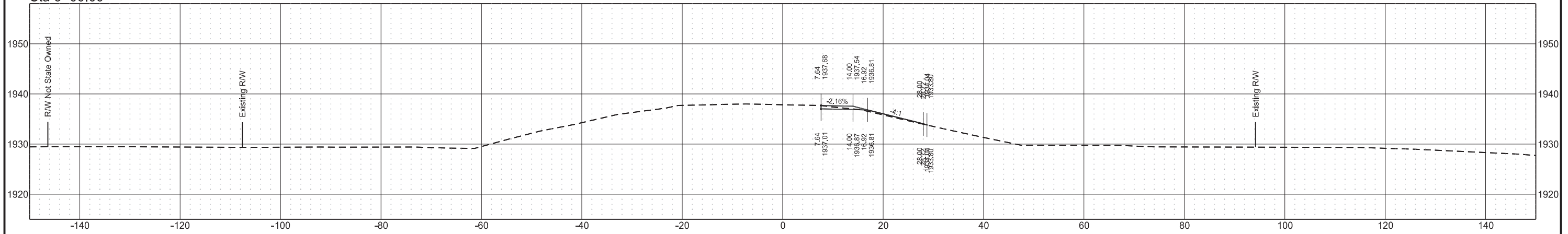


Sta 2676+00.00

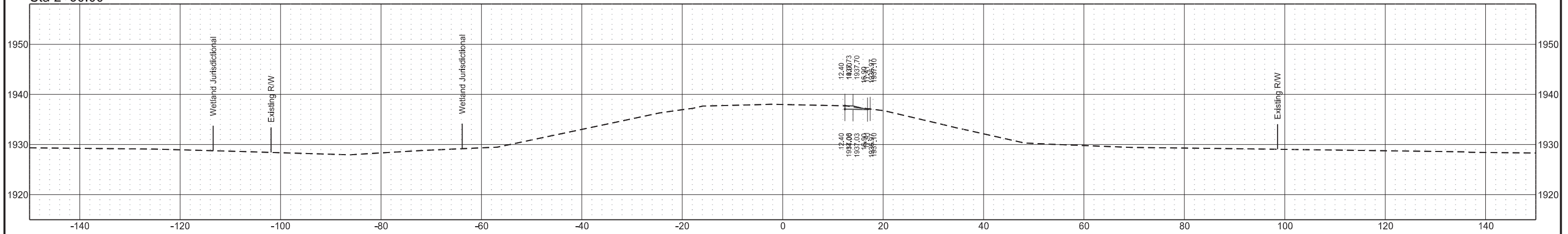


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	16

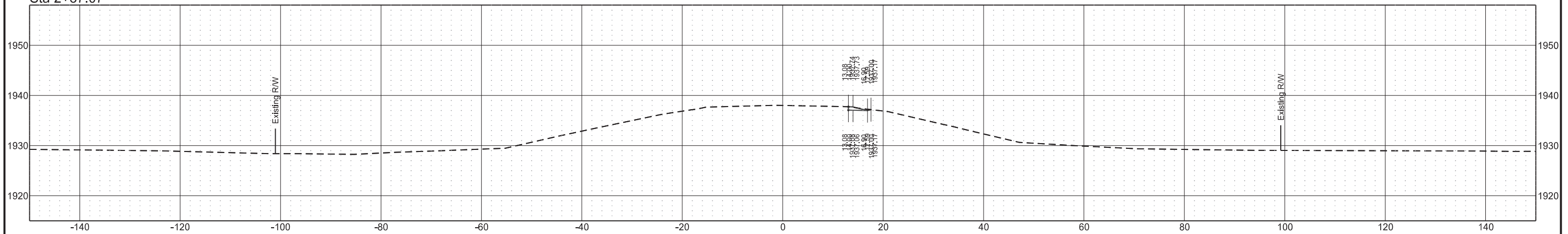
Sta 3+00.00



Sta 2+50.00

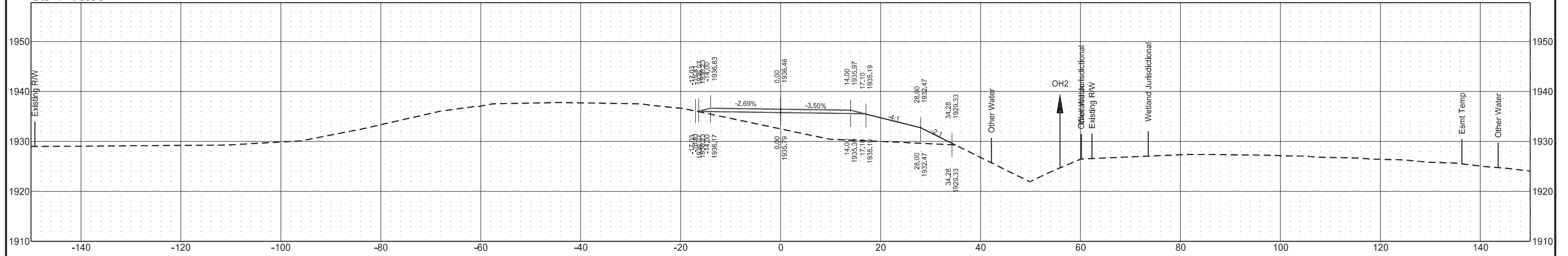


Sta 2+37.07

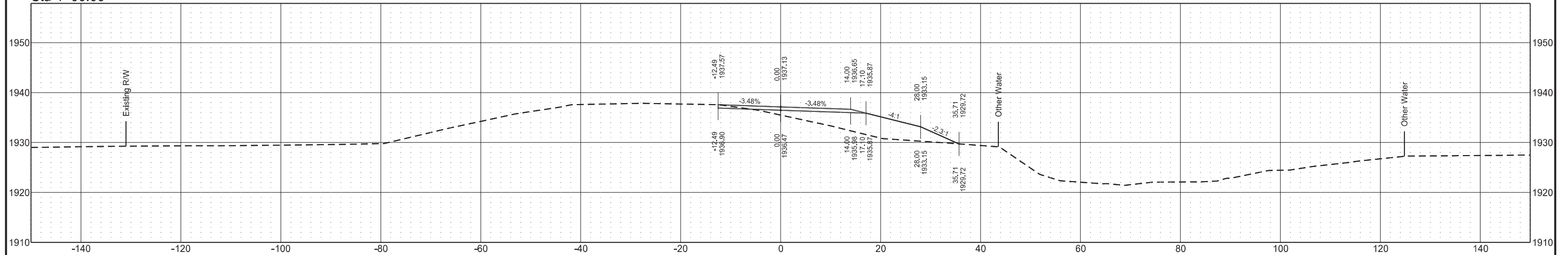


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	17

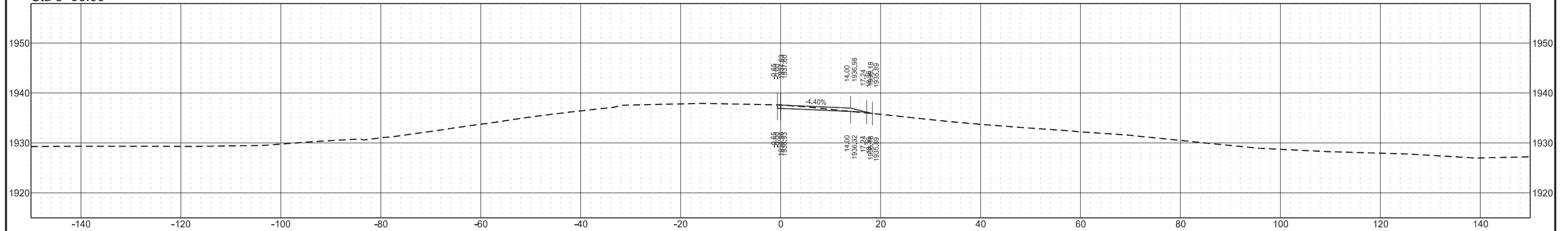
Sta 4+50.00



Sta 4+00.00

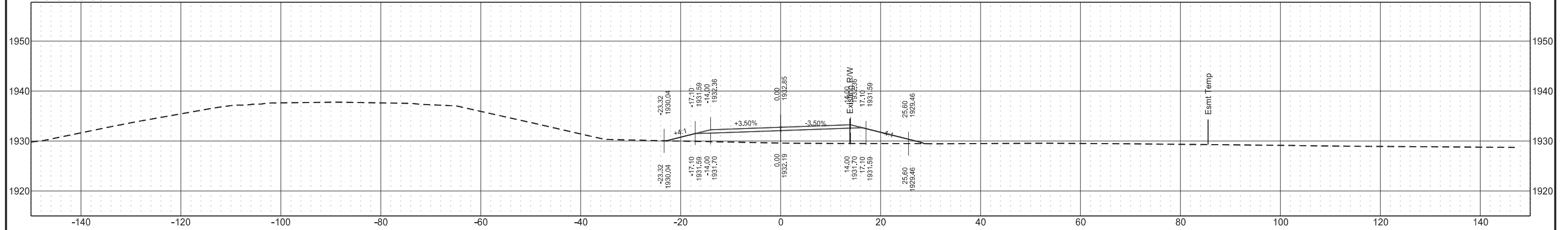


Sta 3+50.00

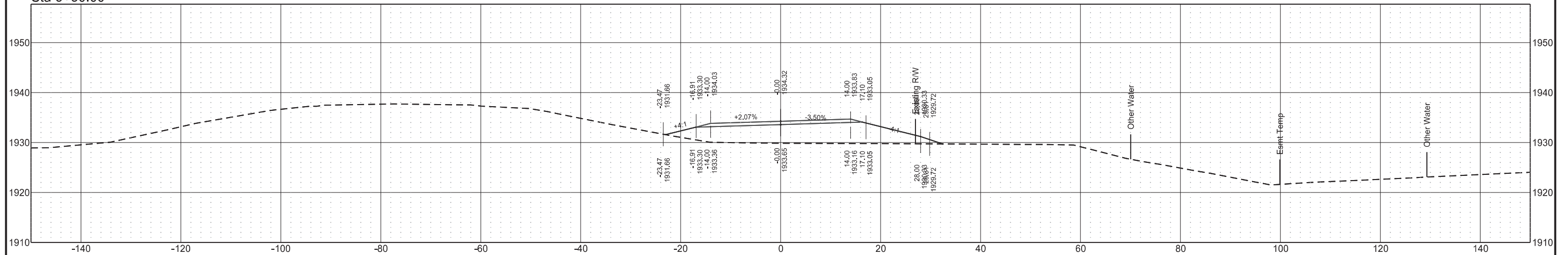


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	18

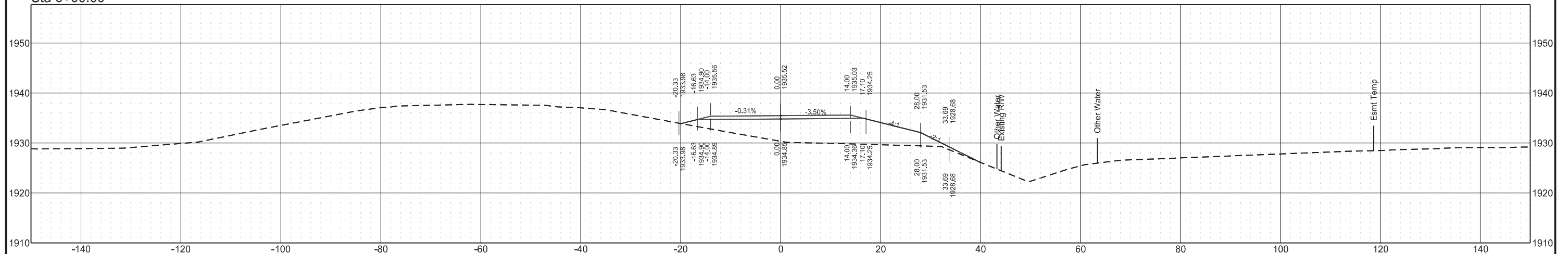
Sta 6+00.00



Sta 5+50.00

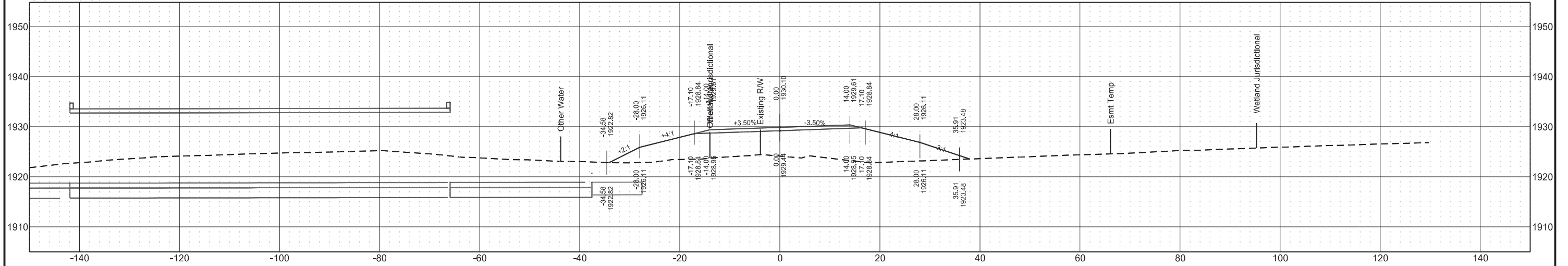


Sta 5+00.00

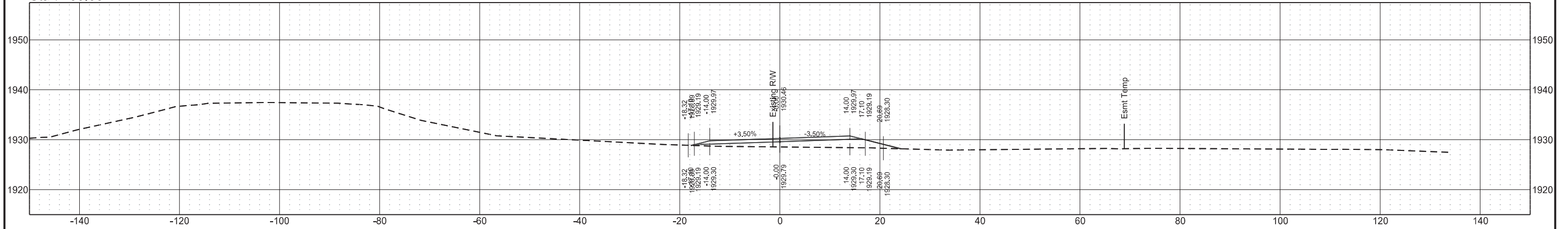


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	19

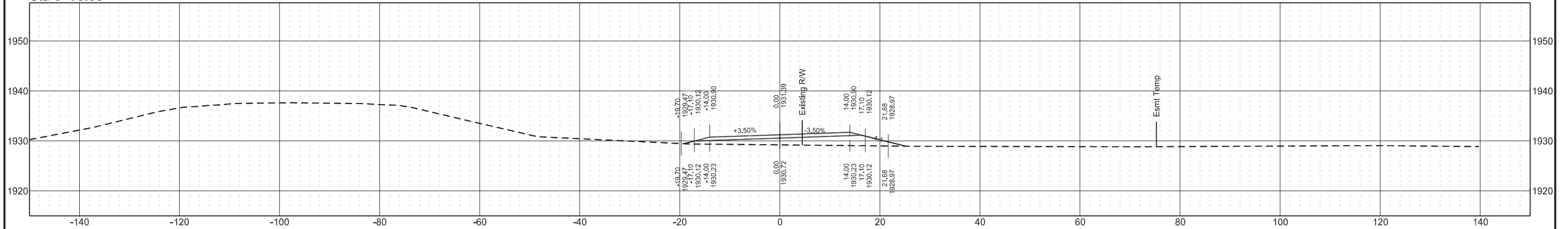
Sta 7+50.00



Sta 7+00.00

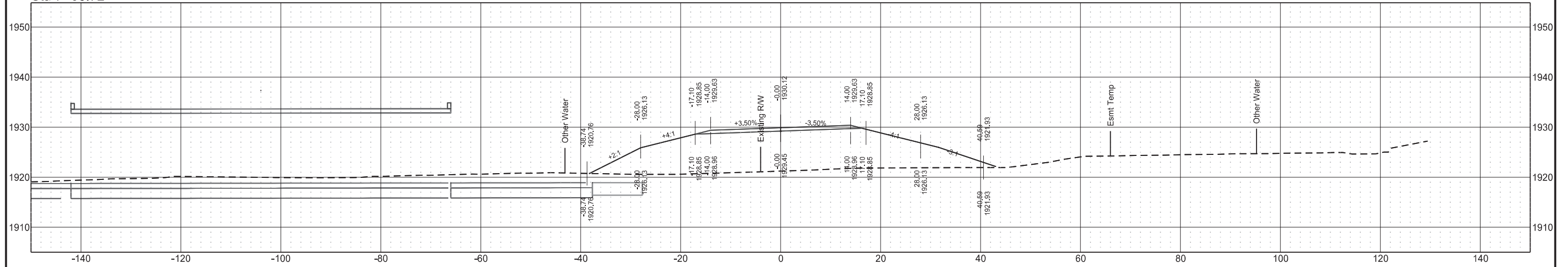


Sta 6+50.00

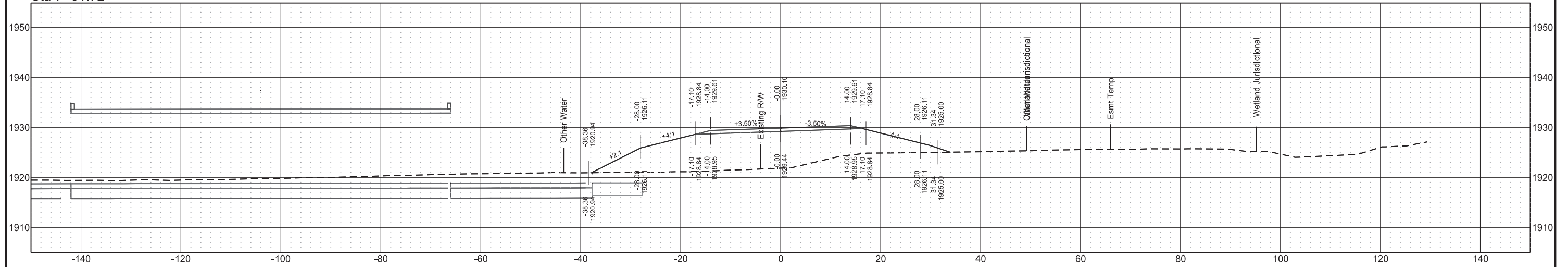


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	20

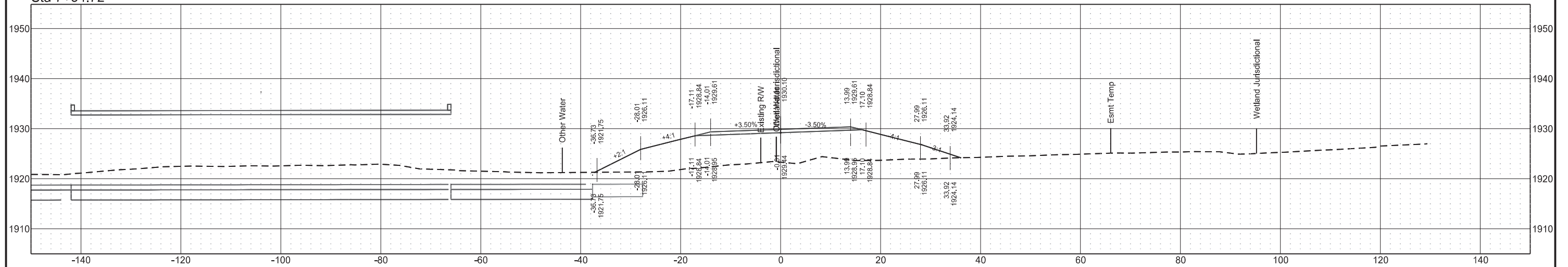
Sta 7+68.72



Sta 7+61.72

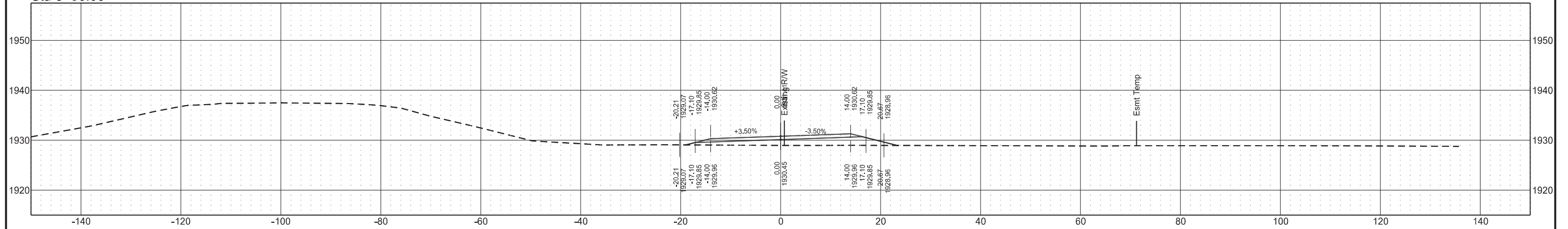


Sta 7+54.72

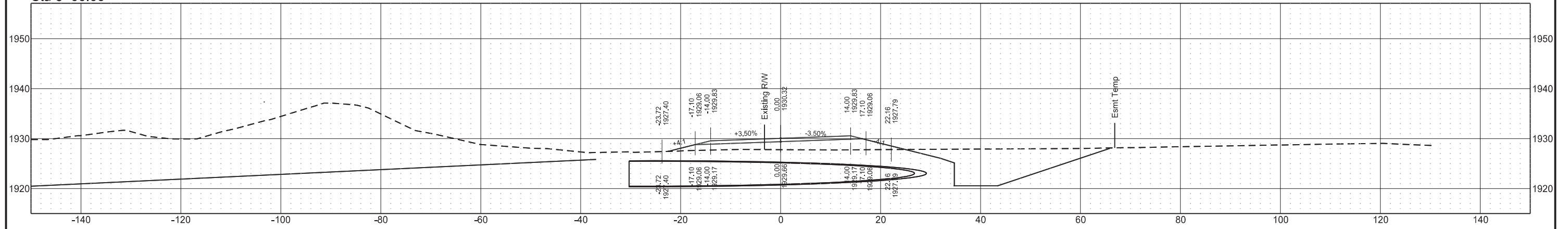


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	21

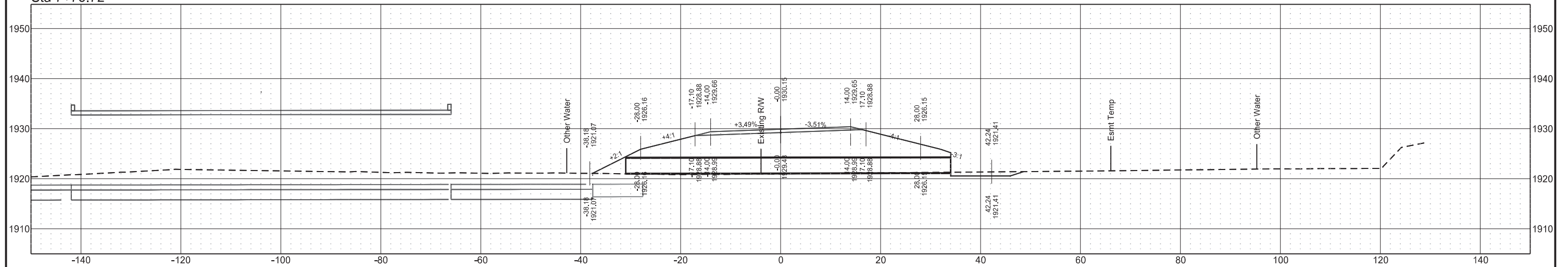
Sta 8+50.00



Sta 8+00.00

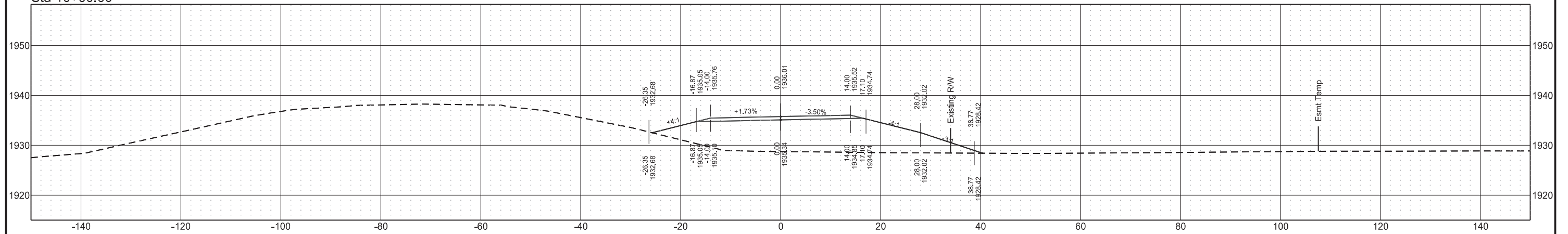


Sta 7+75.72

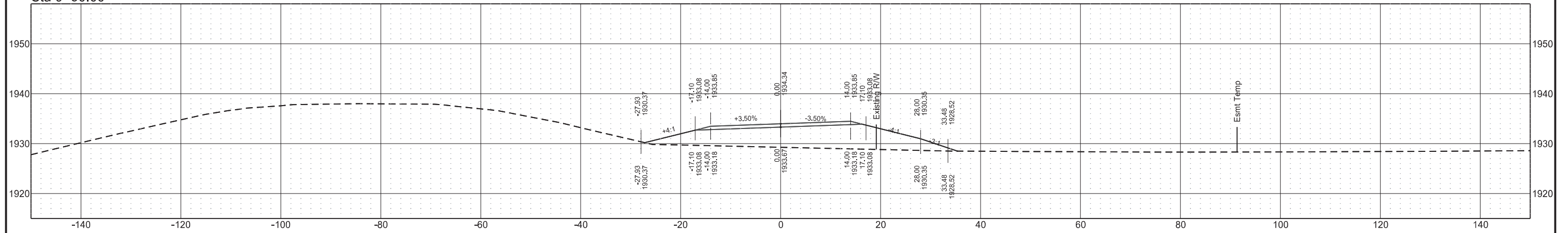


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	22

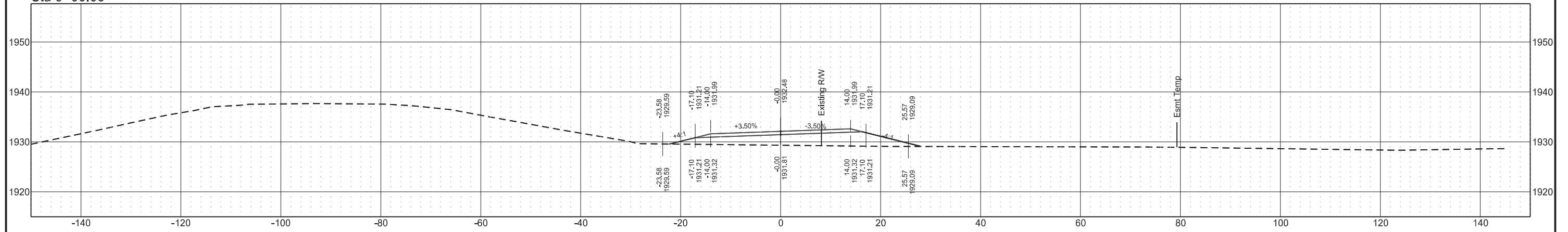
Sta 10+00.00



Sta 9+50.00

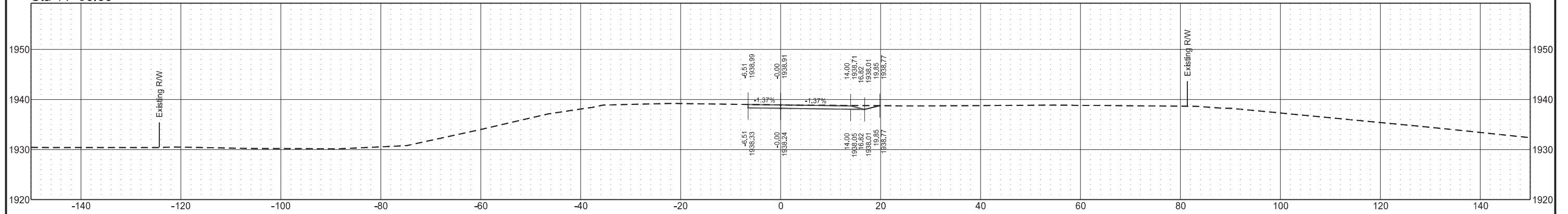


Sta 9+00.00

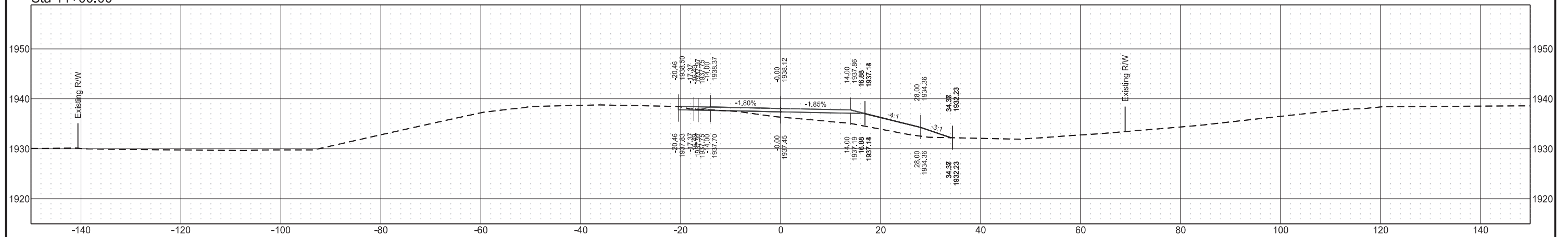


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	23

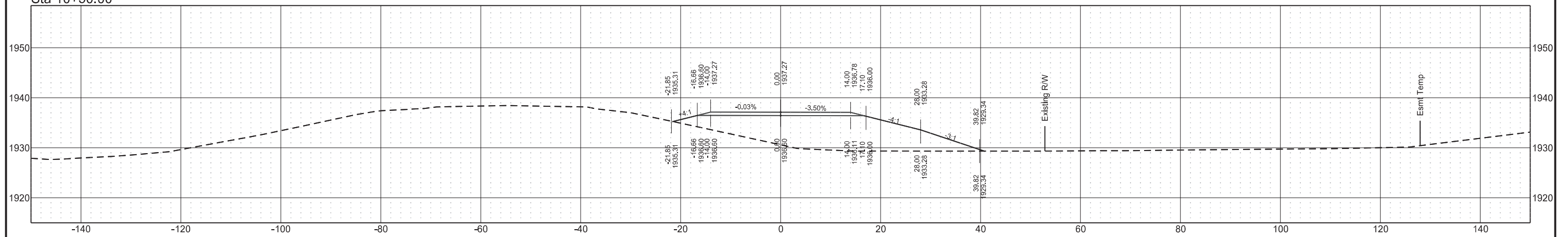
Sta 11+50.00



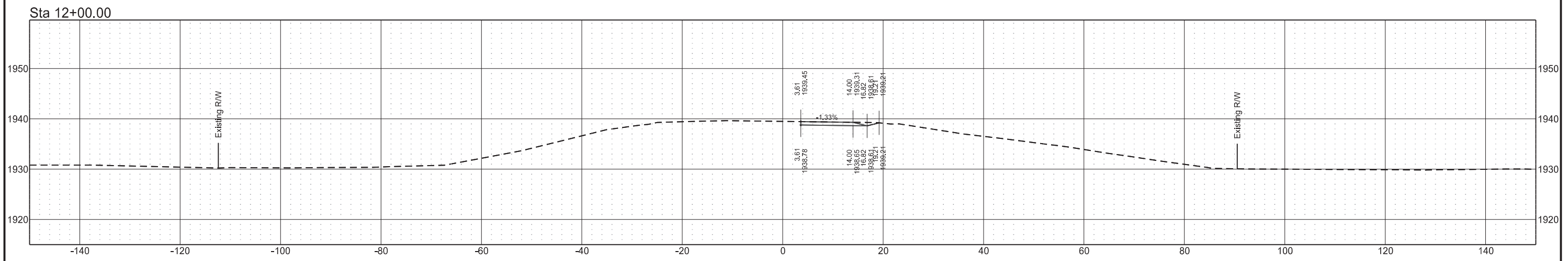
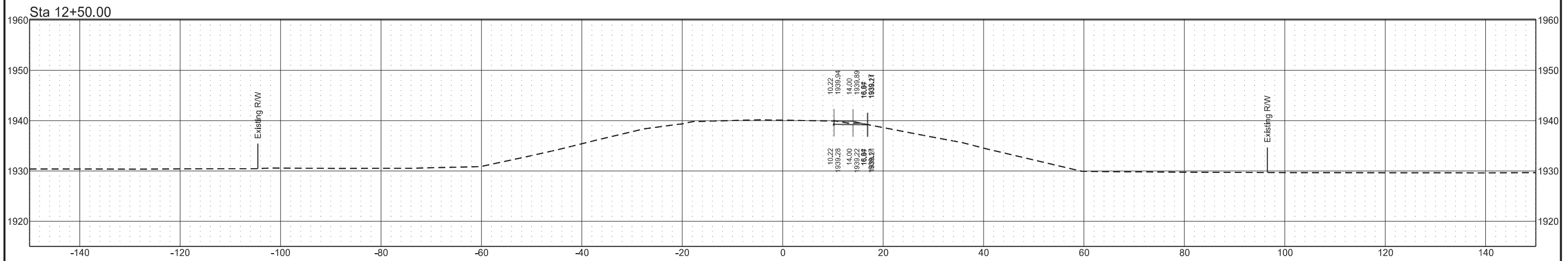
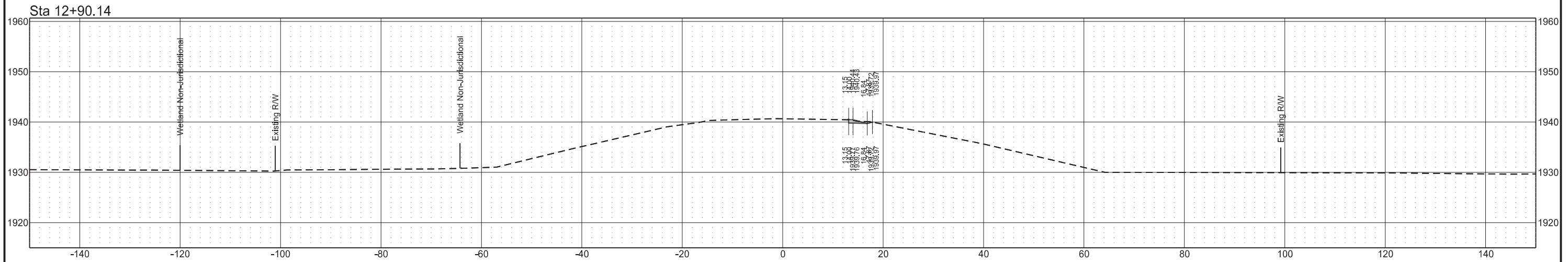
Sta 11+00.00



Sta 10+50.00

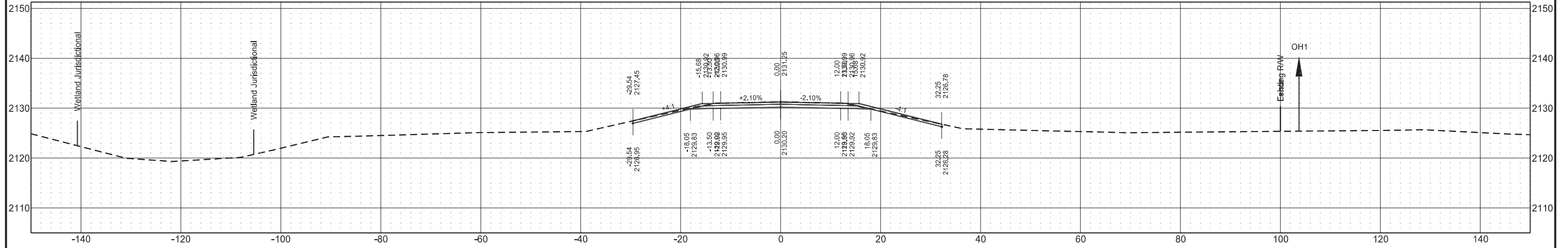


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	200	24

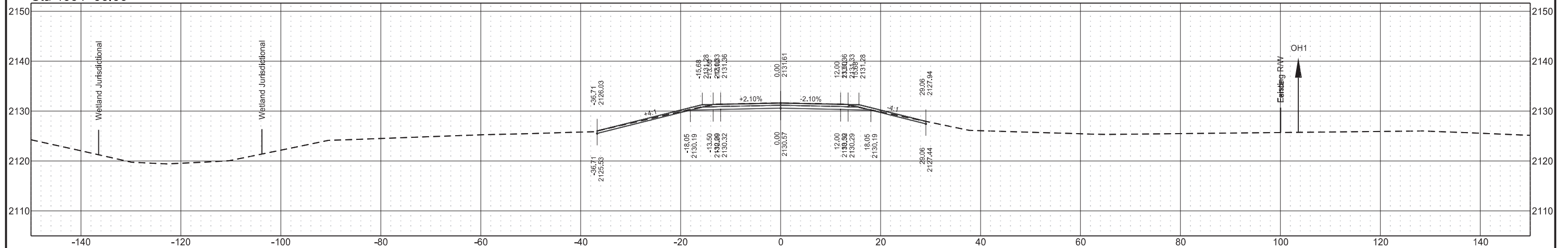


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	25

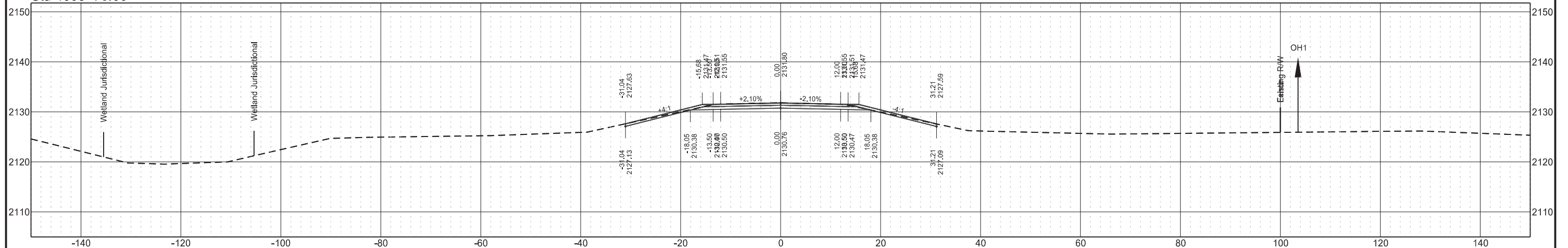
Sta 4604+50.00



Sta 4604+00.00



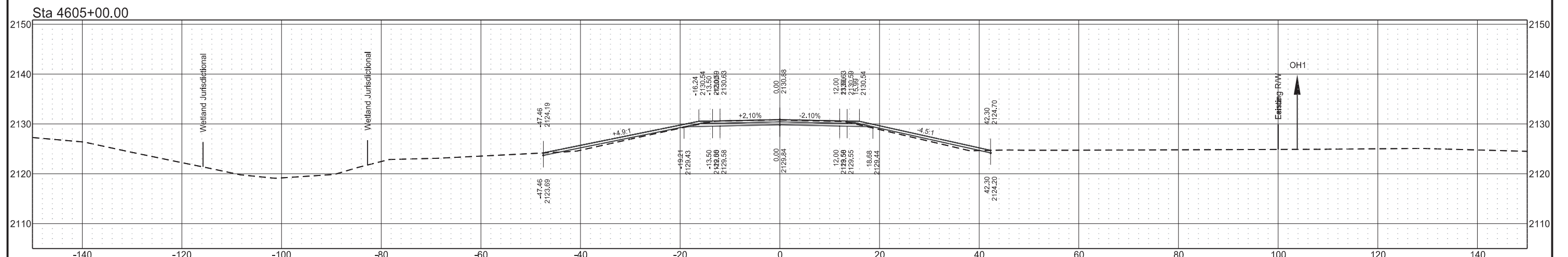
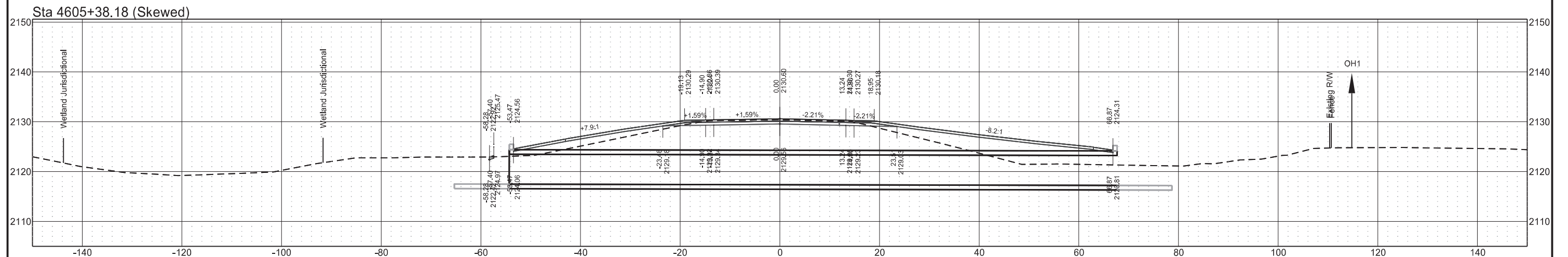
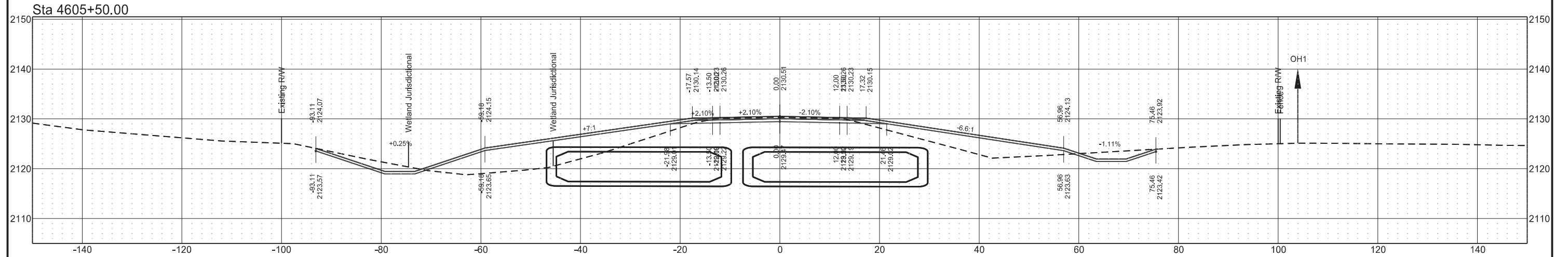
Sta 4603+75.00



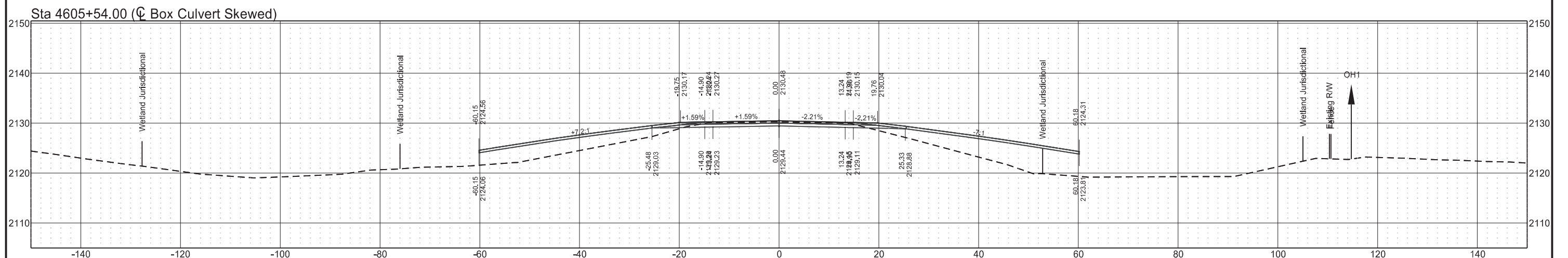
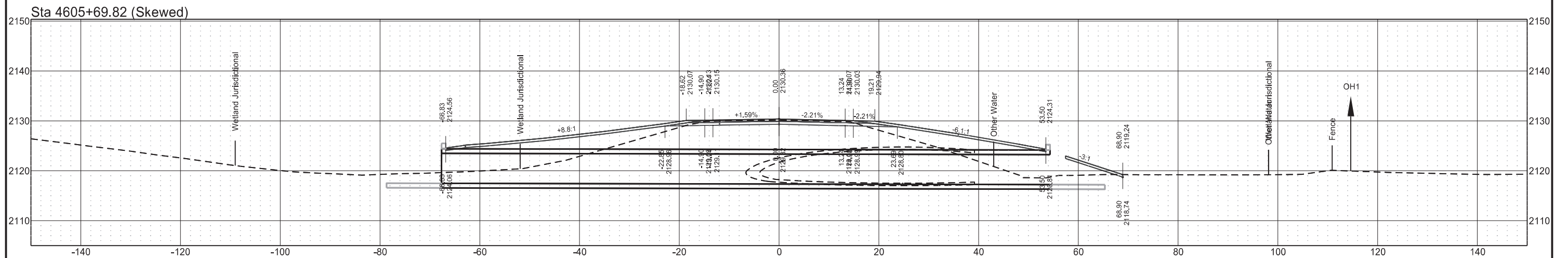
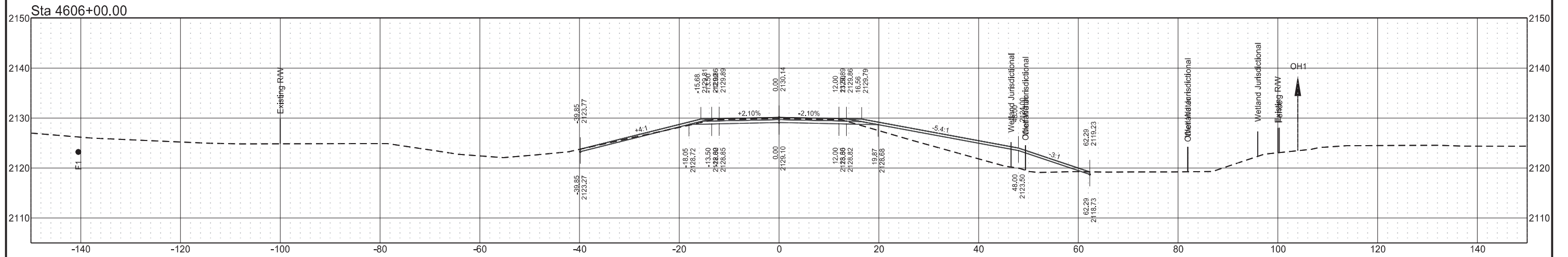
Final

Statewide Structures Project (ND8)
Chain SCL8

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	26

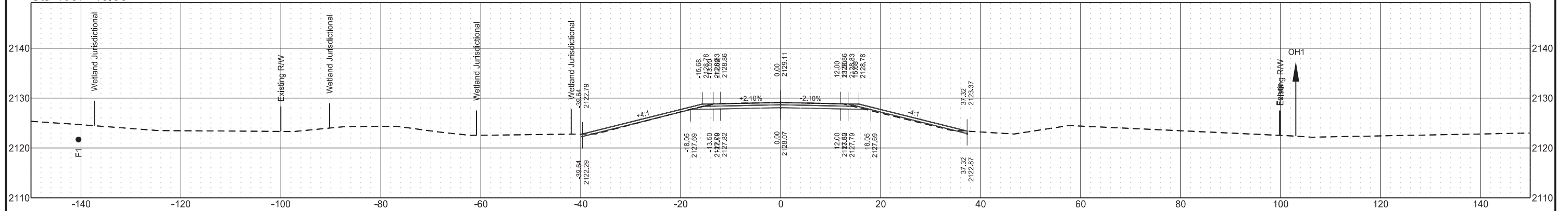


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	27

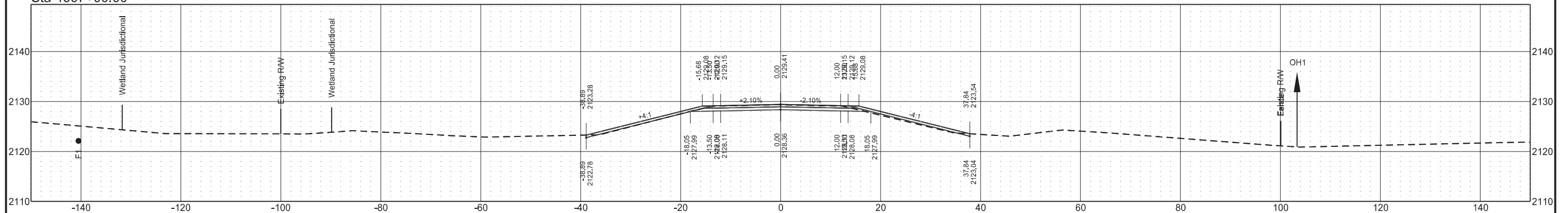


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	28

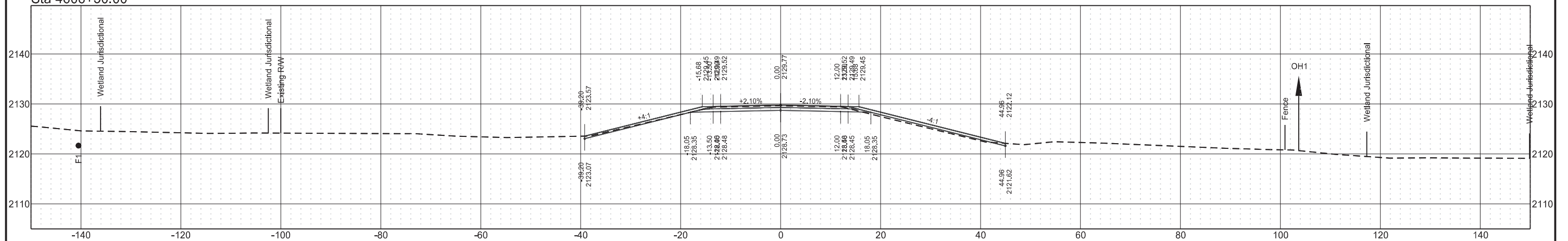
Sta 4607+40.00



Sta 4607+00.00

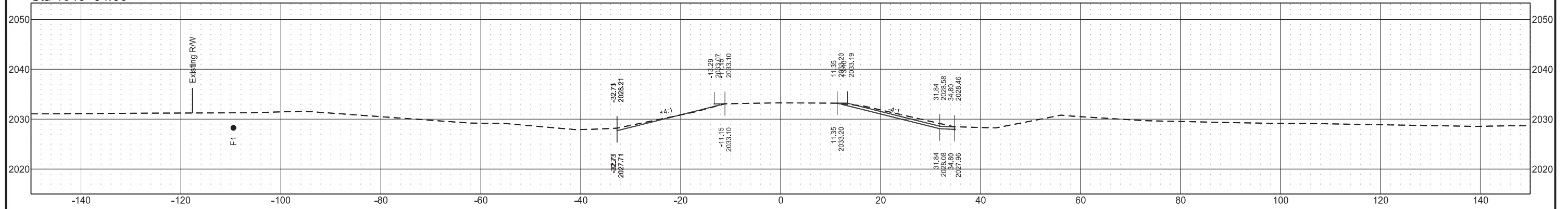


Sta 4606+50.00

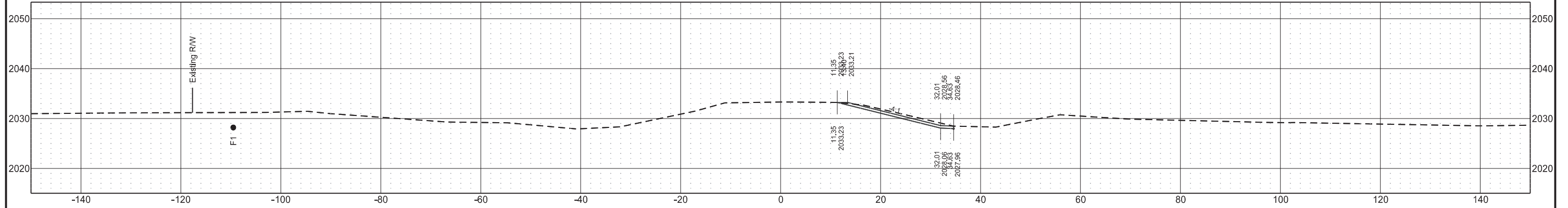


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	29

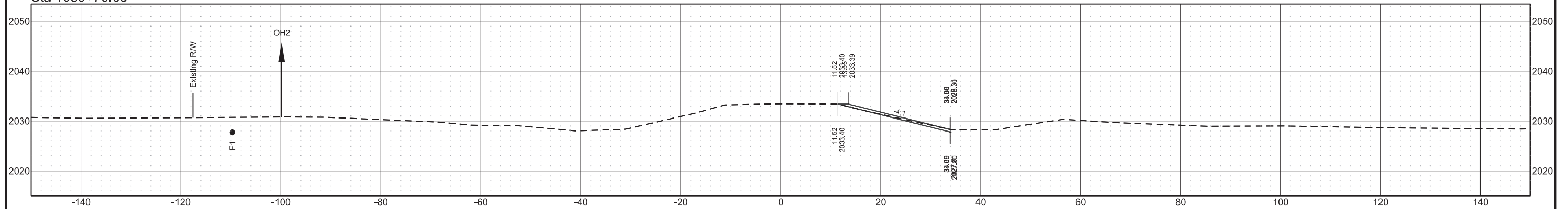
Sta 1540+04.00



Sta 1540+00.00

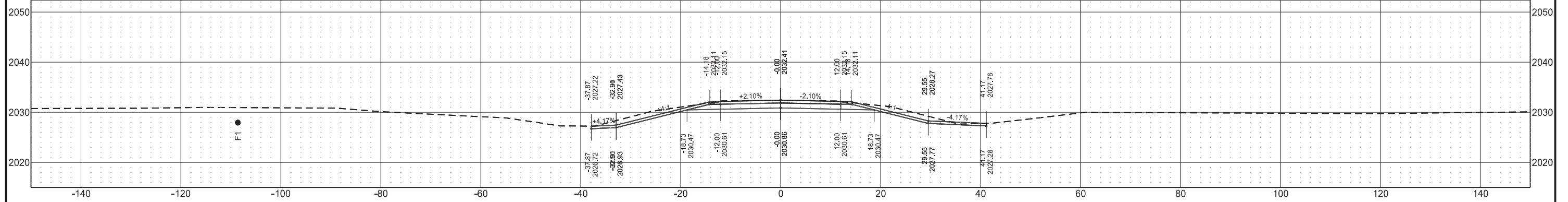


Sta 1539+70.00

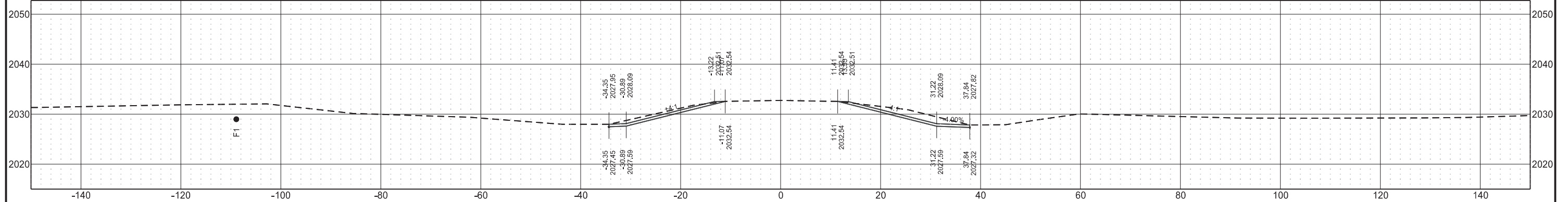


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	30

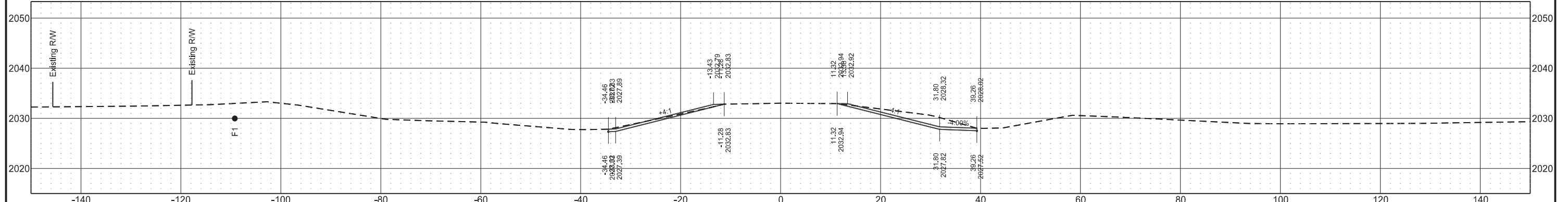
Sta 1541+50.00



Sta 1541+00.00

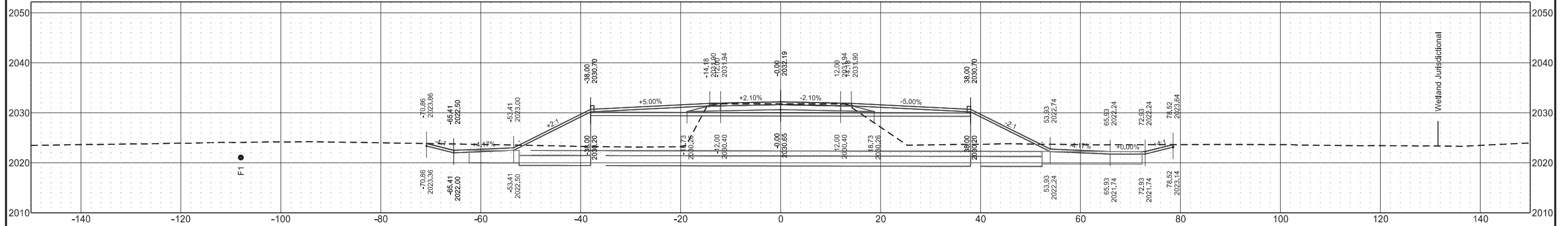


Sta 1540+50.00

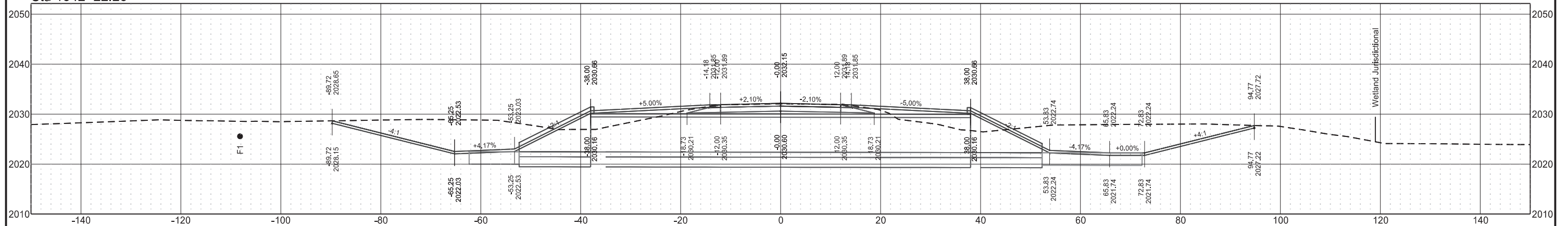


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	31

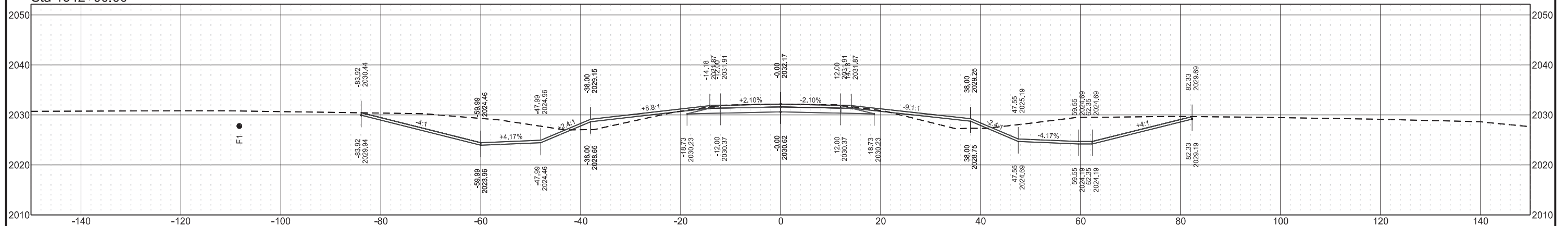
Sta 1542+50.00



Sta 1542+22.25

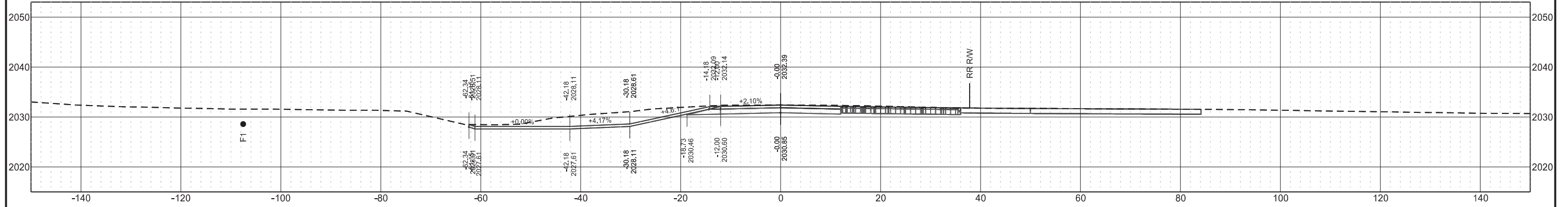


Sta 1542+00.00

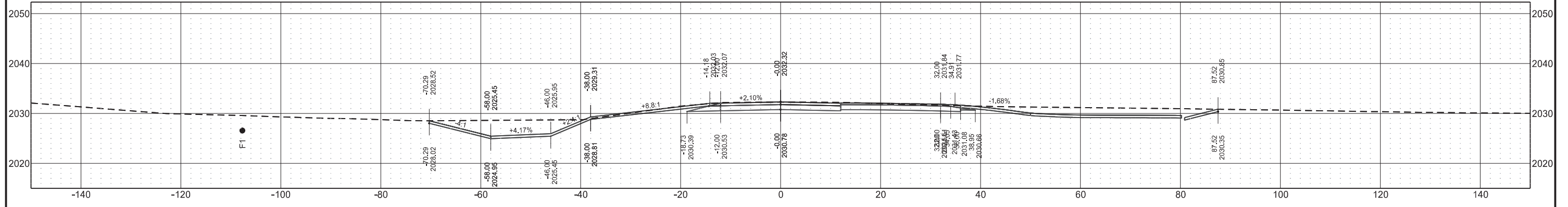


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	200	32

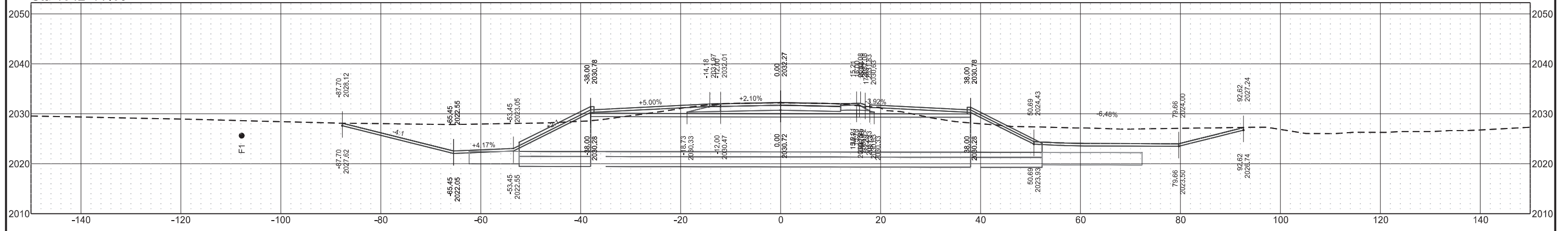
Sta 1543+26.00



Sta 1543+00.00

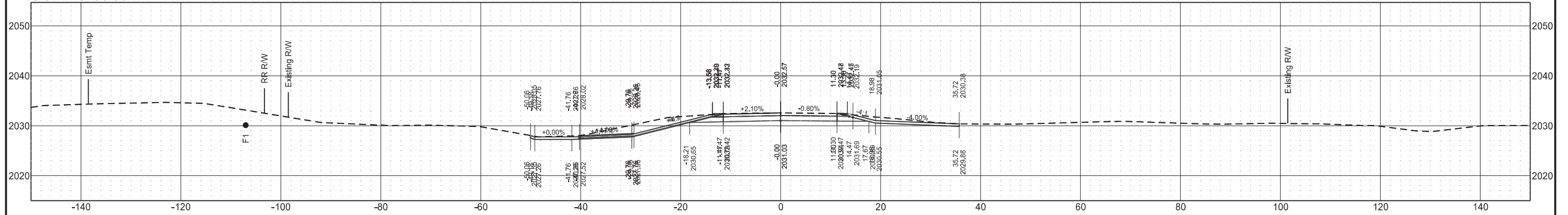


Sta 1542+77.59

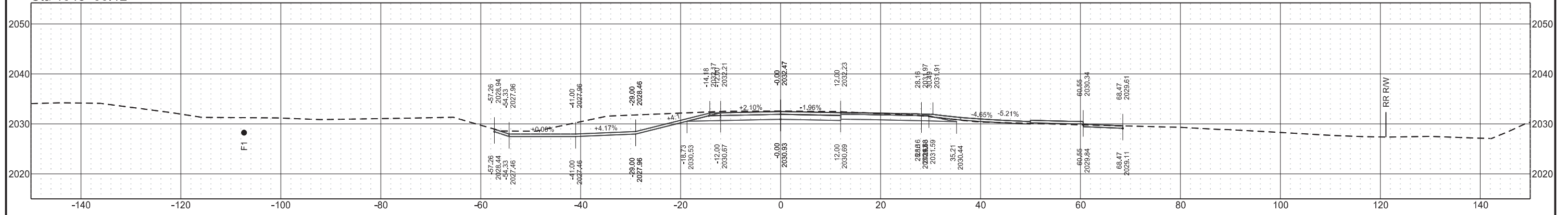


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	33

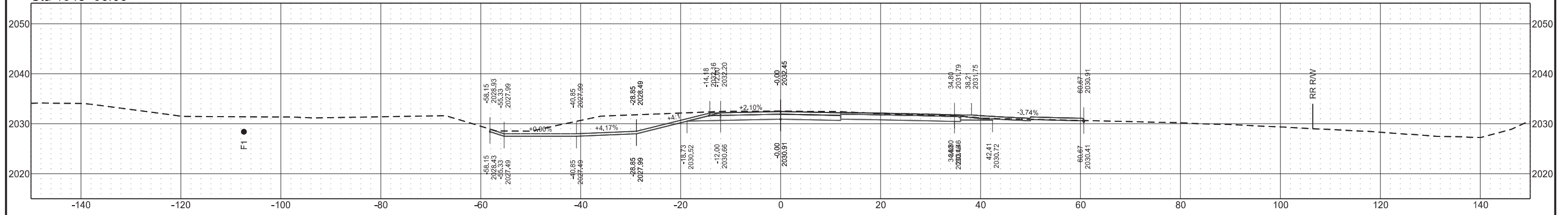
Sta 1543+96.00



Sta 1543+55.12

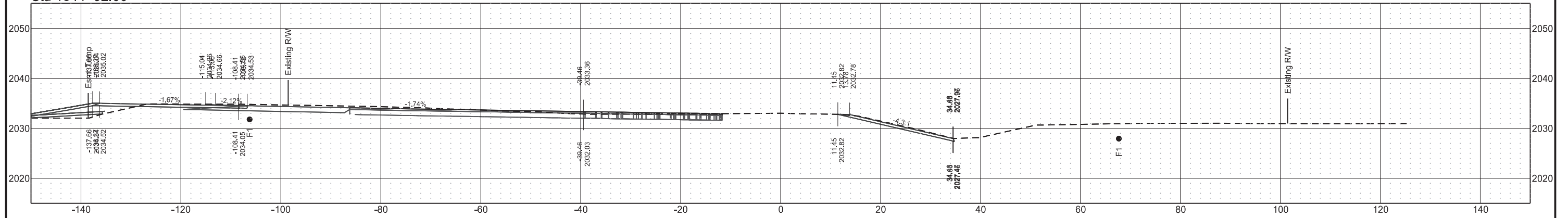


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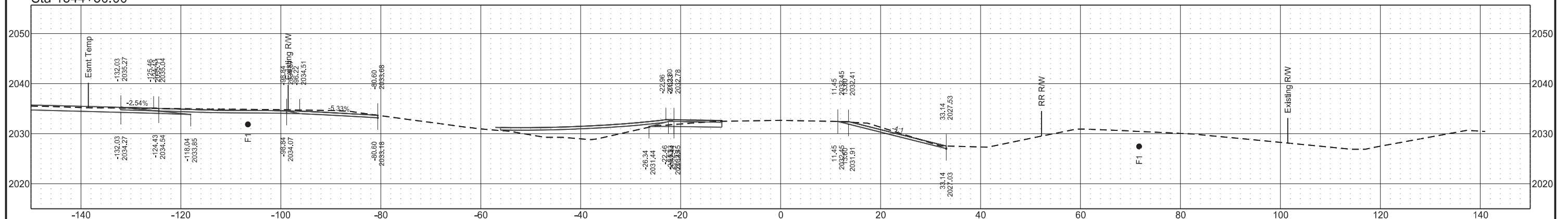


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	34

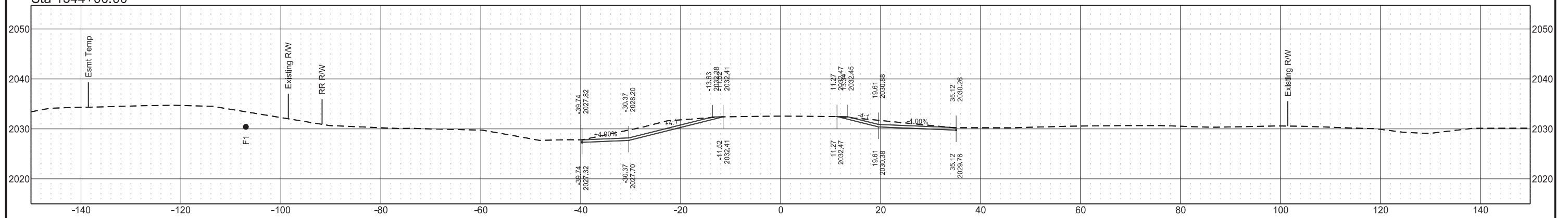
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Sta 1544+50.00

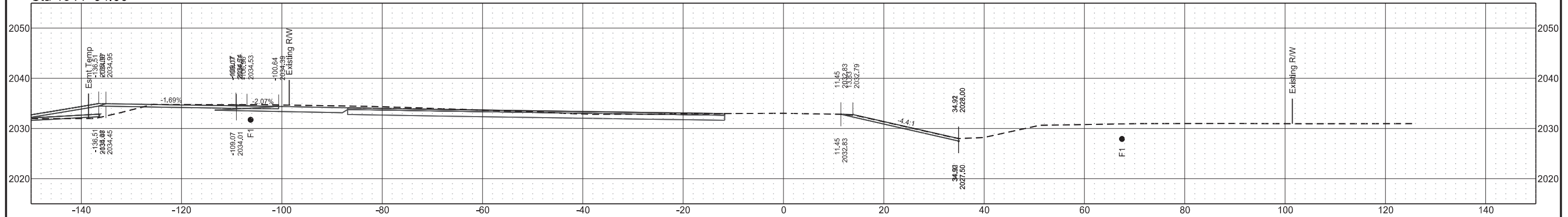


Sta 1544+00.00



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	35

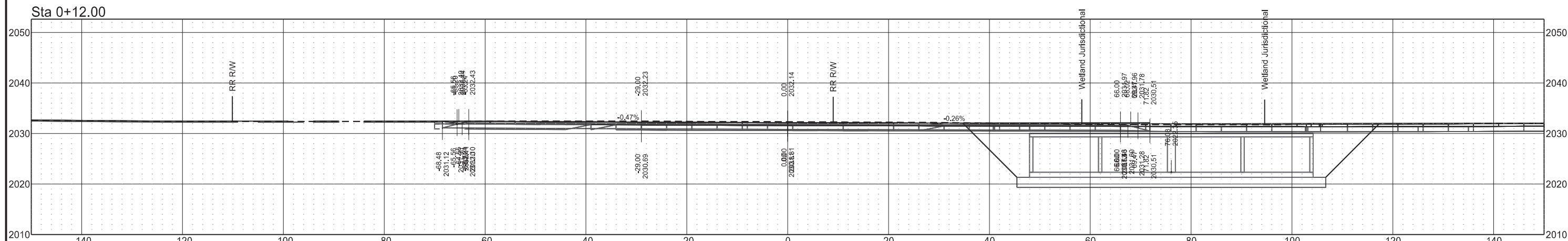
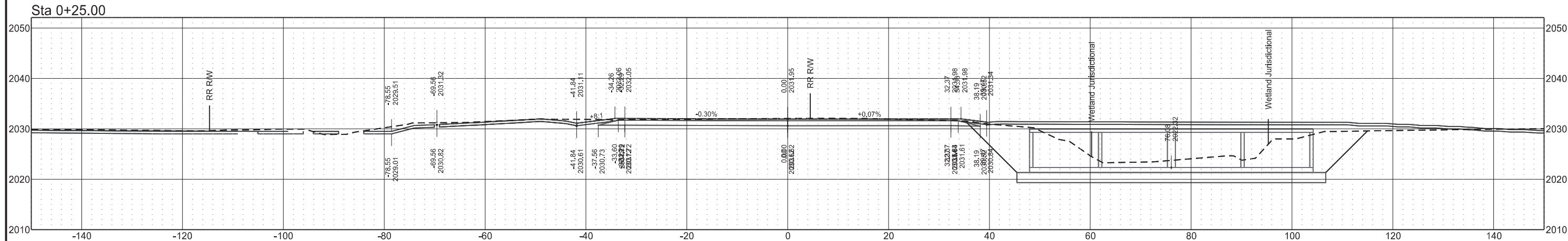
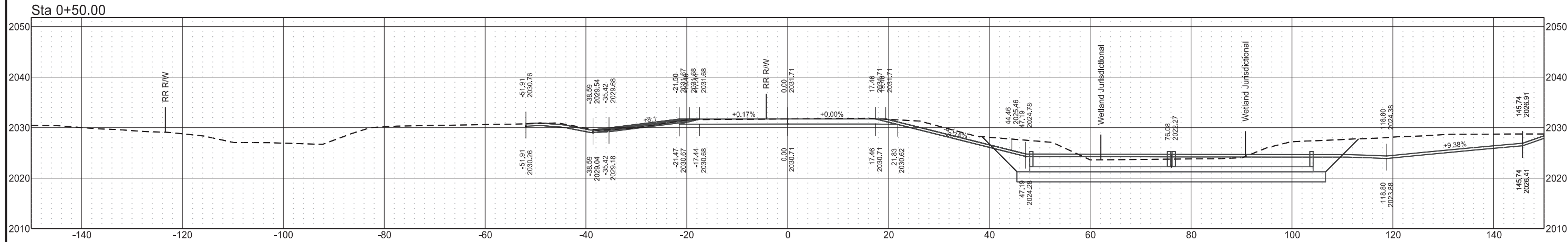
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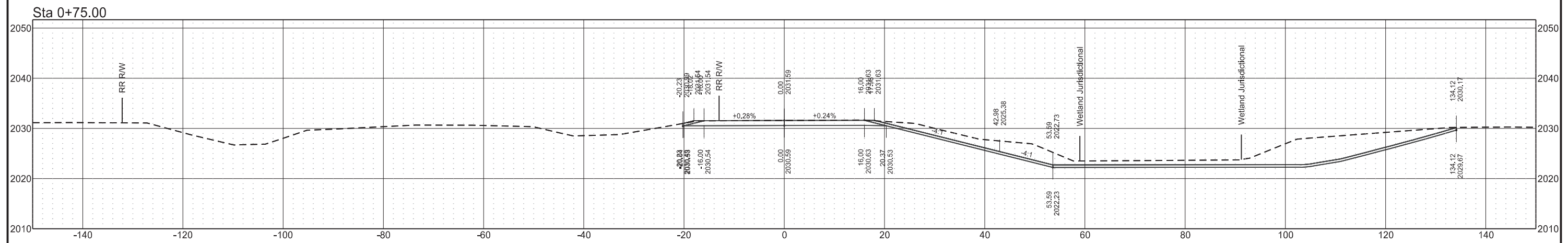
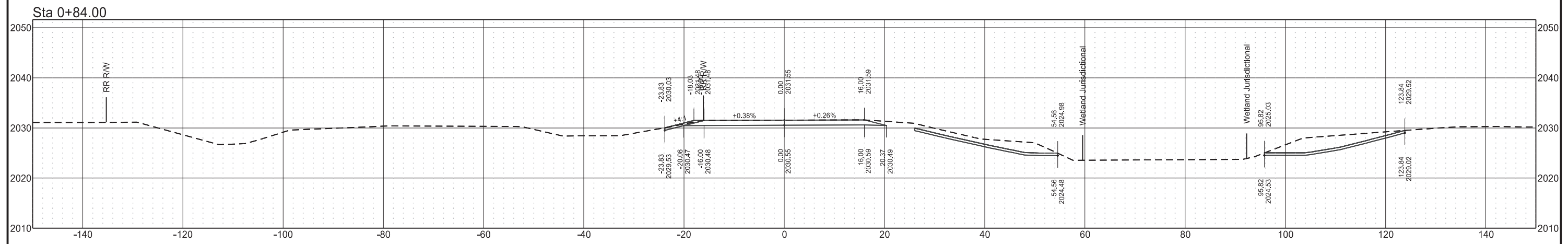
Final

Statewide Structures Project (ND31) Chain SCL_154326

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	36



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	37

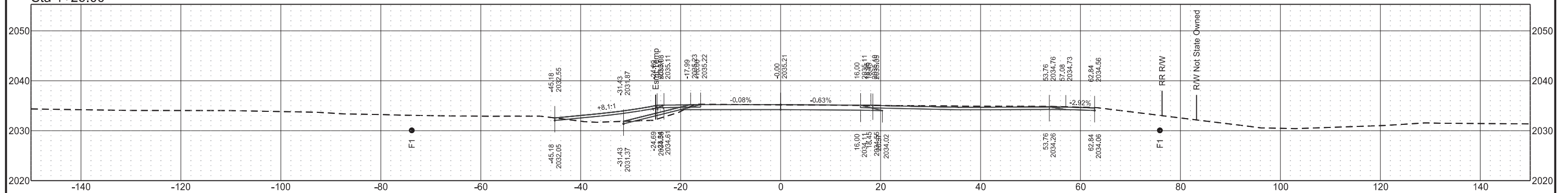


Final

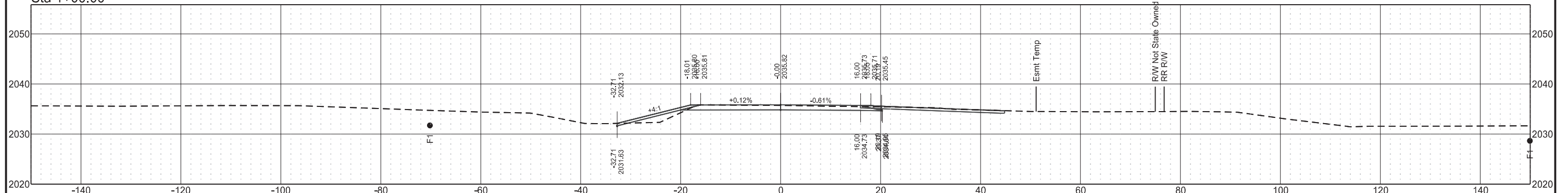
Statewide Structures Project (ND31)
Chain SCL_154492

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	38

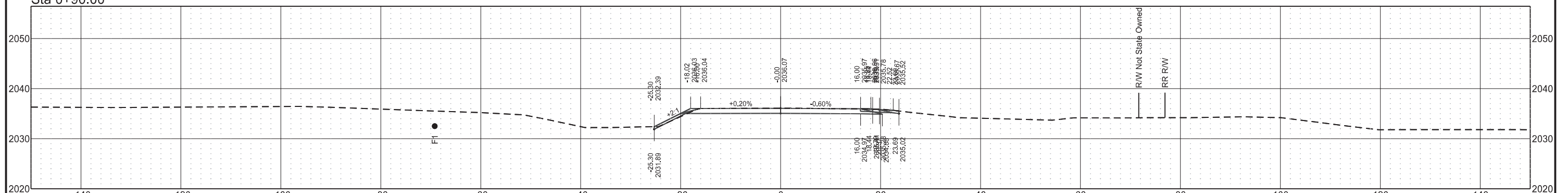
Sta 1+25.00



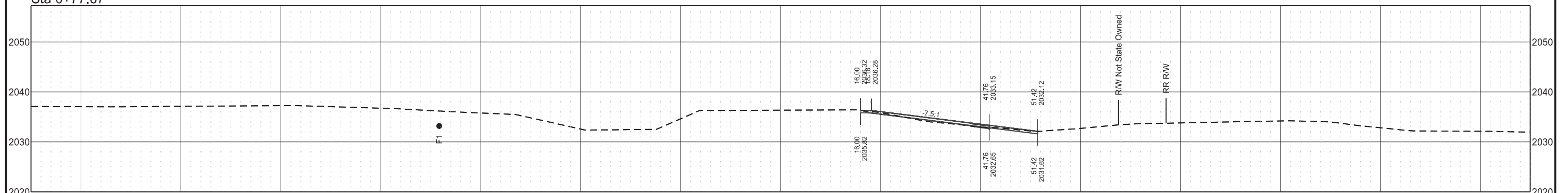
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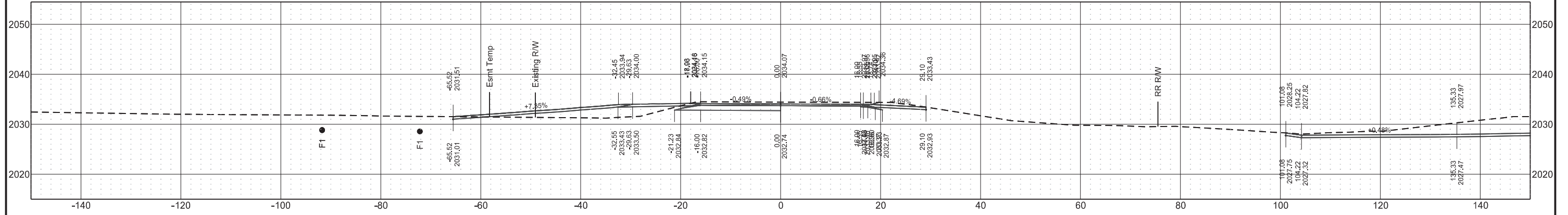
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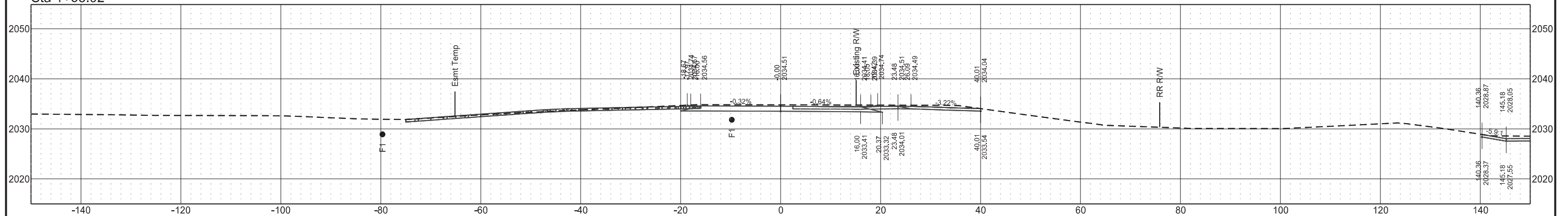
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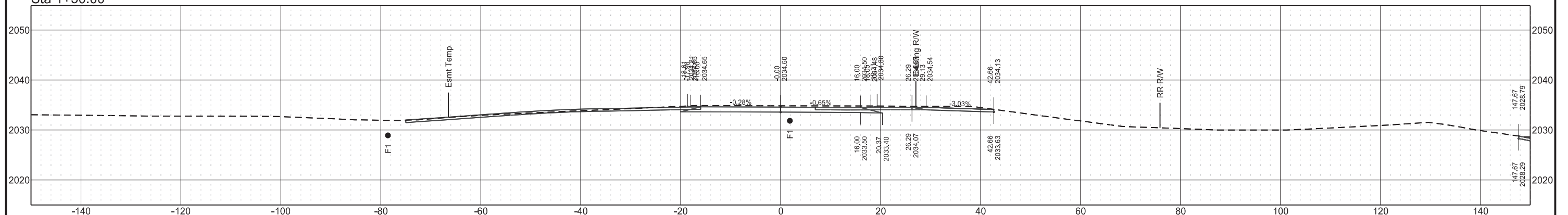
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Sta 1+53.92

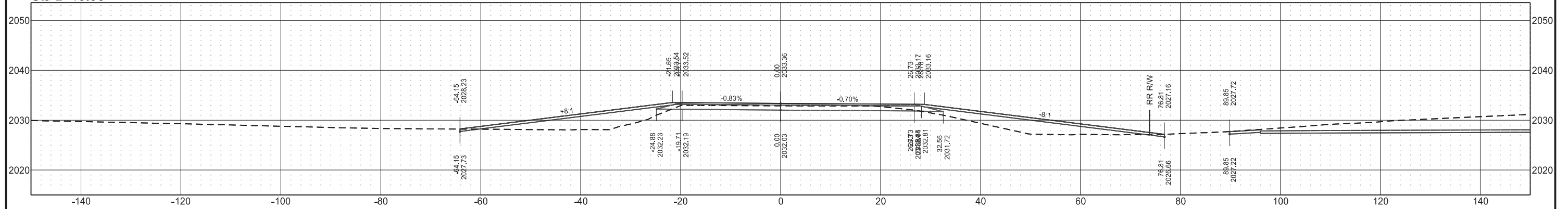


Sta 1+50.00

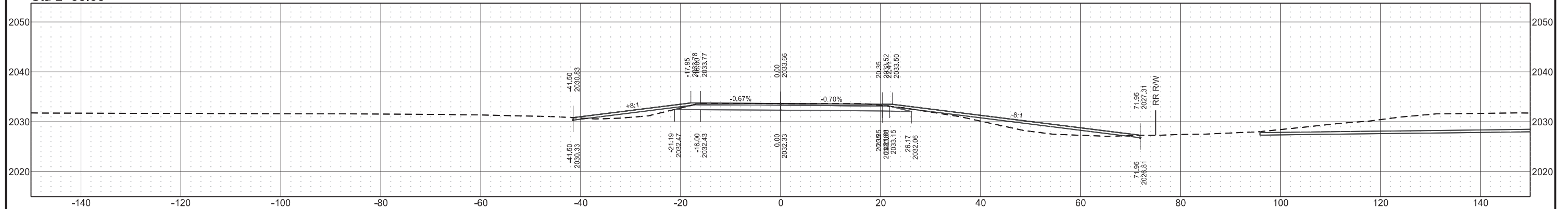


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	40

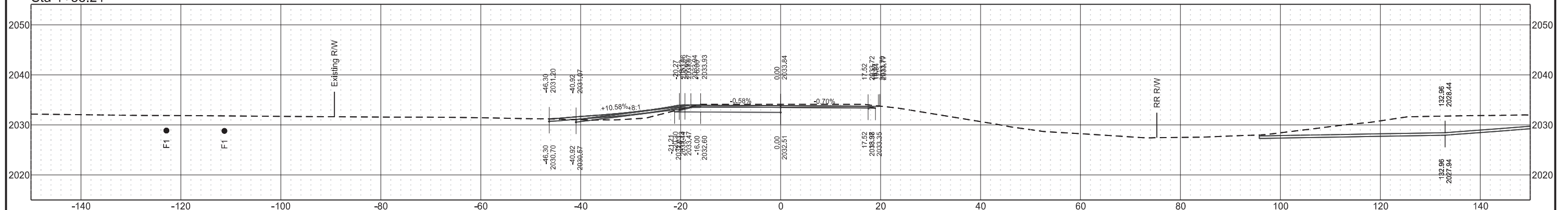
Sta 2+19.96



Sta 2+00.00

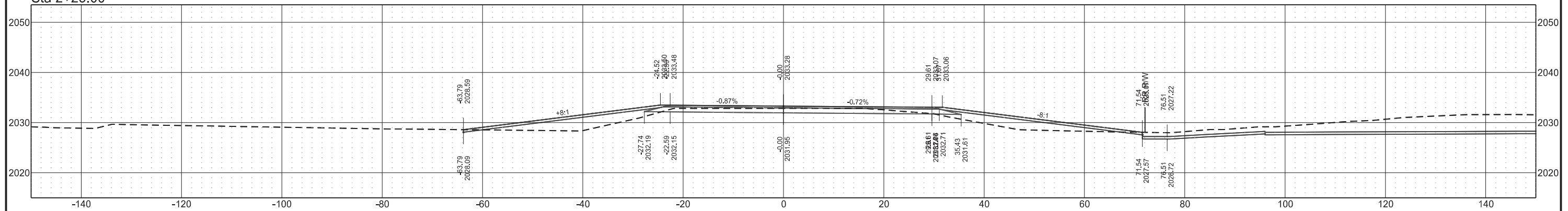


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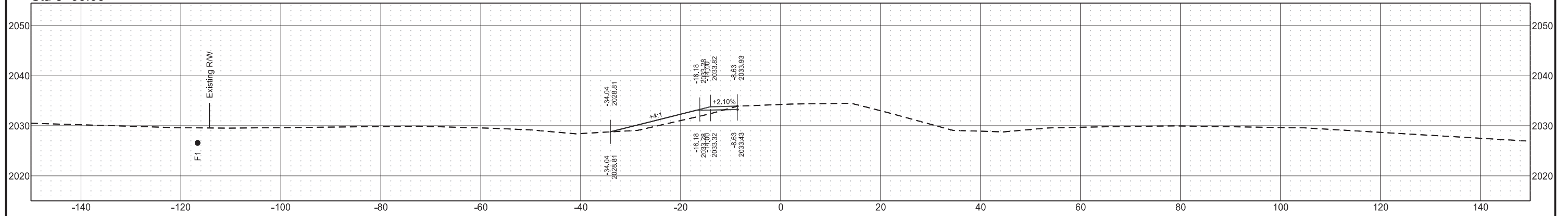
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	41

Sta 2+25.00

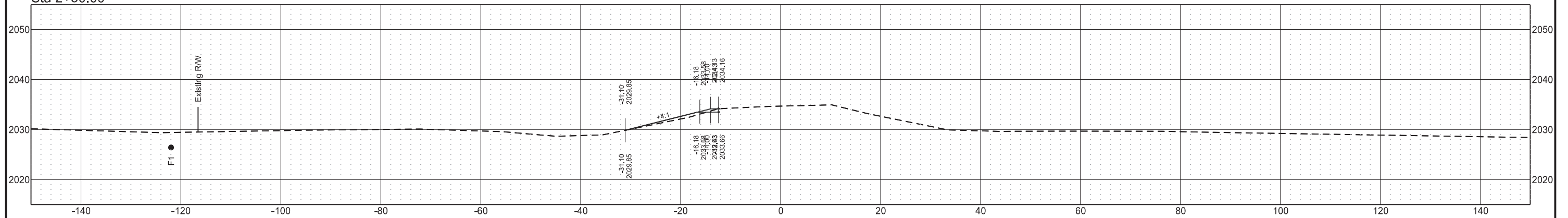


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	SS-9-999(478)	200	42

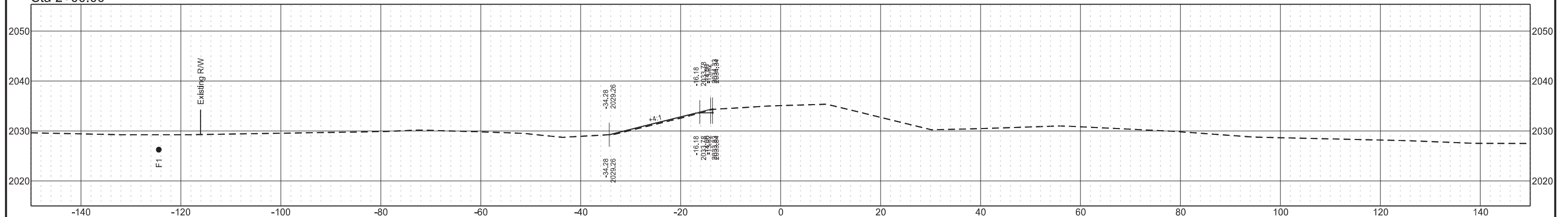
Sta 3+00.00



Sta 2+50.00

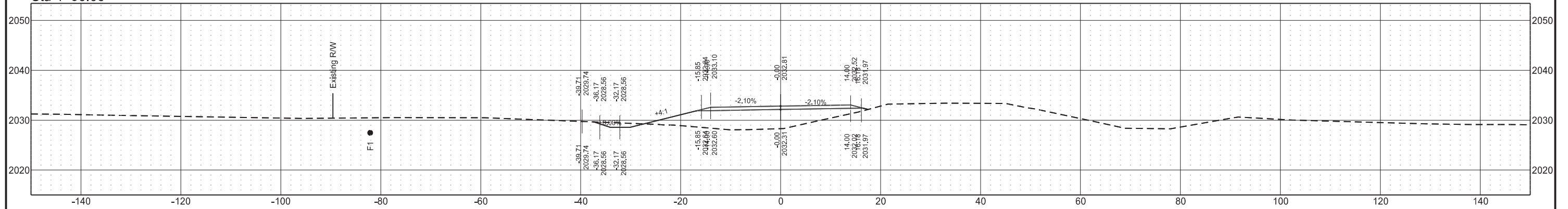


Sta 2+00.00

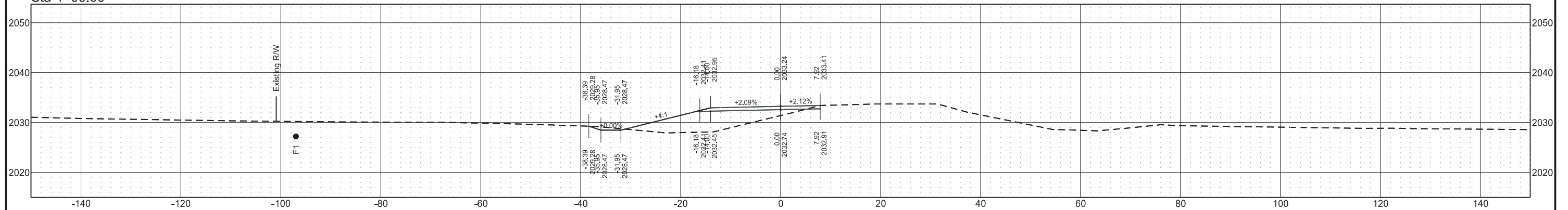


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	43

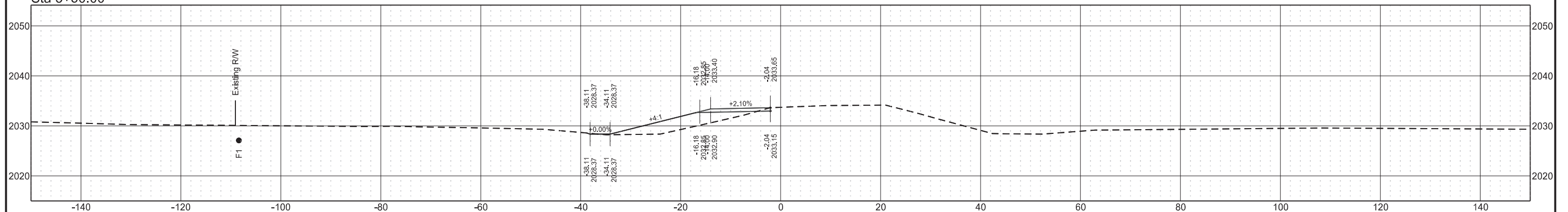
Sta 4+50.00



Sta 4+00.00

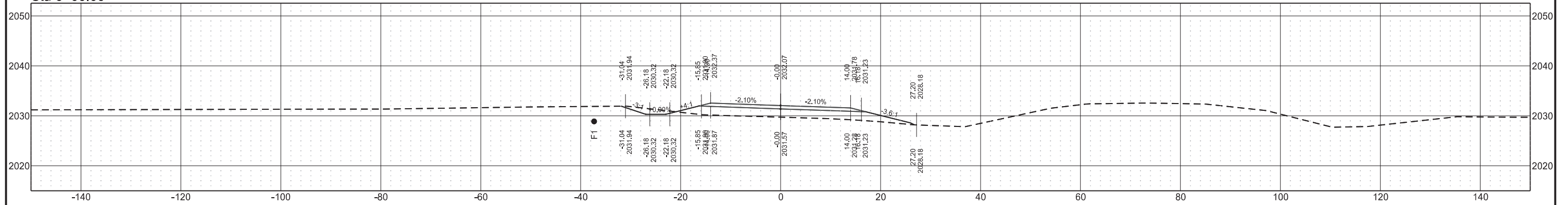


Sta 3+50.00

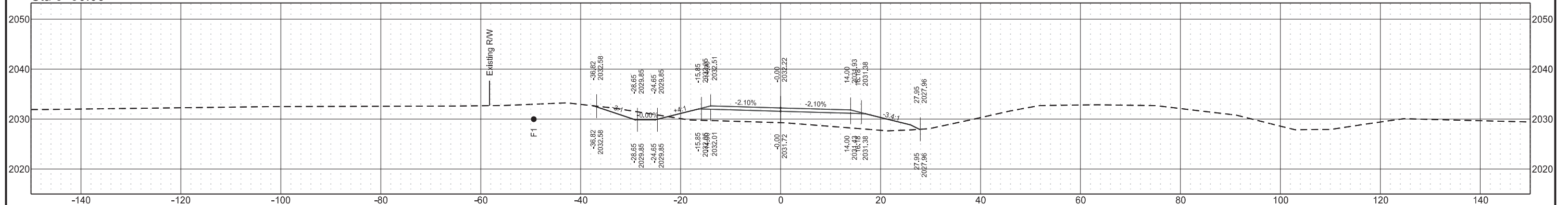


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	44

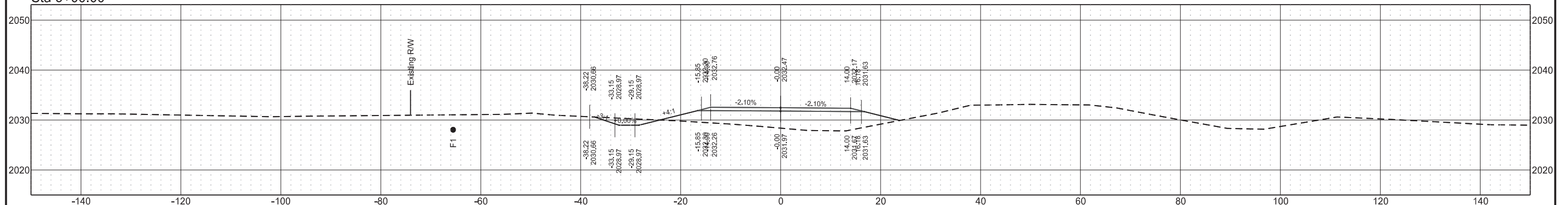
Sta 6+00.00



Sta 5+50.00

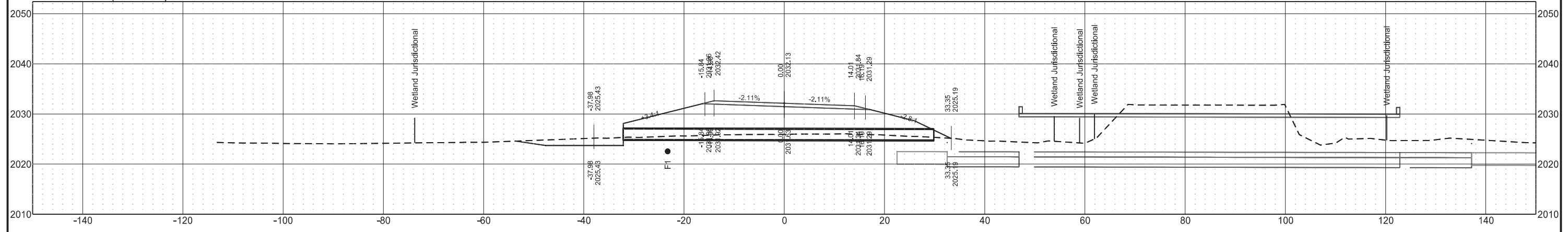


Sta 5+00.00

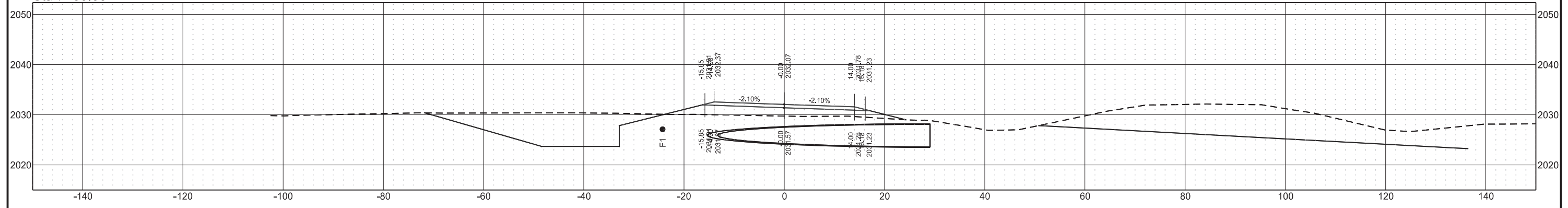


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	45

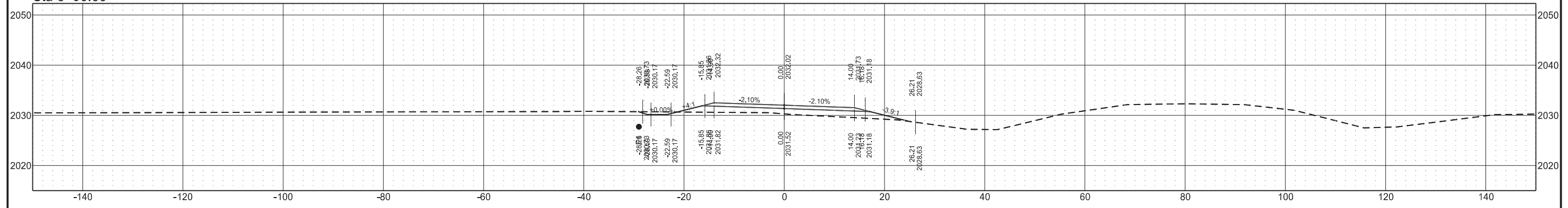
Sta 7+23.08 (Skewed)



Sta 7+00.00

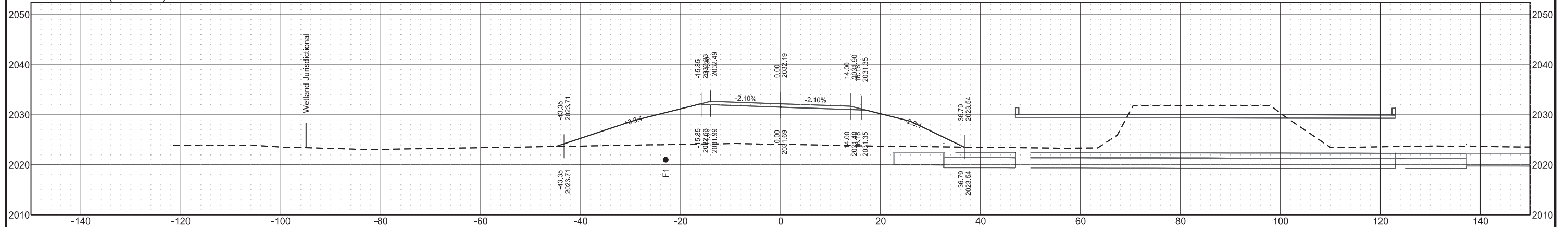


Sta 6+50.00

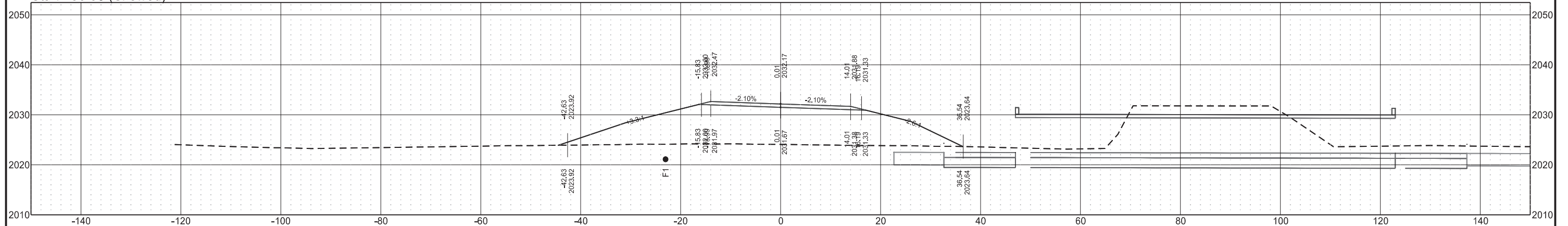


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	46

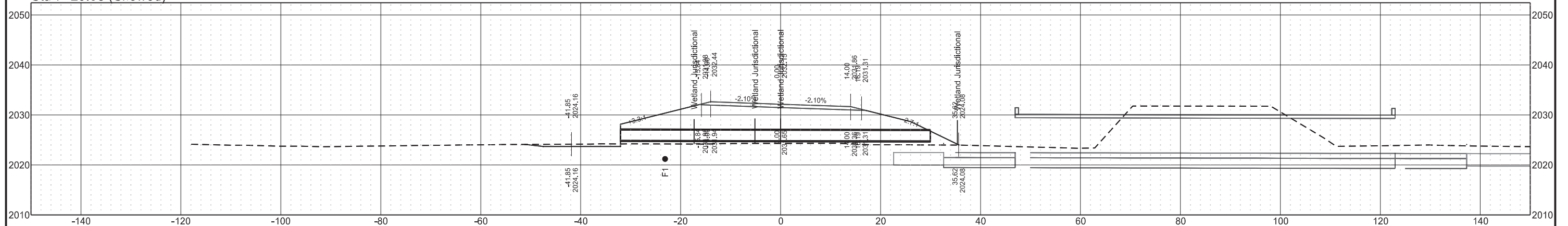
Sta 7+42.58 (Skewed)



Sta 7+36.08 (Skewed)

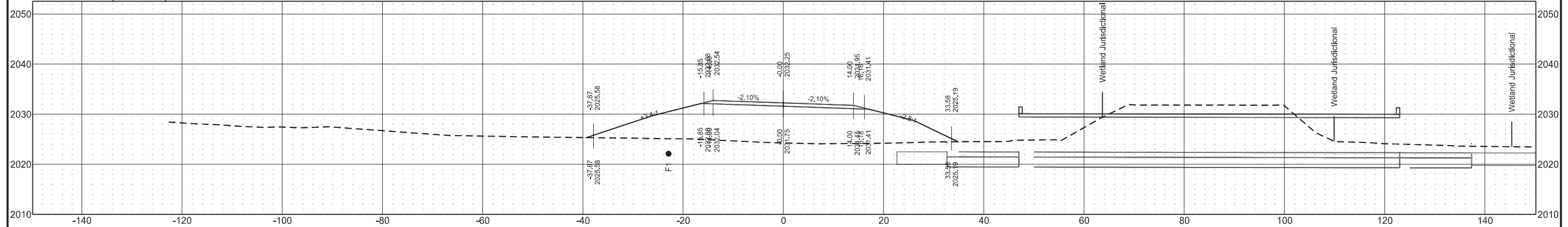


Sta 7+29.58 (Skewed)

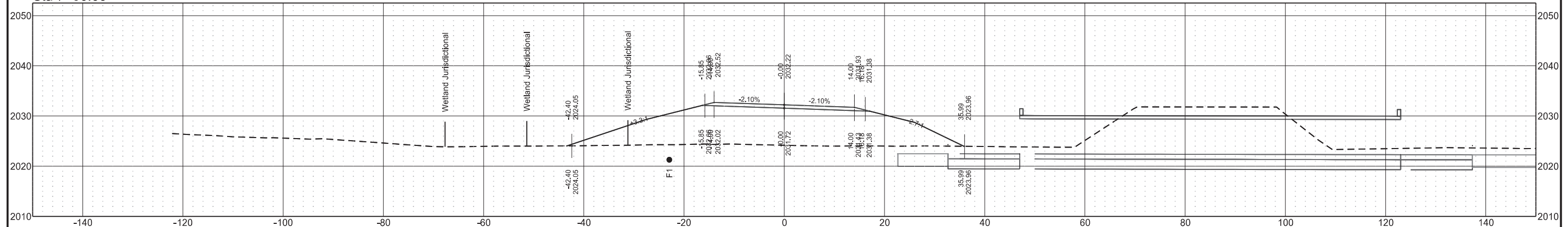


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	47

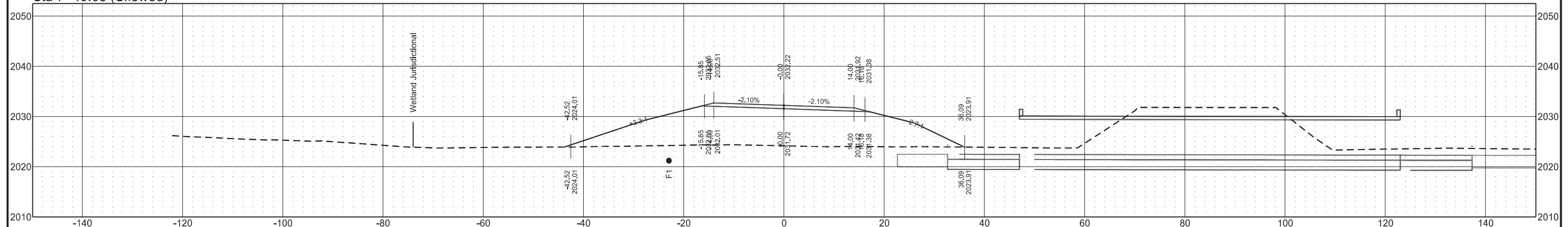
Sta 7+55.58 (Skewed)



Sta 7+50.00

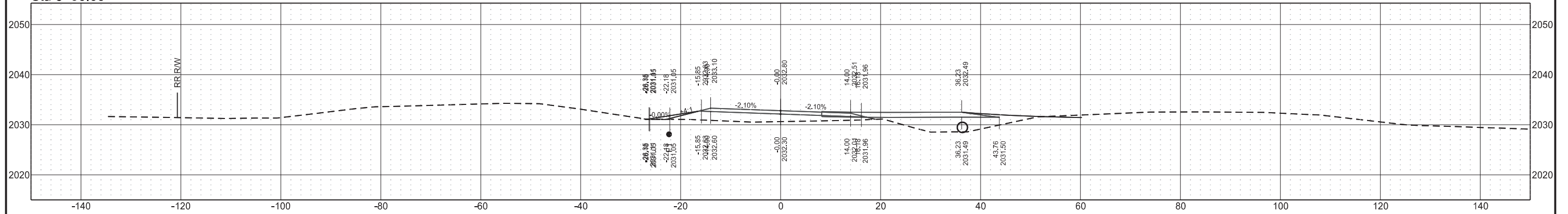


Sta 7+49.08 (Skewed)

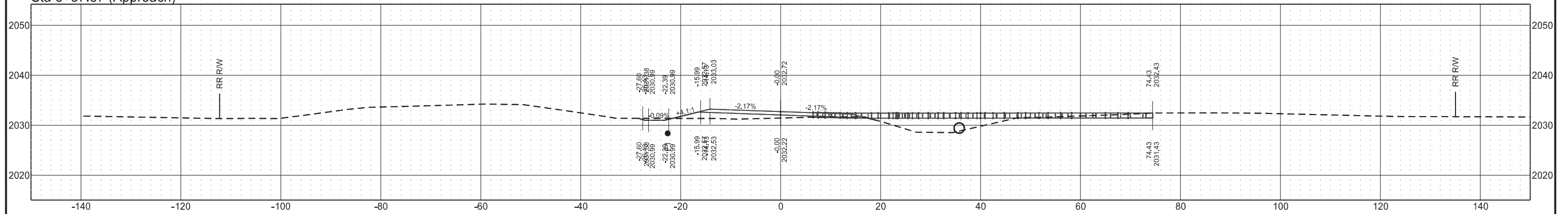


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	48

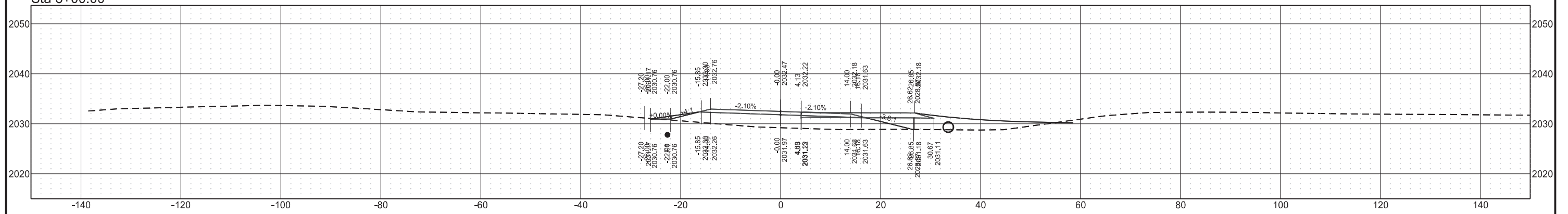
Sta 8+50.00



Sta 8+37.87 (Approach)

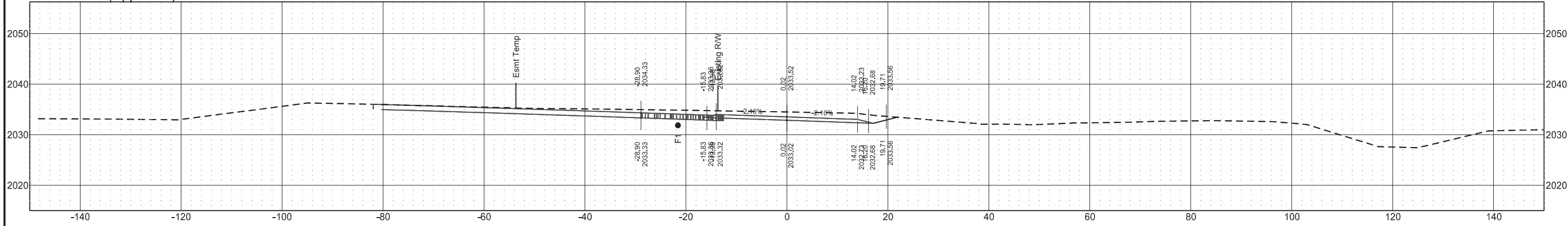


Sta 8+00.00

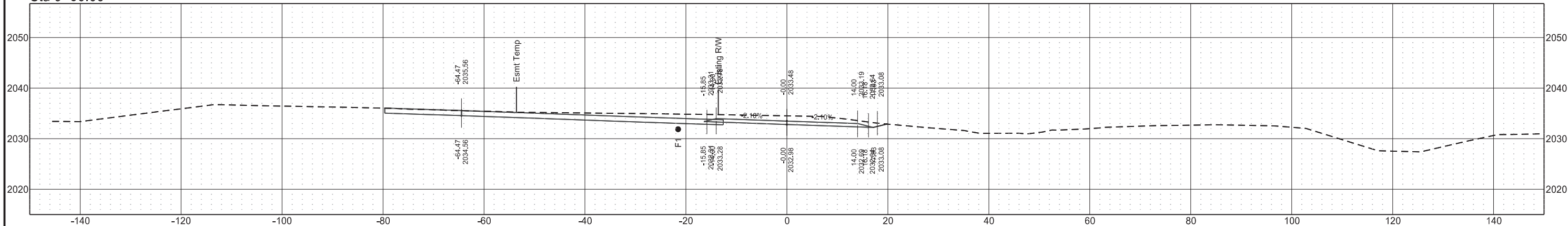


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	49

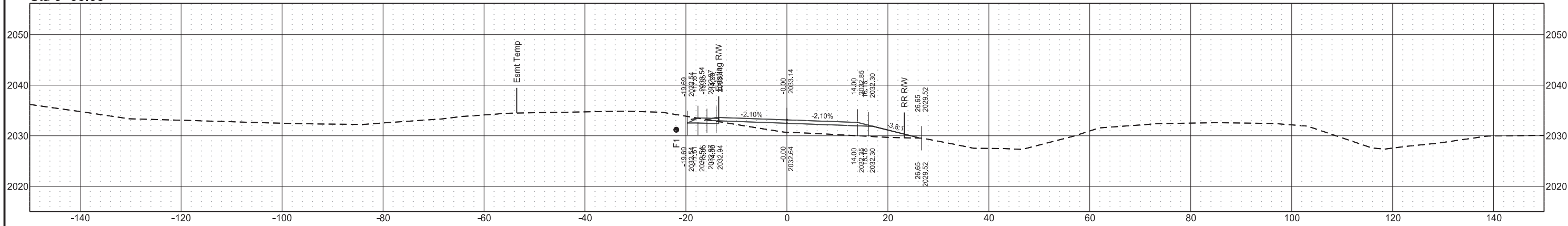
Sta 9+55.98 (Approach)



Sta 9+50.00

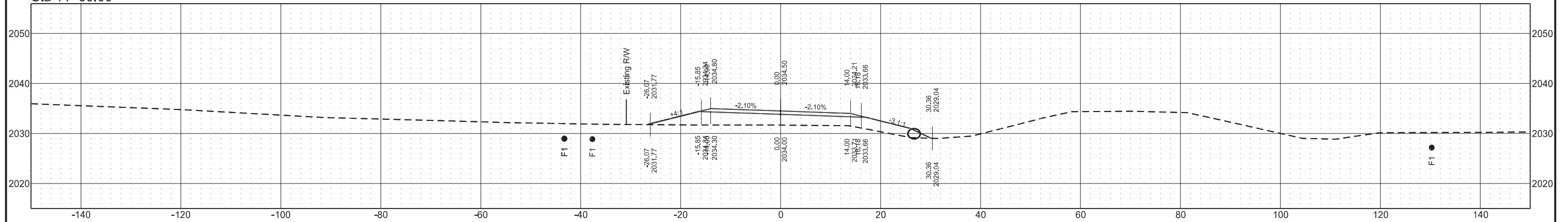


Sta 9+00.00

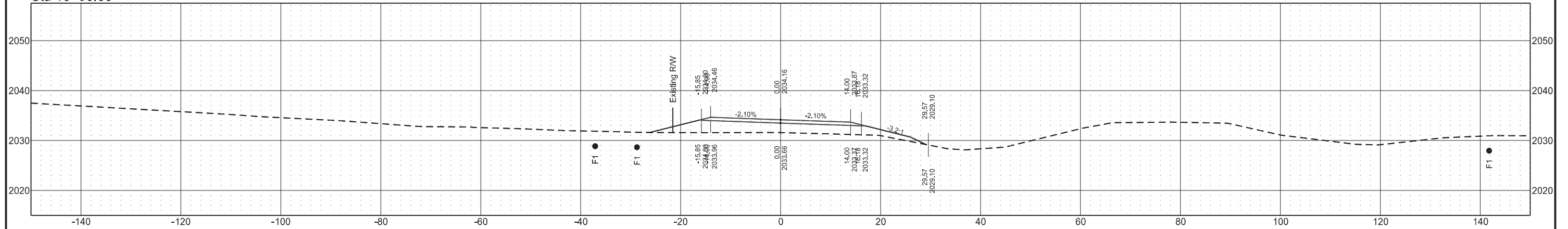


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	50

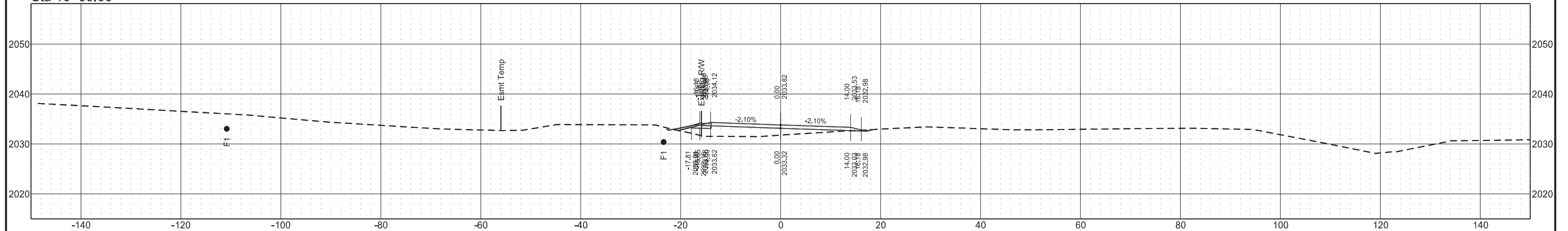
Sta 11+00.00



Sta 10+50.00

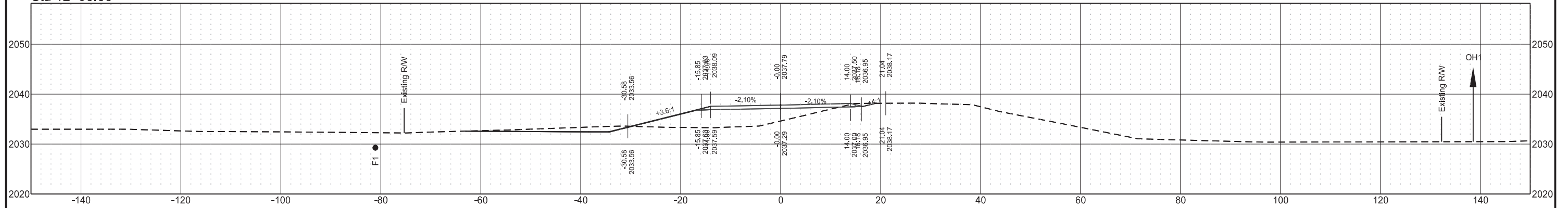


Sta 10+00.00

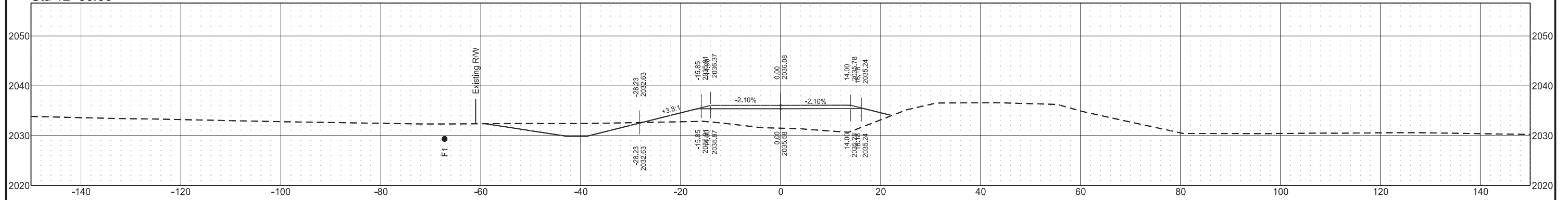


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	51

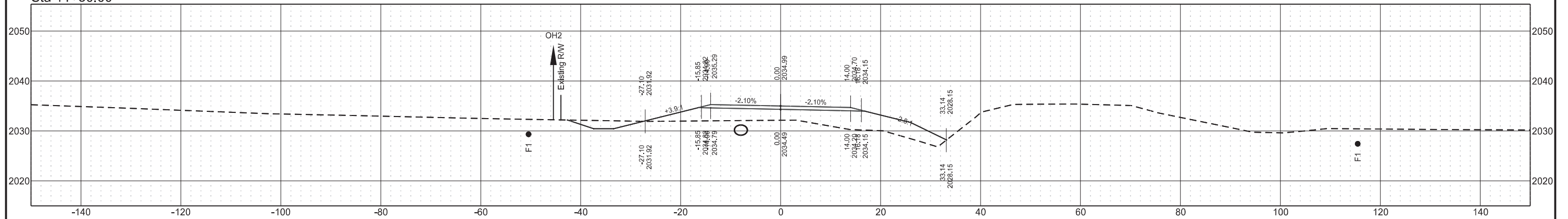
Sta 12+50.00



Sta 12+00.00

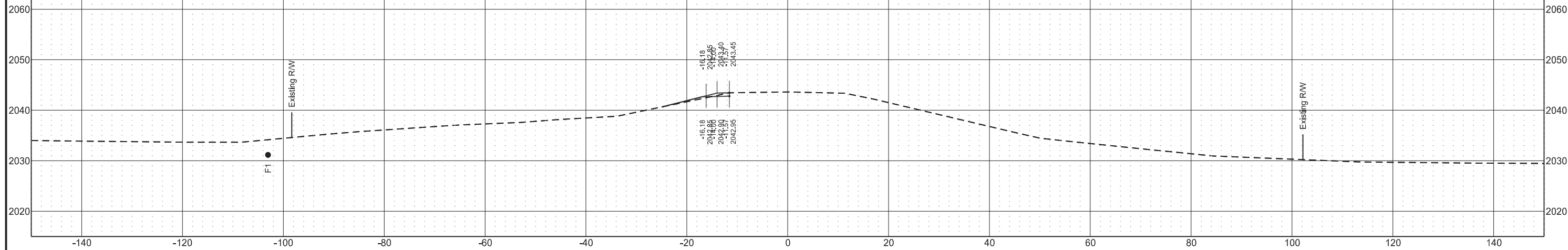


Sta 11+50.00

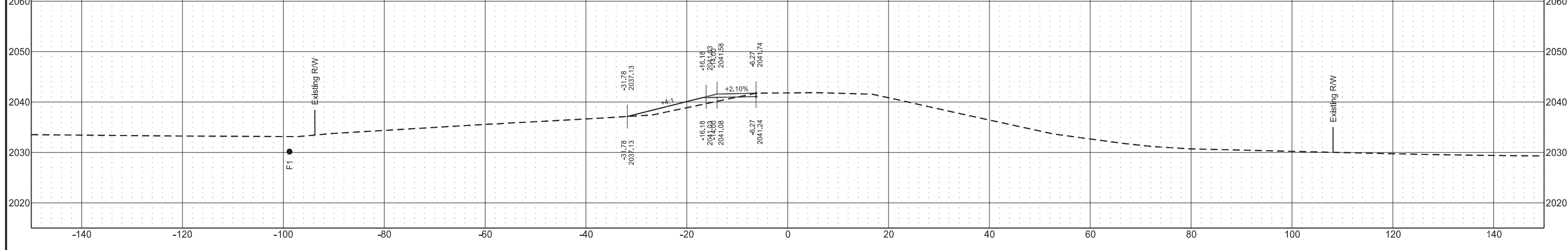


STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	52

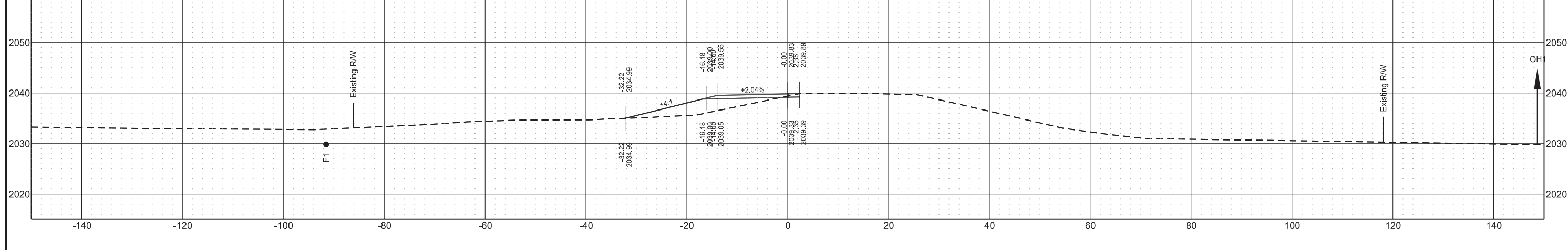
Sta 14+00.00



Sta 13+50.00



Sta 13+00.00

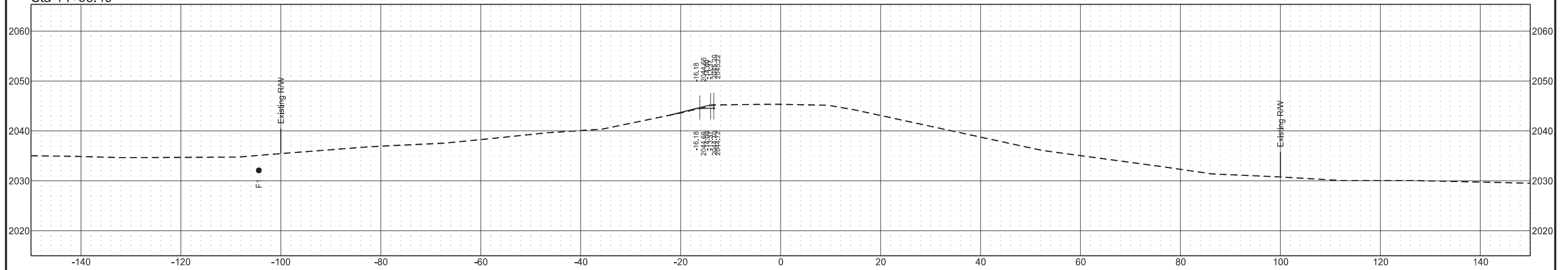


Final

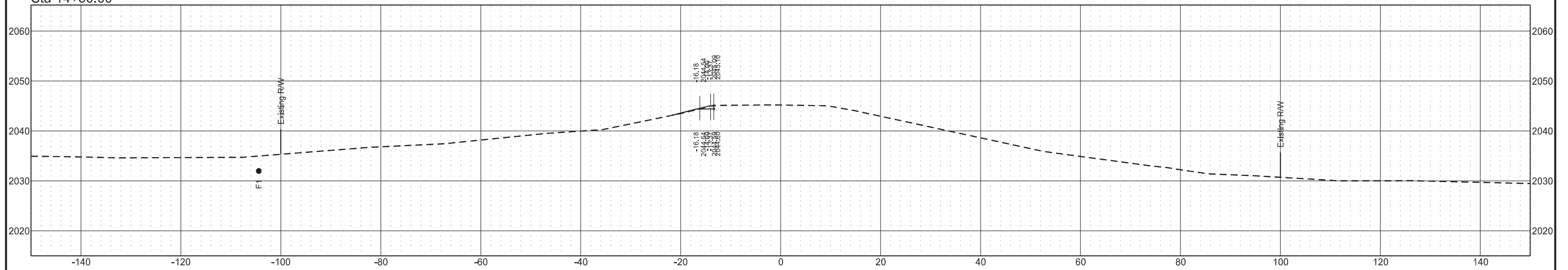
Statewide Structures Project (ND31)
Chain PR31_TempBypass

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	SS-9-999(478)	200	53

Sta 14+53.49



Sta 14+50.00



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 C 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
 DInt delineate
 DIntr delineator
 Depr depression
 Desc description
 Det detail
 DWP detectable warning panel
 Dtr detour
 Dia or \emptyset 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
05-20-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions



NDDOT ABBREVIATIONS

Galv	galvanized	Ln	lane	Obsc	obscure(d)	Qty	quantity
Gar	garage	Lg	large	Ocpd	occupied	Qtr	quarter
Gs L	gas line	Lat	latitude	Ocpy	occupy		
G Reg	gas line regulator	Lt	left	O/s	offset		
GMV	gas main valve	Lens	lenses	OC	on center	Rad or R	radius
G Mtr	gas meter	Lvl	level	C	one dimensional consolidation	RR	railroad
GSV	gas service valve	Lvng	leveling	OC	organic content	Rlwy	railway
GVP	gas vent pipe	Lht	light	Orig	original	Rsd	raised
GV	gate valve	LP	light pole	O To O	out to out	RC	rapid curing
Ga	gauge	Ltg	lighting	OD	outside diameter	Rec	record
Gov	government	Liq	liquid	OH	overhead	Recy	recycle
Grd	graded/grade	LL	liquid limit			RAP	recycled asphalt pavement
Grnd	ground	Loc	location			RPCC	recycled portland cement concrete
GWM	ground water monitor	Long.	longitude	PMT	pad mounted transformer	Ref	reference
Gdrl	guardrail	Lp	loop	Pg	pages	R Mkr	reference marker
Gtr	gutter	LD	loop detector	Pntd	painted	RM	reference monument
		Lum	luminaire	Pr	pair	RP	reference point
				Pnl	panel	Refl	reflectorized
H Plg	H piling			Pk	park	RCB	reinforced concrete box
Hdwl	headwall	Mb	mailbox	PSD	passing sight distance	RCES	reinforced concrete end section
Ht	height	ML	main line	Pvmt	pavement	RCFES	reinforced concrete flared end section
Hel	helical	MH	manhole	Ped	pedestal	RCP	reinforced concrete pipe
HDPE	high density polyethylene	Mkd	marked	Ped	pedestrian	RCPS	reinforced concrete pipe sewer
HM	high mast	Mkr	marker	PPP	pedestrian pushbutton post	RCTES	reinforced concrete traversable end section
HP	high pressure	Mkg	marking	Pen.	penetration	Reinf	reinforcement
HPS	high pressure sodium	MA	mast arm	Perf	perforated	Res	reservation
HTCG	high tension cable guardrail	Matl	material	Per.	perimeter	Res	residence
Hwy	highway	Max	maximum	Perm	permanent	Ret	retaining
Hor	horizontal	MC	meander corner	PL	pipeline	Rev	reverse
HBP	hot bituminous pavement	Meas	measure	PI	place	Rt	right
HMA	hot mix asphalt	Mdn	median	P&P	plan & profile	R/W	right of way
Hyd	hydrant	MD	median drain	PL	plastic limit	Riv	river
Ph	hydrogen ion content	MC	medium curing	Pl or \bar{P}	plate	Rd	road
		MGS	Midwest Guardrail System	Pt	point	Rdbd	road bed
		MM	mile marker	PE	polyethylene	Rdwy	roadway
Id	identification	MP	mile post	PVC	polyvinyl chloride	RWIS	roadway weather information system
Incl	inclinometer tube	Min	minimum	PCC	Portland Cement concrete	Rk	rock
IMH	inlet manhole	Misc	miscellaneous	PP	power pole	Rt	route
ID	inside diameter	Mon	monument	Preempt	preemption		
Inst	instrument	Mnd	mound	Prefab	prefabricated		
Intchg	interchange	Mtbl	mountable	Prfmd or Pref	prefomed		
Intmdt	intermediate	Mtd	mounted	Prep	preperation		
Intscn	intersection	Mtg	mounting	Press.	pressure		
Inv	invert	Mk	muck	PRV	pressure relief valve		
IP	iron pipe			Prestr	prestressed		
				Pvt	private		
				PD	private drive		
Jt	joint	Neop	neoprene	Prod.	production/produce		
Jct	junction	Ntwk	network	Prog	programmed		
		N	North	Prop.	property		
		NE	North East	Prop Ln	property line		
		NW	North West	Ppsd	proposed		
		NB	Northbound	PB	pull box		
		No. or #	number				

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions
04-23-18	General Revisions
12-18-20	General Revisions
08-16-22	General Revisions

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NDDOT ABBREVIATIONS

D-101-3

Salv	salvage(d)	Tel	telephone
San	sanitary sewer line	Tel B	Telephone Booth
Sec	section	Tel P	telephone pole
SL	section line	Tv	television
Sep	separation	Temp	temperature
Seq	sequence	Temp	temporary
Serv	service	TBM	temporary bench mark
Sht	sheet	T	thinwall tube sample
Shtng	sheeting	Ts	topsoil
Shldr	shoulder	Traf	traffic
Sw or Sdwk	sidewalk	TSCB	traffic signal control box
SD	sight distance	Tr	trail
SN	sign number	Transf	transformer
Sig	signal	Trans	transition
Sgl	single	TT	transmission tower
SRCP	slotted reinforced concrete pipe	TES	traversable end section
SC	slow curing	Trans	transverse
SS	slow setting	Trtd	treated
Sm	small	Trmt	treatment
S	South	Qc	triaxial compression
SE	South East	TERO	tribal employment rights ordinance
SW	South West	Tpl	triple
SB	Southbound	Typ	typical
Sp	spaces		
Spcl	special	Qu	unconfined compressive strength
SA	special assembly	Ugrnd	underground
SP	special provisions	Util	utility
G	specific gravity		
Spk	spike	VG	valley gutter
SB	split barrel sample	Vap	vapor
SH	sprinkler head	Vert	vertical
SV	sprinkler valve	VCP	vitrified clay pipe
Sq	square	Vol	volume
Stk	stake	VSFS	vehicle speed feedback sign
Std	standard		
N	standard penetration test	Wkwy	walkway
Std Specs	standard specifications	W	water content
Stm L	steam line	WGV	water gate valve
SEC	steel encased concrete	WL	water line
SMA	stone matrix asphalt	WM	water main
SSD	stopping sight distance	WMV	water main valve
SD	storm drain	W Mtr	water meter
St	street	WSV	water service valve
SPP	structural plate pipe	WW	water well
SPPA	structural plate pipe arch	Wrng	wearing
Str	structure	WIM	weigh in motion
Subd	subdivision	W	west
Sub	subgrade	WB	westbound
Sub Prep	subgrade preparation	Wrng	wiring
Ss	subsoil	W/	with
SS	supplement specification	W/o	without
Supp	supplemental	WC	witness corner
Surf	surfacing		
Surv	survey		
Sym	symmetrical		

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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

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12-18-20	Sheet Added - Continued from D-101-3



NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM 702 Communications
 ACCENT Accent Communications
 AGASSIZ WU Agassiz Water Users Incorporated
 AGC Associated 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
 MCKENZ 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
 MOUNTRAIL-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 GHG 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

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Existing Topography

- Existing Ground Void
- Existing Cemetery 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

Proposed Topography

- 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
- 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

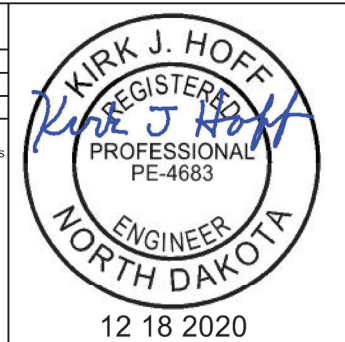
Traffic Utilities

- 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

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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 Typical

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

Geotechnical

- D ----- D ----- Geotextile Fabric Type D
- **Geo** ----- **Geo** ----- Geogrid
- R ----- R ----- Geotextile Fabric Type R
- R ----- R ----- Geotextile Fabric Type R1
- RR ----- RR ----- Geotextile Fabric Type RR
- S ----- S ----- Geotextile Fabric Type S

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

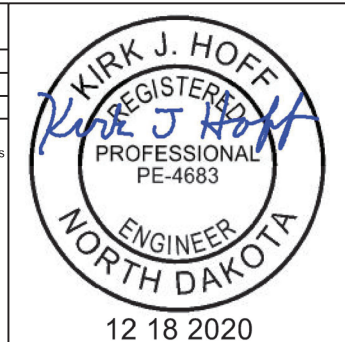
Erosion Control

- Limits of Const Transition Line
- Bale Check
- Rock Check
- s ----- s ----- Floating Silt Curtain
- SF ----- SF ----- Silt Fence
- Excavation Limits
- Fiber Rolls

Environmental

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

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SYMBOLS



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



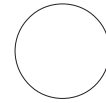
Existing Large Tree



Existing Small Tree



Existing Tree Trunk



Cairn or Stone Circle



Existing Artifact



Existing Satellite Dish



Existing Weather Station



Existing Windmill or Tower



Reinforced Pavement



Continuous Split Barrel Sample



Flight Auger Sample



Split Barrel Sample



Thinwall Tube Sample



Standard Penetration Test



Inclinometer Tube



Excavation Unit



Existing Ground Water Well Bore Hole

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SYMBOLS

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












































































	■			Flexible Delineator			Highway Sign (Exst, Ppsd)
	□	□		Flexible Delineator Type A (Exst, Ppsd)			Mile Post Type A (Exst-Ppsd-Reset)
	▤	▤		Flexible Delineator Type B (Exst, Ppsd)			Mile Post Type B (Exst, Ppsd)
	▥	▥		Flexible Delineator Type C (Exst, Ppsd)			Mile Post Type C (Exst, Ppsd)
	○	○		Flexible Delineator Type D (Exst, Ppsd)			Object Marker Type I (Exst, Ppsd)
	⊙	⊙		Flexible Delineator Type E (Exst, Ppsd)			Object Marker Type II (Exst, Ppsd)
├	├	├	├	Delineator Type A (Exst, Ppsd, Diamond Grade-Reset)			Object Marker Type III (Exst, Ppsd)
┣	┣	┣	┣	Delineator Type B (Exst, Ppsd, Diamond Grade-Reset)		°	Existing Reference Marker
┣	┣	┣	┣	Delineator Type C (Exst, Ppsd, Diamond Grade)		○—○	Road Closure Gate 18 Ft (Exst, Ppsd)
○	○	○	○	Delineator Type D (Exst, Ppsd, Diamond Grade)		○—○	Road Closure Gate 28 Ft (Exst, Ppsd)
⊙	⊙	⊙	⊙	Delineator Type E (Exst, Ppsd, Diamond Grade)		○—○	Road Closure Gate 40 Ft (Exst, Ppsd)
				Barricade (Type I, Type II, Type III)		□	Existing Railroad Battery Box
⊙	↔	←	→	Arrow Panel (Caution Mode, Double Direction, Left Directional, Right Directional, Sequencing, Truck Mounted)		×	Existing RR Profile Spot
	△			Attenuation Device		⋈	Existing Railroad Crossbuck
	▤			Truck Mounted Attenuator		×	Existing Railroad Frog
	●			Delineator Drums		=	Existing Mailbox (Private, Federal)
	☞			Flagger			
	•			Tubular Marker			
	▲			Traffic Cone			
				Back to Back Vertical Panel Sign			

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 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)		Cap or Stub Exst Gas, Exst Sanitary, Exst Storm Drain, Ppsd Storm Drain, Exst Water
			Water Manhole (Exst, Exst with Valve)		
			Sanitary Sewer Manhole (Exst, Ppsd, Exst with Valve)		Existing Pedestal Electrical, Telephone, Fiber Optic Telephone, TV, Fiber Optic TV, Undefined
			Sanitary Force Main Manhole (Exst, Ppsd, Exst with Valve)		
			Storm Drain Manhole (Exst, Ppsd, Exst with Inlet, Ppsd with Inlet)		Existing Pipe Vent Gas, Fuel, Sanitary, Storm Drain, Water, Undefined
			Force Main Storm Drain Manhole (Exst, Exst with Valve)		
			Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)		Valve Exst Gas, Exst Water, Ppsd Water, Exst Undefined
			Existing Water Appurtenance		
			Sprinkler Head (Exst, Ppsd)		Pump Sanitary, Storm Drain, Exst Water
			Fire Hydrant (Exst, Ppsd)		
			Cleanout (Exst Sanitary, Underdrain)		Corrugated Metal End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Catch Basin Inlet (Round, Square)		
			Existing Curb Inlet (Round, Square)		Reinforced Concrete End Section (18, 24, 30, 36, 42, 48, 54, 60 Inch)
			Existing Slotted Reinforced Concrete Pipe		
			Catch Basin (Riser 30 Inch, Beehive, Type A)		Existing Utility Marker
			Inlet Mountable Curb (Type A, Type B)		Existing Meter
			Inlet Saddle Base (Type 1, Type 2)		Existing Fuel Dispensers
			Inlet Special (Catch Basin, Type 1, Type A)		Existing Fuel Filler Pipes
			Inlet (Tee, Type 1, Type 2, Type 2 Double)		Existing Fuel Leak Sensors
			Median Drain		
			Headwall (Exst, Ppsd, Ppsd Single with Vegetation Barrier, Ppsd Double with Vegetation Barrier)		

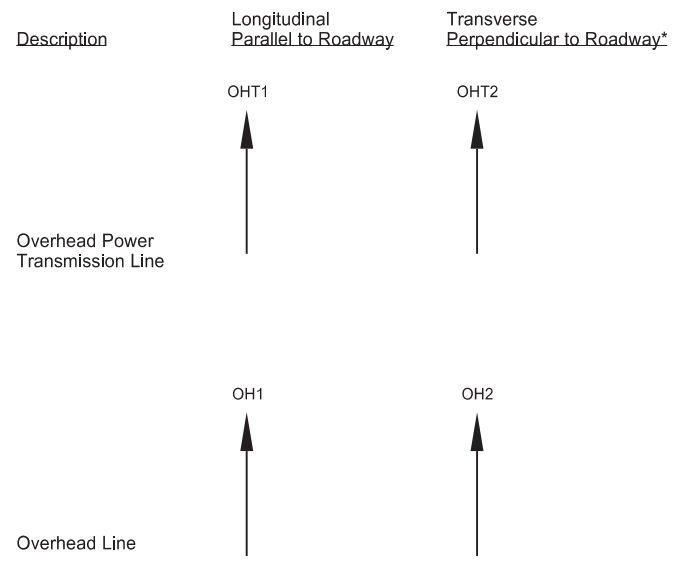
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

KIRK J. HOFF
REGISTERED
PROFESSIONAL
ENGINEER
NORTH DAKOTA
PE-4683
12 18 2020

Cross Section Legend

D-101-40

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

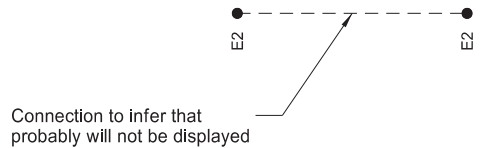


Light Standard - Multiple Variations
Concrete
Steel
Wood
with Traffic Signal

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

* 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.



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.



Anchor

High Tension Cable Guardrail

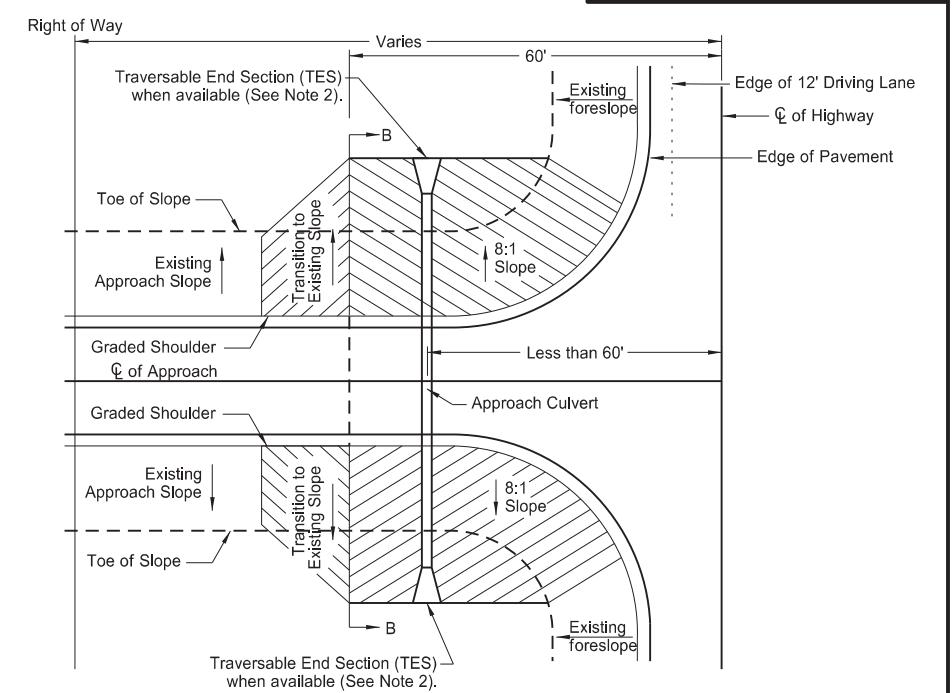
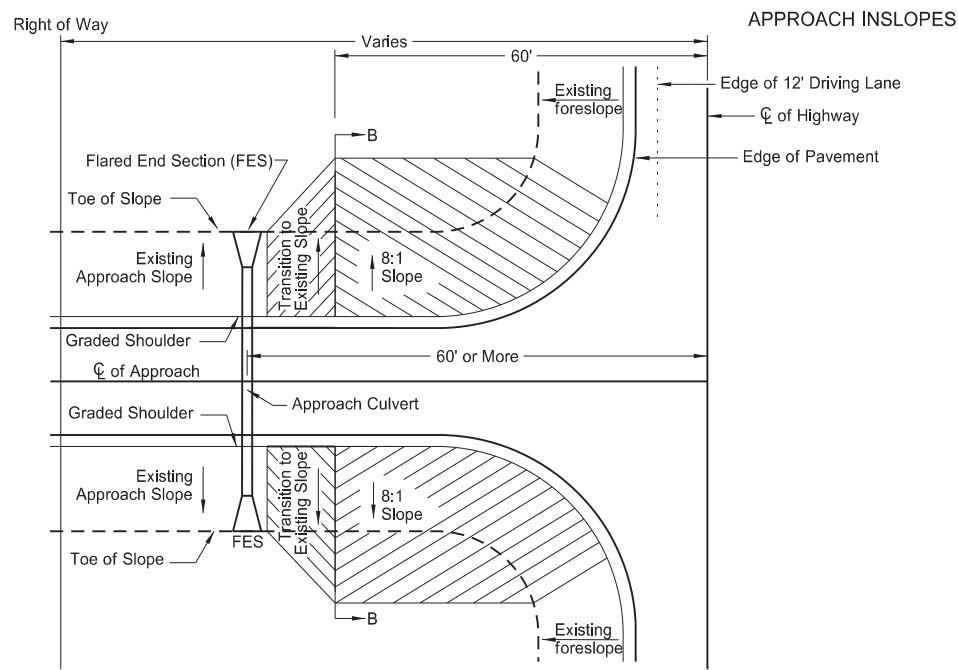
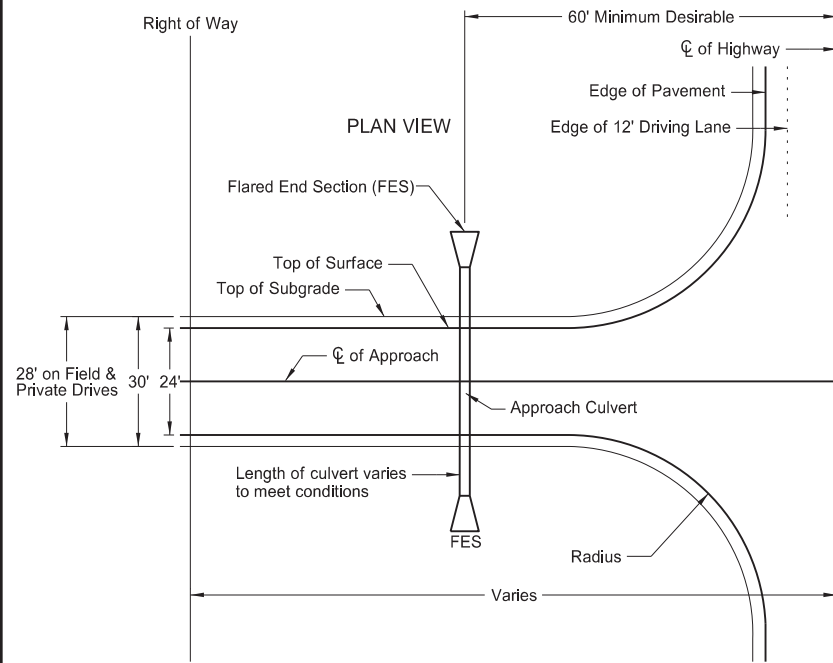
HTC Gait

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



06/14/23

STANDARD RURAL APPROACHES



CASE 1

APPROACH PIPE LOCATED 60' OR MORE FROM CL

CASE 2

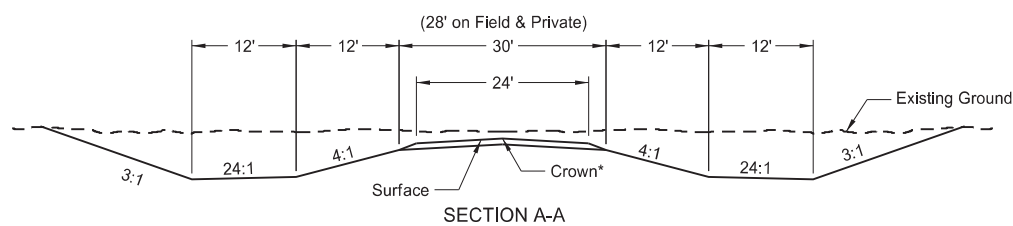
APPROACH PIPE LOCATED LESS THAN 60' FROM CL

Approach Pipe Traversable End Sections (TES)

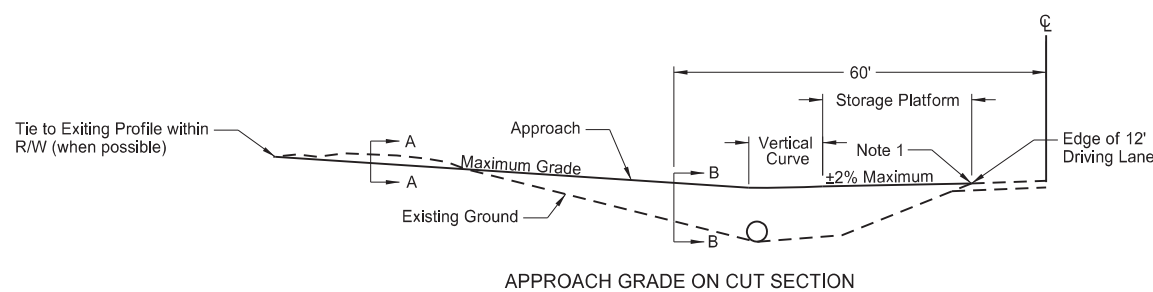
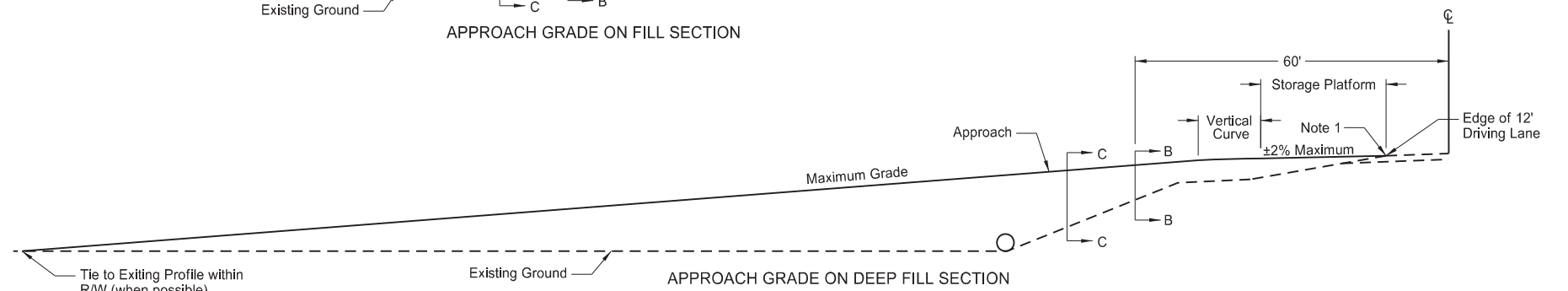
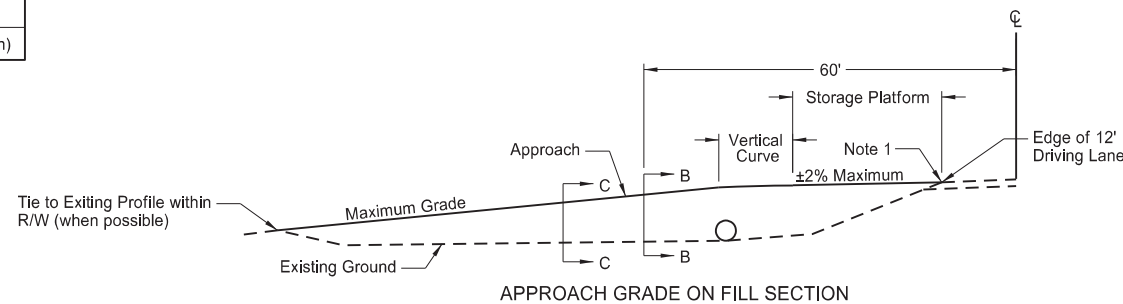
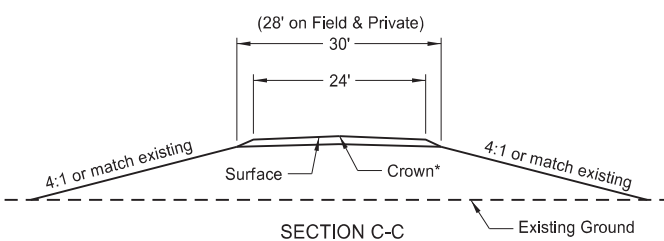
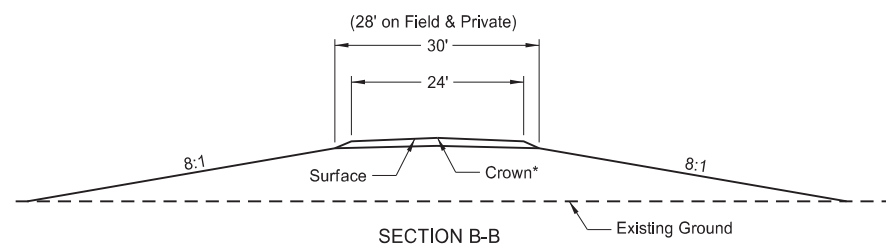
RCP	CSP	CSP Arch
15"	15"	
18"	18"	21"x15"
		24"x18"
24"	24"	28"x20"

CRITERIA FOR RURAL APPROACH TYPES

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



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



NOTES:

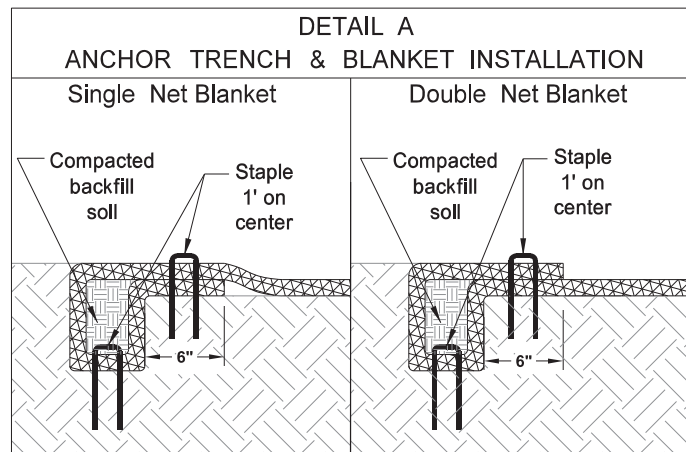
- 5% Max Rollover between approach storage platform and highway.
- Approach pipes up to 24" diameter are acceptable (with traversable end sections) for Case 2. Install approach pipes larger than 24" diameter in accordance with Case 1.

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

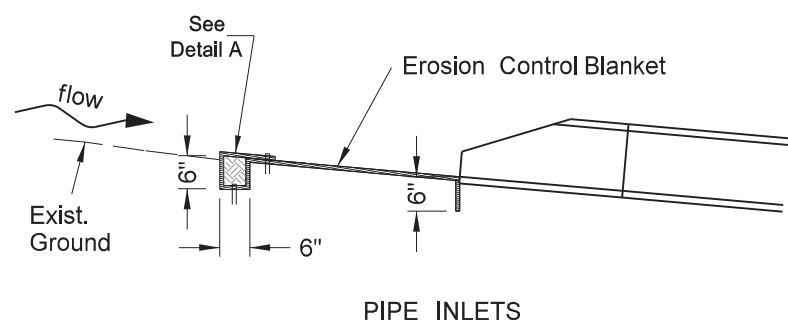
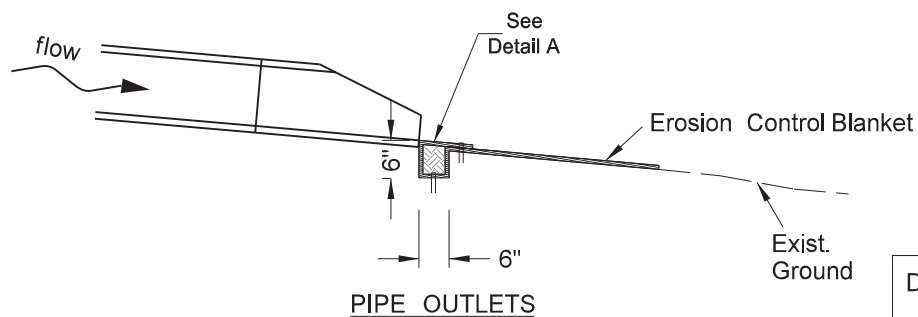
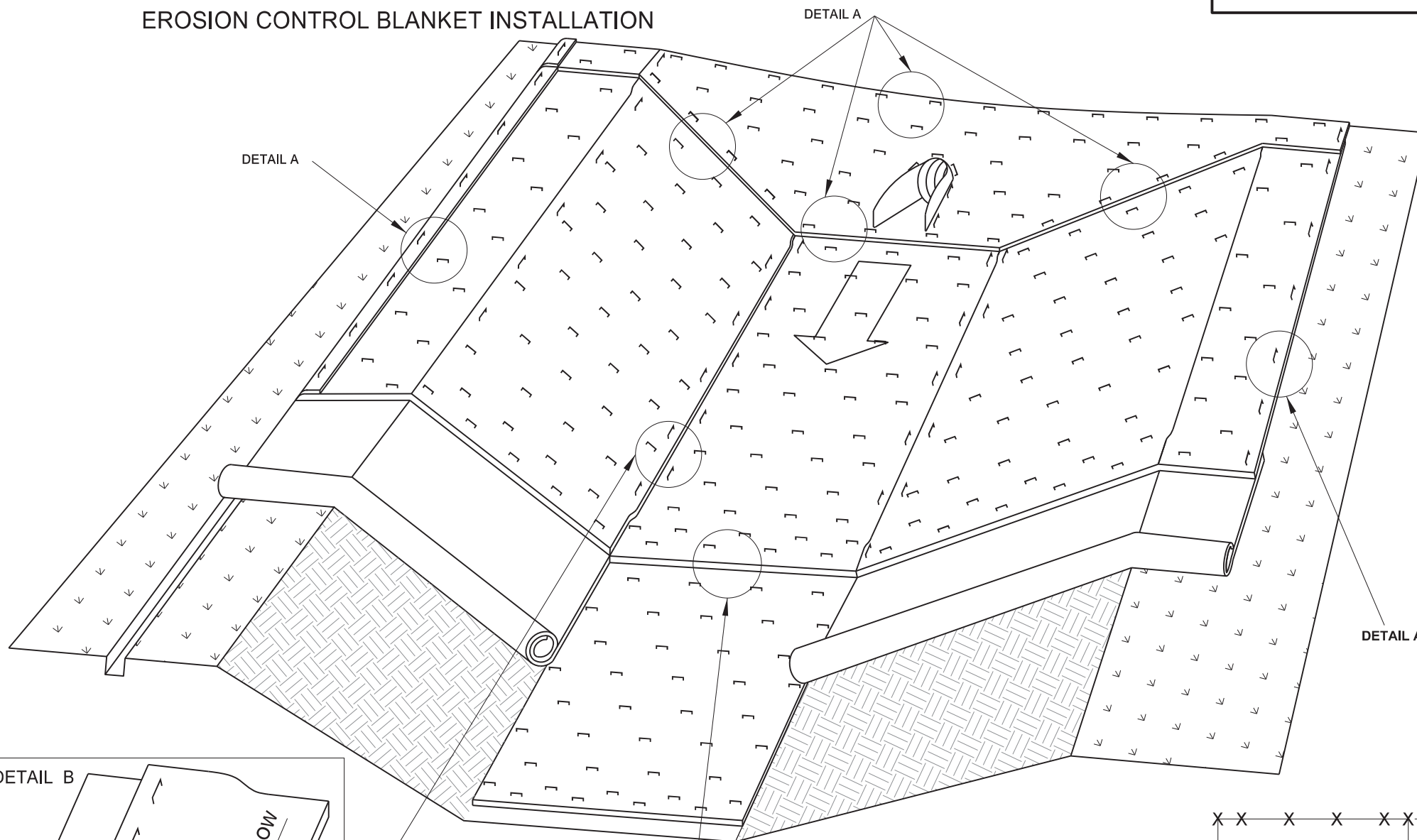


06/29/22

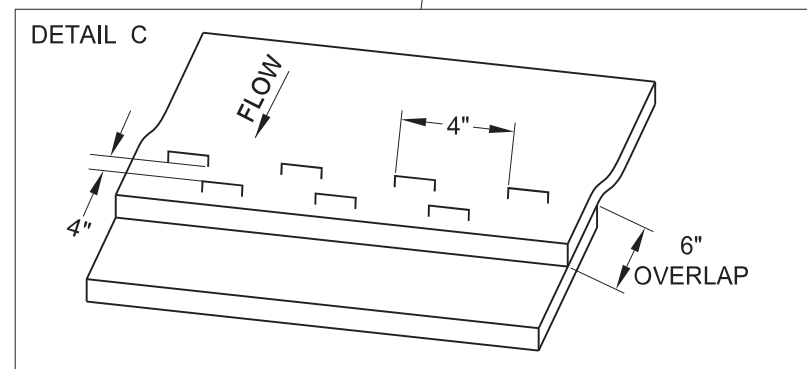
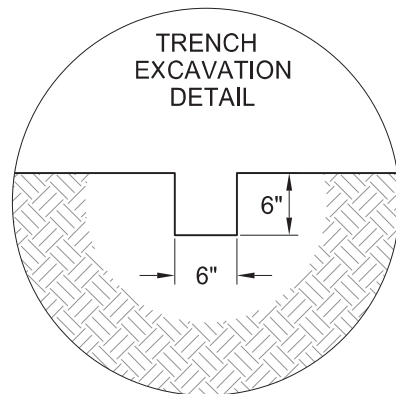
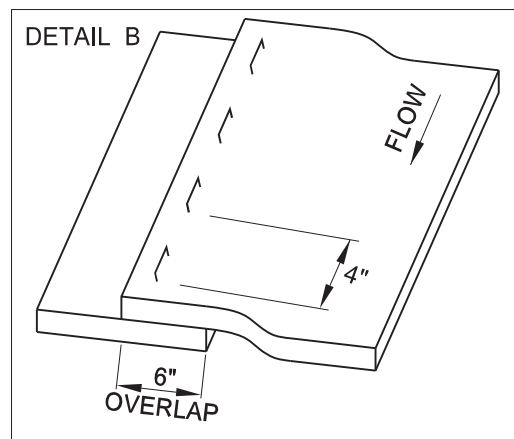
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



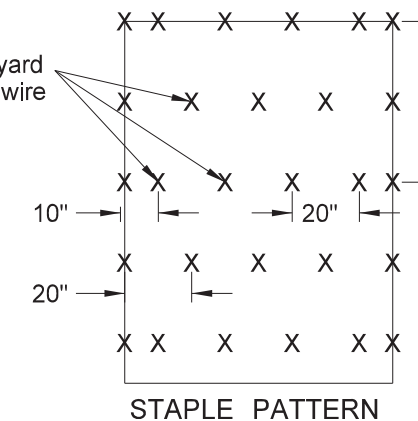
NOTE:
If a Single Net Blanket is used the side with the netting should be on the top once the blanket is installed.



INSTALLATION AT PIPE ENDS



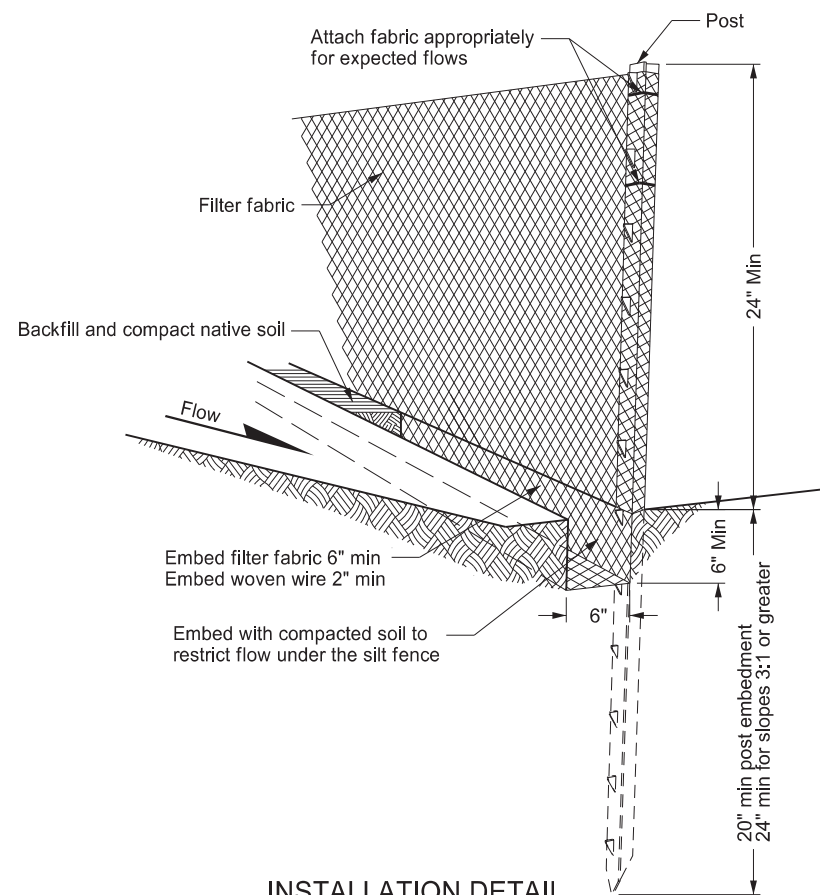
3.8 staples per square yard using 8-inch 11 gauge wire "u" staples.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-5 to D-255-2.
07-27-15	Changed Installation details such as trench depth and overlap dimensions.
08-27-19	New Design Engineer PE Stamp.

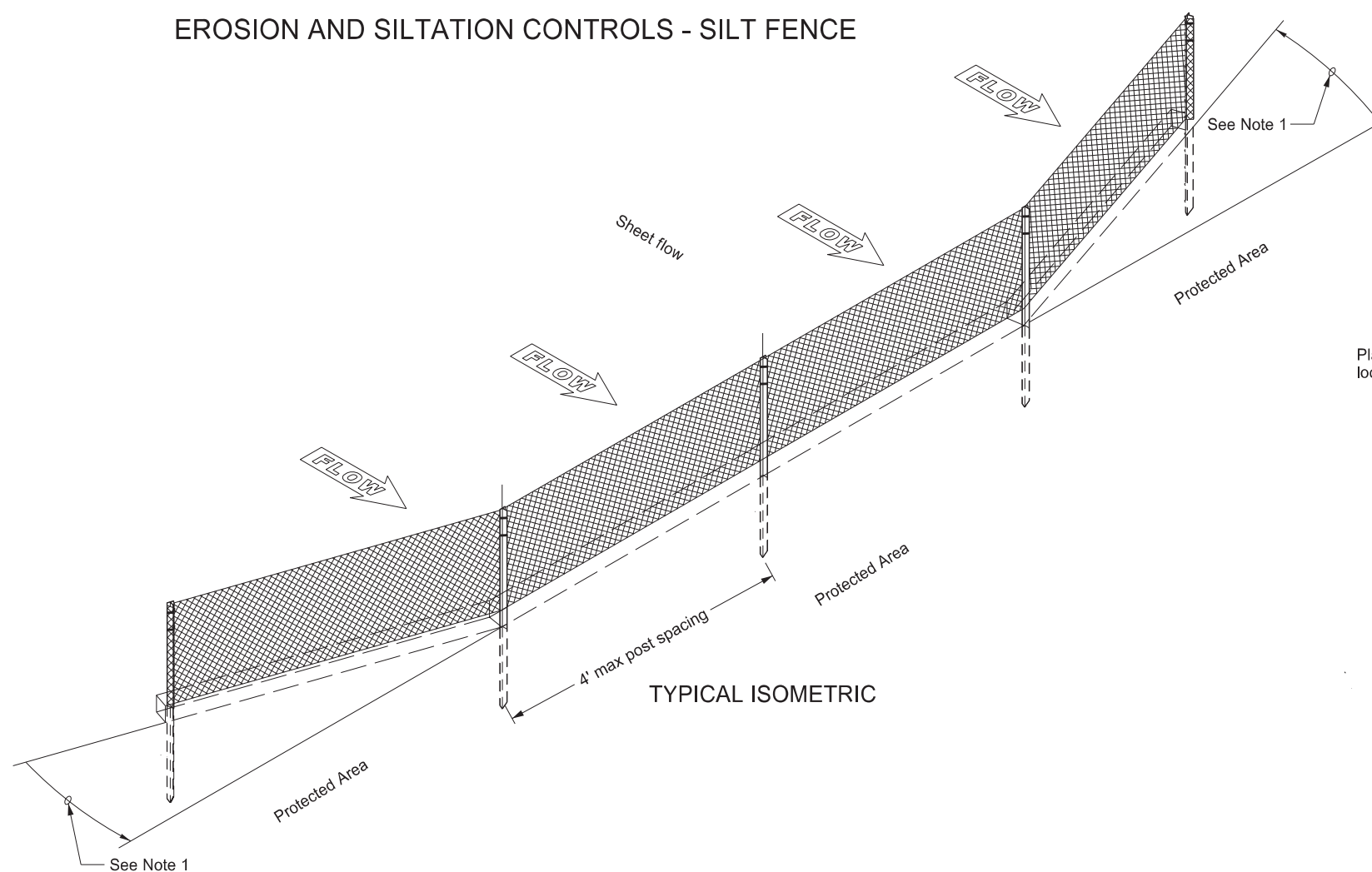
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EROSION AND SILTATION CONTROLS - SILT FENCE

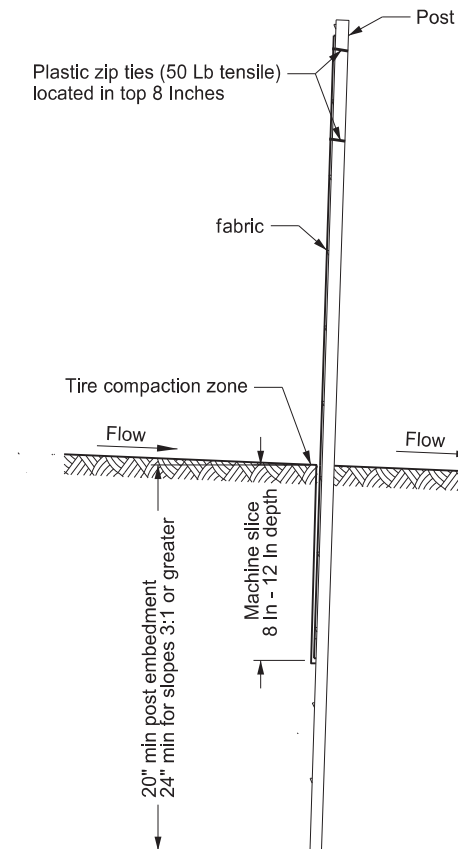


INSTALLATION DETAIL

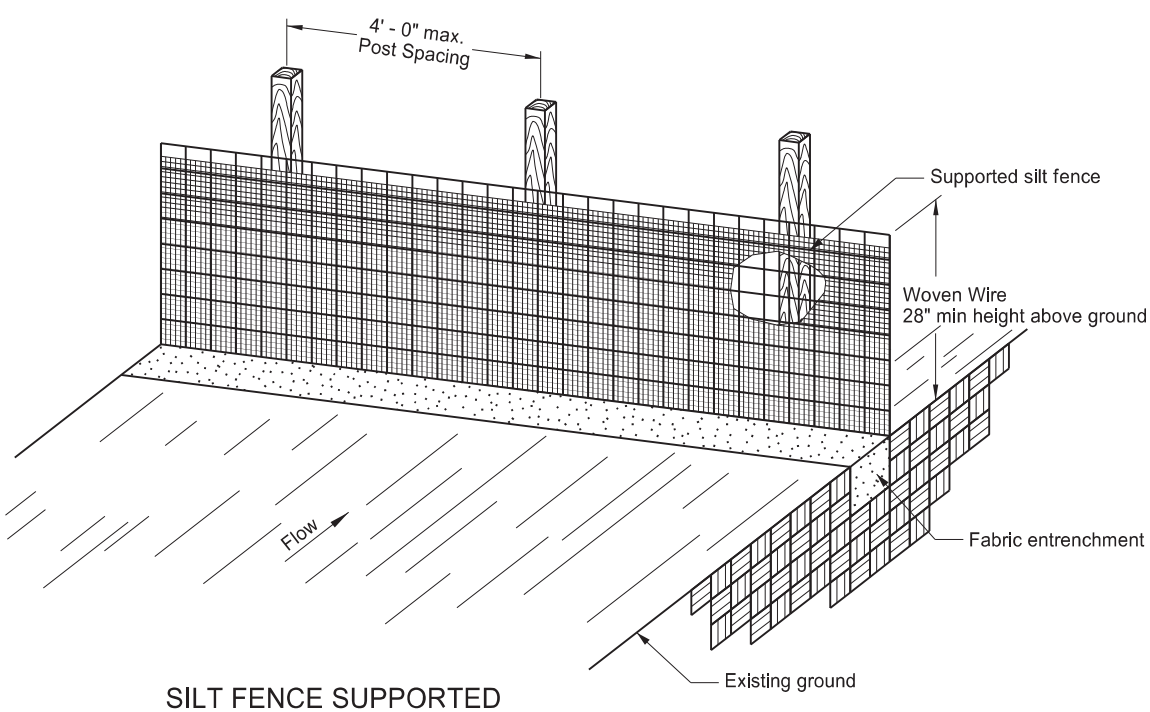
Minimize disturbance of ground around trench and smooth surface after excavation to avoid concentrating flows. Compact to prevent undercutting flows.



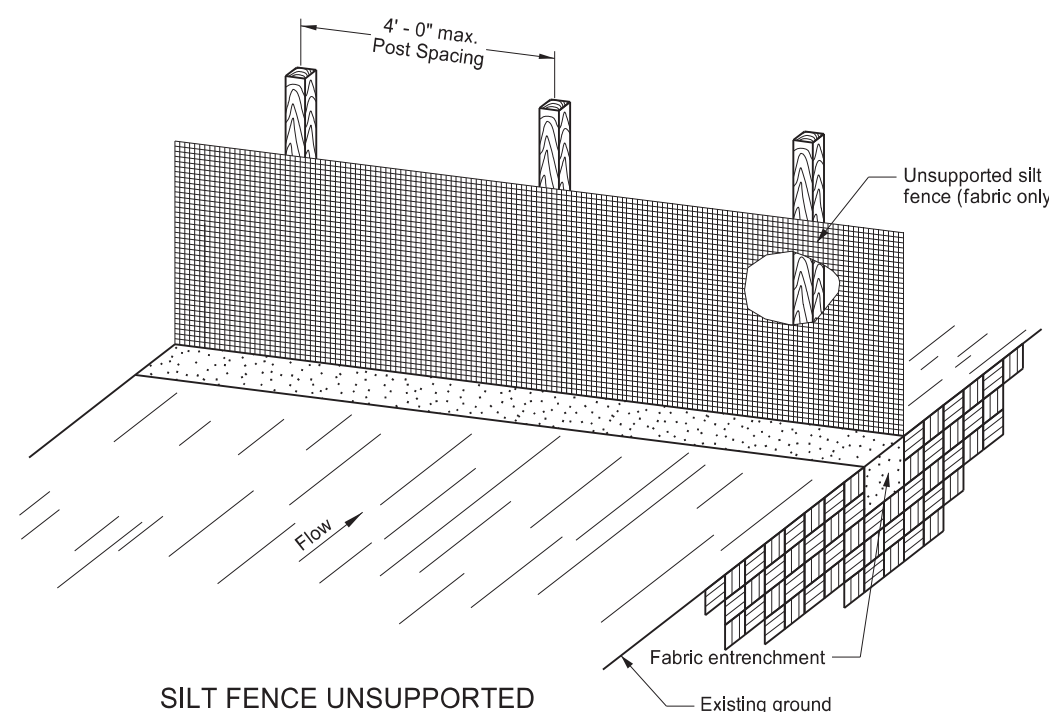
TYPICAL ISOMETRIC



MACHINE SLICED SILT FENCE



SILT FENCE SUPPORTED



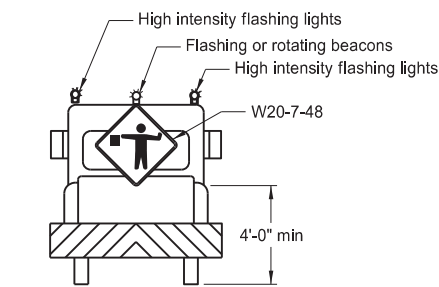
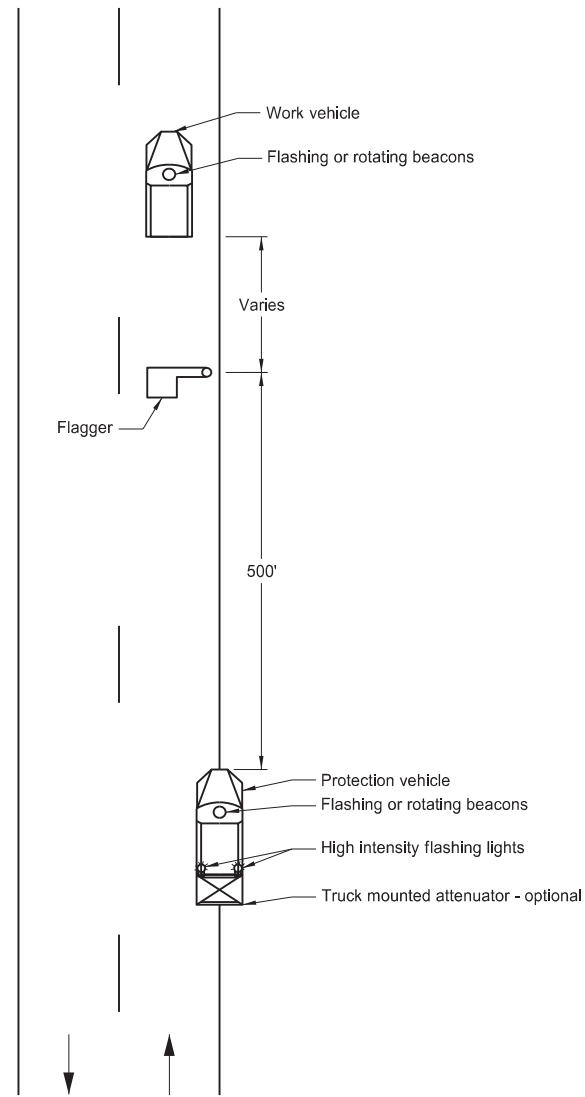
SILT FENCE UNSUPPORTED

- 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.

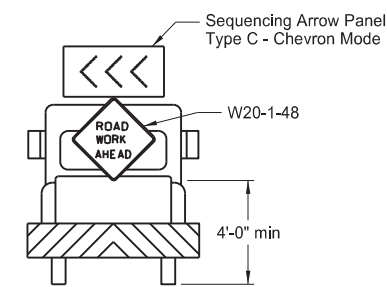
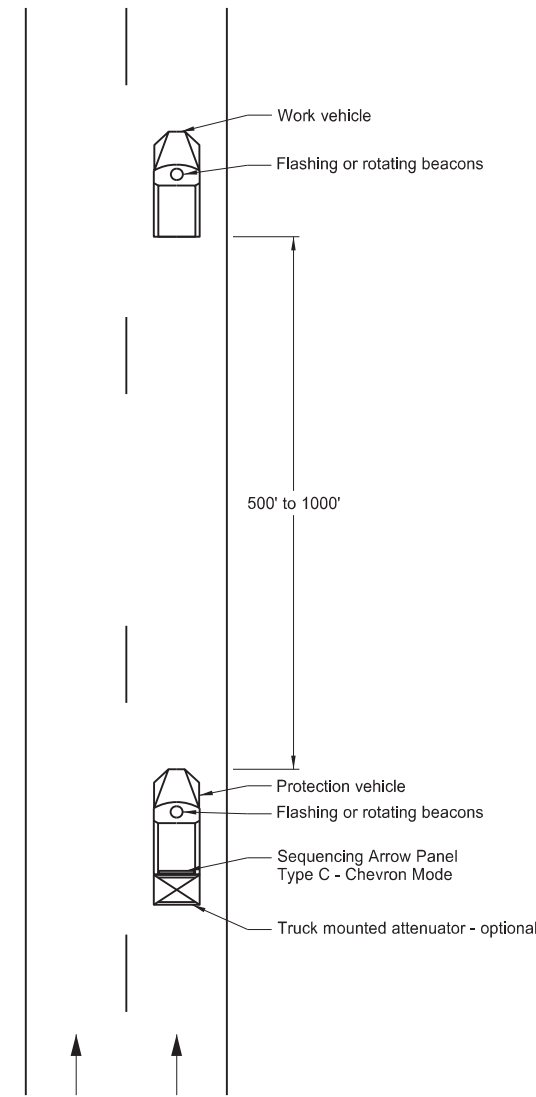
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Two Lane, Two Way Roadways



Typical Protection Vehicle

Multilane Roadways



Typical Protection Vehicle

Notes:

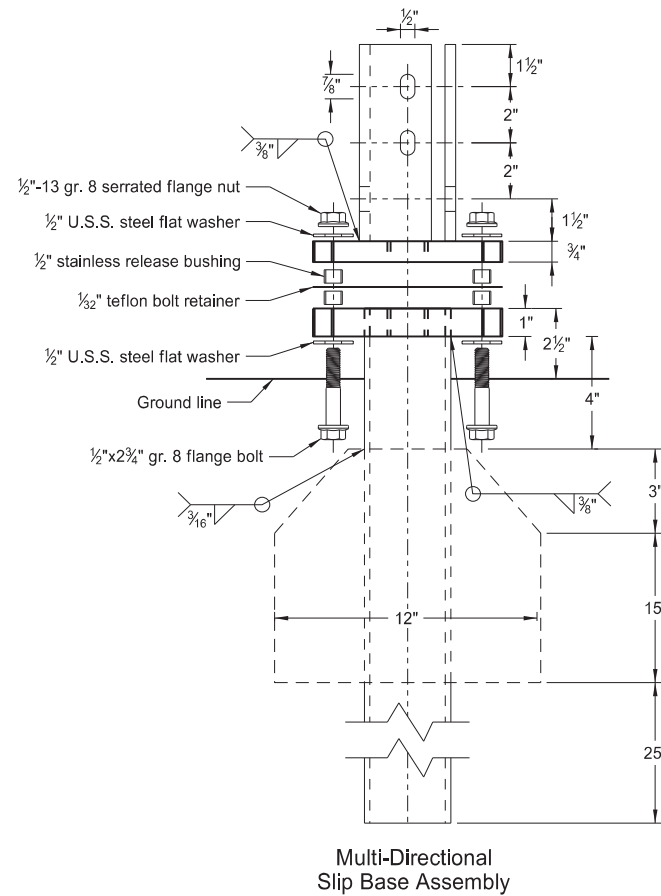
1. Display a 360 degree rotating, flashing, oscillating or strobe light on the working vehicle.
2. Display a 360 degree rotating, flashing, oscillating or strobe light on the shadow vehicle. Operate a sequencing arrow panel Type C in chevron mode on the shadow vehicle for Multilane Roadway.
3. Use these layouts during daylight hours and in areas of good visibility only.
4. Use flagger to protect the work area and warn oncoming traffic for two lane, two way roadway.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
9-27-17 10-03-19	Updated to active voice New Design Engr PE Stamp

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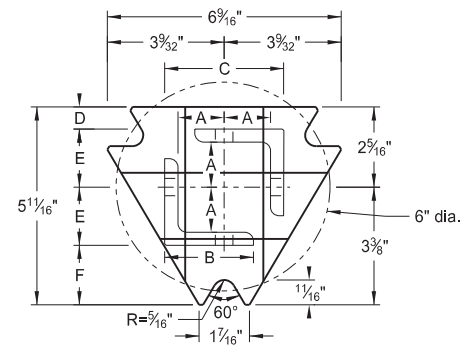
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

Perforated Tube



Multi-Directional Slip Base Assembly

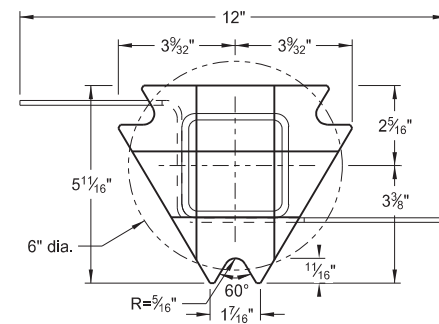
Traffic Flow



Top Post Receiver

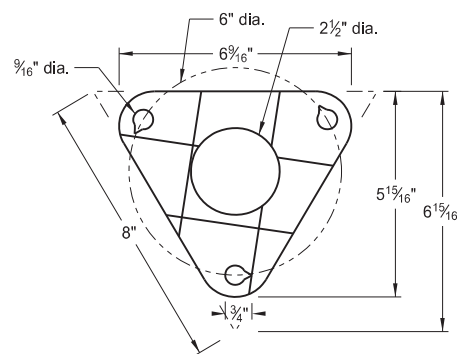
Plate - ASTM A572 grade 50
Angle Receiver - 2 1/2" x 2 1/2" x 3/8" ASTM A36 structural angle

Traffic Flow



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 - 1/2" 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 Thickness Gauge	Sleeve Size in.	Wall Thickness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2 1/4
1	2 1/4	12			No	2 1/2
1	2 1/2	12			(A)	3
1	2 1/2	10			Yes	
1	2 1/2	12	2	12	Yes	
1	2 1/2	12	2 1/4	12	Yes	
2	2	12			No	2 1/4
2	2 1/4	12			No	2 1/2
2	2 1/2	12			Yes	
2	2 1/2	12			Yes	
2	2 1/4	10	2	12	Yes	
2	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/2	12			Yes	
3 & 4	2 1/2	10			Yes	
3 & 4	2 1/2	12	2 1/4	12	Yes	
3 & 4	2 1/4	12	2	12	Yes	
3 & 4	2 1/2	10	2 3/16	10	Yes	

Properties of Telescoping Perforated Tube

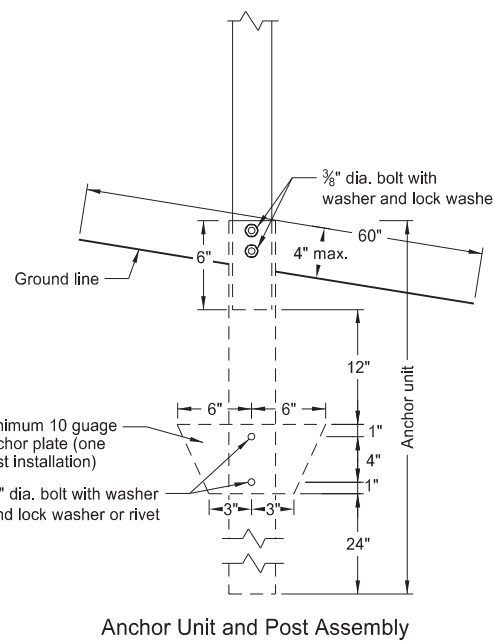
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in. ⁴	Cross Sec. Area in. ²	Section Modulus in. ³
1 1/2 x 1 1/2	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2 1/4 x 2 1/4	0.105	12	2.773	0.561	0.695	0.499
2 3/16 x 2 3/16	0.135	10	3.432	0.605	0.841	0.590
2 1/2 x 2 1/2	0.105	12	3.141	0.804	0.803	0.643
2 1/2 x 2 1/2	0.135	10	4.006	0.979	1.010	0.785

Top Post Receiver Data Table

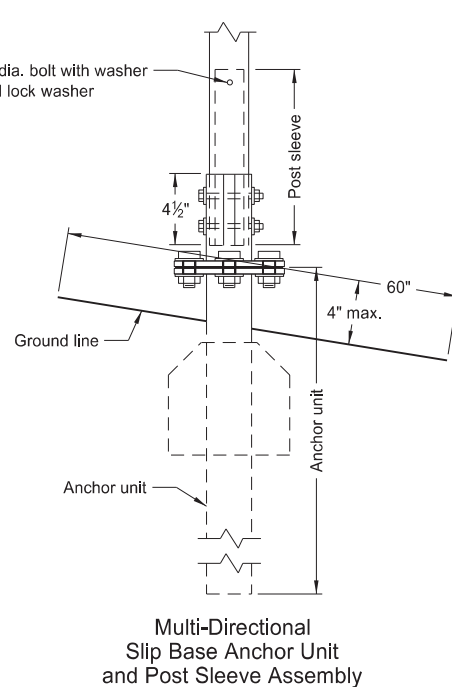
Square Post Sizes (B)	A	B	C	D	E	F
2 3/16" x 10 ga.	1 5/16"	2 1/2"	3 1/2"	2 5/32"	1 3 3/64"	1 7/8"
2 1/2" x 10 ga.	1 3/32"	2 1/2"	3 5/16"	5/8"	1 2 1/32"	1 3/4"

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

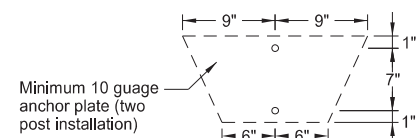
(B) For additional wind load, insert the 2 3/16" x 10 ga. into 2 1/2" x 10 ga.



Anchor Unit and Post Assembly



Multi-Directional Slip Base Anchor Unit and Post Sleeve Assembly

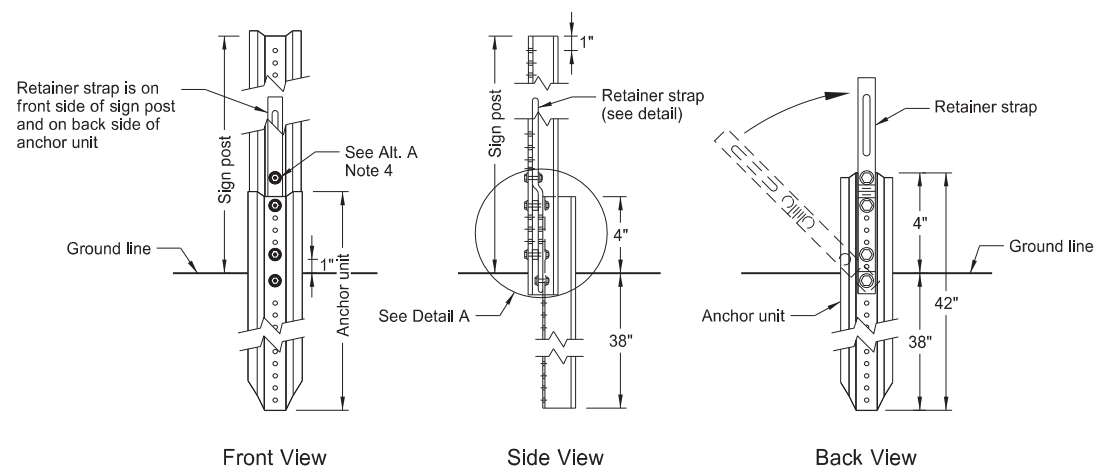
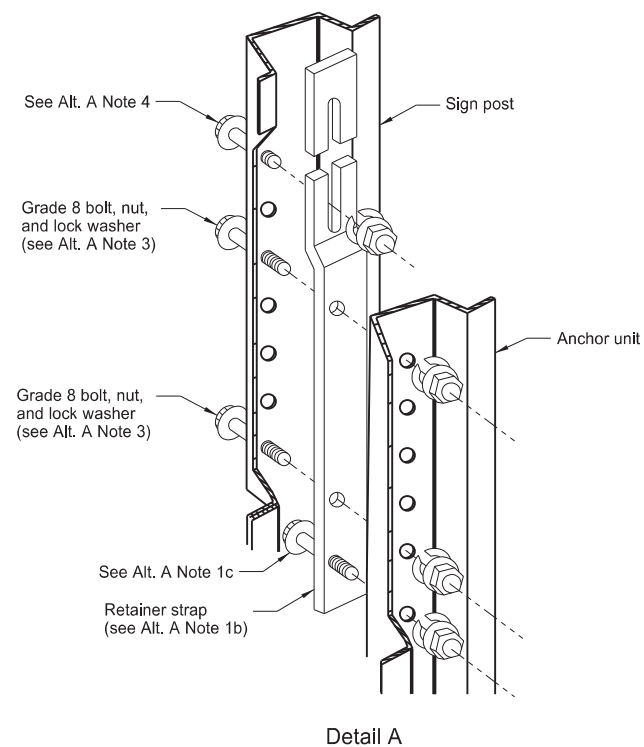


Minimum 10 gauge anchor plate (two post installation)

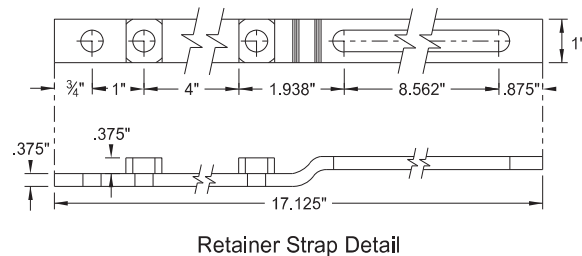
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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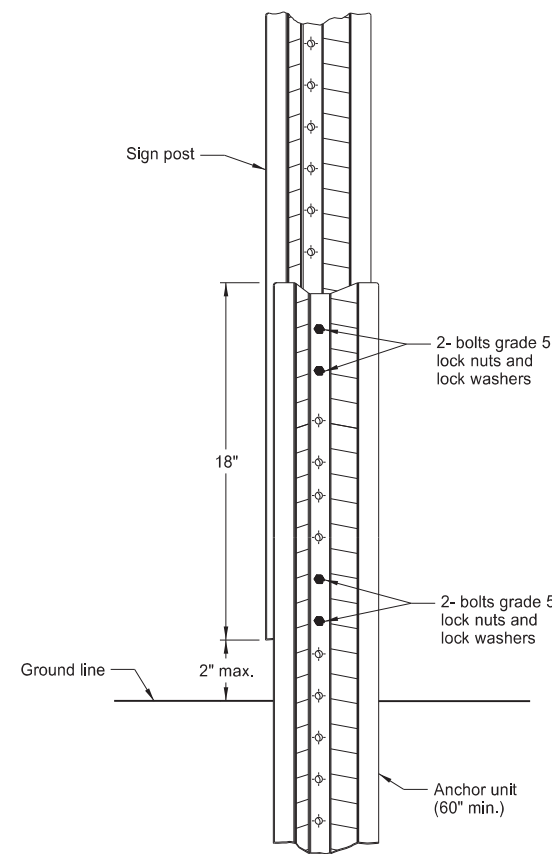
U-Channel Post



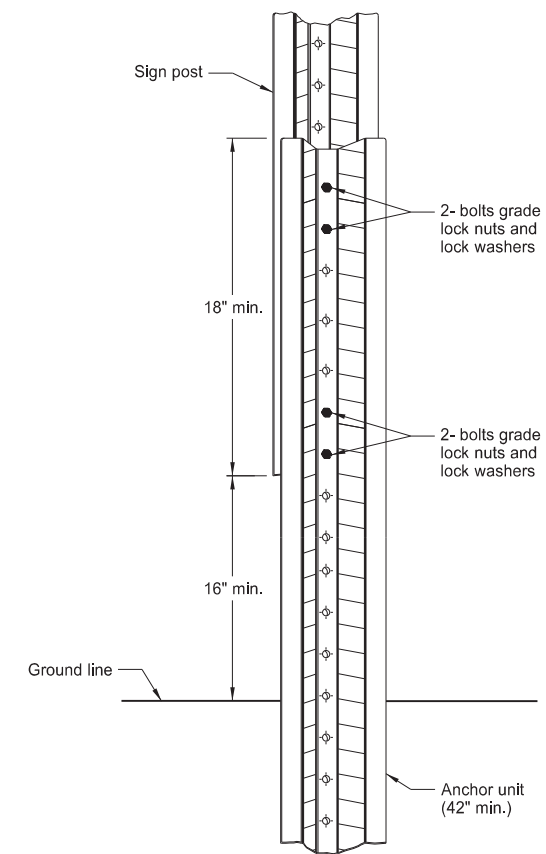
Breakaway U-Channel Detail Alternate A
Install a maximum of 2 posts within 7'.



Retainer Strap Detail



Breakaway U-Channel Splice Detail Alternate B
(2.5 and 3 lb/ft)
Install a maximum of 3 posts within 7'.



Breakaway U-Channel Splice Detail Alternate C
(2.5 and 3 lb/ft)
Install a maximum of 3 posts within 7'.

Alternate A Steps of Installation:

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

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

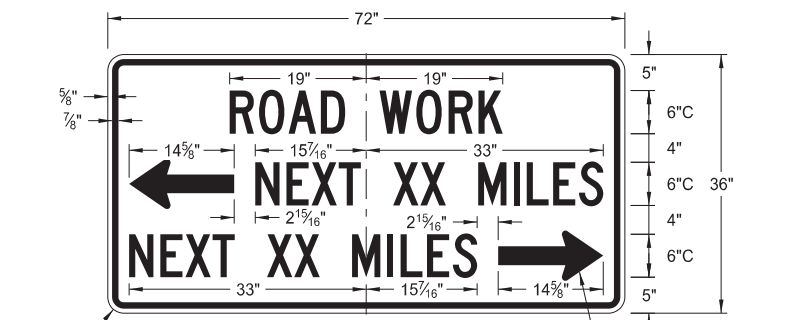
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CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS

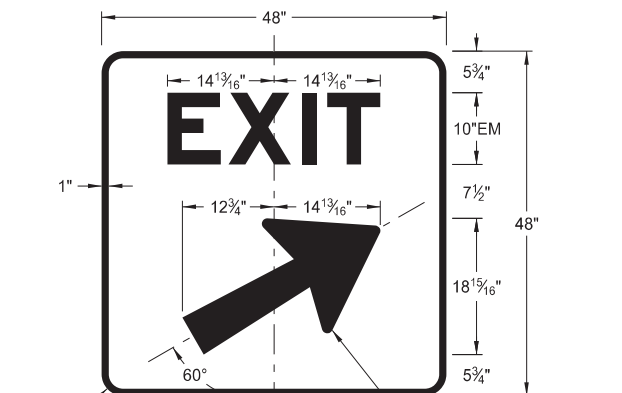
D-704-9



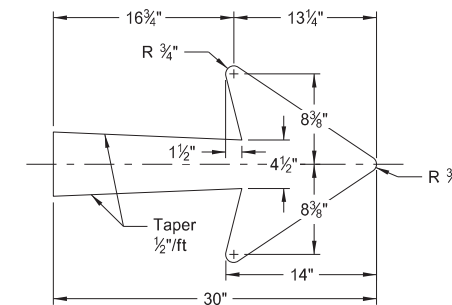
G20-1-60
Legend: black (non-refl)
Background: orange



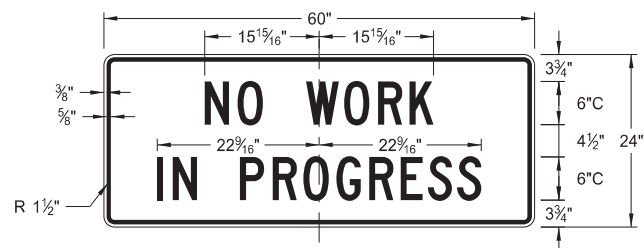
G20-50a-72
Legend: black (non-refl)
Background: orange



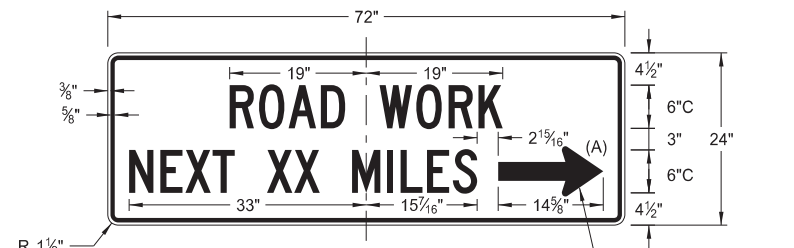
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



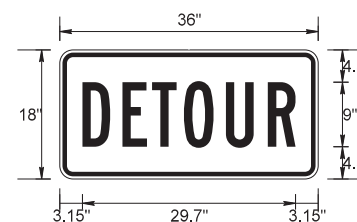
E5-1-48



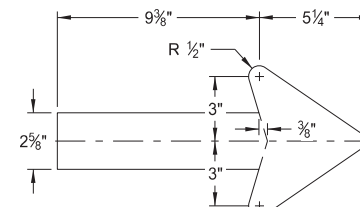
G20-1b-60
Legend: black (non-refl)
Background: orange



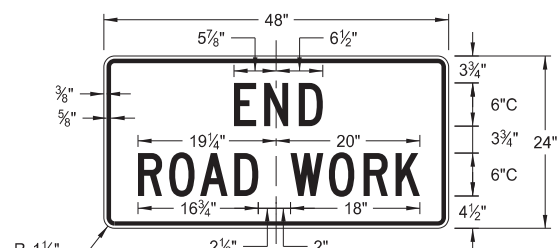
G20-52a-72
Legend: black (non-refl)
Background: orange



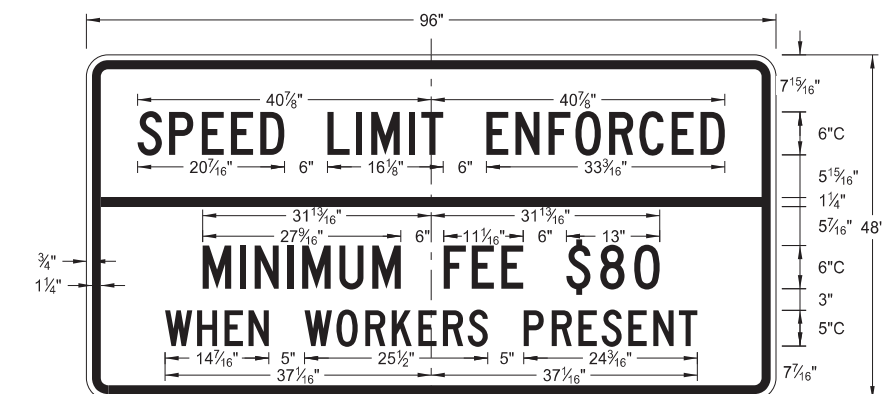
M4-8-36
Legend: black (non-refl)
Background: orange



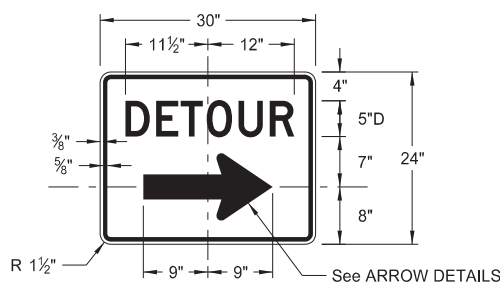
G20-50a-72
G20-52a-72



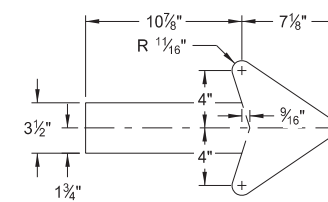
G20-2-48
Legend: black (non-refl)
Background: orange



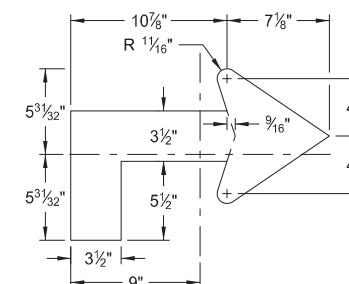
G20-55-96
Legend: black (non-refl)
Background: orange



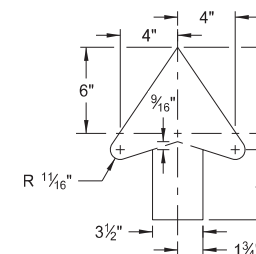
M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange



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



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



M4-9-30
Straight

ARROW DETAILS

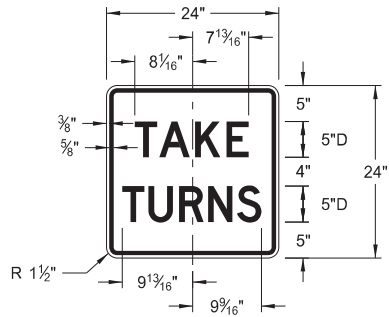
NOTES:

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

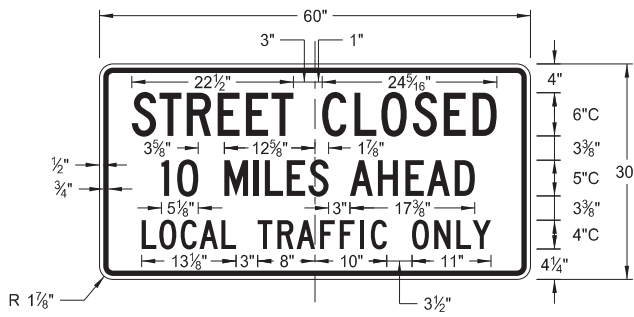
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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Kirk J Hoff,
Registration Number
PE- 4683,
on 10/03/19 and the original document is stored at the
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of Transportation

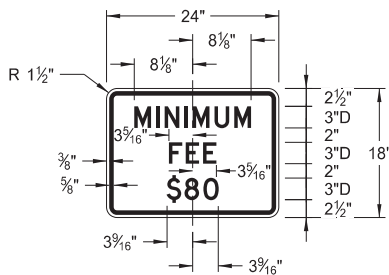
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



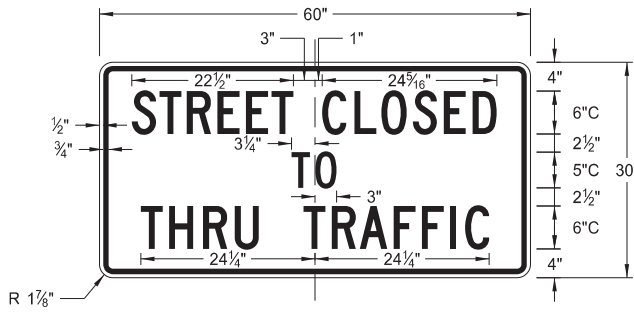
R1-50P-24
Legend: black (non-refl)
Background: white



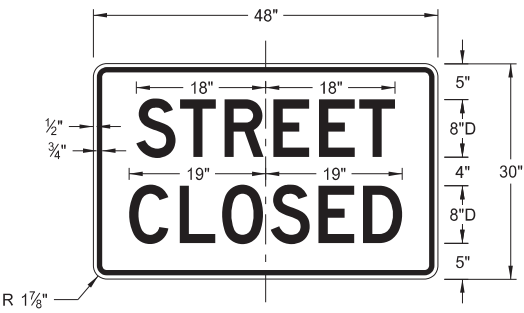
R11-3c-60
Legend: black (non-refl)
Background: white



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



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

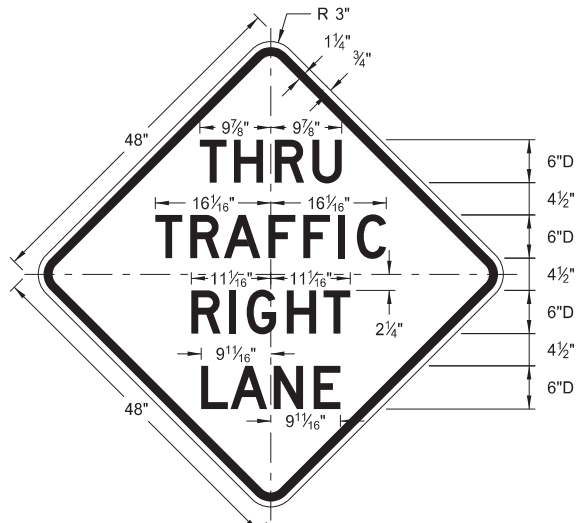


R11-2a-48
Legend: black (non-refl)
Background: white

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

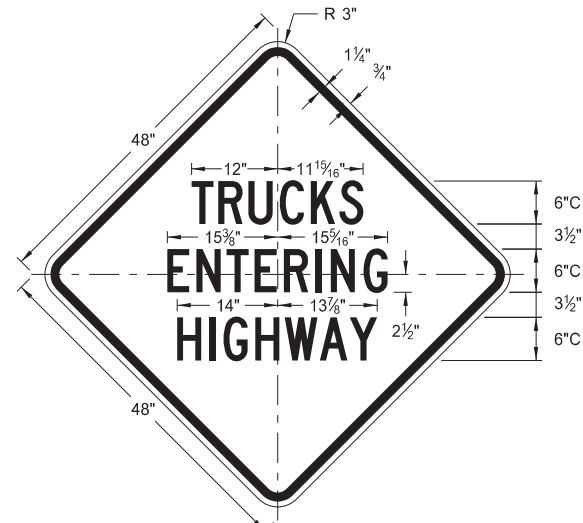
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of Transportation

CONSTRUCTION SIGN DETAILS
WARNING SIGNS



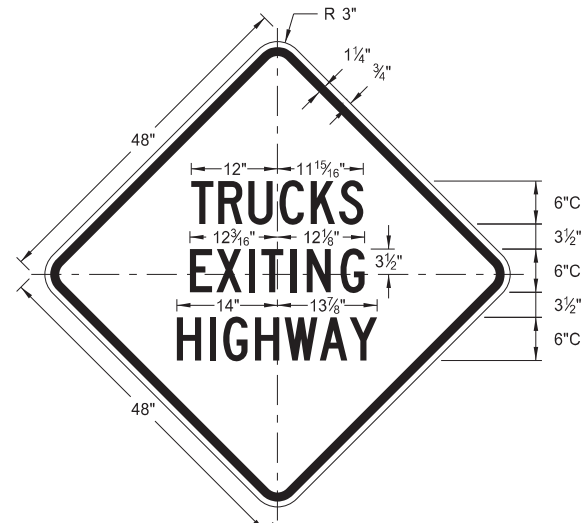
W5-8-48

Legend: black (non-refl)
Background: orange



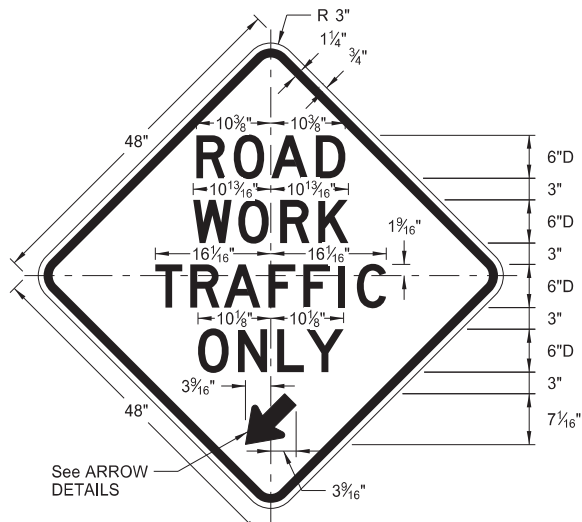
W8-53-48

Legend: black (non-refl)
Background: orange



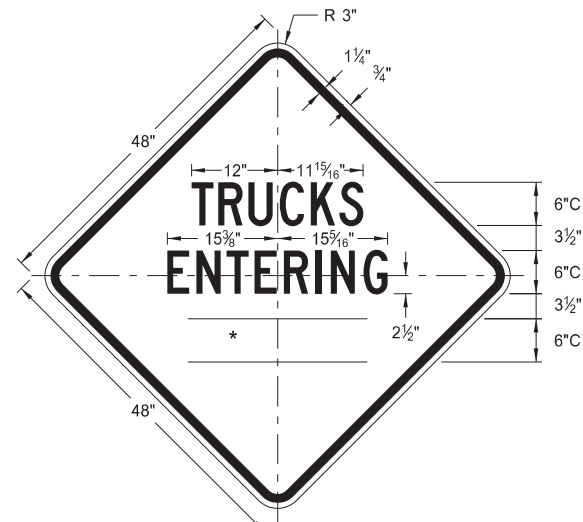
W8-56-48

Legend: black (non-refl)
Background: orange



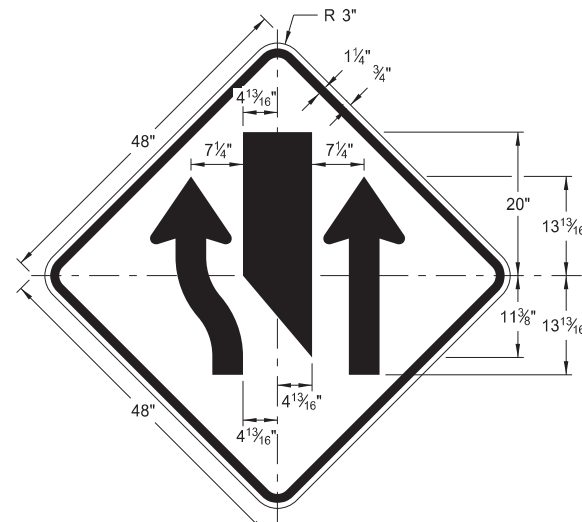
W5-9-48

Legend: black (non-refl)
Background: orange



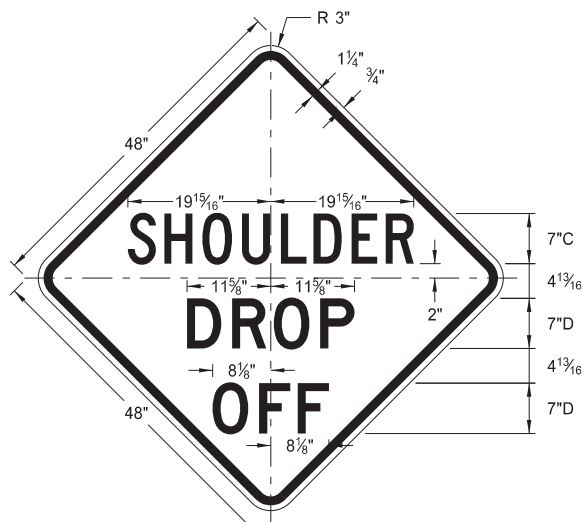
W8-54-48

Legend: black (non-refl)
Background: orange



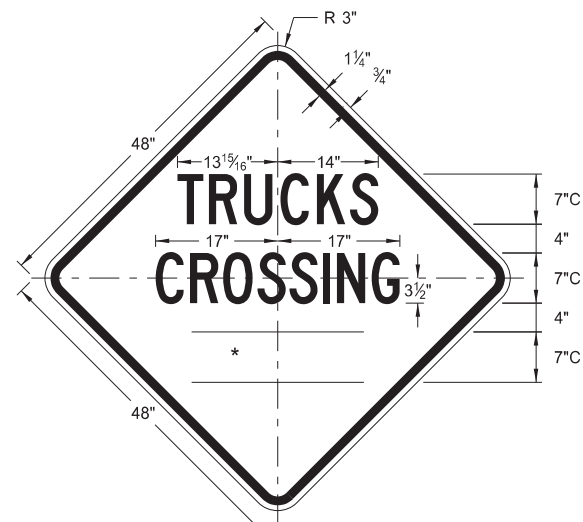
W9-3a-48

Legend: black (non-refl)
Background: orange



W8-9a-48

Legend: black (non-refl)
Background: orange

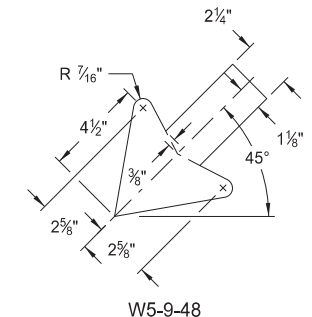


W8-55-48

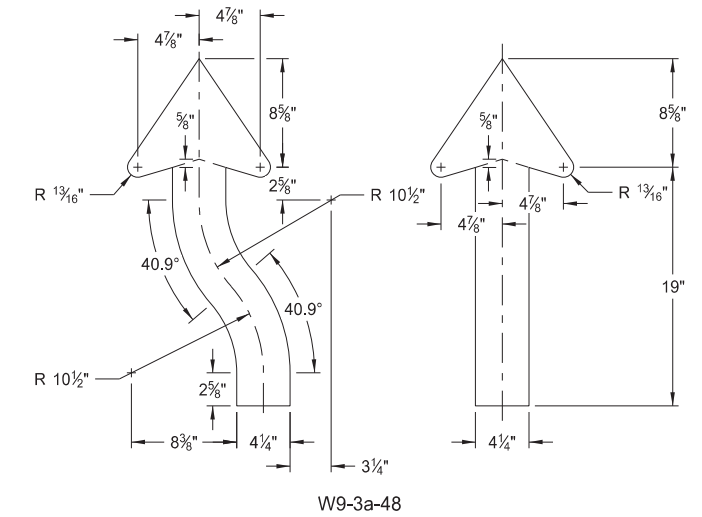
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



W9-3a-48

ARROW DETAILS

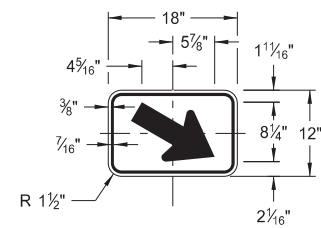
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

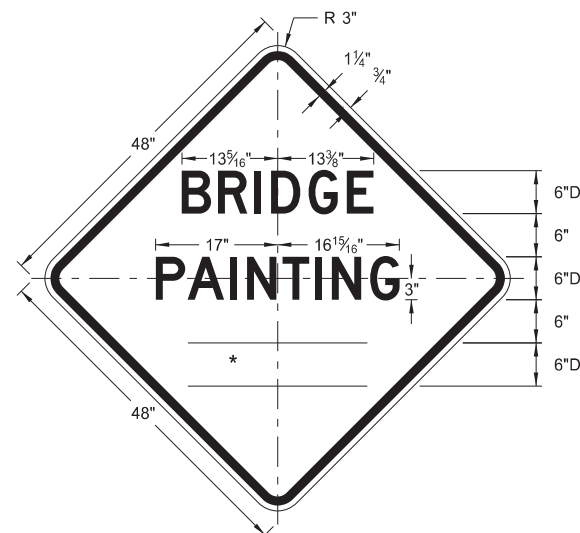
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES



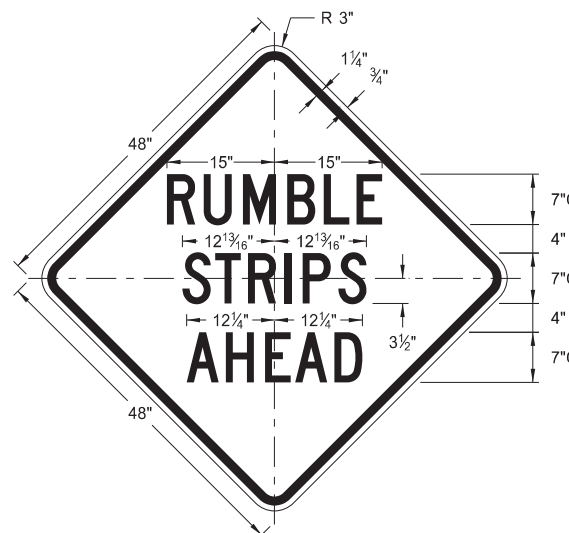
W16-7aP-18

Legend: black (non-refl)
Background: orange



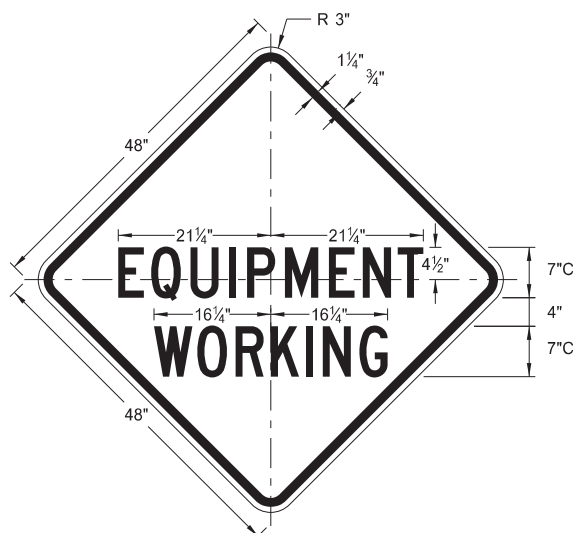
W21-50-48

Legend: black (non-refl)
Background: orange



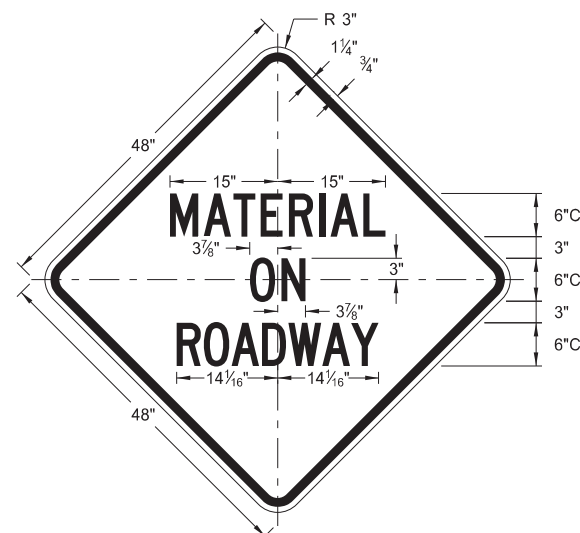
W21-53-48

Legend: black (non-refl)
Background: orange



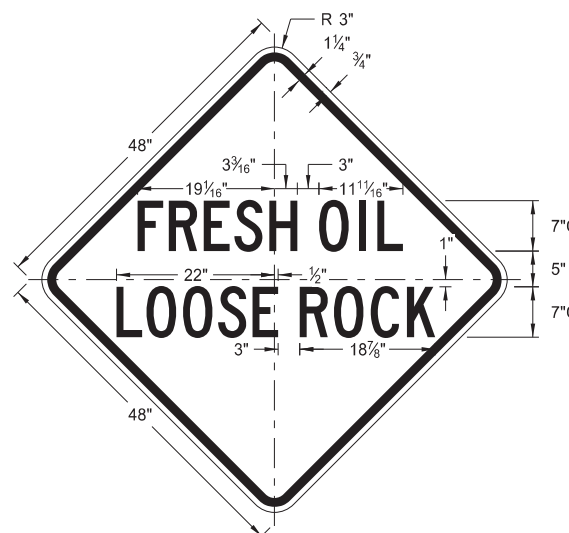
W20-51-48

Legend: black (non-refl)
Background: orange



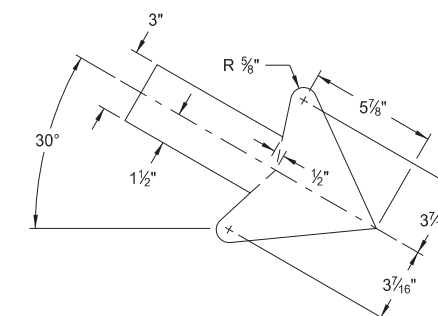
W21-51-48

Legend: black (non-refl)
Background: orange

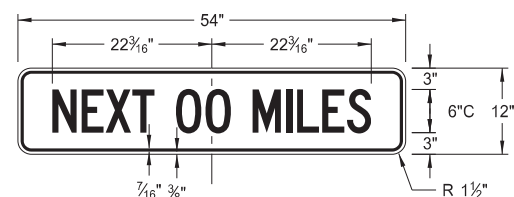


W22-8-48

Legend: black (non-refl)
Background: orange

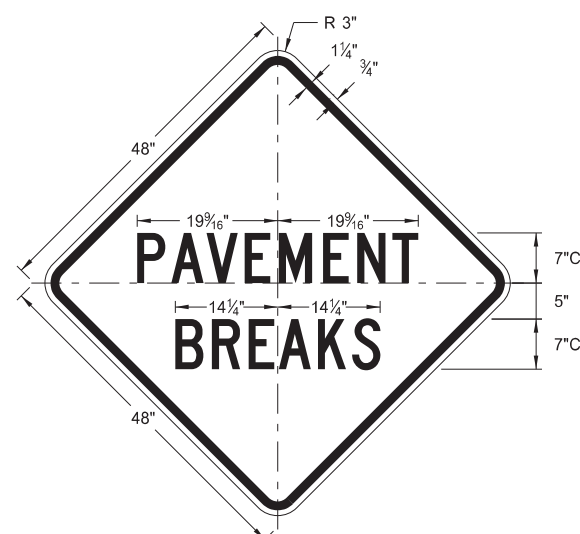


W16-7aP-18



W20-52P-54

Legend: black (non-refl)
Background: orange



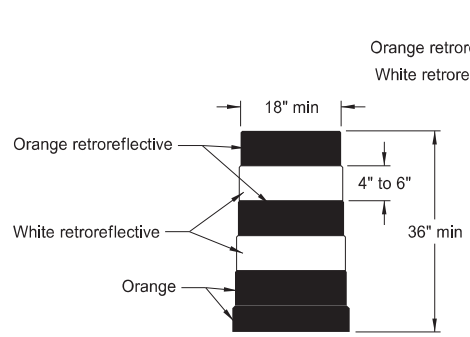
W21-52-48

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.

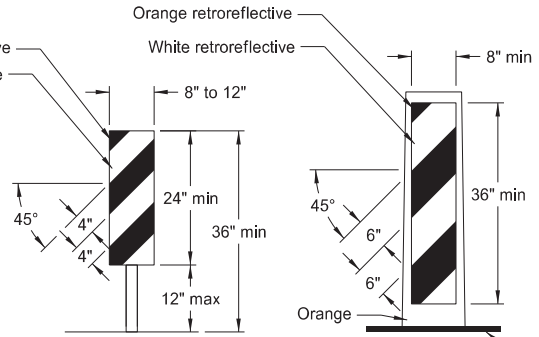
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BARRICADE AND CHANNELIZING DEVICE DETAILS



DELINEATOR DRUM

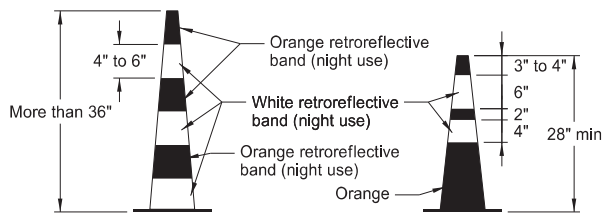
Provide horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide for drum markings. Use a minimum of two orange and two white stripes with the top stripe being orange for each drum. Do not exceed 3" nonretroreflectORIZED spaces between the horizontal orange and 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.



BACK TO BACK VERTICAL PANEL STACKABLE

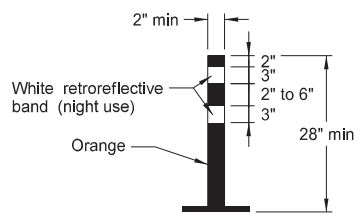
Provide alternating orange and white retroreflective stripes, sloping downward in direction vehicular traffic is to pass. Place retroreflective sheeting on both sides of panel with a minimum of 270 square inches of retroreflective area facing vehicular traffic. Where the height of the retroreflective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

Molded rubber base (min weight 30 lbs)



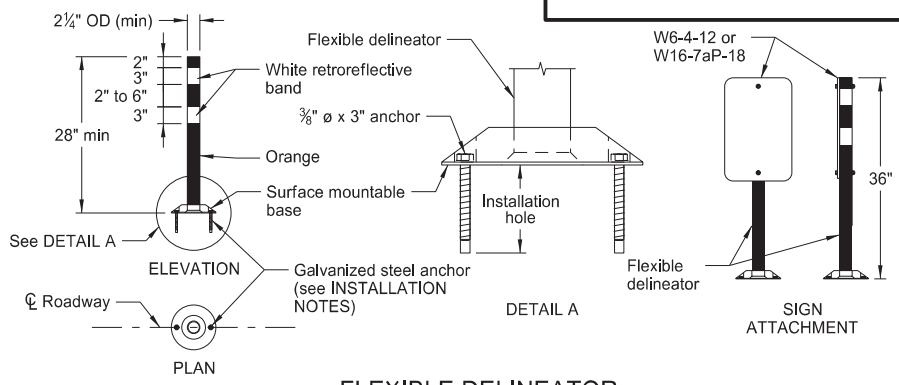
TRAFFIC CONE

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

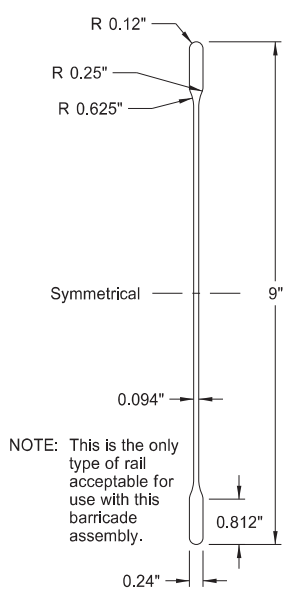
Provide retroreflectORIZATION of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

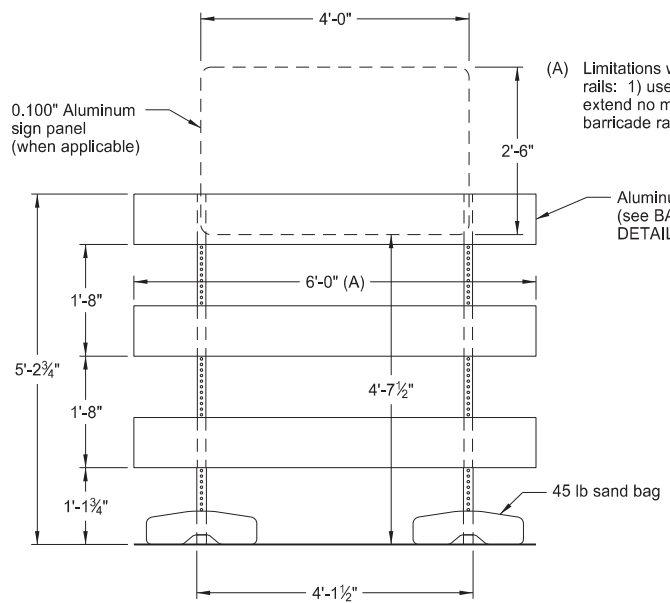
INSTALLATION NOTES:

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.

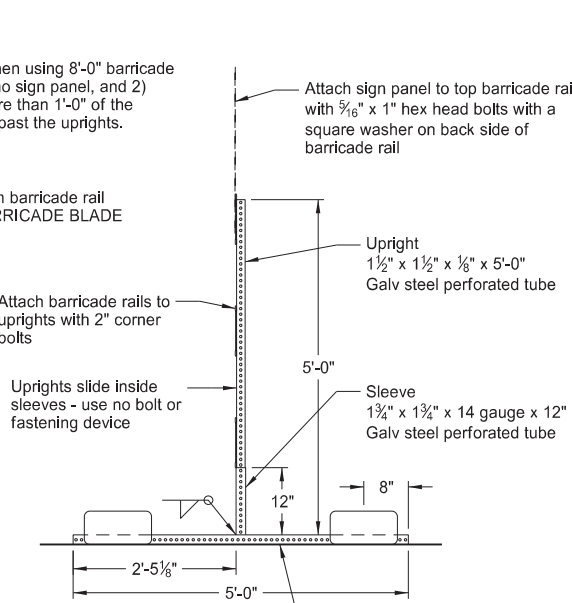


BARRICADE BLADE DETAIL

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



ELEVATION VIEW BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)



SIDE VIEW

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.

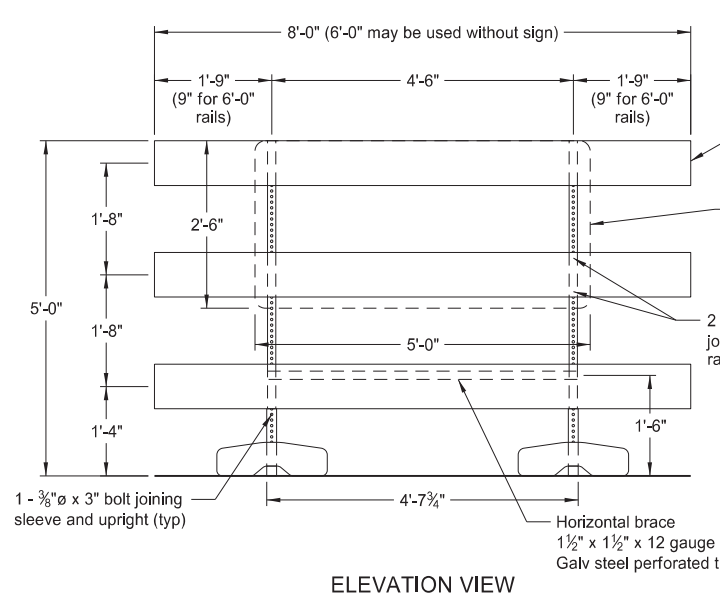
Attach sign panel to top barricade rail with 3/16" x 1" hex head bolts with a square washer on back side of barricade rail

Attach barricade rails to uprights with 2" corner bolts

Uprights slide inside sleeves - use no bolt or fastening device

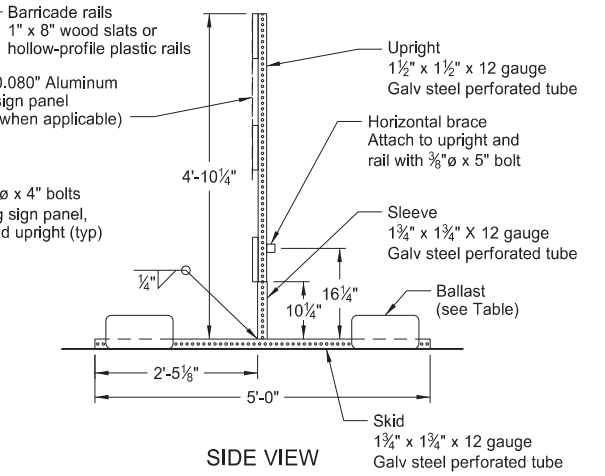
Attach barricade rails to uprights with 2" corner bolts

Uprights slide inside sleeves - use no bolt or fastening device



ELEVATION VIEW

BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)



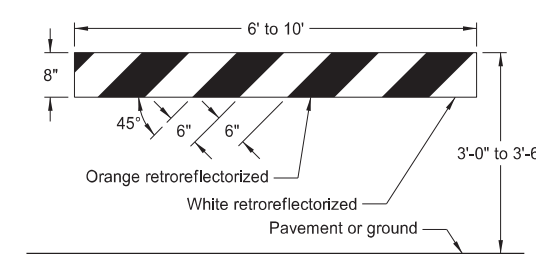
SIDE VIEW

MINIMUM BALLAST (For each side of barricade support)

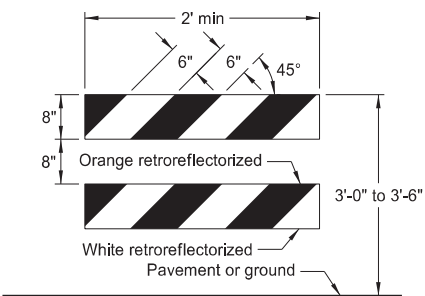
Without Sign	4 - 25 lb sandbags
With Sign	6 - 25 lb sandbags

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.

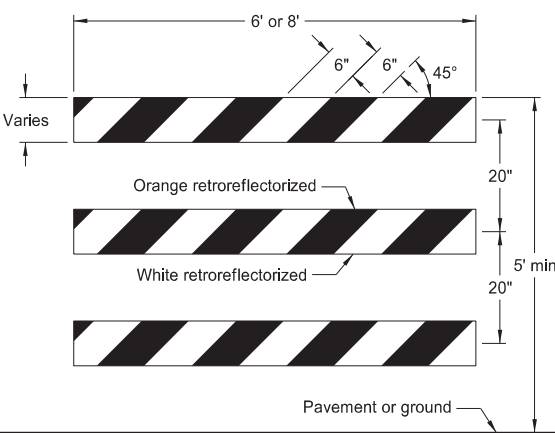
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

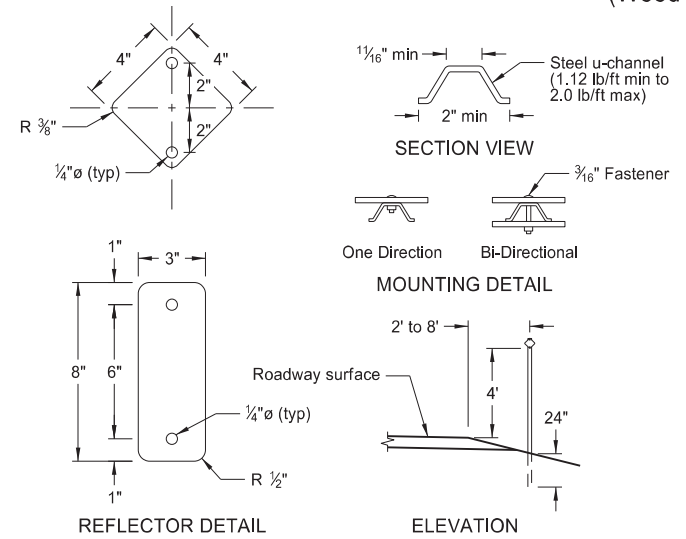


TYPE II BARRICADE



TYPE III BARRICADE

BARRICADE RAIL DETAILS



REFLECTOR DETAIL

ELEVATION

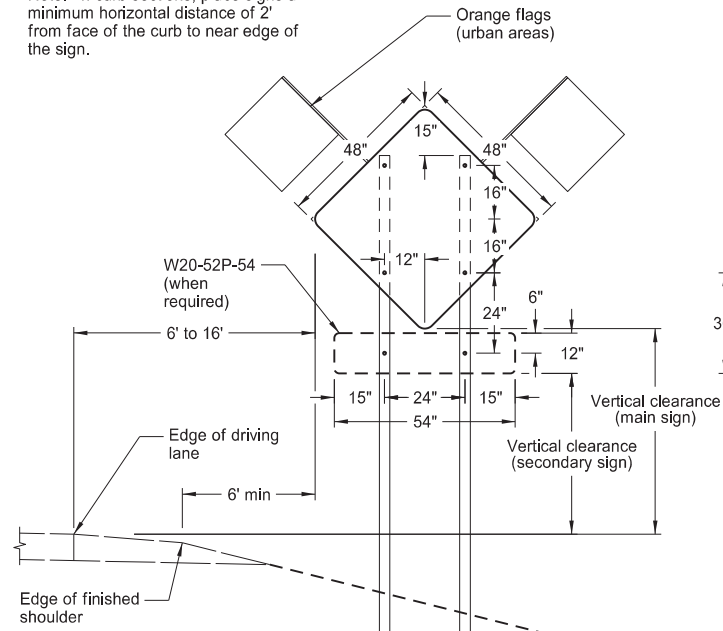
DELINEATORS

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	Revised details for Flexible Delineator

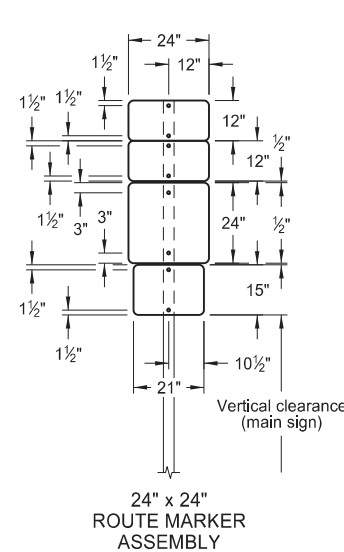
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CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

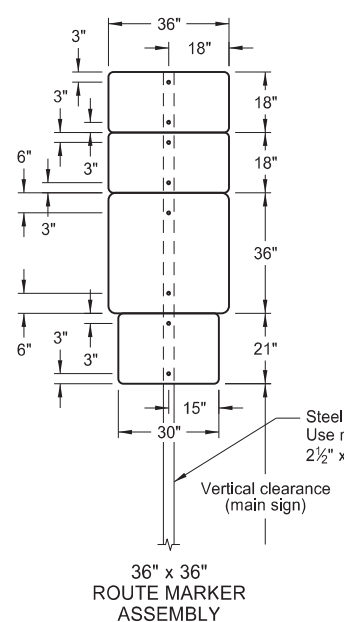
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



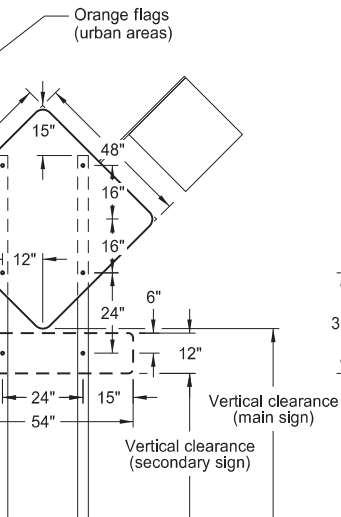
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



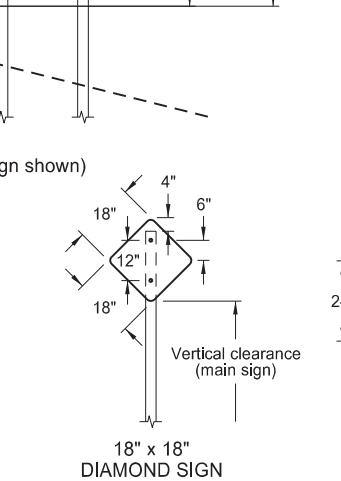
24" x 24" ROUTE MARKER ASSEMBLY



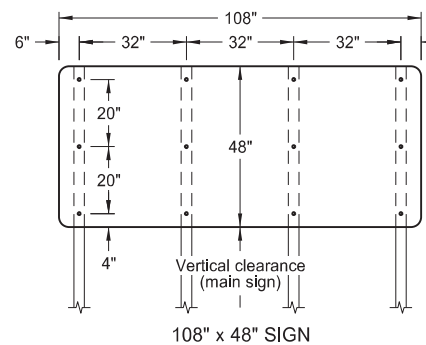
36" x 36" ROUTE MARKER ASSEMBLY



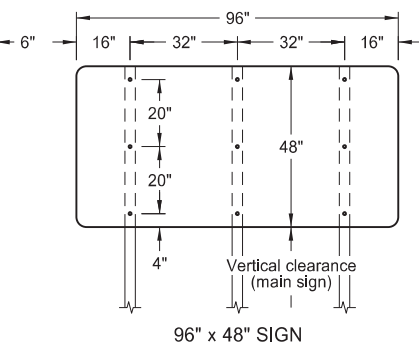
18" x 18" DIAMOND SIGN



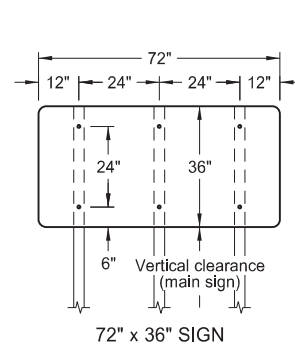
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



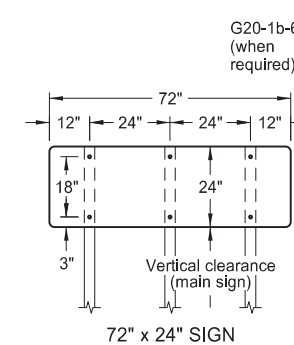
108" x 48" SIGN



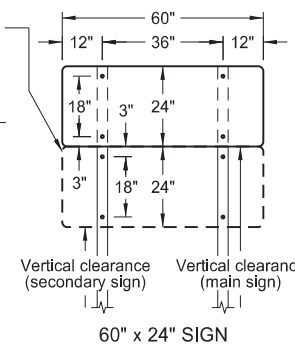
96" x 48" SIGN



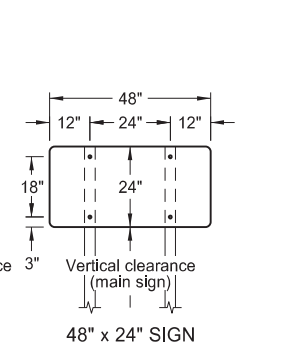
72" x 36" SIGN



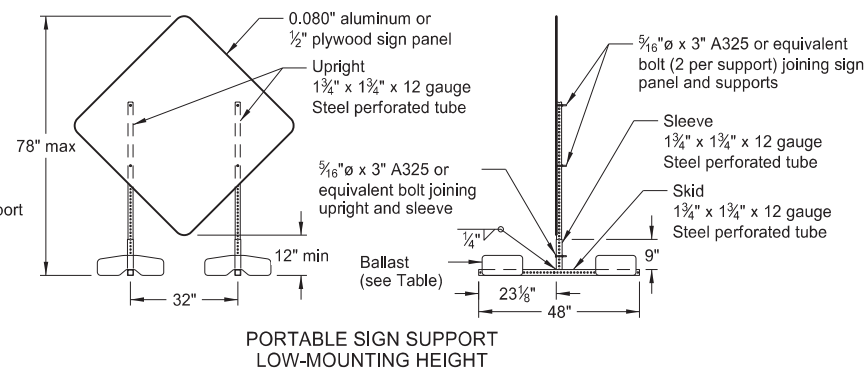
72" x 24" SIGN



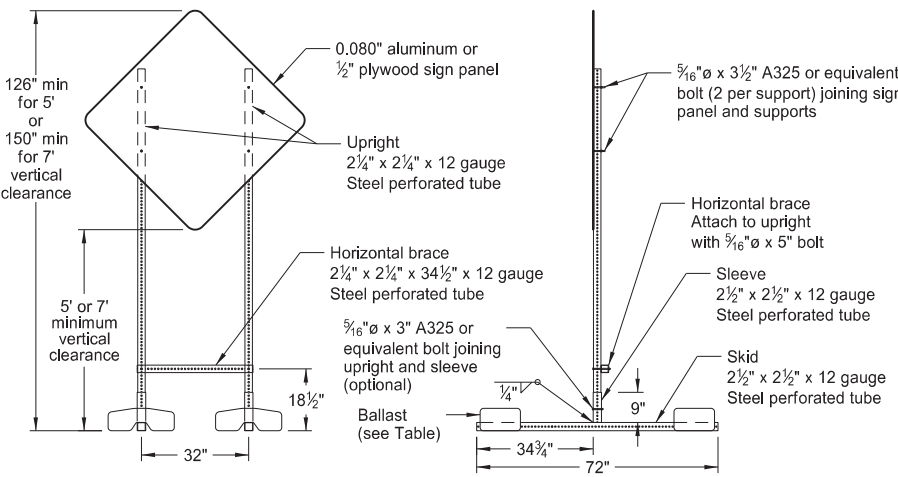
60" x 24" SIGN



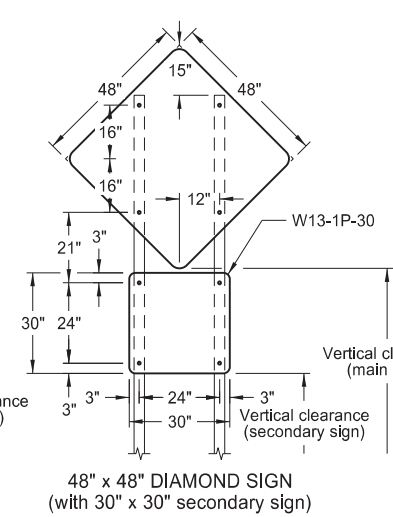
48" x 24" SIGN



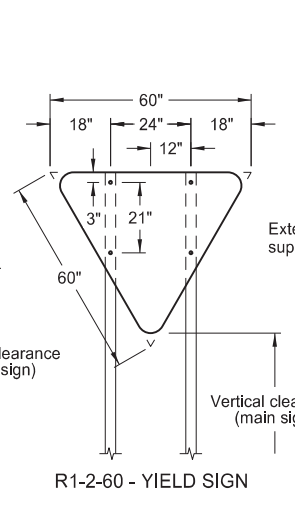
PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



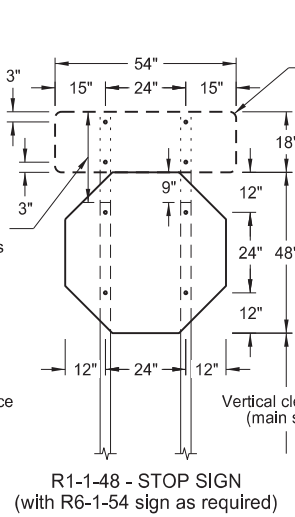
PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT



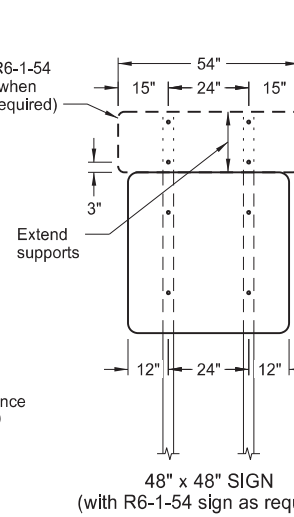
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



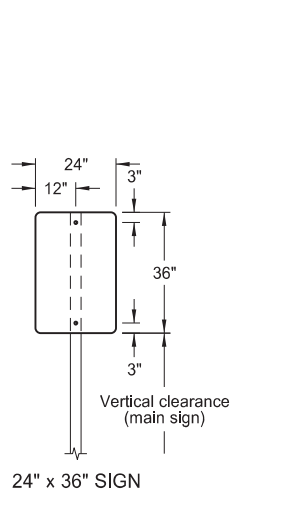
R1-2-60 - YIELD SIGN



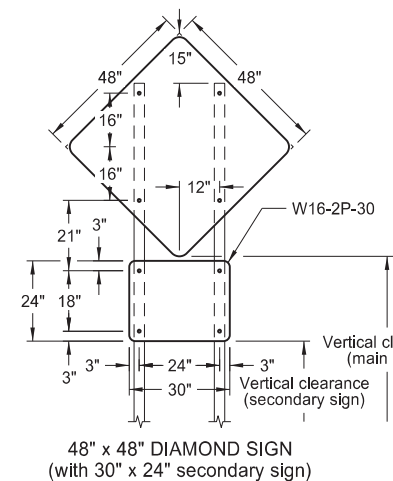
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



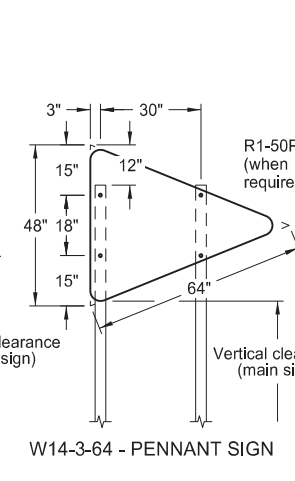
48" x 48" SIGN
(with R6-1-54 sign as required)



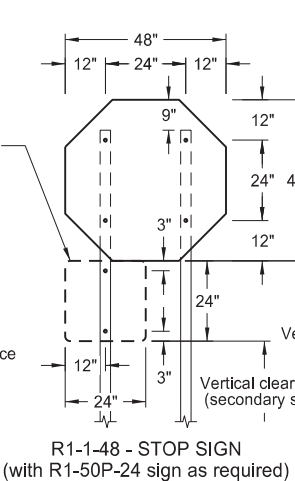
24" x 36" SIGN



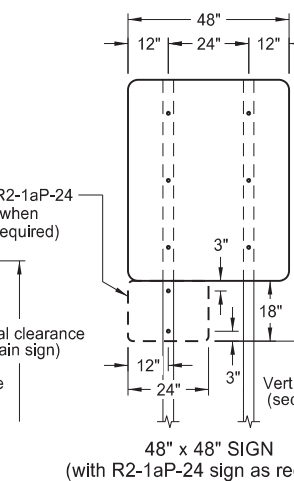
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



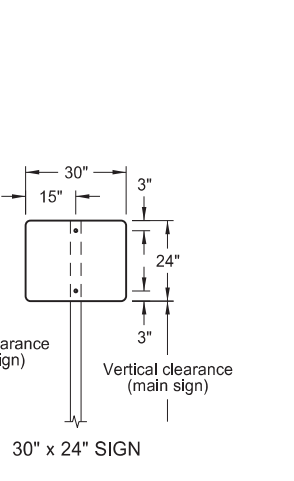
W14-3-64 - PENNANT SIGN



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

NOTES:

- 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 2 1/2" x 2 1/2" 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.
- Sign Panels: Provide sign panels made of 0.100" aluminum, 1/2" plywood, or other approved material, except where noted. Punch all holes round for 5/16" bolts.
- 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)
- 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 unforeseen 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

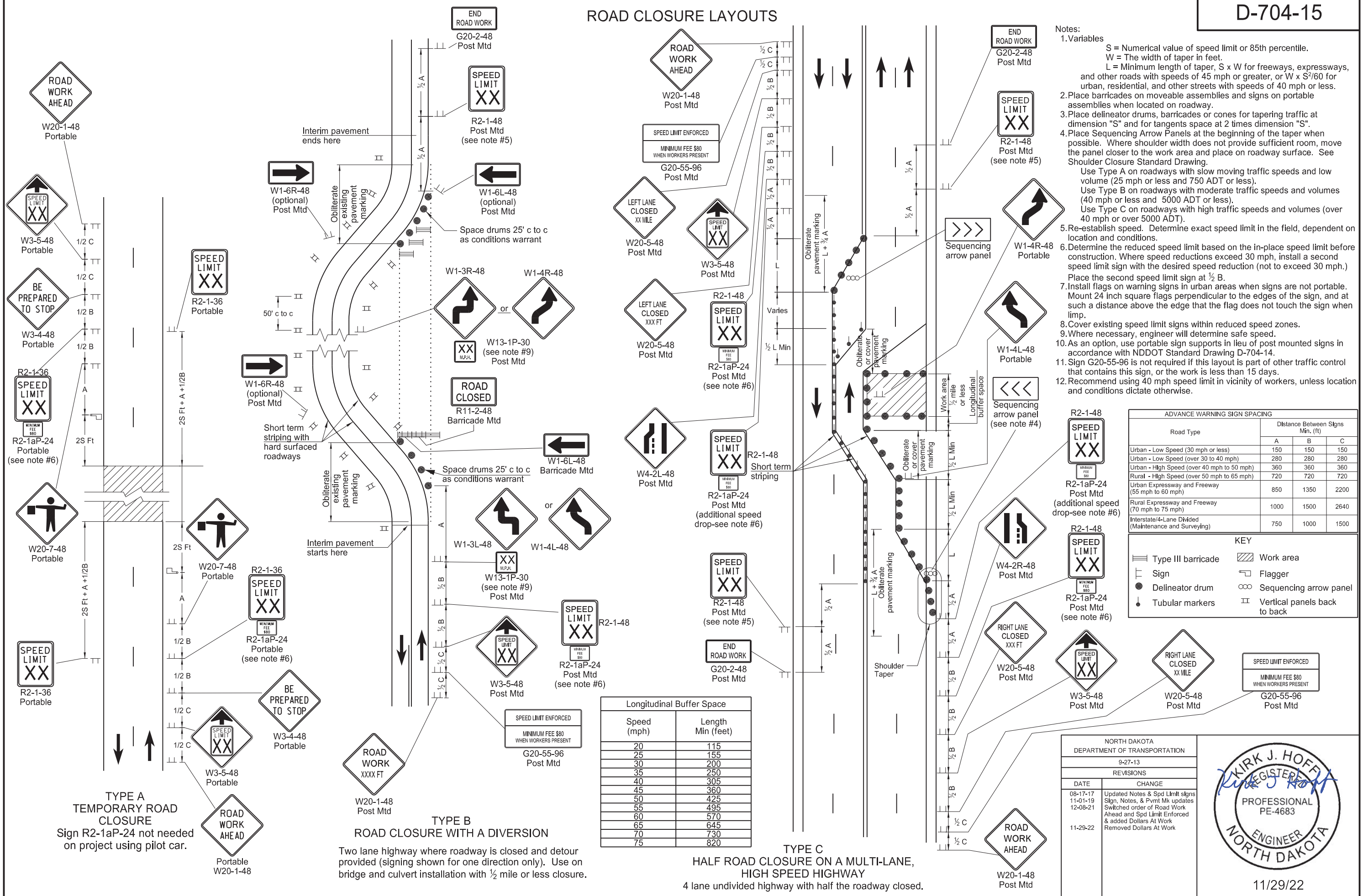
ROAD CLOSURE LAYOUTS

Notes:

- 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 S²/60 for urban, residential, and other streets with speeds of 40 mph or less.
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
- Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
- 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).
- Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
- 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 1/2 B.
- 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.
- Cover existing speed limit signs within reduced speed zones.
- Where necessary, engineer will determine safe speed.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- 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.
- Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

Road Type	ADVANCE WARNING SIGN SPACING		
	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		Work area
	Sign		Flagger
	Delineator drum		Sequencing arrow panel
	Tubular markers		Vertical panels back to back



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

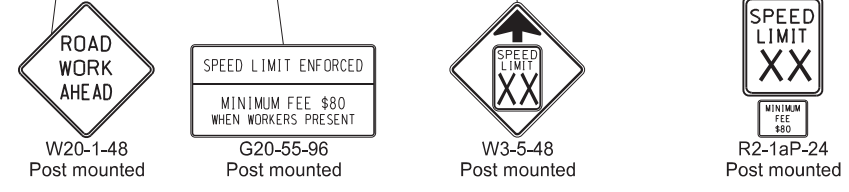
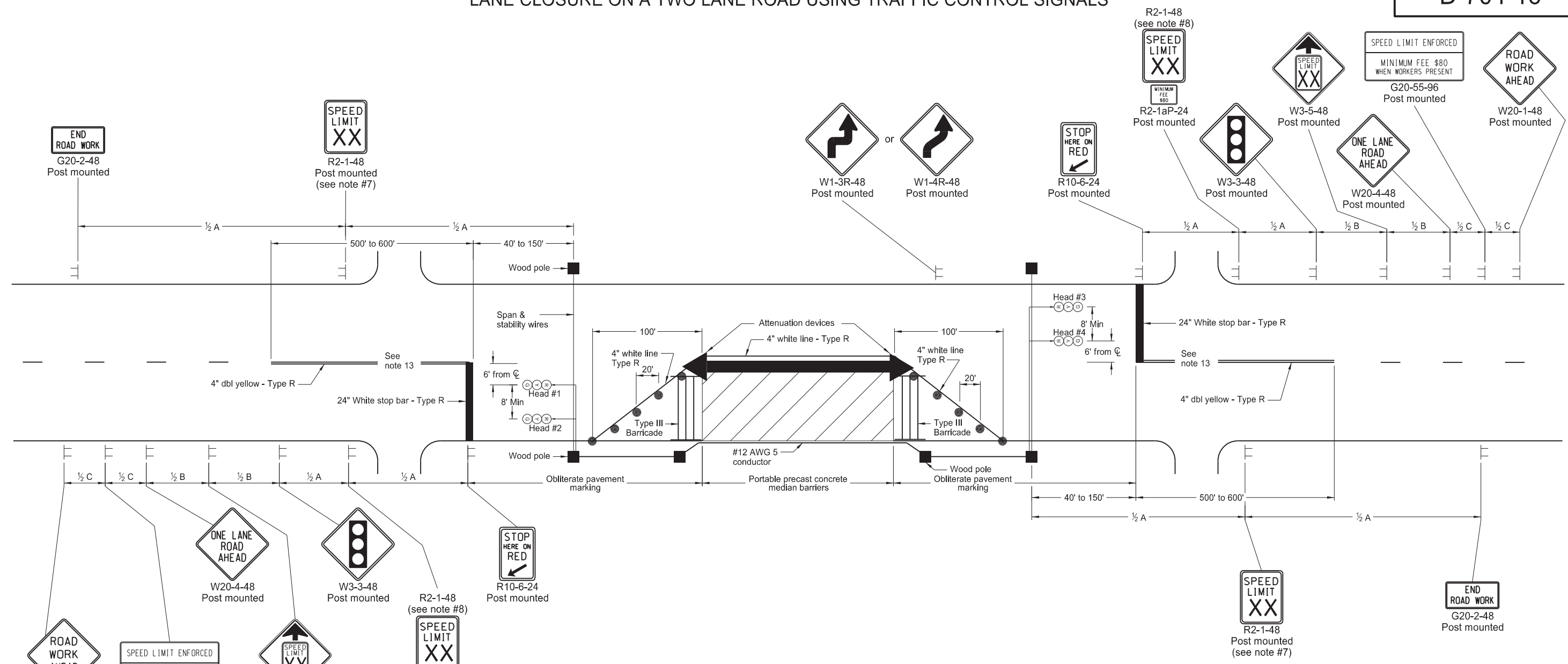
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated Notes & Spd Limit signs
11-01-19	Sign, Notes, & Pmnt Mk updates
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



11/29/22

LANE CLOSURE ON A TWO LANE ROAD USING TRAFFIC CONTROL SIGNALS

D-704-16



KEY	
	Work Area
	Type III Barricade
	Sign
	Delineator Drum
	Wood Pole

Notes:

1. Span conductor overhead between poles except on bridges, where it may alternately be attached and supported by the bridge structure. When conductor is supported by the bridge structure, attach conductor to avoid interference with bridge construction. Attach conductor on either side of bridge as determined by field personnel.
2. Locate controller on a wood pole in the cable run between signal heads for through traffic movements.
3. The timing schedule is suggested trial setting. Check signals in operation frequently to obtain the most efficient timing schedule.
4. Place wood poles a minimum of 16 feet from edge of driving lane. Provide a minimum 16 to 19 feet clearance from the center line of the roadway to the bottom of traffic signal heads suspended over the roadway.
5. Place traffic signal heads with 12 inch red, yellow and green lenses and 5 inch louvered backplates.
6. See standard drawing "Span Wire Mounted Traffic Signals" for interim traffic construction details.
7. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
8. 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 1/2 B. and at such a distance above the edge that the flag does not touch the sign when limp.
9. 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.
10. Cover existing speed limit signs within a reduced speed zone.
11. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
13. Continue double yellow centerline thru private drives.
14. Sign G20-55-96 is not required this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
15. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
16. As an option, use solar powered signals instead of wood pole signal system.

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

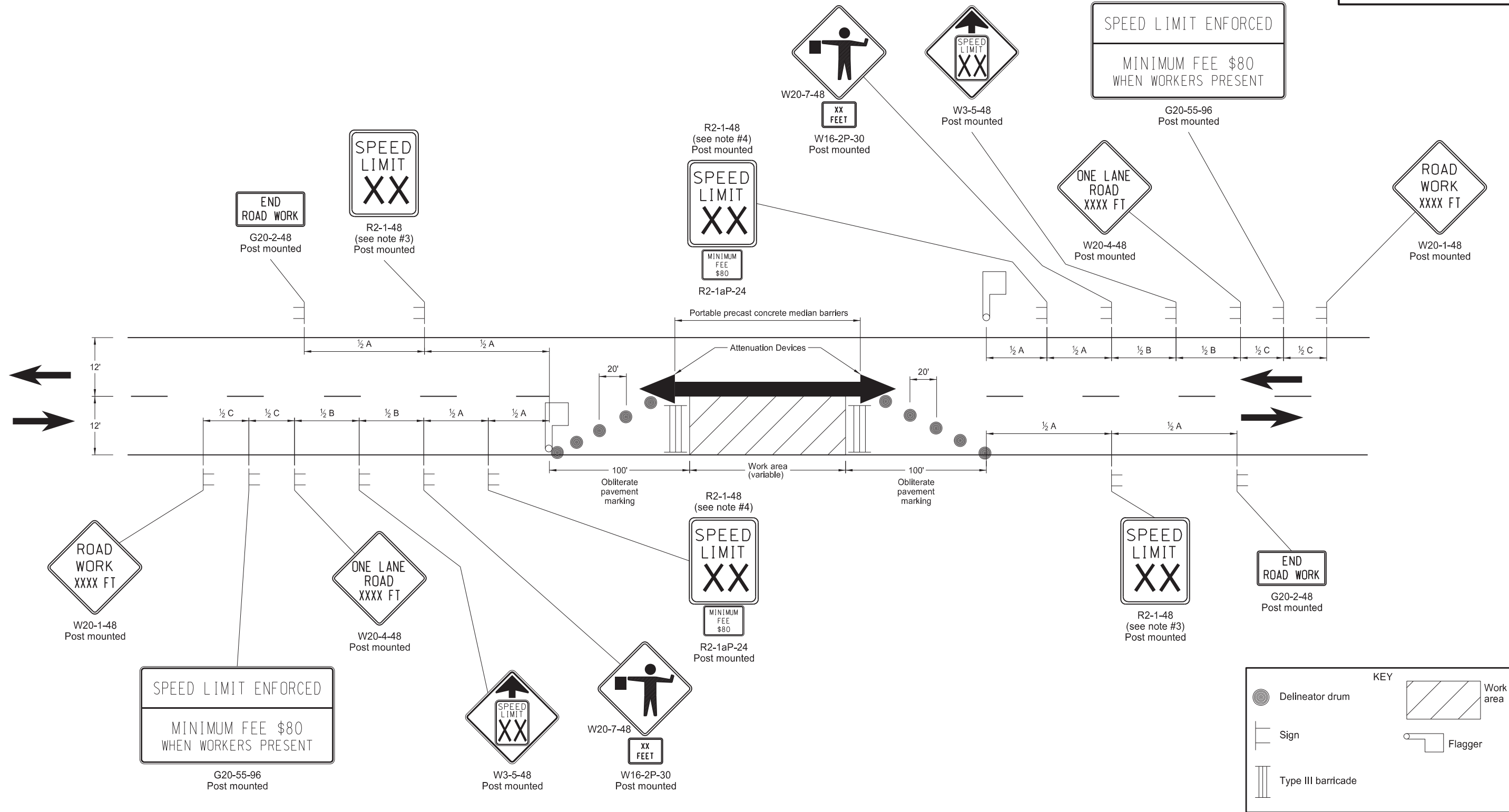
SUGGESTED TIMING AND SIGNAL SEQUENCE						
Heads 1 & 2	Green	Yellow	Red			
			Green	Yellow	Red	
Heads 3 & 4						
Time	18.0	4.5	22.5	18.0	4.5	22.5
Cycle = 90 seconds						
Percent of Cycle	20	5	25	20	5	25

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
11-20-15	Revised Note 6 & Renumbered Minimum Fee plaque
08-17-17	Revised notes & added note
11-01-19	Revised sign #s & pvtmt mk type
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

11/29/22

SIGN LAYOUT FOR ONE LANE CLOSURE TWO LANE ROADWAY

D-704-17



Notes:

1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Remove existing striping as required. Use back to back delineators when inslope is 4:1 or flatter and roadway alignment is visible to approaching vehicles. Place back to back vertical panels when roadways have steep slopes and alignment is not visible to approaching traffic.
3. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
4. 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 1/2 B.
5. 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.
6. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
7. Cover existing speed limit signs within a reduced speed zone.
8. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or if work is less than 15 days.
9. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Note update & sign numbers
11-01-19	Removed signs & revised note
12-08-21	Switched order of Road Work XXXX and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

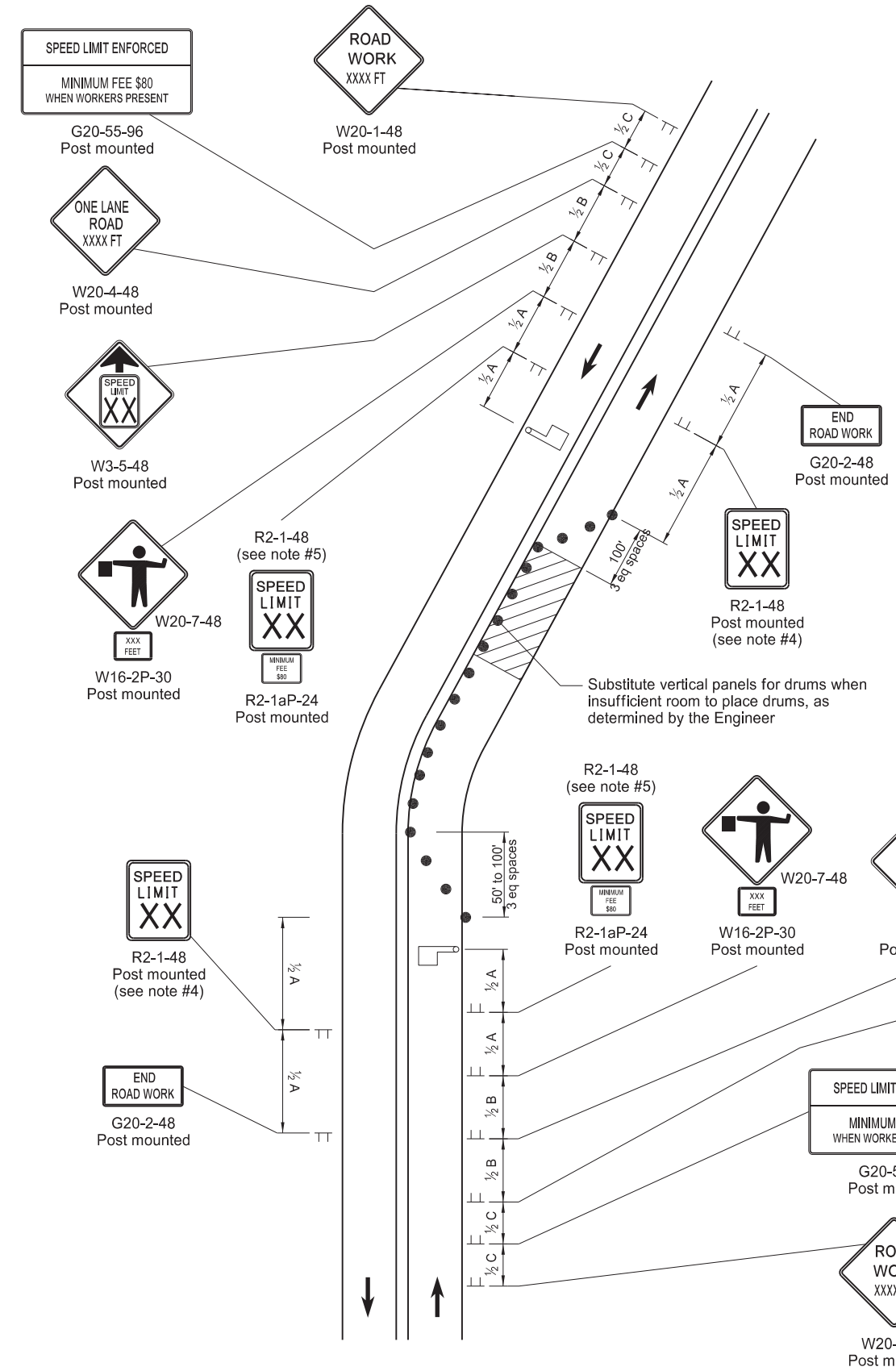
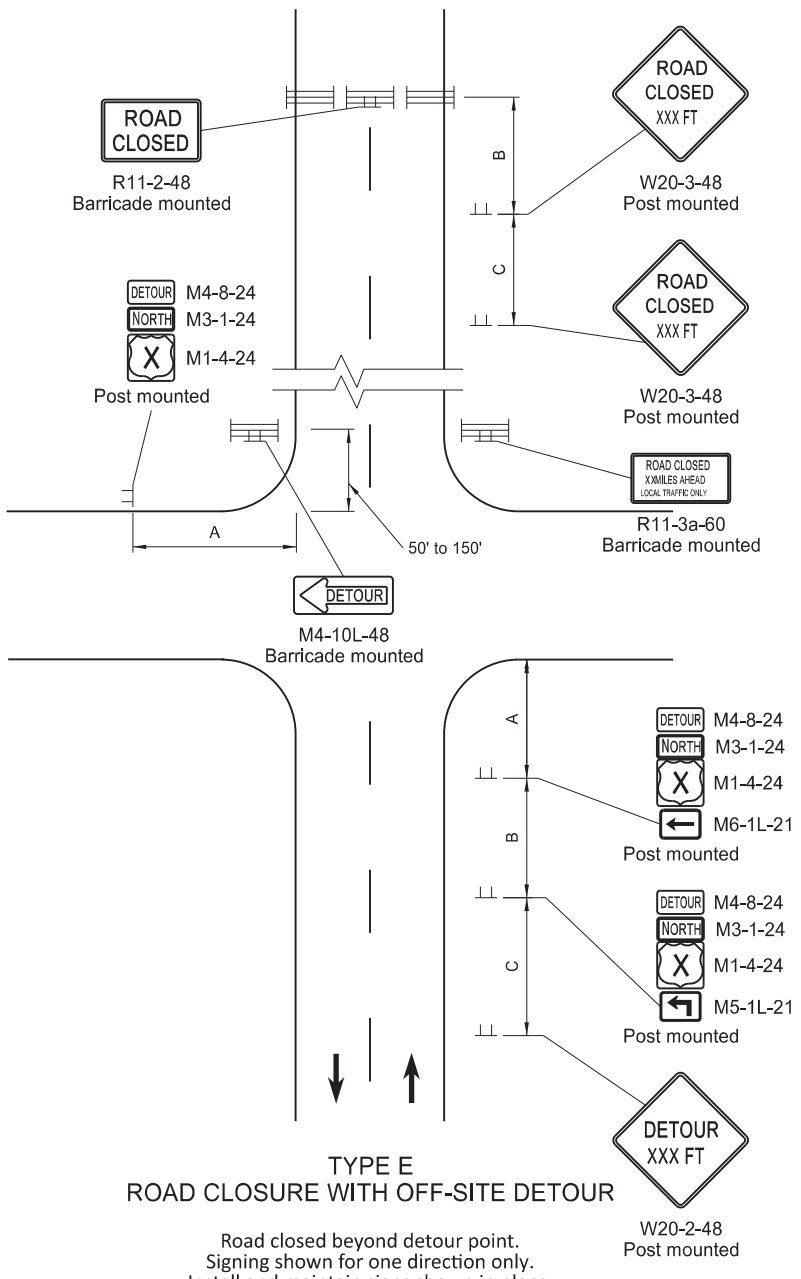


11/29/22

ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

Notes:

- Variables
 S = Numerical value of speed limit or 85th percentile.
 W = The width of taper in feet
 L = Minimum length of taper in feet. $S \times W$ for freeways, expressways, and roads with speeds of 45 mph or greater, or $W \times S^2/60$ for urban, residential, and streets with speeds of 40 mph or less.
- Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
- Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
- Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
- 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 second speed limit sign at $\frac{1}{2}B$.
- 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.
- Cover existing speed limit signs within a reduced speed zone.
- Where necessary, safe speed to be determined by the Engineer.
- As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
- Signs G20-55-96 or R2-1aP-24 are not required when pilot car operation is used, if this layout is part of other traffic control that contains this sign, or if work is less than 15 days. When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
 - Extra care shall be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing (considered as being 15 feet on either side of the closest and farthest rail.)
 - Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
 - Extend buffer space between work zone and lane closure transition upstream of the highway-rail grade crossing to prevent flagging queue from extending across highway-rail grade crossing.
 - If queuing extends across highway-rail crossing, provide flagger at crossing to prevent vehicles from stopping within the crossing (even when automatic warning devices are in place.)
- 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

KEY

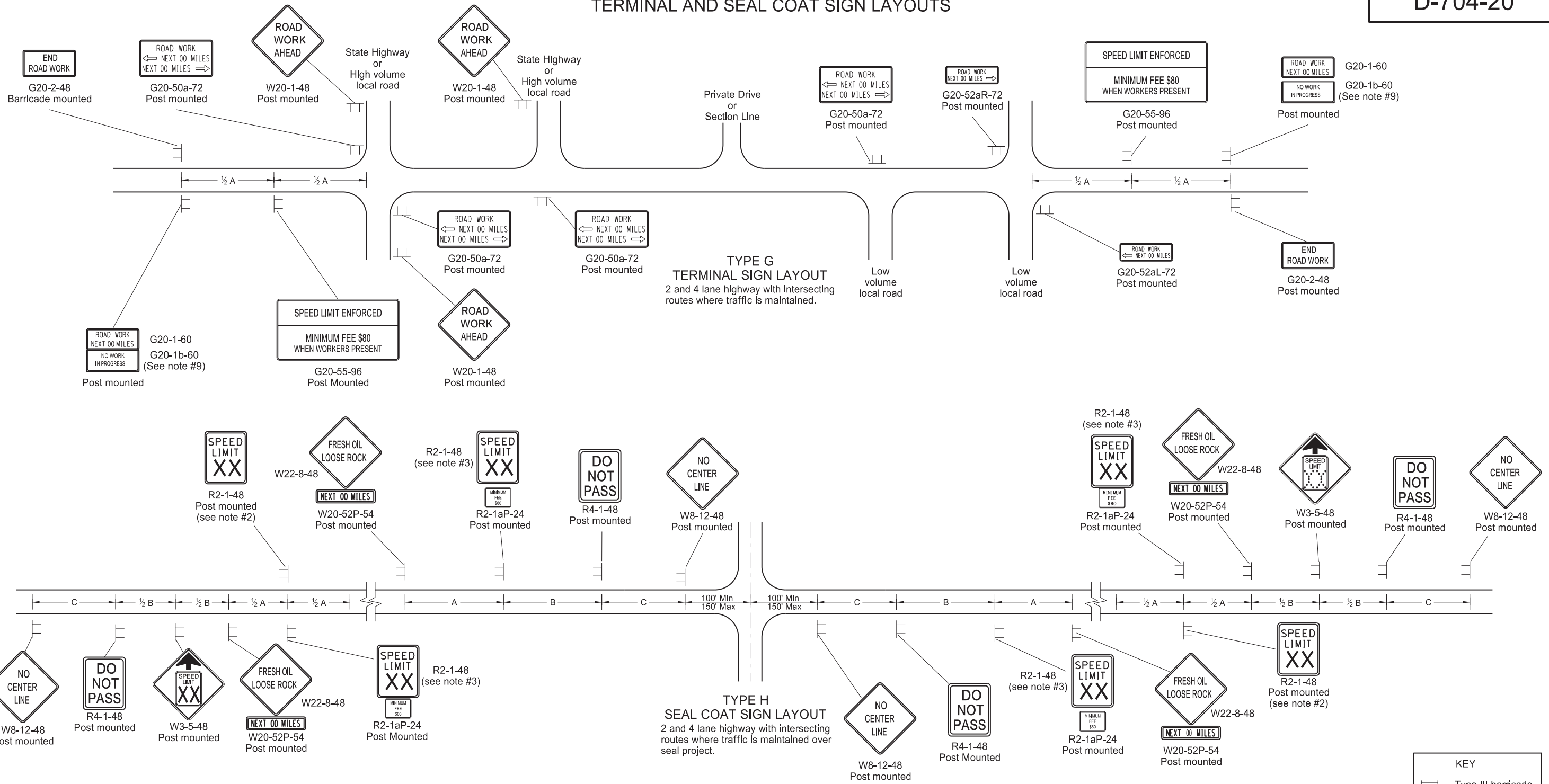
- Delineator Drum
- Sign
- Type III Barricade
- Work/Hazard Area
- Flagger

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
03-13-14	Revised Sign Cell "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work



11/29/22

TERMINAL AND SEAL COAT SIGN LAYOUTS



- Notes:
- Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
 - Determine the exact speed limit in the field, based on location and conditions.
 - Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at 1/2 B.
 - 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.
 - Cover existing speed limit signs within a reduced speed zone.
 - On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
 - Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
 - Install sign G20-1b-60 when work is suspended for winter.
 - Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
 - 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.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
08-17-17	Updated notes & sign numbers
11-01-19	Updated note & sign
12-08-21	Switched order of Road Work and Spd Limit Enforced & added Dollars At Work
11-29-22	Removed Dollars At Work

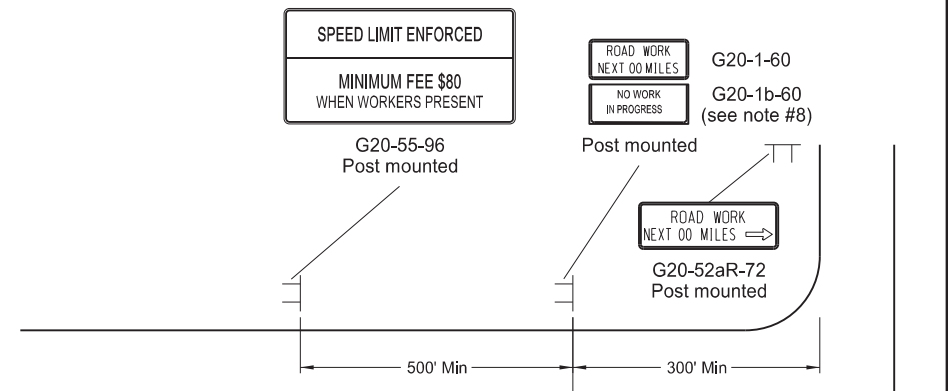
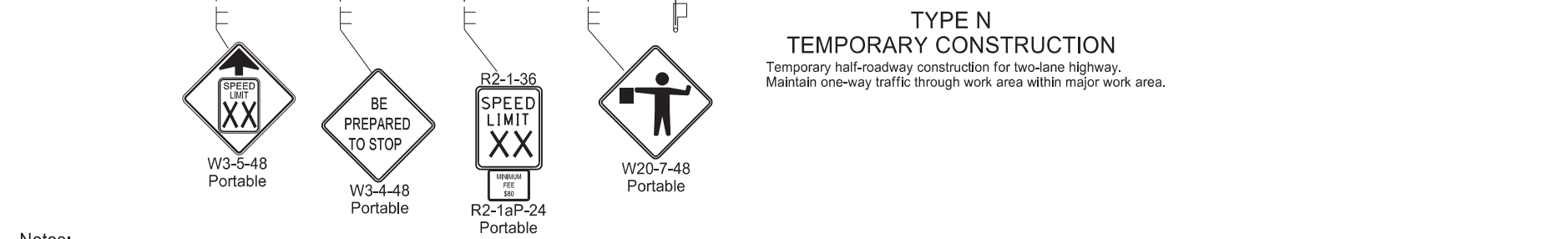
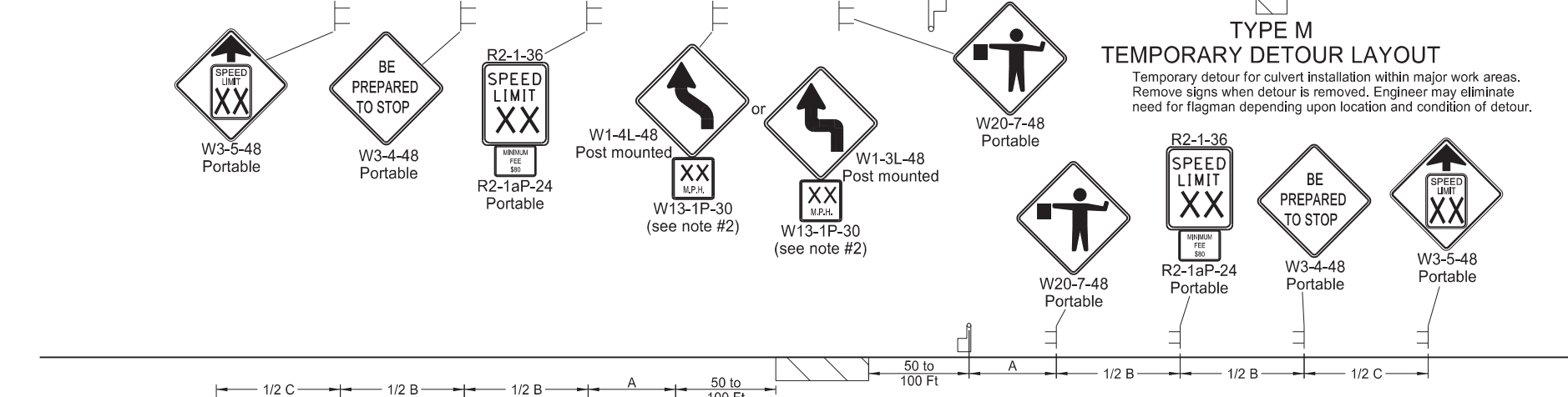
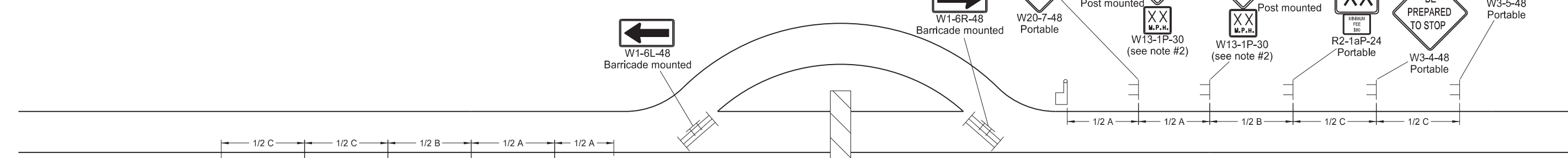
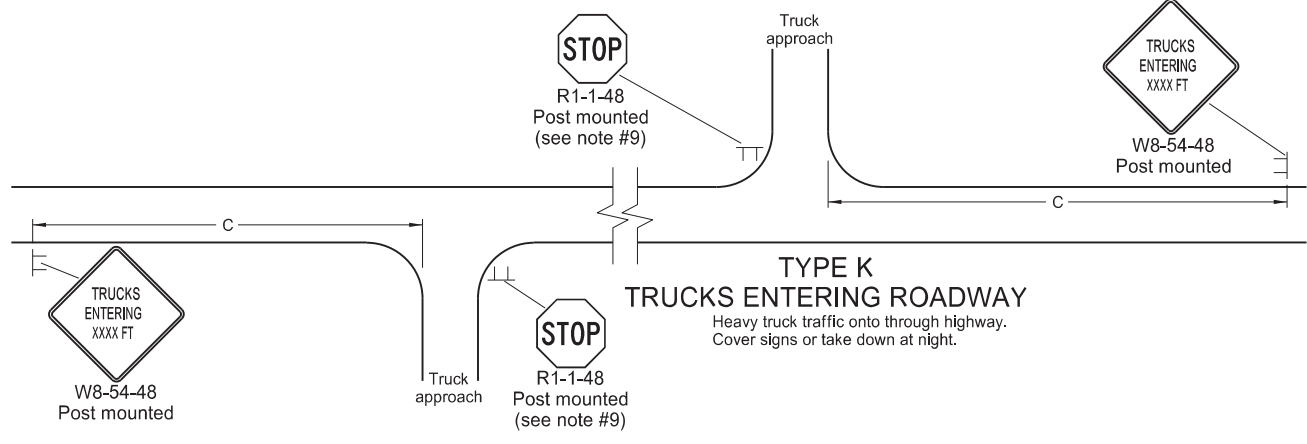


CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22

KEY

- Type III barricade
- Sign
- Work area
- Flagger



- Notes:**
- Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
 - Where necessary, safe speed to be determined by the Engineer.
 - 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 1/2 B.
 - 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.
 - Cover existing speed limit signs within a reduced speed zone.
 - Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
 - As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
 - Install sign G20-1b-60 when work is suspended for winter.
 - If existing stop sign is in place, a 48" stop sign is not required.
 - 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.
 - Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

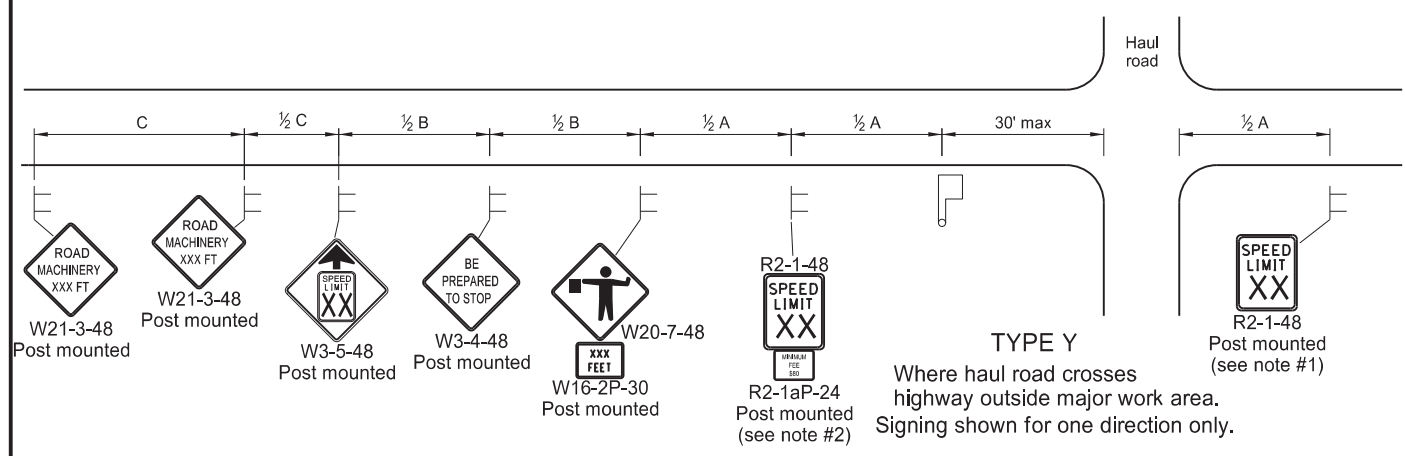
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 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

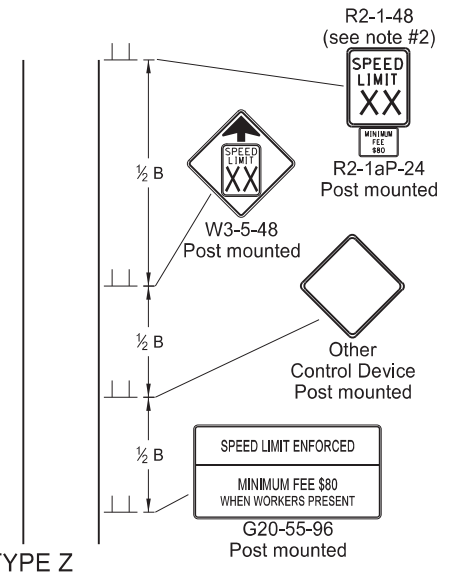


11/29/22

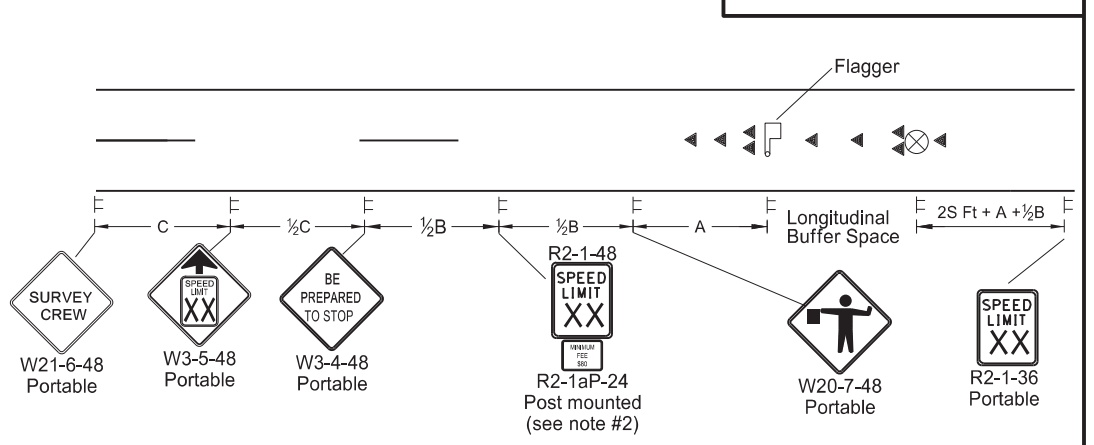
MISCELLANEOUS SIGN LAYOUTS



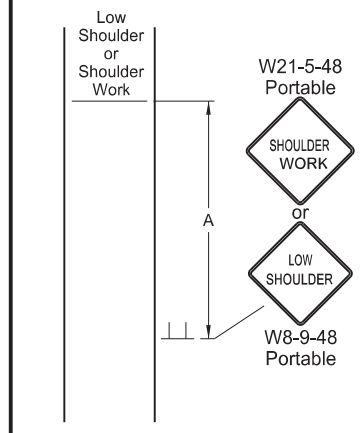
TYPE Y
Where haul road crosses highway outside major work area. Signing shown for one direction only.



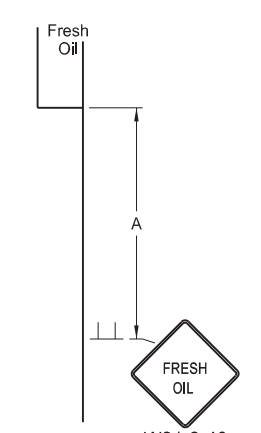
TYPE Z
Where speed zone is needed. Signing shown for one direction only.



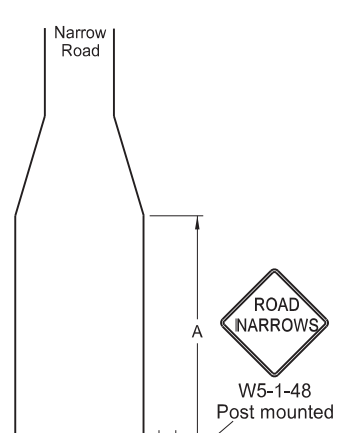
TYPE AA
Where survey crew is used. Signing shown for one direction only.



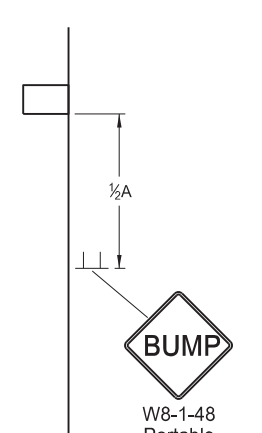
TYPE BB
Within major work area where sign conditions exist



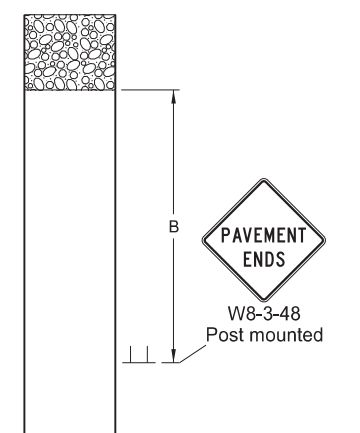
TYPE CC
Where sign conditions exist



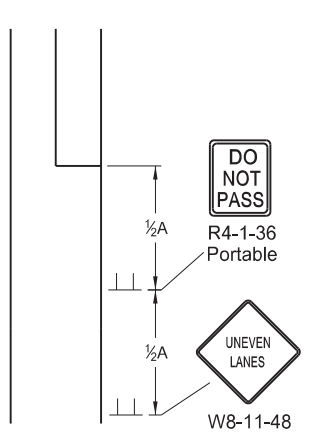
TYPE DD
Where sign conditions exist



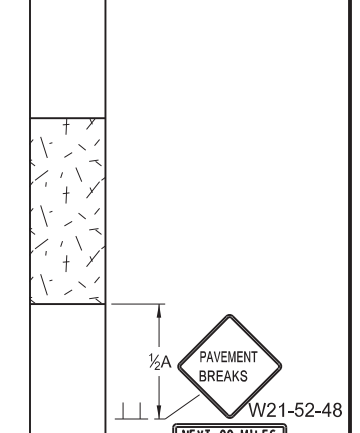
TYPE EE
Where sign conditions exist



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



TYPE GG
Where elevation difference exists between lanes

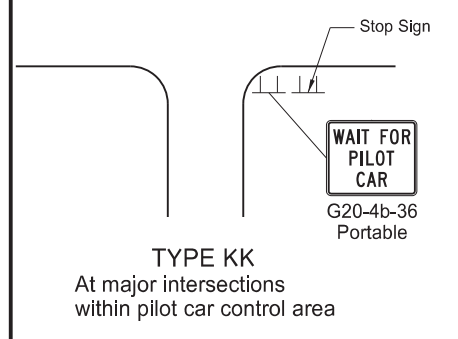


TYPE JJ
For break in pavement. Install signs when conditions exist and remove when not applicable. Signing shown for one direction only.

KEY

- ☐ Flagger
- ☐ Sign
- ▲ Cones
- ⊗ Survey Equipment

S = Numerical value of speed limit or 85th percentile.



TYPE KK
At major intersections within pilot car control area

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

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

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

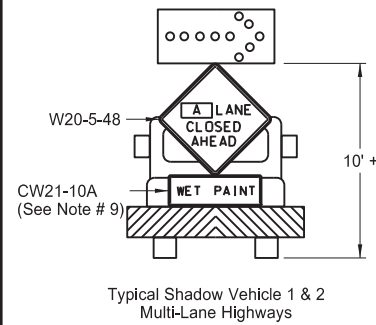
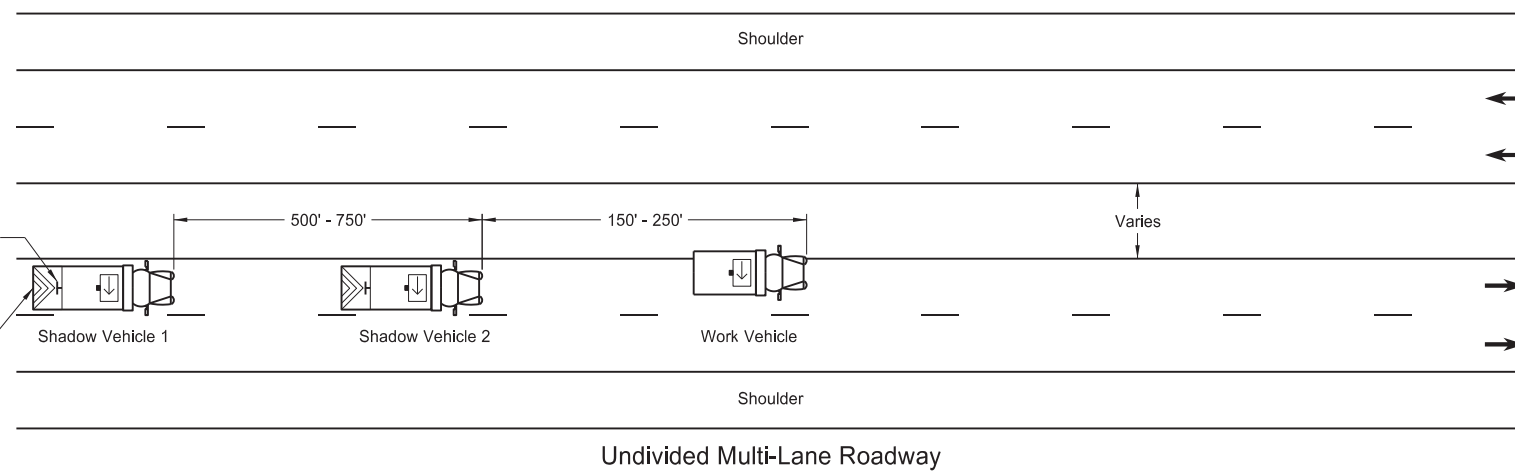
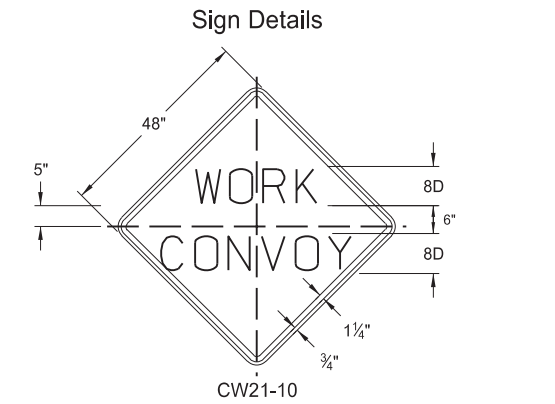
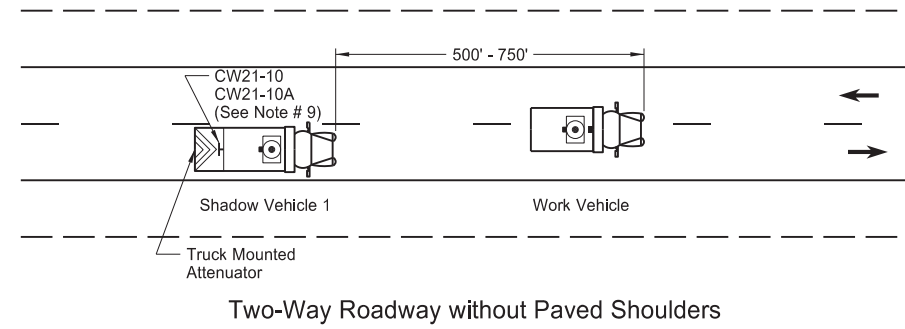
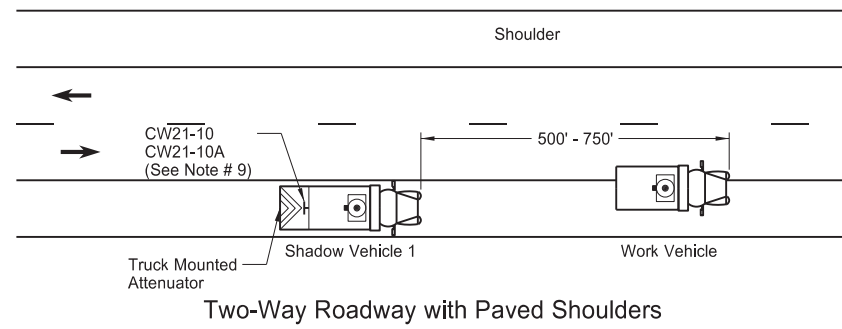
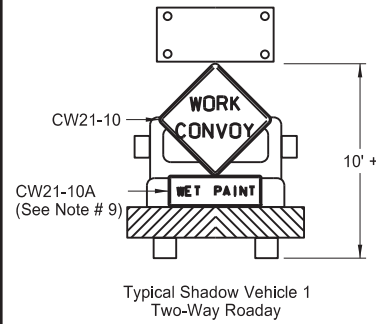
* Posted speed, off-peak 85th percentile speed prior to work starting, or the anticipated operating speed in mph.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers.
11-01-19	Revised note 5 & sign numbers.
2-23-23	Revised distance & removed signs.

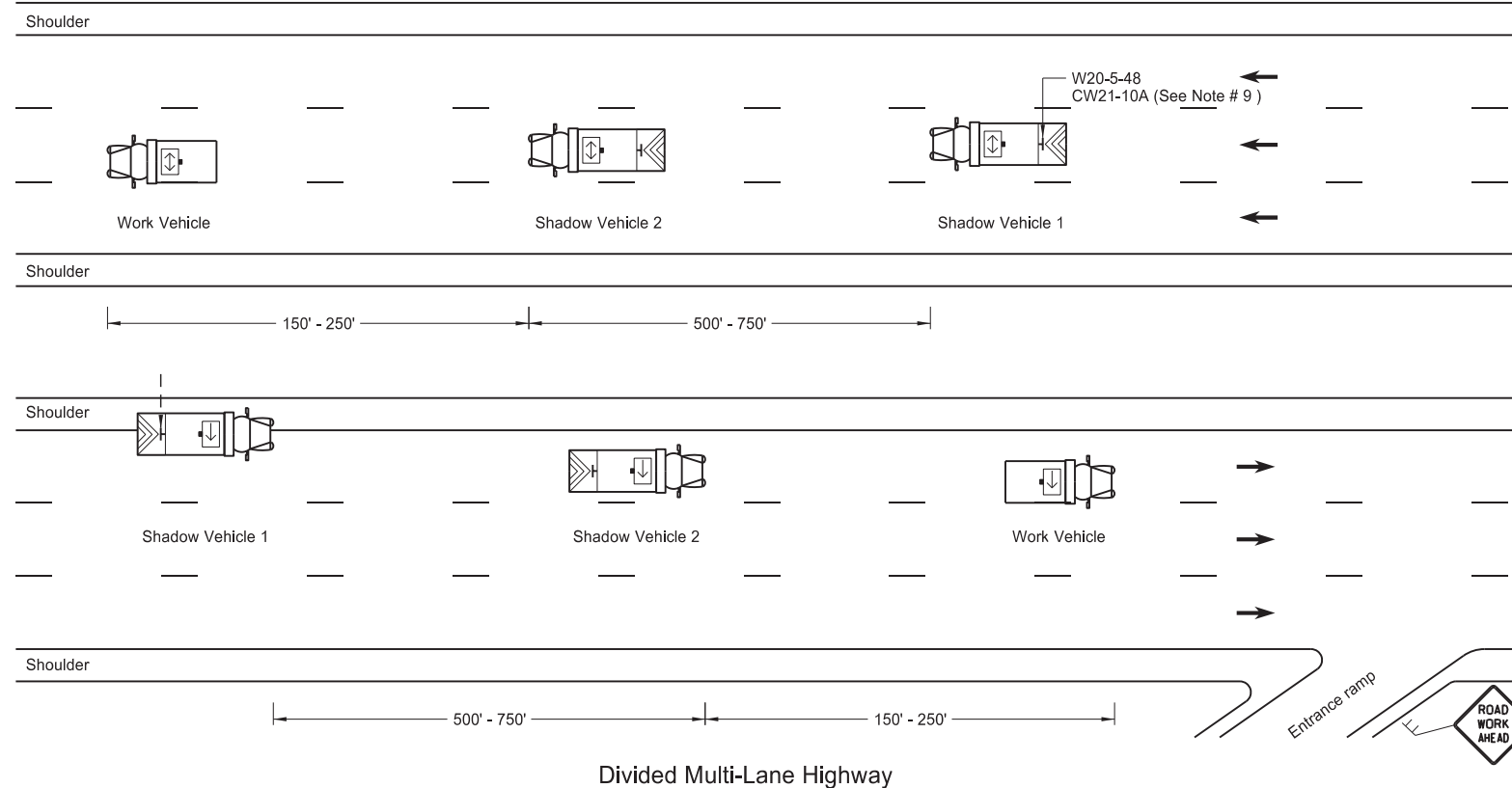


02/23/23

MOBILE OPERATION
(PAVEMENT MARKING)

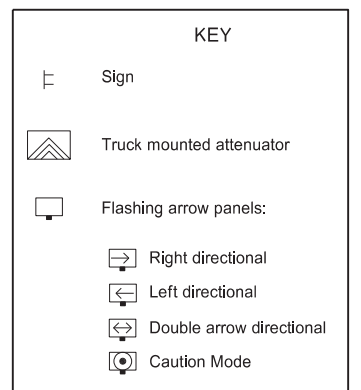


A = Left Right Center



Notes

- Use additional vehicles you choose to be in the convoy with truck mounted attenuators, at your own expense.
- Display yellow rotating beacons or strobe lights on shadow and work vehicles, unless otherwise stated in the plans.
- Use Type B or Type C flashing arrow panels controlled from inside the vehicle.
- Provide each vehicle with two-way electronic communication capability.
- Move shadow vehicle 1 first to shadow other convoy vehicles when convoy changes lane.
- 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.
- Sign Colors
Letters = Black
Border = Black
Background = Orange
- As an option, use shadow vehicle 2 the paint tender vehicle.
- Use sign CW21-10A only during painting operation.
- Pull over work and shadow vehicles periodically to allow motor vehicle traffic to pass on two lane - two way roadways.



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

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Registration Number
PE- 4683,
on 11/08/19 and the original document is stored at the
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of Transportation

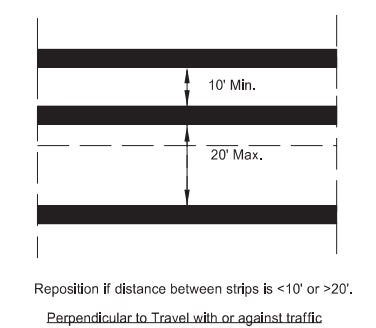
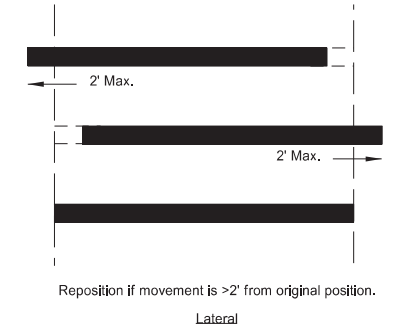
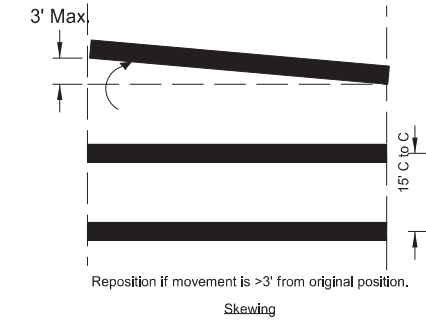
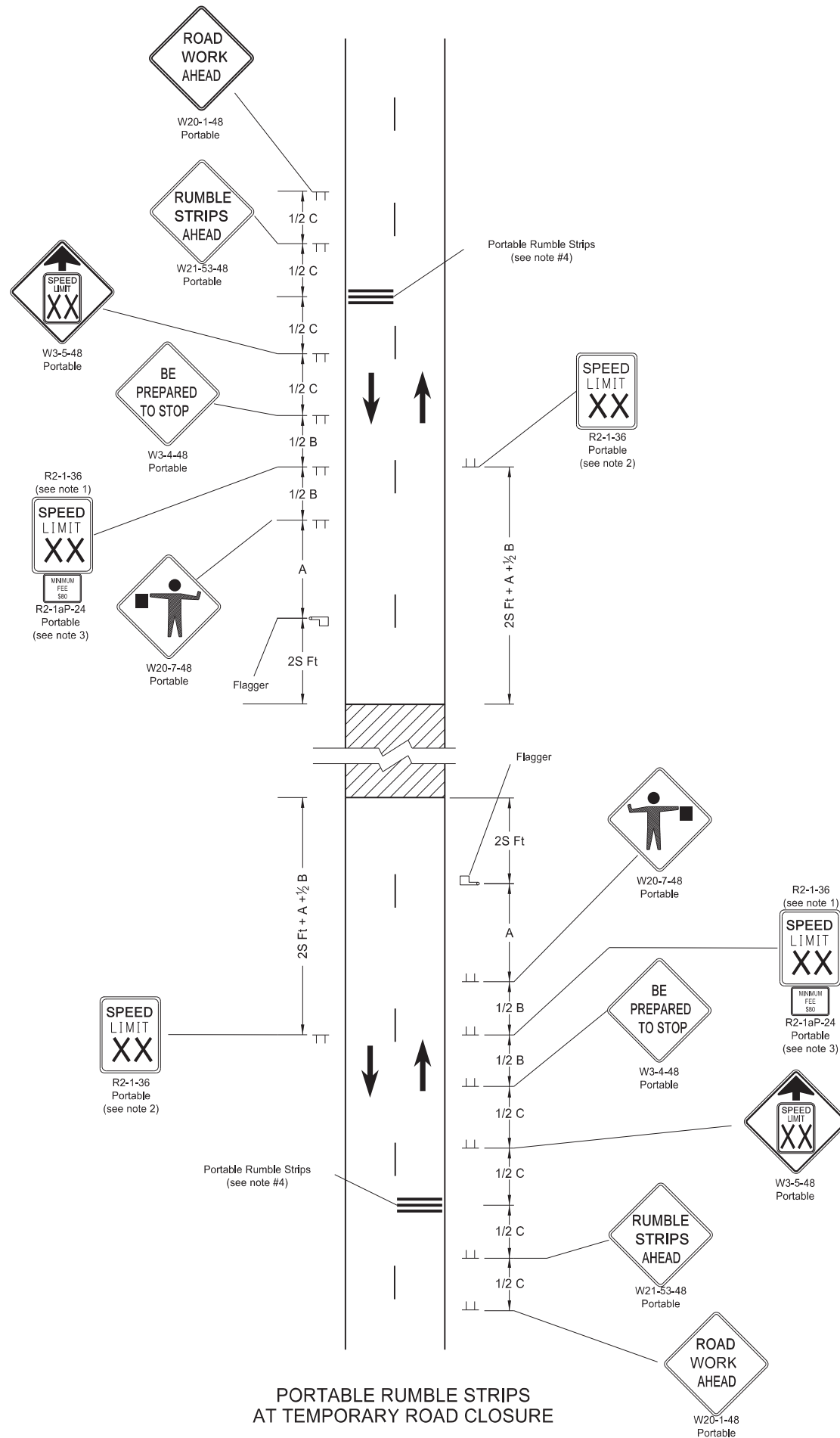
Two-Lane Roadway Portable Rumble Strips

KEY

- Work area
- Flagger
- Sign

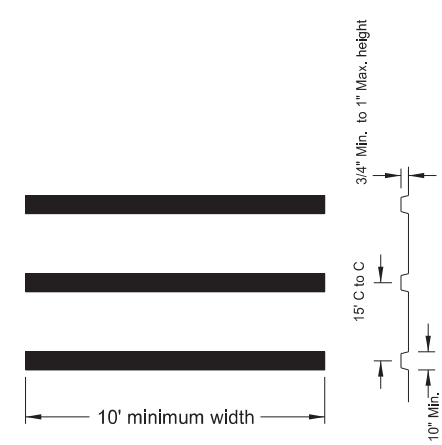
S = Numerical value of speed limit or 85th percentile.

Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - High Speed (over 45 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720



PORTABLE RUMBLE STRIPS ARRAY TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

- Notes:
- Determine speed in the field based on location and conditions.
 - Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
 - Sign R2-1aP-24 is not required when pilot car operation is used.
 - Do not use rumble strips on a non paved surface or in a pre-construction speed zone of 45 mph or less.



PORTABLE RUMBLE STRIPS ARRAY DETAIL

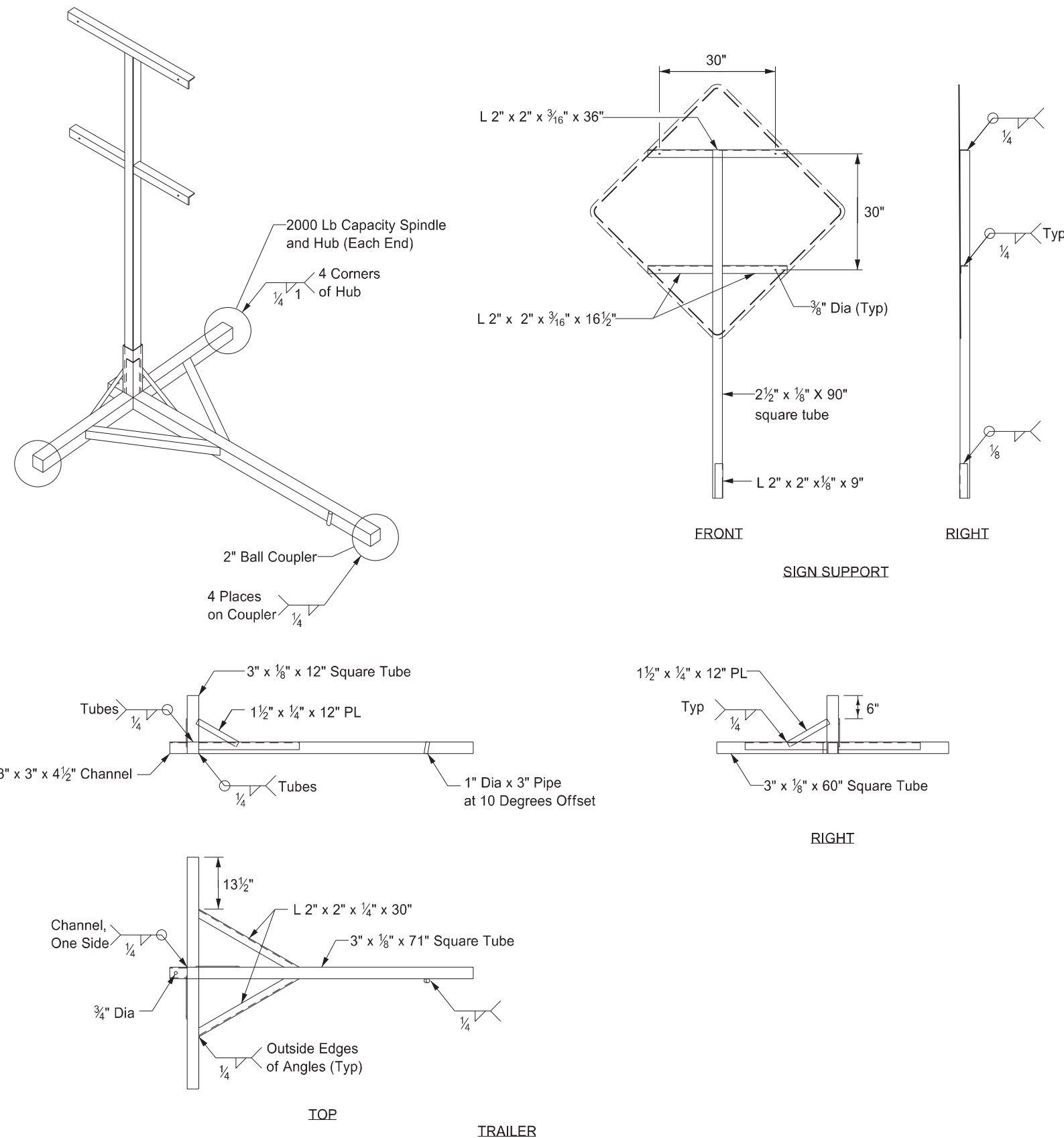
PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		
02-22-22 REVISIONS		
DATE	CHANGE	<p>03/07/23 Use changed to min 45 mph.</p>
03/07/23		

03/07/23

PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50

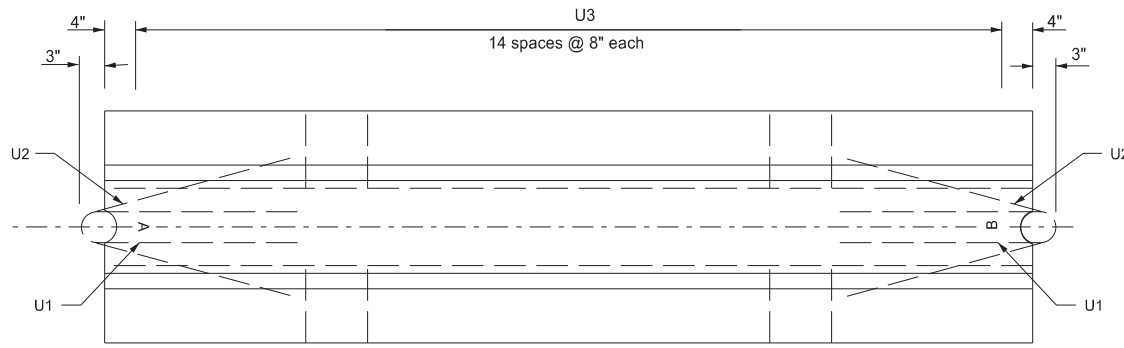


Notes:

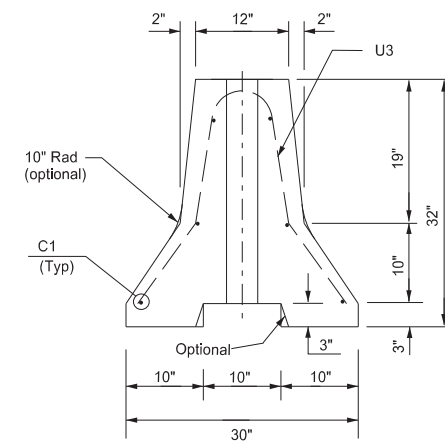
- ① Maximum 250 pound weight of assembly.
- ② Use a 14" wheel and tire.
- ③ Use no automotive and equipment axle assemblies for trailer-mounted sign supports.
- ④ Other NCHRP 350 or MASH crash tested assemblies are acceptable.

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

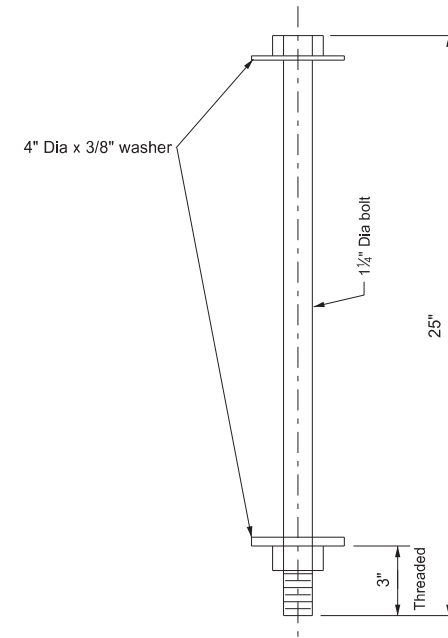
PORTABLE PRECAST CONCRETE MEDIAN BARRIER
(TEMPORARY USAGE)



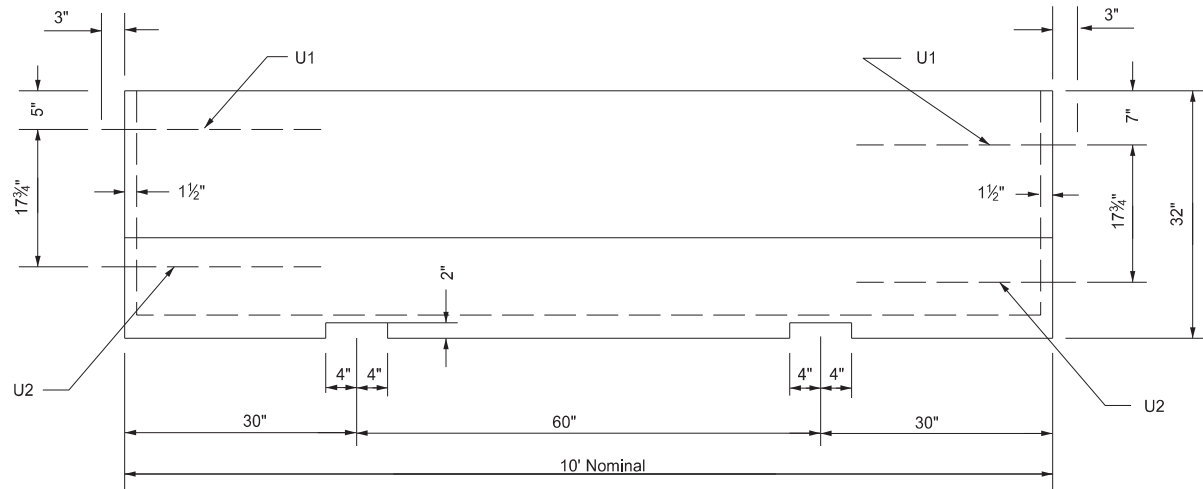
Plan View



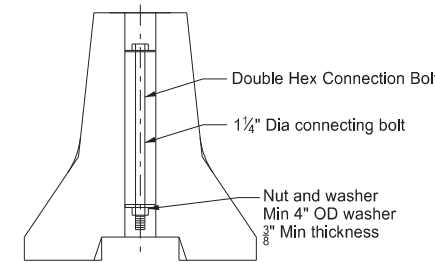
End View



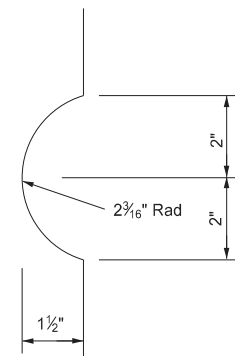
Connecting Bolt Detail
(One per 10 Ft section)



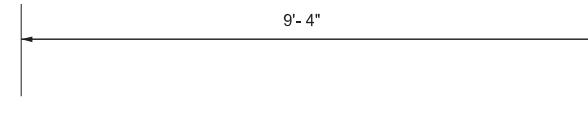
Side View



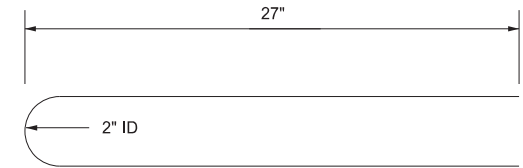
Bolt Connection Detail



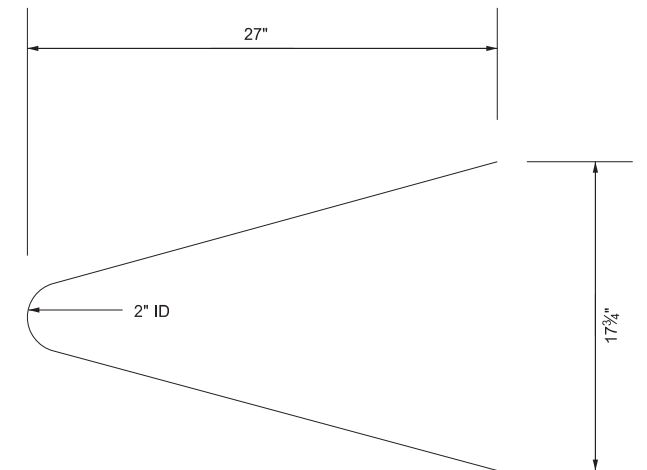
Dap Detail



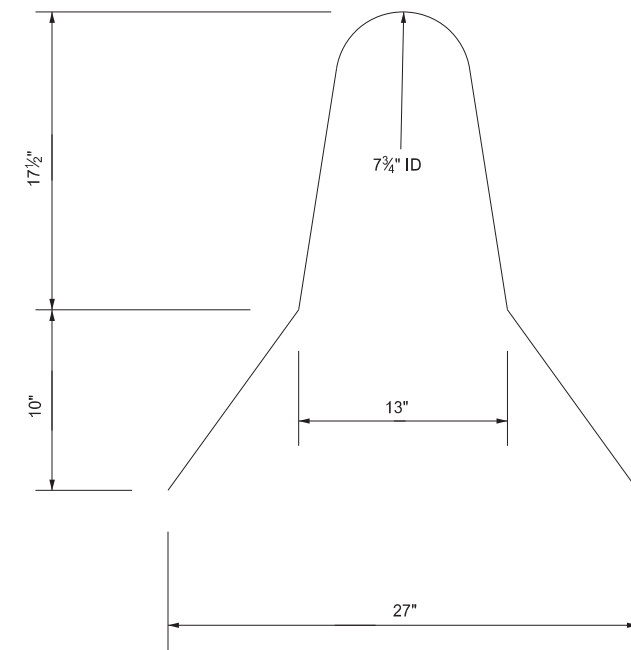
C1 Bar Detail



U1 Bar Detail



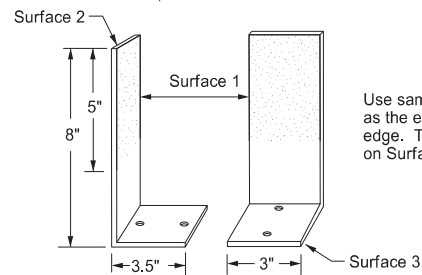
U2 Bar Detail



U3 Bar Detail

Notes:

- Galvanize all exposed hardware as per ASTM A153, except for the loop inserts.
- Use AAE-3 Concrete.
- Provide steel in accordance with Section 612 of NDDOT Standard Specifications.
- Imprint barrier ends A and B as shown with 4 inch letters. Field match A end with B end.
- Place barrier markers at the center of the barrier at 20' centers.
- Connect barrier sections with 1 1/4" Dia A-307 double hex connecting bolt. Maintain bottom nut and washer connection for duration of barrier installation.
- Place barrier to minimize openings between individual sections.



Barrier Marker Detail

Use same color reflective faces as the edge line along barrier edge. Two way reflective on Surface 1 & 2.

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 1/8" thick, 2" wide on 2 1/4" 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'- 10 1/4"	Bent
U3	4	15	5'- 4"	Bent

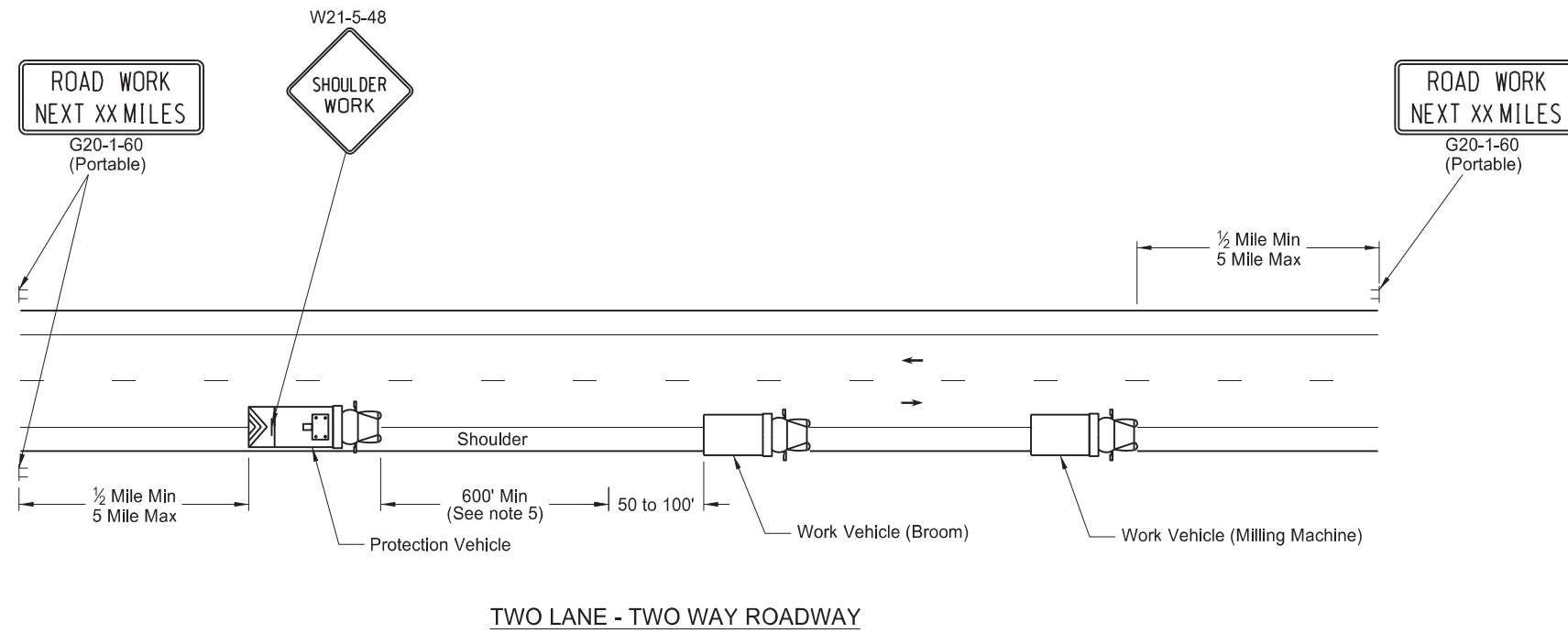
Marker Body
Use high impact, weatherable engineering thermo-plastic material conforming to the following:

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 1/4" @ 73°F	8,000	D790
Flexural modulus, PSI 1/4" @ 73°F	300,000	D790
Elongation @ yield	30%	D638

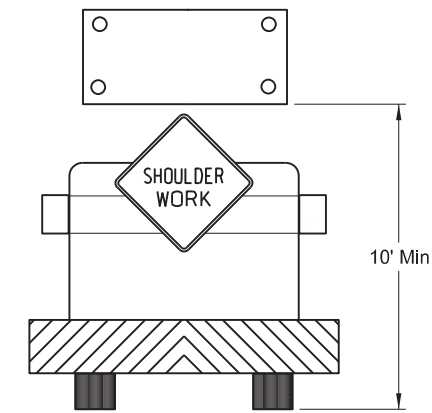
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-20-12	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
11-01-19	New Design Engr PE Stamp

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MOBILE OPERATION Grinding Shoulder Rumble Strips



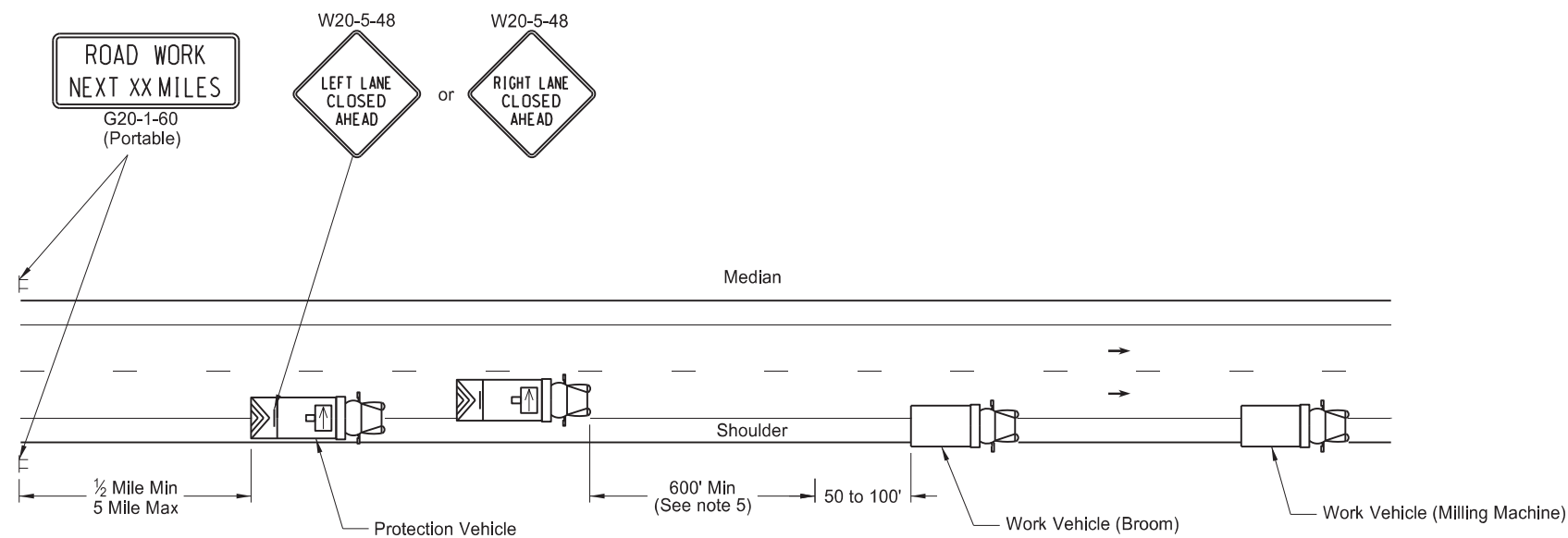
TWO LANE - TWO WAY ROADWAY



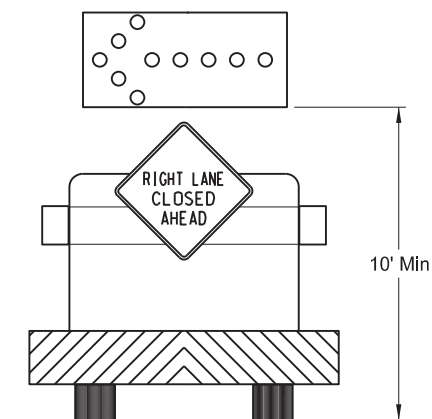
TWO LANE - TWO WAY ROADWAY
Typical Protection Vehicle with Flashing Arrow Panel In Caution Mode

Notes:

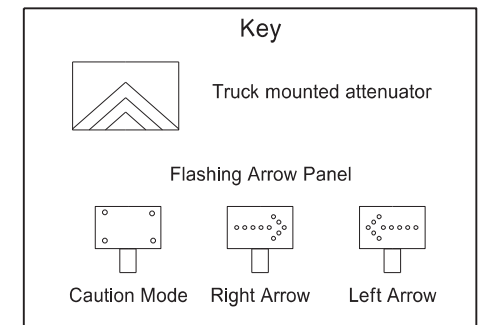
1. Provide truck mounted attenuators on additional vehicles in the convoy, at no additional cost.
2. Provide rotating, flashing, oscillating, or strobe lights on vehicles.
3. Provide Type B or Type C flashing arrow panels that are controlled from inside the vehicle.
4. Provide two - way electronic communication capability in each vehicle.
5. Vary vehicle spacing between the protection vehicle and work vehicle depending on sight distance restrictions. Keep the spacing of the convoy vehicles such that motorists approaching the work convoy can see the protection vehicle in time to slow down and safely pass the work vehicles.
6. Move advance Road Work Ahead signs as the work area moves through the construction zone.



INTERSTATE & 4 LANE DIVIDED HIGHWAY



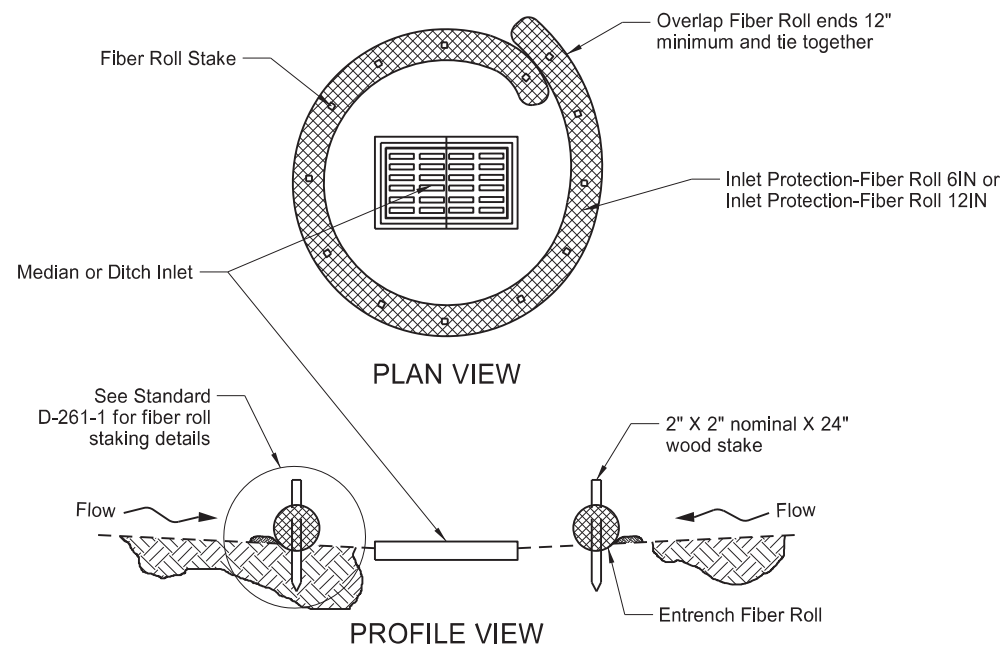
INTERSTATE & 4 LANE DIVIDED HIGHWAY
Typical Protection Vehicle with Flashing Arrow Panel In Flashing Arrow Mode



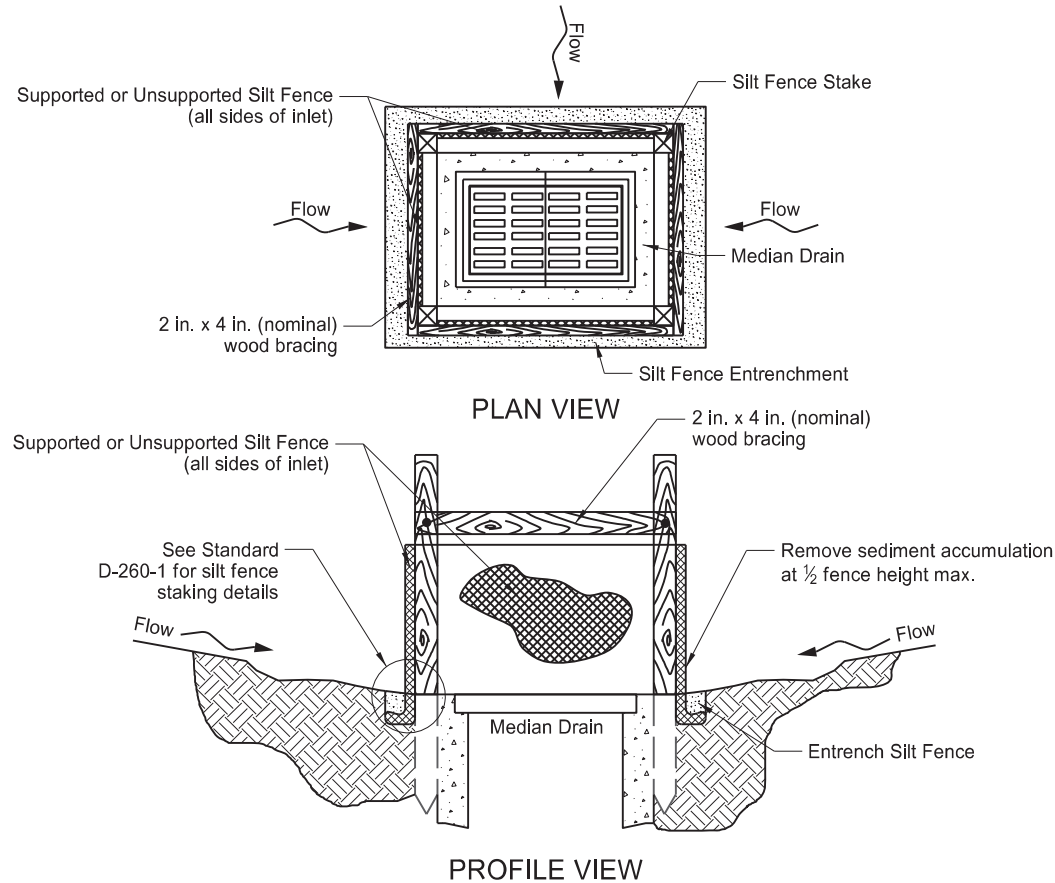
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-15-12	
REVISIONS	
DATE	CHANGE
8-17-17	Updated notes & signs
10-03-19	New Design Engineer PE Stamp

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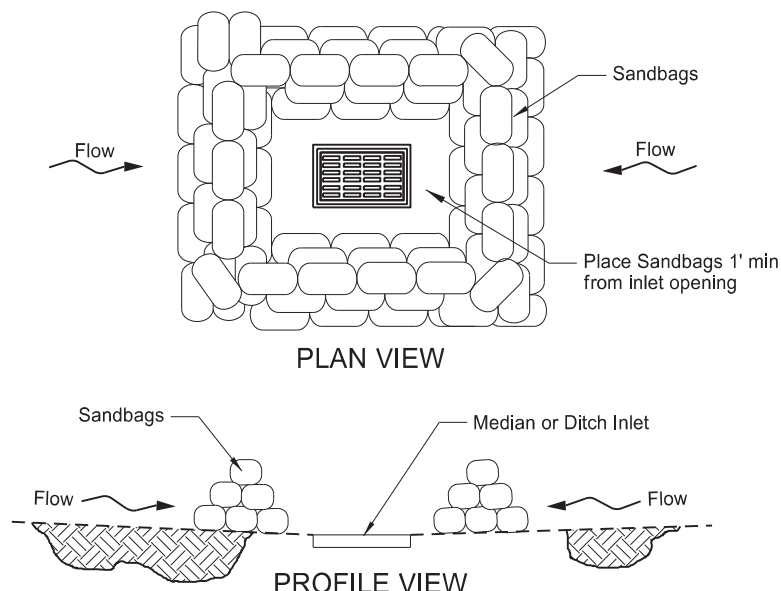
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



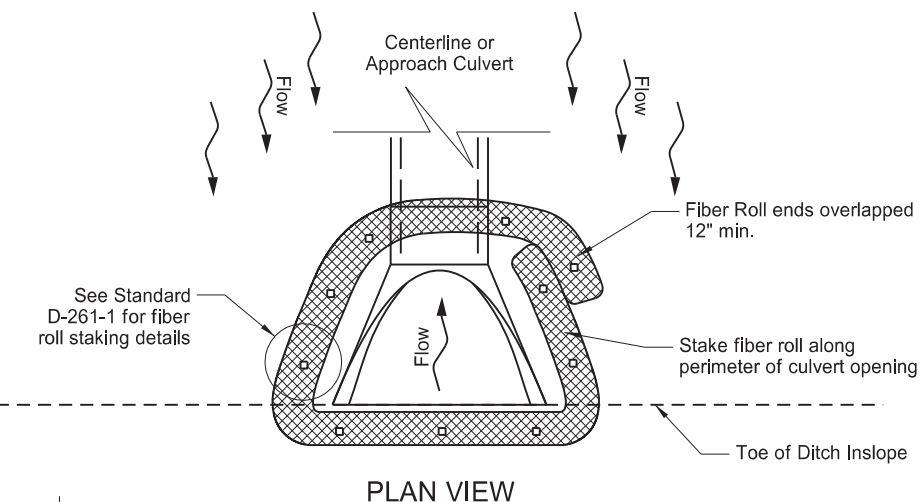
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



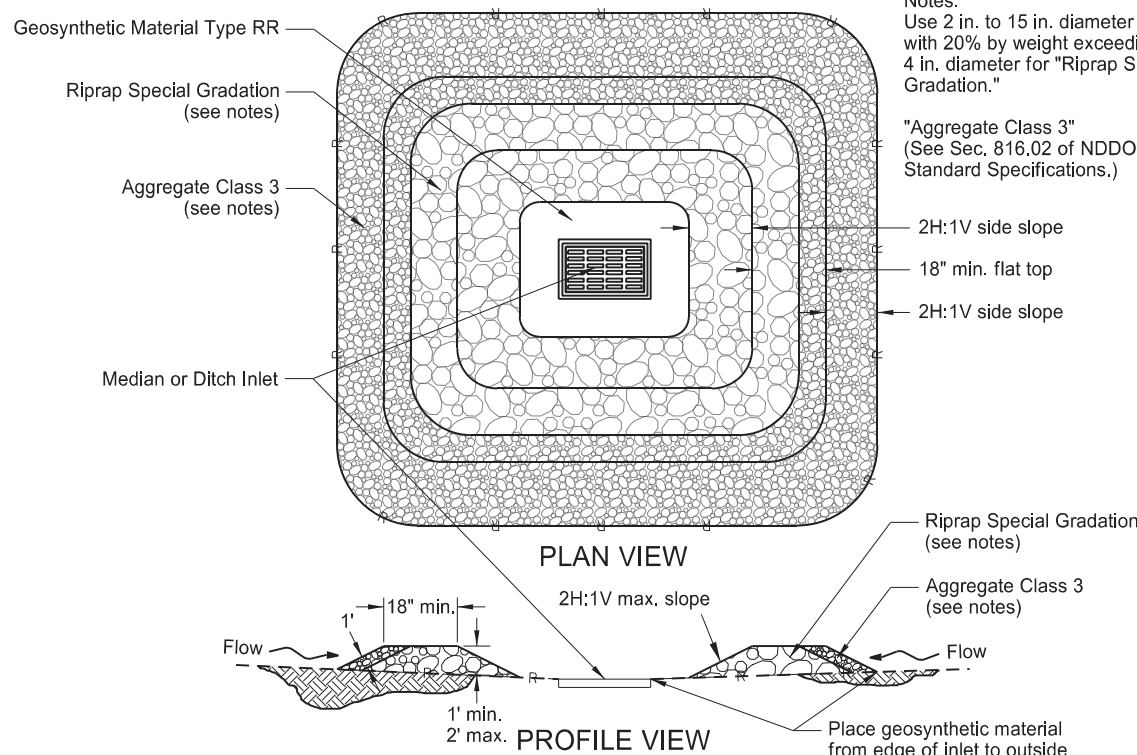
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



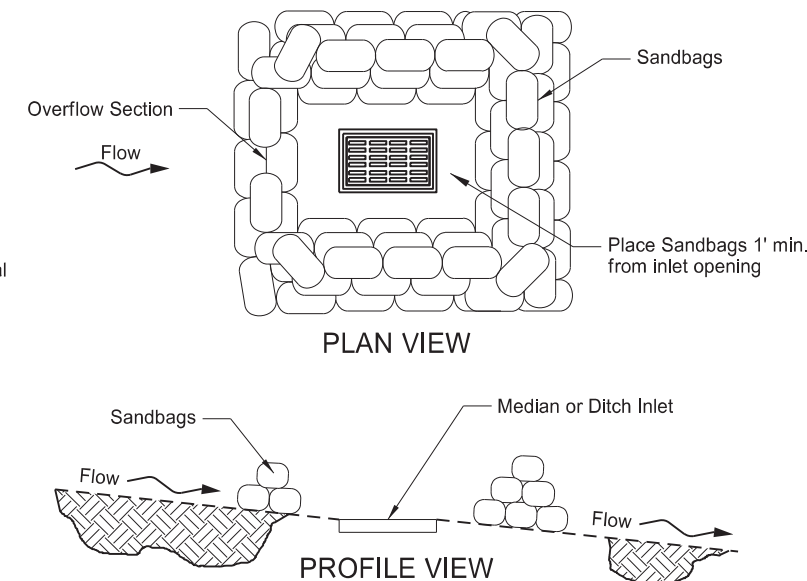
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (ON SLOPE)

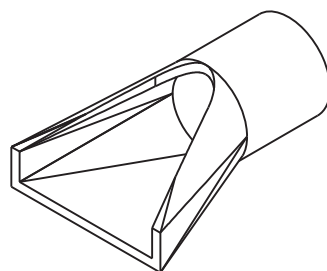
Notes:
 Use 2 in. to 15 in. diameter rock with 20% by weight exceeding 4 in. diameter for "Riprap Special Gradation."
 "Aggregate Class 3"
 (See Sec. 816.02 of NDDOT Standard Specifications.)

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.

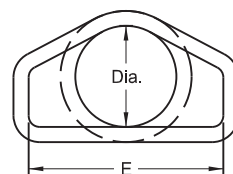
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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

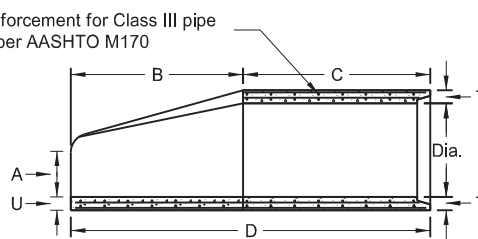
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0 ⁷ / ₈ "	6'-0 ⁷ / ₈ "	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2 ¹ / ₄ "
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2 ¹ / ₂ "
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2 ¹ / ₂ "
24	0'-9 ¹ / ₂ "	3'-7 ¹ / ₂ "	2'-6"	6'-1 ¹ / ₂ "	4'-0"	3"
27	0'-10 ¹ / ₂ "	4'-0"	2'-1 ¹ / ₂ "	6'-1 ¹ / ₂ "	4'-6"	3 ¹ / ₂ "
30	1'-0"	4'-6"	1'-7 ¹ / ₄ "	6'-1 ³ / ₄ "	5'-0"	3 ¹ / ₂ "
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4 ¹ / ₂ "
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9 ¹ / ₄ "	8'-2 ¹ / ₄ "	7'-6"	5 ¹ / ₂ "
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5 ¹ / ₂ "
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6 ¹ / ₂ "
84	3'-0"	7'-6 ¹ / ₂ "	1'-9"	9'-3 ¹ / ₂ "	10'-0"	6 ¹ / ₂ "
90	3'-5"	7'-3 ¹ / ₂ "	2'-0"	9'-3 ¹ / ₂ "	11'-0"	6 ¹ / ₂ "



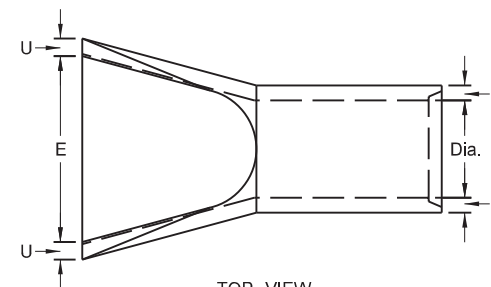
PERSPECTIVE



END VIEW



SIDE VIEW



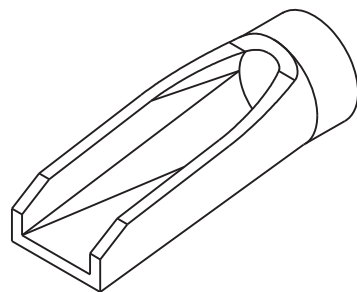
TOP VIEW

REINFORCED CONCRETE PIPE - FLARED END SECTION
Reinforcement to be equivalent to Class III RCP

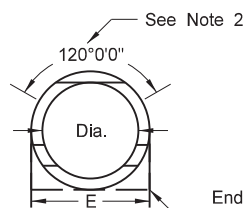
NOTES:

- All reinforcing steel shall meet AASHTO M170 requirements.
- 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.
- Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
66" to 108" (incl.) = not less than 6 feet
- Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
- 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.

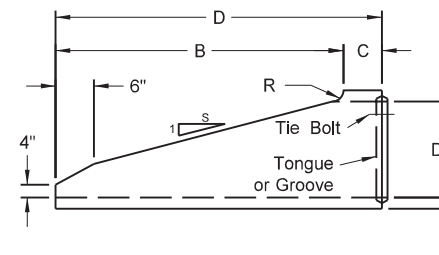
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7 ¹ / ₂ "	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3 ¹ / ₂ "	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



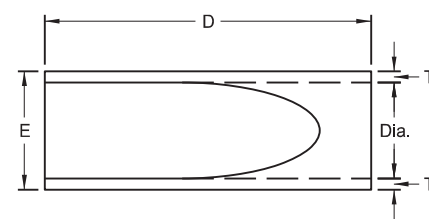
PERSPECTIVE



END VIEW



SIDE VIEW



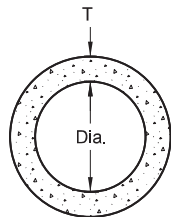
TOP VIEW

REINFORCED CONCRETE PIPE - TRAVERSABLE END SECTION
Reinforcement to be equivalent to Class III RCP

NOTES (Traversable End Section):

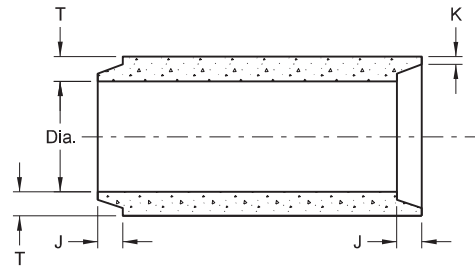
- Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
- Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

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	1 ¹ / ₈ -2 ³ / ₈	3/4	2	
15	1.23	127	1 ¹ / ₈ -2 ³ / ₈	7/8	2 ¹ / ₄	
18	1.77	168	1 ¹ / ₈ -2 ⁷ / ₈	1	2 ¹ / ₂	
21	2.40	214	1 ¹ / ₈ -3 ¹ / ₈	1 ¹ / ₈	2 ³ / ₄	
24	3.14	265	2 ³ / ₈ -3 ¹ / ₈	1 ¹ / ₂	3	
27	3.98	322	2 ³ / ₈ -4	1 ³ / ₄	3 ¹ / ₄	
30	4.91	384	3 ¹ / ₄ -4 ¹ / ₄	1 ³ / ₄	3 ¹ / ₂	
33	5.94	452	3 ¹ / ₄ -4 ¹ / ₄	1 ³ / ₂	3 ³ / ₄	
36	7.07	524	3 ¹ / ₄ -4 ¹ / ₄	1 ¹ / ₂	4	
42	9.62	685	3 ¹ / ₄ -4 ¹ / ₄	1 ³ / ₄	4 ¹ / ₂	
48	12.57	885	3 ¹ / ₄ -4 ¹ / ₄	1 ³ / ₄	5	
54	15.90	1070	4 ¹ / ₈ -5 ¹ / ₄	2	5 ¹ / ₂	
60	19.63	1296	4 ¹ / ₈ -5 ¹ / ₂	2 ¹ / ₄	6	
66	23.76	1542	5-6	2 ³ / ₈	6 ¹ / ₂	
72	28.27	1810	5 ¹ / ₈ -6 ³ / ₄	2 ³ / ₈	7	
78	33.18	2098	6 ¹ / ₄ -7 ¹ / ₄	2 ³ / ₈	7 ¹ / ₂	
84	38.48	2410	5 ¹ / ₈ -7 ¹ / ₄	3 ¹ / ₈	8	
90	44.18	2793	6 ¹ / ₄ -8 ¹ / ₂	3 ¹ / ₈	8 ¹ / ₂	
96	50.27	3092	7-8 ¹ / ₄	3 ¹ / ₂	9	
102	56.75	3466	7-8 ¹ / ₄	3 ¹ / ₂	9 ¹ / ₂	
108	63.62	3864	7 ¹ / ₄ -8 ¹ / ₂	3 ³ / ₄	10	

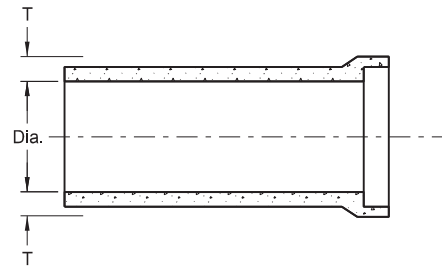


END VIEW

CIRCULAR PIPE

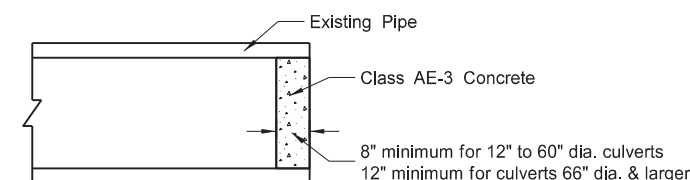


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

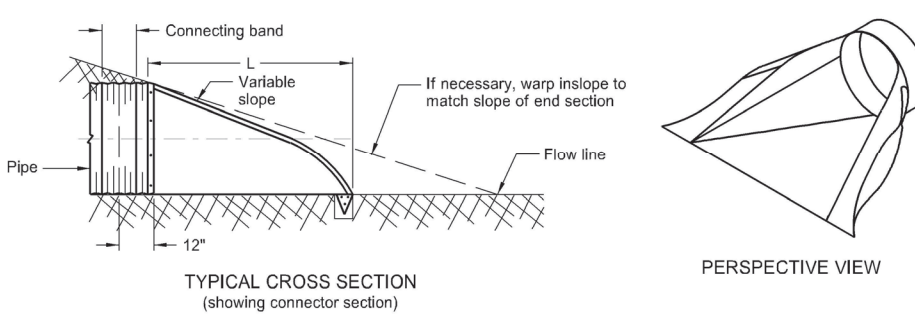
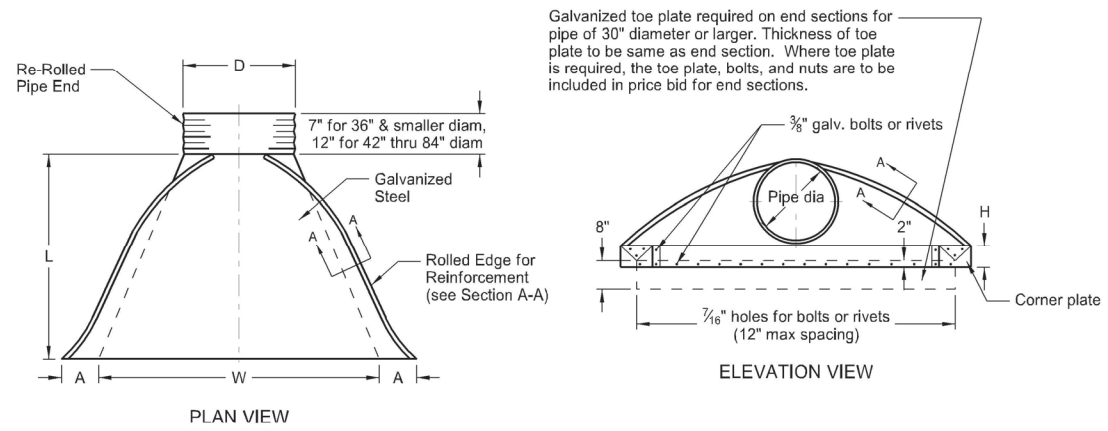
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

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

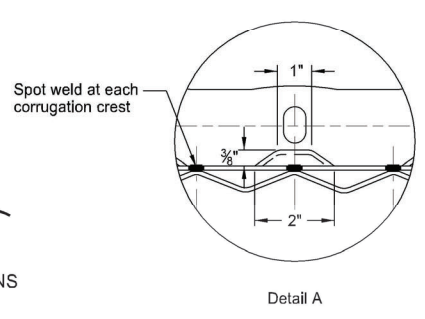
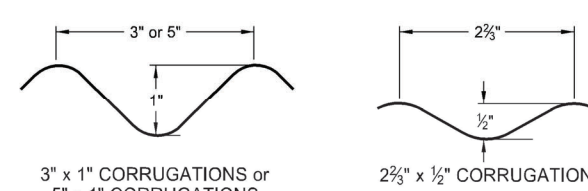
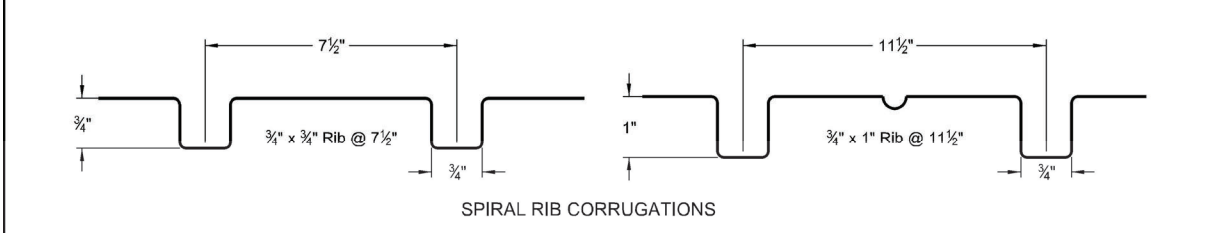
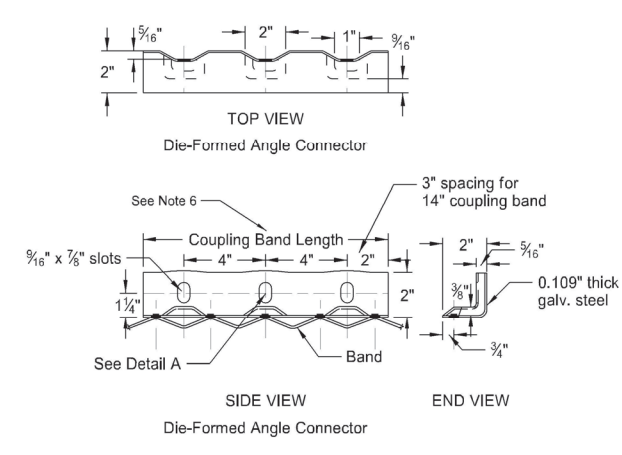
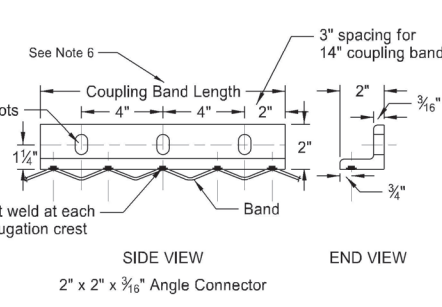
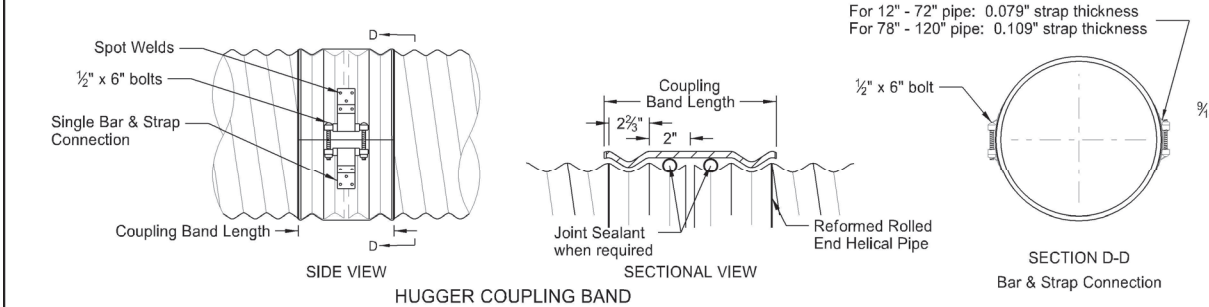
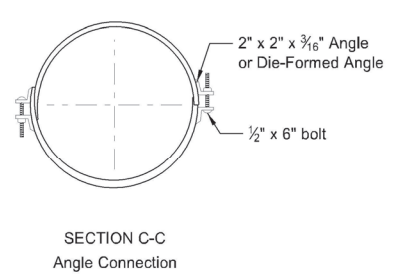
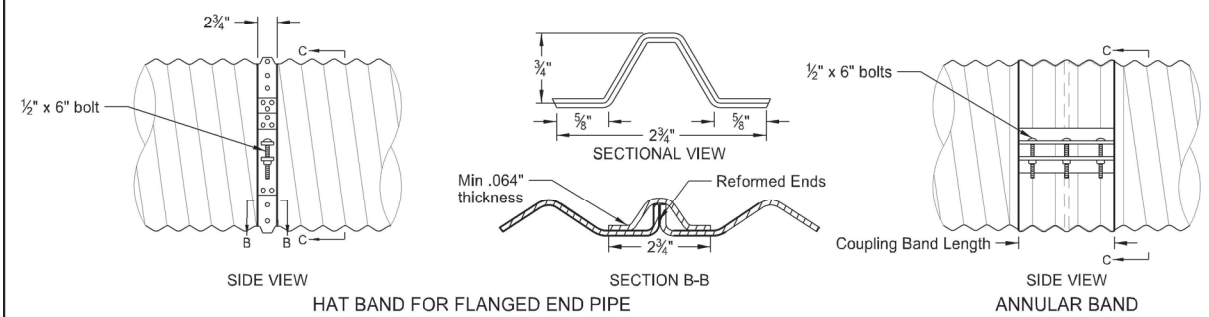
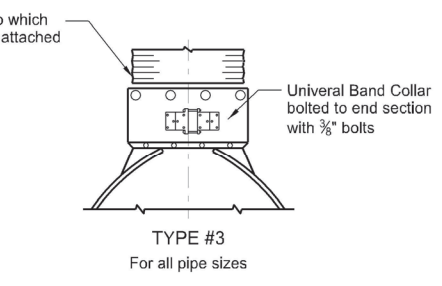
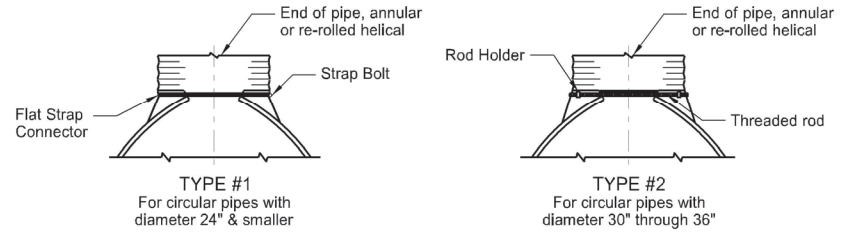
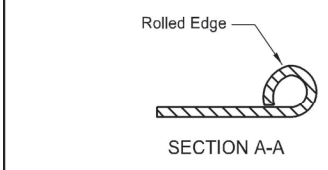


PIPE DIA.	GALVANIZED THICKNESS	END SECTION DIMENSIONS					APPROX. SLOPE RATE	BODY PIECE
		A	B	H	L	W		
15	0.064 - 0.079	7	8	6	26	30	2½:1	1
18	0.064 - 0.109	8	10	6	31	36	2½:1	1
24	0.064 - 0.109	10	13	6	41	48	2½:1	1
30	0.064 - 0.109	12	16	8	51	60	2½:1	1 or 2
36	0.064 - 0.109	14	19	9	60	72	2½:1	2
42	0.064 - 0.138	16	22	11	69	84	2½:1	2
48	0.064 - 0.168	18	27	12	78	90	2½:1	2
54	0.064 - 0.168	18	30	12	84	102	2:1	2
+60	0.084 - 0.168	18	33	12	87	114	1½:1	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	1½:1	3
+84	0.064 - 0.168	18	45	12	87	138	1½:1	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 ⅝" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.

COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅝" x ½"	12" - 48"	2¾"	.064"
		12" - 72"	12"	.052"
Annular Band	2⅝" x ½"	78" - 84"	12"	.079"
		48" - 120"	14"	.052"
Hugger Band	2⅝" x ½"	12" - 72"	10½"	.052"
		78" - 84"	10½"	.079"
	3" x 1" Rerolled End	48" - 120"	10½"	.052"
		48" - 120"	12"	.064"

- NOTES:
- Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
 - 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 ⅜" 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. ⅝" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
 - 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.
 - 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.
 - ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
 - 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.
 - Length of spot welds shall be minimum ½".

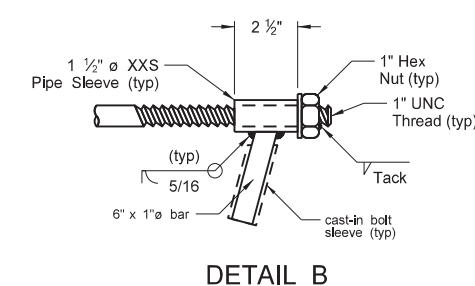
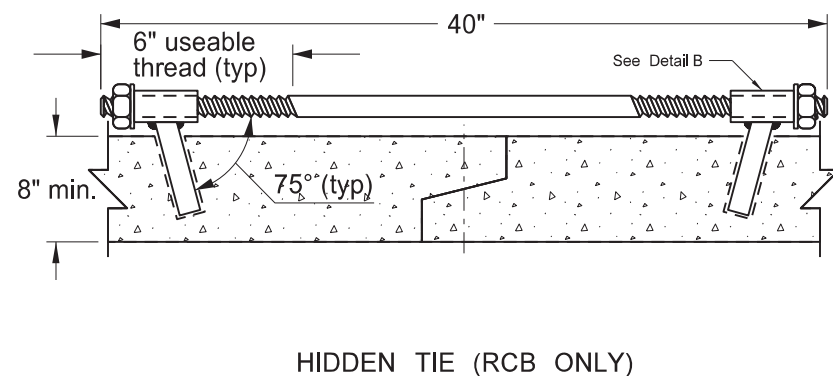
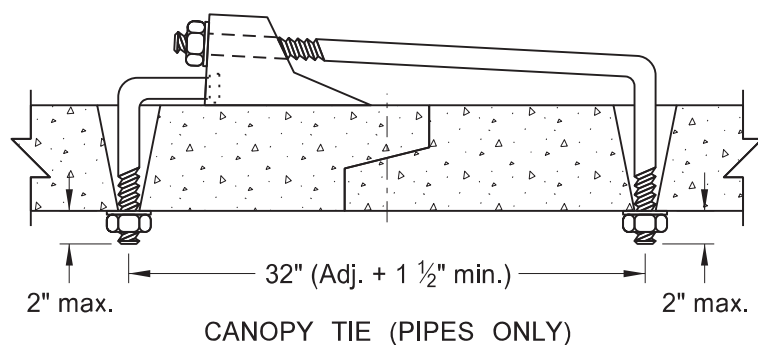
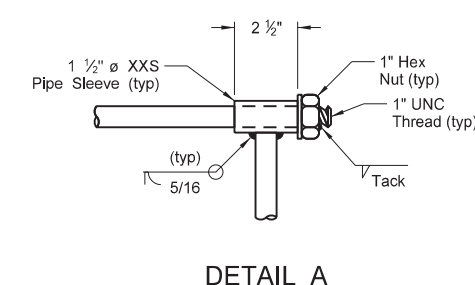
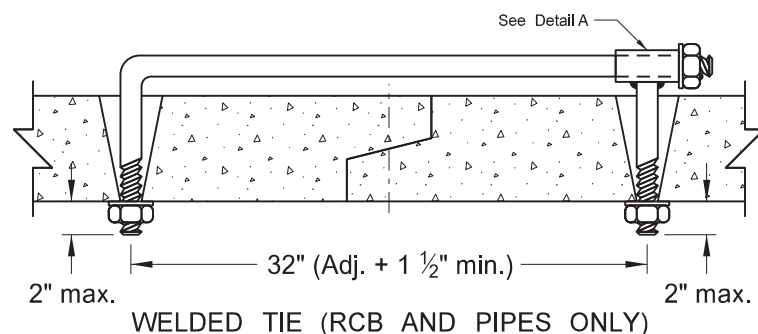
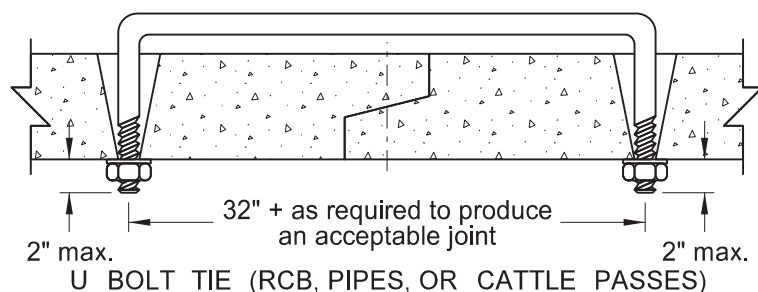
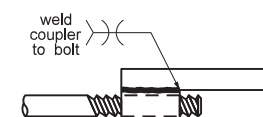
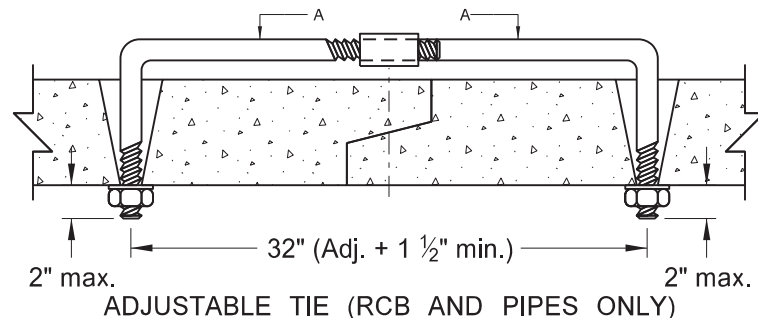
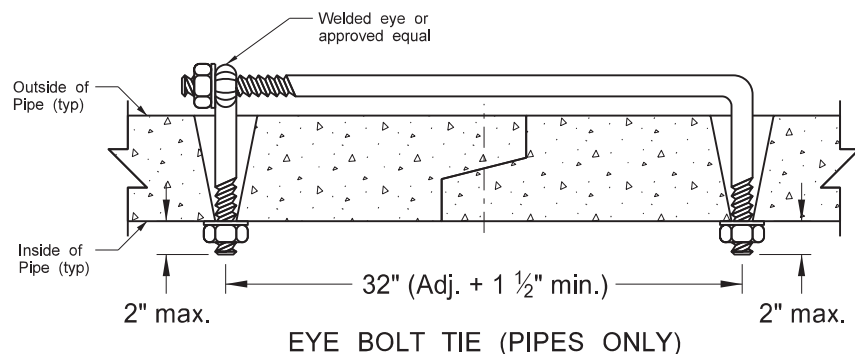


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-16-13	
REVISIONS	
DATE	CHANGE
01-07-14	End Section Plan View
02-27-14	3" x 1" Corrugation Detail
09-18-19	Added Perspective View Detail
09-23-22	Galvanized Thickness Table

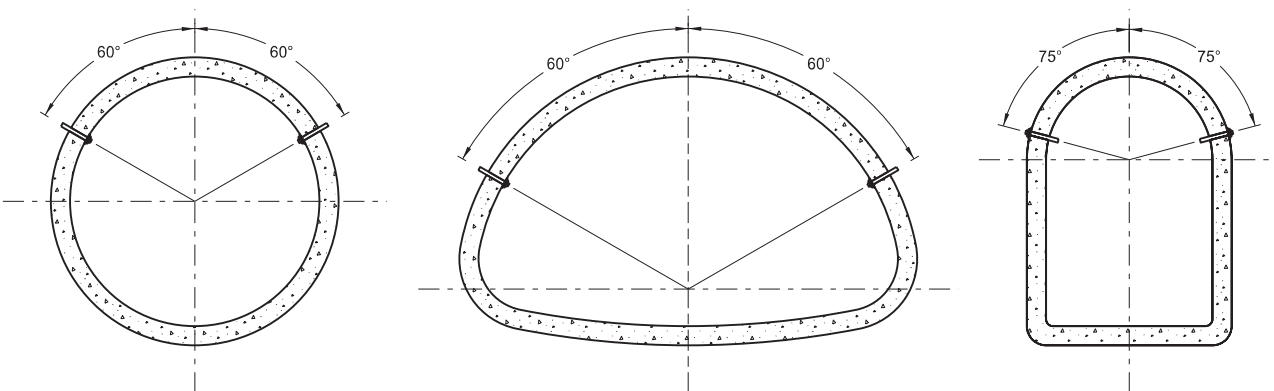
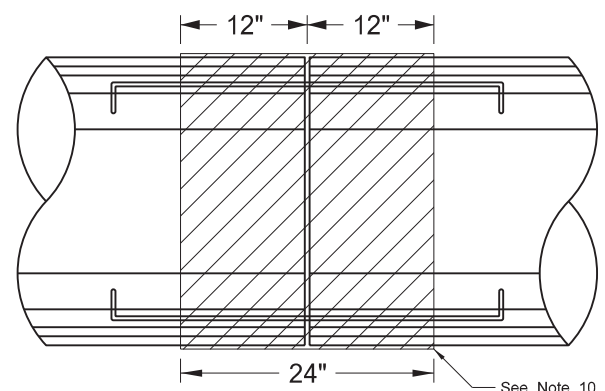
THAN D KETTNER
 REGISTERED PROFESSIONAL ENGINEER
 PE-4684
 NORTH DAKOTA
 09/23/22

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

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ϕ	XXS Pipe Sleeve Inner ϕ
18" - 24"	$\frac{5}{8}$ " See note 3	$\frac{3}{4}$ "
30" - 66"	$\frac{3}{4}$ "	1"
72" - 120"	1"	1 $\frac{1}{4}$ "
RCB/Cattle Pass		



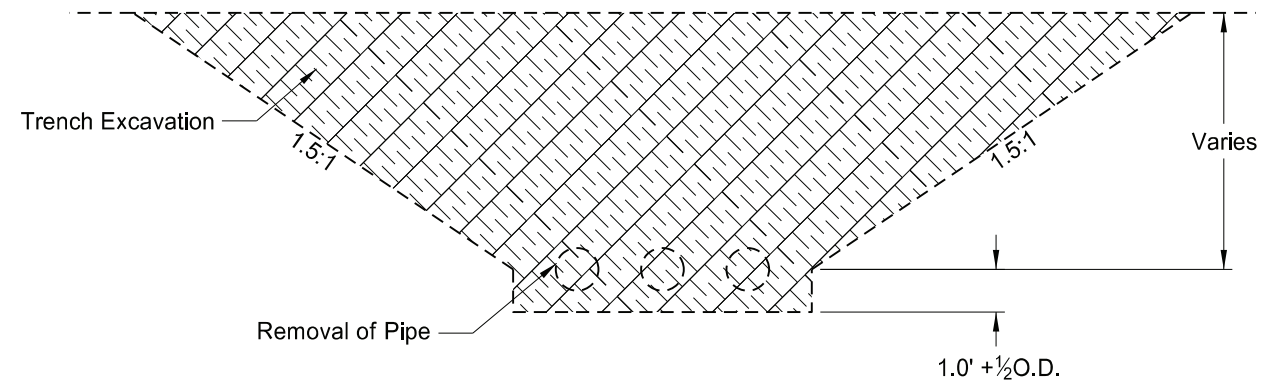
- NOTES:
- The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
 - Insert pipe ties from the inside of the pipes and grout in place for Cattle Pass and Jacked and Bored pipes. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
 - 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.
 - Do not use pipe ties to pull the pipe or RCB sections tight. The ties are only for holding sections together.
 - Use only tie bolt assemblies that have been hot dip galvanized in accordance with ASTM A 153.
 - Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Use holes that have a diameter $\frac{1}{4}$ " 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 $\frac{1}{4}$ ".
 - Select the type of tie bolt used from those shown.
 - 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.
 - 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.
 - 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.
 - 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.
 - Tie RCB's at locations shown on the plans.



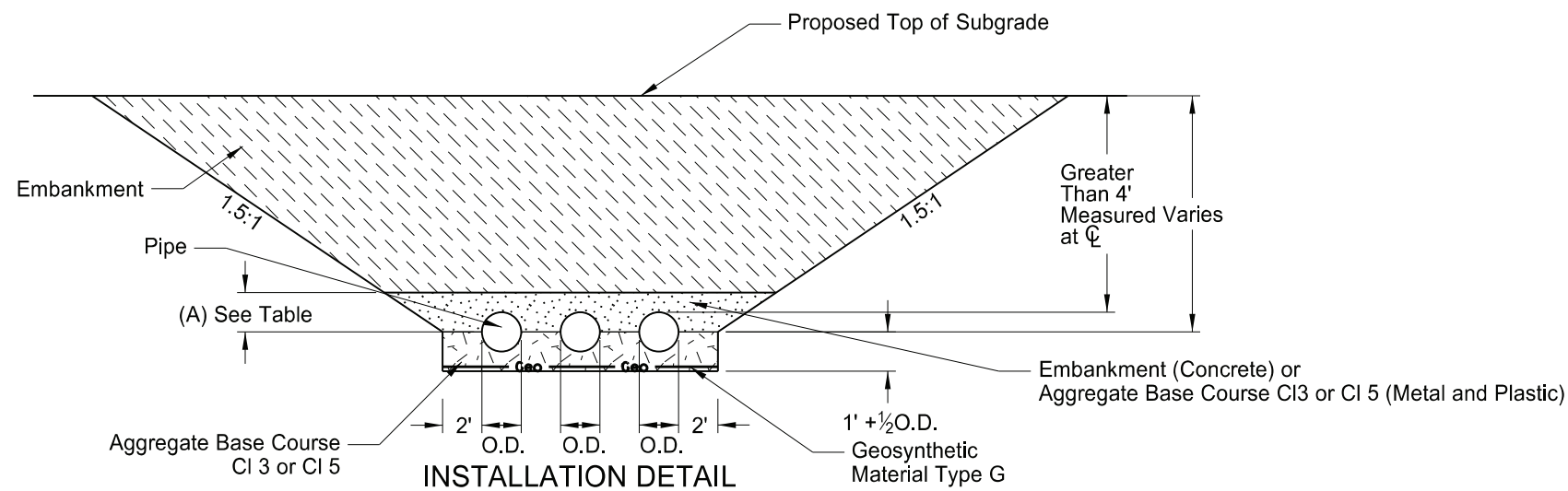
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-5-17	Notes 2-11, Table, Title, Labels
8-11-21	Notes 2-12, Table, Label



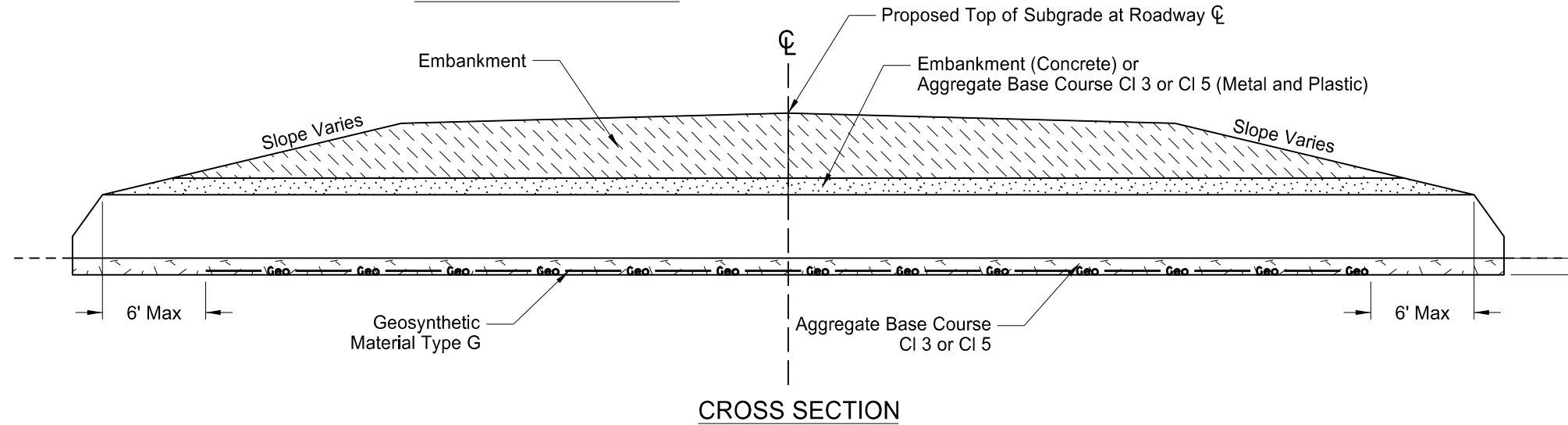
TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
 MULTIPLE PIPES MORE THAN 4 FEET BELOW TOP OF SUBGRADE



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

Pay Items

- 1) Pipe*
- 2) Geosynthetic Material Type G
- 3) Removal of Pipe (if required)

*Included in Pipe Pay Items

- 1) Pipe
- 2) Trench Excavation
- 3) Aggregate Base Course CI 3 or CI 5
- 4) Embankment

NOTES:

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-4-14	
REVISIONS	
DATE	CHANGE
3-3-14	Spelling
1-21-14	Nomenclature
9-18-15	Title Rewording
12-10-15	Added Plastic Pipe
5-27-20	Replaced R1 Fabric with Geogrid Changed bedding depth and embankment requirements



STANDARD MONUMENTS AND RIGHT OF WAY MARKERS

NOTES:

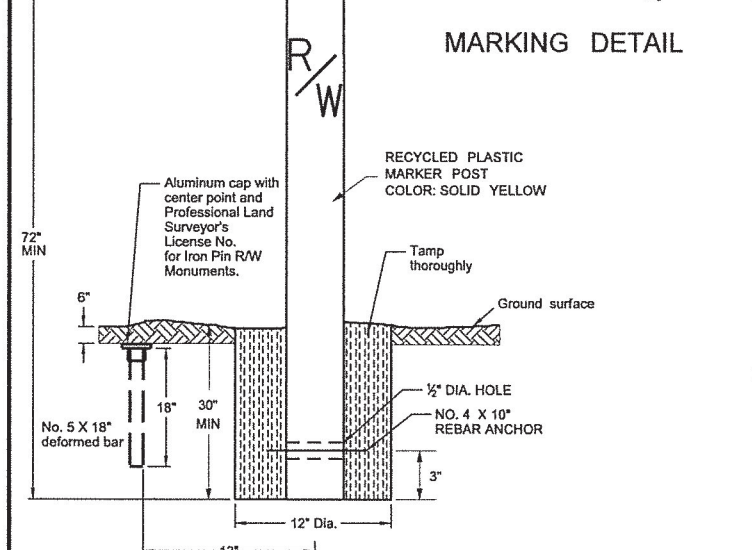
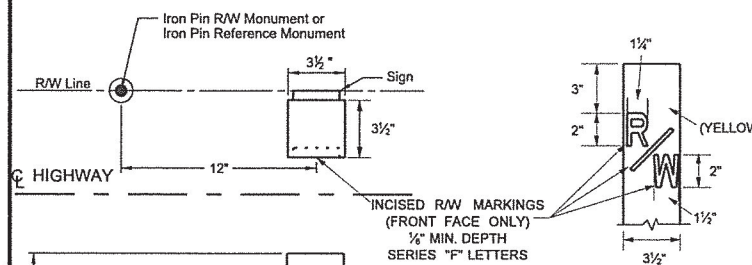
Construct and install Alignment Monuments, Iron Pin Reference Monuments, Iron Pin R/W Monuments, and Right of Way Markers (witness posts) according to Section 720 of the Standard Specifications.

ALIGNMENT MONUMENTS: Place Iron Pin or Precast Concrete Alignment Monuments with aluminum caps on the centerline alignment PI's, section corners, quarter corners, section line crossings, quarter line crossings, and at curve points (PC's, PT's, TS's, and ST's) on the centerline.

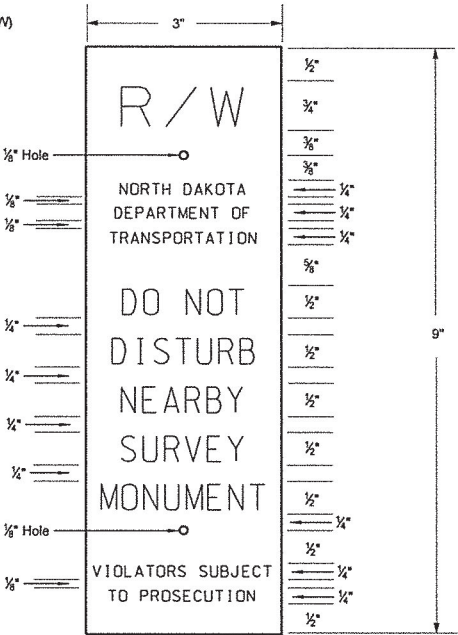
IRON PIN R/W MONUMENT: Place Iron Pins with aluminum caps (No. 5 X 18") at breaks on the Right of Way line, and at curve points (PC's, PT's, TS's and ST's) on the Right of Way line.

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

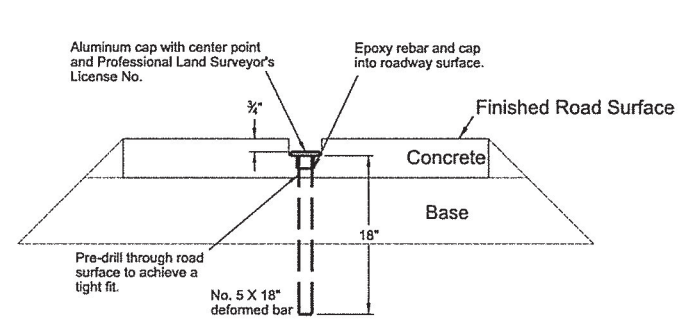
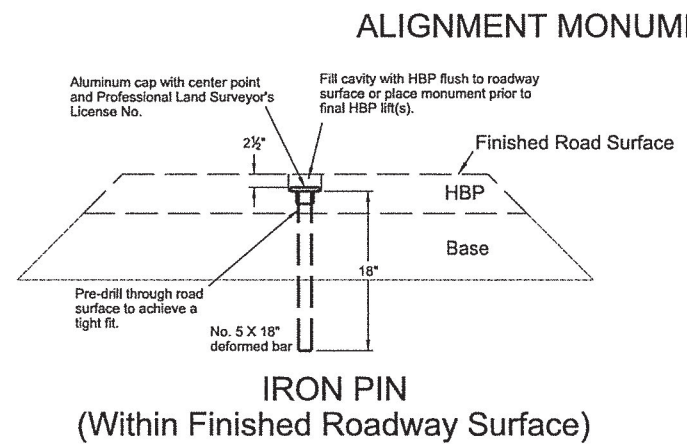
R/W MARKERS (WITNESS POST) WITHIN DRIVEWAYS: If a single iron pin R/W or Reference Monument is within a driveway, place right of way marker (witness post) 50 feet back, in stationing, from the Iron Pin Monument along the R/W line. If R/W break is within a driveway, place right of way markers (witness posts) 50 feet back, or ahead from respective Iron Pin R/W Monuments along the R/W lines. Maintain Iron Pin R/W or Reference Monument original position within driveway.



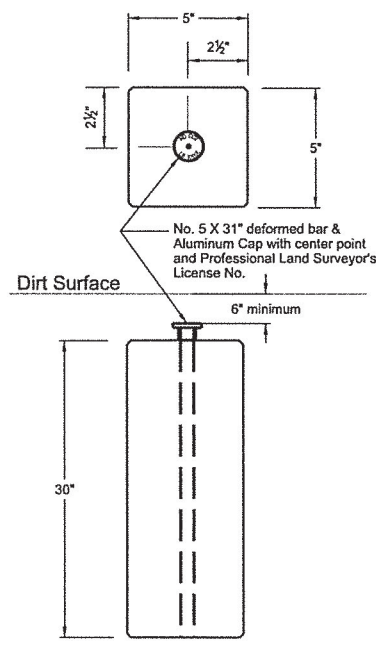
RECYCLED PLASTIC RIGHT OF WAY MARKER (WITNESS POST) DETAILS & IRON PIN REFERENCE AND R/W MONUMENT DETAILS



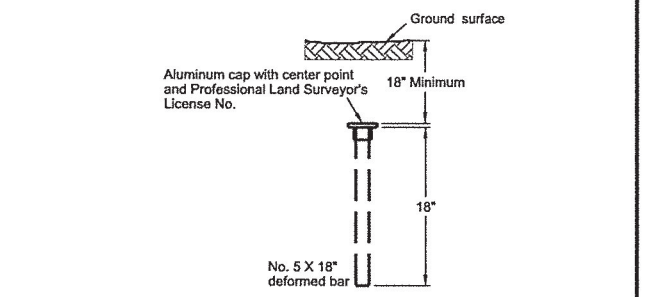
SIGN DETAIL
Black letters on orange high intensity background sheeting meeting ASTM D-4956 Type III or higher on 80 gauge 5052-H38 aluminum. Silk screen graphics. One color print. Attach sign by drilling two holes in the face of the post (side facing the private owner, away from the Department of Transportation right of way). Put inserts into the holes and mount the sign with #4 vandal proof screws. Install sign 2" from top of post.



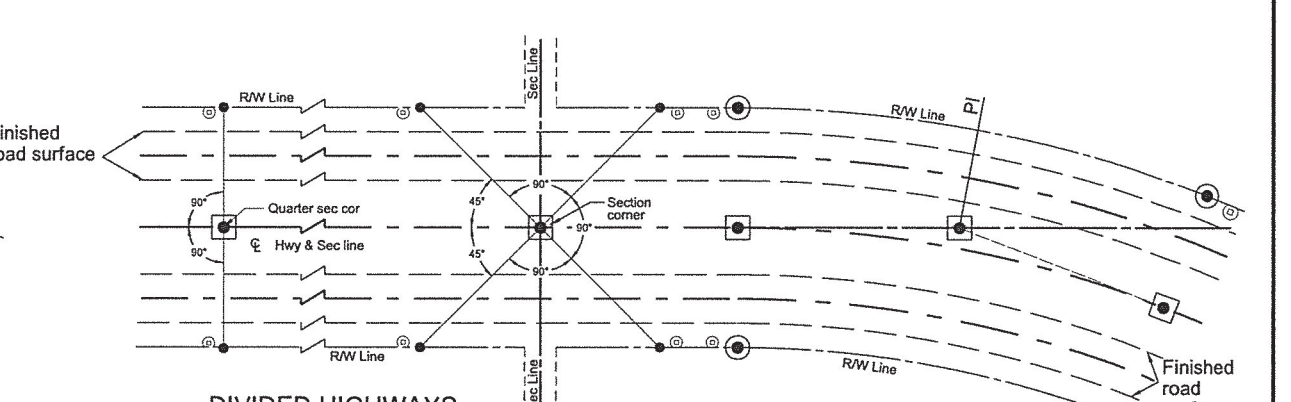
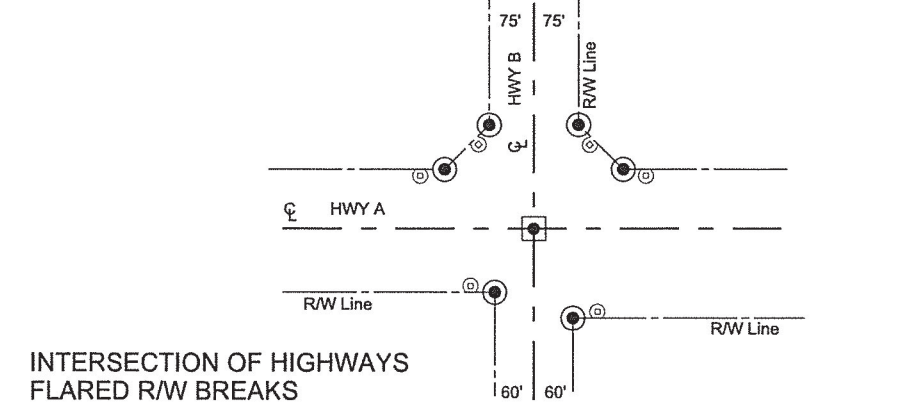
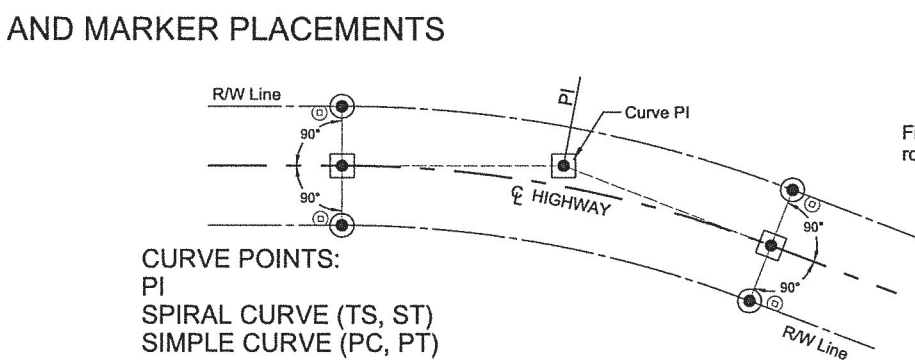
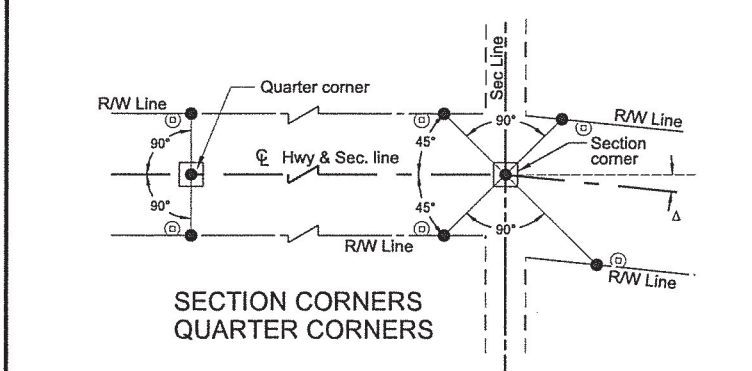
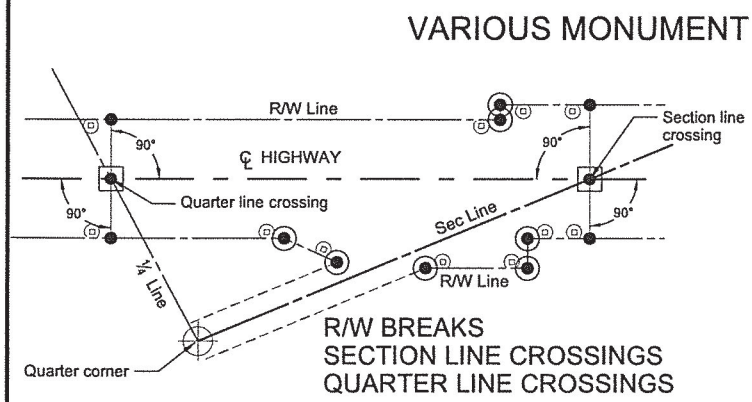
IRON PIN (Within Finished Roadway Surface)
IRON PIN (Within Finished Roadway Surface) (Outside Finished Roadway Surface)



PRECAST CONCRETE (Inside R/W Limits)



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



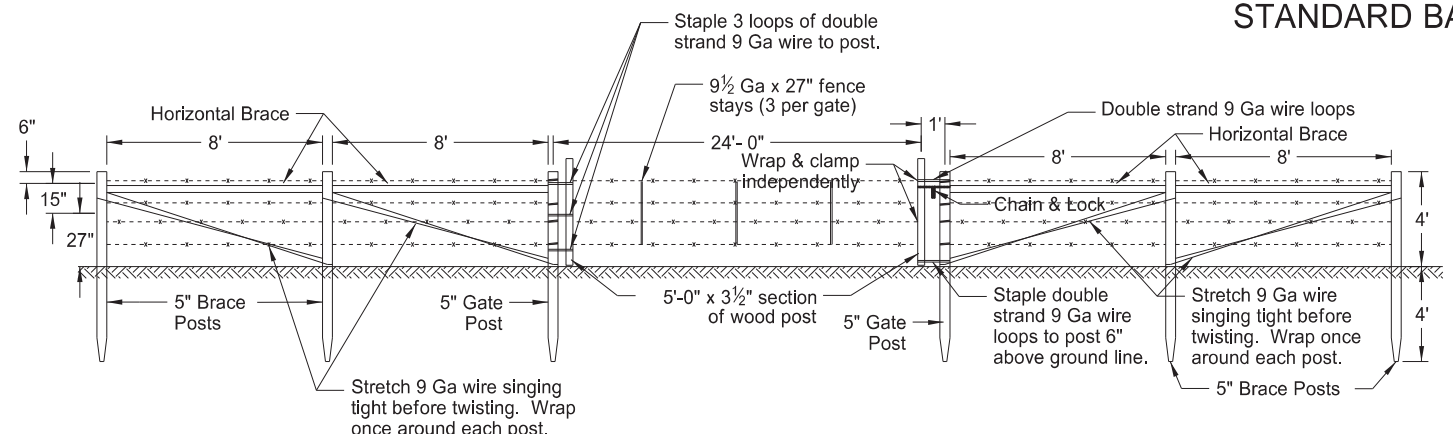
LEGEND

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

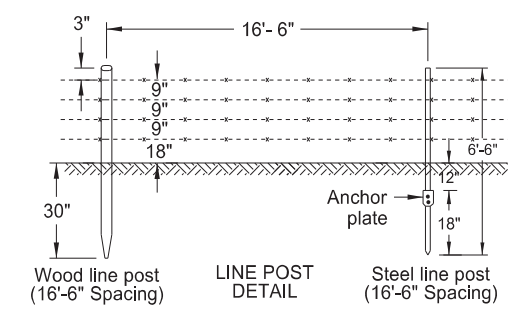
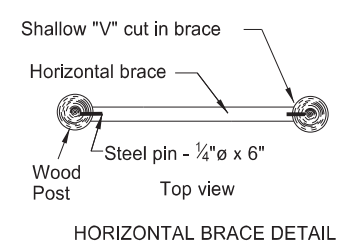
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
11/12/13	Note for SIGN DETAIL modified to meet ASTM D-4956 Type III or higher on 80 gauge 5052-H38
10/17/17	Updated to active voice.
08/27/19	New Design Engr PE Stamp.



STANDARD BARBED WIRE FENCE

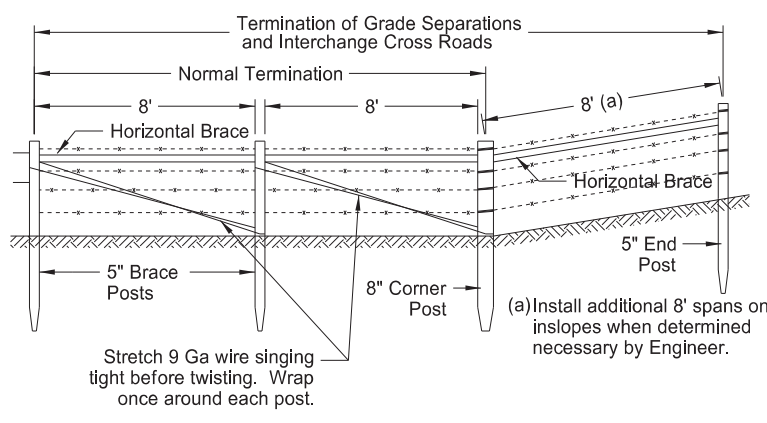


VEHICLE GATE

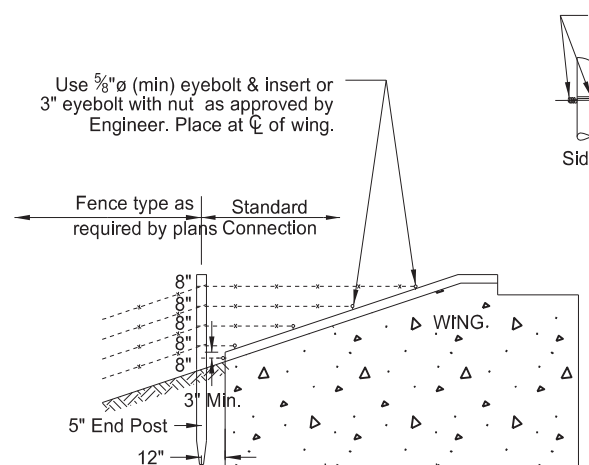


NOTES

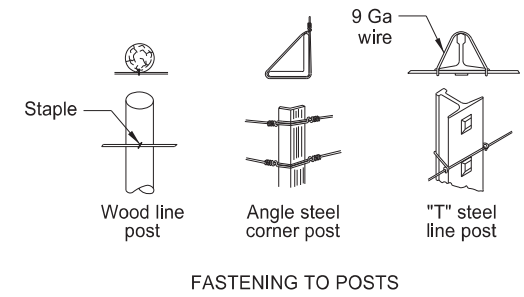
- No deduction in measured pay length of fence made for gates, corner assemblies, double brace assemblies, fence terminals, or depression fencing. Include all costs for abutment fencing in the price bid for fencing bid items.
- Install double brace assemblies at locations shown on the plans or established by the Engineer. Place adjacent fence terminals, corner assemblies, or double brace assemblies at a maximum spacing of 1,320 feet.
- Include all costs of furnishing and installing inserts and eyebolts in the unit price bid for fencing bid items. Use eyebolts galvanized according to AASHTO designation M-30; inserts of corrosion resistant material do not require galvanization. Use concrete inserts capable of developing the full strength of the 5/8" diameter threaded eyebolt, when installed in concrete.
- Determine post type used, either wood or steel, unless otherwise specified in the plans.
- Include the cost of bracing at vehicle gates in the price bid for "Vehicle Gate."



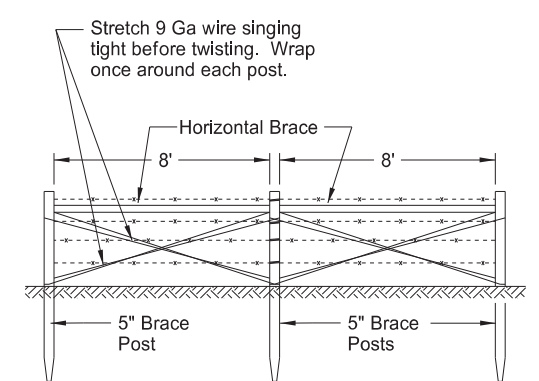
FENCE TERMINAL



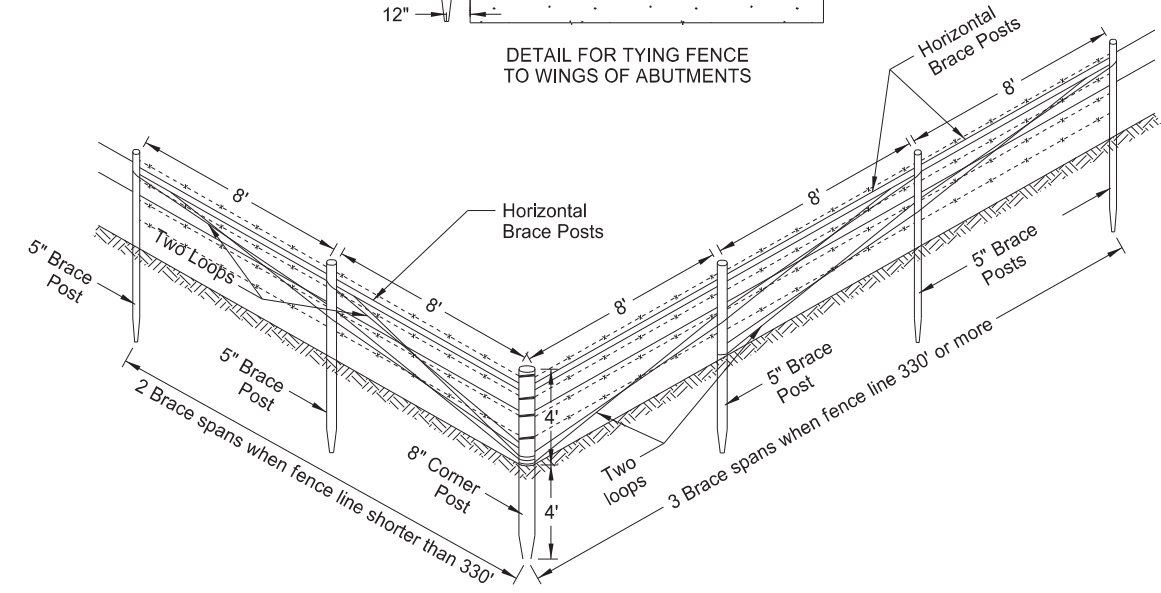
DETAIL FOR TYING FENCE TO WINGS OF ABUTMENTS



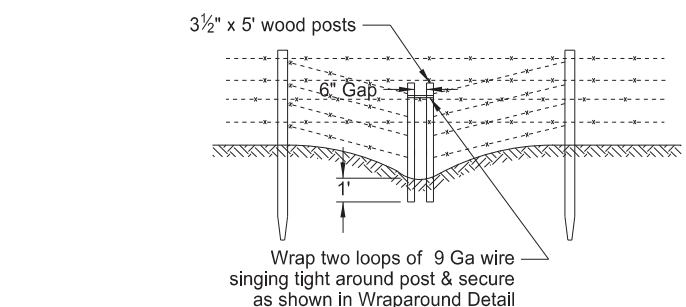
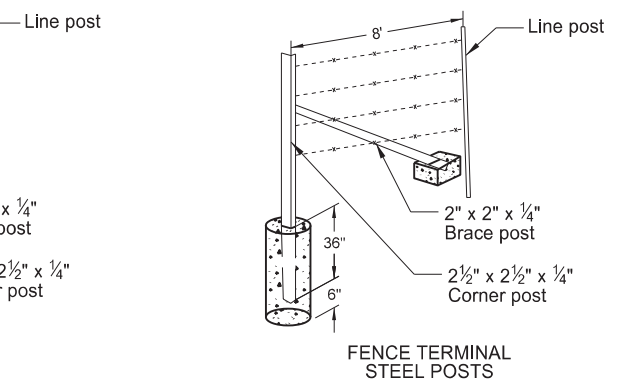
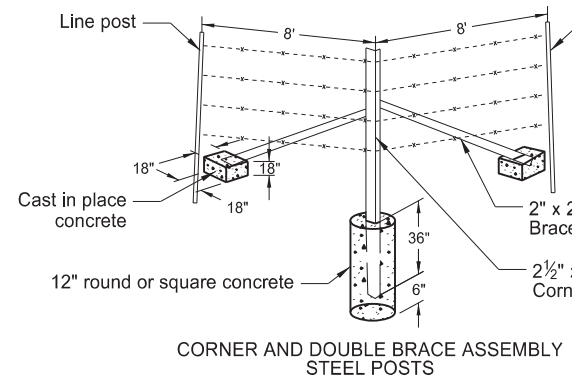
USE OF POST	TREATED WOOD		STEEL		
	Post dia.	Post length	Post length	Post wt. Lbs./Ft.	Anchor wt. Lbs.
Line post	3 1/2"	6'-6"	6'-6"	1.33	0.67
Corner post	8"	8'	7'	4.10	(Conc.)
End post	5"	8'			
Brace post	5"	8'	7'	3.19	(Conc.)
Gate post	5"	8'			
Horizontal brace	4"	8'	As approved by the Engineer		



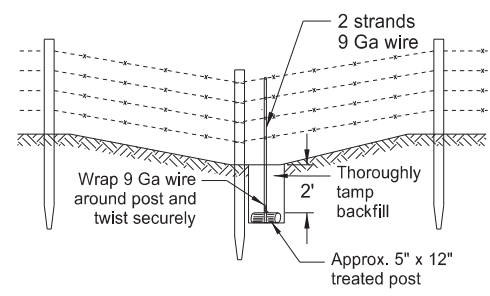
DOUBLE BRACE ASSEMBLY



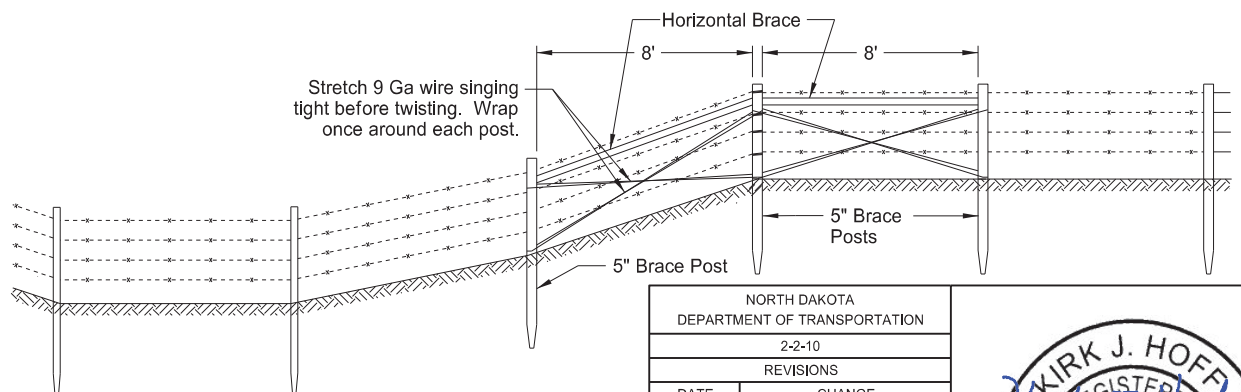
CORNER ASSEMBLY



BREAK-AWAY FENCE FOR NARROW DEPRESSIONS SUBJECT TO FLOODING



DETAIL FOR ANCHORING FENCES IN DEPRESSIONS*
 *Determine locations in the field and include in price bid for fencing. Use other methods of anchoring fence if approved by the Engineer.



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-2-10	
REVISIONS	
DATE	CHANGE
10-02-12	Notes, steel assemblies/posts.
11-25-13	Revised Vehicle Gate.
10-17-17	Updated to active voice.
02-23-23	Revised post spacing/brace size.

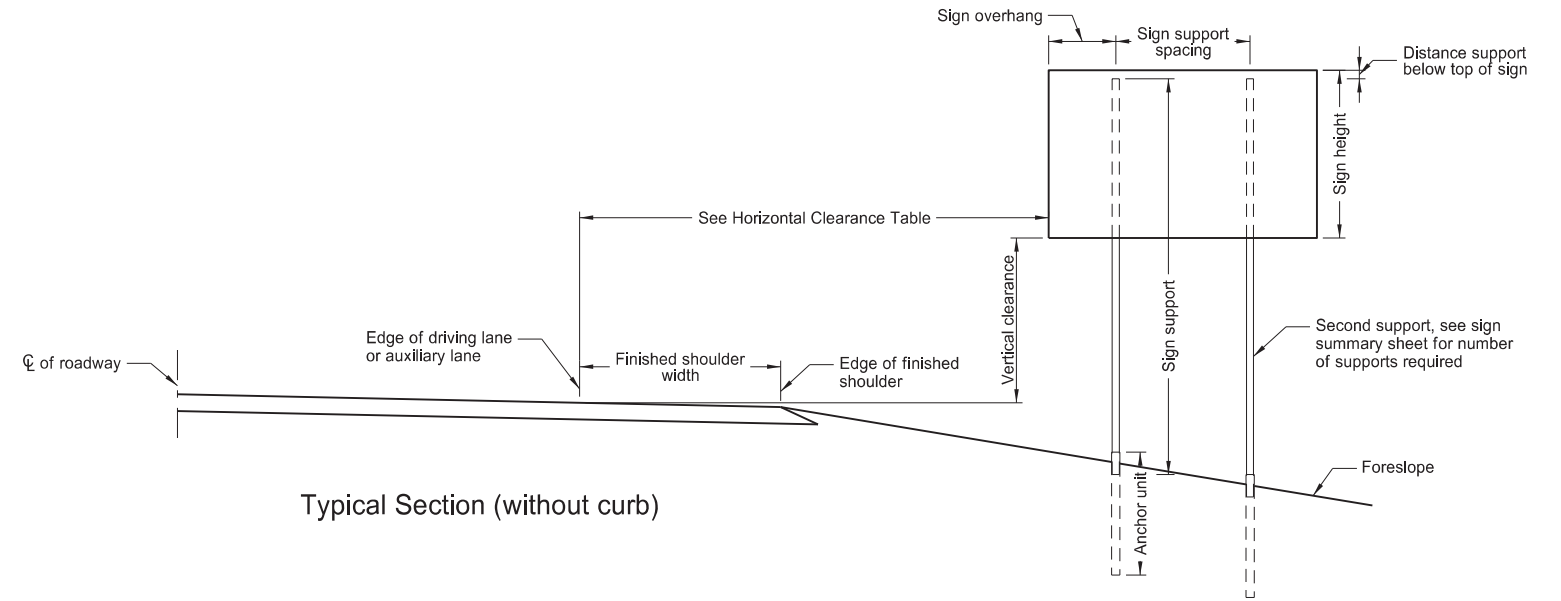


PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

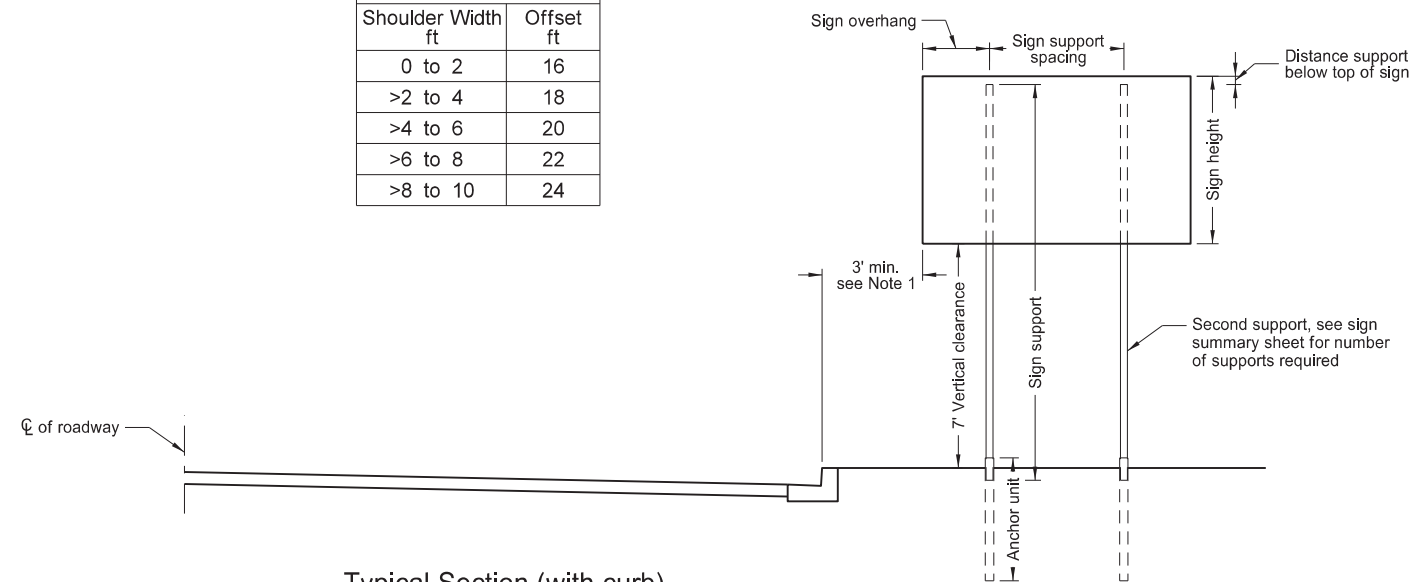
Notes:

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'.

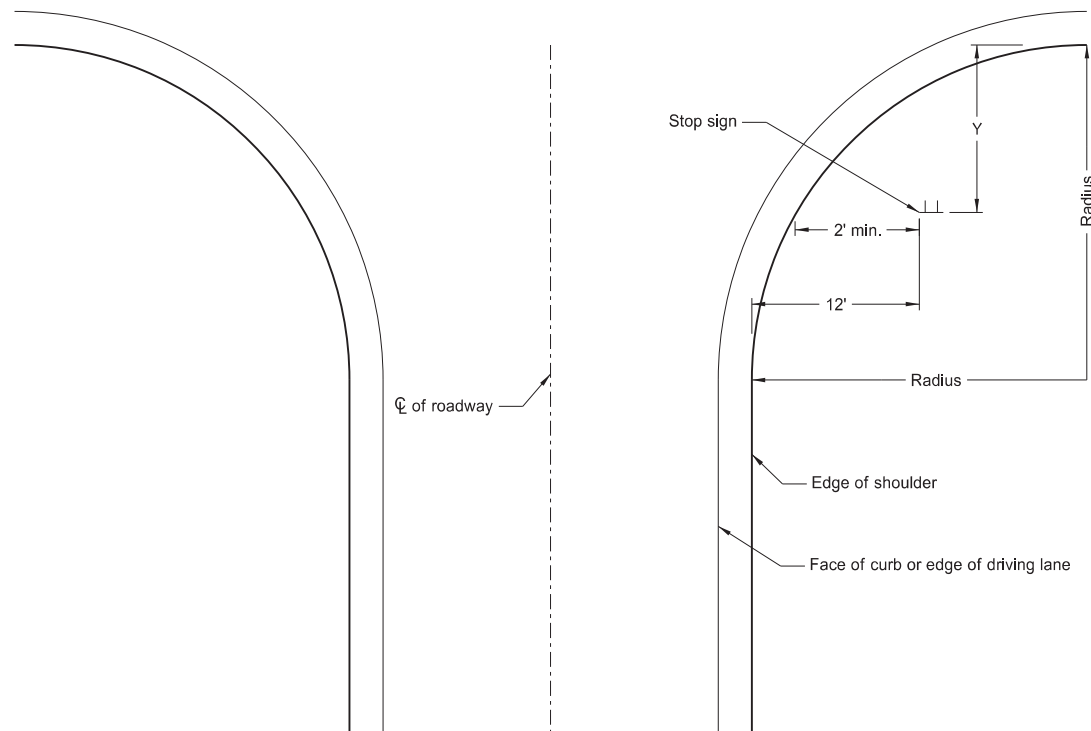


Typical Section (without curb)

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



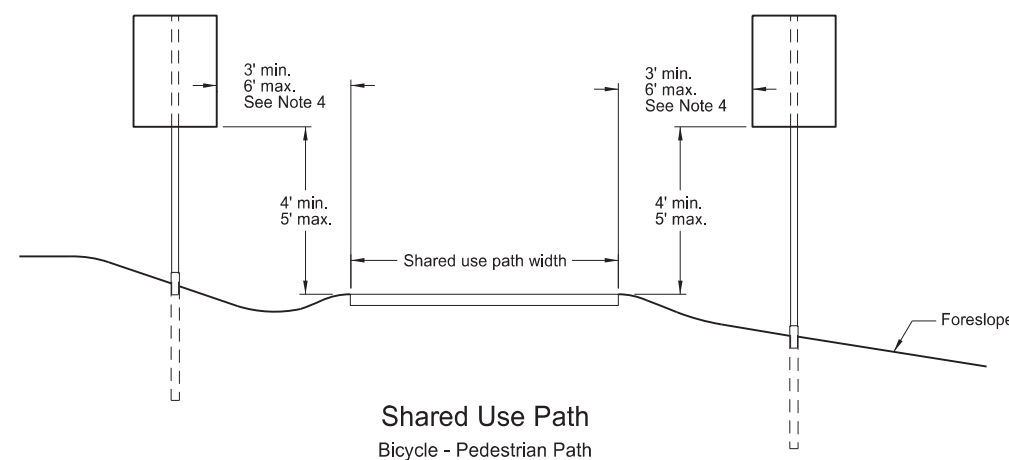
Typical Section (with curb)
Residential or Business District



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



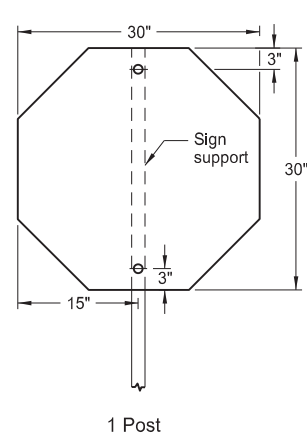
Shared Use Path
Bicycle - Pedestrian Path

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 volcs.
8-29-19	New Design Engineer PE Stamp.

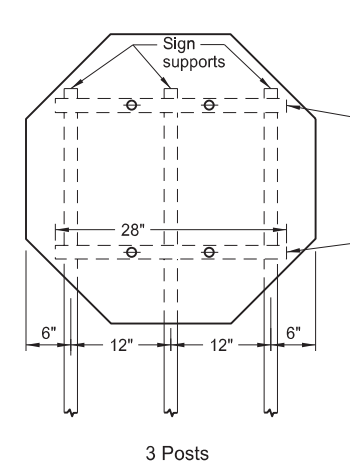
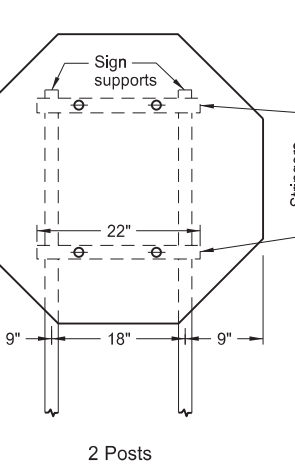
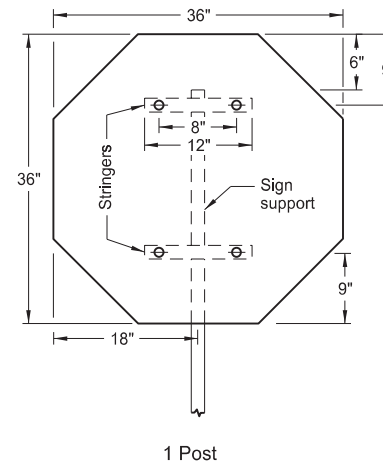
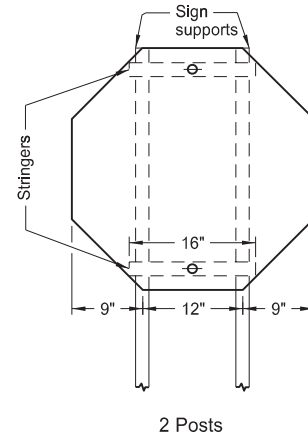
This document was originally issued and sealed by
 Kirk J Hoff,
 Registration Number
 PE- 4683,
 on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

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

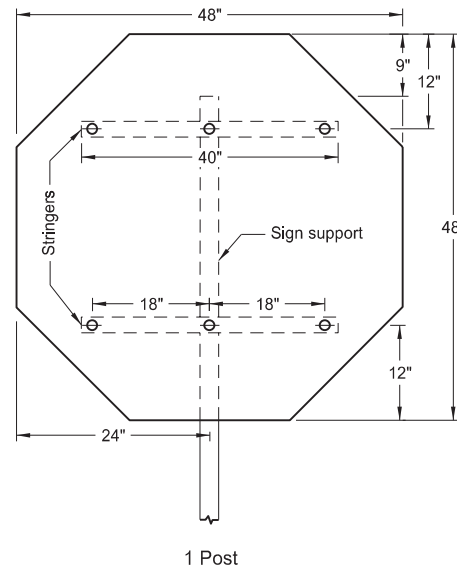
- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1½" x 1½" perforated square tube stringers.
 3. Punch holes round for ⅜" bolt.



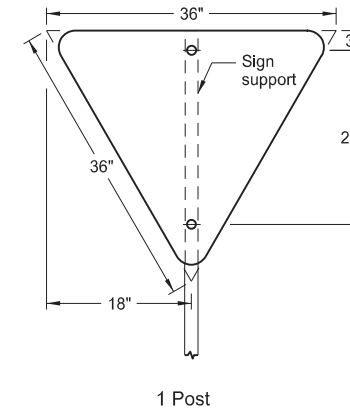
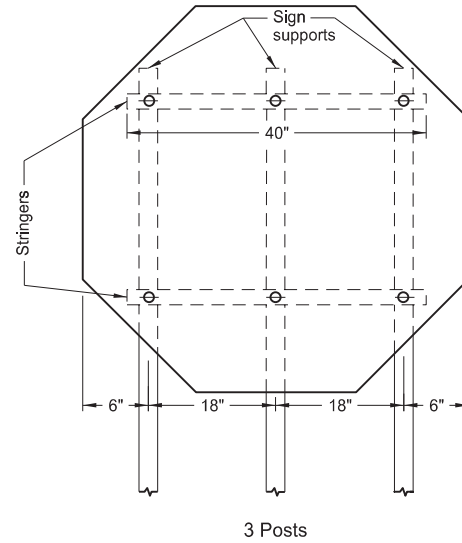
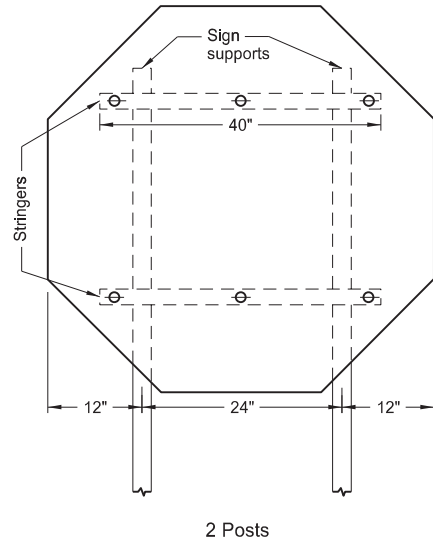
Assembly No. 1



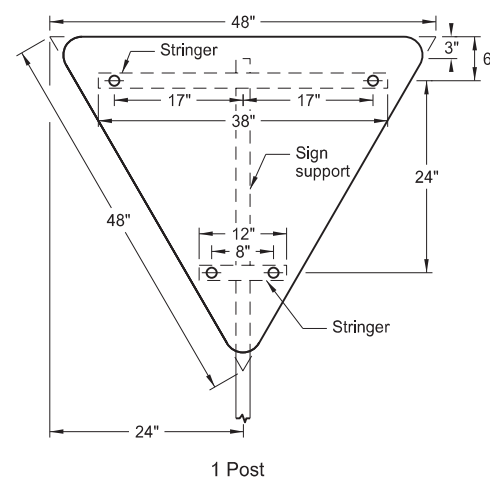
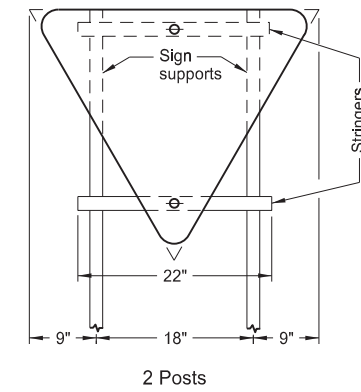
Assembly No. 2



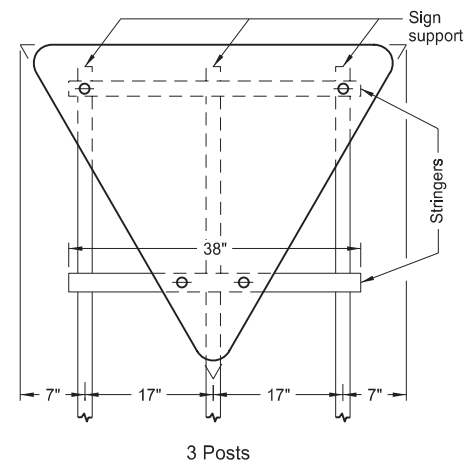
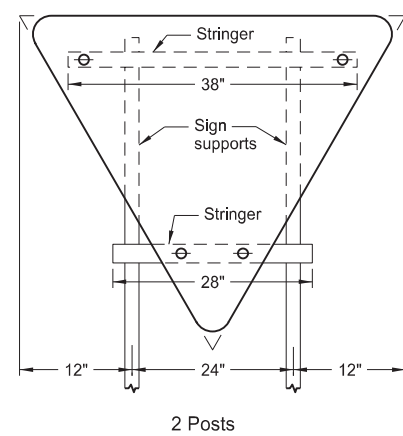
Assembly No. 3



Assembly No. 4



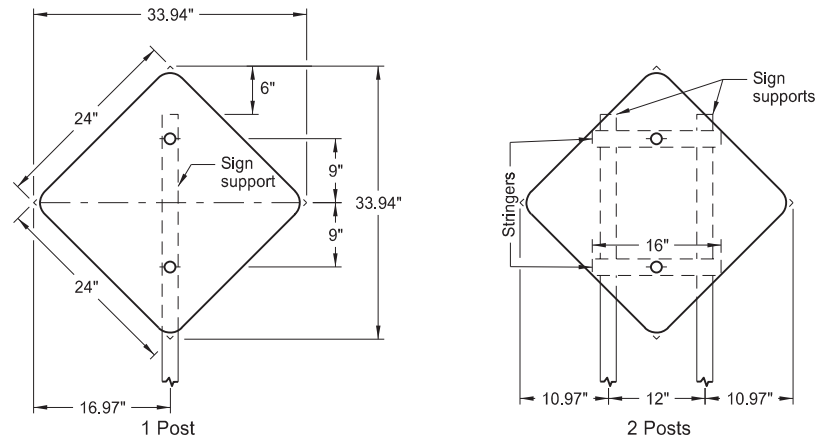
Assembly No. 5



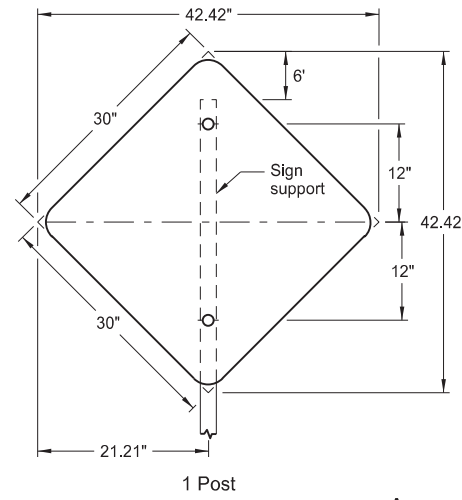
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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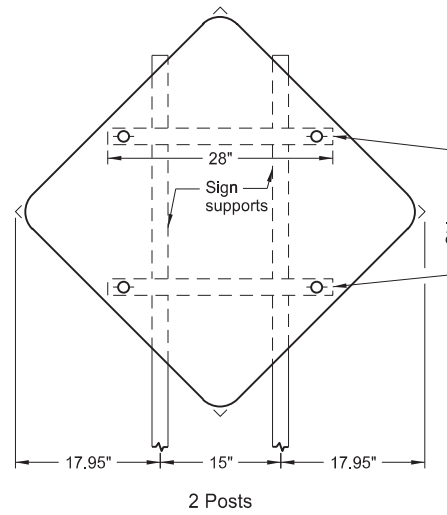
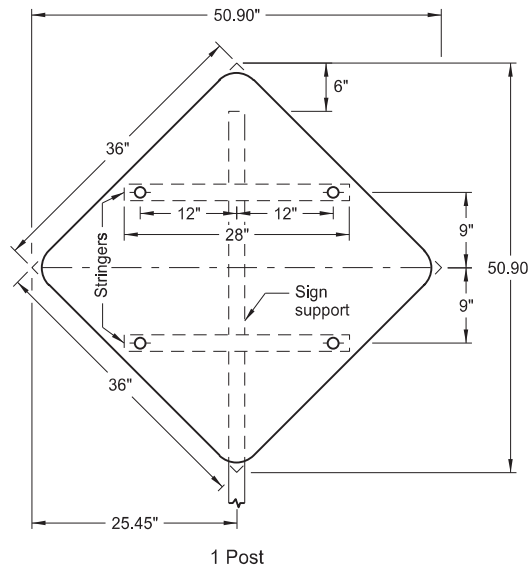
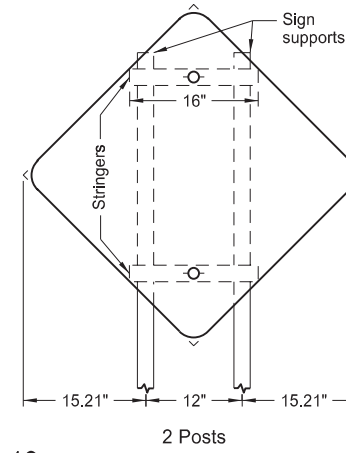
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



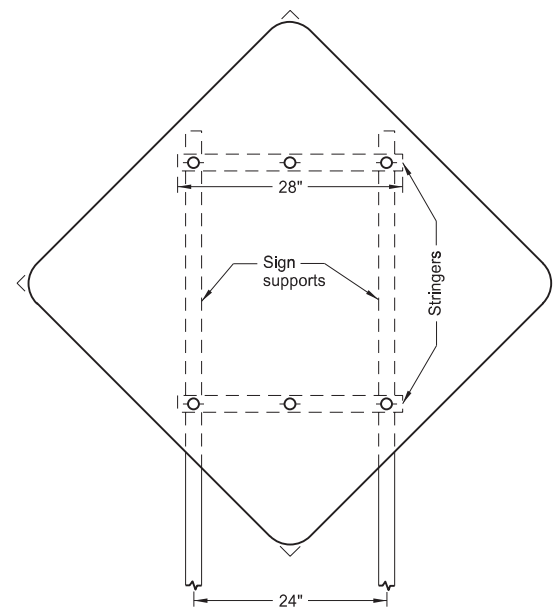
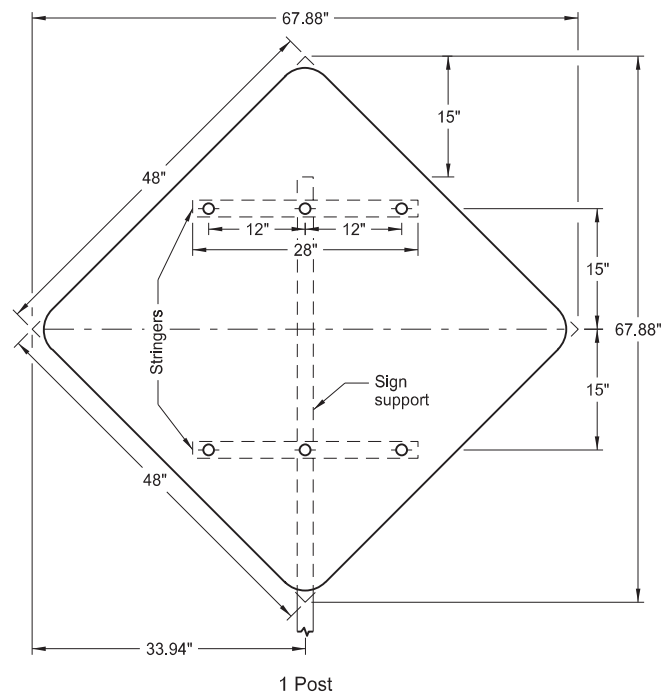
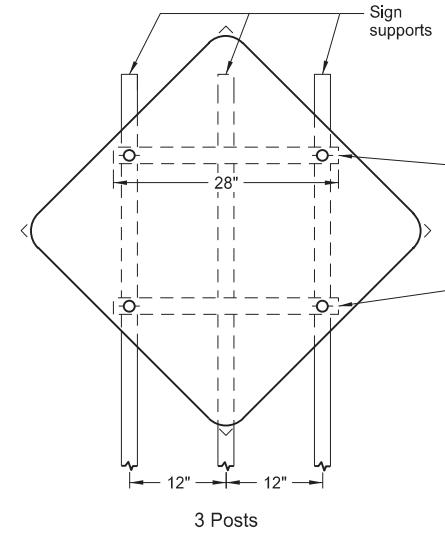
Assembly No. 18



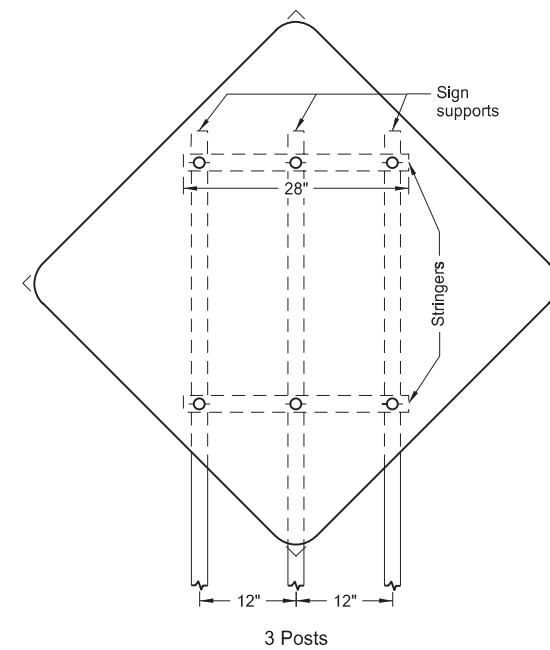
Assembly No. 19



Assembly No. 20



Assembly No. 21



Notes:

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

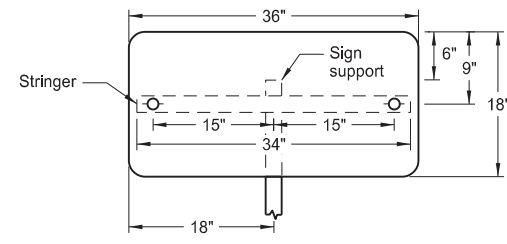
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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Registration Number
PE- 4683,
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS

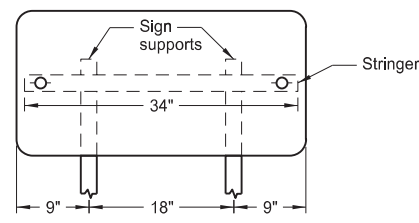
Notes:

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

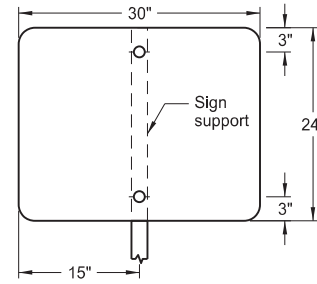


1 Post

Assembly No. 31

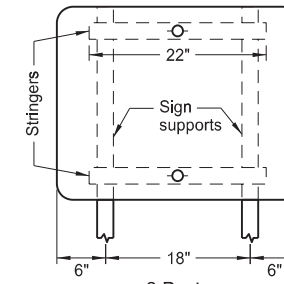


2 Posts

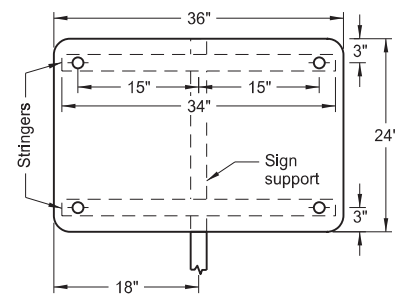


1 Post

Assembly No. 32

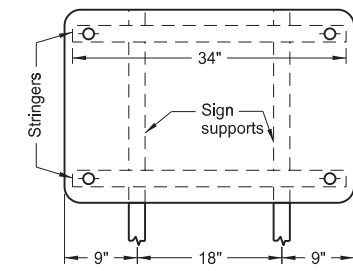


2 Posts

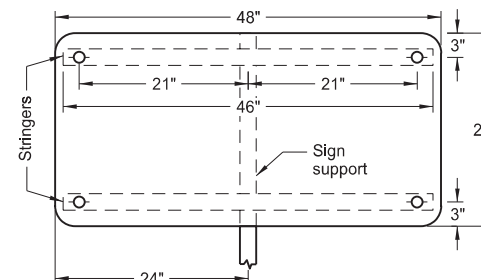


1 Post

Assembly No. 33

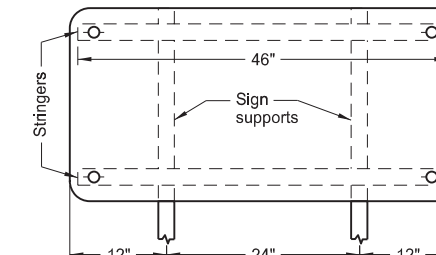


2 Posts

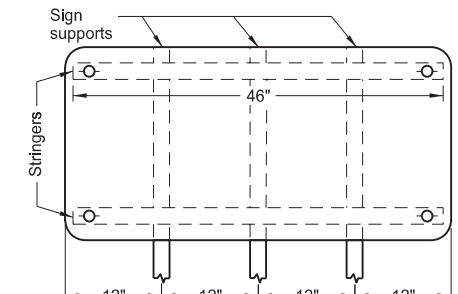


1 Post

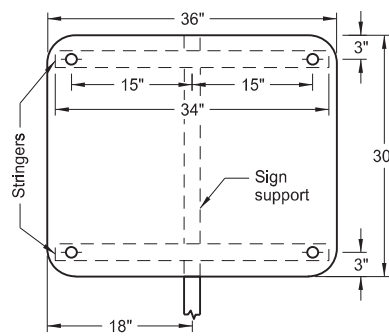
Assembly No. 34



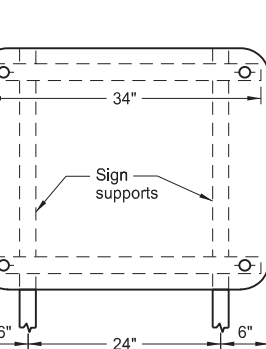
2 Posts



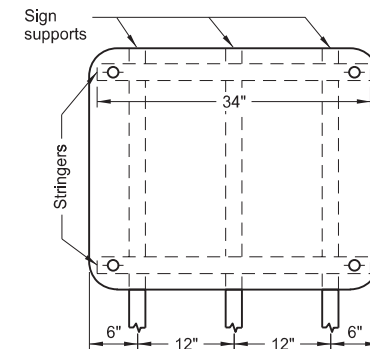
3 Posts



1 Post

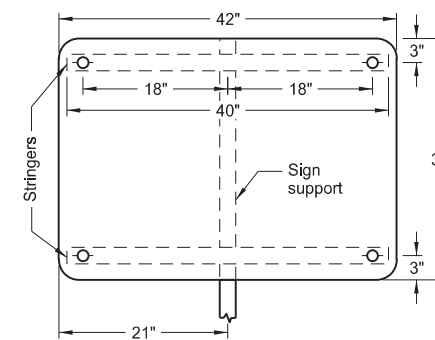


2 Posts

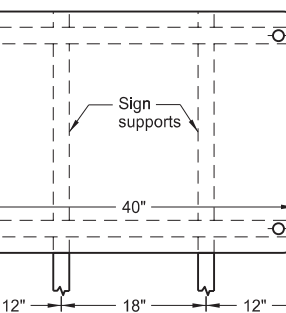


3 Posts

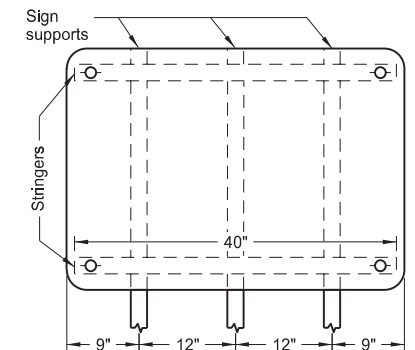
Assembly No. 35



1 Post

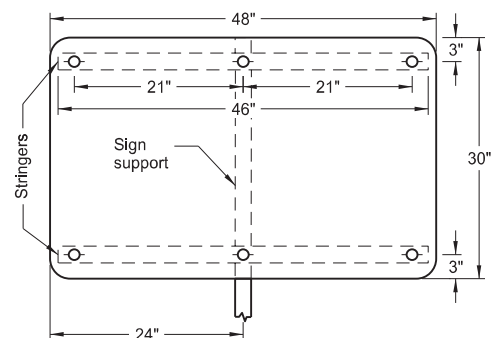


2 Posts

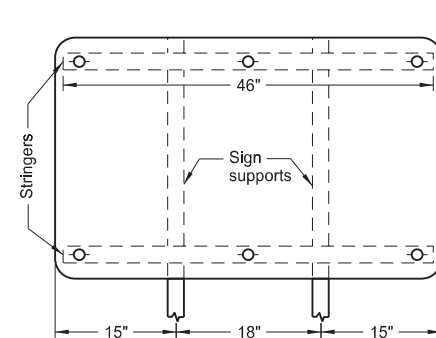


3 Posts

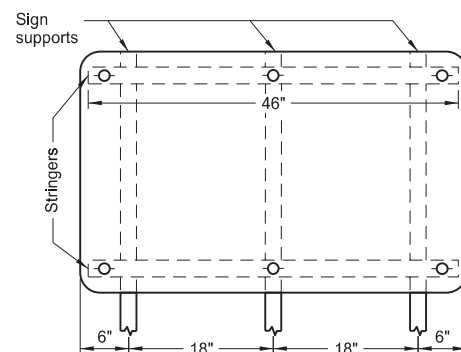
Assembly No. 36



1 Post



2 Posts



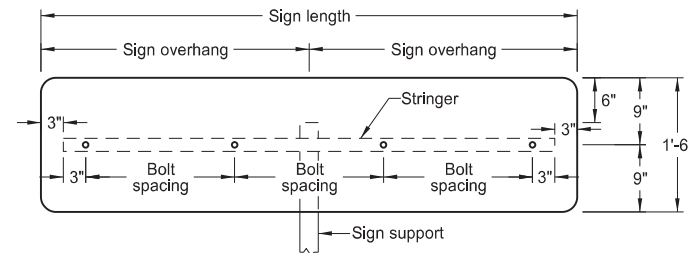
3 Posts

Assembly No. 37

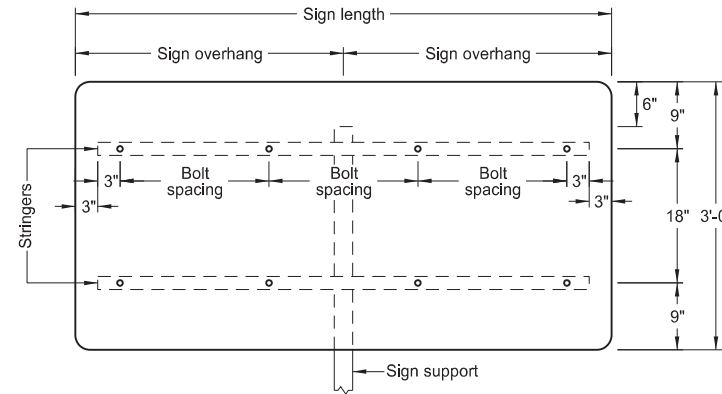
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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

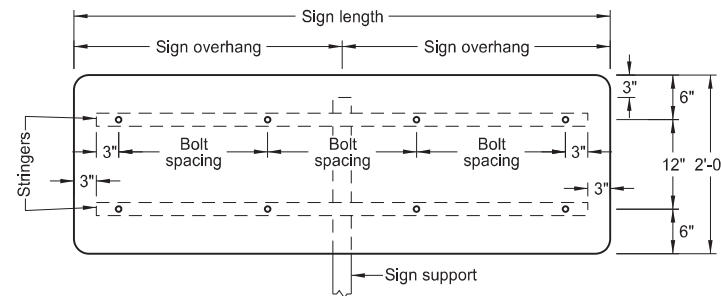
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



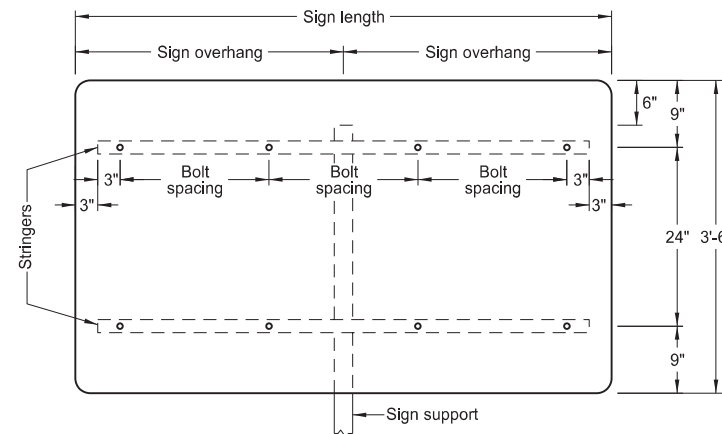
VARIES X 1'-6"



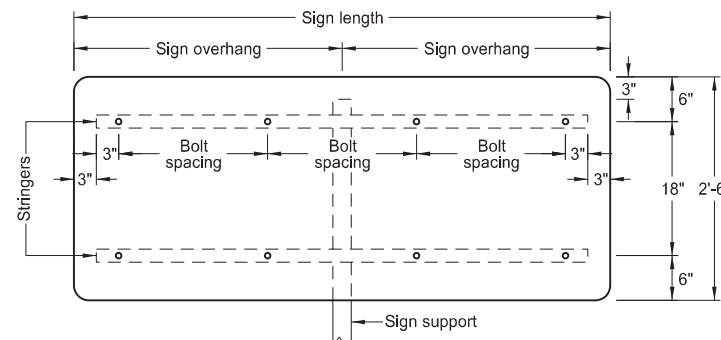
VARIES X 3'-0"



VARIES X 2'-0"



VARIES X 3'-6"



VARIES X 2'-6"

1 POST		
Sign Length	Sign Overhang	Bolt Spacing
4'-0"	2'-0"	18"
4'-6"	2'-3"	21"
5'-0"	2'-6"	24"
5'-6"	2'-9"	18"
6'-0"	3'-0"	20"
6'-6"	3'-3"	22"
7'-0"	3'-6"	24"
7'-6"	3'-9"	2-20" & 2-19"
8'-0"	4'-0"	21"
8'-6"	4'-3"	2-22" & 2-23"
9'-0"	4'-6"	24"
9'-6"	4'-9"	4-20" & 1-22"
10'-0"	5'-0"	2-21" & 3-22"
10'-6"	5'-3"	4-23" & 1-22"
11'-0"	5'-6"	24"
11'-6"	5'-9"	21"
12'-0"	6'-0"	22"

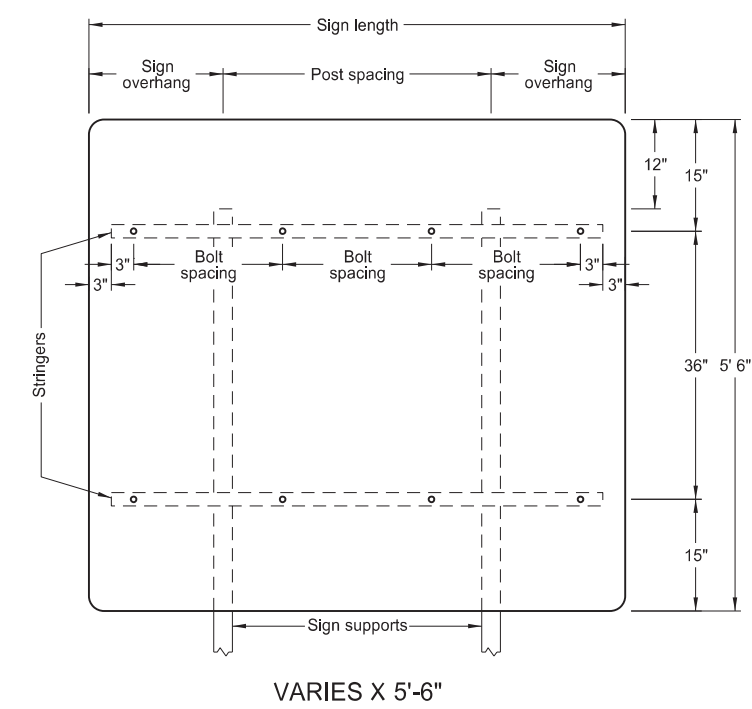
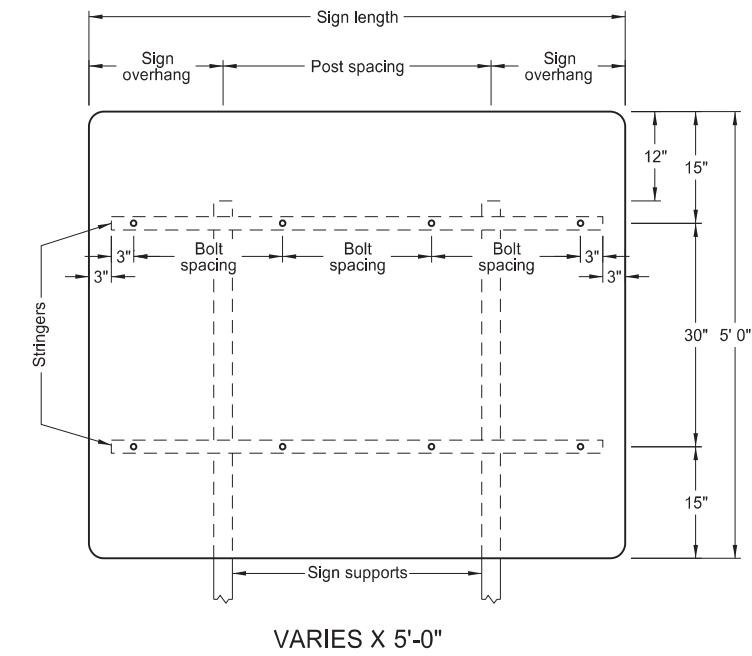
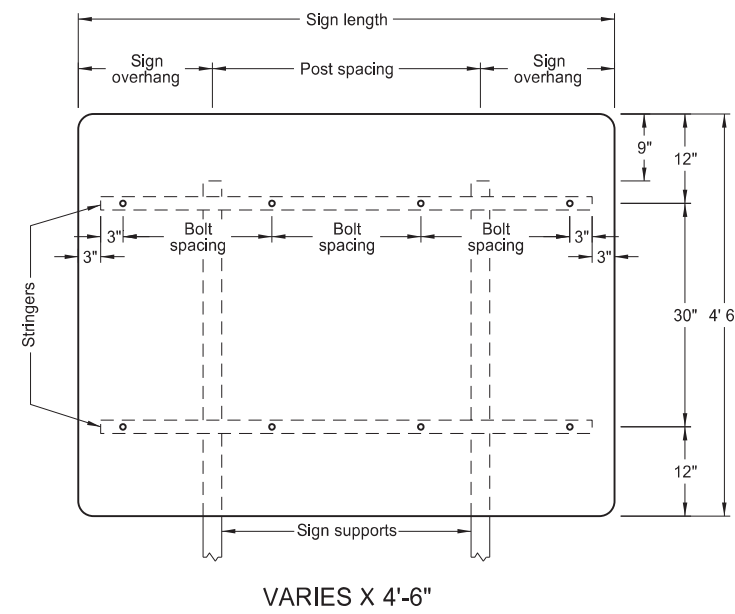
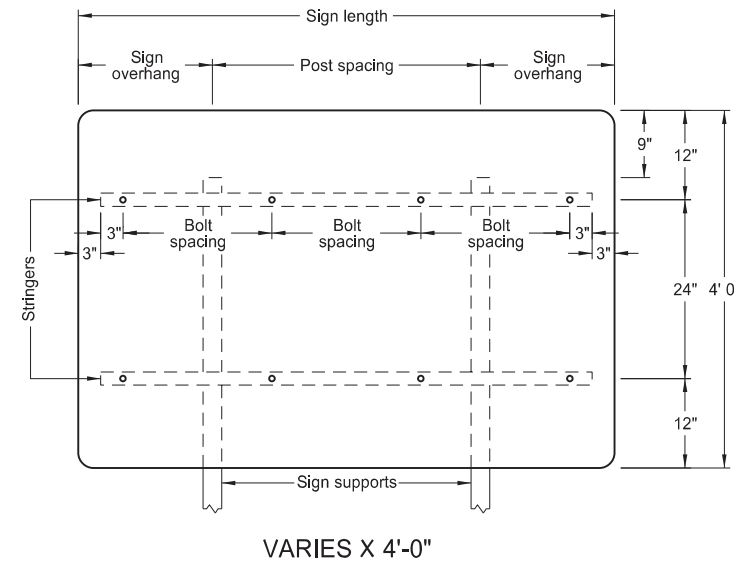
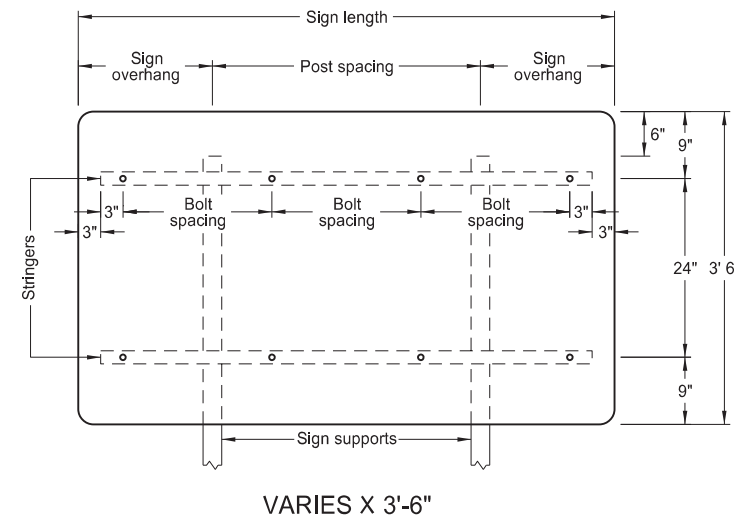
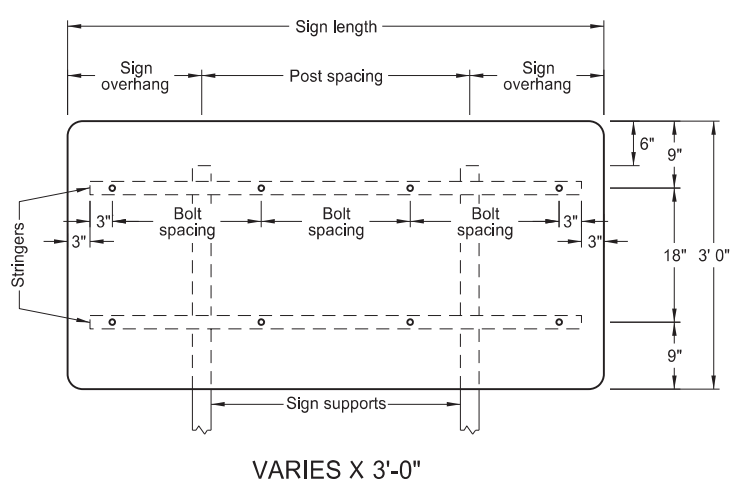
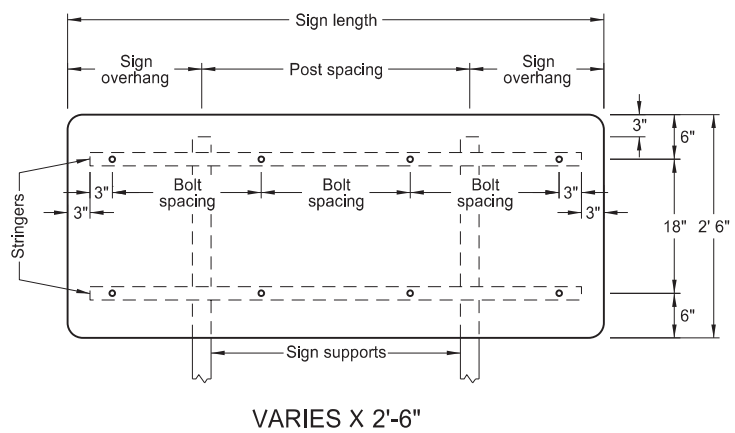
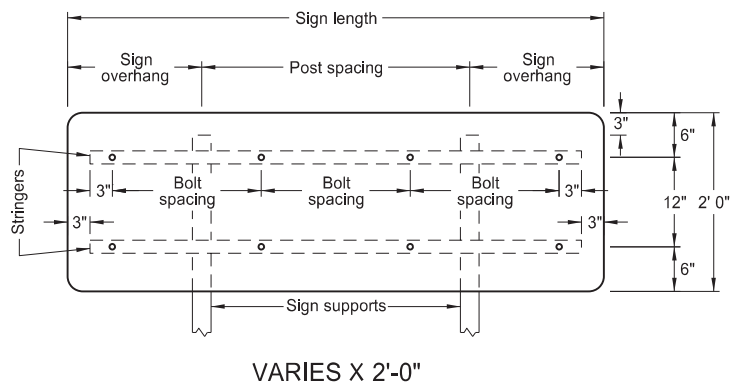
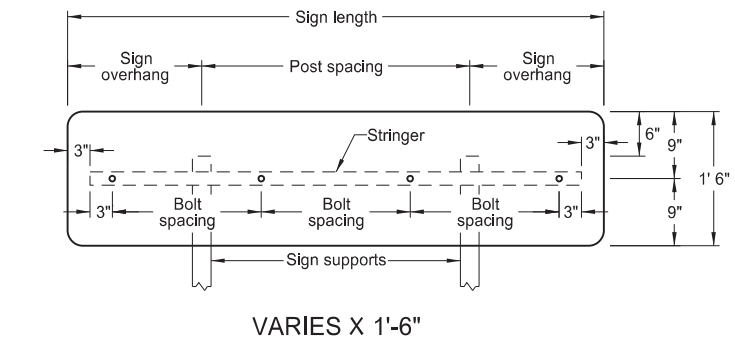
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.
4. Attach single stringer to single post signs with special stringer angle, shown on "Mounting Details Perforated Tube" standard drawing.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engr PE Stamp.

This document was originally issued and sealed by
 Kirk J Hoff,
 Registration Number
 PE- 4683,
 on 9/04/19 and the original document is stored at the
 North Dakota Department
 of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



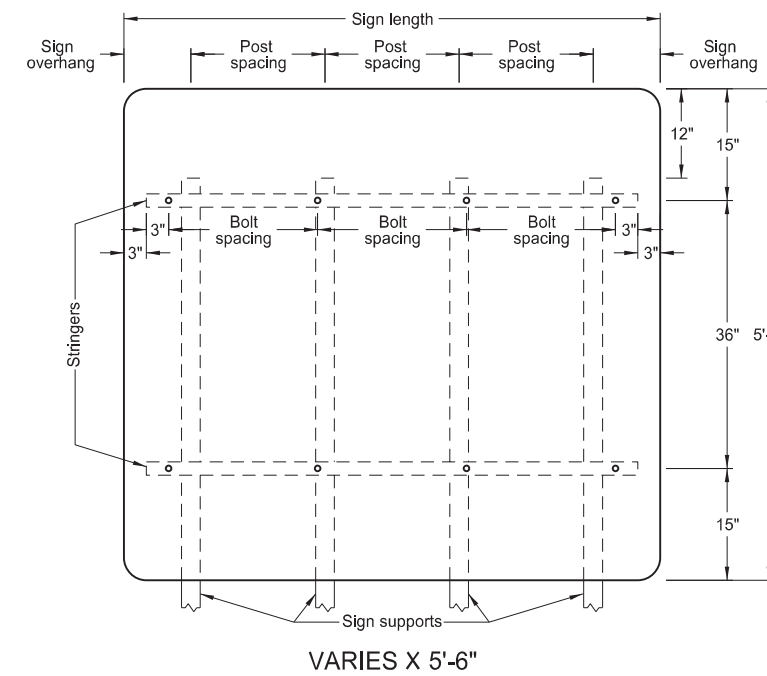
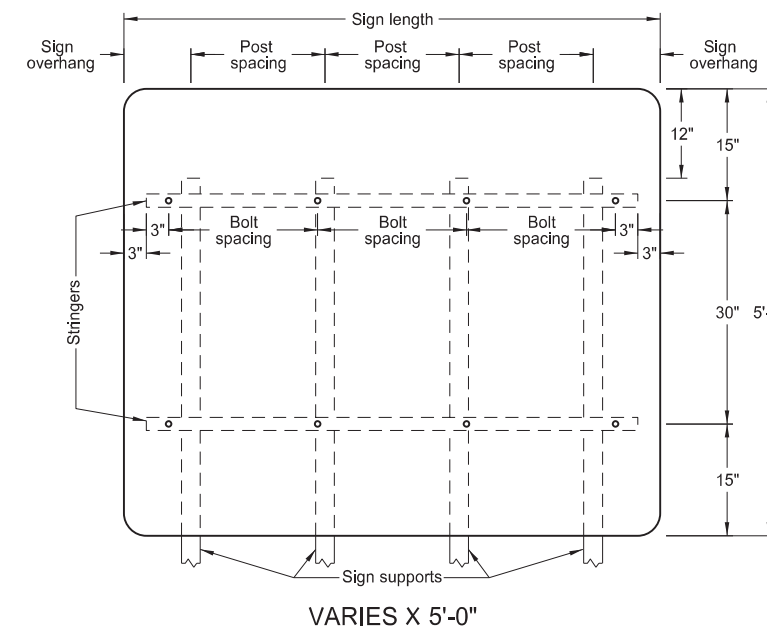
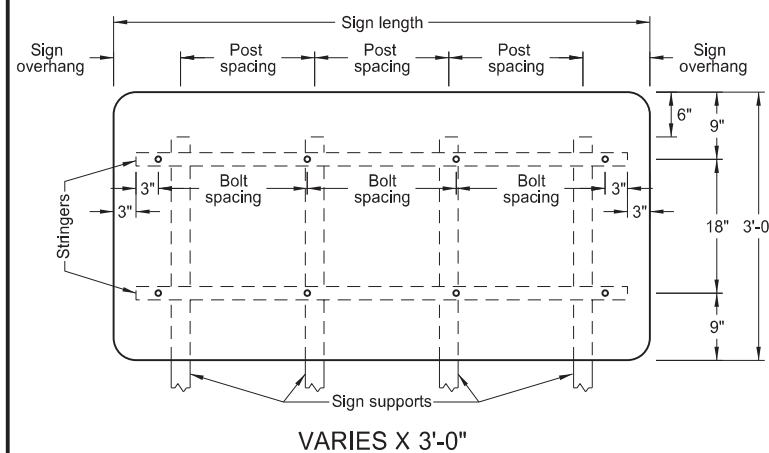
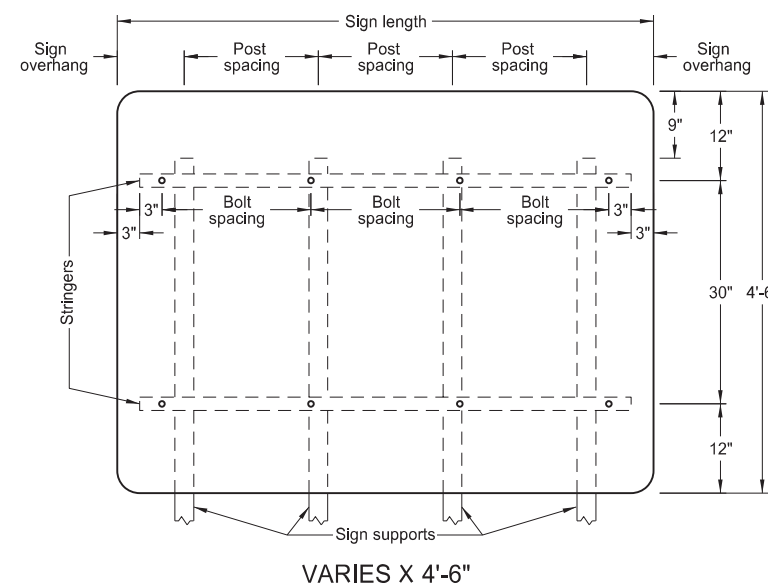
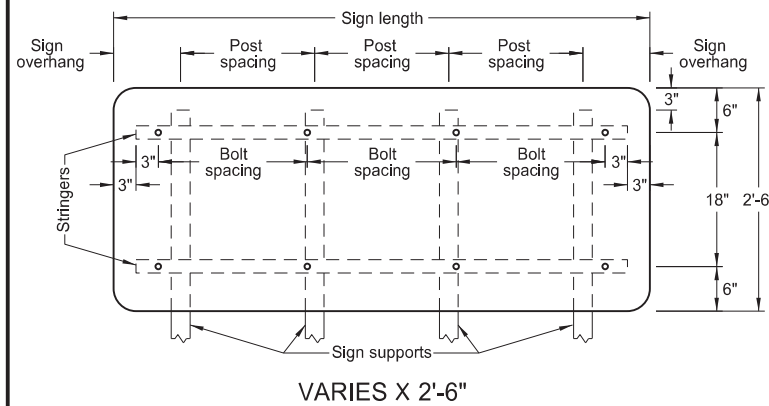
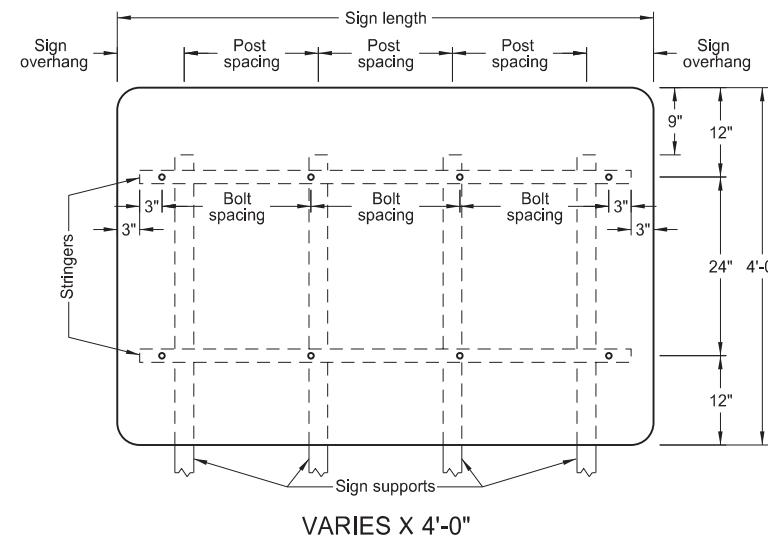
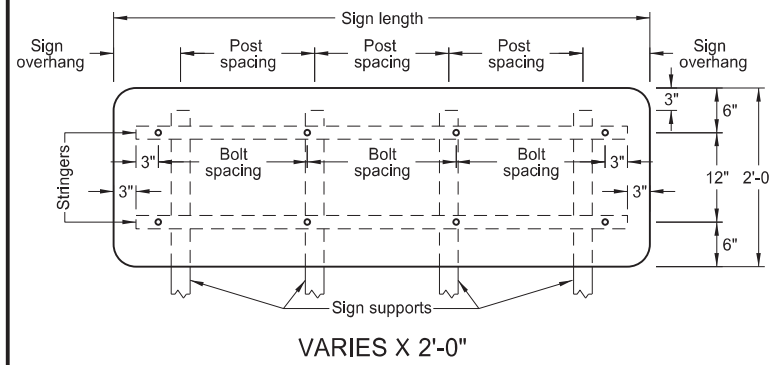
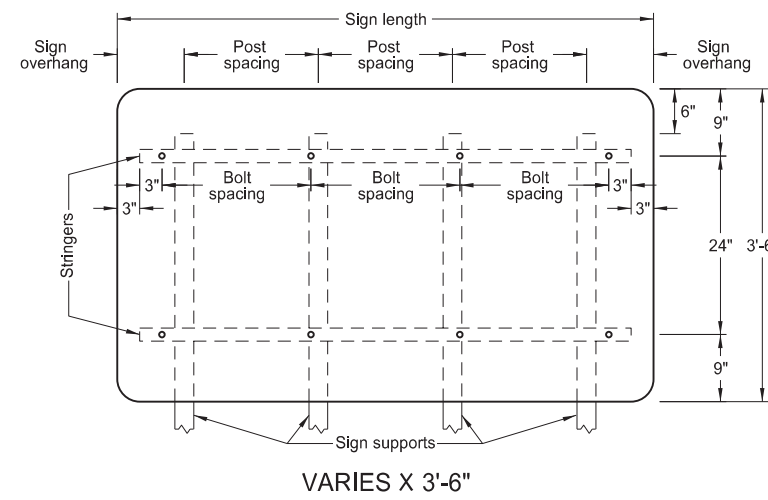
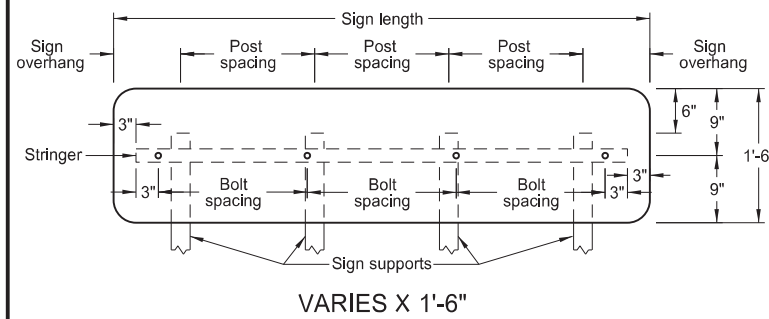
2 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
4'-0"	1'-0"	2'-0"	18"
4'-6"	1'-3"	2'-0"	21"
5'-0"	1'-0"	3'-0"	24"
5'-6"	1'-3"	3'-0"	18"
6'-0"	1'-6"	3'-0"	20"
6'-6"	1'-3"	4'-0"	22"
7'-0"	1'-6"	4'-0"	24"
7'-6"	1'-9"	4'-0"	2-20" & 2-19"
8'-0"	2'-0"	4'-0"	21"
8'-6"	1'-9"	5'-0"	2-22" & 2-23"
9'-0"	2'-0"	5'-0"	24"
9'-6"	1'-9"	6'-0"	4-20" & 1-22"
10'-0"	2'-0"	6'-0"	2-21" & 3-22"
10'-6"	2'-3"	6'-0"	4-23" & 1-22"
11'-0"	2'-6"	6'-0"	24"
11'-6"	2'-9"	6'-0"	21"
12'-0"	2'-0"	8'-0"	22"
12'-6"	2'-3"	8'-0"	23"
13'-0"	2'-6"	8'-0"	24"
13'-6"	2'-9"	8'-0"	3-22" & 4-21"
14'-0"	3'-0"	8'-0"	2-23" & 5-22"
14'-6"	3'-3"	8'-0"	6-23" & 1-24"
15'-0"	3'-6"	8'-0"	24"
15'-6"	2'-9"	10'-0"	6-22" & 2-21"
16'-0"	3'-0"	10'-0"	4-23" & 4-22"
16'-6"	3'-3"	10'-0"	6-23" & 2-24"
17'-0"	3'-6"	10'-0"	24"
17'-6"	3'-9"	10'-0"	22"
18'-0"	3'-0"	12'-0"	6-23" & 3-22"
18'-6"	3'-3"	12'-0"	6-23" & 3-24"
19'-0"	3'-6"	12'-0"	24"
19'-6"	3'-9"	12'-0"	8-22" & 2-23"
20'-0"	4'-0"	12'-0"	8-23" & 2-22"

- Notes:
1. Use 0.100 inch minimum thickness sign backing material.
 2. Use 1 1/2" x 1 1/2" perforated square tube stringers.
 3. Punch holes round for 3/8" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.

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 Registration Number
 PE- 4683,
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 of Transportation

SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR VARIABLE LENGTH SIGNS



4 POSTS			
Sign Length	Sign Overhang	Post Spacing	Bolt Spacing
8'-6"	0'-3"	2'-8"	2-22" & 2-23"
9'-0"	0'-6"	2'-8"	24"
9'-6"	0'-9"	2'-8"	4-20" & 1-22"
10'-0"	1'-0"	2'-8"	2-21" & 3-22"
10'-6"	1'-3"	2'-8"	4-23" & 1-22"
11'-0"	1'-0"	3'-0"	24"
11'-6"	0'-6"	3'-6"	21"
12'-0"	0'-6"	3'-8"	22"
12'-6"	0'-6"	3'-10"	23"
13'-0"	0'-6"	4'-0"	24"
13'-6"	1'-3"	3'-8"	3-22" & 4-21"
14'-0"	1'-6"	3'-8"	2-23" & 5-22"
14'-6"	1'-3"	4'-0"	6-23" & 1-24"
15'-0"	1'-6"	4'-0"	24"
15'-6"	1'-0"	4'-6"	6-22" & 2-21"
16'-0"	1'-0"	4'-8"	4-23" & 4-22"
16'-6"	1'-0"	4'-10"	6-23" & 2-24"
17'-0"	1'-0"	5'-0"	24"
17'-6"	0'-6"	5'-6"	22"
18'-0"	2'-0"	4'-8"	6-23" & 3-22"
18'-6"	1'-9"	5'-0"	6-23" & 3-24"
19'-0"	0'-6"	6'-0"	24"
19'-6"	3'-0"	4'-6"	8-22" & 2-23"
20'-0"	3'-0"	4'-8"	8-23" & 2-22"

Notes:

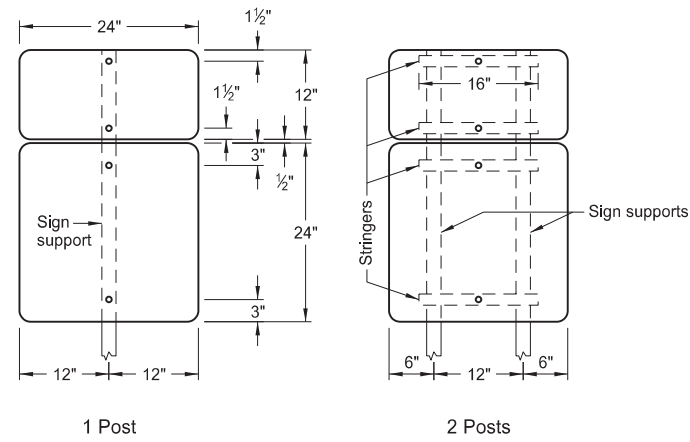
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.

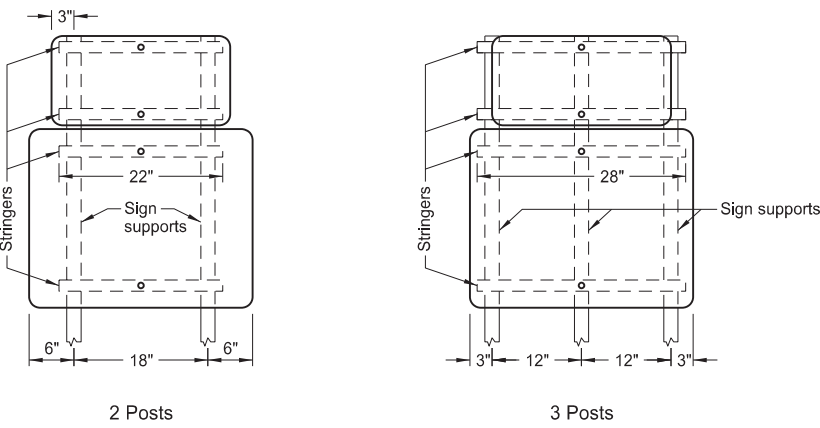
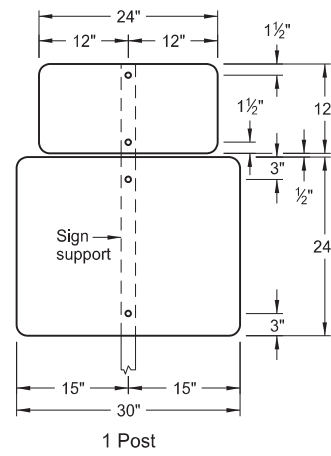
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS - ROUTE MARKER SIGNS

D-754-51



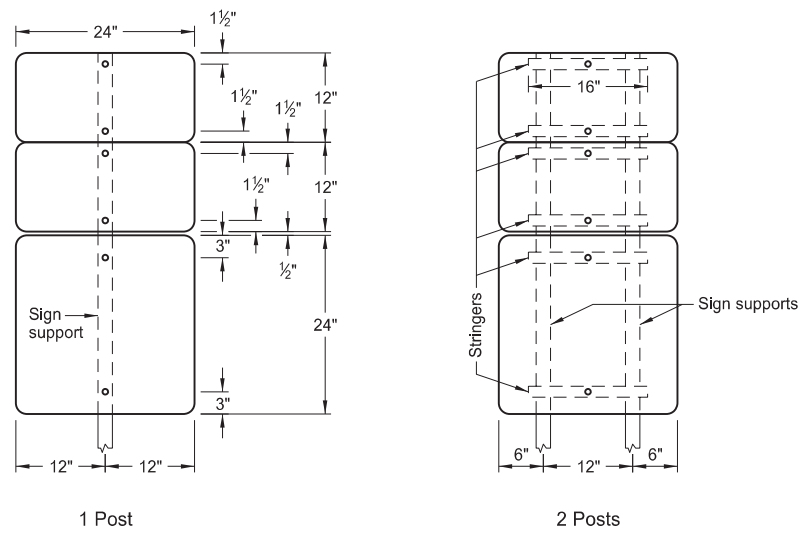
ASSEMBLY NO. 371



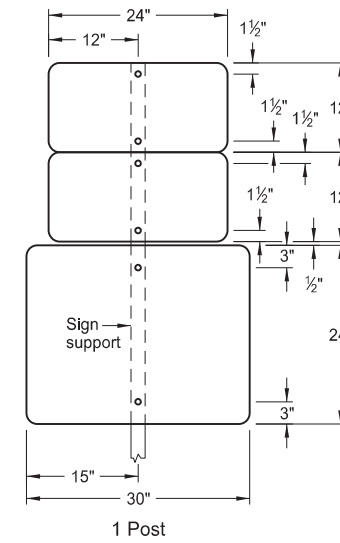
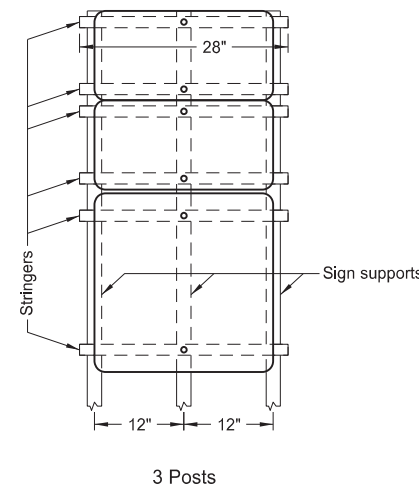
ASSEMBLY NO. 372

Notes:

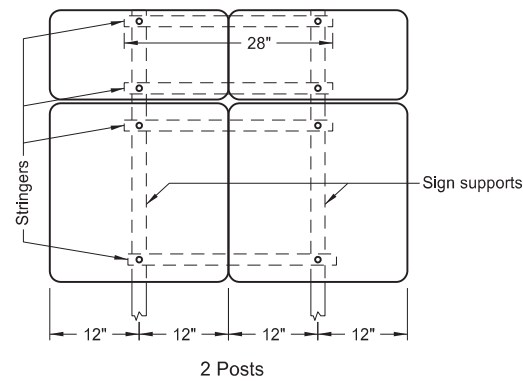
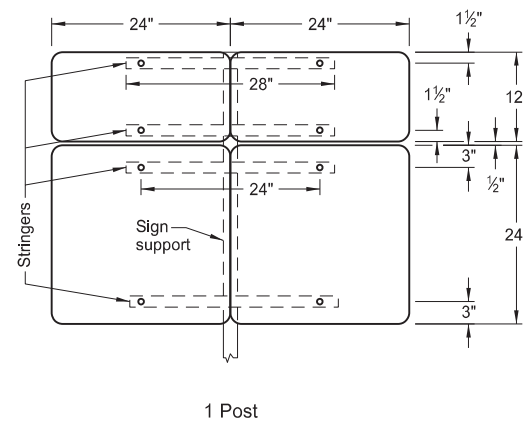
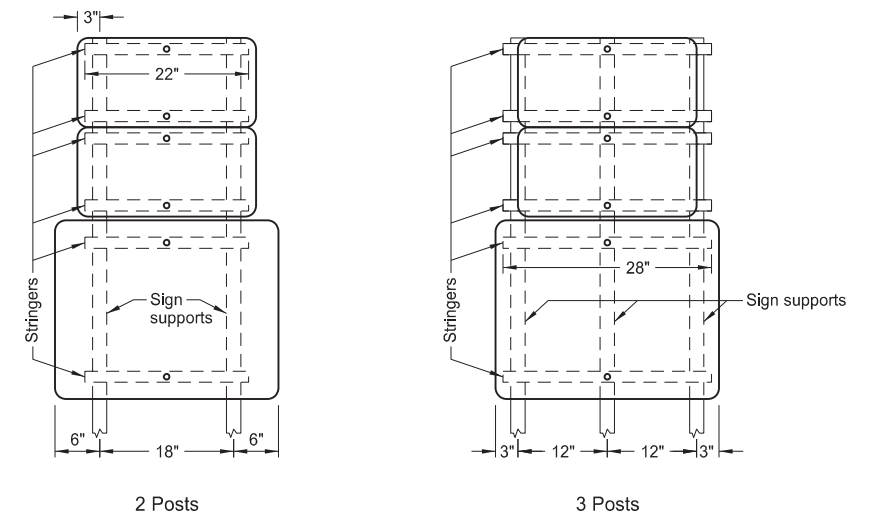
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1 1/2"x1 1/2" perforated square tube stringers.
3. Punch holes round for 3/8" bolt.



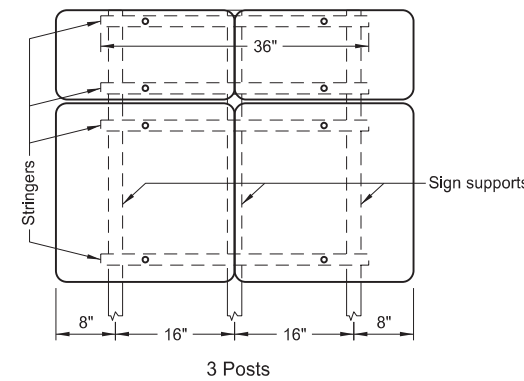
ASSEMBLY NO. 373



ASSEMBLY NO. 374



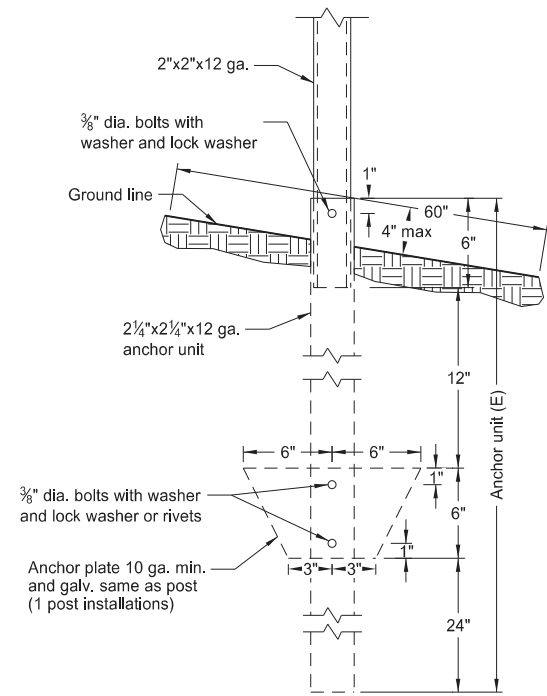
ASSEMBLY NO. 375



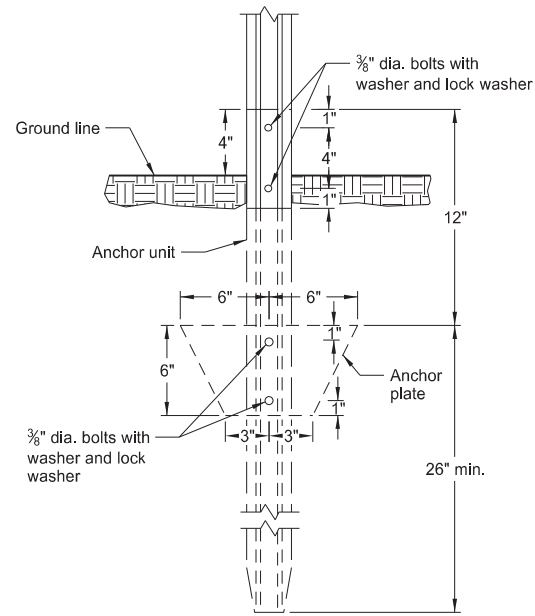
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
9-04-19	New Design Engineer PE Stamp.

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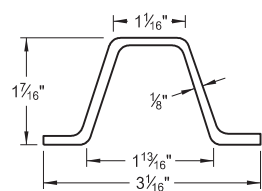
OBJECT MARKERS



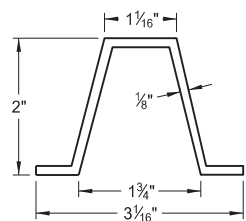
Perforated Tube Anchor Unit Assembly



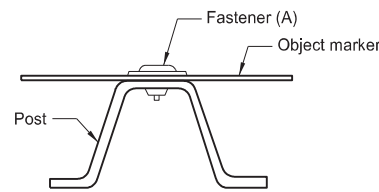
U-Channel Anchor Unit Assembly



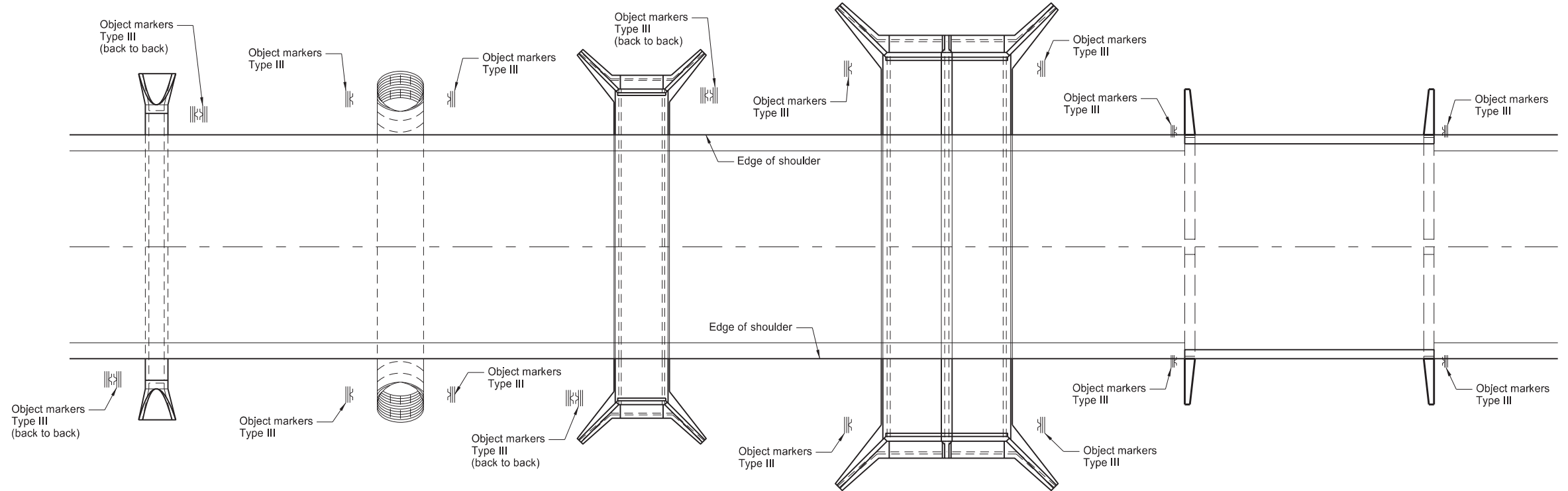
Steel Post Detail
 Approx. 2 lb/ft



Aluminum Post Detail
 Approx. 0.88 lb/ft



Fastener Detail



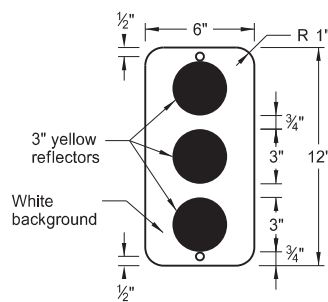
Pipe Culverts
 10' max

Pipe Culverts
 greater than 10'

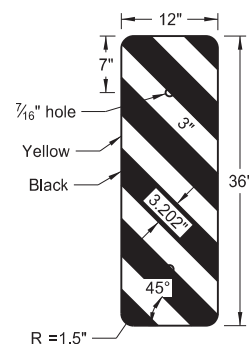
Box Culverts
 10' max

Box Culverts
 greater than 10'

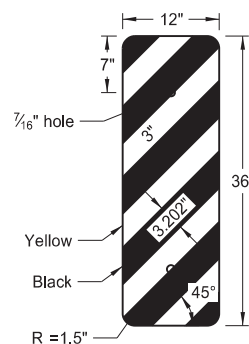
Bridges (B)



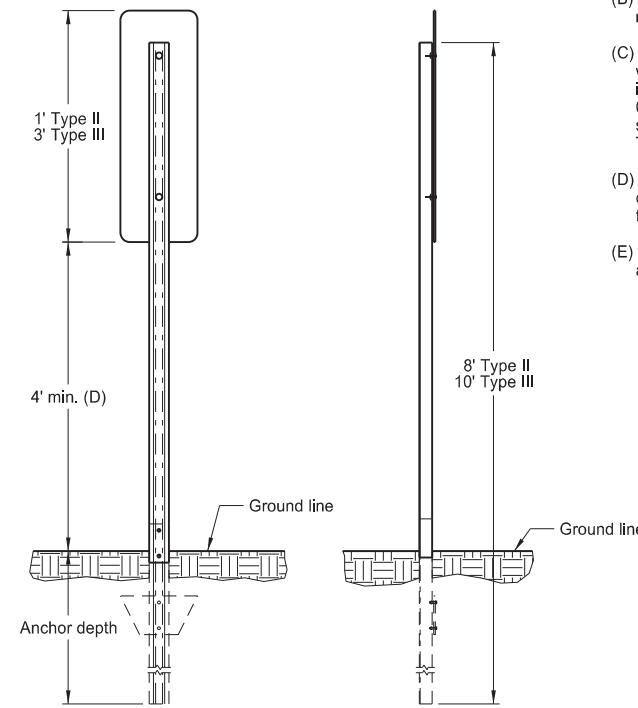
Object Marker
 OM2-1V (C)
 Type II



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



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



Object Marker
 Installation Detail

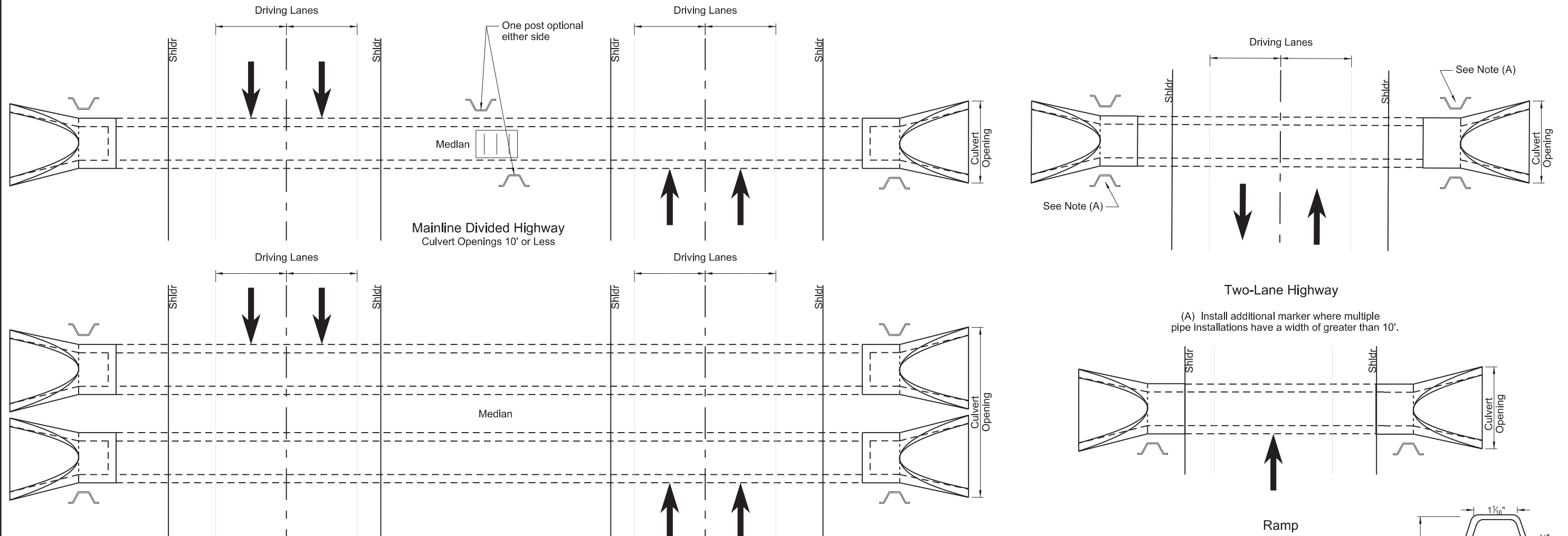
Notes:

- (A) Use 3/8" dia. tension pin type or other non-rust vandal resistant fastener with min. outside dia. 1 3/16" flat washer.
- (B) At locations of approach guardrail with reflectors and end terminal with impact head object markers, do not install object markers.
- (C) Use two object markers for back to back mountings. On bridges where the distance between wheel guards is less than the approach width, mount object markers vertically on steel posts in front of the bridge railing on each side of highway to mark the horizontal clearance. Use 0.100" minimum thickness sheet aluminum for sign backing material. Use ASTM Type XI sheeting for Type III object markers and ASTM Type IV background sheeting with ASTM Type XI reflectors for Type II object markers.
- (D) When object marker is located 8' or less from shoulder or curb, provide 4' minimum vertical clearance from near edge of traveled way to bottom of sign. When located more than 8' from shoulder or curb provide 4' minimum vertical clearance from ground to bottom of sign.
- (E) Use 4" vertical clearance for anchor or breakaway base. Provide 4"x60" measurement above and below post location and back and ahead of post.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
7-18-14	Revised Note C
8-30-18	Updated notes to active voice and removed note.
9-05-19	New Design Engineer PE Stamp.

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OBJECT MARKERS - CULVERTS

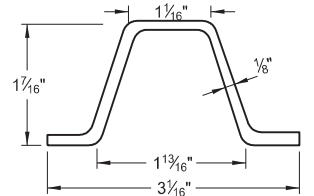


Post Location

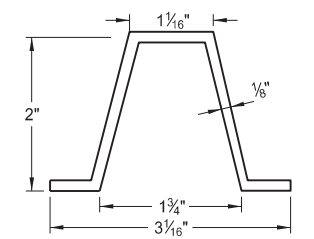
Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations

Top 12 inches painted black

Top 12 inches painted black



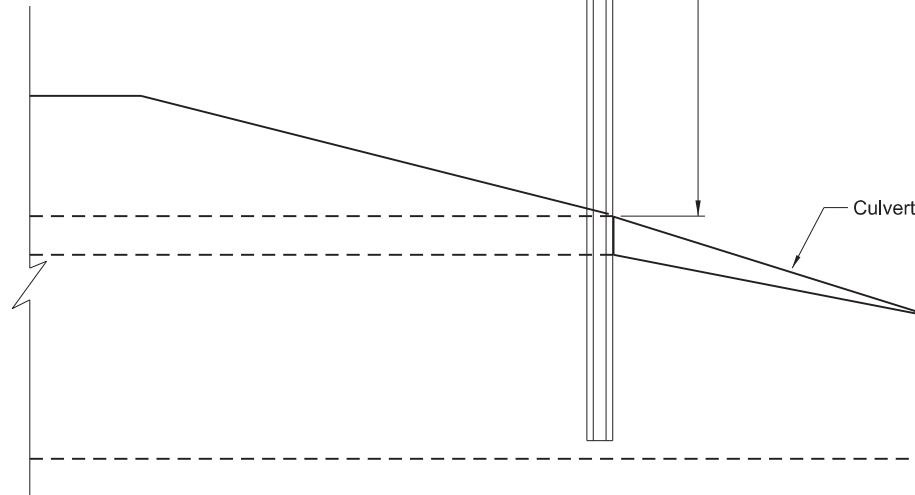
Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

Notes:

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



Installation

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes
8-30-18	Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

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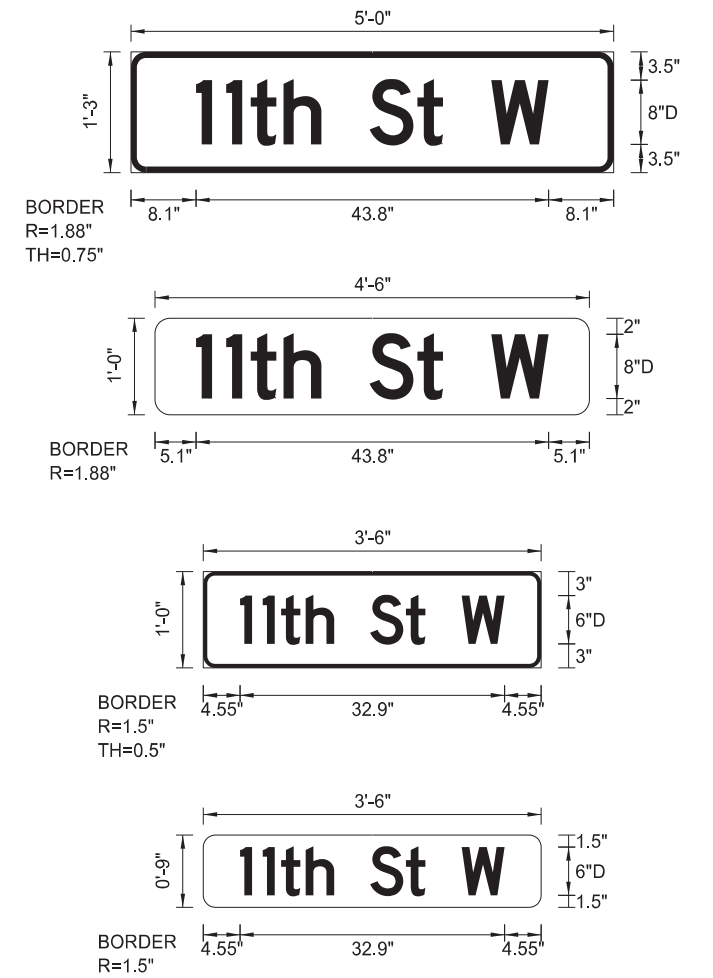
911 SIGN SUPPORT INFORMATION AND SIGN DETAILS

D-754-86

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

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

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



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

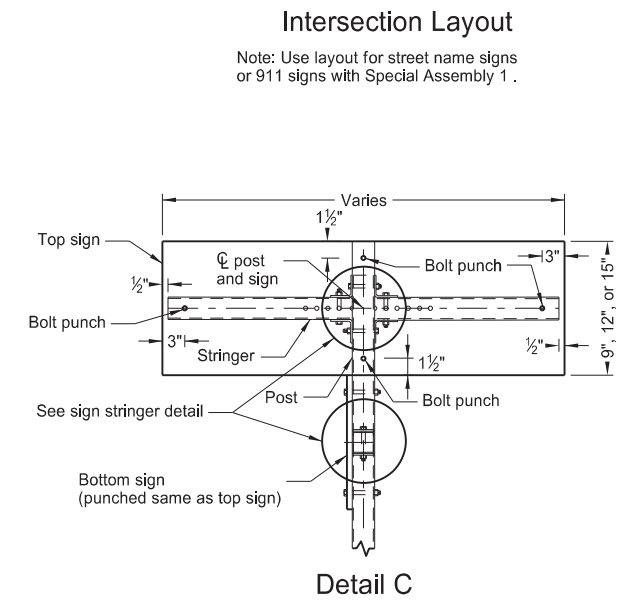
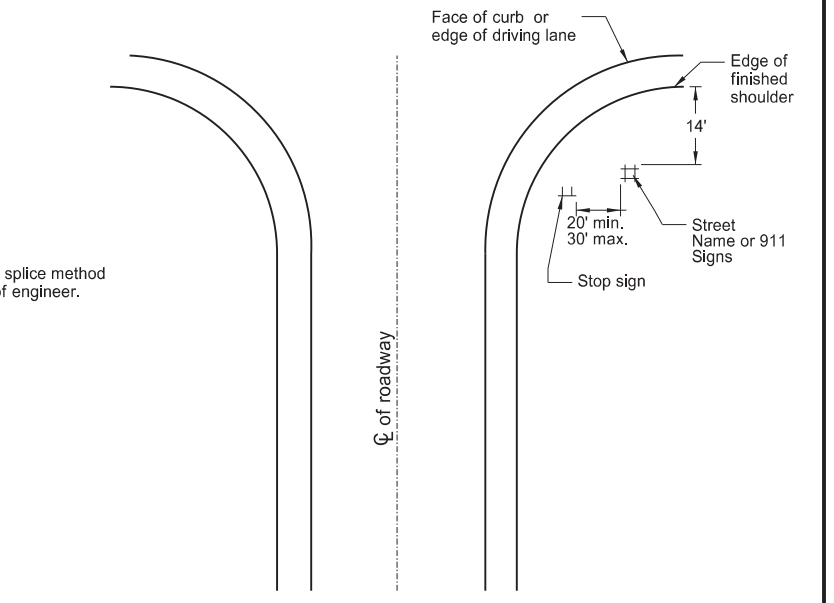
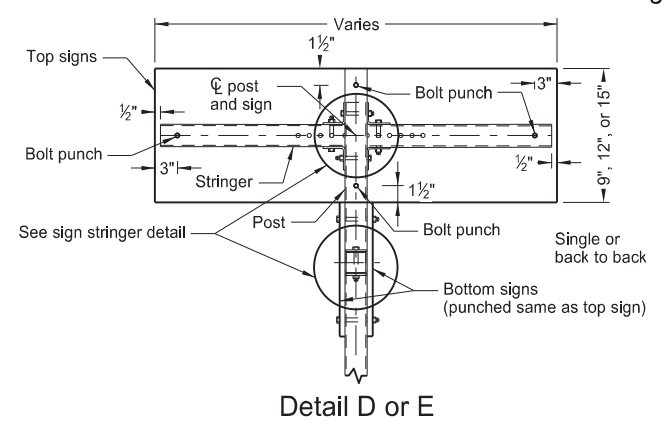
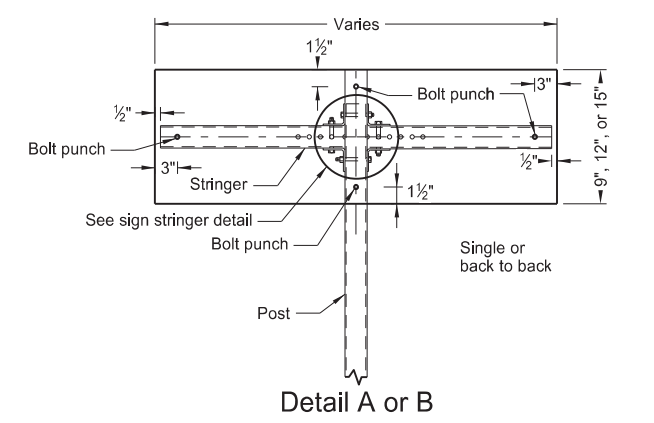
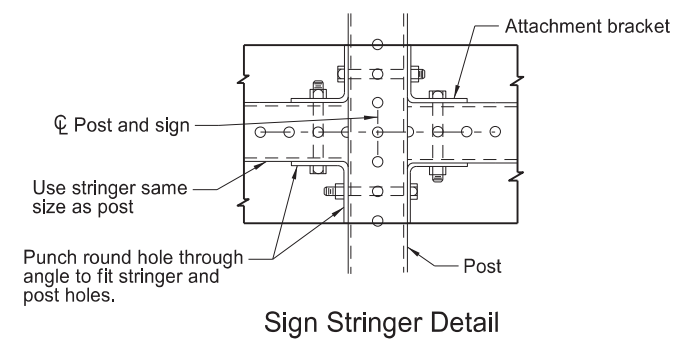
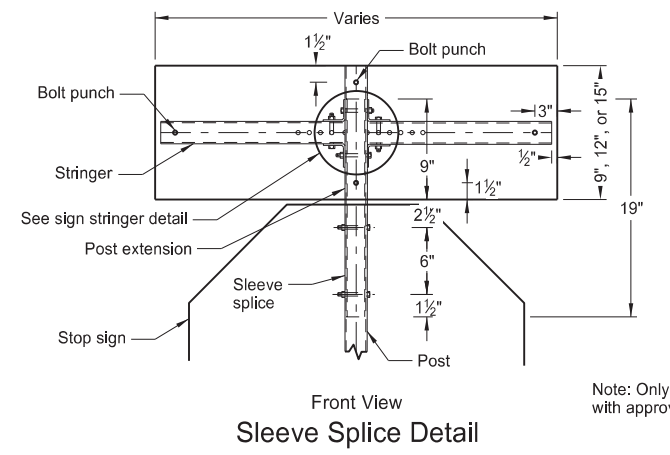
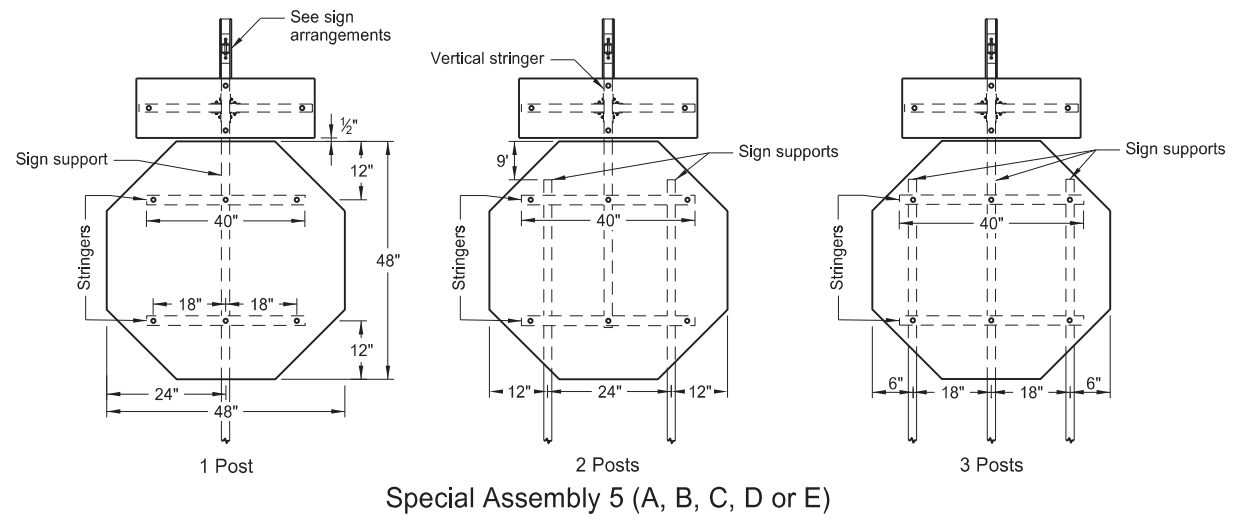
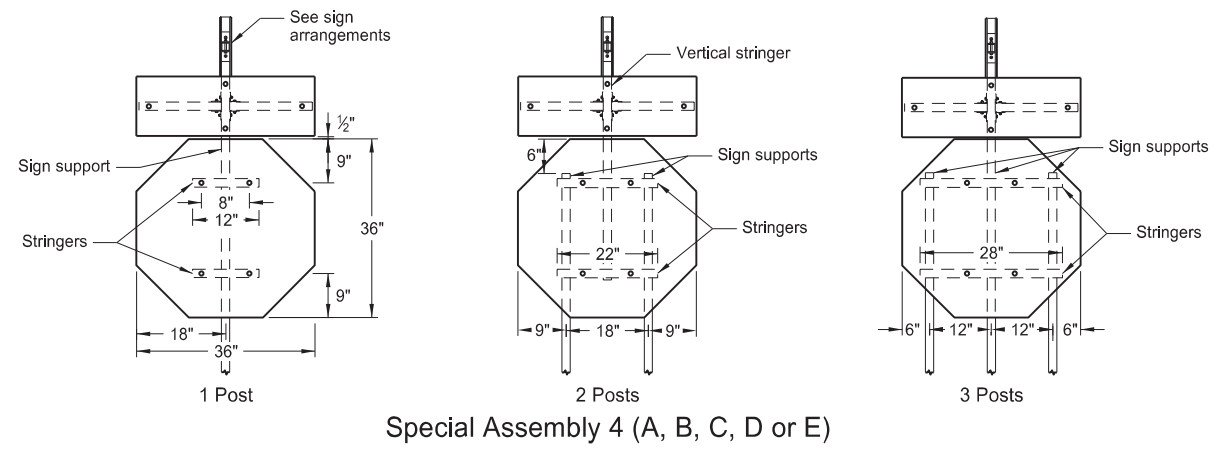
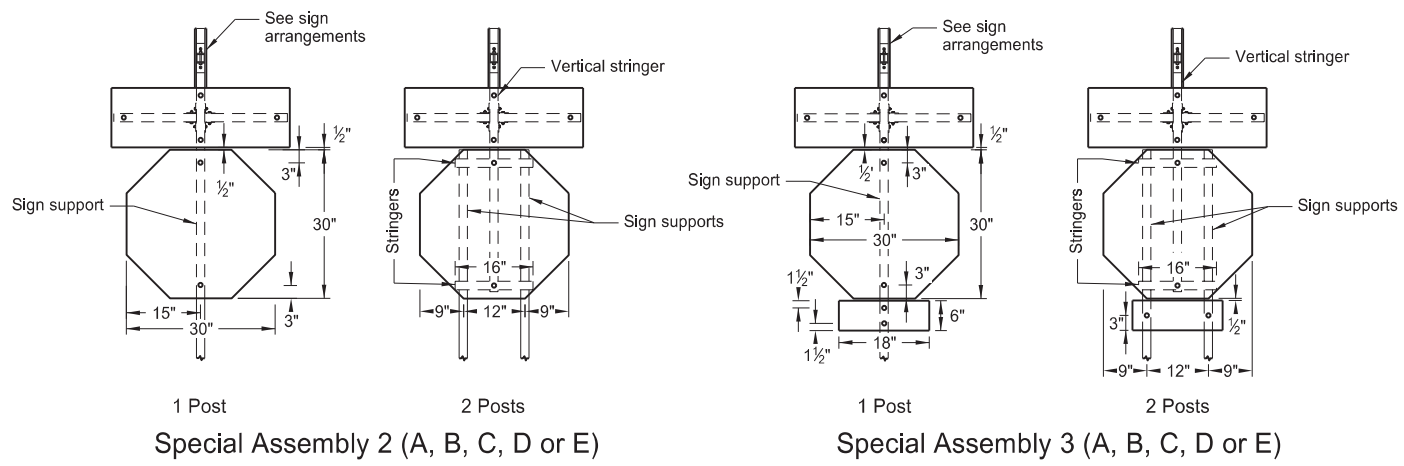
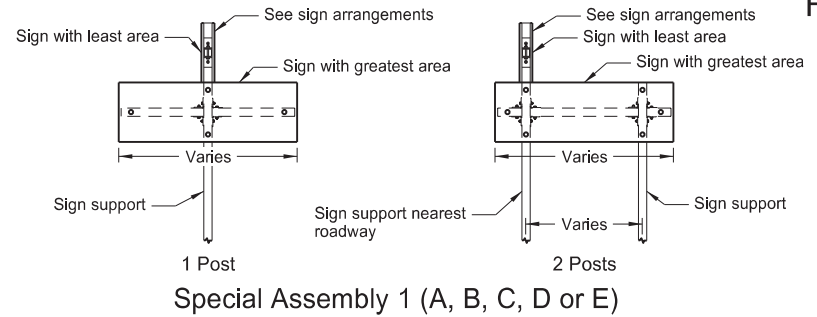
When installing signs on existing supports, check support and sleeve size to determine if they meet table requirements. Measure maximum post length from ground to top of street name sign. If calculated support length is greater than maximum post length shown, recalculate support size.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION		This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation
10-3-13 REVISIONS		
DATE	CHANGE	
7-18-14	Revised street name sign layouts.	
8-30-18	Revised tables, lettering, & signs	
9-05-19	and updated notes to active voice. New Design Engineer PE Stamp.	

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

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



Sign Arrangements

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
8-30-18	Added 2 post layout for SA1 and Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

This document was originally issued and sealed by
 Kirk J Hoff,
 Registration Number
 PE- 4683,
 on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

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

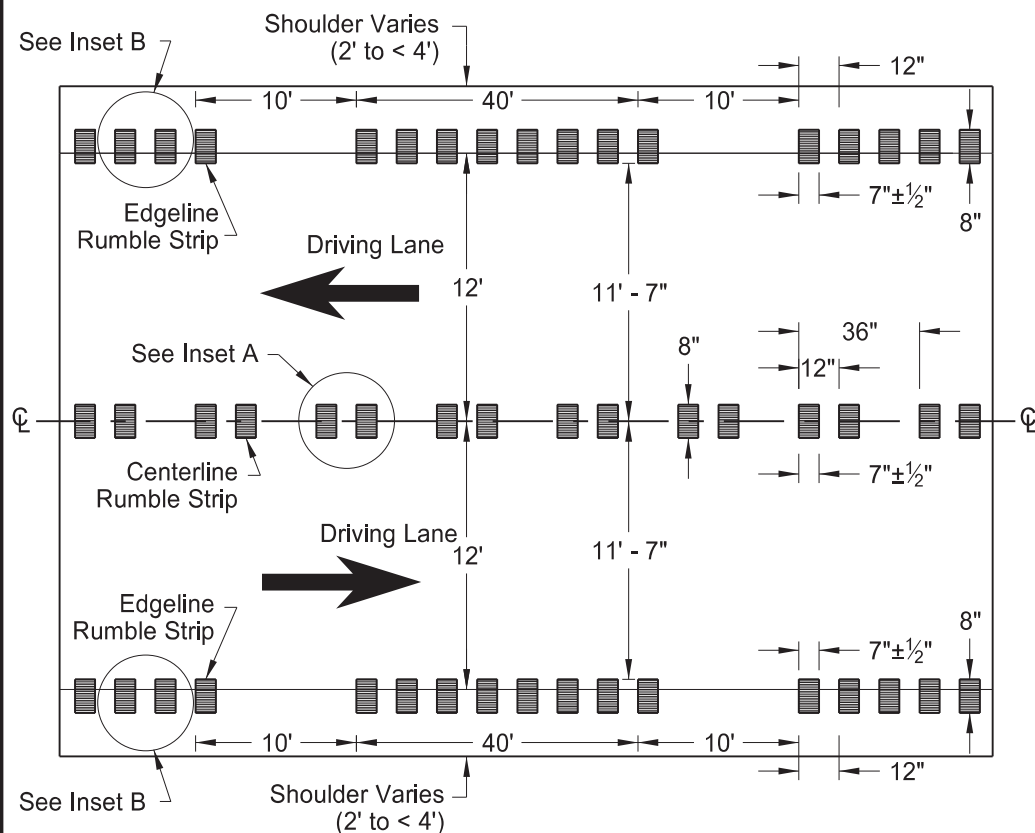
Note: Only use splice method with approval of engineer.

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

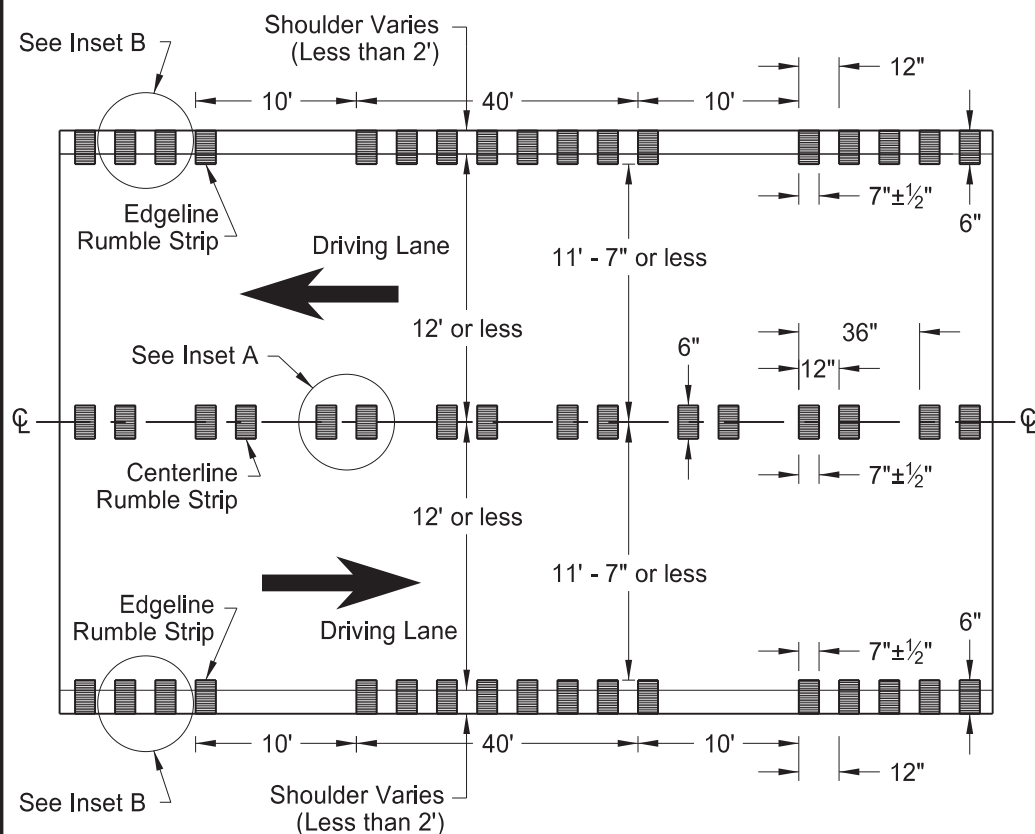
RUMBLE STRIPS
UNDIVIDED HIGHWAYS (SHOULDERS LESS THAN 4')

NOTES:

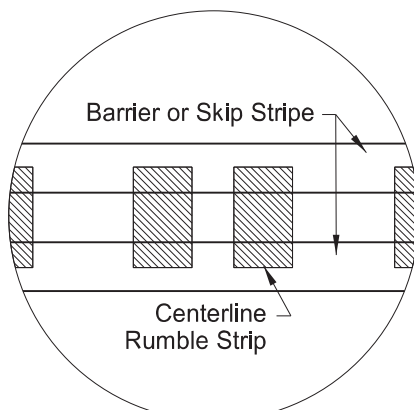
- 1) Discontinue edgeline rumble strips through the entire length of right turn lanes and tapers, and at the radius of a paved or gravel highway, section line, approach, or private drive.
- 2) Discontinue centerline rumble strips 100' before and after a paved or gravel highway, section line, approach, or private drive. Place rumble strips at left turn lanes as shown below.
- 3) No additional quantity provided for centerline rumble strips on left turn tapers. Include all costs for centerline rumble strips on left turn tapers in the price bid for Centerline Rumble Strips.



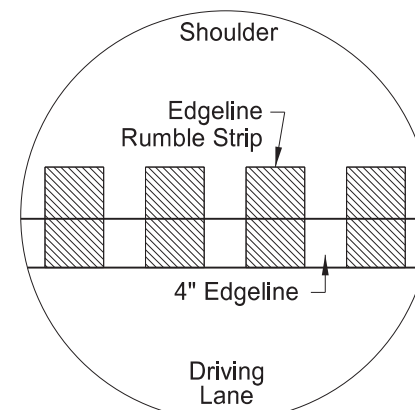
Undivided Highways (12' Driving Lanes & Shoulders 2' to $4'$)



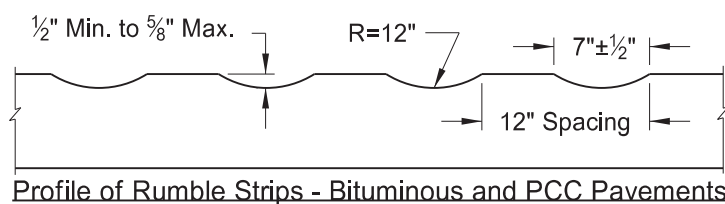
Undivided Highways (12' Driving Lanes or less & Shoulders Less than 2')



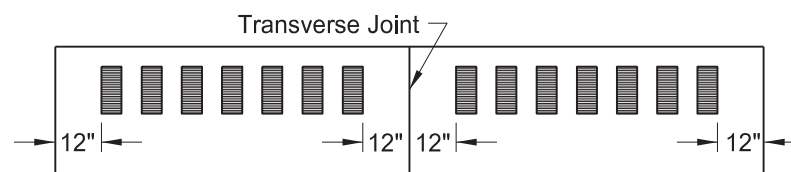
Inset A - Centerline Rumble Strip



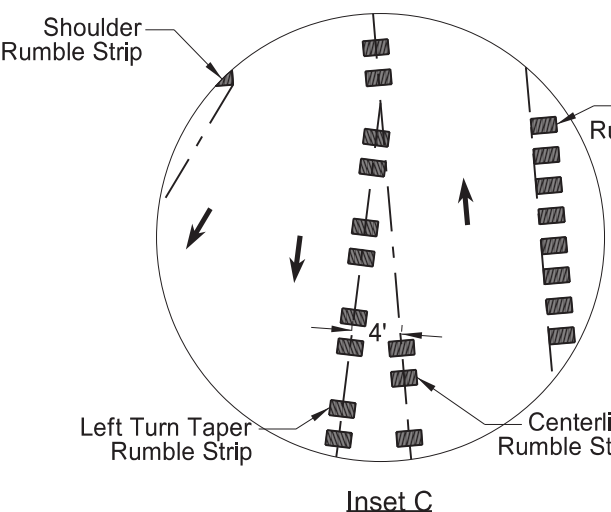
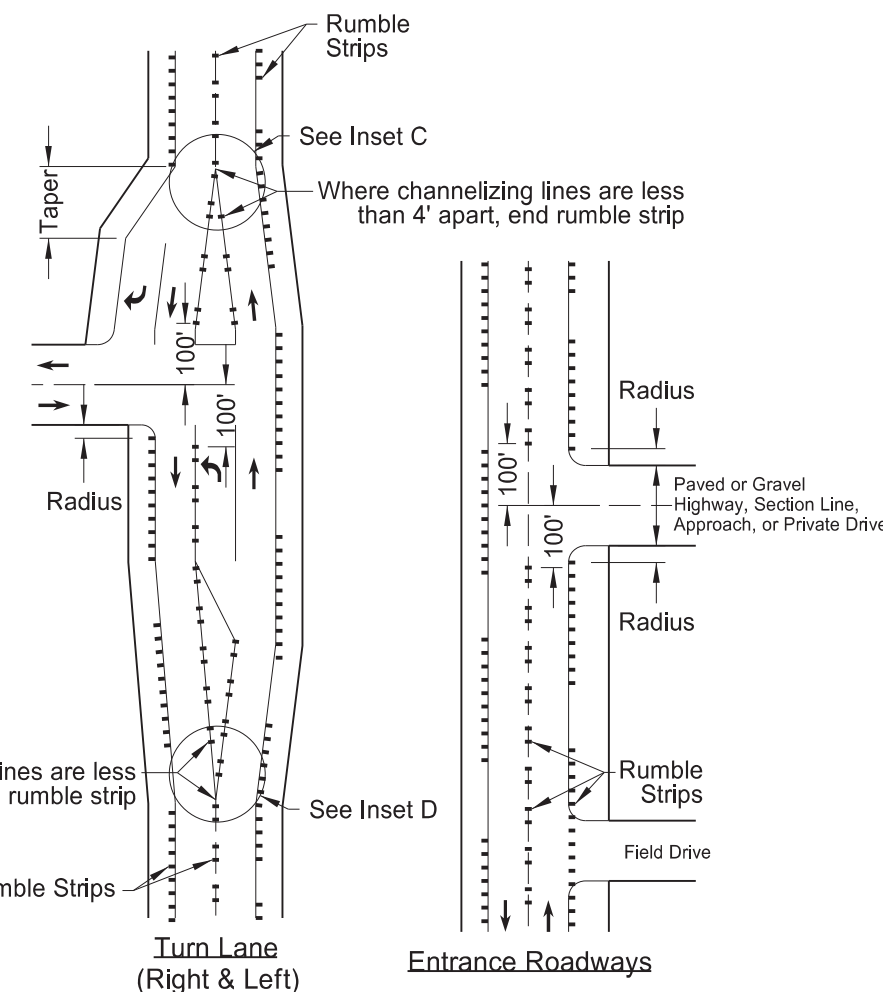
Inset B - Edgeline Rumble Strip



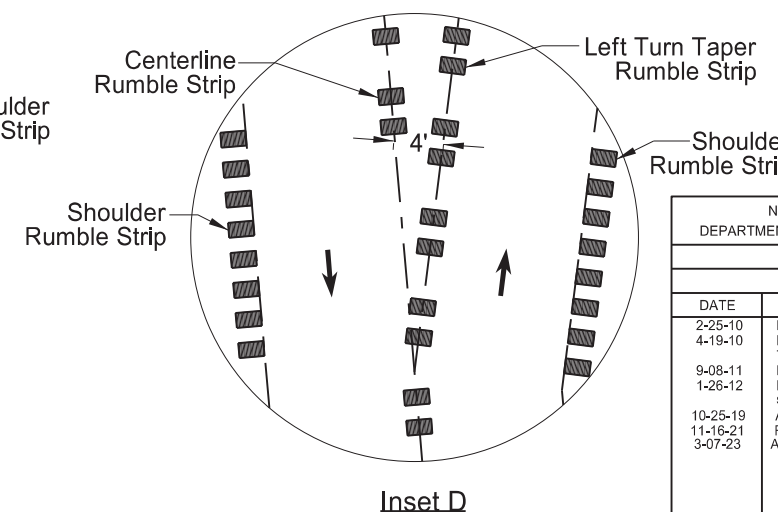
Profile of Rumble Strips - Bituminous and PCC Pavements



Discontinue rumble strip approx. 12" on both sides of PCC transverse joint



Inset C



Inset D

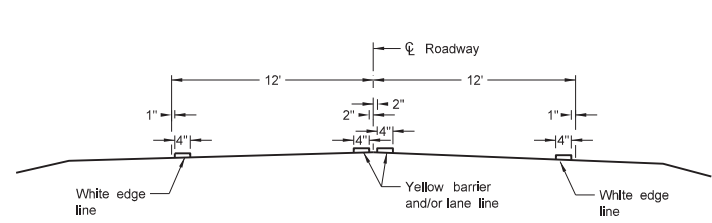
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-29-09	
REVISIONS	
DATE	CHANGE
2-25-10	Note 4 was added.
4-19-10	Revised Note 5, Note 6, and Turn Lane (Right & Left).
9-08-11	Revised Notes and D-760-4.
1-26-12	Revised details for rumble strip widths and dimensions.
10-25-19	Added missing dimensions.
11-16-21	Revised turn lane rumble layout.
3-07-23	Added Note 3.



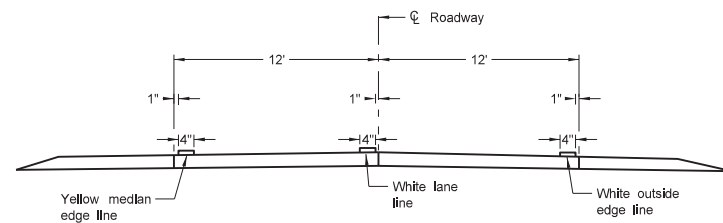
03/07/23

PAVEMENT MARKING

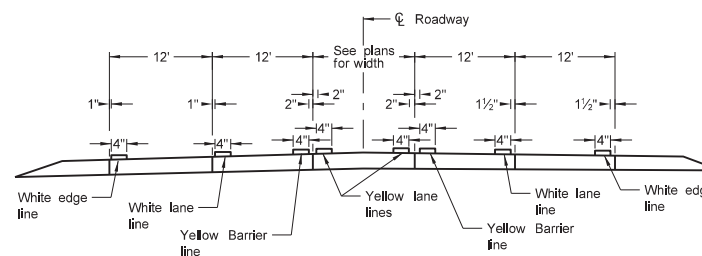
D-762-4



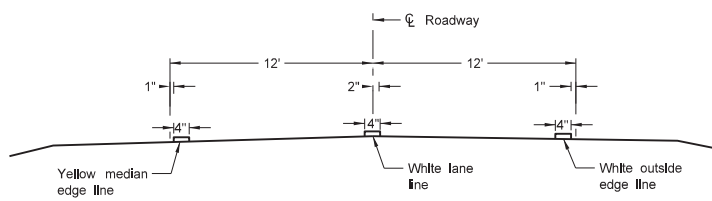
Two Lane Two Way
RURAL ROADWAY



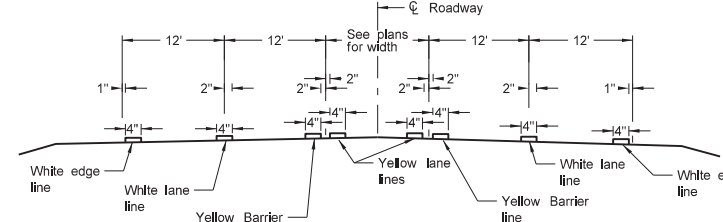
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



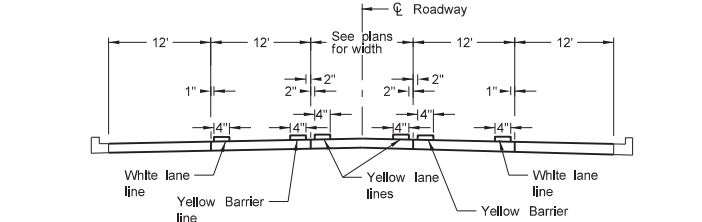
RURAL FIVE LANE ROADWAY
Concrete Section



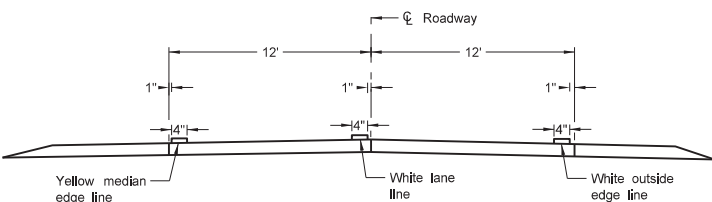
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



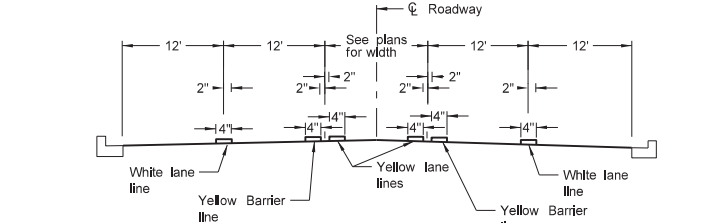
RURAL FIVE LANE ROADWAY
Asphalt Section



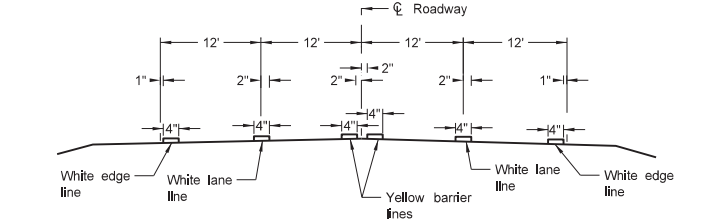
URBAN FIVE LANE SECTION
Concrete Section



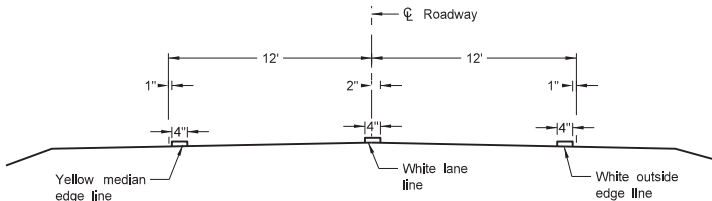
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



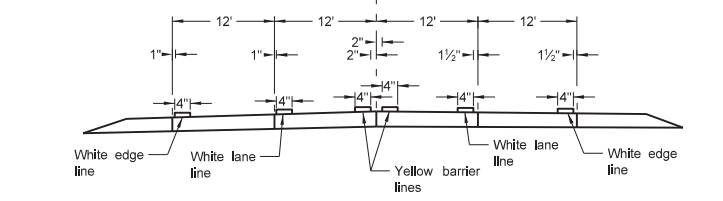
URBAN FIVE LANE SECTION
Asphalt Section



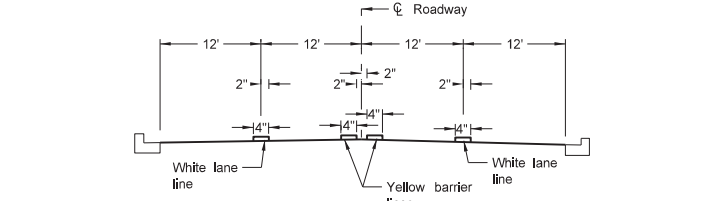
RURAL FOUR LANE ROADWAY
Asphalt Section



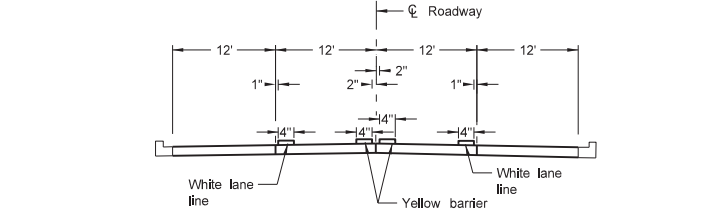
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



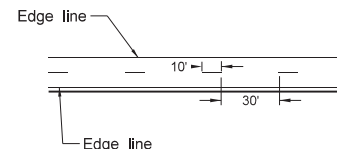
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



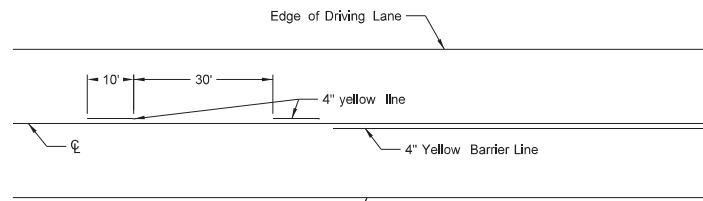
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

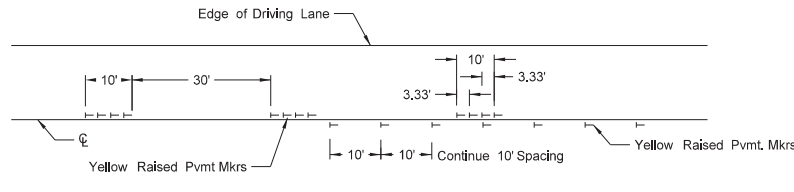
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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

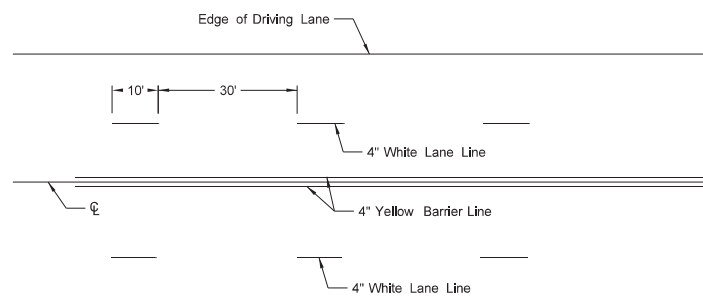


Painted or Tape Lines

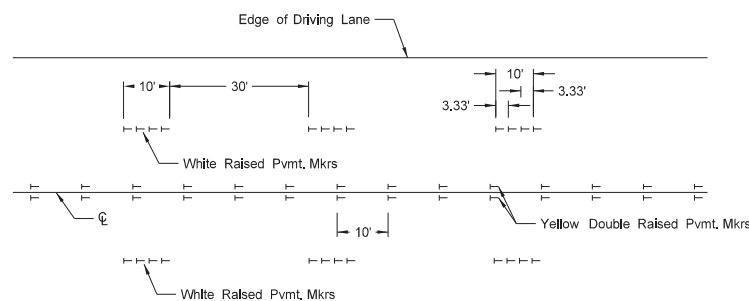


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

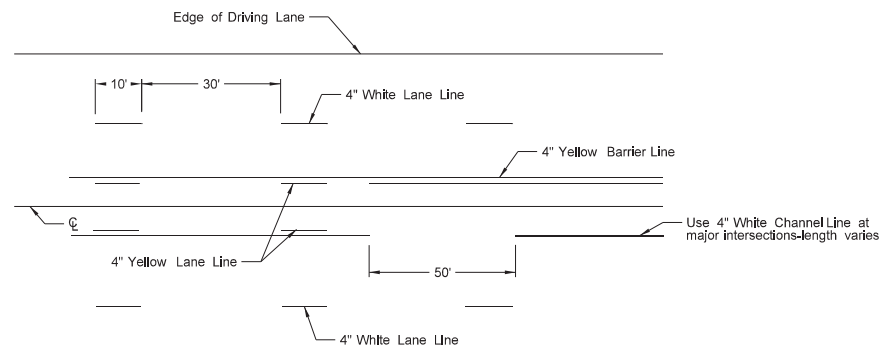


Painted or Tape Lines

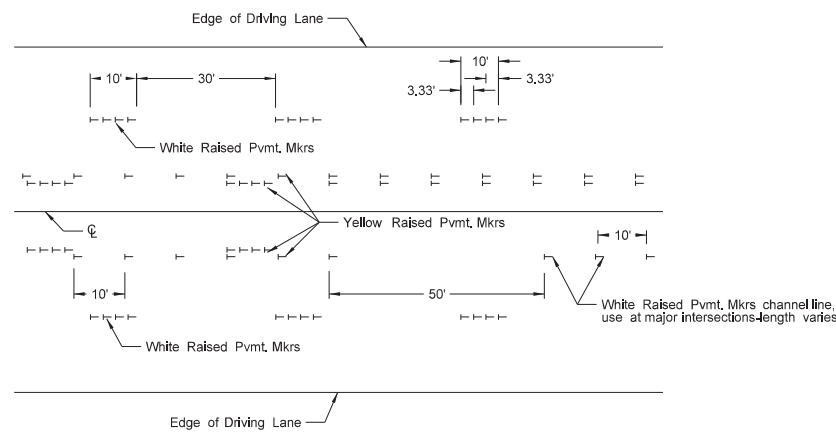


Raised Pavement Markers

FOUR LANE ROADWAY

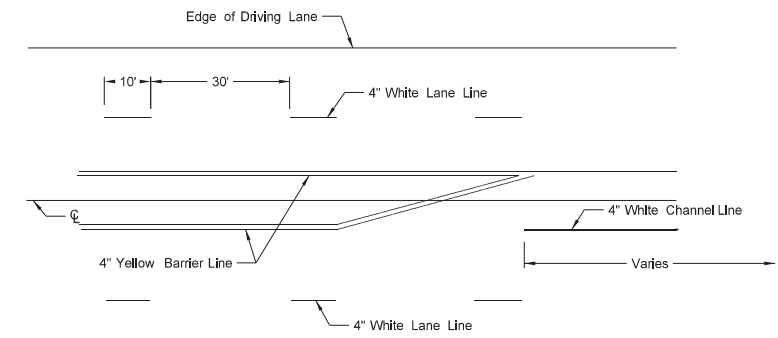


Painted or Tape Lines

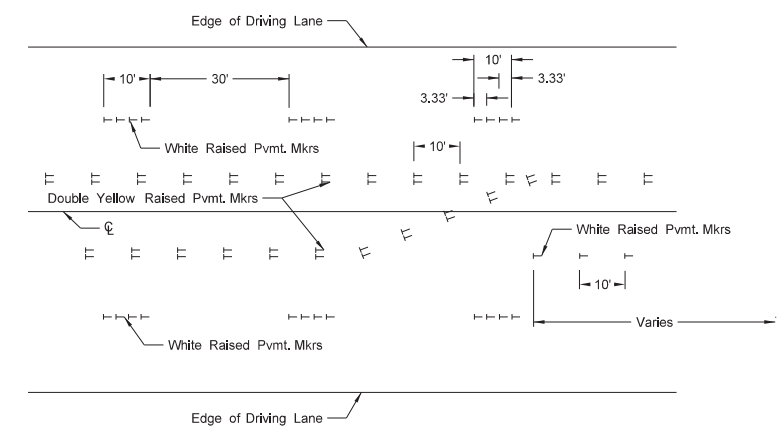


Raised Pavement Markers

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,
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