DESIGN DATA				
Traffic	Average Daily			
Current 2018	Pass: 3,685	Trucks: 615	Total: 4,300	
Forecast 2038	Pass: 5,270	Trucks: 920	Total: 6,190	
Clear Zone Distance: 16 Feet		Design Speed: 35 MPH		
Minimum Sight Dist. for Stopping: N/A		Bridges: N/A		
Sight Dist. for No Passing Zone: N/A				
Pavement Design Life 20 years				
Design Accumulated One-way Flexible ESALs: 3,352,308				

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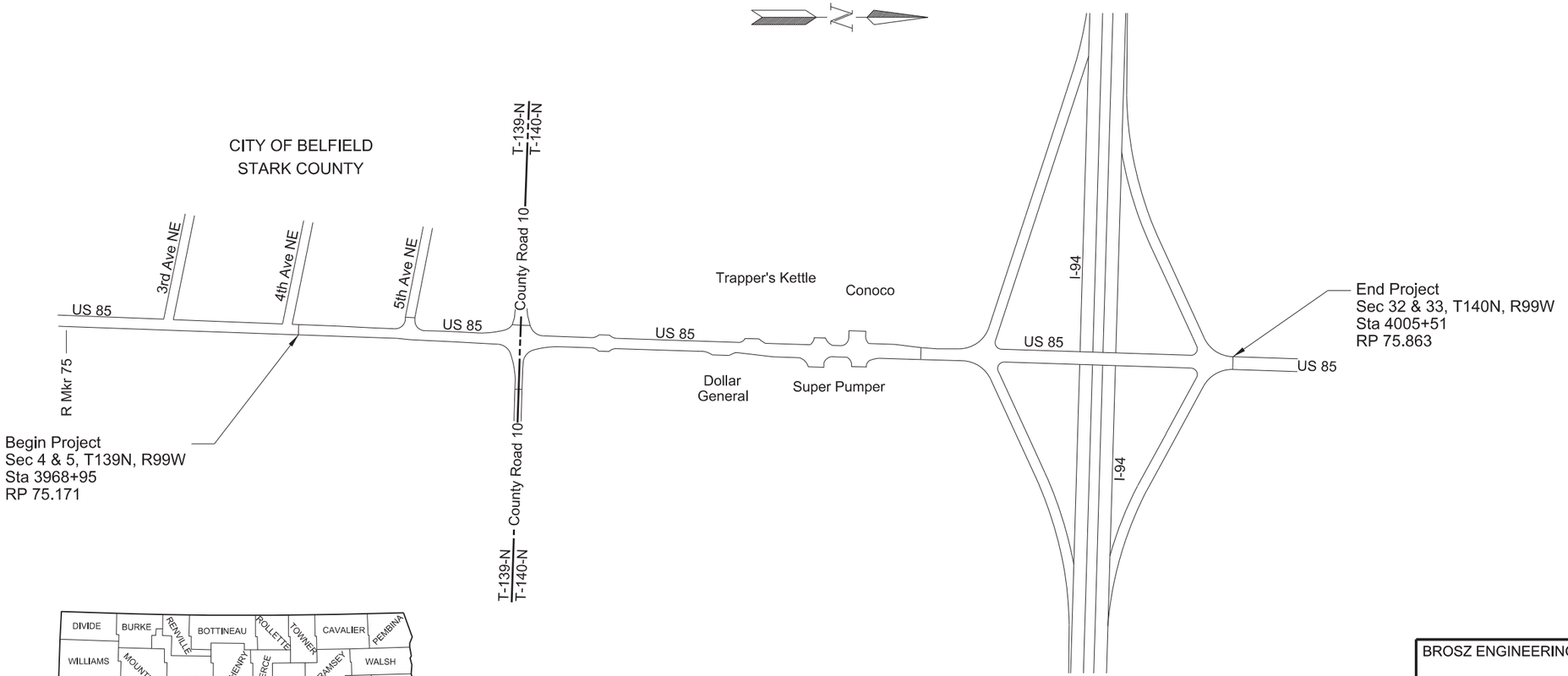
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

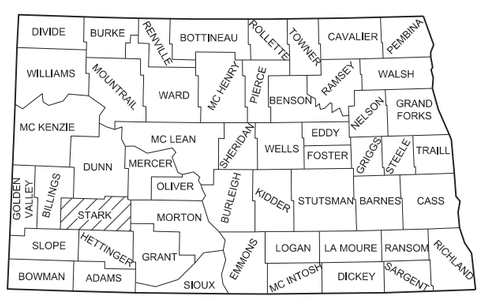
NH-5-085(077)074

Stark County
County Hwy 10 N to I-94 S Interchange
Belfield, ND
Widening, Surfacing, Lighting
Seal Coat and Incidentals

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	10/1/2020
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
NH-5-085(077)074	0.692	0.692





STATE COUNTY MAP

DESIGNER
Lucas Doerr

DESIGNER
Jon Brosz

DESIGNER
Billy Doerr

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Orn, Chad M.
03/21/22

BROSZ ENGINEERING, INC.

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

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11	1	Data Tables
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30	1 - 4	Typical Sections
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60	1 - 3	Plan & Profile
75	1 - 3	Wetland Impacts
76	1 - 3	Temporary Erosion Control
77	1 - 3	Permanent Erosion Control
81	1	Survey Coordinate and Curve Data
82	1 - 4	Survey Data Layouts
90	1 - 3	Paving Layouts
100	1 - 4	Work Zone Traffic Control
110	1 - 6	Signing
120	1 - 4	Pavement Marking
140	1 - 12	Lighting
200	1 - 50	Cross Sections

SPECIAL PROVISIONS

Number	Description
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SP317(20)	Utility Coordination
SP565(20)	Drilled Shaft Foundation
SP592(20)	Hydraulic Mulch
SP593(20)	Soil Stabilizer
SSP 1	Temporary Erosion and Sediment Best Management Practices

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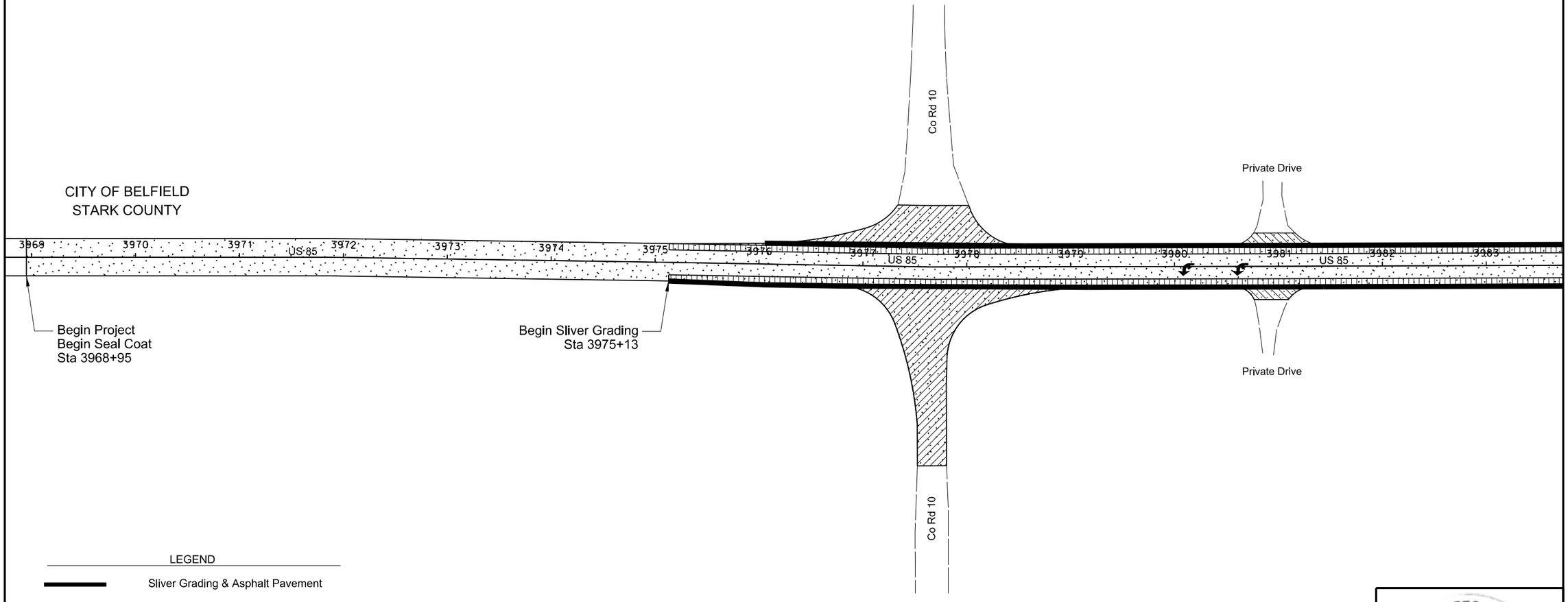
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D-101-4	NDDOT Abbreviations
D-101-10	NDDOT Utility Company and Organization Abbreviations
D-101-20	Line Styles
D-101-21	Line Styles
D-101-30	Symbols
D-101-31	Symbols
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D-203-5	Standard 90 Degree Flared Intersection - (No Center Left Turn Lane on Major Road)
D-255-1	Bridge Approach Slab Drainage Detail
D-261-1	Erosion Control - Fiber Roll Placement Details
D-550-2	Longitudinal Joint Details
D-550-3	Transverse Contraction Joint Details
D-550-4	Transverse Expansion Joint Detail
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D-704-20	Terminal And Seal Coat Sign Layouts
D-704-22	Construction Truck And Temporary Detour Layouts
D-704-23	Short Term Urban Detour And Lane Closure On A Divided Highway Layouts
D-704-24	Shoulder Closures And Bridge Painting Layouts
D-704-26	Miscellaneous Sign Layouts
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D-714-1	Reinforced Concrete Pipe Culverts And End Sections (Round Pipe)
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D-714-27	Pipe Installation Detail for Longitudinal Mainline Pipe or Pipe Not Under the Roadway
D-754-9	Letter and Arrow Details
D-754-23	Perforated Tube Assembly Details
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CITY OF BELFIELD
STARK COUNTY



Begin Project
Begin Seal Coat
Sta 3968+95

Begin Sliver Grading
Sta 3975+13

LEGEND

- Sliver Grading & Asphalt Pavement
- Widening, Asphalt Turn Lane
- 2" Mill and Superpave FAA 45 Overlay
- Superpave FAA 45 Overlay (Depth Varies)
- Asphalt Approach Reconstruction
- Right Turn Lane
- Left Turn Lane
- Chip & Fog Seal

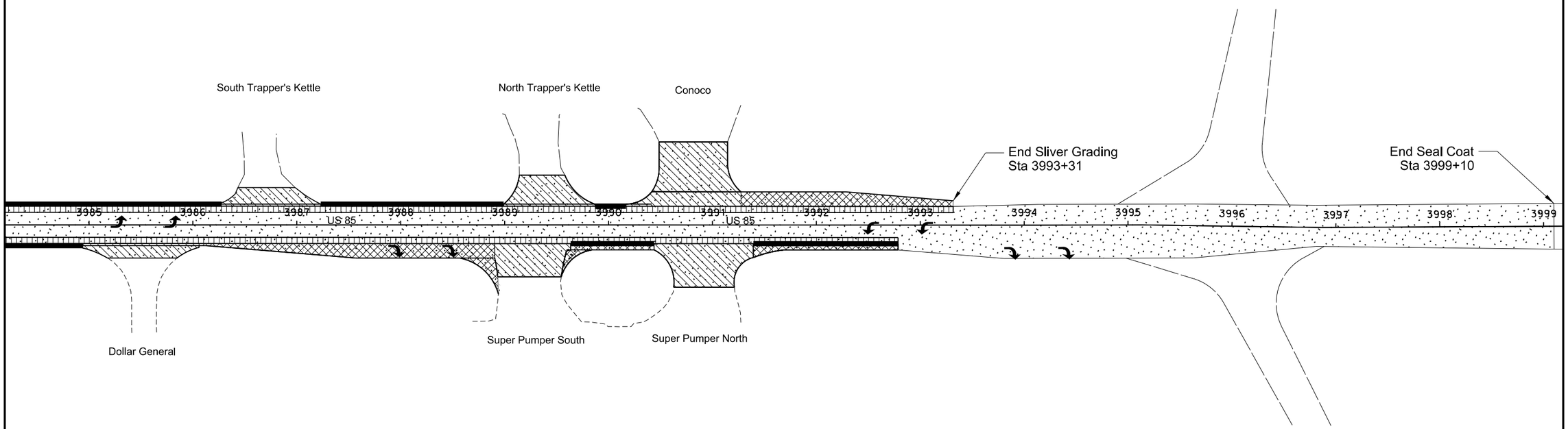
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/18/22
NORTH DAKOTA

Scope of Work

US 85

Belfield Turn Lanes

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LEGEND

- Sliver Grading & Asphalt Pavement
- Widening, Asphalt Turn Lane
- 2" Mill and Superpave FAA 45 Overlay
- Superpave FAA 45 Overlay (Depth Varies)
- Asphalt Approach Reconstruction
- Right Turn Lane
- Left Turn Lane
- Chip & Fog Seal

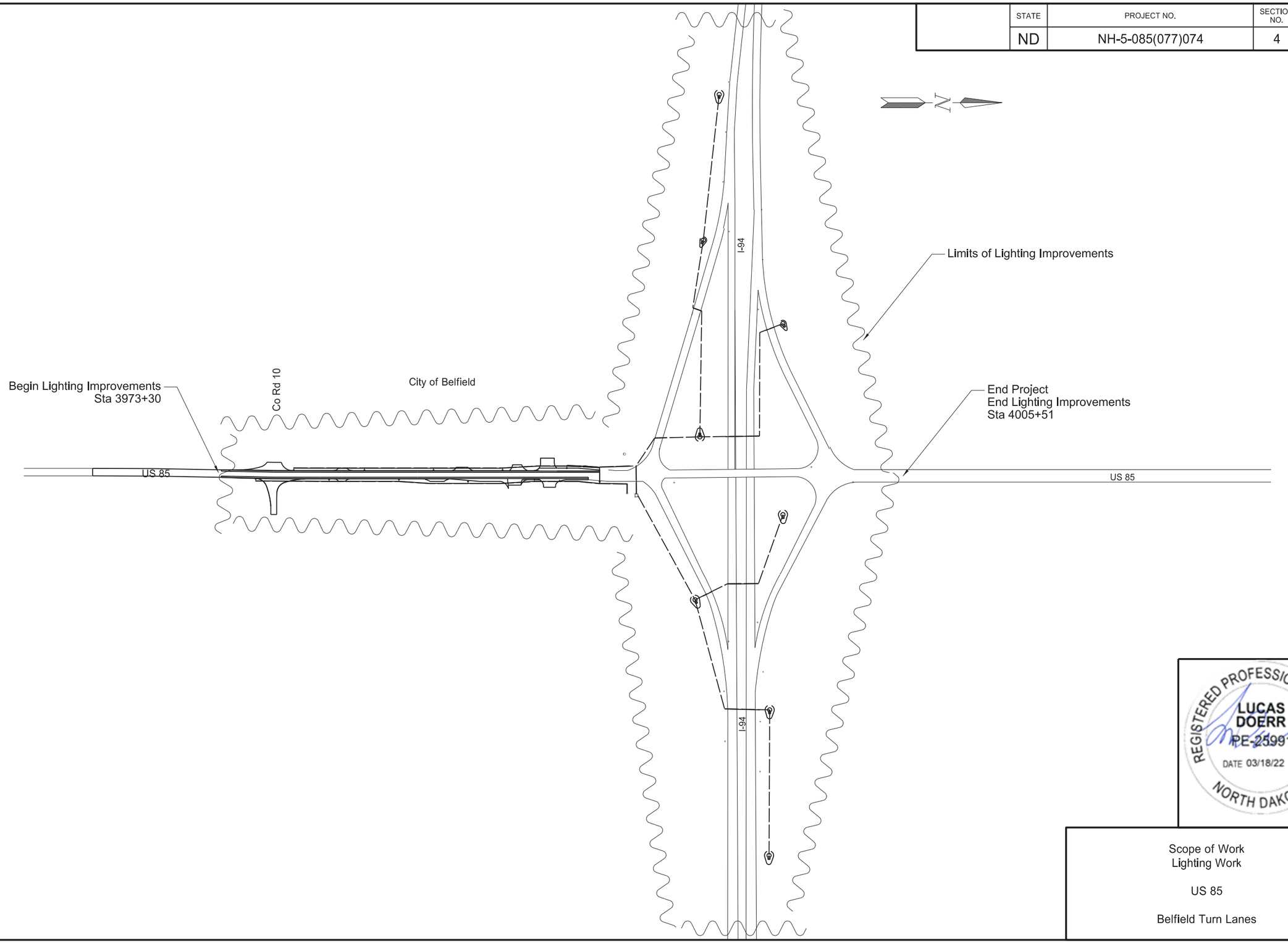
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LUCAS DOERR
PE-25991
DATE 03/18/22
NORTH DAKOTA

Scope of Work

US 85

Belfield Turn Lanes

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REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/18/22
NORTH DAKOTA

Scope of Work
Lighting Work

US 85

Belfield Turn Lanes

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NOTES

100-P01 TIED PROJECTS: This project is tied to Project No. NH-5-085(081)073, PCN 22832, Turn Lanes on US Hwy 85 south of Belfield. Utilize Common Excavation-Waste from the tied project as embankment material on this project.

100-P02 PUBLIC NOTIFICATION: Provide written notices to each adjacent business and property owner a minimum of 7 days in advance of scheduled work that would affect access to their property or facility. Prepare a draft of the written notices to the Engineer for approval – prior to distribution. Notice must include Contractor contact information, anticipated duration of construction activities, and planned alternate access to property. Provide the Engineer a list of the personnel that will distribute the written notices.

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

107-P01 MAINTAINING TRAFFIC – DROP OFFS: If, at the end of the work-day, drop-offs greater than 2 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 E.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”.

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.

The requirements of Section 704.04 O, "Traffic Control for Uneven Pavement" apply to drop-offs created by milling or the placement of hot mix asphalt.

108-P01 BIWEEKLY PLANNING & REPORTING MEETING: A biweekly (every other week) planning and reporting meeting is required.

202-P01 REMOVAL OF BITUMINOUS SURFACING: The tonnage of “Removal of Bituminous Surfacing” includes the entire depth of bituminous surfacing and the entire depth of aggregate base except the bottom one inch. The quantity of “Removal of Bituminous Surfacing” is not included in the excavation quantity.

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

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

203-P01 COMPACTION AND DENSITY CONTROL: Compact material for sliver grading as specified in Section 203.04 E.3 Compaction Control, Type B. Benching of existing slopes will not be required for sliver grading.

Compact material for the construction of turn lanes from Station 3986+13 to 3988+90 (Super Pumper) and from Station 3991+27 to 3993+32 (Conoco) as specified in Section 203.04 E.2 Compaction Control, Type A. Benching of existing slopes will be required for turn lane construction. Include all costs associated with the Type A compaction control in the price bid for “Borrow Excavation”.

203-P02 COMMON EXCAVATION-SUBCUT: Incorporate Common Excavation-Subcut material into sliver grading. Include all costs for subcut, hauling, placing, and compacting material in the unit price bid for “Common Excavation-Subcut.” Engineer will measure Common Excavation-Subcut at plan quantity. Do not use the excavated material in areas of widening for turn lanes.

253-P01 HYDRAULIC MULCH: Seed disturbed areas within the project limits per Section 251.04; do not apply seed concurrently with hydraulic mulch. The Temporary Care Maintenance requirements of Section 253.04 B.2 are hereby waived for temporary and permanent applications of hydraulic mulch.

261-P01 FIBER ROLLS: Use fiber rolls that are composed of netting that meets either of the following:

- Plastic or natural fiber photodegradable netting that has a life expectancy between 12 and 24 months.
- 100 percent biodegradable netting that has a life expectancy between 6 to 12 months.

401-P01 FOG SEAL: Apply fog seal immediately after performing final brooming. Dilute fog seal and apply at a rate of 0.12 Gal/SY (0.06 Gal/SY undiluted). Fog Seal oil shall be diluted by the supplier.

411-P01 MILLING PCC PAVEMENT: Remove the existing concrete surfacing in the milling sections to form a straight vertical edge to allow placement of 2" minimum thickness of HMA surfacing. Sweep the milled areas following the milling operation. Apply dust palliative measures as needed to control dust. Include all costs associated with the sweeping operation and application of dust palliative measures in the price bid for “MILLING PCC PAVEMENT.”



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NOTES

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

704-255 TRAFFIC CONTROL FOR SHOULDER DROP-OFF: If the shoulder and adjacent driving lane are not even at the end of the day, the following criteria will apply:

Place the following sign assembly at the locations listed below.

Sign Assembly: Sign No. W8-17-48 "Shoulder Drop Off" and supplemental plate Sign No. W20-52P-54 to identify the distance.

Locations:

- In advance of the drop off;
- Spaced at each mile from the advance sign; and
- At major intersections (CMC routes, state and US highways, and Interstate Ramps).

If the difference in elevation between the shoulder and the driving lane is 2" or greater, construct a slough on the driving lane that is 4:1 or flatter.

If the difference in elevation between the shoulder and driving lane is less than 2", no slough is required.

Sign assemblies will be measured and paid for according to Section 704 "Temporary Traffic 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-P01 TRAFFIC CONTROL: Maintain two-way, two-lane traffic at all times with exception of the seal coat operation. The traffic control devices will comply with the following Standard Drawings:

D-704-15, Layout Type A
D-704-19, Layout Type F
D-704-20, Layout Type G & H
D-704-22, Layout Type K and Type L
D-704-24, Layout R
D-704-26, Layout Type BB, EE and FF

Utilize stackable vertical panels in place of tubular markers for D-704-24, Layout R Shoulder Work.

The required traffic control signs and devices are included in the “Traffic Control Devices List” and will be measured and paid at the Contract Unit Price for each device. Additional devices required to accommodate the Contractor’s operation will be the Contractor’s responsibility.

704-P02 TRAFFIC CONTROL PHASING: Construct approaches half at a time and utilize flaggers and other devices to maintain access. This includes the milling and paving operations for the business approaches and private drives and the reconstruction of the County Road 10 intersection.

704-P04 TRAFFIC CONTROL FOR SEAL COATS: Provide traffic control consisting of a temporary lane closure, flagging, and a pilot car.

Traffic control device quantities are based on a 1 mile limitation and following list:

1. Standard D-704-15, layout A, place layout A at both ends of the work zone. Flagging stations located within the work zone require sign W20-7-48 only;
2. Standard D-704-20, layout H, signing will be required at the junction of County Road 10;
3. Standard D-704-22, layouts K and L;
4. Standard D-704-26, layout KK, for use at major approaches within the pilot zone.

Provide additional devices at no cost to the Department.



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714-P01 PIPE EXTENSIONS: Remove the silted-in material from the pipes before extending them. Include the cost of removing the silt in the price bid for the respective culvert. Assume all pipes require silt cleanout.

754-P01 RESET DYNAMIC SPEED DISPLAY SIGN: Remove and reset the solar powered Dynamic Speed Display Sign located at Sta 3993+16 Lt. Include all costs associated with removing, storing and resetting the Dynamic Speed Display Sign to be fully operational in the price bid for “Reset Sign Panel.”

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

762-200 PERMANENT WATER BASED PAVEMENT MARKING: Replace the first paragraph of 762.04 C.2.a "Method of Application" with the following:

Allow new bituminous treatment to cool to a temperature below 125 °F and cure for a period of 72 hours before applying permanent pavement marking.

762-P01 SHORT TERM PAVEMENT MARKINGS: The plan quantity includes 2 applications of short-term pavement markings.

- The first temporary application will be for centerline and barrier lines after the chip seal operation is complete.
- The second temporary application will be for centerline and barrier lines after the fog seal is complete.

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
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DATE 03/16/22
NORTH DAKOTA

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NOTES

SECTION 140

770-P01 LED LUMINAIRE: Provide luminaires that meet the following:

Light Source	LED
Light Output	17,500 lm to 22,500 lm
Driver	500 mA to 900 mA
Wattage	135W to 190W
Color Temperature	4000K ±400K
Operating Temperature Range	-40°C to +40°C
Photocell on Luminaire	No
Luminaire Housing	Die Cast Aluminum
Vibration Testing	ANSI/NEMA C136.31 Level 2, 3 G
Surge Suppression Rating	ANSI/IEEE C62.41 Cat C
Outdoor rating for housing, wiring, and drivers	ANSI C136.25 IP-65
Tool-less Access	Yes

Provide one of the luminaires listed or an approved equal for “Lighting System A”:

Company	Catalog Number
American Electric Lighting	ATB0 P453 MVOLT R2 4K NR (Type A) ATB0 P453 MVOLT R3 4K NR (Type B)
Signify Lumec	RFL-190W112LED-4K-G2-R2M-UNV NR (Type A) RFL-190W112LED-4K-G2-R3M-UNV NR (Type B)

See Light Standards chart in Section 140 sheet 11 for Luminaire Type.

770-P02 BREAKAWAY LIGHT STANDARD: Ensure the bases for the light standards are the breakaway transformer type with a minimum of 4 anchor bolts. Galvanize the light standards and provide 8 ft davit mast arms. Ensure the shaft length is 42 ft from the top of the foundation to the bottom of the luminaire for all light standards.

770-P03 HIGH MAST POLES: Provide high mast lighting poles following Section 895.13 “High-Mast Lighting Assembly” of the standard specifications and a minimum of 8 anchor bolts per pole.

770-P04 LED LUMINAIRE – HIGH MAST: Provide luminaires that meets the following:

Light Source	LED
Light Output	55,000 lm to 65,000 lm
Driver	850 mA to 1100 mA
Wattage	400W to 600W
Color Temperature	4000K ±400K
Operating Temperature Range	-40°C to +40°C
Luminaire Housing	Die Cast Aluminum
Vibration Testing	ANSI/NEMA C136.31 Level 2, 3 G
Surge Suppression Rating	ANSI/IEEE C62.41 Cat C
Outdoor rating for housing, wiring, and drivers	ANSI C136.25 IP-65
Qualified with Design Lights Consortium	Yes

Provide a cast aluminum slip fitter housing that accommodates a 2-inch horizontal pipe bracket and that is adjustable 3 degrees above and below the bracket axis for leveling. Provide means to prevent the twisting of the luminaire about the bracket. Include terminal boards in the housing.

Provide an effective projected area of a luminaire less than 2.2 square feet. Provide a luminaire with a maximum weight of 62 pounds.

Provide a symmetrical luminaire that has a maximum beam angle of between 55 degrees and 60 degrees. Provide asymmetrical luminaires that have a Type III medium distribution.

The High Mast Lighting was designed using these values:

Roadway Classification	Principal Arterial
Average Maintained Illuminance	0.8 foot-candles
Illuminance Uniformity Ratio (avg/min)	3.0:1
Minimum Illuminance	0.2 foot-candles
Light Loss Factor	0.81

Provide the high mast luminaires listed below or an approved equal for the High Mast Lighting.

REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
PE-10588
DATE 2/8/2022
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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NOTES

Company	Catalog Number
Holophane High Mast LED	HMLED4 P3 40K MVOLT AW
Holophane High Mast LED	HMLED4 P3 40K MVOLT MAS

Include all cost associated with the LED luminaire in the bid price for “LED Luminaire – High Mast”.

770-P05 HIGH MAST TOWER LABELING: Provide labels on every high mast tower with the following specifications:

- Outdoor rated permanent backing material
- Protective coating
- Outdoor rated Permanent Adhesive
- 1” letters, 3”x12” total size
- 5-year life span
- 5 total with the High Mast Number printed on each. Refer to the High Mast Light Standards charts in the plans for the High Mast Number.

Install the label 2” above the hand hole cover and level with the foundation. Ensure the surface is clean of dirt or debris. If needed, sand the area to remove any surface rust. Ensure the label is securely fastened to the surface.

Include all costs for purchasing and installing the labels in the item “LED Luminaire - High Mast”.

770-P06 MULTIPLE UNDERGROUND CABLE: The plans call for using Multiple Underground Cable and Conduit in various locations. In lieu of the Multiple Underground Cable, the contractor may furnish and install rigid conduit and single RHW conductors of the same size for the Multiple Underground Cable.

Install conduit size as specified by the National Electric Code. If the contractor chooses to use the conduit and single conductors, include the cost to furnish conduit and conductors in the item Multiple Underground Cable. Include the cost of installing conduit with single conductors in the bid price for High Mast Lighting and "Lighting System A”.

Include the conduit shown in the plans under roadways for installing Multiple Underground Cable in the item High Mast Lighting and “Lighting System A”.

770-P07 EXISTING INTERCHANGE LIGHTING: The existing partial interchange lighting shall remain operational until the high mast lighting system is installed. Include all costs to keep operational in the item “Remove Light Standard”.

770-P08 WOOD POLE LIGHT STANDARD REMOVAL: The wood pole light standards will be removed by MDU as shown in the plans. Coordinate the removal with the installation of the new lighting. MDU contact person: Jeff Jirges 701-290-4378.

770-P09 RODENT SCREENS: Provide rodent protection using wire mesh with a maximum size opening of ¼ inch for all light standard installations. Place the wire mesh continuously around the anchor bolts to protect rodents from entering the base through the space between the concrete foundation and the lower plate of the light standard. Secure the mesh to the anchor bolts. Place the rodent screen the same day the light standard is installed. Include all costs for labor, equipment, and materials necessary to complete this work in the price bid for “Lighting System A.”

REGISTERED PROFESSIONAL ENGINEER
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DATE 2/8/2022
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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ENVIRONMENTAL NOTES

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

EN-1 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.

REGISTERED PROFESSIONAL ENGINEER
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PE-25991
DATE 03/16/22
NORTH DAKOTA

Estimated Quantities

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	NH-5-085(081)073		

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	LIGHTING			TOTAL
103	0100	CONTRACT BOND	L SUM	0.45	0.3			0.75
202	0135	REMOVAL OF BITUMINOUS SURFACING	TON	6116				6116
202	0169	REMOVAL OF END SECTION-ALL TYPES & SIZES	EA	2				2
203	0109	TOPSOIL	CY	3326	257			3583
203	0138	COMMON EXCAVATION-SUBCUT	CY	308				308
203	0140	BORROW-EXCAVATION	CY	3376	826			4202
216	0100	WATER	M GAL	267				267
251	0200	SEEDING CLASS II	ACRE	4.02				4.02
251	2000	TEMPORARY COVER CROP	ACRE	4.02				4.02
253	0051	SOIL STABILIZER	ACRE		0.65			0.65
253	0201	HYDRAULIC MULCH	ACRE	8.04	0.65			8.69
260	0100	SILT FENCE UNSUPPORTED	LF	150				150
260	0101	REMOVE SILT FENCE UNSUPPORTED	LF	150				150
261	0112	FIBER ROLLS 12IN	LF	930				930
261	0113	REMOVE FIBER ROLLS 12IN	LF	480				480
302	0120	AGGREGATE BASE COURSE CL 5	TON	9766				9766
401	0050	TACK COAT	GAL	641				641
401	0070	FOG SEAL	GAL	1213				1213
411	0100	MILLING PAVEMENT SURFACE	TON	285				285
411	0110	MILLING PCC PAVEMENT	SY	221				221
420	0111	CRS2P EMULSIFIED ASPHALT	GAL	6806				6806
420	0125	COVER COAT MATERIAL CL 41	TON	229				229
430	0045	SUPERPAVE FAA 45	TON	1831				1831
430	1000	CORED SAMPLE	EA	11				11
430	5806	PG 58H-28 ASPHALT CEMENT	TON	117				117
702	0100	MOBILIZATION	L SUM	0.45	0.3			0.75
704	0100	FLAGGING	MHR	500				500
704	1000	TRAFFIC CONTROL SIGNS	UNIT	2130				2130
704	1048	PORTABLE RUMBLE STRIPS	EA	2				2
704	1060	DELINEATOR DRUMS	EA	70				70
704	1067	TUBULAR MARKERS	EA	160				160
704	1080	STACKABLE VERTICAL PANELS	EA	68				68
706	0500	AGGREGATE LABORATORY	EA	0.75				0.75
706	0550	BITUMINOUS LABORATORY	EA	0.75				0.75
706	0600	CONTRACTOR'S LABORATORY	EA	0.75				0.75
714	0615	PIPE CONC REINF 24IN CL III	LF	44				44
714	3020	END SECT-CONC REINF 24IN	EA	2				2
714	5015	PIPE CORR STEEL .064IN 18IN	LF	12				12
714	5810	END SECT CORR STEEL .064IN 18IN	EA	2				2
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA	2				2
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	40.8				40.8
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	55.6				55.6
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	565				565
754	0592	RESET SIGN PANEL	EA	17				17
762	0103	PVMT MK PAINTED-MESSAGE	SF	240				240
762	0430	SHORT TERM 4IN LINE-TYPE NR	LF	13568				13568
762	0434	SHORT TERM 8IN LINE-TYPE NR	LF	2712				2712

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	8	2
	NH-5-085(081)073		

Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	LIGHTING			TOTAL
762	1104	PVMT MK PAINTED 4IN LINE	LF	12076				12076
762	1108	PVMT MK PAINTED 8IN LINE	LF	1616				1616
762	1124	PVMT MK PAINTED 24IN LINE	LF	171				171
770	0003	LIGHTING SYSTEM A	EA		1			1
770	0030	CONCRETE FOUNDATION-HIGH MAST LIGHTING	EA		8			8
770	0060	CONCRETE FOUNDATION-FEED POINT-TYPE B	EA		1			1
770	0220	CABLE TRENCH-TYPE II	LF		4983			4983
770	0340	2.5IN DIAMETER RIGID CONDUIT	LF		819			819
770	0485	MULTIPLE UNDERGROUND CABLE 4NO4 STYLE USE	LF		5878			5878
770	0735	FEED POINT-TYPE II-PAD MOUNTED	EA		1			1
770	3733	HIGH MAST LIGHTING ASSEMBLY TYPE HM-140-4	EA		6			6
770	3739	HIGH MAST LIGHTING ASSEMBLY TYPE HM-140-10	EA		2			2
770	4280	LED LUMINAIRE - HIGH MAST	EA		42			42
770	4560	REMOVE LIGHT STANDARD	EA		17			17

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	10	1

Basis of Estimate		Widening, Superpave FAA 45 & Chip Seal (See Section 90 Sheet 1)			Widening, Superpave FAA 45 & Chip Seal (See Section 90 Sheet 2)			Widening, Superpave FAA 45 & Chip Seal (See Section 90 Sheet 3)			Old Hwy 10 & Two Private Drive Approaches (See Section 40 Sheet 1 & Section 90 Sheet 1&2)	Two Trappers Kettle & Conoco Approaches (See Section 40 Sheets 1 & 2 & Section 90 Sheets 2&3)	Two Cenex & Dollar General Approaches (See Section 40 Sheets 2 & Section 90 Sheets 2&3)		
		Begin Sta	End Sta		Begin Sta	End Sta		Begin Sta	End Sta						
		3975+13	3980+00		3980+00	3988+00		3988+00	3993+32						
Surfacing Quantities		Total Sta =	4.87		Total Sta =	8.00		Total Sta =	5.32						
Material	**Unit**	**Width (ft)**	**Quantity per Station**	**Sub-Total**	**Width (ft)**	**Quantity per Station**	**Sub-Total**	**Width (ft)**	**Quantity per Station**	**Sub-Total**	**Sub-Total**	**Sub-Total**	**Sub-Total**	**Total**	**Unit**
Removal of Bituminous Surfacing (2 Ton/CY)	Ton	---	375	1825.00	---	262	2098.00	---	228	1212.00	981	---	---	**6,116**	**Ton**
Milling Pavement Surface	Ton	6' Lt & 6' Rt	15	73	6' Lt & 6' Rt	15	119	6' Lt & 6' Rt	15.0	76	6	11	---	**285**	**Ton**
Milling PCC Pavement	SY	---	---	---	---	---	---	---	---	---	86	---	135	**221**	**SY**
Common Excavation - Subcut	CY	---	---	---	---	---	---	---	---	---	308	---	---	**308**	**CY**
Aggregate Base Course CL 5 (1.875 Ton/CY)	Ton	---	289.5	1,410	---	434.4	3,475	---	502.1	2,671	2,210	---	---	**9,766**	**Ton**
Tack Coat (0.05 Gal/SY)	Gal	---	11.3	55	---	15.0	120	---	21.4	114	188	90	74	**641**	**Gal**
Superpave FAA 45 (2 Ton/CY)	Ton	---	28.7	140	---	43.5	348	---	63.9	340	577	275	151	**1,831**	**Ton**
PG 58H-28 Asphalt Cement (5.9%)	Ton	---	2.1	10	---	2.6	21	---	3.9	21	36	18	11	**117**	**Ton**

Chip Seal Basis of Estimate		Widening, Superpave FAA 45 & Chip Seal (See Section 90 Sheet 1)			Widening, Superpave FAA 45 & Chip Seal (See Section 90 Sheet 2)			Widening, Superpave FAA 45 & Chip Seal (See Section 90 Sheet 3)			Old Hwy 10 & Two Private Drive Approaches (See Section Section 90 Sheet 1&2)	Two Trappers Kettle & Conoco Approaches (See Section Section 90 Sheets 2&3)	Two Cenex & Dollar General Approaches (See Section Section 90 Sheets 2&3)		
		Begin Sta	End Sta		Begin Sta	End Sta		Begin Sta	End Sta						
		3968+95	3980+00		3980+00	3988+00		3988+00	3999+10						
Surfacing Quantities		Total Sta =	11.05		Total Sta =	8.00		Total Sta =	11.10						
Material	**Unit**	**Width (ft)**	**Quantity per Station**	**Sub-Total**	**Width (ft)**	**Quantity per Station**	**Sub-Total**	**Width (ft)**	**Quantity per Station**	**Sub-Total**	**Sub-Total**	**Sub-Total**	**Sub-Total**	**Total**	**Unit**
Fog Seal (0.06 Gal/SY)	Gal	---	31.4	347	---	32.1	257	---	38.9	432	103	44	30	**1,213**	**Gal**
CRS2P Emulsified Asphalt (0.38 Gal/SY)	Gal	---	165.2	1,825	---	173.3	1,386	---	206.0	2,287	685	333	290	**6,806**	**Gal**
Cover Coat Material CL 41 (25 lbs/SY)	Ton	---	5.4	60	---	5.8	46	---	6.8	76	24	12	11	**229**	**Ton**

HMA Cored Samples

Specification Section	A	B		C	Quantity	Quantity	Unit
	Distance (Ft)÷1000	Lanes	Joints	Lifts	(A x B x C)	(1 per mile)	
430.04 I.2.b(1), "General" Conoco Right Turn Lane	1	1	N/A	3	3	N/A	EA
430.04 I.2.b(1), "General" Superpumper Right Turn Lane	1	1	N/A	3	3	N/A	EA
430.04 I.2.b(1), "General" Mainline	2	2	N/A	1	4	N/A	EA
SSP 4 Longitudinal Joint Density in HMA Pavements (Centerline)	1	N/A	0	0	0	N/A	EA
430.04 I.2.b(2),"Pavement Thickness Determination Cores"					N/A	1	EA
				Total	10	1	EA

Water
25 MGal/Mile for Dust Palliative
20 Gal/Ton for Aggregates
10 Gal/CY for Embankment

REGISTERED PROFESSIONAL ENGINEER
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PE-25991
DATE 03/16/22
NORTH DAKOTA

Basis of Estimate

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	11	1

Location	203-0138 Common Excavation - Subcut (CY) **Pay Item	Embankment (CY)	Common Excavation - Waste*** (CY)	203-0140 Borrow Excavation (CY) Pay Item	203-0109 Topsoil (CY) *Pay Item
	A	B	C	D = C-B-A	E
Common Excavation-Waste from Tied Project NH-5-085(081)073	0	0	1,250	-1,250	0
3975+13 to 3993+31 (Hwy 85 Mainline)	0	3,615	0	3,615	3,326
3977+65 (County Road 10 East and West)	308	1,319	0	1,011	0
Lighting Earthwork	0	826	0	826	257
Total	308	5,760	---	4,202	3,583

* Topsoil Volumes Computed from Surface Areas Measurements at a 6" Depth.

** Common Excavation - Subcut will not be measured and will be paid for at plan quantity. Common Excavation - Subcut is located at County Road 10

*** Common Excavation - Waste: Utilize waste material from tied project no. NH-5-085(081)073, PCN 22832. Common Excavation - Waste will be paid for on tied project.

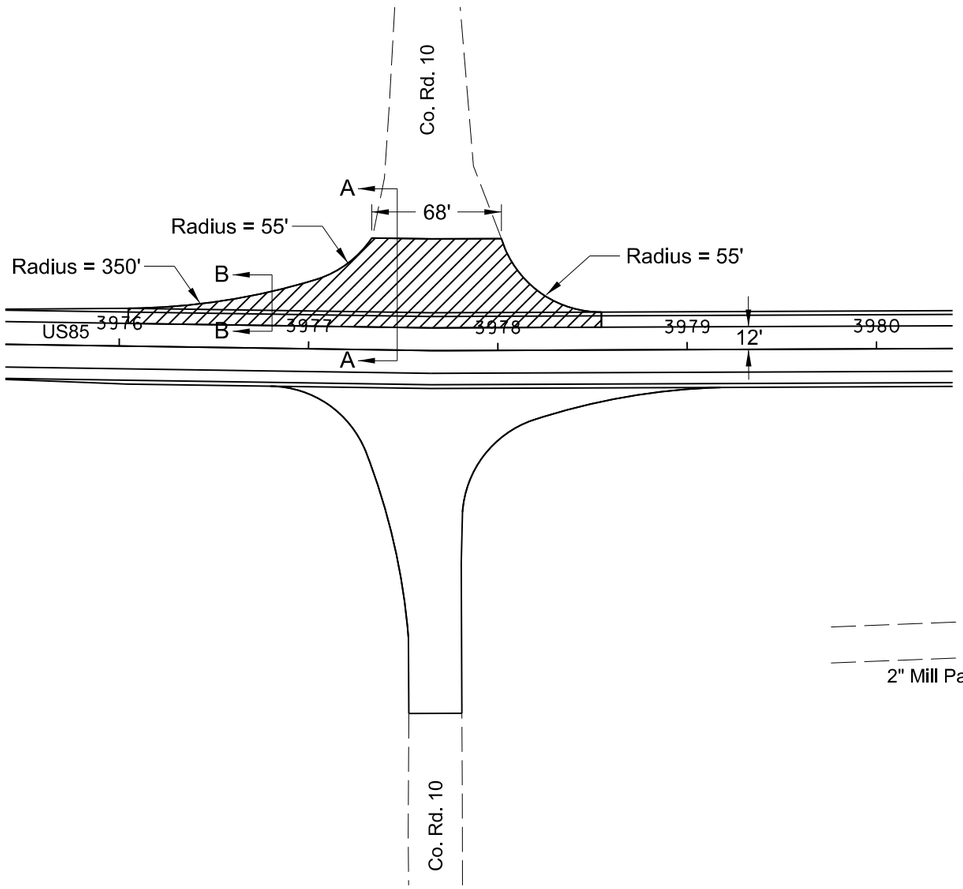


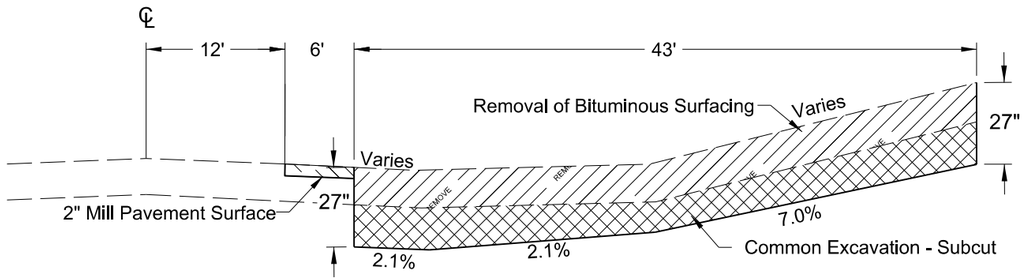
Earthwork Summary

US 85

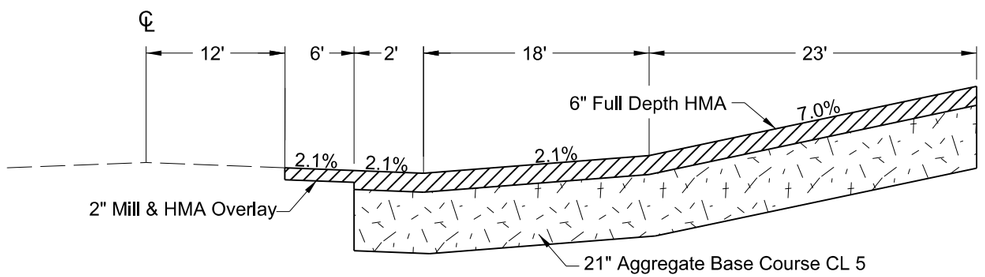
Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	1





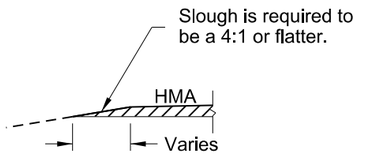
Section A-A - Removal



Section A-A - Proposed

Legend

- Aggregate Base Course CL 5
- Removal of Bituminous Surfacing
- Hot Mix Asphalt (HMA)
- Milling Pavement Surface
- Common Excavation - Subcut



Section B-B

Notes:
1. Actual HMA paving and aggregate base course limits may vary in the field, as approved by the Engineer.
2. Refer to Section 90 Paving Layout sheets for quantities.
3. The HMA slough around the radii must be constructed to a 4:1 or flatter. (see section B-B)
4. Refer to Section 82 for coordinate data information of approaches

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LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

*See Section 40 for Removal/Milling
See Section 90 for Surfacing Quantities

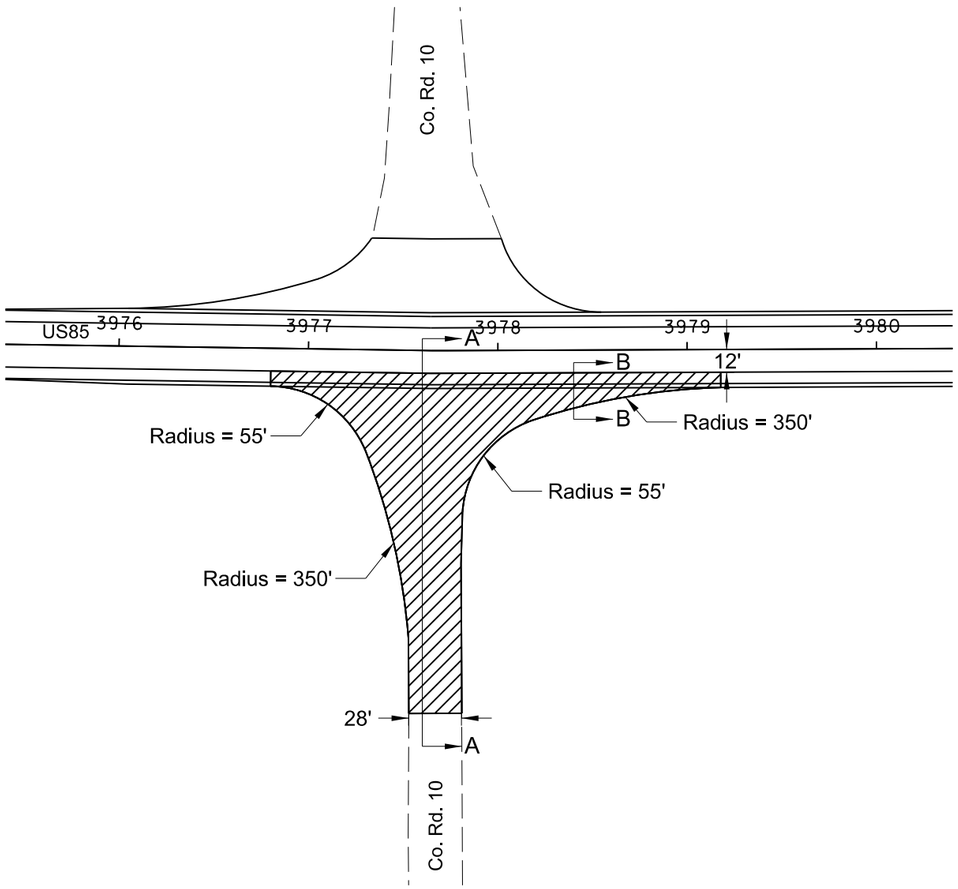
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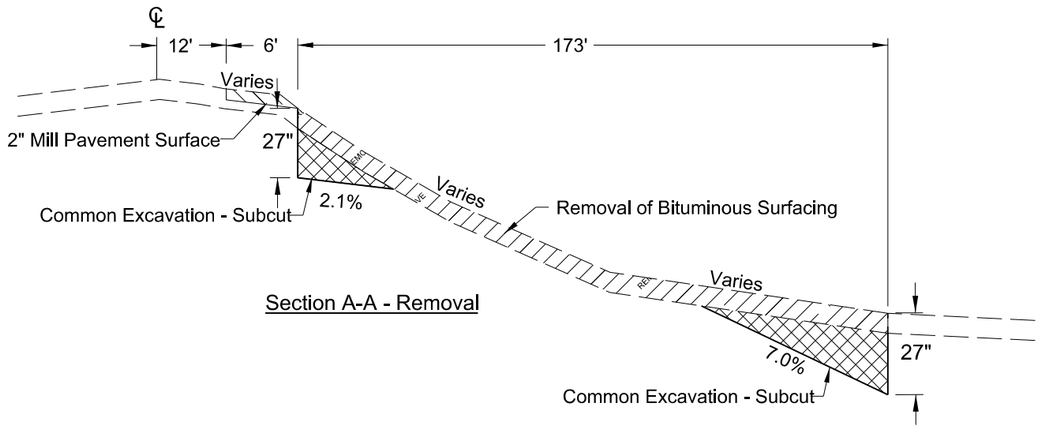
Approach Paving Details
County Road 10 - West Leg

US 85

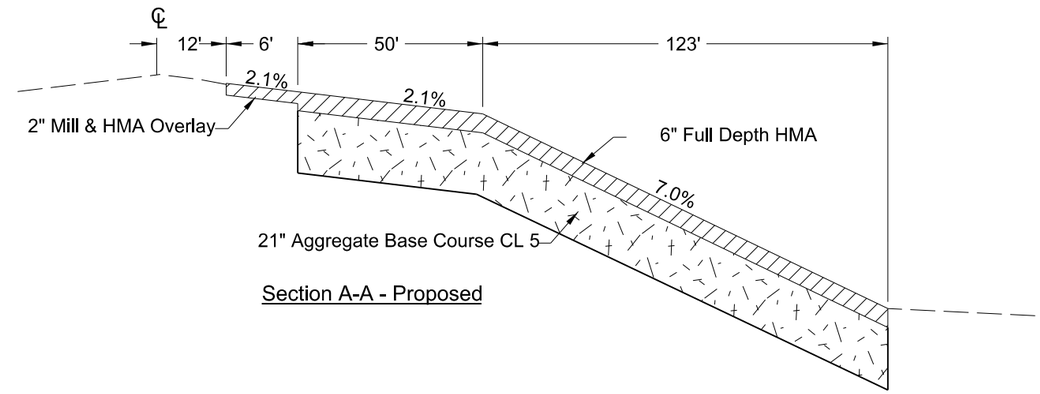
Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	20	2





Section A-A - Removal

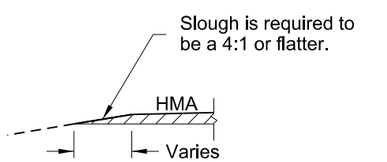


Section A-A - Proposed

Notes:
1. Actual HMA paving and aggregate base course limits may vary in the field, as approved by the Engineer.
2. Refer to Section 90 Paving Layout sheets for quantities.
3. The HMA slough around the radii must be constructed to a 4:1 or flatter. (see section B-B)
4. Refer to Section 82 for coordinate data information of approaches

Legend

- Aggregate Base Course CL 5
- Removal of Bituminous Surfacing
- Hot Mix Asphalt (HMA)
- Milling Pavement Surface
- Common Excavation - Subcut



Section B-B

*See Section 40 for Removal/Milling
See Section 90 for Surfacing Quantities

*Drawing Not to Scale

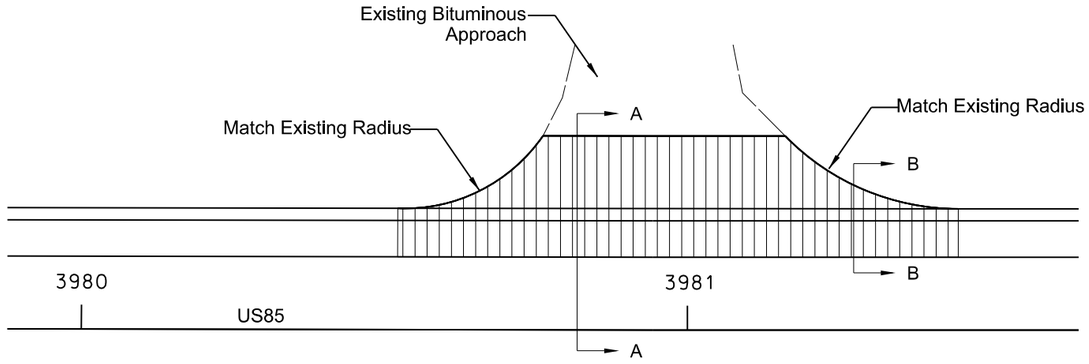
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Approach Paving Details
County Road 10 - East Leg

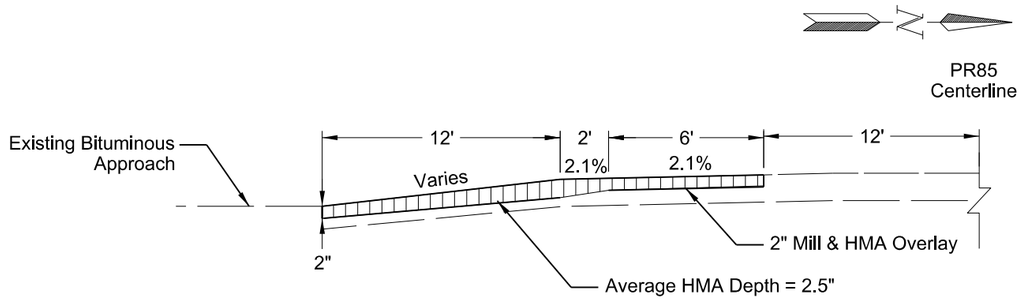
US 85

Belfield Turn Lanes

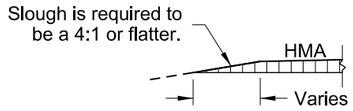
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	3



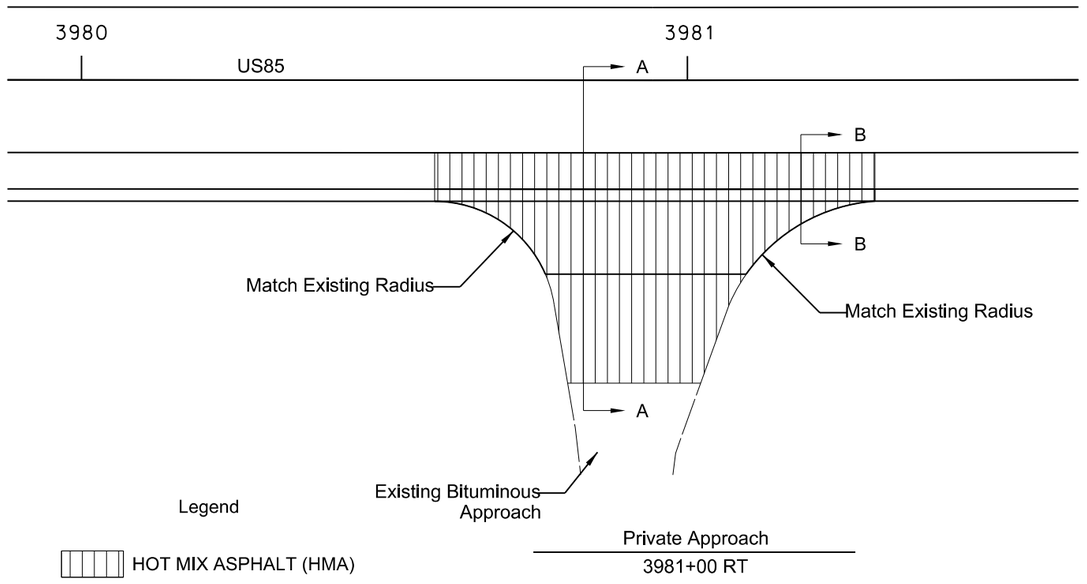
Private Approach
3981+00 LT



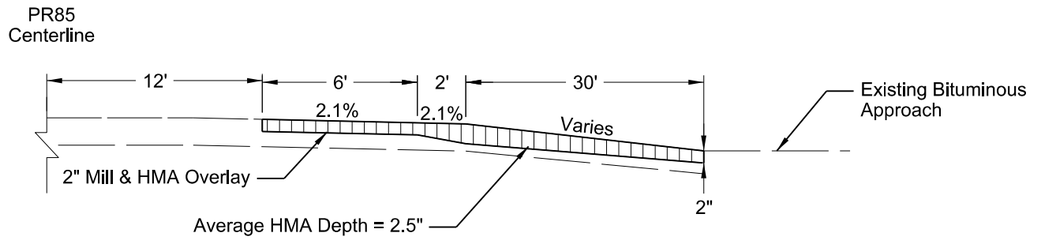
Section A-A Approach Paving



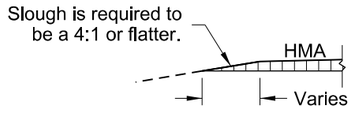
Section B-B



Private Approach
3981+00 RT



Section A-A Approach Paving



Section B-B

*See Section 40 for Removal/Milling
See Section 90 for Surfacing Quantities
*Drawing Not to Scale

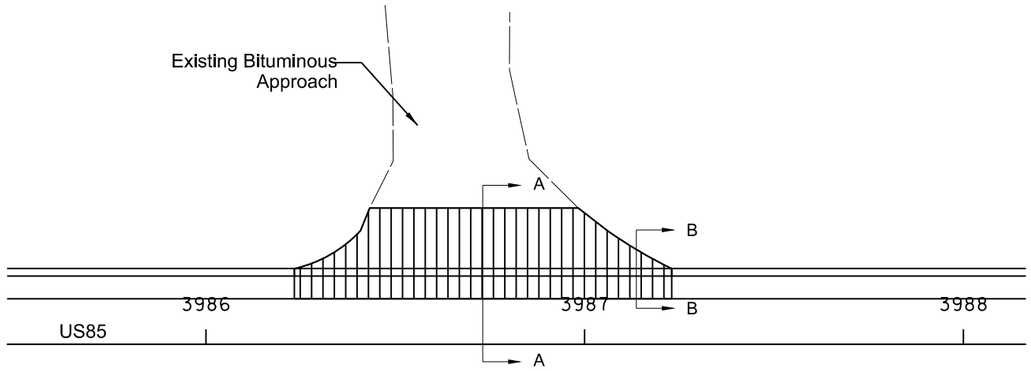


Approach Paving Details
Private Drives

US 85

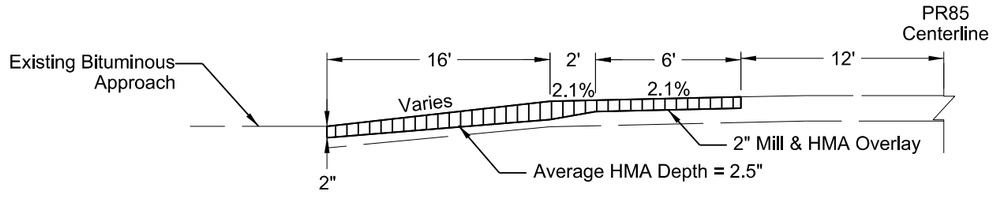
Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	4

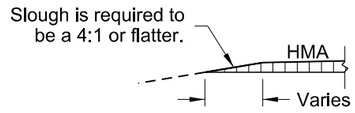


South Trapper's Kettle Approach

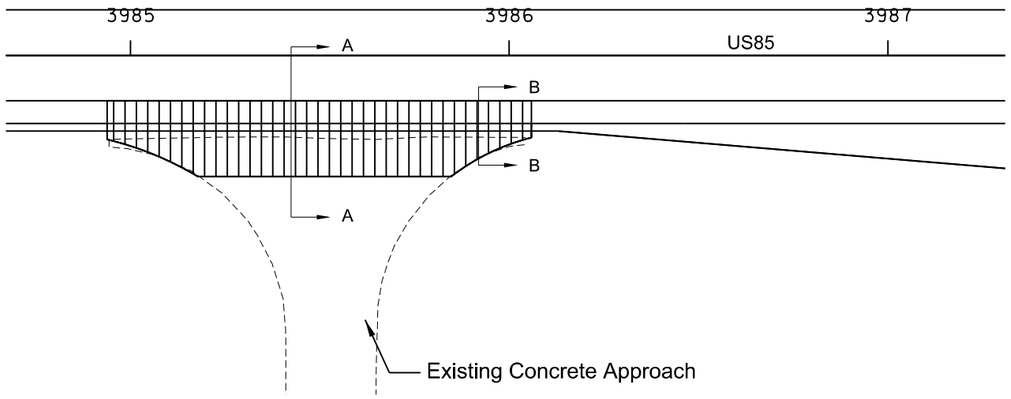
3986+71 LT



Section A-A Approach Paving

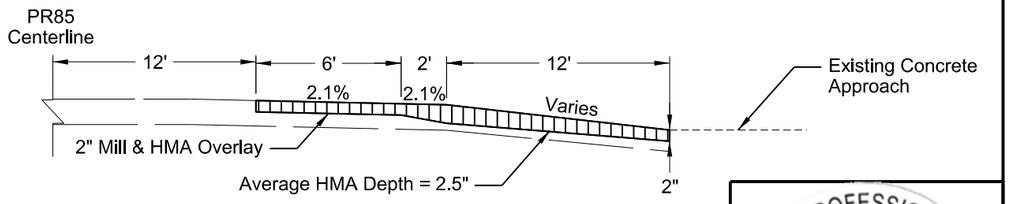


Section B-B

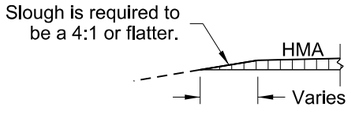


Dollar General Approach

3985+51 RT



Section A-A Approach Paving



Section B-B

*See Section 40 for Removal/Milling
See Section 90 for Surfacing Quantities
*Drawing Not to Scale

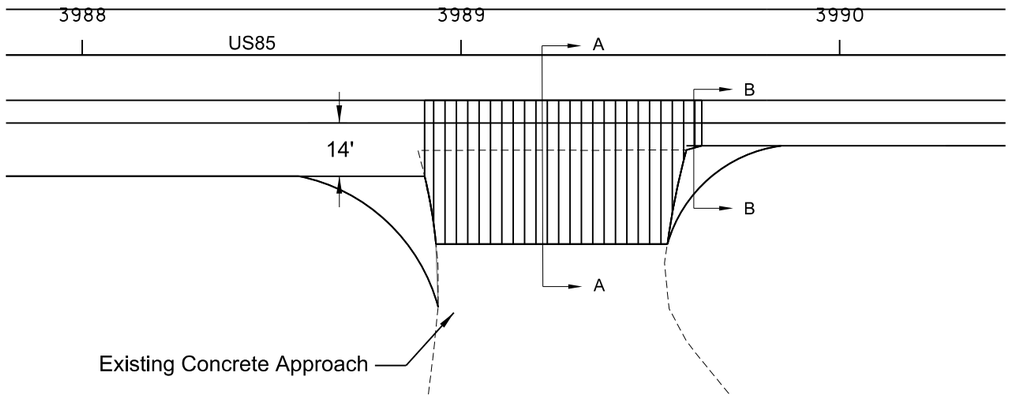


Approach Paving Details
Dollar General & South Trapper's Kettle

US 85

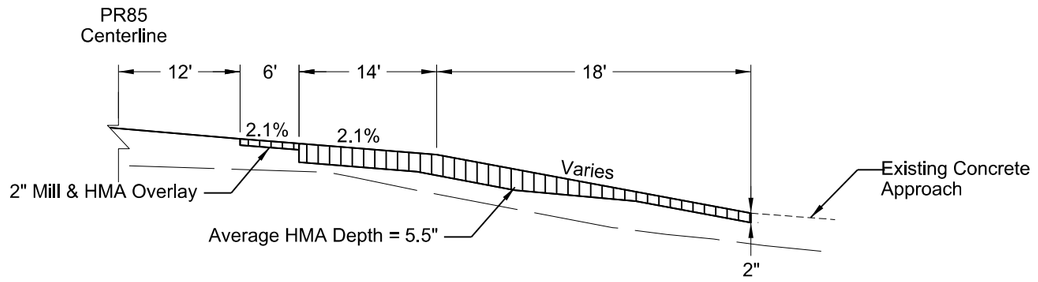
Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	5

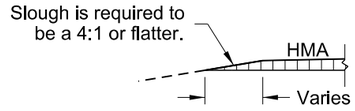


South Super Pumper Approach

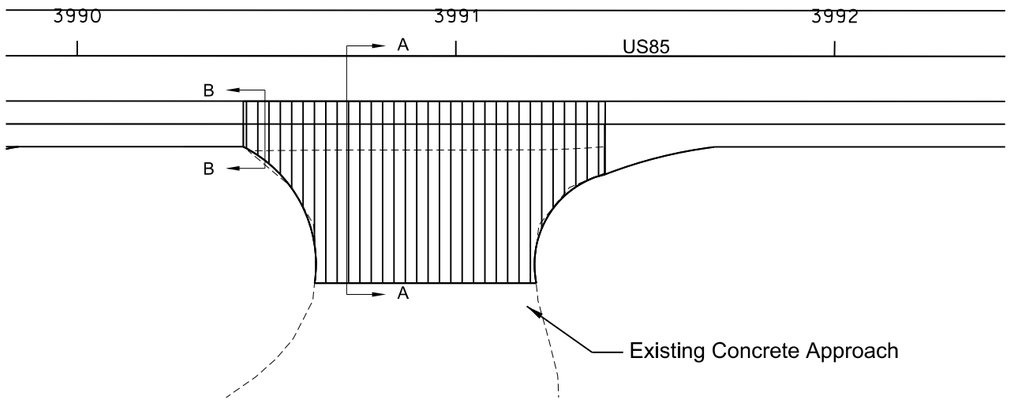
3989+10 RT



Section A-A Approach Paving



Section B-B

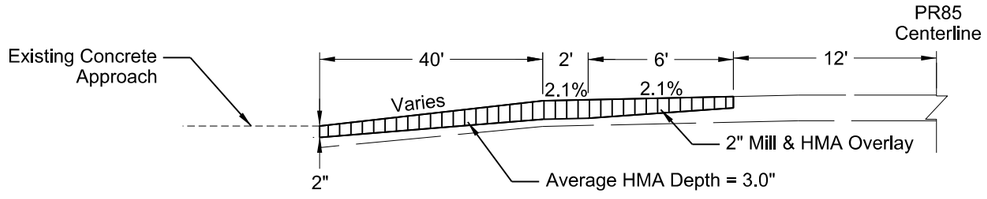


Legend

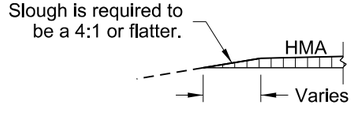
HOT MIX ASPHALT (HMA)

North Super Pumper Approach

3991+00 RT



Section A-A Approach Paving



Section B-B

*See Section 40 for Removal/Milling
See Section 90 for Surfacing Quantities
*Drawing Not to Scale

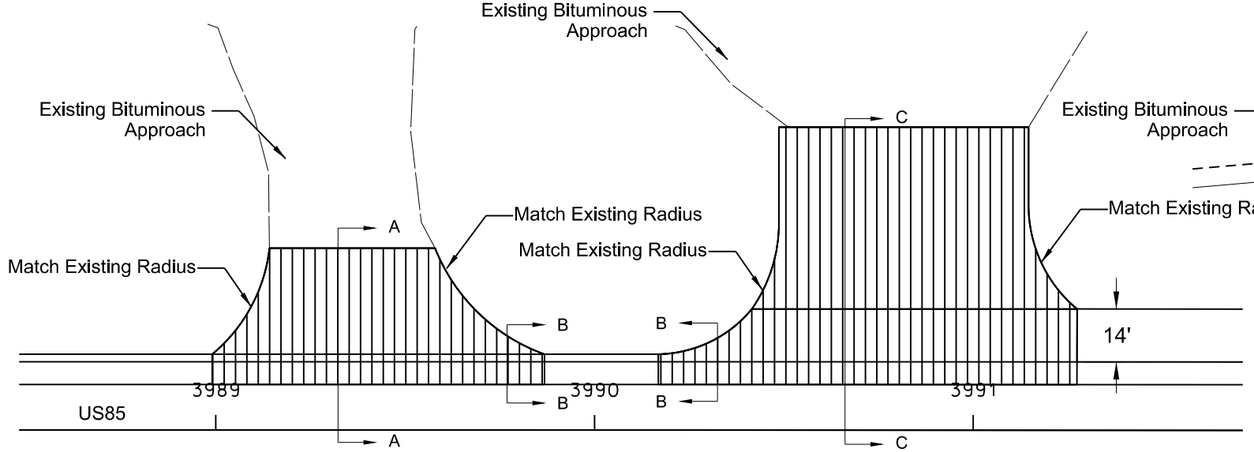


Approach Paving Details
North & South Super Pumper Approaches

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	6

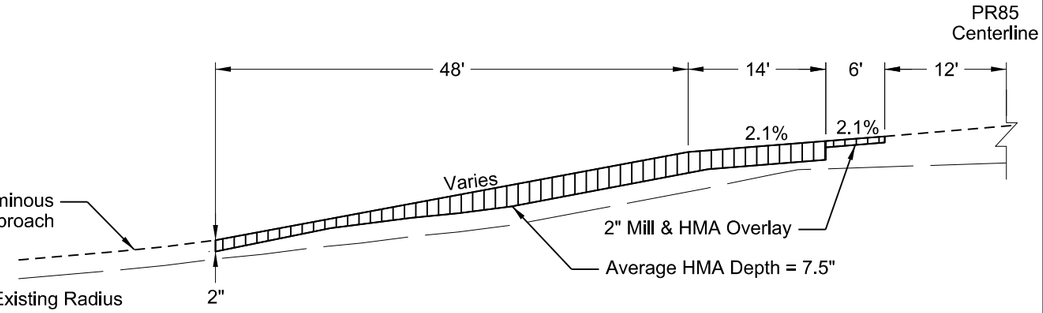


North Trapper's Kettle Approach

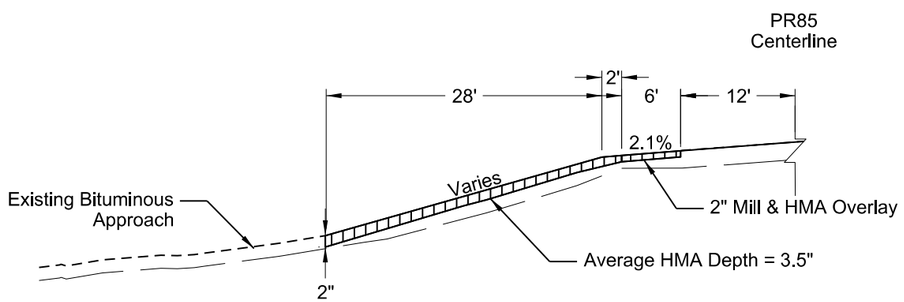
3989+36 LT

Conoco Approach

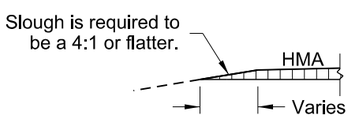
3990+81 LT



Section C-C Approach Paving



Section A-A Approach Paving



Section B-B

Legend

HOT MIX ASPHALT (HMA)

*See Section 40 for Removal/Milling
See Section 90 for Surfacing Quantities
*Drawing Not to Scale

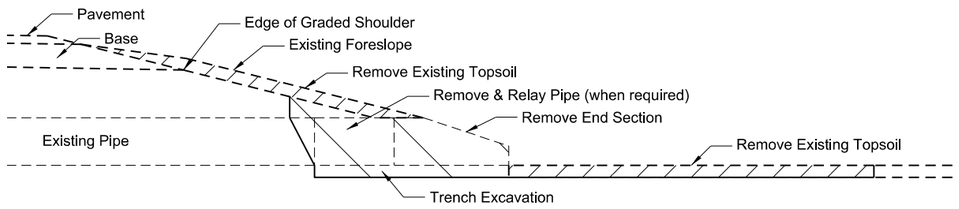
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PE-25991
DATE 03/16/22
NORTH DAKOTA

Approach Paving Details
North Trapper's Kettle & Conoco Apporach

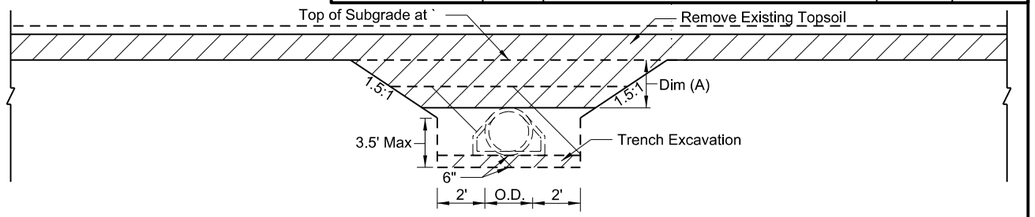
US 85

Belfield Turn Lanes

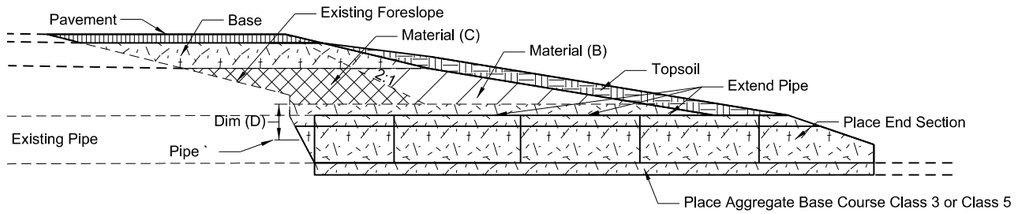
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	7



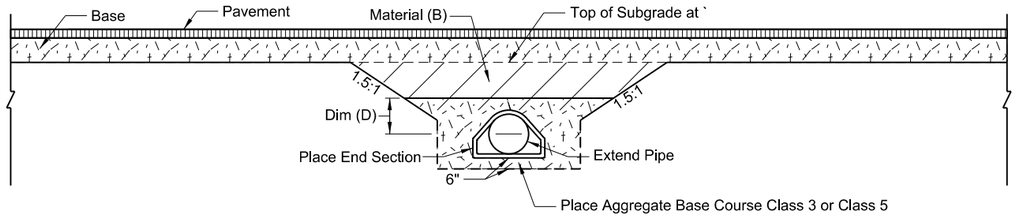
Removal Section
Cross Section View



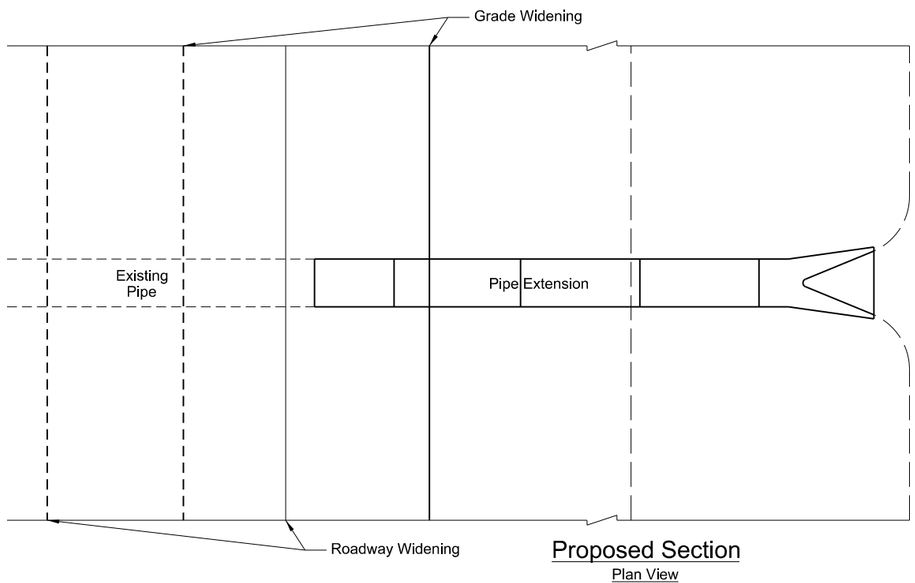
Removal Detail
Side View



Proposed Section
Cross Section View



Backfill Detail
Side View (Topsoil not shown)



Proposed Section
Plan View

Pay Items
1) Pipe*
2) Remove & Relay Pipe - All Types & Sizes (when required)
3) Remove & Reset End Section or
   Remove End Section and Place New End Section
4) Borrow Excavation or Common Excavation
5) Topsoil
6) Seeding
7) Mulching

*Included in Pipe Pay Item
1) Pipe
2) Trench excavation
3) Aggregate Base Course Class 3 or Class 5

Pipe Materials	Dim (A)<=4 Feet Material (B)	Material (C)	Backfill Dimension Dim (D)
Concrete	Embank or Aggr	Aggregate	0.5 O.D.
Metal	Embank or Aggr	Aggregate	0.5 O.D.+1 Foot

Pipe Materials	Dim (A)>4 Feet Material (B)	Material (C)	Backfill Dimension Dim (D)
Concrete	Embankment	Embankment	0.5 O.D.
Metal	Embankment	Embankment	0.5 O.D.+1 Foot

NOTES:
1. Embankment may be either Borrow Excavation or Common Excavation

2. Aggregate may be either Class 3 or Class 5 Aggregate Base Course.

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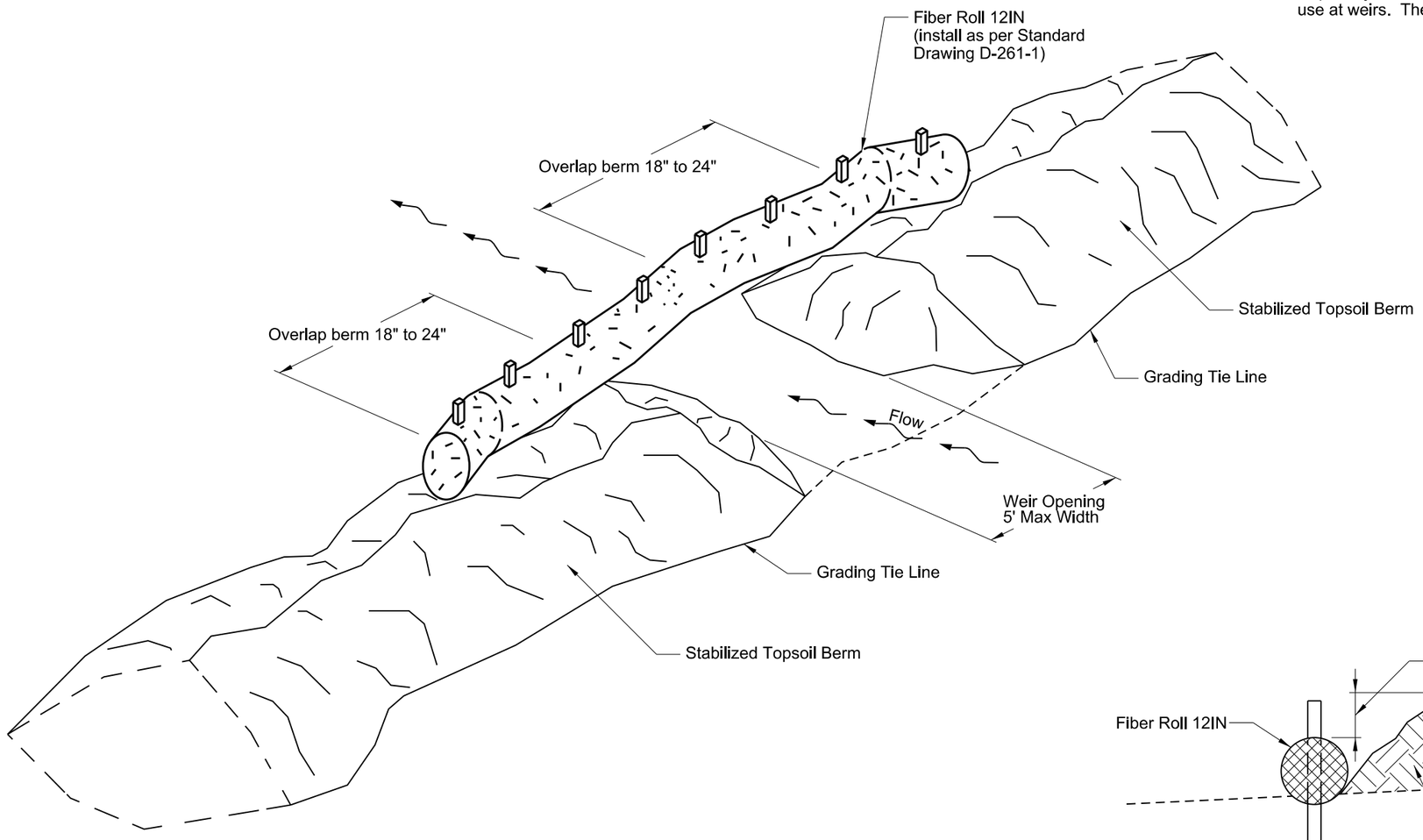
Mainline Widening CL Pipe Extension Detail

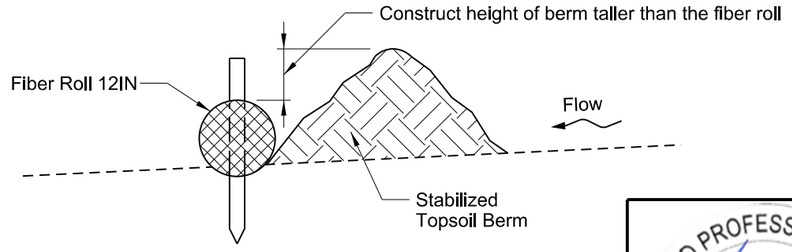
US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	20	8

A quantity of 180 LF of Fiber Roll 12IN has been included in the quantities for use at weirs. The Engineer will measure the actual quantity required in the field.





Topsoil Berm Detail

Notes:

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

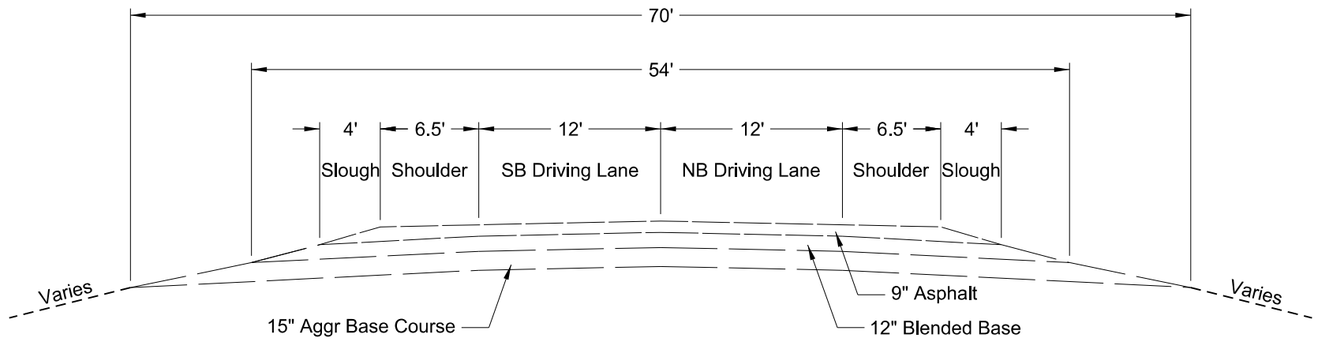
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Temporary Topsoil Berm and Weir Detail

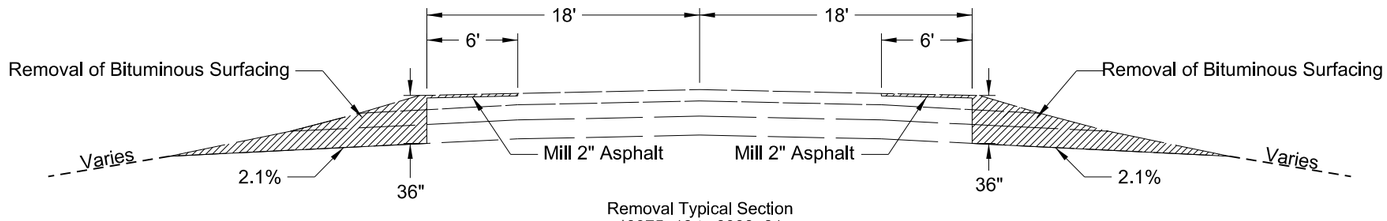
US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	30	1



Existing Typical Section
3975+13 to 3993+31



Removal Typical Section
*3975+13 to 3993+31

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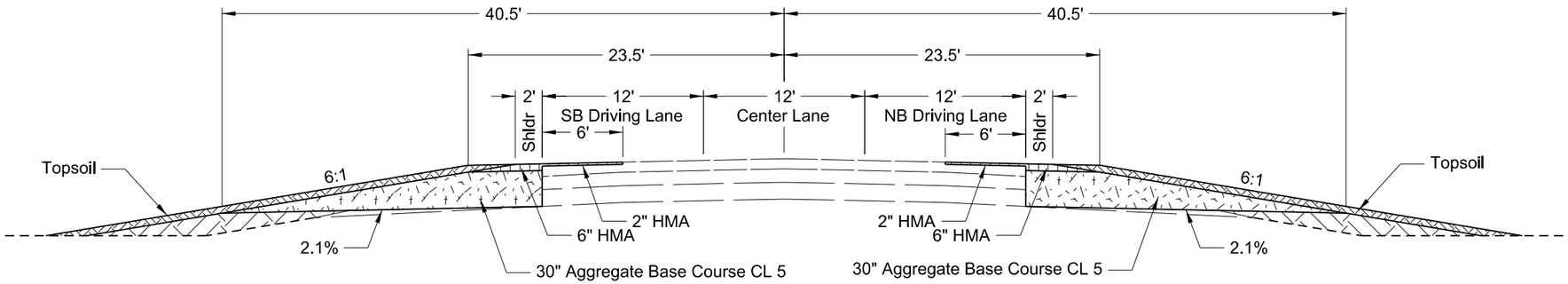
* Do not perform Removal of Bituminous Surfacing across existing approaches. See Section 40 for station ranges and quantities.

Existing & Removal Typical Sections

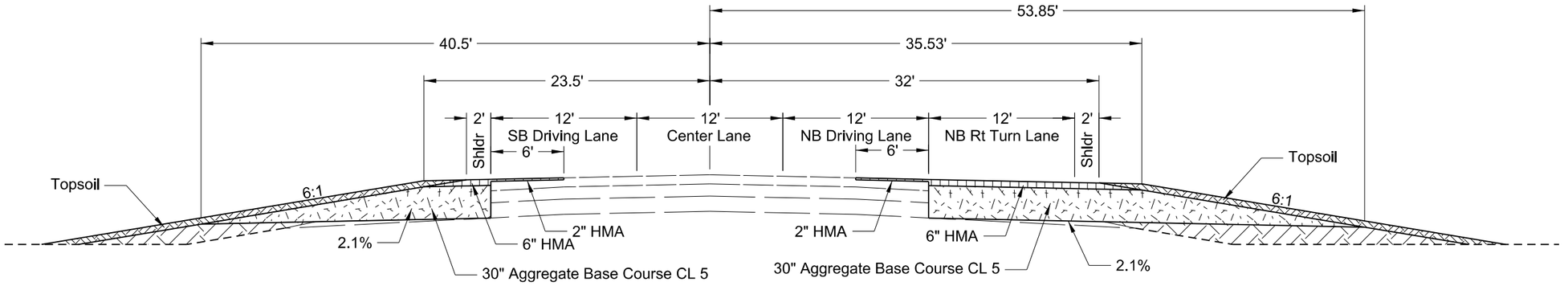
US 85

Belfield Turn Lanes

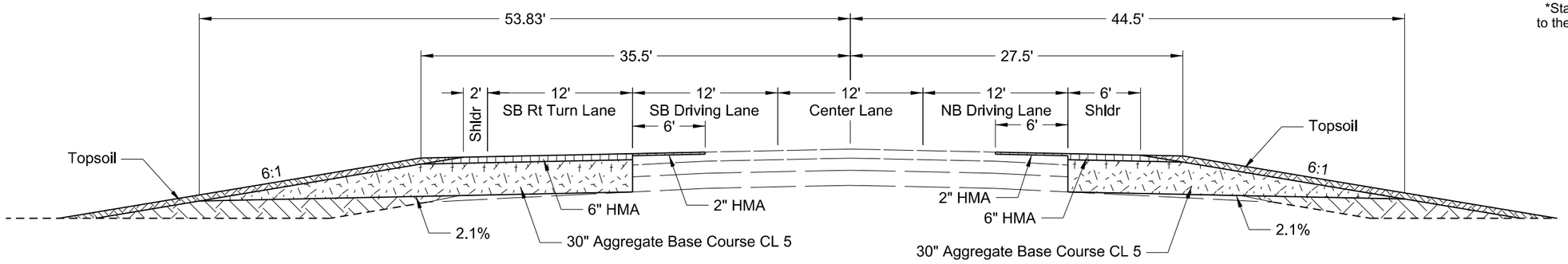
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	30	2



Proposed Typical Section
Three-Lane Section
3975+13 to 3984+84
3987+10 to 3991+71



Proposed Typical Section
Three-Lane Section w/ NB Rt Turn Lane
3984+84 to 3987+10



Proposed Typical Section
Three-Lane Section w/ SB Rt Turn Lane & 6' NB Shoulder
3991+71 to 3993+31

*Station ranges are approximate due to the turn lane and approach locations.

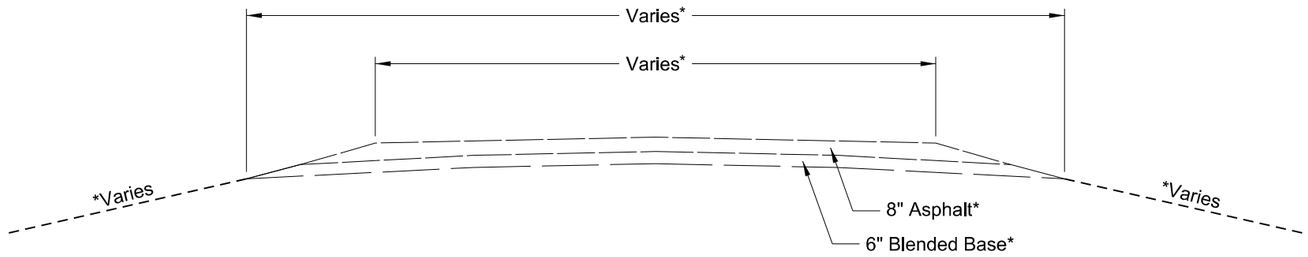
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NORTH DAKOTA

Proposed Typical Sections

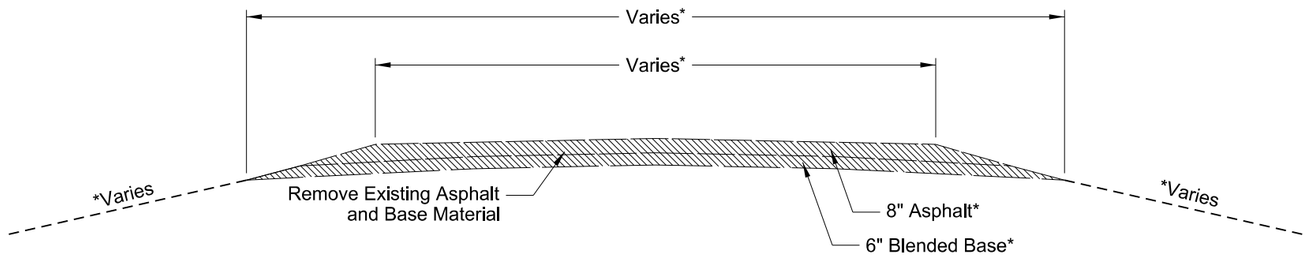
US 85

Belfield Turn Lanes

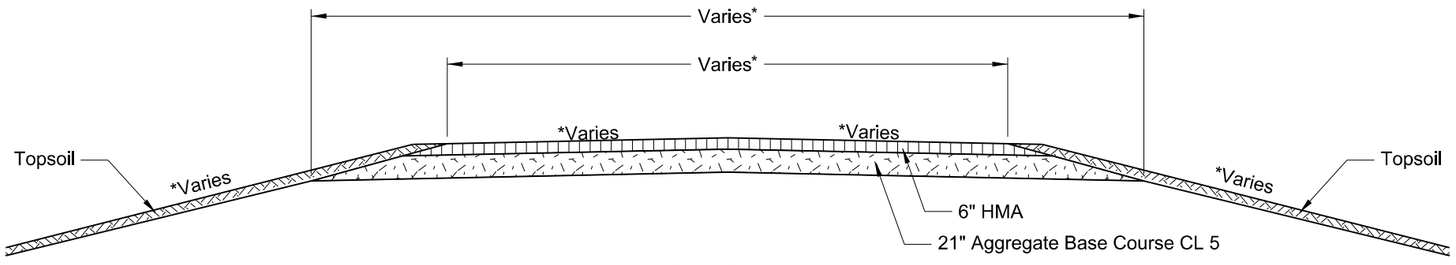
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	30	3



County Road 10
Existing Typical Section
1+20 to 1+58 (West Side)
2+20 to 3+92 (East Side)



County Road 10
Removal Typical Section
1+20 to 1+58 (West Side)
2+20 to 3+92 (East Side)



County Road 10
Proposed Typical Section
1+20 to 1+58 (West Side)
2+20 to 3+92 (East Side)

* Notes: Existing widths and slopes vary due to the flared geometrics of the intersection.

Existing depths are estimated; not field verified.

Refer to Section 20 and 82 for specific information.

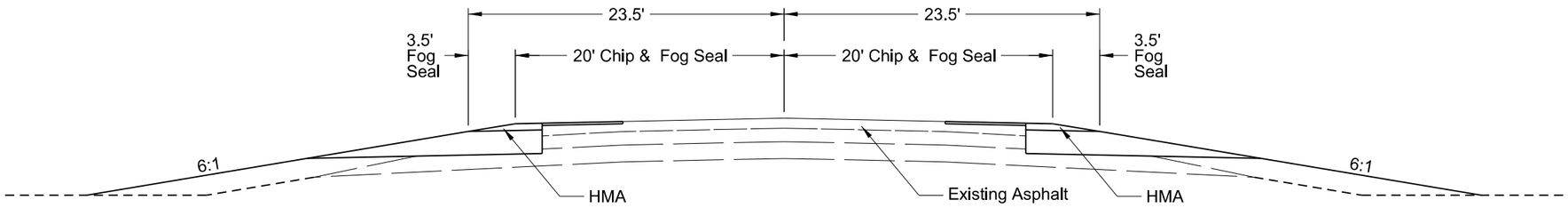
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Existing, Removal & Proposed Typical Sections
East & West Portions of County Road 10

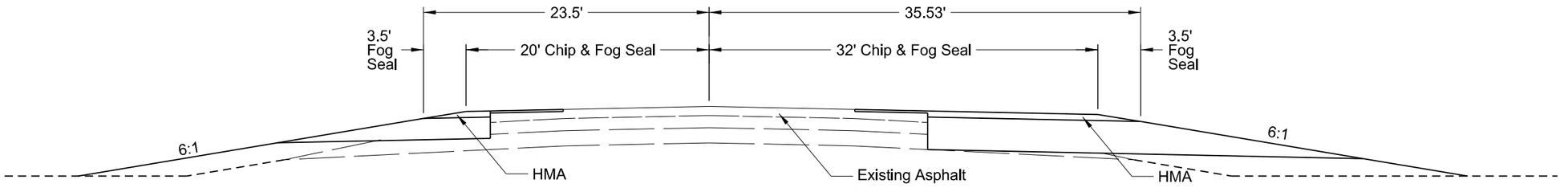
US 85

Belfield Turn Lanes

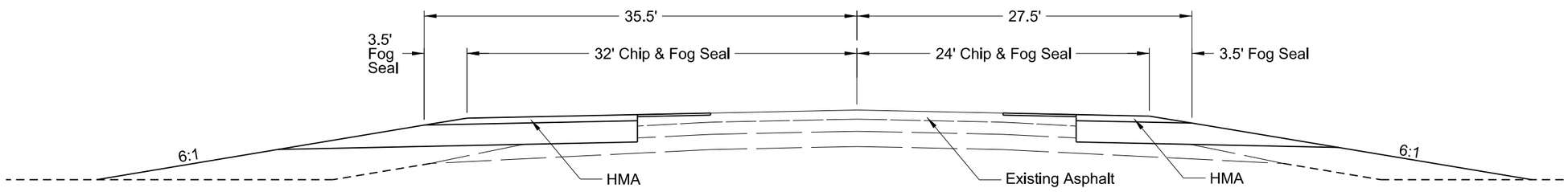
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	30	4



Proposed Seal Coat Typical Section
Three-Lane Section
Sta 3968+95 to 3984+84
Sta 3987+10 to 3991+71



Proposed Seal Coat Typical Section
Three-Lane Section w/ NB Rt Turn Lane
Sta 3984+84 to 3987+10



Proposed Seal Coat Typical Section
Three-Lane Section w/ SB Rt Turn Lane & 6' NB Shoulder
Sta 3991+71 to 3999+10

*Station ranges are approximate due to the turn lane and approach locations.

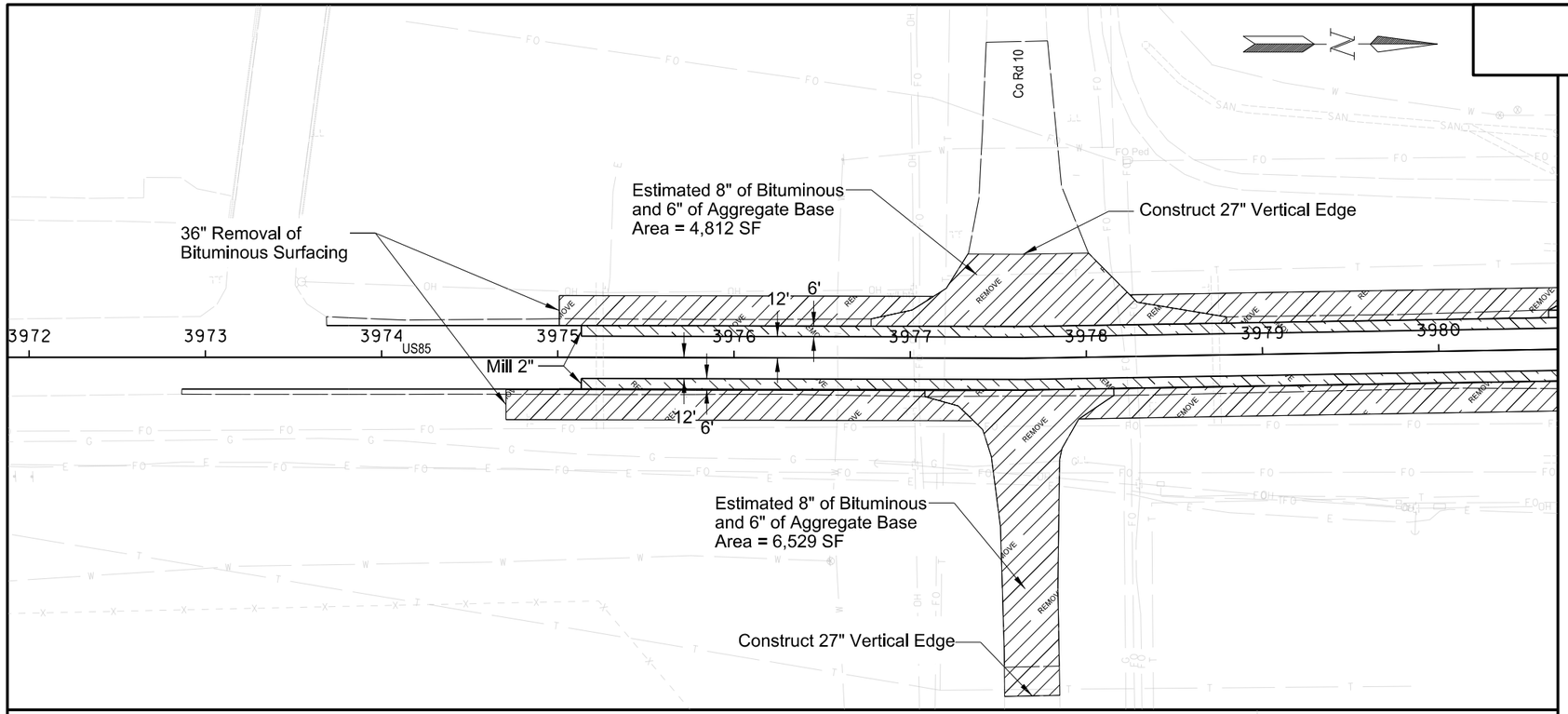
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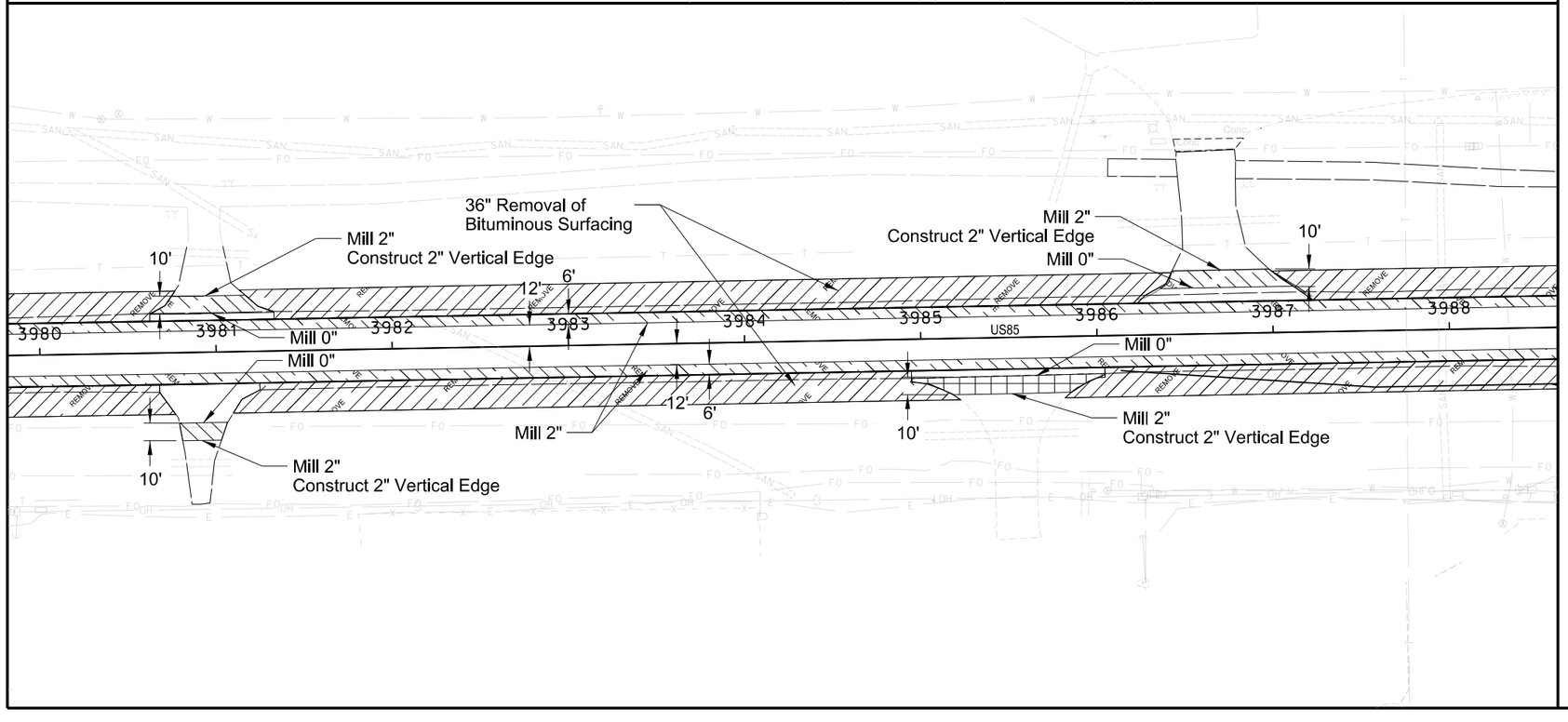
Proposed Typical Sections
Seal Coat

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	40	1





SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0135	REMOVAL OF BITUMINOUS SURFACING		
		3974+70 to 3977+34 Rt	489	TON
		3975+01 to 3977+13 Lt	393	TON
		3977+65 (Approach) Lt	416	TON
		3977+65 (Approach) Rt	565	TON
		3977+95 to 3980+68 Rt	504	TON
		3978+25 to 3980+63 Lt	439	TON
		3981+25 to 3984+94 Rt	685	TON
		3981+33 to 3986+23 Lt	907	TON
		3986+04 to 3988+00 Rt	363	TON
		3987+23 to 3988+00 Lt	143	TON
411	0100	MILLING PAVEMENT SURFACE		
		3980+94 (Approach) Lt	4	TON
		3980+94 (Approach) Rt	2	TON
		3986+65 (Approach) Lt	4	TON
		3975+13 to 3988+00 Lt	92	TON
		3975+13 to 3988+00 Rt	100	TON
411	0110	MILLING PCC PAVEMENT		
		3985+50 (Approach) Rt	86	SY

LEGEND

PCC Pavement Grinding

Removal of Bituminous Surfacing

Milling Pavement Surface

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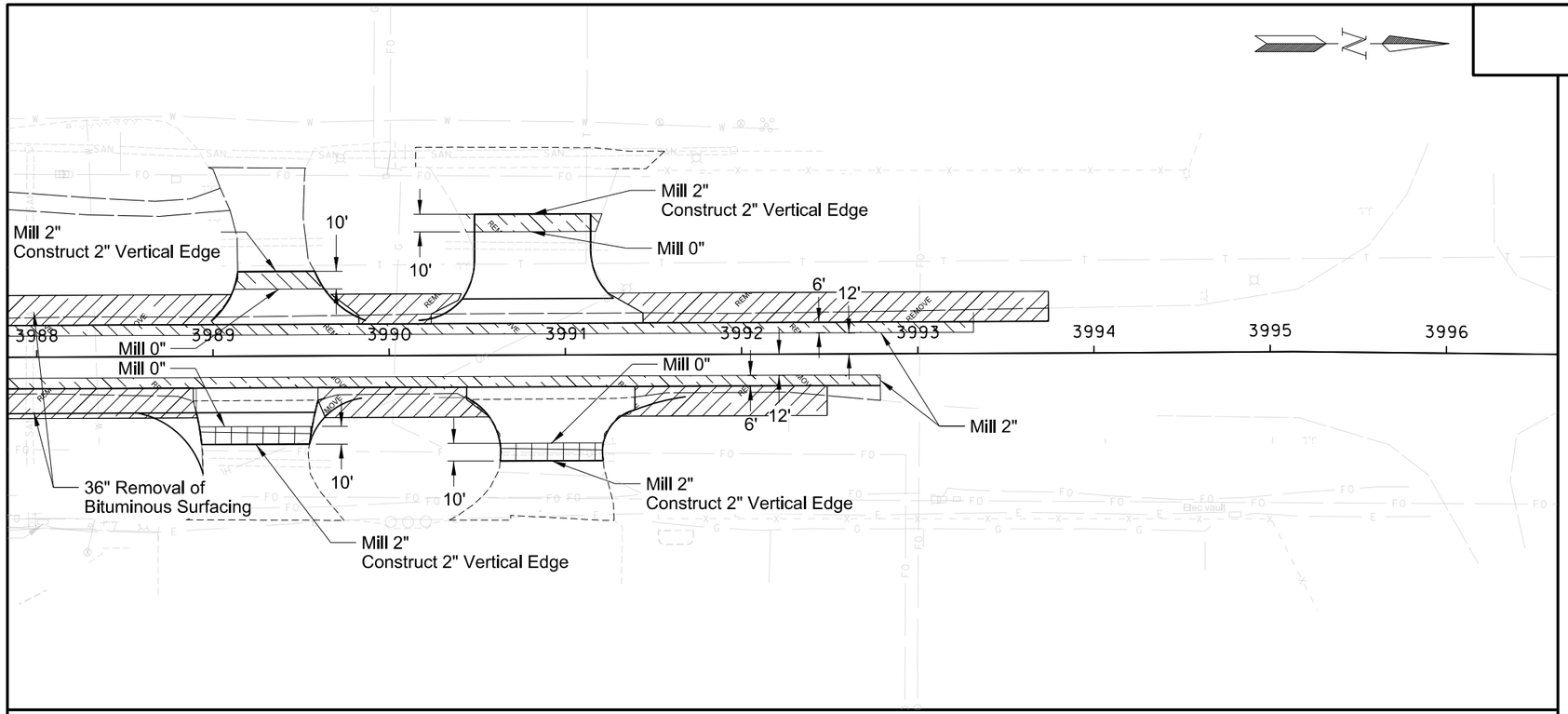
Removals

US 85

Belfield Turn Lanes

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	40	2



SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0135	REMOVAL OF BITUMINOUS SURFACING		
		3988+00 to 3988+89 Rt	165	TON
		3988+00 to 3989+01 Lt	187	TON
		3989+60 to 3990+44 Rt	156	TON
		3989+83 to 3990+24 Lt	76	TON
		3991+39 to 3992+48 Rt	202	TON
		3991+44 to 3993+74 Lt	426	TON
411	0100	MILLING PAVEMENT SURFACE		
		3989+29 (Approach) Lt	3	TON
		3990+84 (Approach) Lt	4	TON
		3988+00 to 3992+79 Lt	40	TON
		3988+00 to 3993+32 Rt	36	TON
411	0110	MILLING PCC PAVEMENT		
		3989+29 (Approach) Rt	70	SY
		3990+92 (Approach) Rt	65	SY

LEGEND

PCC Pavement Grinding

Removal of Bituminous Surfacing

Milling Pavement Surface

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Removals

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	51	1

ALLOWABLE PIPE LIST

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coating	Steel Pipe Corrugations or Spiral Rib	Steel Pipe Minimum Thickness	R1 Fabric (Pay Item)	End Section*		Applicable Backfill Detail
													Begin	End	
				Inch	Bid Item	LF		Inch	Type	Inch	Inch	SY	EA	EA	Plan/Standard
3975+24	42' Lt	3975+24	50' Lt	24	Pipe Conc. Reinf. CL III (Extension)	8	Reinforced Concrete Pipe - Class III **(barrel length = 8 LF)**	24					R & R		Section 20 Sheet 7
3975+24	41' Rt	3975+24	53' Rt	24	Pipe Conc. Reinf. CL III (Extension)	12	Reinforced Concrete Pipe - Class III **(barrel length = 12 LF)**	24						R & R	Section 20 Sheet 7
3978+74	39' Rt	3978+74	63' Rt	24	Pipe Conc. Reinf. CL III (Extension)	24	Reinforced Concrete Pipe - Class III **(barrel length = 24 LF)**	24					FES		Section 20 Sheet 7
3978+74	45' Lt	3978+74	45' Lt	24	Pipe Conc. Reinf. CL III (Extension)	0	Reinforced Concrete Pipe - Class III **(barrel length = 0 LF)**	24						FES	Section 20 Sheet 7
3988+70	61' Rt	3988+74	60' Rt	18	Pipe Corr. Steel (Extension)	4	Corrugated Steel Pipe (CSP)	18					FES		Section 20 Sheet 7
3988+74	60' Rt	3988+78	59' Rt	18	Pipe Corr. Steel (Extension)	22.5° Bend (4')	Corrugated Steel Pipe (CSP)	18							Section 20 Sheet 7
3991+25	61' Lt	3991+29	62' Lt	18	Pipe Corr. Steel (Extension)	22.5° Bend (4')	Corrugated Steel Pipe (CSP)	18						FES	Section 20 Sheet 7

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

Corrugations 2 = 2-2/3" x 1/2"
3 = 3" x 1"
5 = 5" x 1"

Spiral Ribs: 3/4 = 3/4" x 3/4" @ 7-1/2"
1 = 3/4" x 1" @ 11-1/2"

End Sections: R & R = Remove & Relay
FES = Flared End Section
TES = Traversable End Section

NOTE: * Denotes the price bid for "Pipe Conduit" bid items includes end sections. The pipe barrel length shall be bid separately from the end sections for culvert extensions.

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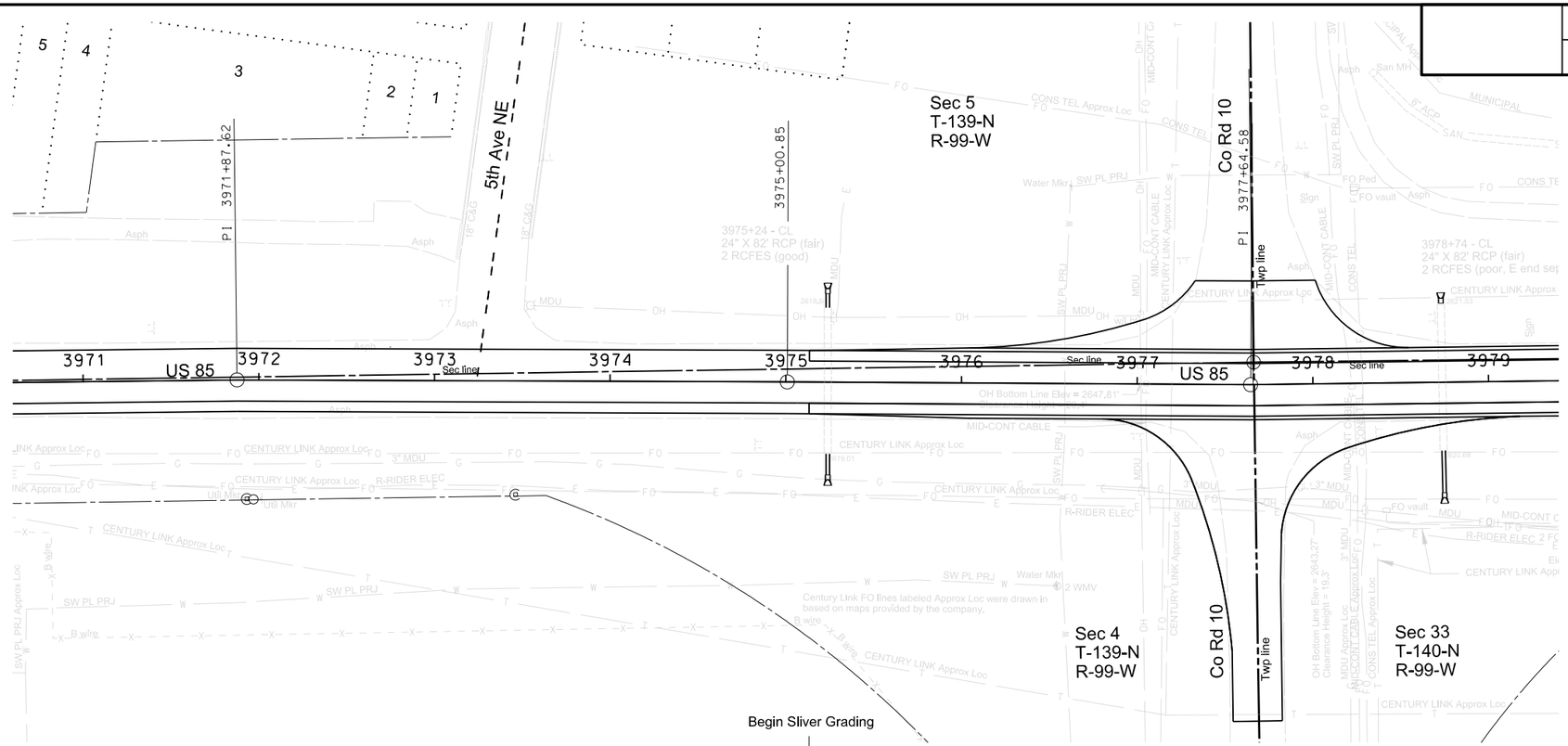
Allowable Pipe List

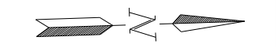
US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	60	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0169	REMOVAL OF END SECTION - ALL TYPES & SIZES		
		3978+74 - 39' RT	1	EA
		3978+74 - 45' LT	1	EA
714	0615	PIPE CONC REINF 24IN CL III		
		3975+24 - 42' to 50' LT	8	LF
		3975+24 - 41' to 53' RT	12	LF
		3978+74 - 39' to 63' RT	24	LF
714	3020	END SECT-CONC REINF 24IN		
		3978+74 - 63' RT	1	EA
		3978+74 - 45' LT	1	EA
714	9660	REMOVE & RELAY END SECTION - ALL TYPES & SIZES		
		3975+24 - 42' LT	1	EA
		3975+24 - 55' RT	1	EA







Plan & Profile

US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	60	2

Sec 32
T-140-N
R-99-W

3978+74 - CL
24" X 82' RCP (fair)
2 RCFES (poor, E end separated)

3980+91 - 56' Lt
18" X 59' CSP (poor)
2 CSFES (poor, rusted)

PI 3980+94.35

PI 3984+56.81

3985+76 - 76' Lt to SE end
3985+98 - 149' Lt to NW end
8" X 76' PVC (poor)
1 PVCFES (SE end, fair)
1 Vertical drop pipe w/ lockable plastic cover at ground level (NW end, poor)

3986+59 - 64' Lt
18" X 92' CSP (fair)
2 CSFES (poor)

3979 3980 3981 US 85 3982 3983 3984 3985 3986 3987 Sec line US 85

R/W Mon

R/W Mon

Prop Cor

Old Prop Cor

3980+88 - 63' Rt
18" X 58' CSP (fair)
2 CSFES (fair, buried in inslope)

Transition Inslopes Around Existing Culvert

3985+33 - 55' Rt
18" X 110' CSP (fair)
2 CSFES (good)

3985+92 - 81' Rt to YE end
12" X 21' CPP (fair)
2 CPFES (good)

Century Link Tel lines labeled Approx Loc were drawn in based on maps provided by the company.

Century Link FO lines labeled Approx Loc were drawn in based on maps provided by the company.

Century Link Tel lines labeled Approx Loc were drawn in based on maps provided by the company.

c 33
140-N
99-W

2

1

5

2,660
2,650
2,640
2,630

Existing Ground

2,629.04 2,630.77 2,632.71 2,635.58 2,639.04 2,642.83 2,646.77 2,650.60 2,654.16

3979+00 3980+00 3981+00 3982+00 3983+00 3984+00 3985+00 3986+00 3987+00

N

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LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Plan & Profile

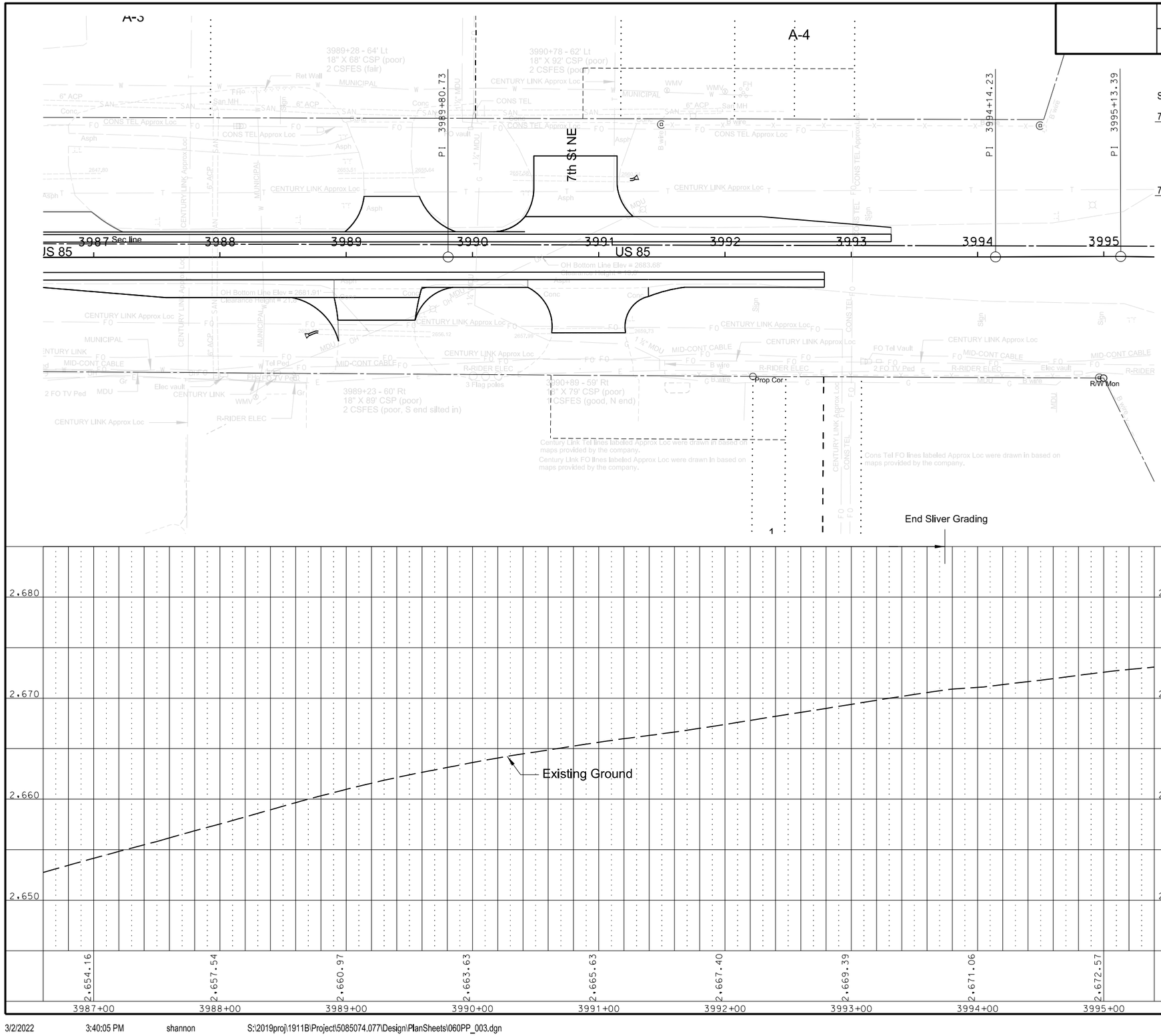
US 85

Belfield Turn Lanes

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	60	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
714	5015	PIPE CORR STEEL .064IN 18IN		
		3988+70 - 61' RT to 3988+74 - 60' RT	4	LF
		3988+74 - 60' RT to 3988+78 - 59' RT (22.5° BEND)	4	LF
		3991+25 - 61' LT to 3911+29 - 62' LT (22.5° BEND)	4	LF
714	5810	END SECT CORR STEEL .064IN 18IN		
		3988+70 - 61' RT	1	EA
		3991+29 - 62' LT	1	EA



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DATE 03/16/22
NORTH DAKOTA

Plan & Profile

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts Acre(s)		USFWS Easement Impacts Acre(s)		Wetland Mitigation											
								Mitigation Required			USACE/11990 Bank		11990 Bank		USFWS Bank		Onsite			
				Temp.	Perm.	Temp.	Perm.	EO 11990	USACE	USFWS	Location	Acre(s)	Location	Acre(s)	Location	Acre(s)	Mitigation Location; Ratio	Acre(s)	Constructed Site #	Constructed Size Acre(s)
1a	Section 32, T140N, R99W	Created	No	0.15	0.01			N	N	N										
1b	Section 32, T140N, R99W	Created	No	0.01	0.01			N	N	N										
2	Section 32, T140N, R99W	Created	No	0.00	0.01			N	N	N										
				0.16	**0.03**															

[1] A wetland Jurisdictional Determination was issued by the USACE on 09/24/2019; NWO-2015-00767-BIS.

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	Total (Acres)	Wetland Type	Total (Acres/Lf)
Natural/JD	0.00	Temporary JD	0.00
Natural/Non-JD	0.00	Non-JD Temporary	0.00
Created/JD	0.00	Permanent JD > 0.10	0.00
Created/Non-JD	0.03	Permanent OW	0.00 ac/00 ft.
Total	**0.03**	Temporary OW	0.00 ac/00 ft

Mitigation Summary Table

	Location	Onsite Acre(s)	11990 Bank Acre(s)	USACE/11990 Bank Acre(s)	USFWS Bank Acre(s)
USACE Only	NA	0.00		0.00	
EO 11990 Only	NA	0.00	0.00		
USACE/11990	NA	0.00		0.00	
USFWS	NA				0.00
	Total	**0.00**	**0.00**	**0.00**	**0.00**

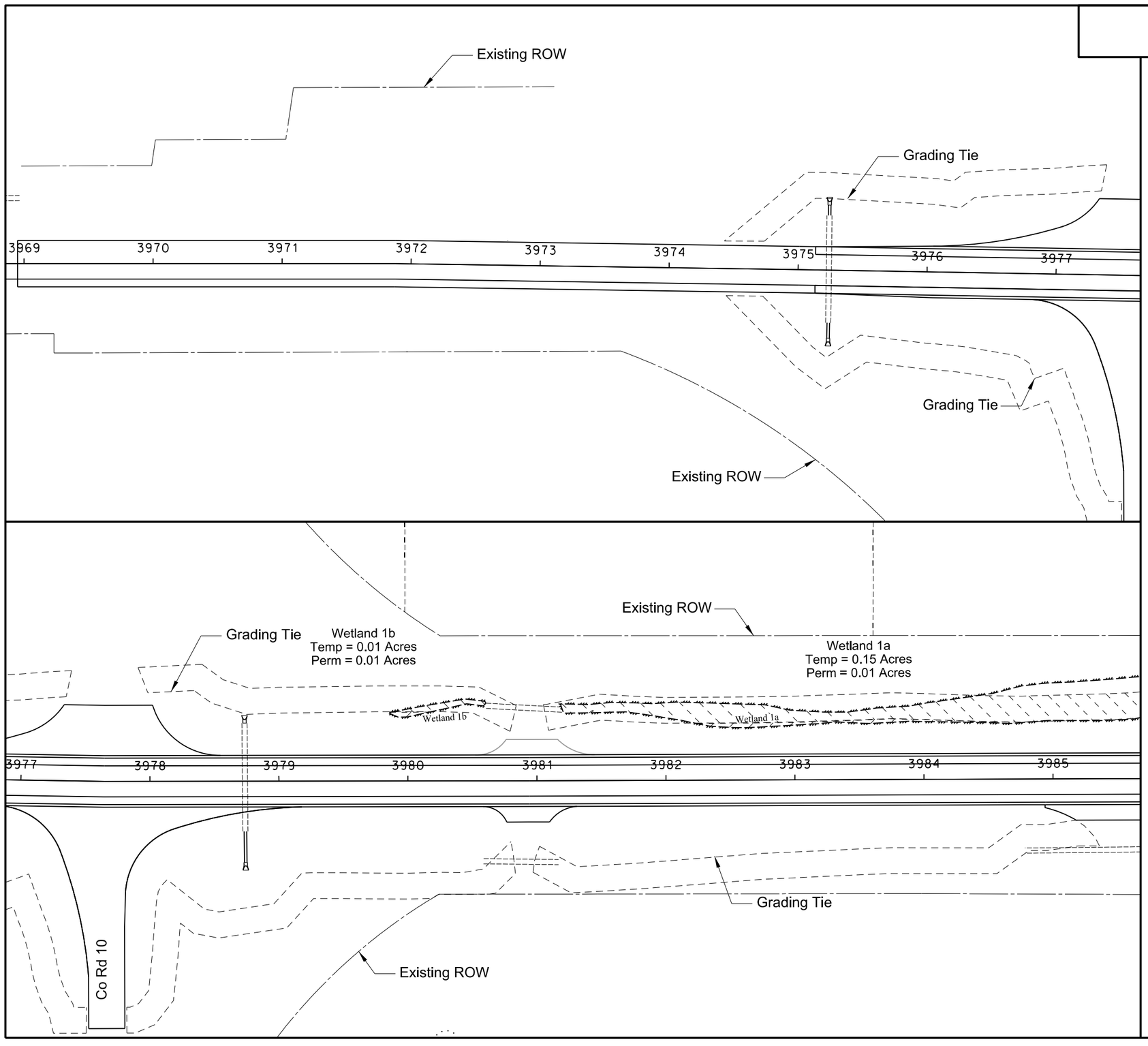
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DATE 03/16/22
NORTH DAKOTA

Wetlands, Mitigation, and Environmental

ND 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	75	2



Permanent Wetland Impact

Temporary Wetland Impact

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DATE 03/16/22
NORTH DAKOTA

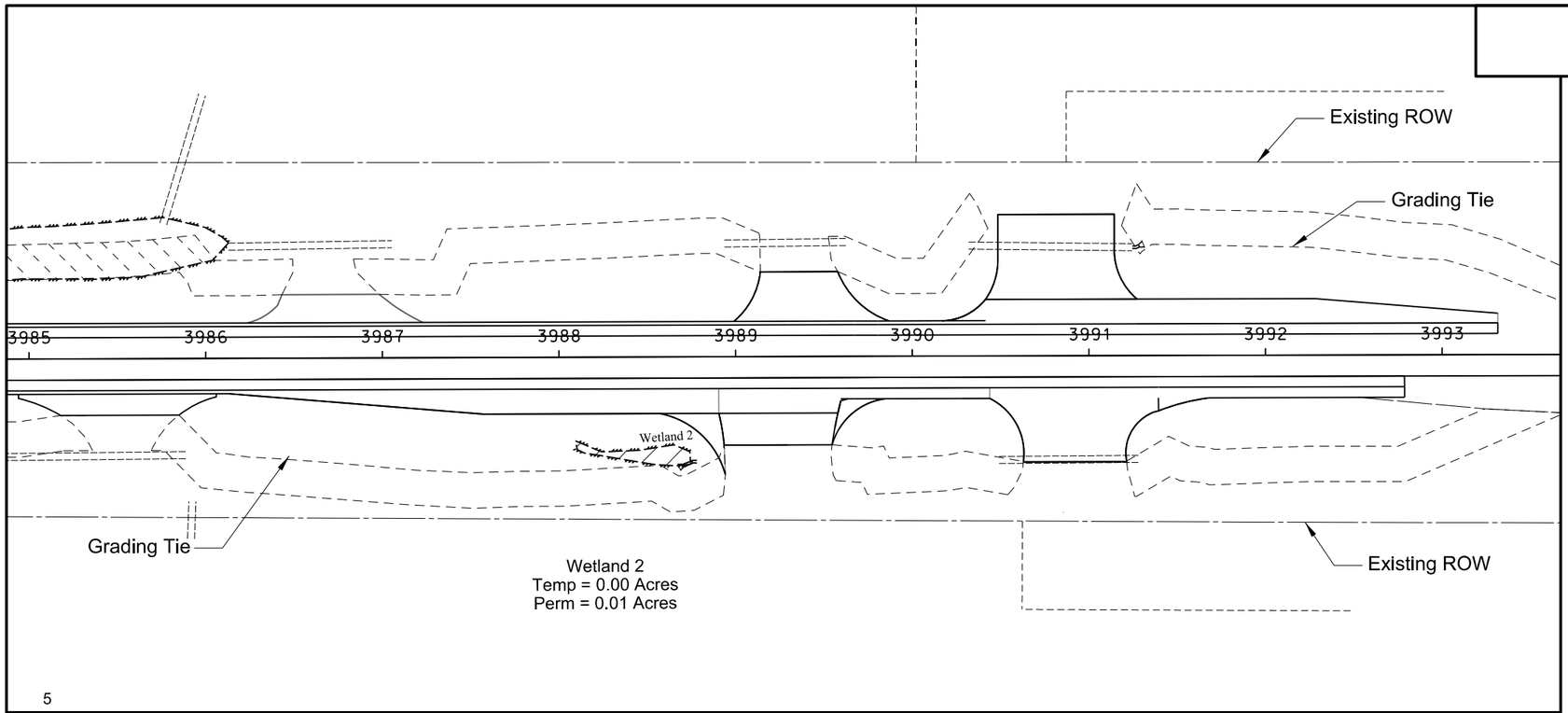
Wetland Mitigation and Environmental

US 85

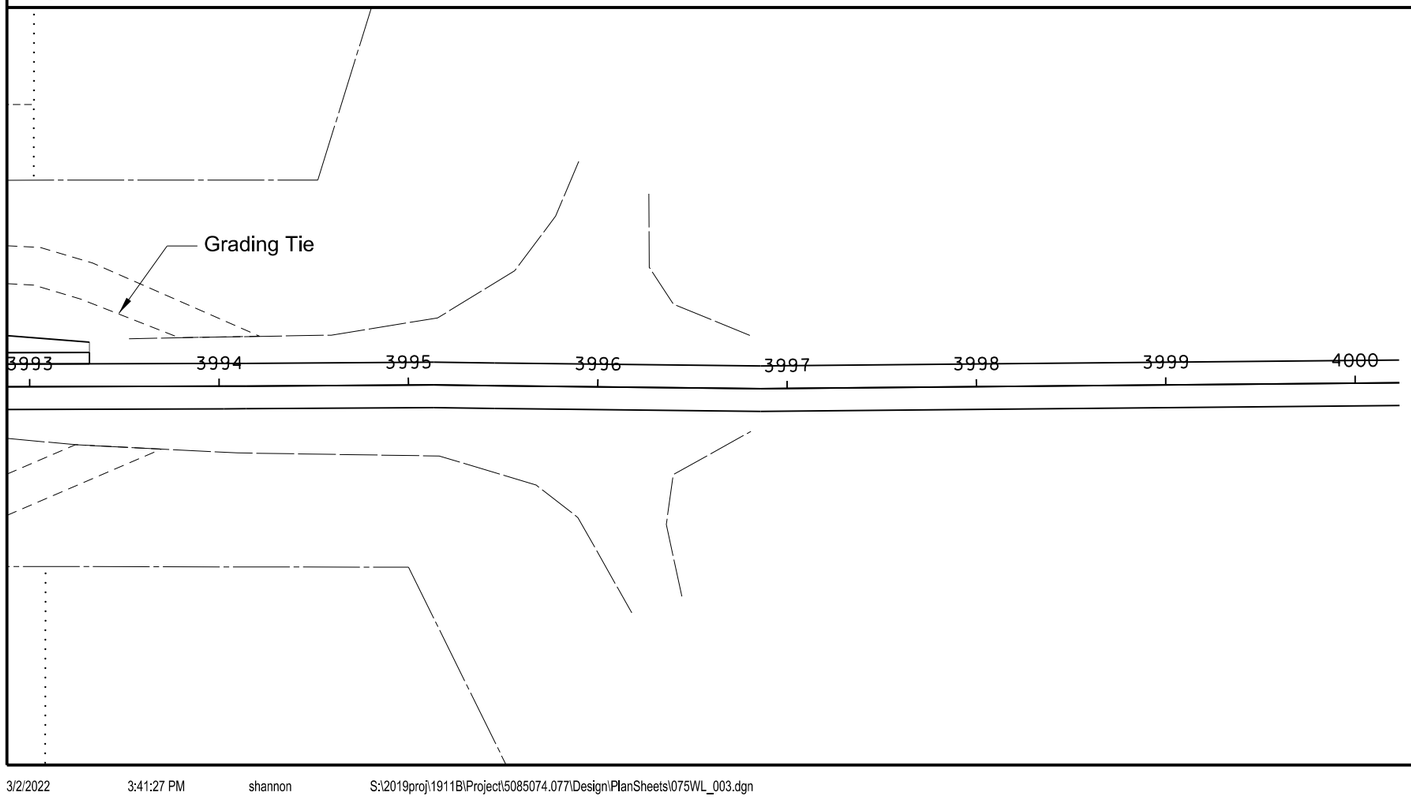
Belfield Turn Lanes

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	75	3



5



Permanent Wetland Impact

Temporary Wetland Impact

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DATE 03/16/22
NORTH DAKOTA

Wetland Mitigation and Environmental

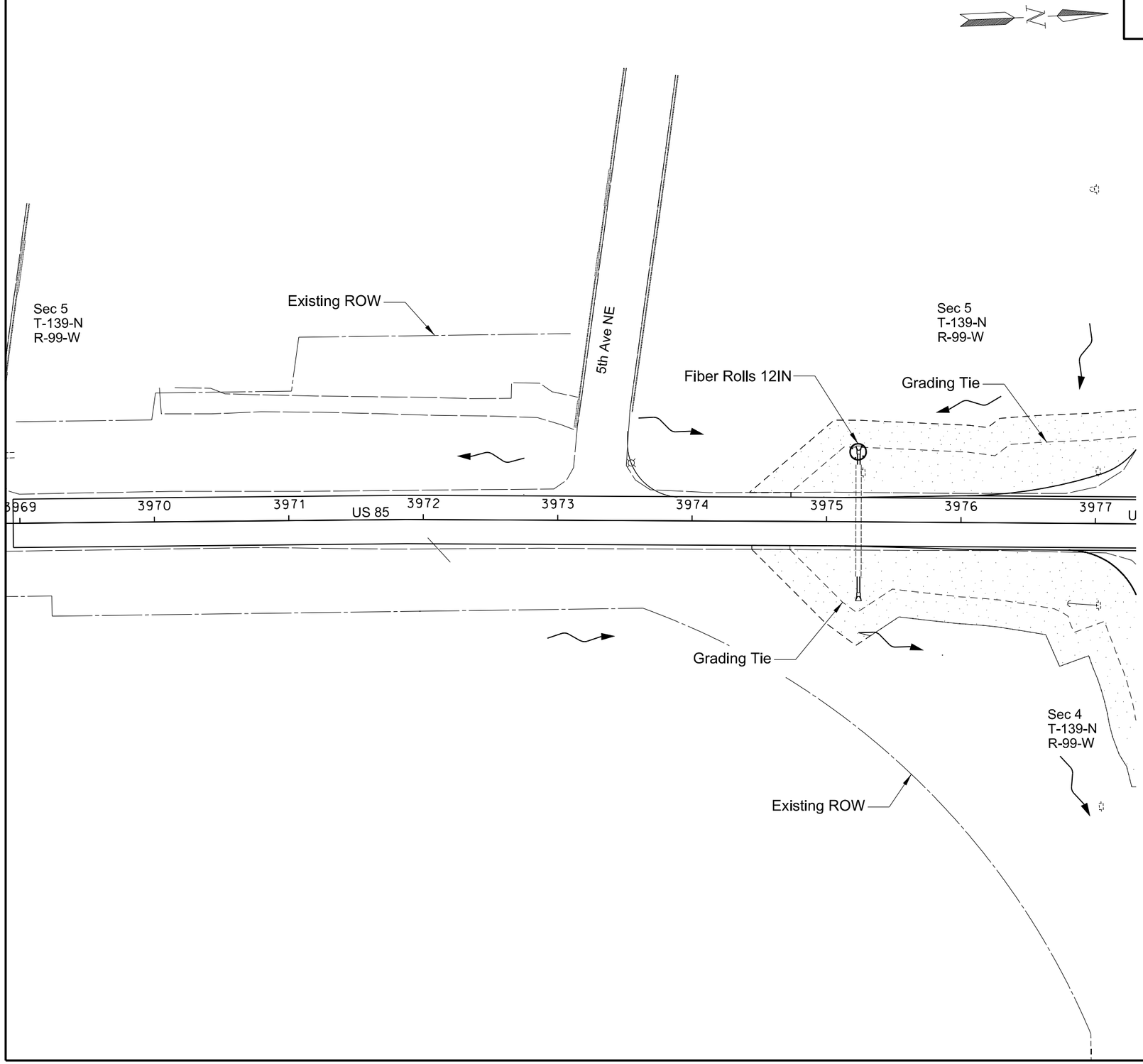
US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	76	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	TEMPORARY COVER CROP		
		3974+42 to 3977+00 Rt	0.47	ACRE
		3974+42 to 3977+00 Lt	0.32	ACRE
253	0201	HYDRAULIC MULCH		
		3971+88 to 3977+00 Rt	0.47	ACRE
		3973+60 to 3977+00 Lt	0.32	ACRE
261	0112	FIBER ROLLS 12IN		
		3975+24 Lt	30	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		3975+24 Lt	30	LF



LEGEND

- Delineated Wetland
- Temporary Cover Crop & Hydraulic Mulch
- Flow Arrow
- Fiber Rolls - 12"
- SF — Silt Fence - Unsupported

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PE-25991
DATE 03/16/22
NORTH DAKOTA

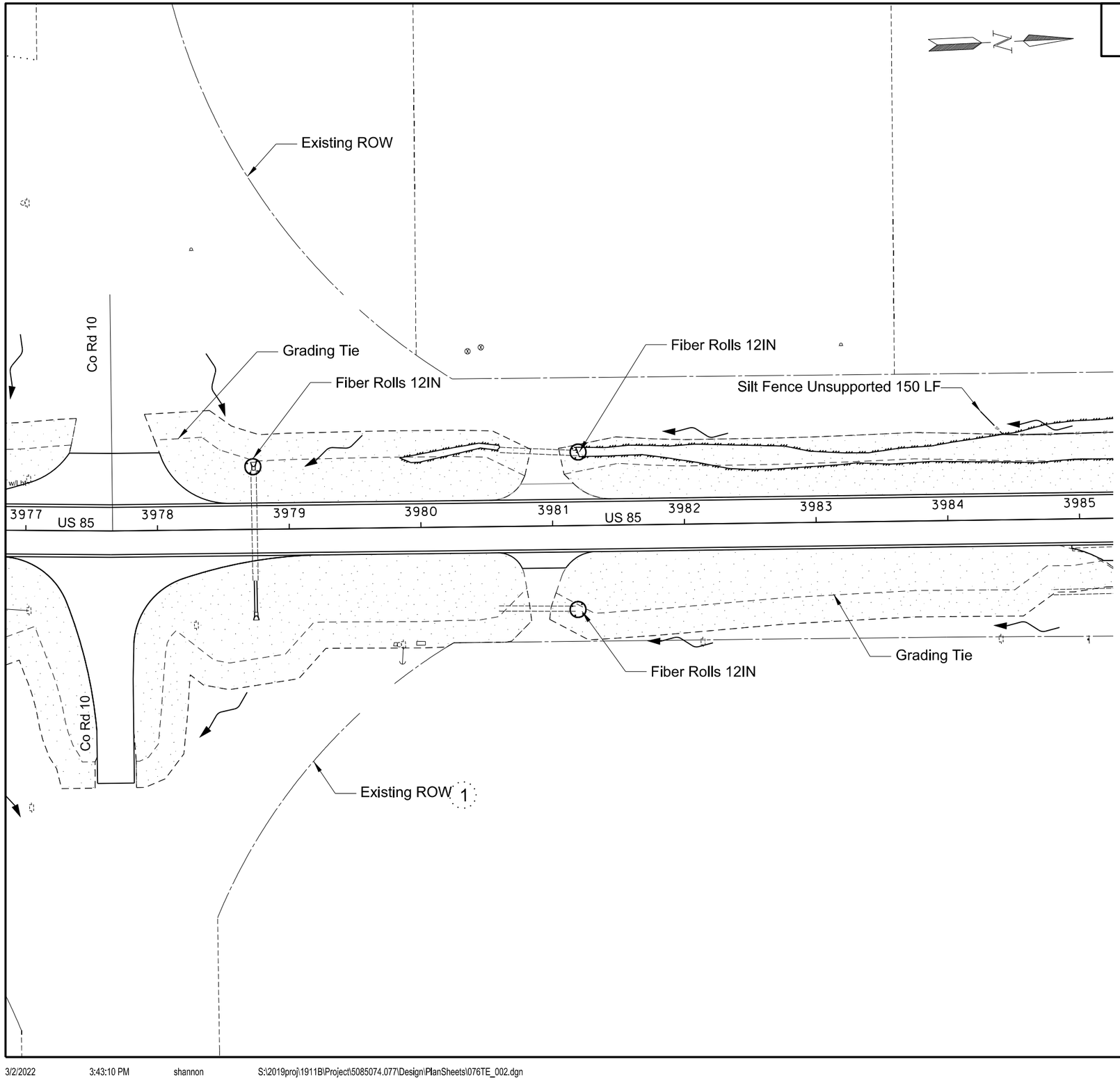
Temporary Erosion Control

US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	76	2



SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	TEMPORARY COVER CROP		
		3977+00 to 3985+00 Rt	1.01	ACRE
		3977+00 to 3985+00 Lt	0.75	ACRE
253	0201	HYDRAULIC MULCH		
		3977+00 to 3985+00 Rt	1.01	ACRE
		3977+00 to 3985+00 Lt	0.75	ACRE
260	0100	SILT FENCE UNSUPPORTED		
		3984+26 to 3985+48	150	LF
260	0101	REMOVAL SILT FENCE UNSUPPORTED		
		3984+26 to 3985+48 Lt	150	LF
261	0112	FIBER ROLLS 12IN		
		3978+74 Lt	30	LF
		3981+17 Rt	30	LF
		3981+20 Lt	30	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		3978+74 Lt	30	LF
		3981+17 Rt	30	LF
		3981+20 Lt	30	LF

LEGEND

- Delineated Wetland
- Temporary Cover Crop & Hydraulic Mulch
- Flow Arrow
- Fiber Rolls - 12"
- SF — Silt Fence - Unsupported

REGISTERED PROFESSIONAL ENGINEER
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PE-25991
DATE 03/16/22
NORTH DAKOTA

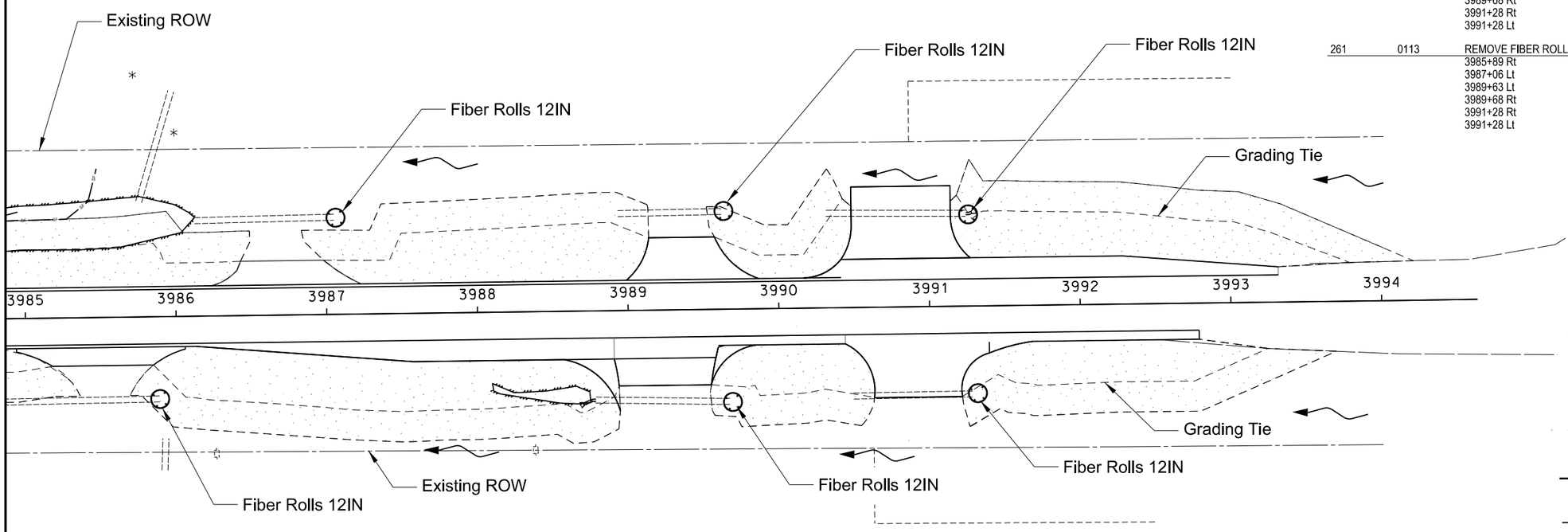
Temporary Erosion Control

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	76	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	TEMPORARY COVER CROP		
		3985+00 to 3993+07 Rt	0.70	ACRE
		3985+00 to 3994+47 Lt	0.77	ACRE
253	0201	HYDRAULIC MULCH		
		3985+00 to 3993+07 Rt	0.70	ACRE
		3985+00 to 3994+47 Lt	0.77	ACRE
261	0112	FIBER ROLLS 12IN		
		3985+89 Rt	30	LF
		3987+06 Lt	30	LF
		3989+63 Lt	30	LF
		3989+68 Rt	30	LF
		3991+28 Rt	30	LF
		3991+28 Lt	30	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		3985+89 Rt	30	LF
		3987+06 Lt	30	LF
		3989+63 Lt	30	LF
		3989+68 Rt	30	LF
		3991+28 Rt	30	LF
		3991+28 Lt	30	LF



LEGEND

- Delineated Wetland
- Temporary Cover Crop & Hydraulic Mulch
- Flow Arrow
- Fiber Rolls - 12"
- SF — Silt Fence - Unsupported

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DATE 03/16/22
NORTH DAKOTA

Temporary Erosion Control

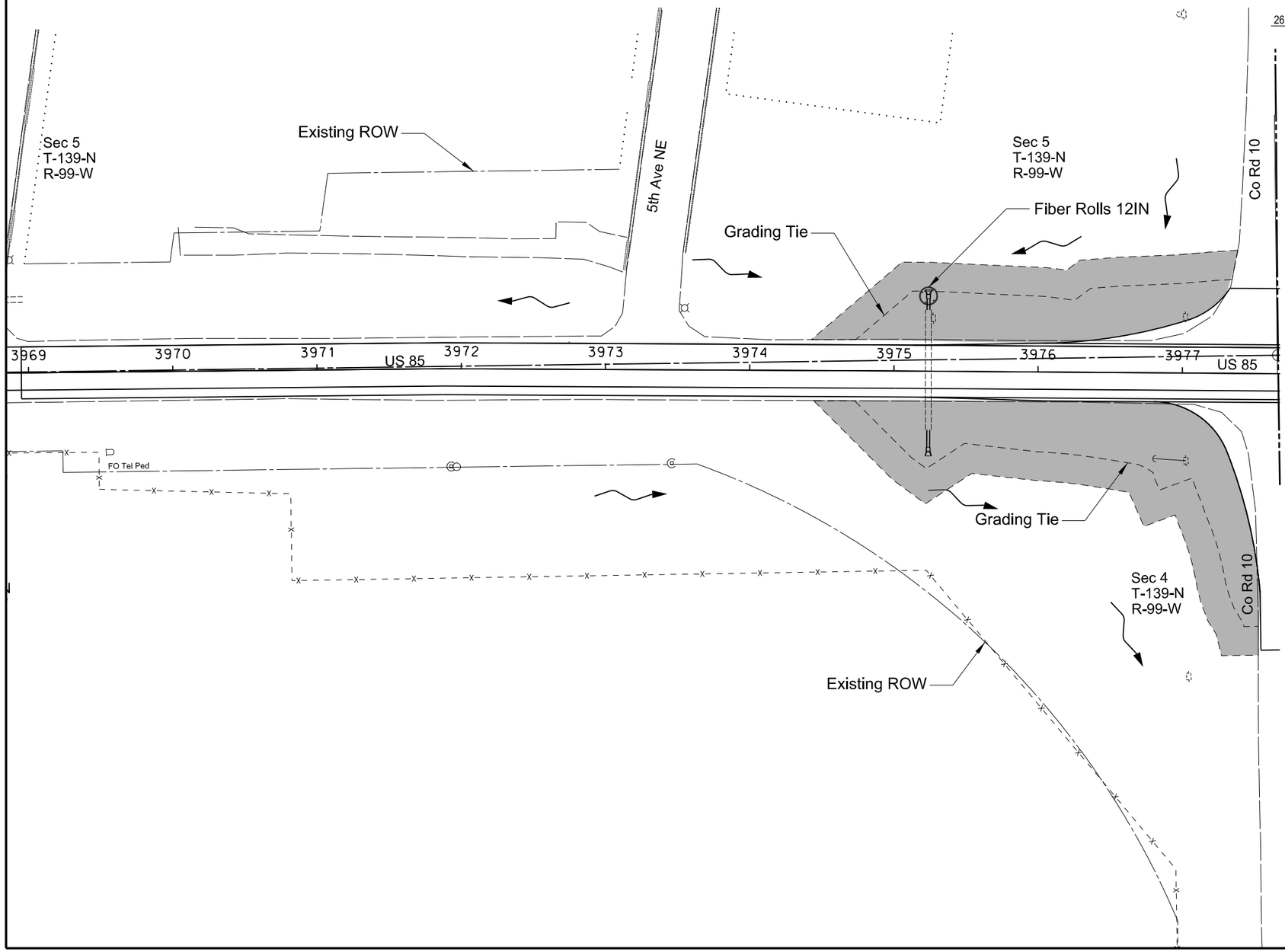
US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	77	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	SEEDING CLASS II		
		3971+88 to 3977+00 Rt	0.47	ACRE
		3973+60 to 3977+00 Lt	0.32	ACRE
253	0201	HYDRAULIC MULCH		
		3971+88 to 3977+00 Rt	0.47	ACRE
		3973+60 to 3977+00 Lt	0.32	ACRE
261	0112	FIBER ROLLS 12IN		
		3975+24 Lt	30	LF



LEGEND

- Delineated Wetland
- Seeding Class II & Hydraulic Mulch
- Flow Arrow
- Fiber Rolls - 12"

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Permanent Erosion Control

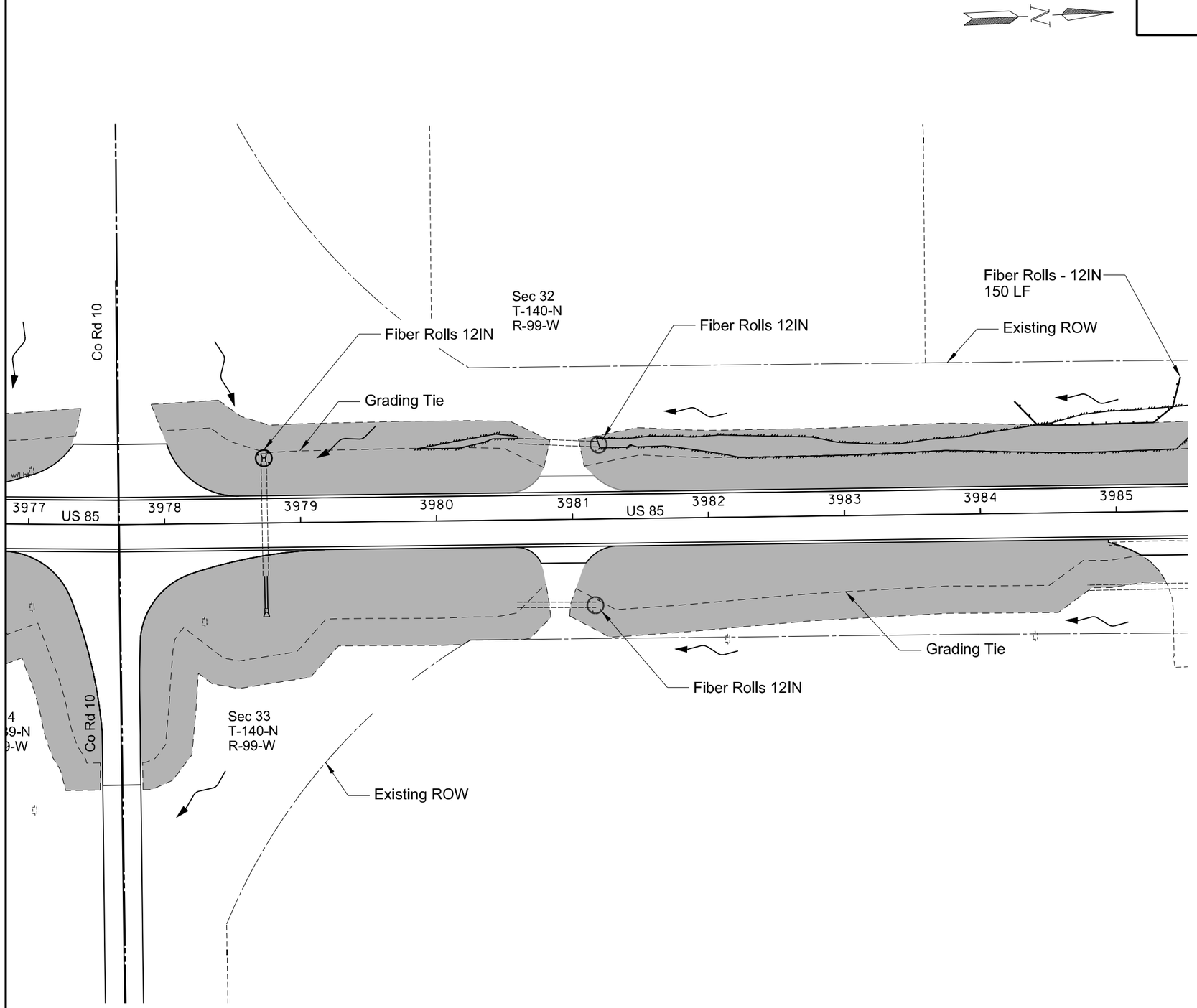
US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	77	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	SEEDING CLASS II		
		3977+00 to 3985+00 Lt	0.75	ACRE
		3977+00 to 3985+00 Rt	1.01	ACRE
253	0201	HYDRAULIC MULCH		
		3977+00 to 3985+00 Lt	0.75	ACRE
		3977+00 to 3985+00 Rt	1.01	ACRE
261	0112	FIBER ROLLS 12IN		
		3978+74 Lt	30	LF
		3981+17 Rt	30	LF
		3981+20 Lt	30	LF
		3984+26 to 3985+48 Lt	150	LF



LEGEND

- Delineated Wetland
- Seeding Class II & Hydraulic Mulch
- Flow Arrow
- Fiber Rolls - 12"

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Permanent Erosion Control

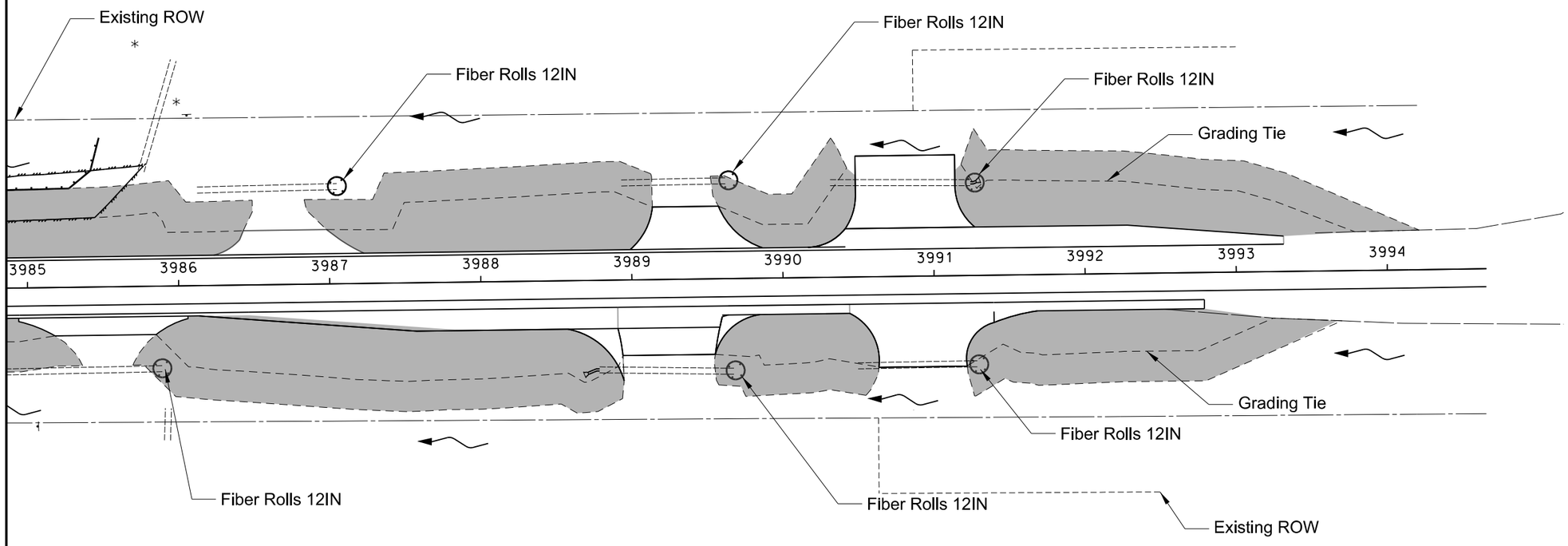
US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	77	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	SEEDING CLASS II		
		3985+00 to 3993+07 Rt	0.70	ACRE
		3985+00 to 3994+47 Lt	0.77	ACRE
253	0201	HYDRAULIC MULCH		
		3985+00 to 3993+07 Rt	0.70	ACRE
		3985+00 to 3994+47 Lt	0.77	ACRE
261	0112	FIBER ROLLS 12IN		
		3985+89 Rt	30	LF
		3987+06 Lt	30	LF
		3989+63 Lt	30	LF
		3989+68 Rt	30	LF
		3991+28 Rt	30	LF
		3991+28 Lt	30	LF



LEGEND

- Delineated Wetland
- Seeding Class II & Hydraulic Mulch
- Flow Arrow
- Fiber Rolls - 12"

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NORTH DAKOTA

Permanent Erosion Control

US 85

Belfield Turn Lanes

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PRELIMINARY SURVEY COORDINATE AND CURVE DATA - Belfield - BNR SEP N TO S I-94 JCT

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
US 85 (Chain: SCL85)			
BEG Rec ¼ Cor	3951+45.21	455348.60	1296300.88
PI PK Nail	3971+97.31	457399.60	1296367.85
Twp line xing ½" RB	3977+66.52	457967.95	1296399.22
Station equation US 85 (SCL85) at I 94 (EX94)			
US 85	4000+23.39	460223.57	1296474.06
I 94	2236+92.53	460223.57	1296474.06
¼ line xing	4004+11.67	460611.64	1296486.94
Rec Sec Cor END	4030+56.84	463255.36	1296574.66
I-94 (Chain: EX94)			
BEG	2183+16.12	461177.41	1291218.19
PC	2206+56.55	460511.30	1293461.84
PI C601	2213+89.04	460302.83	1294164.03
PT	2221+13.62	460277.71	1294896.08
US 85	2236+92.53	460223.57	1296474.06
PC	2262+95.66	460134.32	1299075.66
PI C603	2271+73.28	460104.22	1299952.76
PT	2280+37.36	459812.97	1300780.65
END	2290+51.10	459476.55	1301736.94

CURVE DATA

ARC DEFINITION		
	C601	C603
	PI STA = 2213+89.04	PI STA = 2271+73.28
	Delta = 14° 34' 14" LT	Delta = 17° 25' 00" RT
	Da = 1° 00' 00"	Da = 1° 00' 00"
	R = 5729.65	R = 5729.65
	T = 732.48	T = 877.62
	L = 1457.06	L = 1741.70

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-139-N R-99-W			
N ¼ Cor Sec 5	4-A	458066.44	1293747.47
NW Cor Sec 4	5-A	457968.36	1296386.42
W ¼ Cor Sec 4	5-B	455348.60	1296300.88
SW Cor Sec 4	5-C	452708.67	1296201.29
T-140-N R-99-W			
SE Cor Sec 29	5-L	463255.36	1296574.66
W ¼ Cor Sec 33	5-M	460611.86	1296480.53
S ¼ Cor Sec 33	6-N	457882.79	1299029.34
E ¼ Cor Sec 33	7-M	460430.97	1301773.70

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	MONUMENT DESCRIPTION
PRIMARY CONTROL						
GPS 1	458204.23	1295556.70	2659.86	3979+75	850' Lt	5/8" Rebar with Alum Cap stamped "GPS 1"
GPS 3	454045.60	1294214.38	2676.81	N/A	N/A	5/8" Rebar with Alum Cap stamped "GPS 3"

REFERENCE MARKERS

R Mkr #	NORTHING	EASTING	STATION	O\S	ALIGNMENT
75	456196.01	1296360.08	3959+94	32' Rt	SCL85

NOTES: Sheet 1 of 1

Date Survey Completed 04/18/19

☐ Assumed Coordinates

☒ All coordinates on this sheet are Stark County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998175

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

INITIALIZING BENCH MARK
NDGPS Stations (OPUS)

☒ NAVD-88
☐ _____

☒ GEOID12B ☐ _____
☐ GEOID18

DAVID M. NASSET
REGISTERED LAND SURVEYOR
LS - 4432
3/16/2022
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	82	1

Best - Fit Design Alignment
Name: PR85

Chain PR85 contains:
PR851 PR853 PR855 PR857 PR859 PR8511 PR8513 PR8515 PR8517 PR8519 PR8521 PR8522

Beginning chain PR85 description
Feature: Alignment 3 L

==========

Point PR851 N 456,702.6643 E 1,296,345.0930 Sta 3965+00.00

Course from PR851 to PR853 N 1° 54' 22.08" E Dist 275.8384

Point PR853 N 456,978.3500 E 1,296,354.2680 Sta 3967+75.84

Course from PR853 to PR855 N 2° 03' 50.78" E Dist 411.7767

Point PR855 N 457,389.8595 E 1,296,369.0992 Sta 3971+87.62

Course from PR855 to PR857 N 2° 55' 41.28" E Dist 313.2385

Point PR857 N 457,702.6890 E 1,296,385.1005 Sta 3975+00.85

Course from PR857 to PR859 N 3° 03' 09.68" E Dist 263.7252

Point PR859 N 457,966.0400 E 1,296,399.1450 Sta 3977+64.58

Course from PR859 to PR8511 N 1° 58' 09.00" E Dist 329.7277

Point PR8511 N 458,295.5730 E 1,296,410.4750 Sta 3980+94.31

Course from PR8511 to PR8513 N 1° 51' 47.52" E Dist 362.4987

Point PR8513 N 458,657.8800 E 1,296,422.2610 Sta 3984+56.81

Course from PR8513 to PR8515 N 1° 52' 33.42" E Dist 523.9238

Point PR8515 N 459,181.5230 E 1,296,439.4120 Sta 3989+80.73

Course from PR8515 to PR8517 N 1° 54' 06.32" E Dist 433.4988

Point PR8517 N 459,614.7830 E 1,296,453.7980 Sta 3994+14.23

Course from PR8517 to PR8519 N 1° 43' 34.39" E Dist 99.1580

Point PR8519 N 459,713.8960 E 1,296,456.7850 Sta 3995+13.39

Course from PR8519 to PR8521 N 2° 42' 54.66" E Dist 172.6578

Point PR8521 N 459,886.3600 E 1,296,464.9640 Sta 3996+86.04

Course from PR8521 to PR8522 N 1° 32' 43.57" E Dist 337.3365

Point PR8522 N 460,223.5738 E 1,296,474.0619 Sta 4000+23.38

==========

Ending chain PR85 description

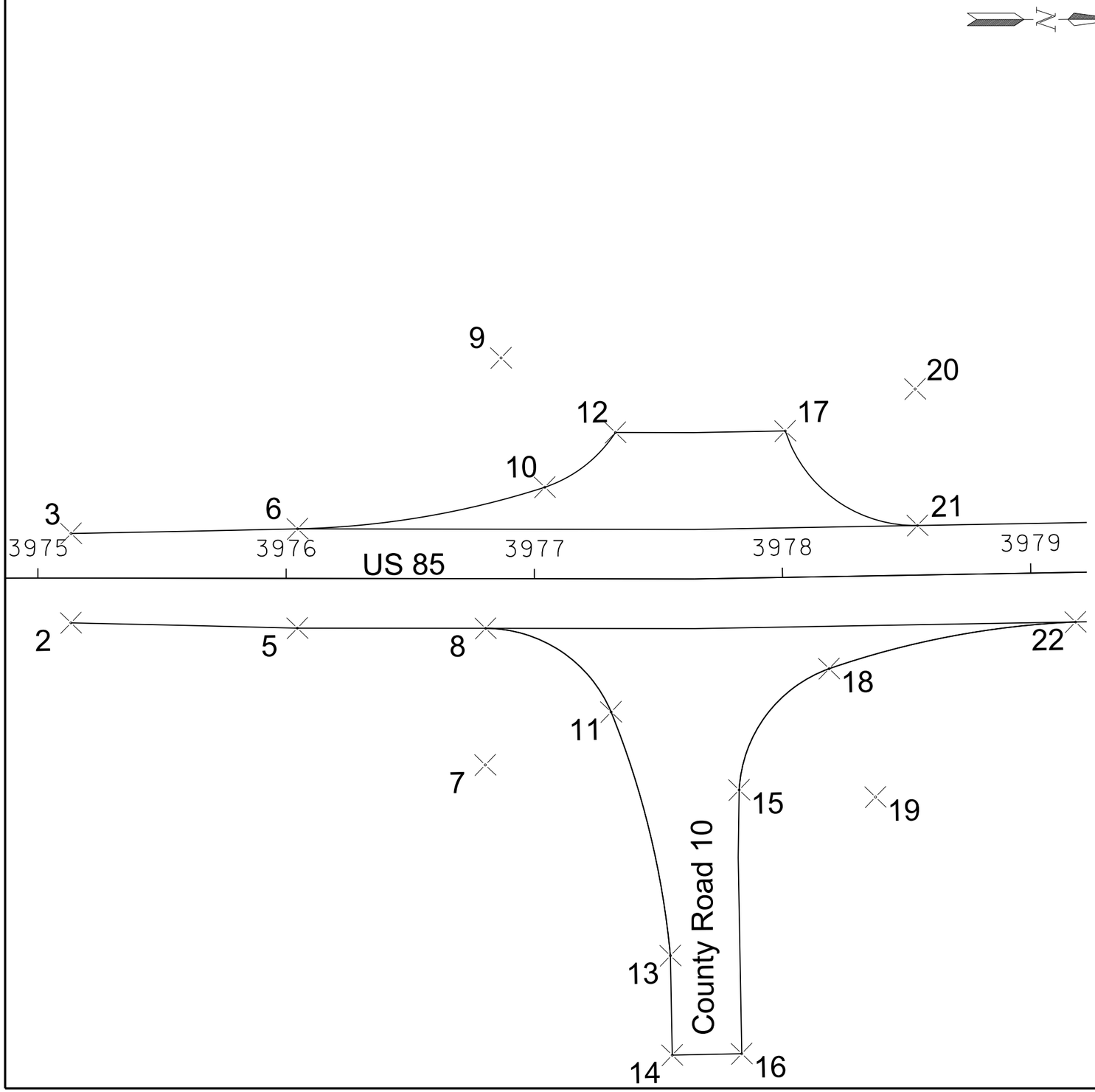
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Proposed Horizontal Alignment Description

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	82	2



Point	Northing	Easting	Station	Offset	Description
1	457598.7430	1296564.842	3974+06.23	184.8	*Radius Point
2	457714.2085	1296403.74	3975+13.35	18.0	Edge of Pavement
3	457716.1257	1296367.792	3975+13.35	-18.0	Edge of Pavement
4	457817.8240	1296020.81	3975+96.43	-369.9	*Radius Point
5	457805.1942	1296410.596	3976+04.57	20.0	Edge of Pavement
6	457807.3237	1296370.652	3976+04.57	-20.0	Edge of Pavement
7	457877.937	1296469.553	3976+80.35	75	Radius Point
8	457880.924	1296414.634	3976+80.41	20.0	Edge of Pavement
9	457892.777	1296306.136	3976+86.47	-88.9752	Radius Point
10	457907.6887	1296359.076	3977+04.18	-36.9	Edge of Pavement
11	457929.6668	1296450.871	3977+31.01	53.6	Edge of Pavement
12	457937.2291	1296338.525	3977+32.58	-59.0	Edge of Pavement
13	457948.4347	1296550.154	3977+55.04	151.7	Edge of Pavement
14	457947.0878	1296590.200	3977+55.83	191.8	Edge of Pavement
15	457979.5545	1296484.915	3977+81.03	85.3	Edge of Pavement
16	457975.0737	1296591.089	3977+80.20	191.5	Edge of Pavement
17	458005.6044	1296341.470	3978+02.14	-59.0	Edge of Pavement
18	458018.2782	1296437.998	3978+18.12	37.0	Edge of Pavement
19	458034.2572	1296490.625	3978+35.90	89.1	Radius Point
20	458058.7281	1296327.288	3978+54.74	-75.0	Radius Point
21	458056.8382	1296382.255	3978+54.74	-20.0	Edge of Pavement
22	458118.3998	1296424.395	3979+17.72	20.0	Edge of Pavement
23	458114.9636	1296774.378	3979+26.31	369.9	*Radius Point

* Radius Points That Are Located Off The Sheet

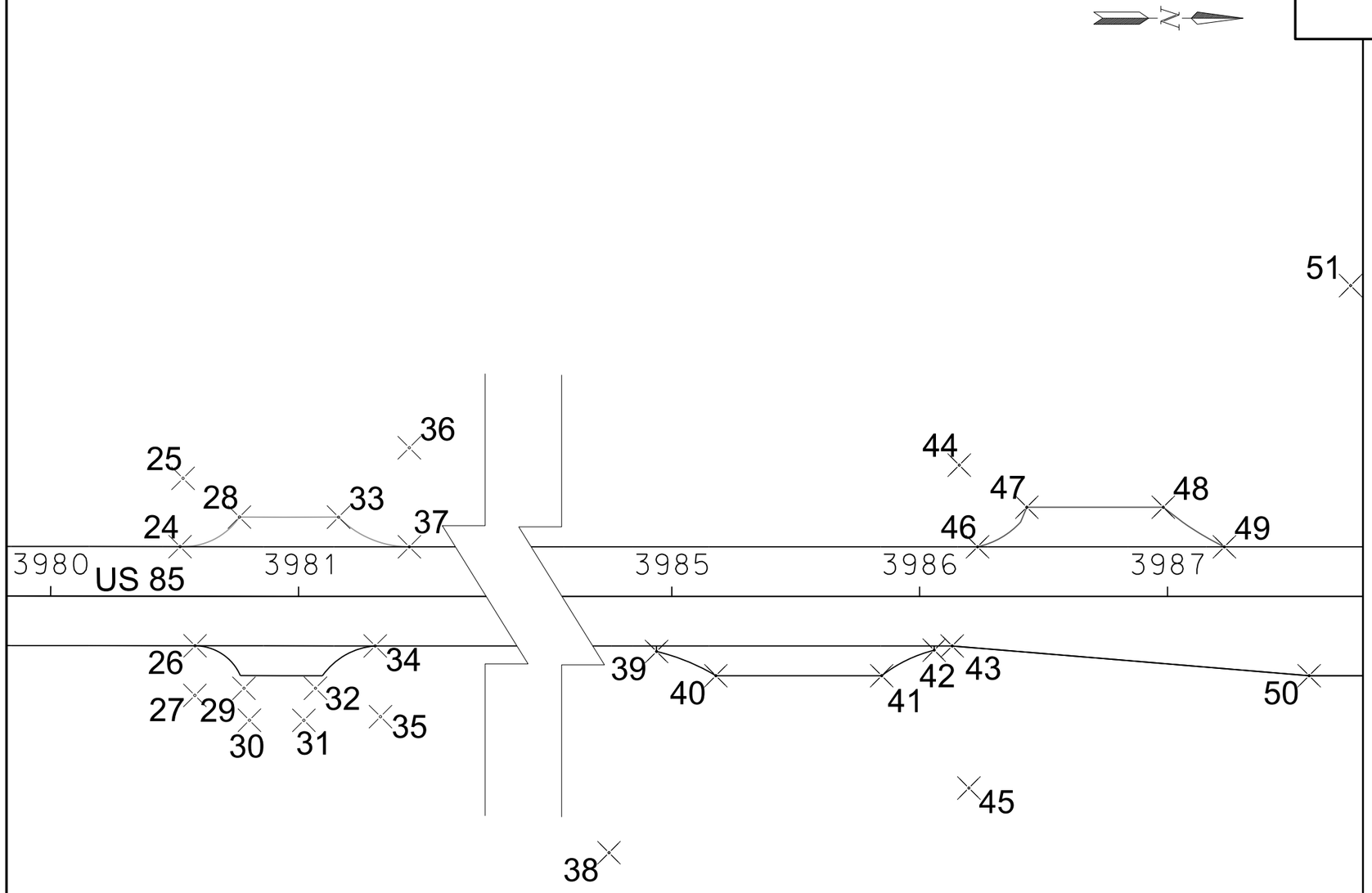
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Survey Data Layout

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	82	3



Point	Northing	Easting	Station	Offset	Description
24	458254.1614	1296389.033	3980+52.18	-20.0	Edge of Pavement
25	458256.2580	1296361.509	3980+53.33	-47.6	Radius Point
26	458258.8955	1296429.214	3980+58.29	20.0	Edge of Pavement
27	458258.1634	1296449.217	3980+58.25	40.0	Radius Point
28	458278.4915	1296377.869	3980+76.11	-32.0	Edge of Pavement
29	458278.0550	1296446.987	3980+78.05	37.1	Edge of Pavement
30	458279.8334	1296459.963	3980+80.28	50.0	Edge of Pavement
31	458301.7820	1296460.703	3981+02.15	50.0	Edge of Pavement
32	458306.8858	1296447.925	3981+06.83	37.1	Edge of Pavement
33	458318.4496	1296379.202	3981+16.15	-32.0	Edge of Pavement
34	458331.5265	1296431.644	3981+30.93	20.0	Edge of Pavement
35	458332.7313	1296460.254	3981+33.06	48.5	Radius Point
36	458347.9106	1296352.146	3981+44.72	-60.0	Radius Point
37	458346.6101	1296392.125	3981+44.72	-20.0	Edge of Pavement
38	458672.3604	1296526.217	3984+74.68	103.4	Radius Point
39	458694.1873	1296445.691	3984+93.86	22.2	Edge of Pavement
40	458717.7923	1296456.241	3985+17.80	32.0	Edge of Pavement
41	458784.6688	1296458.431	3985+84.71	32.0	Edge of Pavement
42	458806.1628	1296448.827	3986+05.88	21.7	Edge of Pavement
43	458813.4915	1296447.369	3986+13.16	20.0	Edge of Pavement
44	458818.7244	1296374.517	3986+16.00	-53.0	Radius Point
45	458818.3261	1296504.902	3986+19.87	77.3	Radius Point
46	458824.9850	1296407.724	3986+23.34	-20.0	Edge of Pavement
47	458845.3949	1296392.383	3986+43.24	-36.0	Edge of Pavement
48	458900.4233	1296394.185	3986+98.30	-36.0	Edge of Pavement
49	458924.5577	1296410.985	3987+22.97	-20.0	Edge of Pavement
50	458957.0215	1296464.076	3987+57.16	32.0	Edge of Pavement
51	458978.8890	1296307.270	3987+73.88	-125.4	Radius Point

* Radius Points That Are Located Off The Sheet

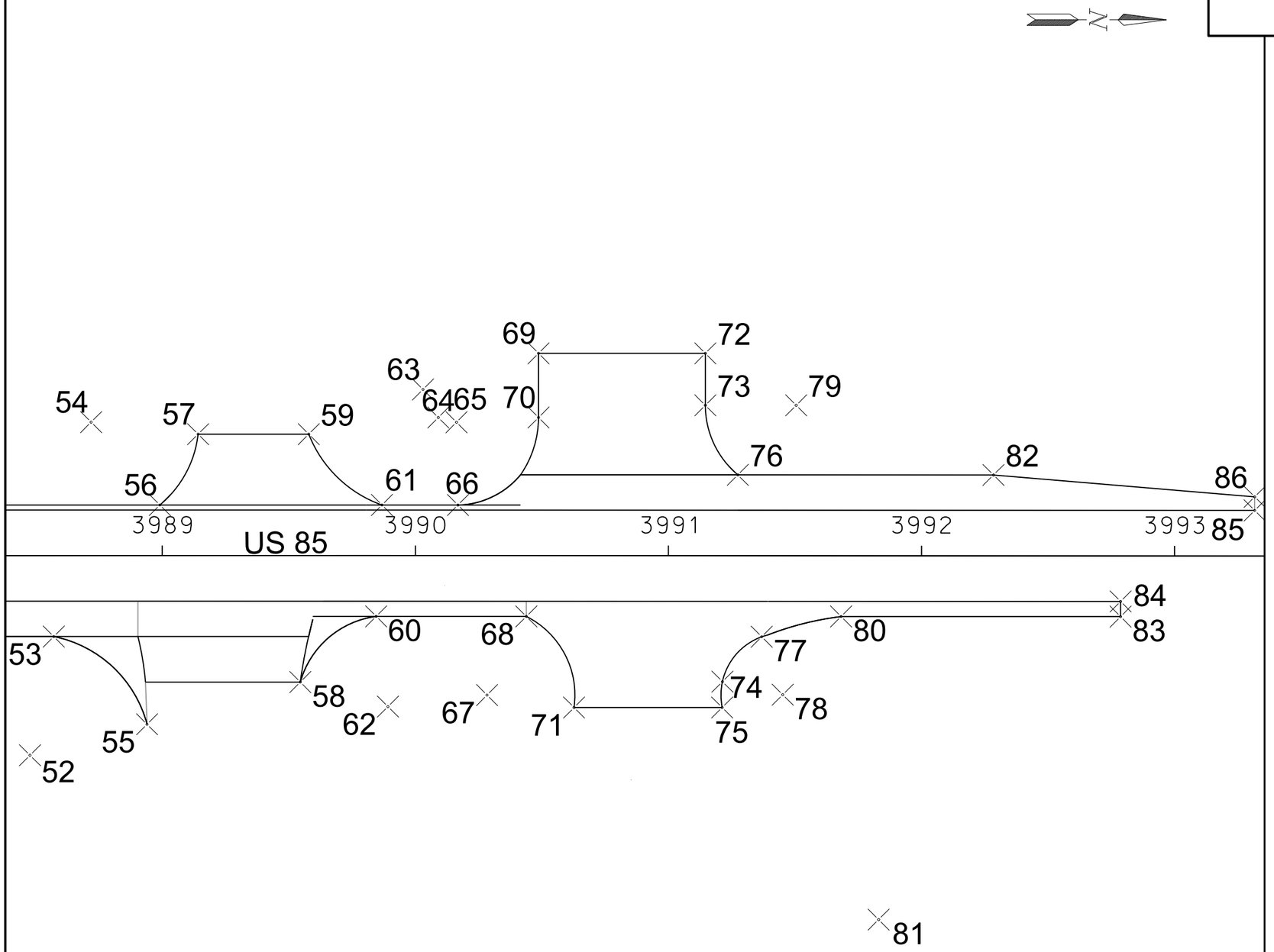
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US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	82	4



Point	Northing	Easting	Station	Offset	Description
52	459046.0189	1296513.936	3988+47.74	78.9	Radius Point
53	459056.9679	1296467.350	3988+57.16	32.0	Edge of Pavement
54	459074.4747	1296383.120	3988+71.90	-52.8	Radius Point
55	459092.6570	1296503.208	3988+94.00	66.7	Edge of Pavement
56	459100.5415	1296416.749	3988+99.05	-20.0	Edge of Pavement
57	459116.5780	1296389.259	3989+14.18	-48.0	Edge of Pavement
58	459153.7151	1296488.528	3989+54.54	50.0	Edge of Pavement
59	459160.2829	1296390.691	3989+57.91	-48	Edge of Pavement
60	459184.5364	1296463.551	3989+84.54	24.0	Edge of Pavement
61	459188.2589	1296419.625	3989+86.80	-20.0	Edge of Pavement
62	459188.0131	1296499.346	3989+89.20	59.7	Radius Point
63	459205.9751	1296374.503	3990+03.01	-65.7	Radius Point
64	459211.6516	1296385.791	3990+09.06	-54.6	Radius Point
65	459218.7721	1296387.9	3990+16.25	-52.7	Radius Point
66	459218.2594	1296420.621	3990+16.82	-20.0	Edge of Pavement
67	459227.2922	1296496.058	3990+28.35	55.1	Radius Point
68	459243.8308	1296465.510	3990+43.87	24.0	Edge of Pavement
69	459252.0551	1296361.733	3990+48.64	-80.0	Edge of Pavement
70	459251.2247	1296387.087	3990+48.66	-54.6	Edge of Pavement
71	459261.4978	1296502.117	3990+62.74	60.0	Edge of Pavement
72	459317.9319	1296363.891	3991+14.56	-80.0	Edge of Pavement
73	459317.2594	1296384.422	3991+14.57	-59.5	Edge of Pavement
74	459320.4365	1296493.819	3991+21.37	49.8	Edge of Pavement
75	459319.9944	1296504.033	3991+21.27	60.0	Edge of Pavement
76	459329.1767	1296412.327	3991+27.40	-32.0	Edge of Pavement
77	459336.5188	1296476.576	3991+36.87	32.0	Edge of Pavement
78	459344.0741	1296499.745	3991+45.19	54.9	Radius Point
79	459353.1375	1296385.597	3991+50.46	-59.5	Radius Point
80	459368.1365	1296469.622	3991+68.24	24.0	Edge of Pavement
81	459379.0264	1296589.850	3991+83.12	143.8	Radius Point
82	459430.1555	1296415.680	3992+28.44	-32.0	Edge of Pavement
83	459478.4997	1296473.286	3992+78.67	24.0	Edge of Pavement
84	459478.6988	1296467.289	3992+78.67	18.0	Edge of Pavement
85	459532.8319	1296433.067	3993+31.63	-18.0	Edge of Pavement
86	459533.0101	1296427.700	3993+31.63	-23.4	Edge of Pavement

* Radius Points That Are Located Off The Sheet

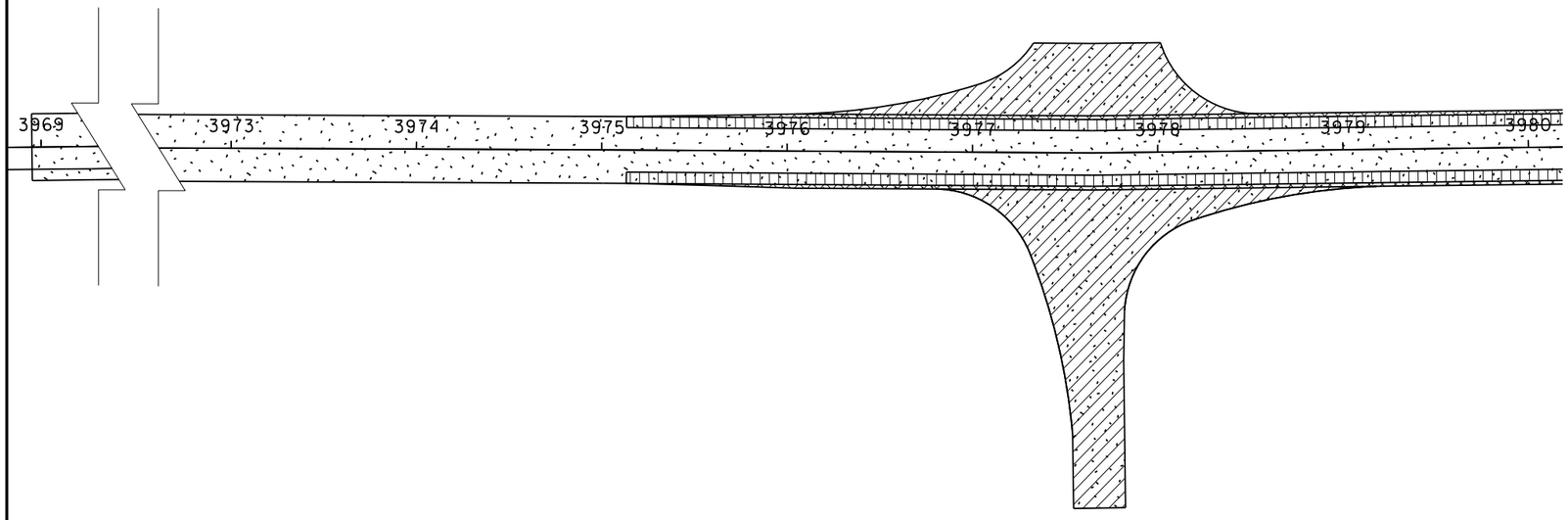
REGISTERED PROFESSIONAL ENGINEER
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PE-25991
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NORTH DAKOTA

Survey Data Layout

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	90	1



SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		3975+13 to 3980+00 Lt	665	TON
		3975+13 to 3980+00 Rt	745	TON
		3977+66 (Approach) Lt	757	TON
		3977+66 (Approach) Rt	1453	TON
401	0050	TACK COAT		
		3975+13 to 3980+00 Lt (1st Applicaiton)	5	GAL
		3975+13 to 3980+00 Lt (2nd Applicaiton)	22	GAL
		3975+13 to 3980+00 Rt (1st Applicaiton)	6	GAL
		3975+13 to 3980+00 Rt (2nd Applicaiton)	22	GAL
		3977+66 (Approach) Lt (1st Applicaiton)	29	GAL
		3977+66 (Approach) Lt (2nd Applicaiton)	29	GAL
		3977+66 (Approach) Rt (1st Applicaiton)	53	GAL
		3977+66 (Approach) Rt (2nd Applicaiton)	53	GAL
401	0070	FOG SEAL		
		3968+95 to 3980+00	347	GAL
		3977+66 (Approach) Lt	30	GAL
		3977+66 (Approach) Rt	64	GAL
420	0111	CRS2P EMULSIFIED ASPHALT		
		3968+95 to 3980+00	1,825	GAL
		3977+66 (Approach) Lt	213	GAL
		3977+66 (Approach) Rt	386	GAL
420	0125	COVER COAT MATERIAL CL 41		
		3968+95 to 3980+00	60	TON
		3977+66 (Approach) Lt	7	TON
		3977+66 (Approach) Rt	13	TON
430	0045	SUPERPAVE FAA 45		
		3975+13 to 3980+00 Lt	69	TON
		3975+13 to 3980+00 Rt	71	TON
		3977+66 (Approach) Lt	192	TON
		3977+66 (Approach) Rt	354	TON
430	5806	PG 58H-28 ASPHALT CEMENT		
		3975+13 to 3980+00 Lt	5	TON
		3975+13 to 3980+00 Rt	5	TON
		3977+66 (Approach) Lt	12	TON
		3977+66 (Approach) Rt	21	TON

LEGEND

- 6" - SUPERPAVE FAA 45 / 21" AGGREGATE BASE COURSE CL 5
- SUPERPAVE FAA 45 OVERLAY (DEPTH VARIES)
- 6" - SUPERPAVE FAA 45 / 30" AGGREGATE BASE COURSE CL 5
- CHIP & FOG SEAL
- 2" MILL AND SUPERPAVE FAA 45 OVERLAY

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

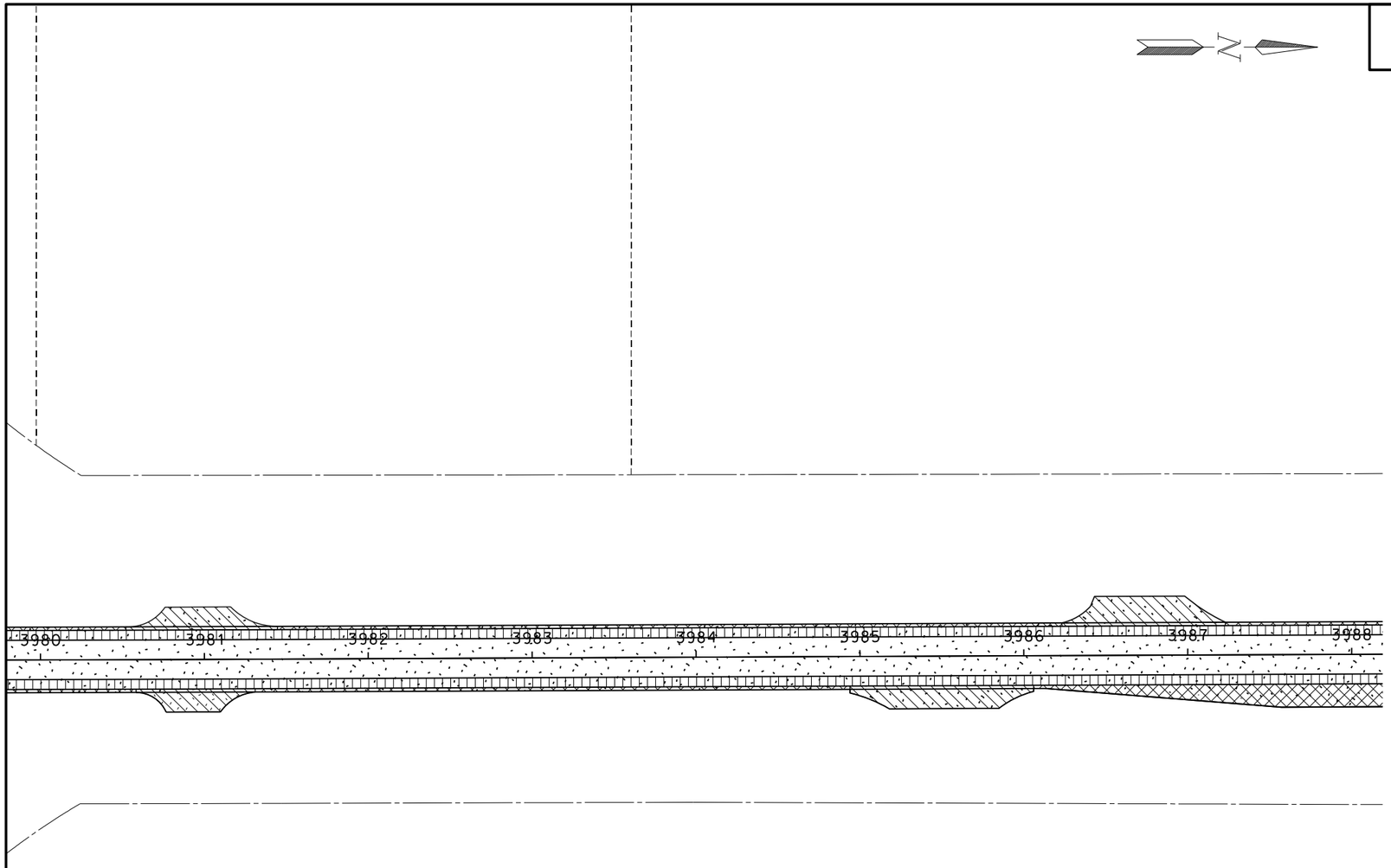
Paving Layout

US 85

Belfield Turn Lanes

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	90	2



SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		3980+00 to 3988+00 Lt	1,658	TON
		3980+00 to 3988+00 Rt	1,817	TON
401	0050	TACK COAT		
		3980+00 to 3988+00 Lt (1st Applicaiton)	11	GAL
		3980+00 to 3988+00 Lt (2nd Application)	40	GAL
		3980+00 to 3988+00 Rt (1st Application)	21	GAL
		3980+00 to 3988+00 Rt (2nd Application)	48	GAL
		3980+92 (Approach) Lt (1st Application)	5	GAL
		3980+92 (Approach) Lt (2nd Application)	5	GAL
		3980+92 (Approach) Rt (1st Application)	7	GAL
		3980+92 (Approach) Rt (2nd Application)	7	GAL
		3985+50 (Approach) Rt (1st Application)	8	GAL
		3985+50 (Approach) Rt (2nd Application)	8	GAL
		3986+70 (Approach) Lt (1st Application)	8	GAL
		3986+70 (Approach) Lt (2nd Application)	8	GAL
401	0070	FOG SEAL		
		3980+00 to 3988+00	257	GAL
		3980+92 (Approach) Lt	3	GAL
		3980+92 (Approach) Rt	6	GAL
		3985+50 (Approach) Rt	5	GAL
		3986+70 (Approach) Lt	6	GAL
420	0111	CRS2P EMULSIFIED ASPHALT		
		3980+00 to 3988+00	1,386	GAL
		3980+92 (Approach) Lt	36	GAL
		3980+92 (Approach) Rt	50	GAL
		3985+50 (Approach) Rt	56	GAL
		3986+70 (Approach) Lt	58	GAL
420	0125	COVER COAT MATERIAL CL 41		
		3980+00 to 3988+00	46	TON
		3980+92 (Approach) Lt	2	TON
		3980+92 (Approach) Rt	2	TON
		3985+50 (Approach) Rt	2	TON
		3986+70 (Approach) Lt	2	TON
430	0045	SUPERPAVE FAA 45		
		3980+00 to 3988+00 Lt	149	TON
		3980+00 to 3988+00 Rt	199	TON
		3980+92 (Approach) Lt	13	TON
		3980+92 (Approach) Rt	18	TON
		3985+50 (Approach) Rt	21	TON
		3986+70 (Approach) Lt	21	TON
430	5806	PG 58H-28 ASPHALT CEMENT		
		3980+00 to 3988+00 Lt	9	TON
		3980+00 to 3988+00 Rt	12	TON
		3980+92 (Approach) Lt	1	TON
		3980+92 (Approach) Rt	2	TON
		3985+50 (Approach) Rt	2	TON
		3986+70 (Approach) Lt	2	TON

LEGEND

- 6" - SUPERPAVE FAA 45 / 21" AGGREGATE BASE COURSE CL 5
- SUPERPAVE FAA 45 OVERLAY (DEPTH VARIES)
- 6" - SUPERPAVE FAA 45 / 30" AGGREGATE BASE COURSE CL 5
- CHIP & FOG SEAL
- 2" MILL AND SUPERPAVE FAA 45 OVERLAY

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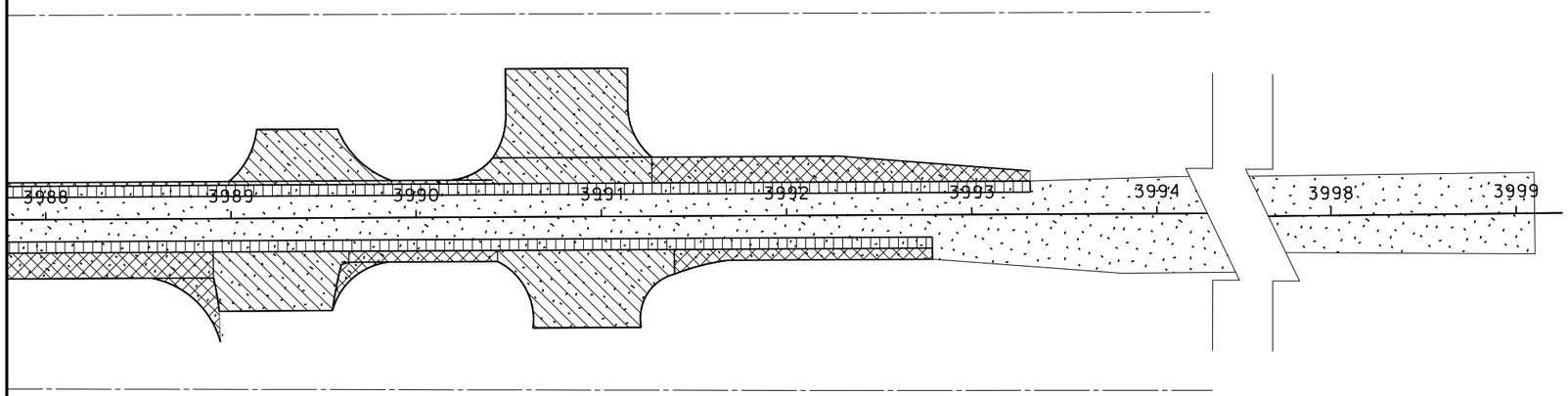
Paving Layout

US 85

Belfield Turn Lanes

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	90	3



SPEC	CODE	BID ITEM	QUANTITY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		3988+00 to 3993+32 Lt	1,370	TON
		3988+00 to 3992+79 Rt	1,301	TON
401	0050	TACK COAT		
		3988+00 to 3993+32 Lt (1st Application)	19	GAL
		3988+00 to 3993+32 Lt (2nd Application)	37	GAL
		3989+34 to 3992+79 Rt (1st Application)	21	GAL
		3989+34 to 3992+79 Rt (2nd Application)	37	GAL
		3989+25 (Approach) Lt (1st Application)	11	GAL
		3989+25 (Approach) Lt (2nd Application)	11	GAL
		3989+25 (Approach) Rt (1st Application)	12	GAL
		3989+25 (Approach) Rt (2nd Application)	12	GAL
		3990+92 (Approach) Lt (1st Application)	26	GAL
		3990+92 (Approach) Lt (2nd Application)	26	GAL
		3990+92 (Approach) Rt (1st Application)	17	GAL
		3990+92 (Approach) Rt (2nd Application)	17	GAL
401	0070	FOG SEAL		
		3988+00 to 3999+10	432	GAL
		3989+25 (Approach) Lt	10	GAL
		3989+25 (Approach) Rt	10	GAL
		3990+92 (Approach) Lt	28	GAL
		3990+92 (Approach) Rt	15	GAL
420	0111	CRS2P EMULSIFIED ASPHALT		
		3988+00 to 3999+10	2,287	GAL
		3989+25 (Approach) Lt	78	GAL
		3989+25 (Approach) Rt	103	GAL
		3990+92 (Approach) Lt	197	GAL
		3990+92 (Approach) Rt	131	GAL
420	0125	COVER COAT MATERIAL CL 41		
		3988+00 to 3999+10	76	TON
		3989+25 (Approach) Lt	3	TON
		3989+25 (Approach) Rt	4	TON
		3990+92 (Approach) Lt	7	TON
		3990+92 (Approach) Rt	5	TON
430	0045	SUPERPAVE FAA 45		
		3988+00 to 3999+10 Lt	164	TON
		3988+00 to 3999+10 Rt	176	TON
		3989+25 (Approach) Lt	40	TON
		3989+25 (Approach) Rt	73	TON
		3990+92 (Approach) Lt	214	TON
		3990+92 (Approach) Rt	57	TON
430	5806	PG 58H-28 ASPHALT CEMENT		
		3988+00 to 3999+10 Lt	10	TON
		3988+00 to 3999+10 Rt	11	TON
		3989+25 (Approach) Lt	3	TON
		3989+25 (Approach) Rt	5	TON
		3990+92 (Approach) Lt	13	TON
		3990+92 (Approach) Rt	4	TON

LEGEND

- 6" - SUPERPAVE FAA 45 / 21" AGGREGATE BASE COURSE CL 5
- SUPERPAVE FAA 45 OVERLAY (DEPTH VARIES)
- 6" - SUPERPAVE FAA 45 / 30" AGGREGATE BASE COURSE CL 5
- CHIP & FOG SEAL
- 2" MILL AND SUPERPAVE FAA 45 OVERLAY

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DATE 03/16/22
NORTH DAKOTA

Paving Layout

US 85

Belfield Turn Lanes

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	**60"x24"**	**ROAD WORK NEXT __ MILES**	**2**	**28**	**56**
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**26**	**52**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	**108"x48"**	**CONTRACTOR SIGN**	**2**	**70**	**140**
G20-50a-72	**72"x36"**	**ROAD WORK NEXT __ MILES RT & LT ARROWS**	**4**	**43**	**172**
G20-52a-72	**72"x24"**	**ROAD WORK NEXT __ MILES RT or LT ARROW**	**2**	**36**	**72**
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT		59	
I2-5-96	**48"x96"**	**PROJECT FUNDING SIGN**	**4**	**58**	**232**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**2**	**30**	**60**
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1aP-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**2**	**10**	**20**
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	**48"x60"**	**DO NOT PASS**	**2**	**39**	**78**
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)		12	
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**2**	**35**	**70**
W3-5-48	48"x48"	SPEED REDUCTION AHEAD		35	
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	**48"x48"**	**BUMP**	**8**	**35**	**280**
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	**48"x48"**	**LOOSE GRAVEL**	**2**	**35**	**70**
W8-11-48	**48"x48"**	**UNEVEN LANES**	**2**	**35**	**70**
W8-12-48	**48"x48"**	**NO CENTER LINE**	**2**	**35**	**70**
W8-17-48	**48"x48"**	**SHOULDER DROP-OFF SYMBOL**	**2**	**35**	**70**
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT or _ MILE**	**2**	**35**	**70**
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**4**	**35**	**140**
W20-2-48	48"x48"	DETOUR AHEAD or __FT or __MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE		35	
W20-4-48	**48"x48"**	**ONE LANE ROAD AHEAD or __ FT or _ MILE**	**2**	**35**	**70**
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE		35	
W20-7-48	**48"x48"**	**FLAGGER**	**2**	**35**	**70**
W20-8-18	**18"x18"**	**STOP - SLOW PADDLE Back to Back**	**2**	**5**	**10**
W20-52P-54	**54"x12"**	**NEXT __ MILES (Mounted on warning sign post)**	**4**	**12**	**48**
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		35	
W21-5-48	**48"x48"**	**SHOULDER WORK**	**2**	**35**	**70**

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE		35	
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	**48"x48"**	**RUMBLE STRIPS AHEAD**	**2**	**35**	**70**
W22-8-48	**48"x48"**	**FRESH OIL LOOSE ROCK**	**2**	**35**	**70**

SPECIAL SIGNS

SPEC & CODE

704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**2130**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**500**
704-1048	**PORTABLE RUMBLE STRIPS**	**EACH**	**2**
704-1050	TYPE I BARRICADES	EACH	
704-1052	TYPE III BARRICADES	EACH	
704-1060	**DELINEATOR DRUMS**	**EACH**	**70**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**160**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	**STACKABLE VERTICAL PANELS**	**EACH**	**68**
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	**SHORT TERM 4IN LINE - TYPE NR**	**LF**	**20349**

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

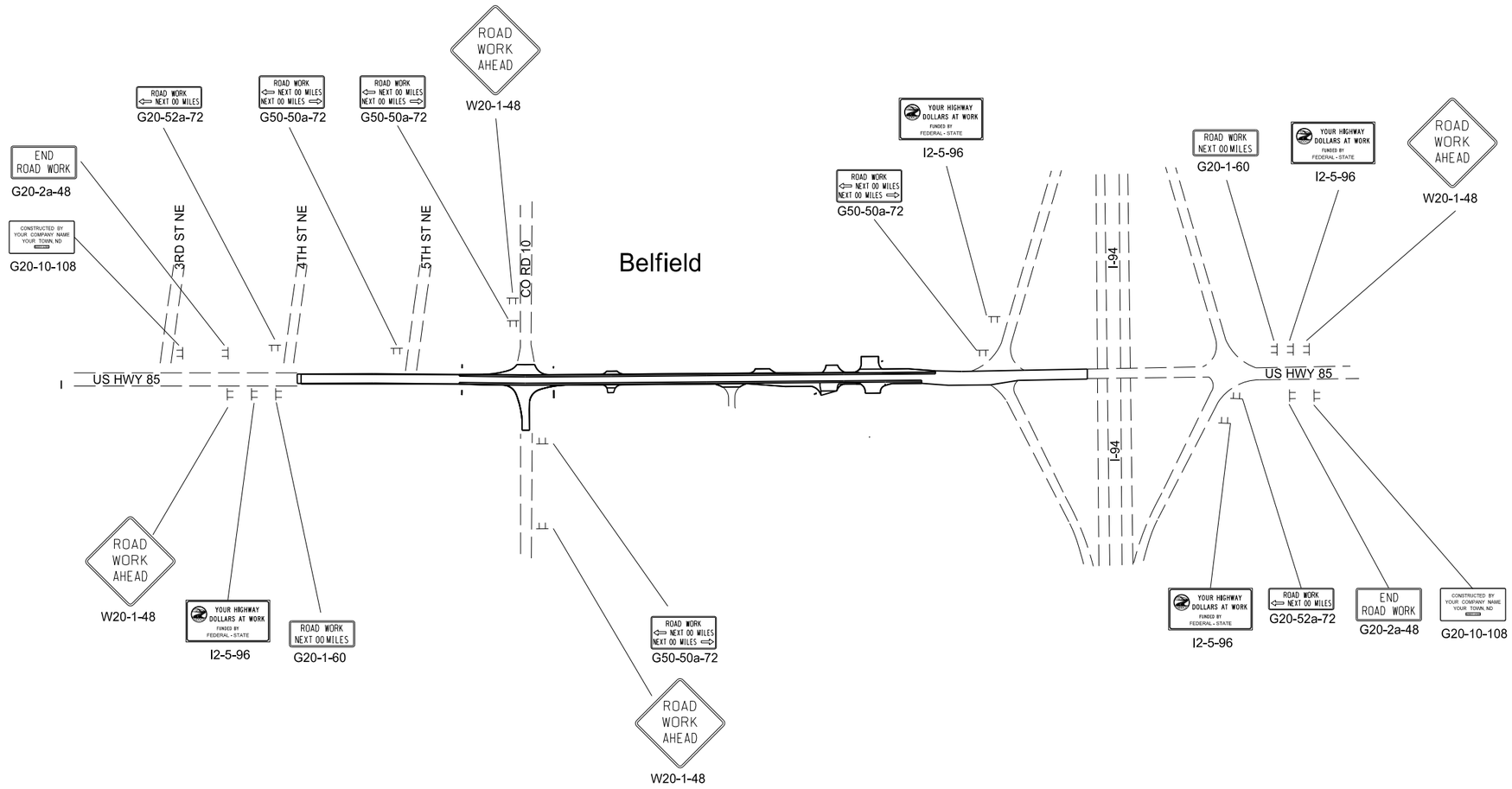
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LUCAS DOERR
PE-25991
DATE 03/18/22
NORTH DAKOTA

Traffic Control Devices List

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	100	2



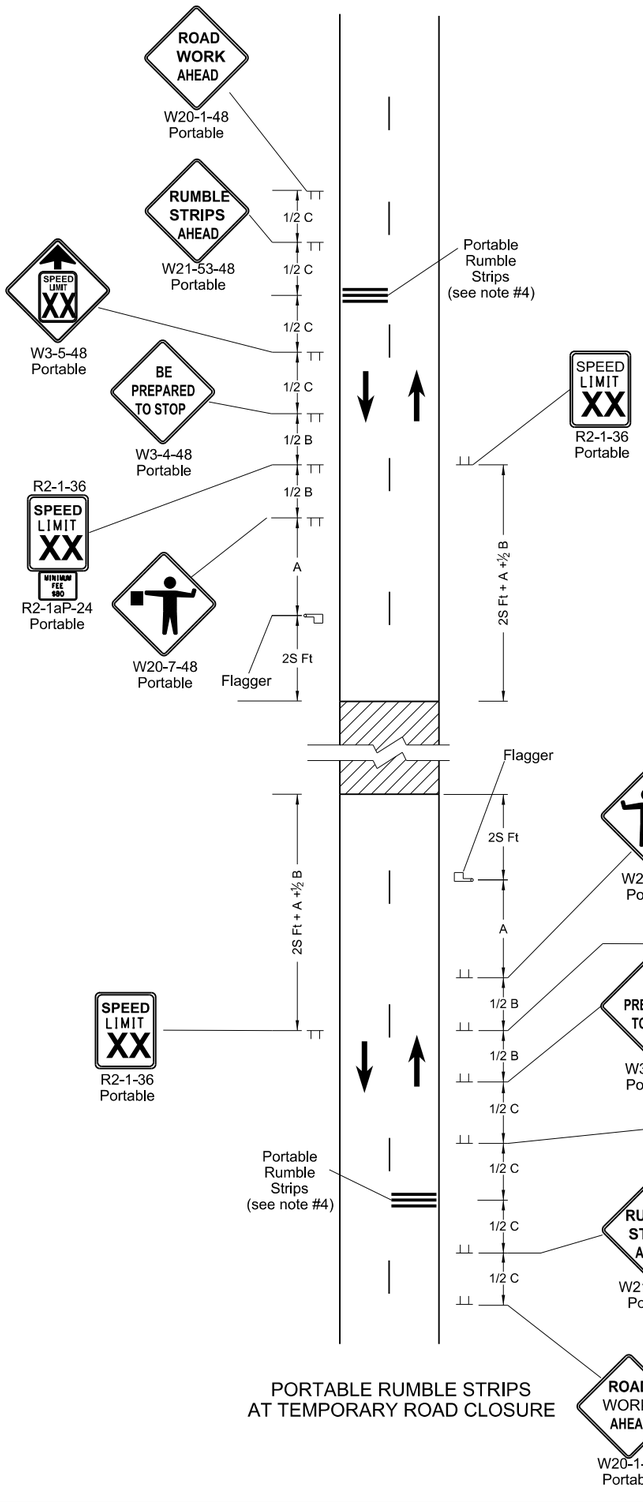
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Work Zone Traffic Control

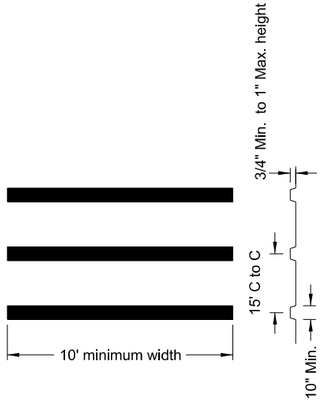
US 85

Belfield Turn Lanes

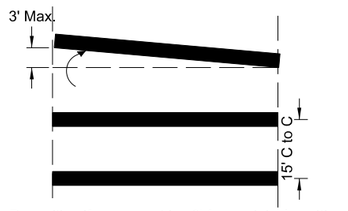
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	100	3



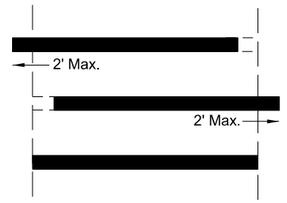
PORTABLE RUMBLE STRIPS AT TEMPORARY ROAD CLOSURE



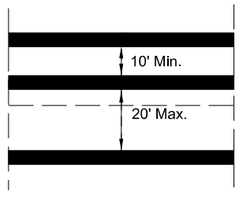
PORTABLE RUMBLE STRIPS ARRAY DETAIL



Reposition if movement is >3' from original position.
Skewing



Reposition if movement is >2' from original position.
Lateral



Reposition if distance between strips is <10' or >20'.
Perpendicular to Travel with or against traffic

PORTABLE RUMBLE STRIPS ARRAY
TYPES OF MOVEMENT AND MAXIMUM ALLOWANCES

Notes:
1. Number of devices were calculated using 40 mph. Speed determined in the field based on location and conditions.
2. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
3. Sign R2-1aP-24 is not required when pilot car operation is used.
4. Rumble strips are not used on a non paved surface or in a pre-construction speed zone of 25 mph or less.

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

KEY
- Work area
- Flagger
- Sign

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

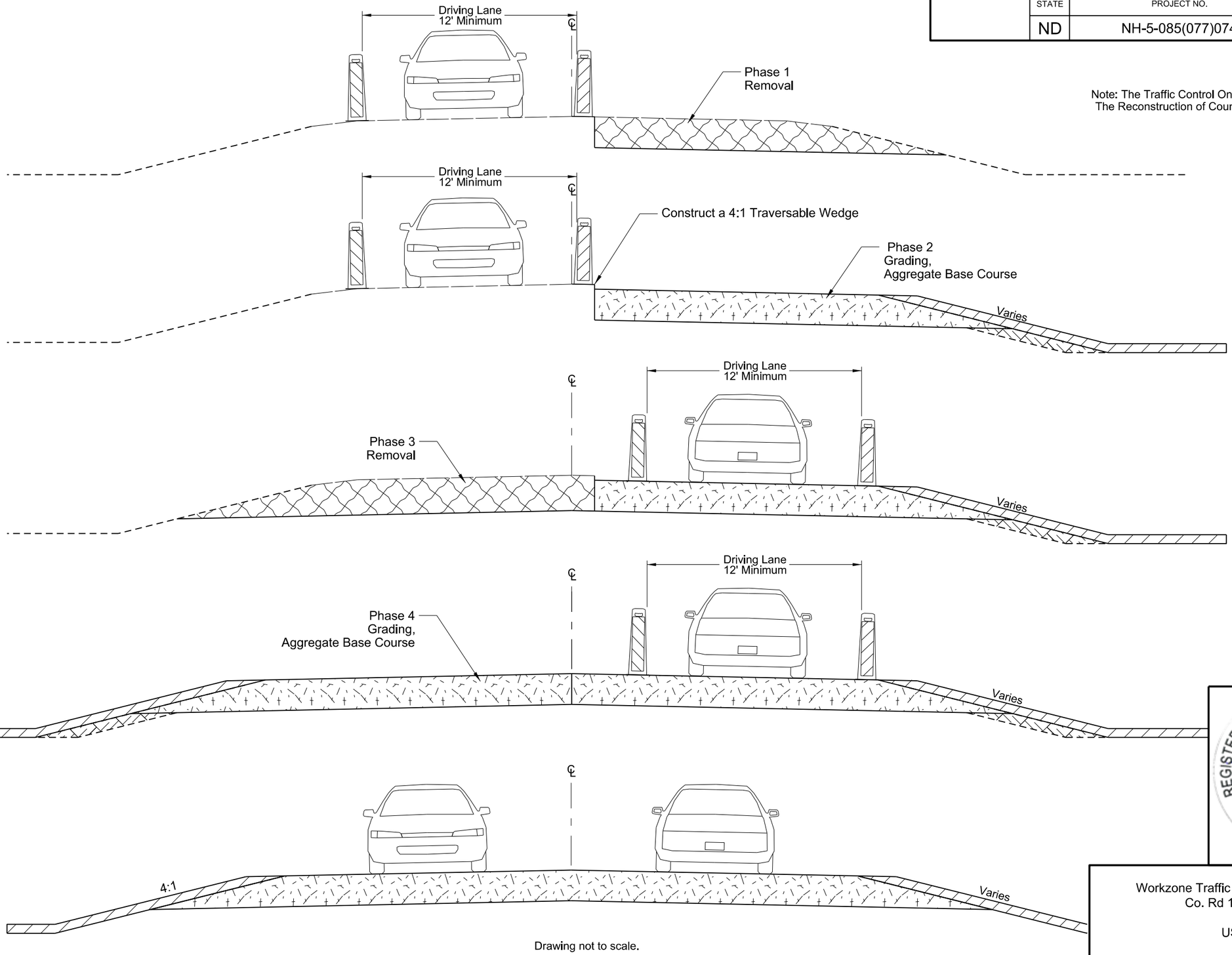
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NORTH DAKOTA

Two-Lane Portable Rumble Strips

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	100	4



Note: The Traffic Control On This Sheet Is For The Reconstruction of County Road 10 Only.

Drawing not to scale.

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DATE 03/18/22
NORTH DAKOTA

Workzone Traffic Control Phasing for
Co. Rd 10 Regrade

US 85

Belfield Turn Lanes

3/2/2022 3:55:25 PM shannon S:\2019proj\1911B\Project\5085074.077\Design\PlanSheets\100WZ_004_County Rd 10.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	NH-5-085(077)074	110	1

Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Vert Clear-ance FT	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
3971+40 Lt	R2-1-24	9			14.0				7.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga	1			
3973+05 Lt	R1-1-30	1		5.2	12.9				7.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
3974+82 Rt	M4-3-24				13.9				7.0	2.5 x 2.5 10 ga	20.5						1	4	3 x 3 7 ga	1		1	
3977+00 Rt	M4-5-24				14.6				7.0	2.5 x 2.5 10 ga	15.2	5.0				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga	1		1	
3977+26 Lt	SA 2B		9.0		13.0				7.0	2.25 x 2.25 12 ga	13.3	4.6				2 x 2 12 ga	1	4	3 x 3 7 ga	1		1	
3977+92 Lt	M1-6-24	14	4.0		12.7				7.0	2 x 2 12 ga	13.0						1	4	2.25 x 2.25 12 ga	1			
3977+93 Rt	R1-1-30	1		5.2	14.2				7.0	2.5 x 2.5 10 ga	16.9						1	4	3 x 3 7 ga			1	
3978+32 Lt	M4-5-24				14.6				7.0	2.5 x 2.5 10 ga	15.2	5.0				2.19 x 2.19 10 ga	1	4	3 x 3 7 ga	1		1	
3978+70 Lt	M4-3-24				13.9				7.0	2.5 x 2.5 10 ga	16.9						1	4	3 x 3 7 ga	1		1	
3979+26 Lt	SN 2	39	10.5		13.0				7.0	2.5 x 2.5 12 ga	15.3	3.9				2.25 x 2.25 12 ga	1	4	3 x 3 7 ga			1	
3979+50 Rt	R2-1-24	9		5.0	13.2				7.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
3983+00 Lt	SN 5	9		5.0	13.2				7.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
3983+00 Rt	D9-3-24	399	6.2		14.0				7.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
3984+25 Rt	M2-1-21	391	6.2		14.0				7.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
3984+31 Lt	SN 3		5.3		13.3				7.0	2.5 x 2.5 10 ga	13.7						1	4	3 x 3 7 ga	1		1	
3985+84 Lt	SN 4	9		5.0	13.2				7.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				
3986+37 Lt	R1-1-30	1			13.2				7.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga	1			
3988+00 Lt	D9-3-24	399	6.2		13.4				7.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga	1			
3989+02 Lt	R1-1-30	1		5.2	12.2				7.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga				
3989+65 Rt	R1-1-30	1		5.2	13.8				7.0	2.5 x 2.5 12 ga	14.1						1	4	3 x 3 7 ga				
3990+39 Lt	R1-1-30	1			12.2				7.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga	1			
3991+29 Rt	R1-1-30	1			11.1				7.0	2.25 x 2.25 12 ga	13.7						1	4	2.5 x 2.5 12 ga	1			
3992+27 Rt	Billings 304				12.7	13.4			7.0	2.5 x 2.5 12 ga	15.7	3.4	4.1			2.25 x 2.25 12 ga	2	4	3 x 3 7 ga	1		2	
3993+16 Lt	DSDS			5.0	15.4	15.6			7.0	2.5 x 2.5 12 ga	17.2						2	4	3 x 3 7 ga	1		2	
3993+77 Rt	M1-4-24	436			14.5	14.9	15.2		7.0	2.25 x 2.25 12 ga	15.9	4.5	4.8	5.2		2 x 2 12 ga	3	4	3 x 3 7 ga	1		3	
3994+64 Lt	M1-4-24		2.0		13.6				7.0	2.5 x 2.5 12 ga	16.2						1	4	3 x 3 7 ga	1			
3995+01 Rt	R3-2-24	14			13.3				7.0	2.25 x 2.25 12 ga	13.9						1	4	2.5 x 2.5 12 ga	1			
3995+22 Rt	M1-4-24	399	6.2		14.2				7.0	2.5 x 2.5 12 ga	15.9						1	4	3 x 3 7 ga				
Sub Total			55.6	40.8	**Total**	436.4											**Total**	128.0		17	0	15	
Grand Total			**55.6**	**40.8**	**Total**	**436.4**											**Total**	**128**	**0**	**17**	**0**	**15**	

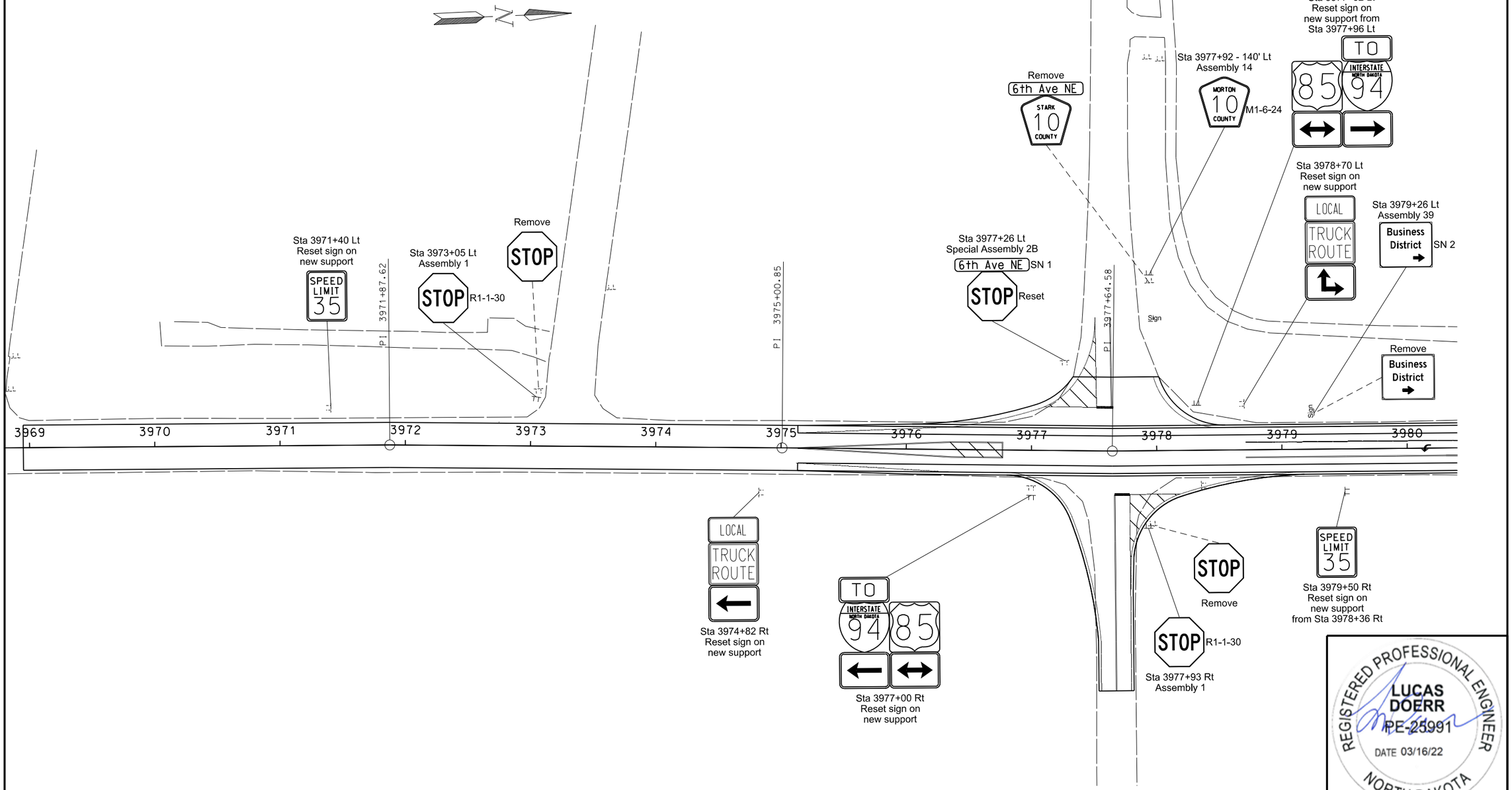
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Sign Summary
Perforated Tube

US 85
Belfield Turn Lanes

3/2/22 4:01:19PM

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	110	2



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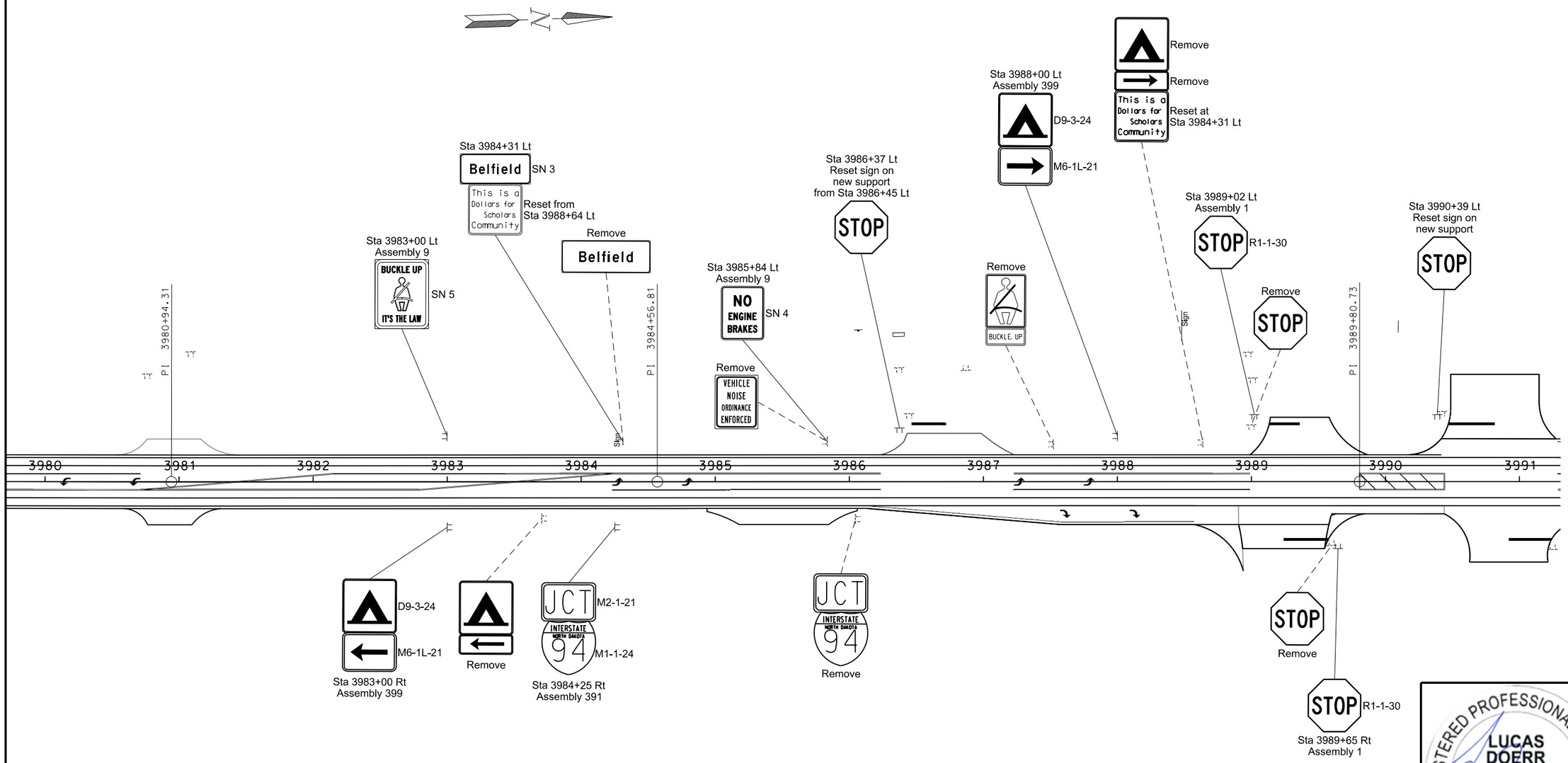
Sign Layout

US 85

Belfield Turn Lanes

3/2/2022 3:57:54 PM shannon S:\2019proj\1911B\Project\5085074.077\Traffic\110SN_002.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	110	3



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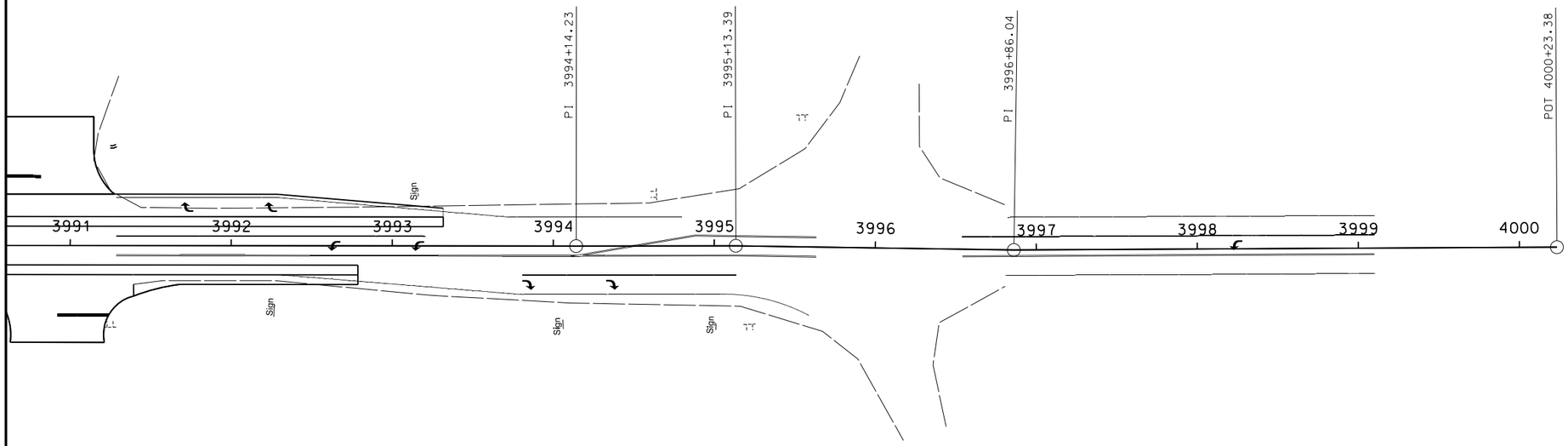
Sign Layout

US 85

Belfield Turn Lanes

3/2/2022 3:58:15 PM shannon S:\2019proj\1911B\Project\5085074.077\Traffic\110SN_003.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	110	4



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DATE 03/16/22
NORTH DAKOTA

Sign Layout

US 85

Belfield Turn Lanes

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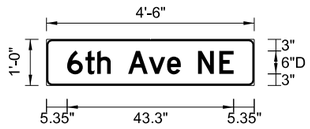
STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	110	6

SIGN NUMBER	SN 1
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

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): none

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.ssl

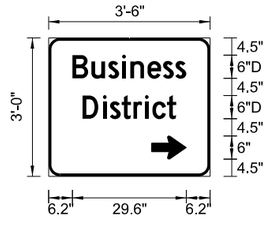
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
6	t	h		A	v	e		N	E									43.3	6/4.5	D 2000
5.4	10.1	13.2	16.7	21.2	26.6	31.4	34.9	39.4	44.9											

SIGN NUMBER	SN 2
WIDTH X HEIGHT	3'-6" x 3'-0"
BORDER WIDTH	0.75" (inset 0")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	**TYPE:** IV Reflective
	COLOR: Green
LEGEND/BORDER	**TYPE:** IV Reflective
	COLOR: White

SYMBOL	X	Y	WID	HT	ANGLE
ND_6IN_TYPE D	26.8	4.5	6	9	270

STATION(S): none

AREA: 10.5 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Destination.ssl

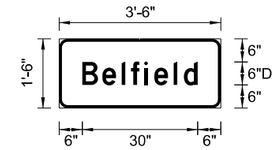
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
B	u	s	i	n	e	s	s											29.6	6/4.5	D 2000
6.2	11.1	15.5	19.1	21.3	25.7	29.7	33													
D	i	s	t	r	i	c	t											24.3	6/4.5	D 2000
8.8	14.1	15.9	19	22	25	27	30.7													

SIGN NUMBER	SN 3
WIDTH X HEIGHT	3'-6" 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

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): none

AREA: 5.3 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Conv_Boundary.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
B	e	l	f	i	e	l	d											30	6/4.5	D 2000
6	11.2	16.3	18.7	22.1	24.7	29.8	32.4													

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PE-25991
DATE 03/16/22
NORTH DAKOTA

Sign Details

US 85

Belfield Turn Lanes

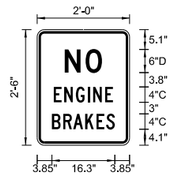
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	110	5

SIGN NUMBER	SN 4
WIDTH X HEIGHT	2'-0" x 2'-6"
BORDER WIDTH	0.63" (inset 0.38")
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	**TYPE:** IV Reflective
	COLOR: White
LEGEND/BORDER	**TYPE:** IV Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S): none

AREA: 5.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Reg_24_Small.ssl

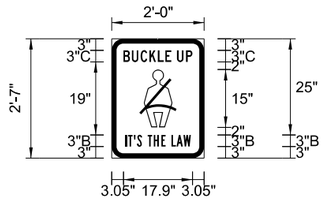
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
N	O																	9.7	6	D 2000
7.2	12.6																			
E	N	G	I	N	E													15.4	4	C 2000
4.3	7	10.1	13.1	14.5	17.7															
B	R	A	K	E	S													16.3	4	C 2000
3.8	6.8	9.4	12.5	15.4	17.9															

SIGN NUMBER	SN 5
WIDTH X HEIGHT	2'-0" x 2'-7"
BORDER WIDTH	1.25" (inset 0")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	**TYPE:** IV Reflective
	COLOR: White
LEGEND/BORDER	**TYPE:** IV Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
Seat Belt	7.2	8	9.7	15	0

STATION(S): none

AREA: 5.2 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: BEI_Reg_60_Large_Width Restriction.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
B	U	C	K	L	E	U	P											17.9	3	C 2000
3	5.2	7.5	9.8	12	13.9	16.9	19.3													
I	T	'	S	T	H	E	L	A	W									17.1	3	B 2000
3.4	4.3	5.7	6.6	9.4	10.9	12.9	15.5	16.8	18.6											

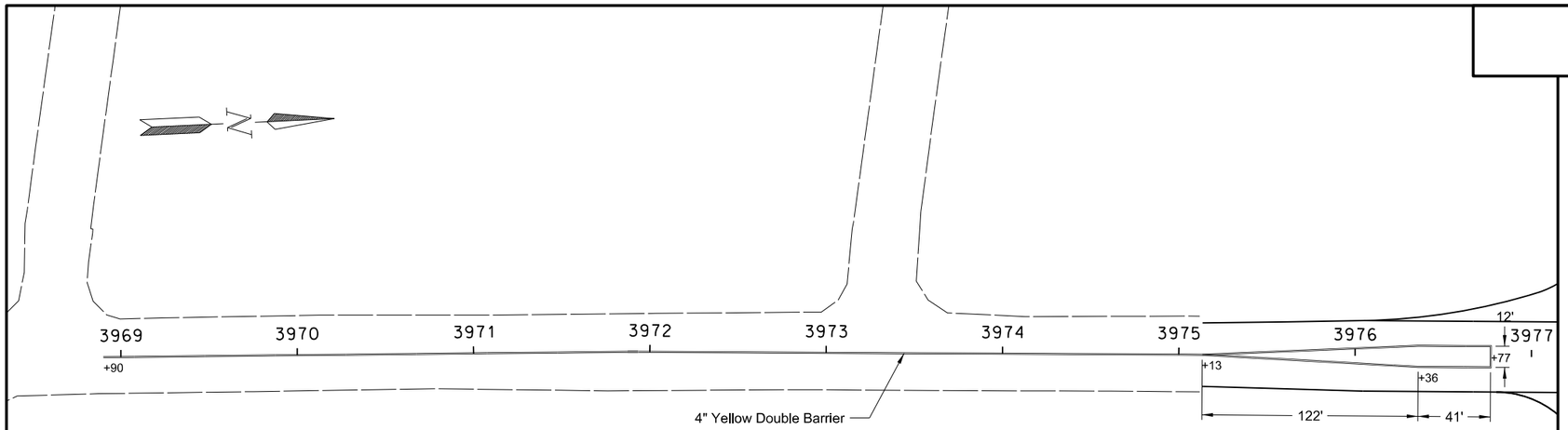
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

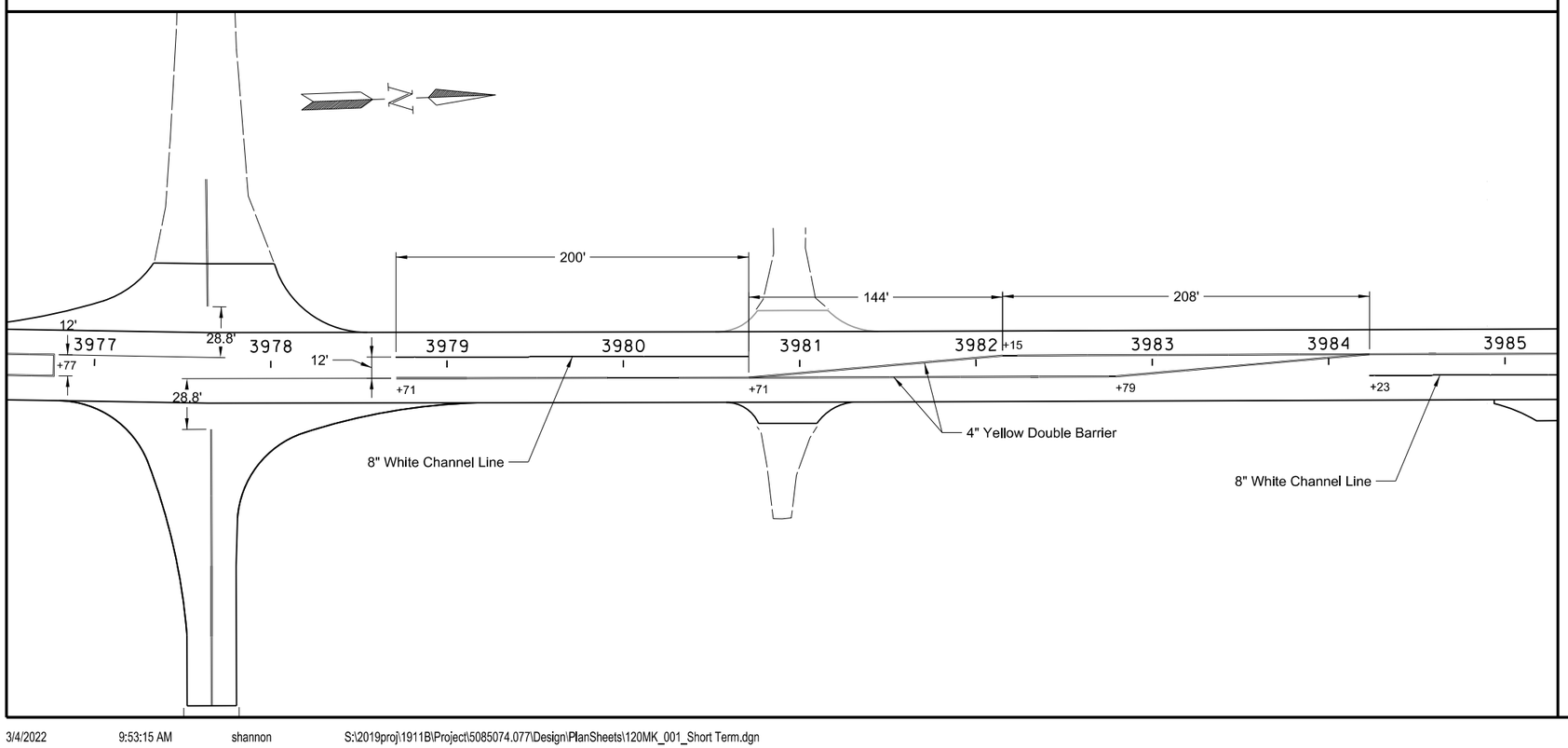
Sign Details

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	120	1





SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0430	SHORT TERM 4IN LINE-TYPE NR		
		Yellow Double Barrier (2 applications)		
		3968+90 to 3975+13	2492	LF
		3975+13 to 3976+77	1356	LF
		Co Rd 10 E	628	LF
		3978+71 to 3984+23	3624	LF
762	0434	SHORT TERM 8IN LINE-TYPE NR		
		White Channel Line (2 applications)		
		3978+71 to 3980+71	400	LF

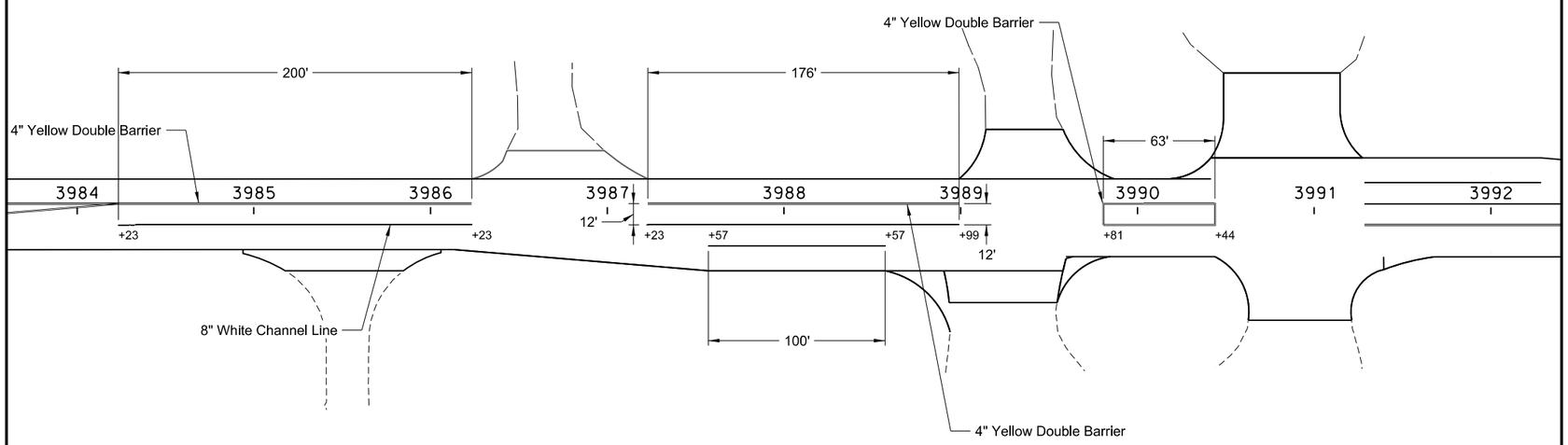
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

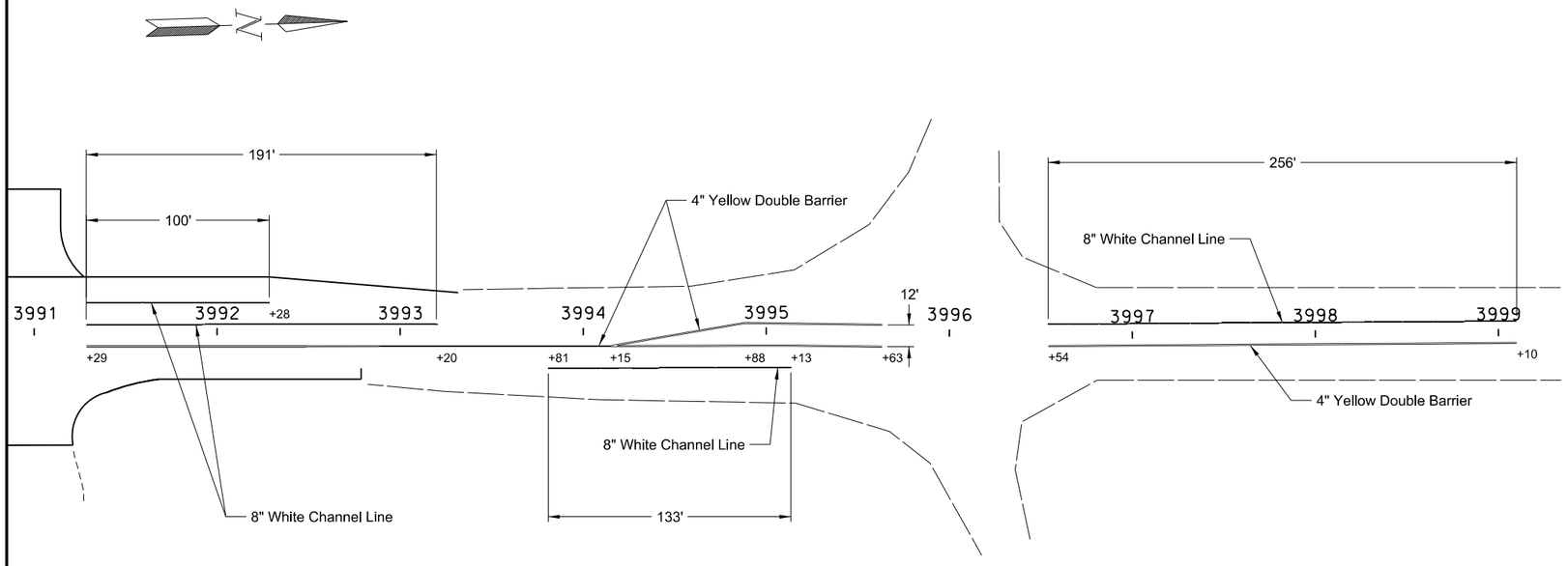
Temporary Pavement Markings

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	120	2





SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0430	SHORT TERM 4IN LINE-TYPE NR		
		Yellow Double Barrier (2 Applications)		
		3984+23 to 3986+23	800	LF
		3987+23 to 3988+99	704	LF
		3989+81 to 3990+44	600	LF
		3991+29 to 3994+15	1144	LF
		3994+15 to 3995+63	1196	LF
		3996+54 to 3999+10	1024	LF
762	0434	SHORT TERM 8IN LINE-TYPE NR		
		White Channel Line (2 Applications)		
		3984+23 to 3986+23	400	LF
		3987+23 to 3988+99	552	LF
		3991+29 to 3995+13	848	LF
		3996+54 to 3999+10	512	LF

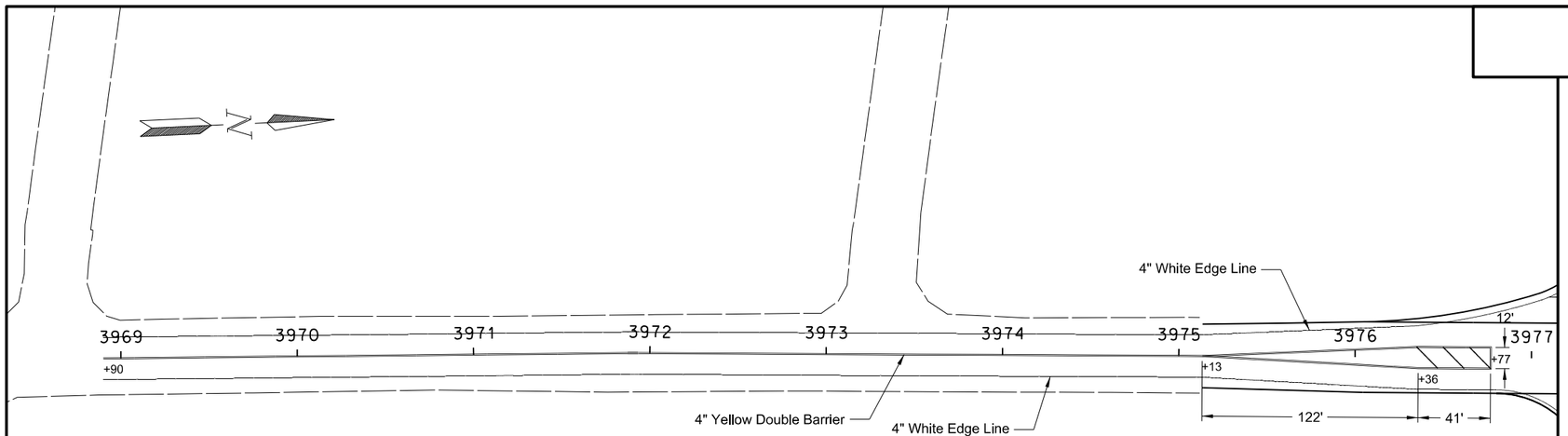
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

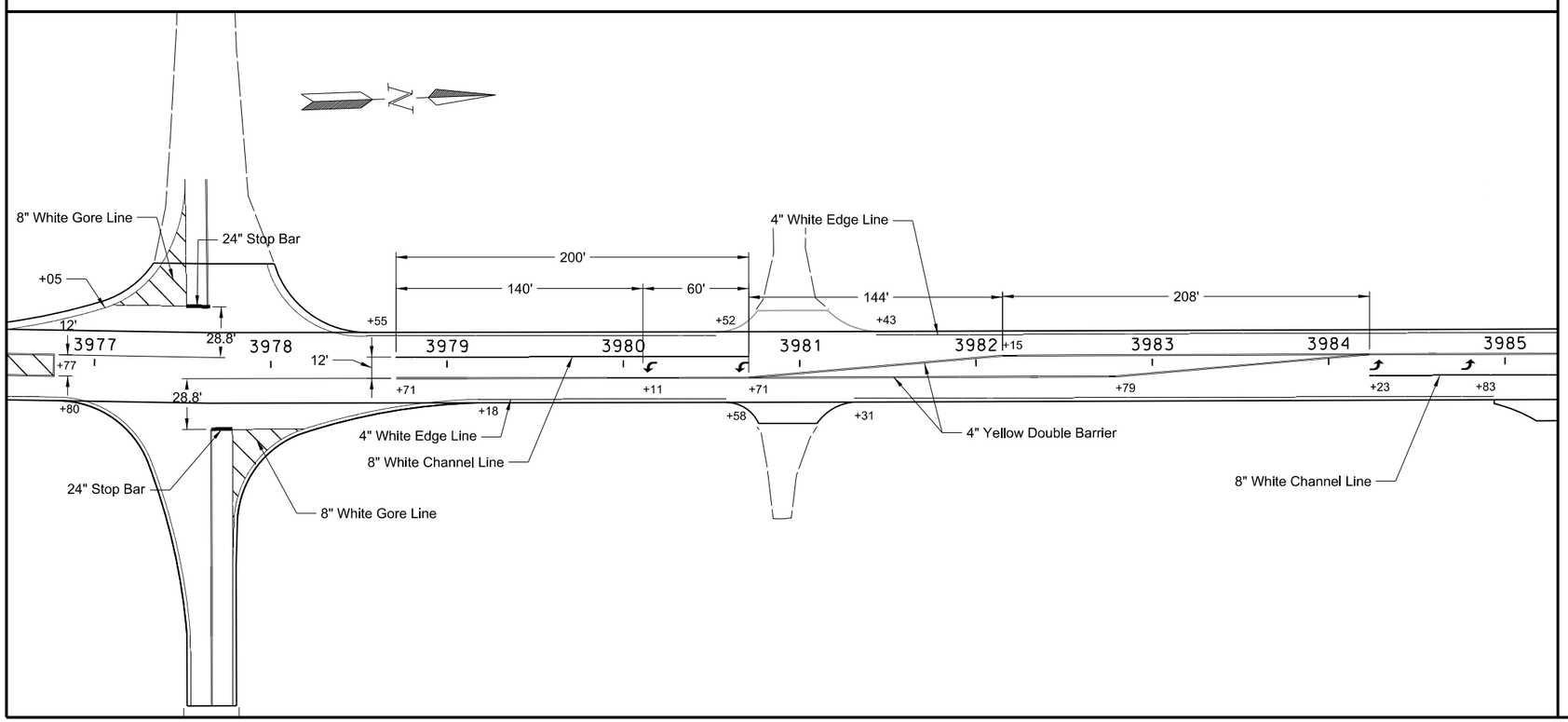
Temporary Pavement Markings

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	120	3





SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0103	PVMT MK PAINTED-MESSAGE		
		2 Left Turn Arrows	32	SF
762	1104	PVMT MK PAINTED 4IN LINE		
		Yellow Double Barrier		
		3968+90 to 3975+13	1246	LF
		3975+13 to 3976+77	678	LF
		Co Rd 10 W	144	LF
		Co Rd 10 E	314	LF
		3978+71 to 3984+23	1812	LF
		White Edge Line Left		
		3968+90 to 3975+13	623	LF
		3975+13 to 3977+05	157	LF
		Co Rd 10 W	168	LF
		3978+55 to 3980+52	197	LF
		3981+43 to 3984+23	280	LF
		White Edge Line Right		
		3968+90 to 3975+13	623	LF
		3975+13 to 3976+80	168	LF
		Co Rd 10 E	484	LF
		3979+18 to 3980+58	141	LF
		3981+31 to 3984+23	292	LF
762	1108	PVMT MK PAINTED 8IN LINE		
		White Channel Line		
		3978+71 to 3980+71	200	LF
		Yellow Gore Line		
		3976+35 to 3976+77	51	LF
		White Gore Line		
		Co Rd 10 W	80	LF
		Co Rd 10 E	61	LF
762	1124	PVMT MK PAINTED 24IN LINE		
		3977+65 Lt & Rt	24	LF

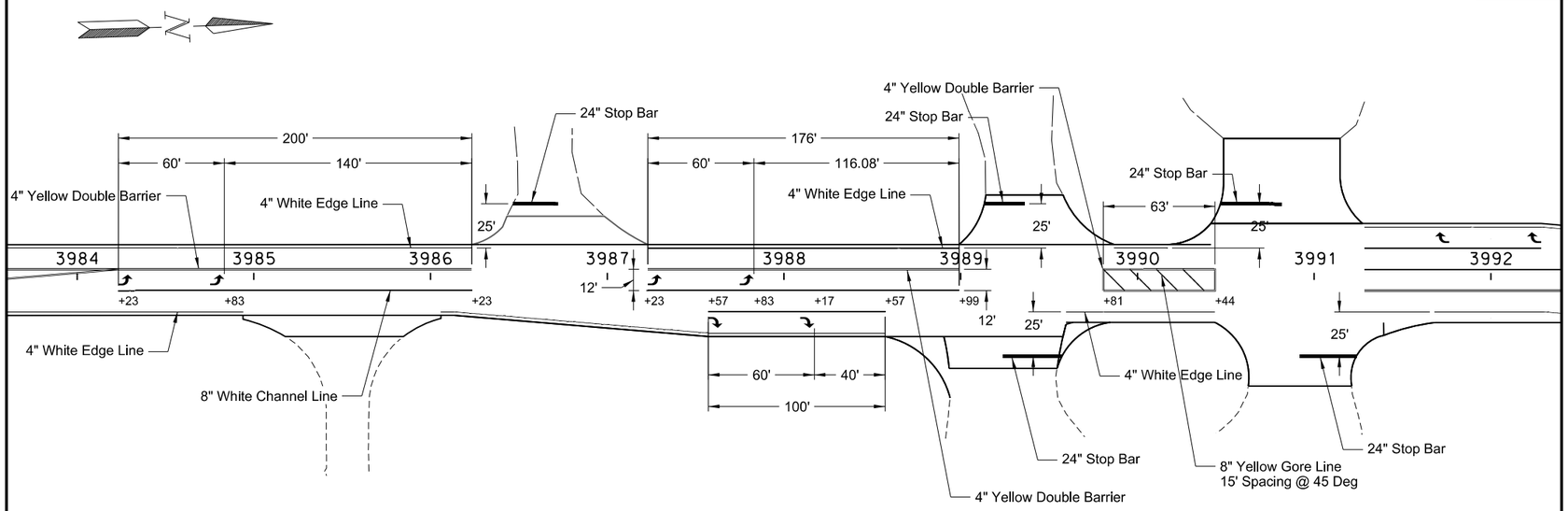
REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

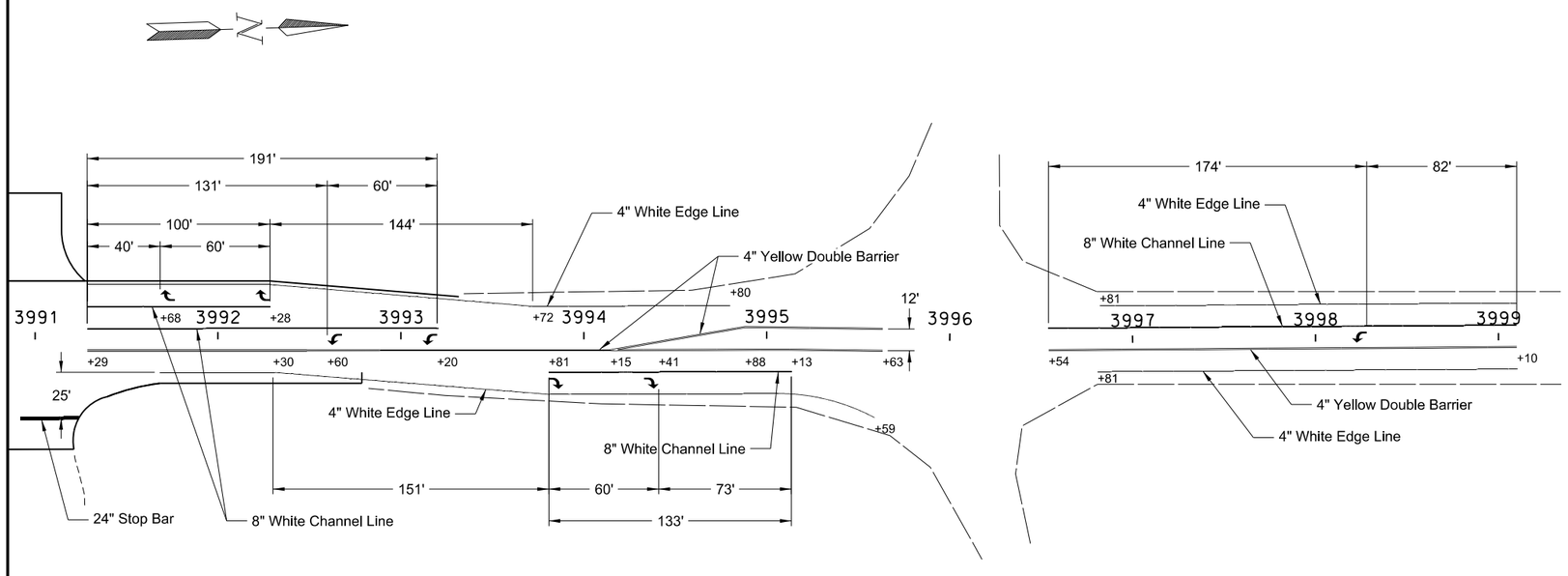
Permanent Pavement Markings

US 85

Belfield Turn Lanes

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	NH-5-085(077)074	120	4





SPEC	CODE	BID ITEM	QUANTITY	UNIT
762	0103	PVMT MK PAINTED-MESSAGE		
		7 Left Turn Arrows	112	SF
		6 Right Turn Arrows	96	SF
762	1104	PVMT MK PAINTED 4IN LINE		
		Yellow Double Barrier		
		3984+23 to 3986+23	400	LF
		3987+23 to 3988+99	352	LF
		3989+81 to 3990+44	300	LF
		3991+29 to 3994+15	572	LF
		3994+15 to 3995+63	598	LF
		3996+54 to 3999+10	512	LF
		White Edge Line Left		
		3984+23 to 3986+23	200	LF
		3987+23 to 3988+99	176	LF
		3989+87 to 3990+17	30	LF
		3991+29 to 3994+80	352	LF
		3996+81 to 3999+10	228	LF
		White Edge Line Right		
		3984+23 to 3984+94	71	LF
		3986+06 to 3988+57	252	LF
		3989+60 to 3990+44	84	LF
		3991+68 to 3995+59	394	LF
		3996+81 to 3999+10	228	LF
762	1108	PVMT MK PAINTED 8IN LINE		
		White Channel Line		
		3984+23 to 3986+23	200	LF
		3987+23 to 3988+99	276	LF
		3991+29 to 3995+13	424	LF
		3996+54 to 3999+10	256	LF
		Yellow Gore Line		
		3989+81 to 3990+44	68	LF
762	1124	PVMT MK PAINTED 24IN LINE		
		3986+71 Lt	24	LF
		3989+36 Lt & Rt	56	LF
		3990+90 Lt & Rt	67	LF

REGISTERED PROFESSIONAL ENGINEER
LUCAS DOERR
PE-25991
DATE 03/16/22
NORTH DAKOTA

Permanent Pavement Markings

US 85

Belfield Turn Lanes

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	140	1

N

Approx location of Existing Crude Oil Collector
Plains Pipe Line LP

Sta 2236+22 Bk-86' Lt
Remove existing light std.

Sta 2238+62 Bk-92' Lt
Remove existing light std.

2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 224(

I-94 Westbound

I-94 Eastbound

Sta 2230+13 Bk-81' Rt
Remove existing light std.

Sta 2232+50 Bk-87' Rt
Remove existing light std.

Sta 2234+88 Bk-99' Rt
Remove existing light std.

Sta 2237+27 Bk-70' Rt
Remove existing light std.

SWR

Sta 2230+74 Bk-124' Rt (I-94)
High Mast Light
4 luminaire
Concrete foundation

Grading Tie
Inslope = 6:1

Top of Embankment

Limits of Disturbance
Seeding Area = 409 SY

Sta 2237+69 Bk-194' Rt (I-94)
Sta 5+26-60' Rt (SWR)
High Mast Light
4 luminaire
Concrete foundation

Top of Embankment

Grading Tie
Inslope = 3:1

Limits of Disturbance
Seeding Area = 230 SY

REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
PE-10588
DATE 2/8/2022
NORTH DAKOTA

Lighting System

High Mast Lighting Layout

I-94 and US 85 Interchange

Belfield

3/8/2022 1:05:17 PM cabrahamson R:\project\50085074.077\traffic\140LT_001_LLIGHT.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	140	2

N

US 85

4005

0

Sta 4005+51-35' Rt (US 85)
Remove existing light std.

Sta 2241+69 Bk-189' Lt (I-94)
Sta 8+73-62' Lt (NWR)
High Mast Light
4 luminaire
Concrete foundation

Top of Embankment

Limits of Disturbance
Seeding Area = 337 SY

Grading Tie
Inslope = 3:1

Sta 8+77-20' Lt (NWR)

Sta 2241+01 Bk-70' Lt
Remove existing light std.

Sta 2242+02 Bk-106' Lt (I-94)
Sta 8+81-27' Rt (NWR)

Sta 2242+12 Bk-78' Lt (I-94)

NWR

15

10

Sta 4003+51-38' Lt (US 85)
Remove existing light std.

Limits of Disturbance
Seeding Area = 455 SY

Top of Emankment

Sta 2238+83 Ahd- 191' Lt (I-94)
High Mast Light
10 luminaire
Concrete foundation

Grading Tie
Inslope = 6:1

NER

5

Sta 2247+09 Bk-78' Lt (I-94)

Sta 2242+14 Ahd-74' Lt (I-94)

Sta 2244+00 Ahd-70' Lt
Remove existing light std.

I-94 Westbound

I-94 Westbound

I-94 Westbound

0 2241 2242 2243 2244 2245 2246 2247 2248 2237 2238 2239 2240 2241 2242 2243 2244 2245

I-94 Eastbound

I-94 Eastbound

I-94 Eastbound

4000

EQUATION:
Sta 2248+96.84 Bk =
Sta 2236+92.48 Ahd

Sta 2247+13 Bk-86' Rt (I-94)

Sta 2242+15 Ahd-75' Rt (I-94)

Sta 2244+93 Ahd-70' Rt
Remove existing light std.

Limits of Disturbance
Seeding Area = 474 SY

Sta 8+55-28' Lt (SWR)

Sta 2242+54 Ahd-150' Rt (I-94)
Sta 6+39-29' Lt (SER)

Limits of Disturbance
Seeding Area = 263 SY

Sta 6+41-18'Rt (SER)

Top of Embankment

Sta 2247+14 Bk-209' Rt (I-94)
Sta14+38-189' Lt (SWR)
High Mast Light
10 luminaire
Concrete foundation

Grading Tie
Inslope = 6:1

Sta 3996+91-37' Rt (US 85)
Remove existing light std.

Grading Tie
Inslope = 3:1

Top of Embankment

Sta 8+52-10' Rt (SWR)

SWR

10

15

SER

5

Sta 14+87-38' Lt (SWR)

Sta 14+91-18' Rt (SWR)

Sta 16+58-65' Rt (SWR)

Sta 2242+93 Ahd-230' Rt (I-94)
Sta 6+44-60' Rt (SER)
High Mast Light
4 luminaire
Concrete foundation

Sta 3994+91-42' Lt (US 85)
Existing light std
in place to remain.
Remove luminaire
Install LED luminaire

Sta 3994+53-100' Lt (US 85)
Remove feed point-
pole mounted

Sta 0+64-93' Rt (SER)
Sta 3995+10-99' Rt (US 85)
Feed Point A - Type II -
Pad Mounted

3996

14

REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
PE-10588
DATE 2/8/2022
NORTH DAKOTA

Lighting System

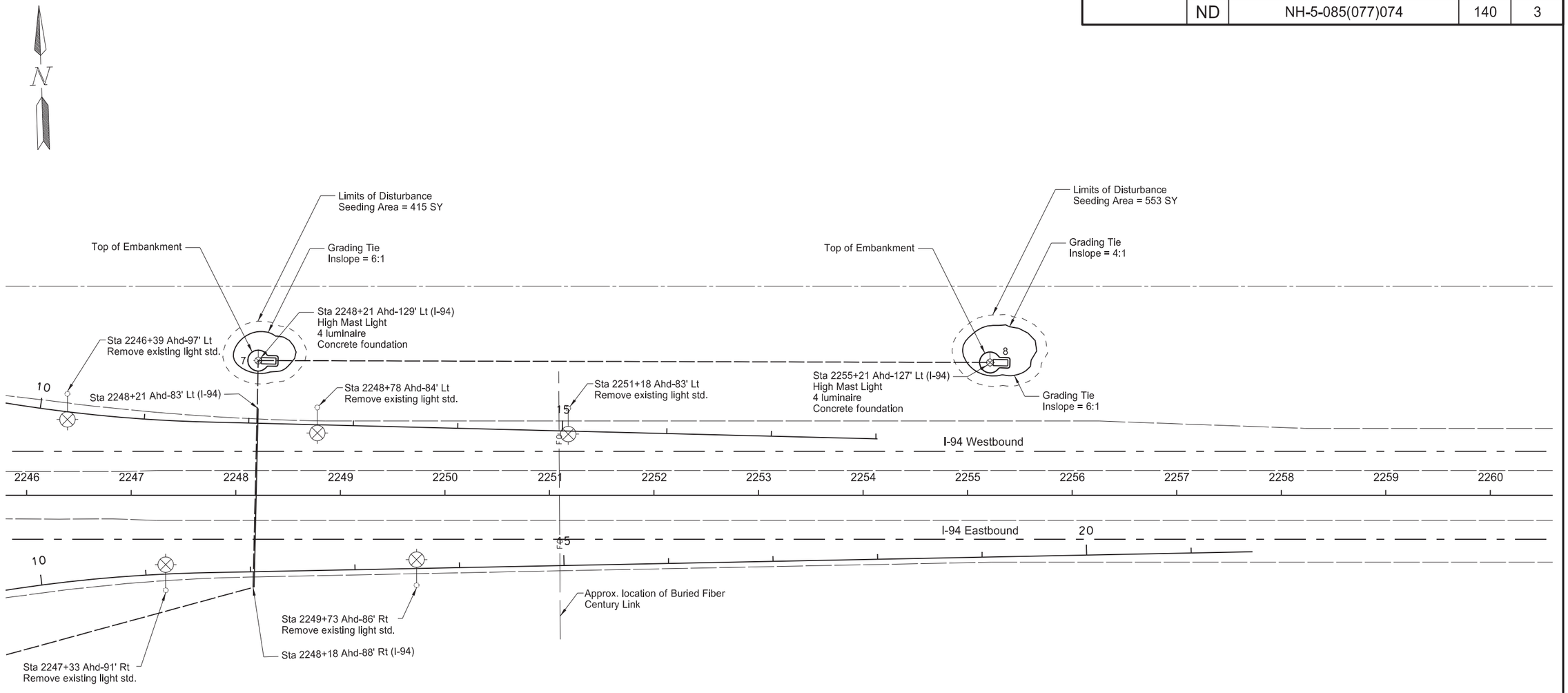
High Mast Lighting Layout

I-94 and US 85 Interchange

Belfield

3/8/2022 1:05:18 PM cabrahamson R:\project\50085074.077\traffic\140LT_002_LLIGHT.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	140	3



REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
PE-10588
DATE 2/8/2022
NORTH DAKOTA

Lighting System

High Mast Lighting Layout

I-94 and US 85 Interchange

Belfield

3/8/2022 1:05:19 PM cabrahamson R:\project\50085074.077\traffic\140LT_003_LLIGHT.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	140	4

Light Std Number	Station	Cable Trench	Conduit		Cable Runs	
		LF	LF	Dia	LF	Type
1 2 2	2230+74 Bk-124' Rt to 2237+69 Bk-194' Rt (I-94) = 5+26-60' Rt (SWR)	704			712	4 No. 4 USE
2 Bend Bend 4 4	5+26-60' Rt (SWR) to 8+52-10' Rt (SWR) to 8+55-28' Lt (SWR) to 14+38-189' Lt (SWR = 2247+14 Bk-209' Rt (I-94)	328 605	46	2 1/2"	987	4 No. 4 USE
3 Bend Bend 4	2241+69 Bk-189' Lt (I-94) to 2242+02 Bk-78' Lt (I-94) to 2247+09 Bk-78' Lt (I-94) to 2247+14 Bk-209' Rt (I-94)	72 497 124	47 163	2 1/2" 2 1/2"	911	4 No. 4 USE
4 4 Bend Bend FP	2247+14 Bk-209' Rt (I-94) = 14+38-189' Lt (SWR) to 14+91-18' Rt (SWR) to 16+58-65' Rt (SWR) to 0+64-93' Rt (SER)	157 161	60 134	2 1/2" 2 1/2"	526	4 No. 4 USE
8 7	2255+21 Ahd-127' Lt (I-94) to 2248+21 Ahd-129' Lt (I-94)	700			708	4 No. 4 USE
7 Bend 6 6	2248+21 Ahd-129' Lt (I-94) to 2248+18 Ahd-88' Rt (I-94) to 2242+93 Ahd-230' Rt (I-94) = 6+44-60' Rt (SER)	45 542	171	2 1/2"	766	4 No. 4 USE
5 Bend Bend 6 6	2238+83 Ahd-191' Lt (I-94) to 2242+14 Ahd-74' Lt (I-94) to 2242+15 Ahd-75' Rt (I-94) to 2242+93 Ahd-230' Rt (I-94) = 6+44-60' Rt (SER)	351 125	150 48	2 1/2" 2 1/2"	682	4 No. 4 USE
6 FP	6+44-60' Rt (SER) to 0+64-93' Rt (SER)	572			586	4 No. 4 USE

High Mast Light Standards							
No.	RP	High Mast Number (A)	Station - Offest	Location	Circuit	IES-Type	Pole Ht.
1	42.023	HM 0094-042.023	2230+74 Bk-124' Rt	Eastbound	1	Asym	140'
2	42.155	HM 0094-042.155	2237+69 Bk-194' Rt	SW ramp outside	1	Asym	140'
3	42.230	HM 0094-042.230	2241+69 Bk-189' Lt	NW ramp outside	1	Asym	140'
4	42.334	HM 0094-042.334	2247+14 Bk-209' Rt	Eastbound	1	Sym	140'
5	42.402	HM 0094-042.402	2238+83 Ahd-191' Lt	Westbound	2	Sym	140'
6	42.479	HM 0094-042.479	2242+93 Ahd-230' Rt	SE ramp outside	2	Asym	140'
7	42.579	HM 0094-042.579	2248+21 Ahd-129' Lt	Westbound	2	Asym	140'
8	42.712	HM 0094-042.712	2255+21 Ahd-127' Lt	Westbound	2	Asym	140'

(A) This column shows the number for the labels. Refer to note 770-P05

High Mast Lighting Quantities													
Concrete Foundation - Highway Lighting	Concrete Foundation - Feed Point - Type B	Cable Trench - Type II	2 1/2" Dia Rigid Conduit	Multiple Underground Cable 4 No. 4 Style USE	Feed Point - Type II - Pad Mounted	High Mast Lighting Assembly Type HM-140-4	High Mast Lighting Assembly Type HM-140-10	LED Luminaire - High Mast	Remove Light Standard	Borrow Excavation Type A	Topsoil Remove/Replace	Hydraulic Mulch	Soil Stabilizer
EA	EA	LF	LF	LF	EA	EA	EA	EA	EA	CY	CY	SY	SY
8	1	4983	819	5878	1	6	2	42	17	826	257	3136	3136

REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
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DATE 2/8/2022
NORTH DAKOTA

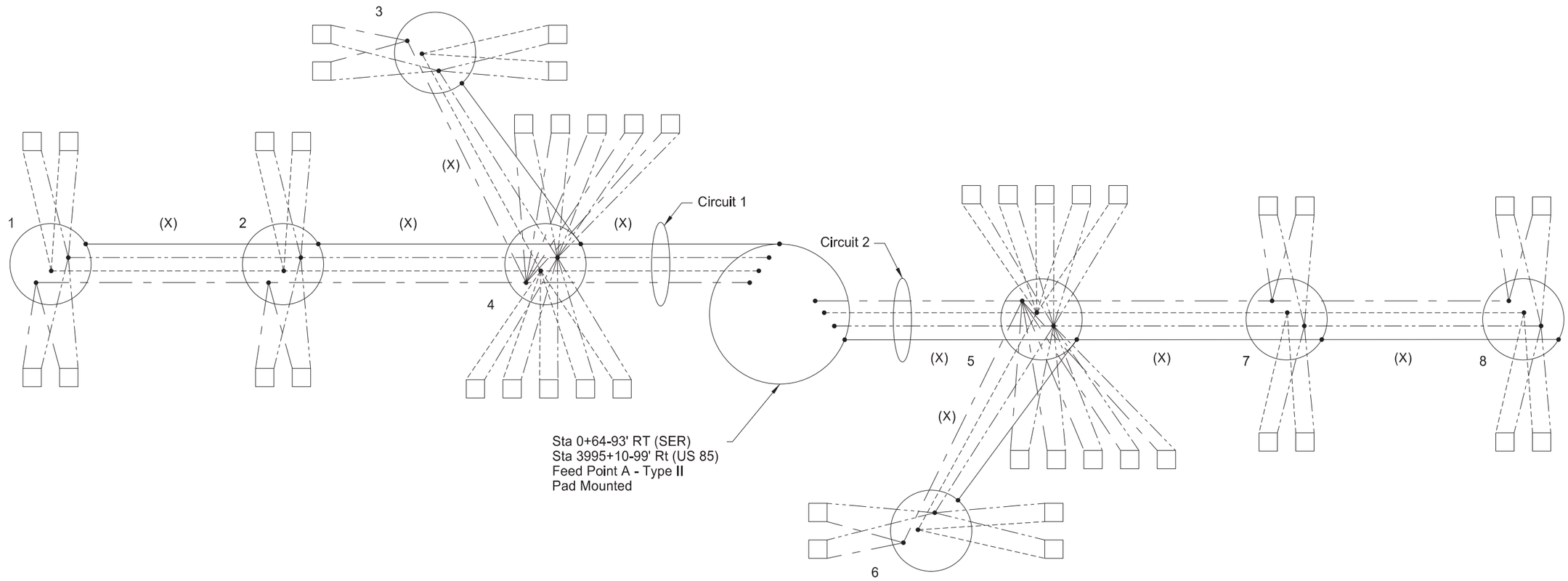
Lighting System

Conduit, Cable Runs and Quantities
High Mast Lighting

I-94 and US 85 Interchange

Belfield

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	140	5



Legend

Ground Conductor	LED High Mast Luminaire 240v x 480v operated on 240v
Nuetral Conductor	5 — High mast Light Standard Number
Phase Conductor	
Phase Conductor	High Mast Light Standard
(X) — 4 No. 4 USE	

REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
PE-10588
DATE 2/8/2022
NORTH DAKOTA

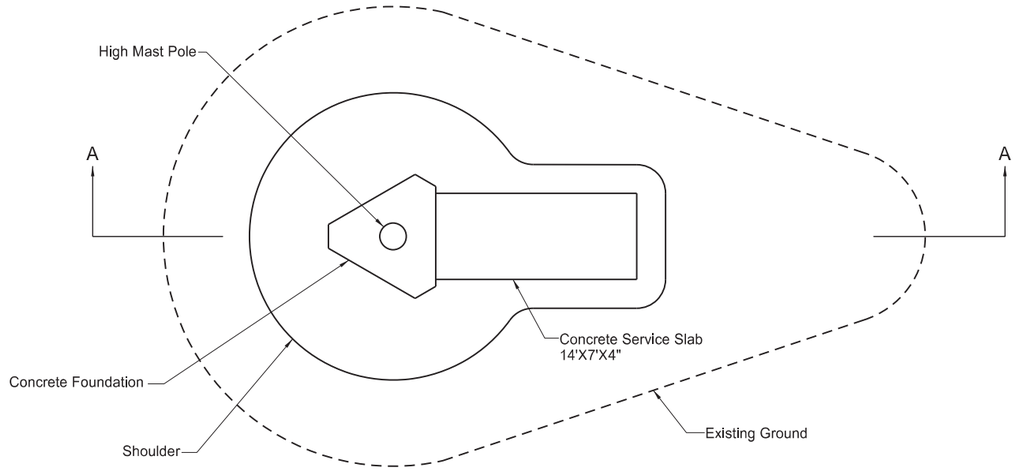
Lighting System

Lighting Schematic
Feed Point A

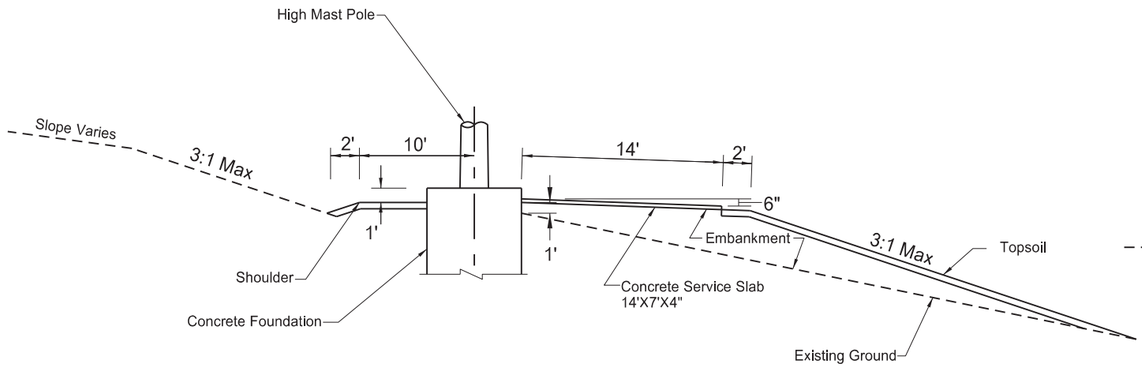
I-94 and US 85 Interchange

Belfield

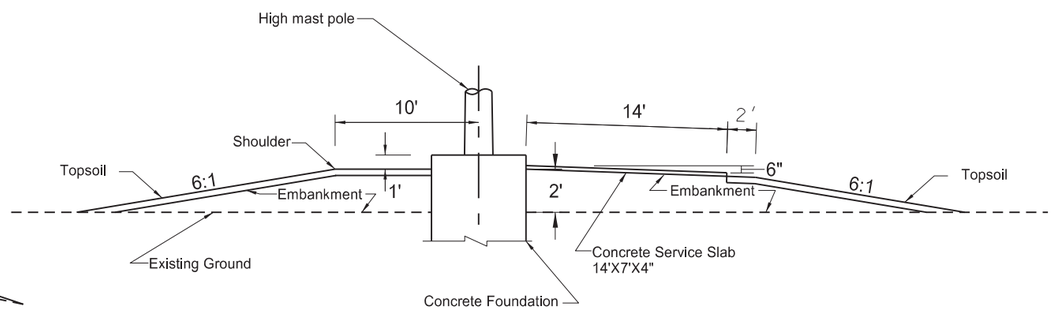
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	140	6



Plan View



Section AA
Cut Section



Section AA
Fill Section

REGISTERED PROFESSIONAL ENGINEER
CHAD ABRAHAMSON
PE-10588
DATE 2/8/2022
NORTH DAKOTA

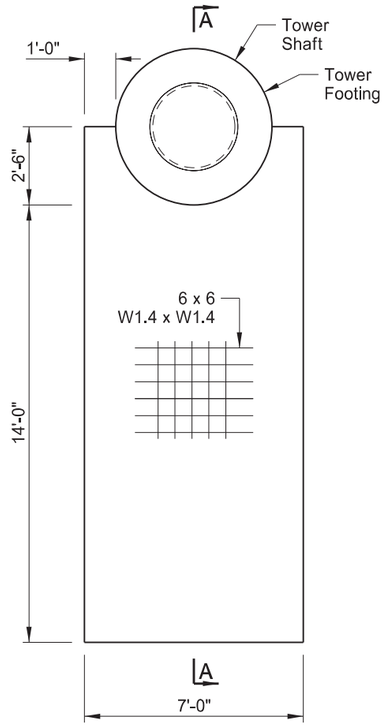
High Mast Light Site Preparation

Various High Mast Locations

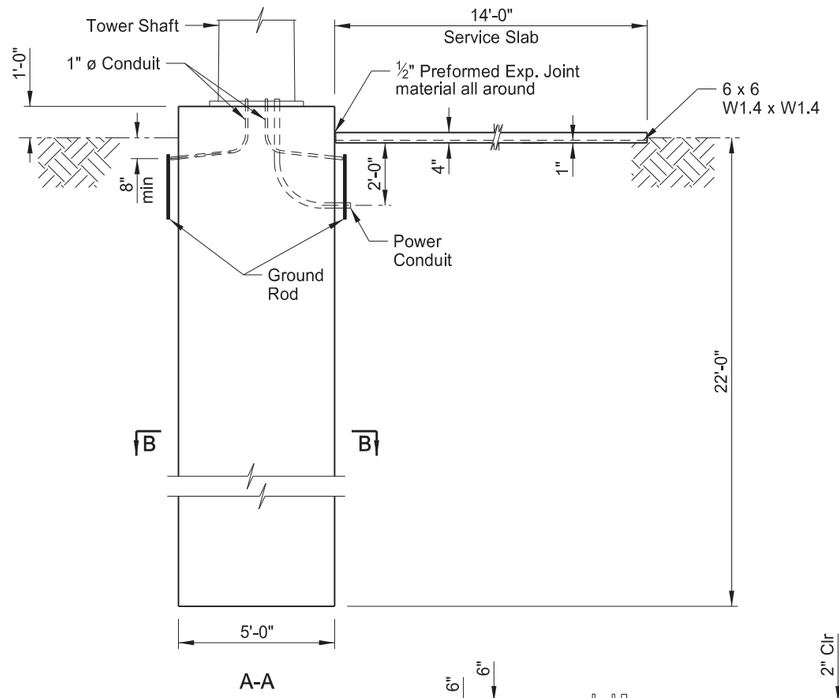
I-94 and US 85 Interchange

Belfield

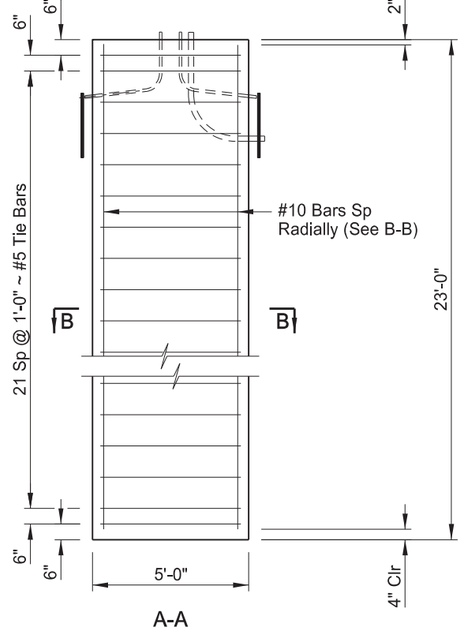
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
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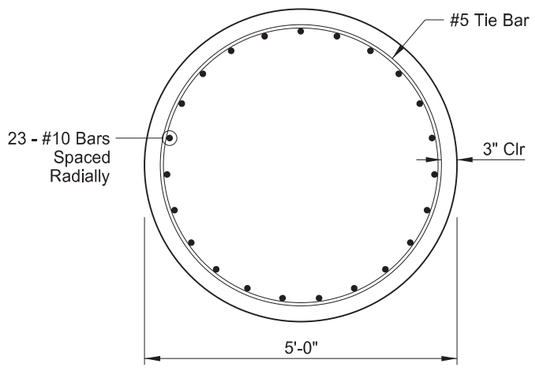
SERVICE SLAB PLAN



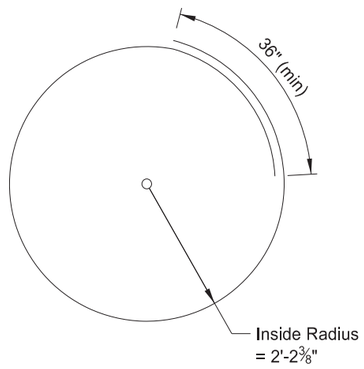
A-A



A-A



B-B



#5 TIE BAR

NOTES:

Include the concrete, reinforcing steel, wire fabric, expansion joint filler, and labor required to build the foundation and service slab in the bid item "Concrete Foundation - High Mast Lighting."

If temporary casing is required to build the shaft remove the temporary casing as the concrete is placed. Include the material and labor required for the temporary casing in the bid item "Concrete Foundation - High Mast Lighting."

If any fill is added, the embedment length will need to be 22'-0" into the existing ground from the low side and foundation must be 1'-0" above existing ground on the high side.

CLASS AE CONCRETE - HIGH MAST FOUNDATIONS: The class AE Concrete that is used will meet all requirements specified in section 602. Cast all drilled shafts continuously with no construction joints. Provide Grade 60 reinforcing steel that meets the requirements of Section 612. Include the concrete, reinforcing bars, excavation, and labor required to build the sign foundations in the pay item "Concrete Foundation - High Mast Lighting."

Estimated quantities (a 23'-0" long foundation and service slab)

Class AE-3 Concrete	16.7	CY
* Reinforcing Steel	2,969	LBS

See pole shop drawings for anchorage details.

* Includes wire fabric.

HIGH MAST LIGHT FOUNDATION
I-94 STATIONING

No.	STATION/OFFSET	POLE HEIGHT
1	2230+74 Bk - 124' Rt	140'
2	2237+69 Bk - 194' Rt	140'
3	2241+69 Bk - 189' Lt	140'
4	2247+14 Bk - 209' Rt	140'
5	2238+83 Ahd - 191' Lt	140'
6	2242+93 Ahd - 230' Rt	140'
7	2248+21 Ahd - 129' Lt	140'
8	2255+21 Ahd - 127' Lt	140'

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
770	0030	CONCRETE FOUNDATION-HIGH MAST LIGHTING	EA	8



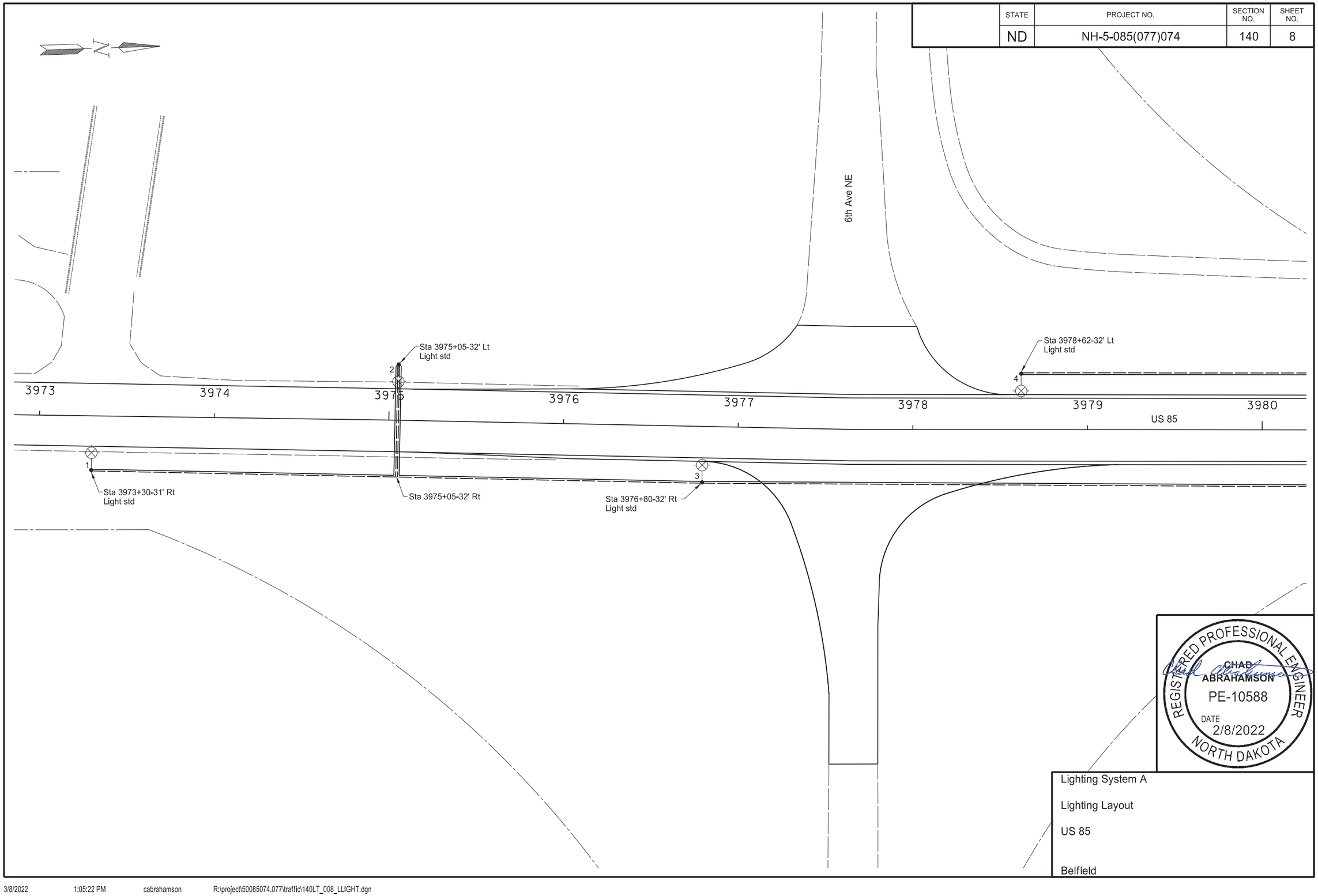
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SPECIAL PROVISIONS	
SP 565(20)	DRILLED SHAFT FOUNDATION

BNRR SEP N TO S I-94 - BELFIELD

CONCRETE FOUNDATION
HIGH MAST LIGHTING DETAILS

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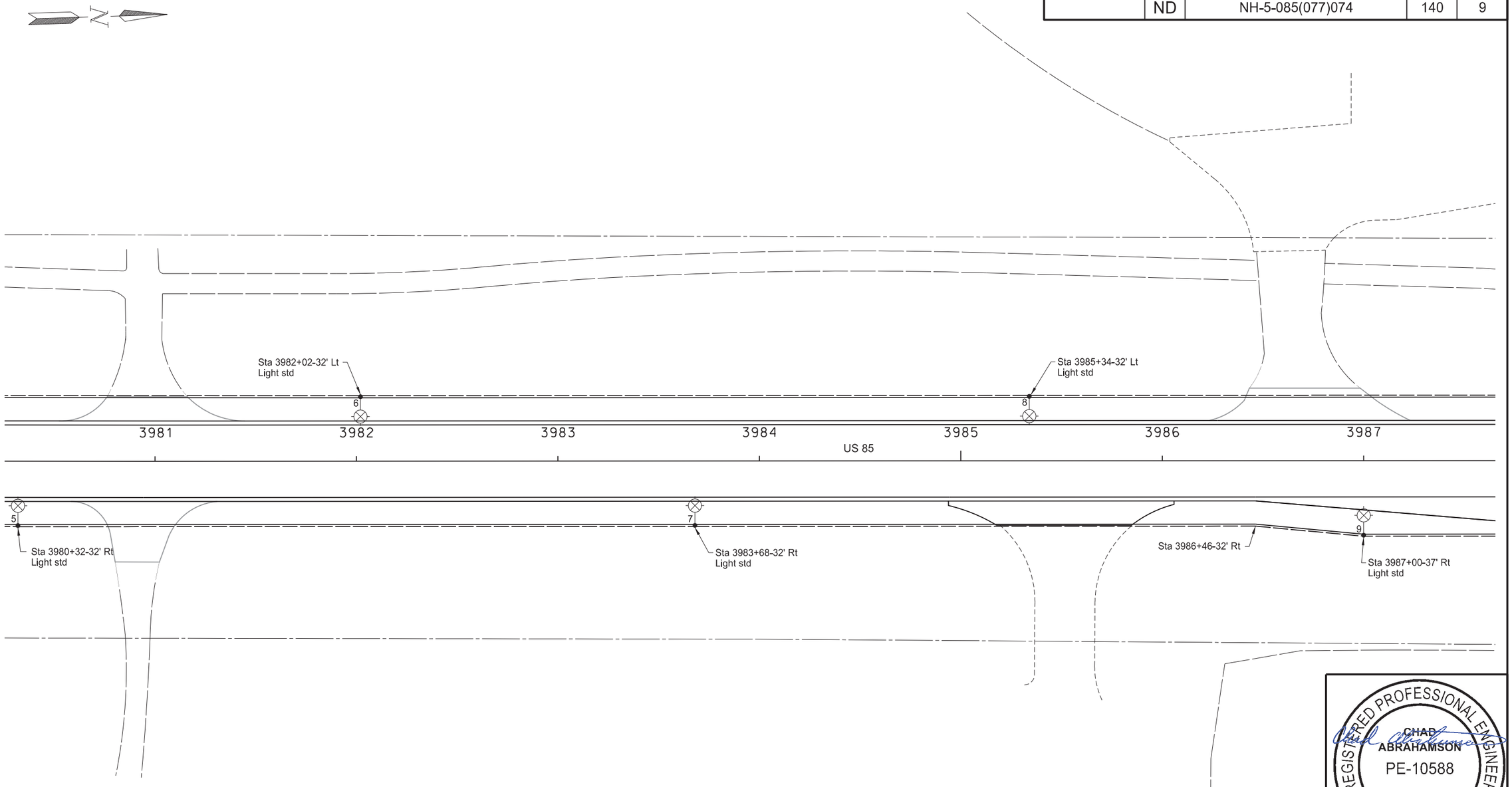
Lighting System A

Lighting Layout

US 85

Belfield

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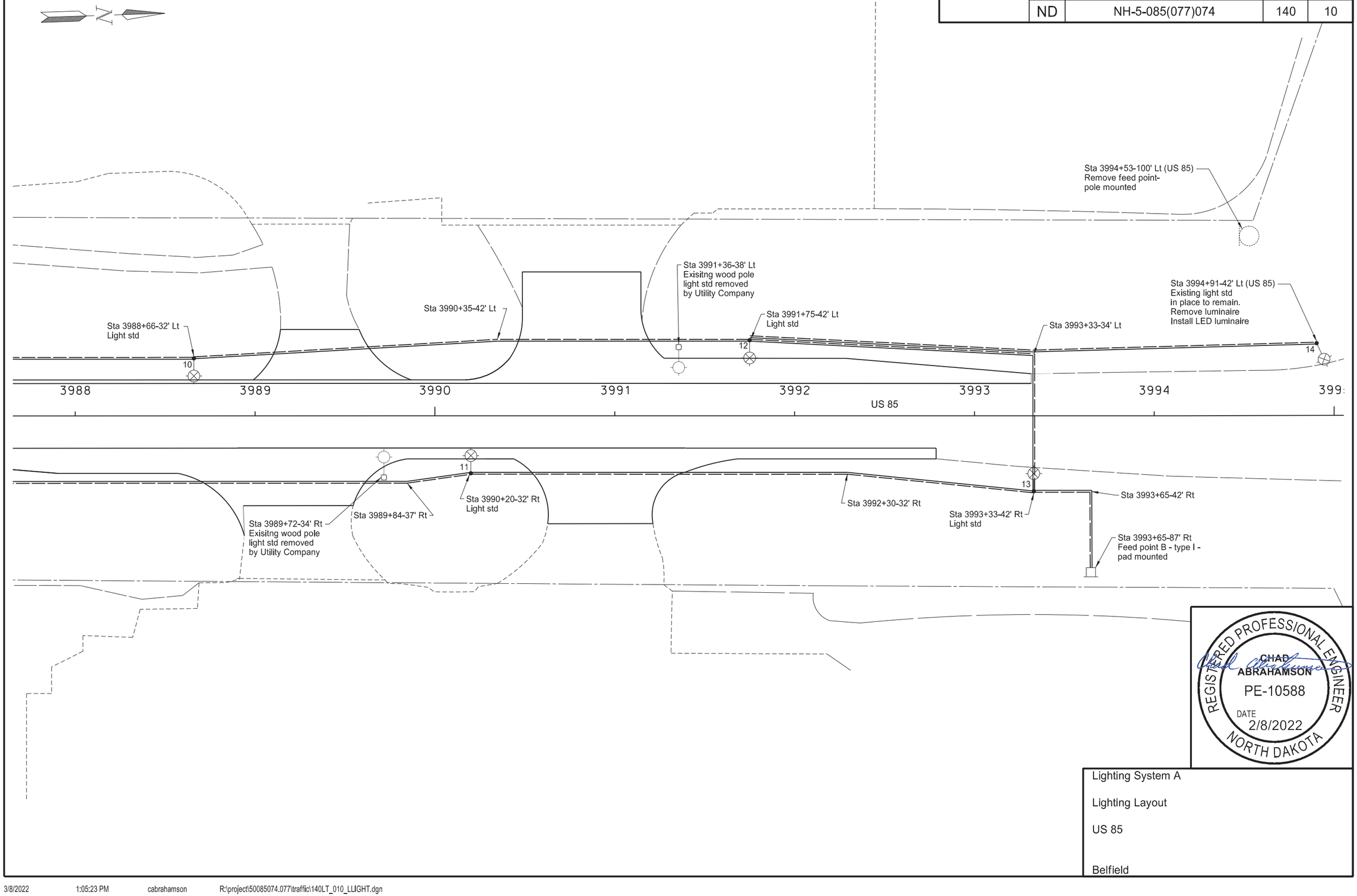
Lighting System A

Lighting Layout

US 85

Belfield

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Lighting System A

Lighting Layout

US 85

Belfield

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Light Std Number	Station	Conduit		Cable Runs	
		LF	Dia	LF	Type
1 bend 2	3973+30-31' rt to 3975+05-32' rt to 3975+05-32' lt	 174 63	 2" 2"	494 247	(2) No. 6 RHW (1) No. 6 THW
2 bend 3	3975+05-32' lt to 3975+05-32' rt to 3976+80-32' rt	 63 174	 2" 2"	494 247	(2) No. 6 RHW (1) No. 6 THW
3 5	3976+80-32' rt to 3980+32-32' rt	 351	 2"	722 361	(2) No. 6 RHW (1) No. 6 THW
5 7	3980+32-32' rt to 3983+68-32' rt	 334	 2"	688 344	(2) No. 6 RHW (1) No. 6 THW
7 bend 9	3983+68-32' rt to 3986+46-32' rt to 3987+00-37' rt	 277 54	 2" 2"	682 341	(2) No. 6 RHW (1) No. 6 THW
9 bend 11	3987+00-37' rt to 3989+84-37' rt to 3990+20-32' rt	 283 36	 2" 2"	658 329	(2) No. 6 RHW (1) No. 6 THW
11 bend 13	3990+20-32' rt to 3992+30-32' rt to 3993+33-42' rt	 209 103	 2" 2"	644 322	(2) No. 6 RHW (1) No. 6 THW
4 6	3978+62-32' lt to 3982+02-32' lt	 338	 2"	696 348	(2) No. 6 RHW (1) No. 6 THW
6 8	3982+02-32' lt to 3985+34-32' lt	 330	 2"	680 340	(2) No. 6 RHW (1) No. 6 THW
8 10	3985+34-32' lt to 3988+66-32' lt	 330	 2"	680 340	(2) No. 6 RHW (1) No. 6 THW
10 bend 12	3988+66-32' lt to 3990+35-42' lt to 3991+75-42' lt	 168 139	 2" 2"	634 317	(2) No. 6 RHW (1) No. 6 THW
12 bend 14	3991+75-42' lt to 3993+33-34' lt to 3994+91-42' lt	 158 158	 2" 2"	652 326	(2) No. 6 RHW (1) No. 6 THW
12 bend 13	3991+75-42' lt to 3993+33-34' lt to 3993+33-42' rt	 158 75	 2" 2"	486 243	(2) No. 6 RHW (1) No. 6 THW
13 bend FP	3993+33-42' rt to 3993+65-42' rt to 3993+65-87' rt	 31 44	 2" 2"	182 91	(2) No. 6 RHW (1) No. 6 THW

LIGHTING FOUNDATION TABLE		
Description	Footing Depth "D" 24" and 30" Dia	Footing Depth "D" 36" and 42" Dia
Light Standard 42' Pole	6'	5'

Lighting Quantities (A)												
Concrete Foundation - Highway Lighting	Concrete Foundation - Feed Point - Type B	2" Dia Rigid Conduit	Underground Conductor No. 6 Type RHW	Underground Conductor No. 6 Type THW	Combo Feed Point - Lighting (Type I) and Flashing Beacon - Pad Mounted	Light Std 8' MA 42' Pole Breakaway	LED Luminaire	Remove Luminaire	Remove Feed Point			Lighting System A
EA	EA	LF	LF	LF	EA	EA	EA	EA	EA			EA
13	1	3734	8392	4196	1	13	14	1	1			1

(A) Do not bid seperately but include in the item "Lighting System A".

Light Standards					
No.	Station	Circuit	Pole Ht.	Mast Arm	Luminaire Type
1	3973+30-31' rt	1	42' (B)	8'	A
2	3975+05-32' lt	1	42' (B)	8'	A
3	3976+80-32' rt	1	42' (B)	8'	A
4	3978+62-32' lt	1	42' (B)	8'	A
5	3980+32-32' rt	1	42' (B)	8'	A
6	3982+02-32' lt	1	42' (B)	8'	A
7	3983+68-32' rt	1	42' (B)	8'	A
8	3985+34-32' lt	1	42' (B)	8'	A
9	3987+00-37' rt	1	42' (B)	8'	A
10	3988+66-32' lt	1	42' (B)	8'	A
11	3990+20-32' rt	1	42' (B)	8'	A
12	3991+75-42' lt	1	42' (B)	8'	B
13	3993+33-42' rt	1	42' (B)	8'	B
14	3994+91-42' lt	1	Existing	Existing	B

(B) Breakaway

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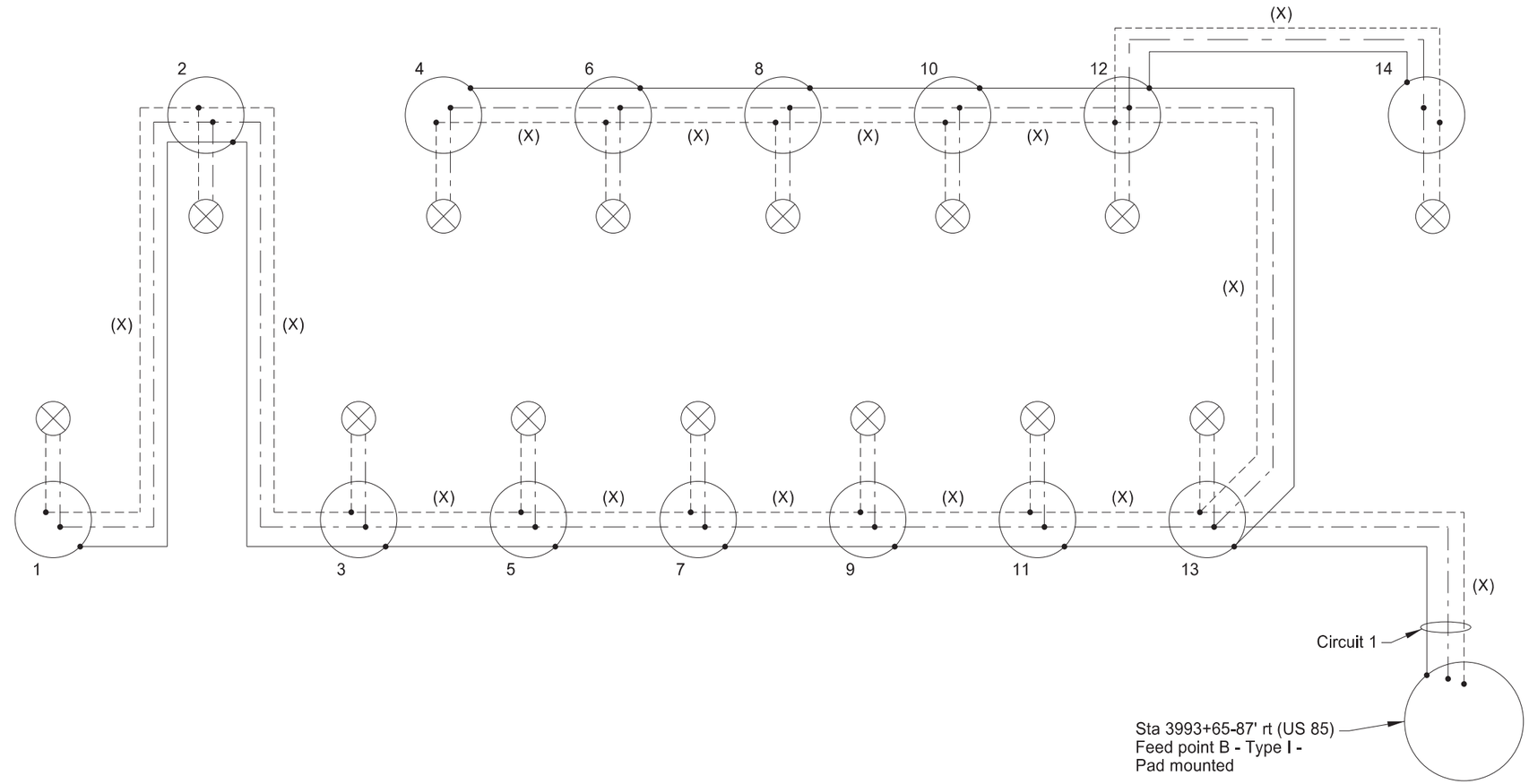
Lighting System A

Conduit, Cable Runs and Quantities
Light Standards

US 85

Belfield

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LEGEND

Phase conductor	
Phase conductor	
Ground conductor	
(X)	Underground Conductor (2) No. 6 RHW, (1) No. 6 THW
	LED luminaire 120v x 240v operated on 240v
	Light standard
9	Light standard number

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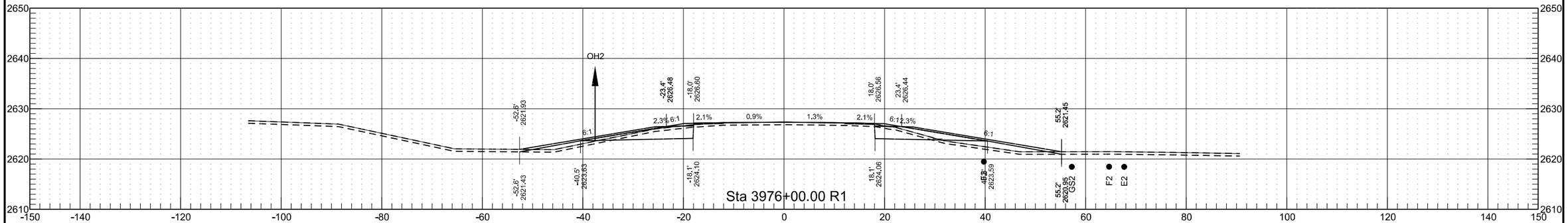
Lighting System A

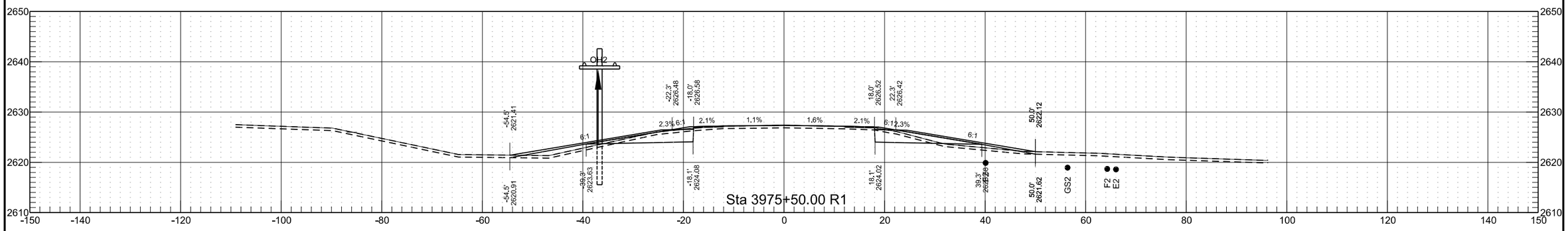
Lighting Schematic
Feed Point B

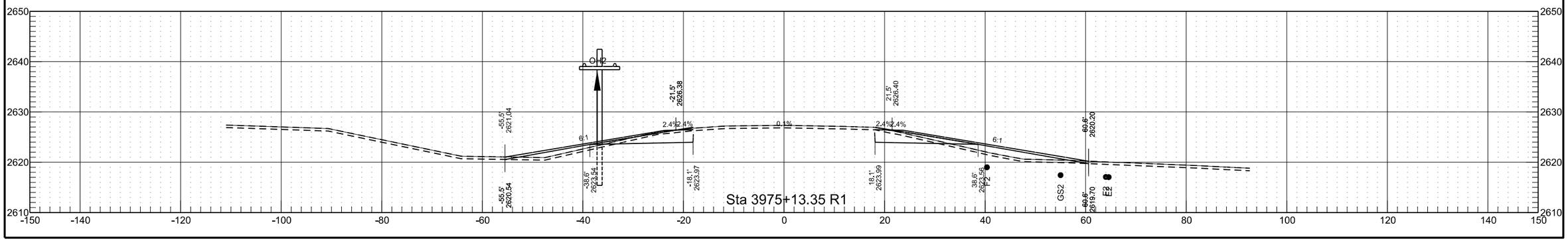
US 85

Belfield

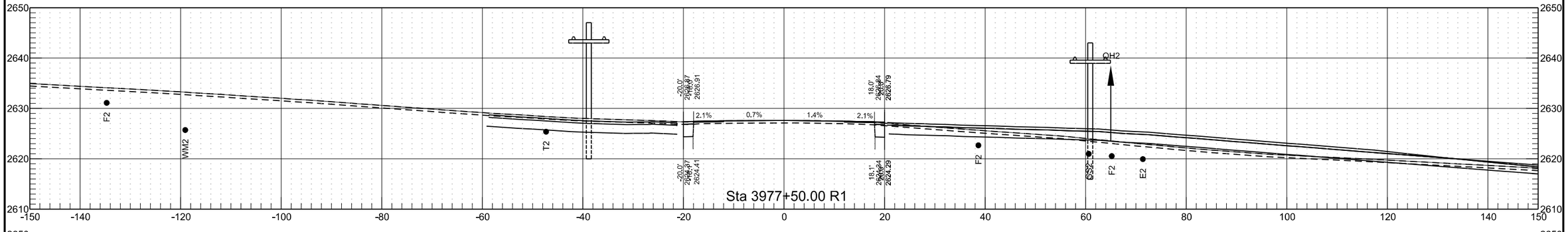
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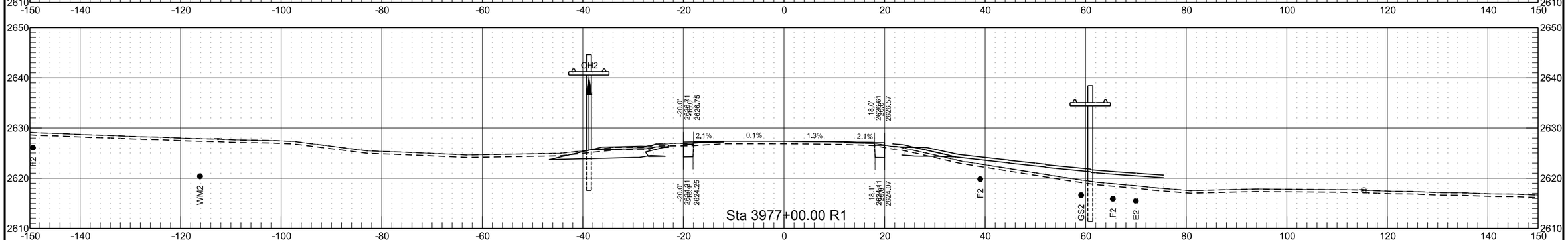


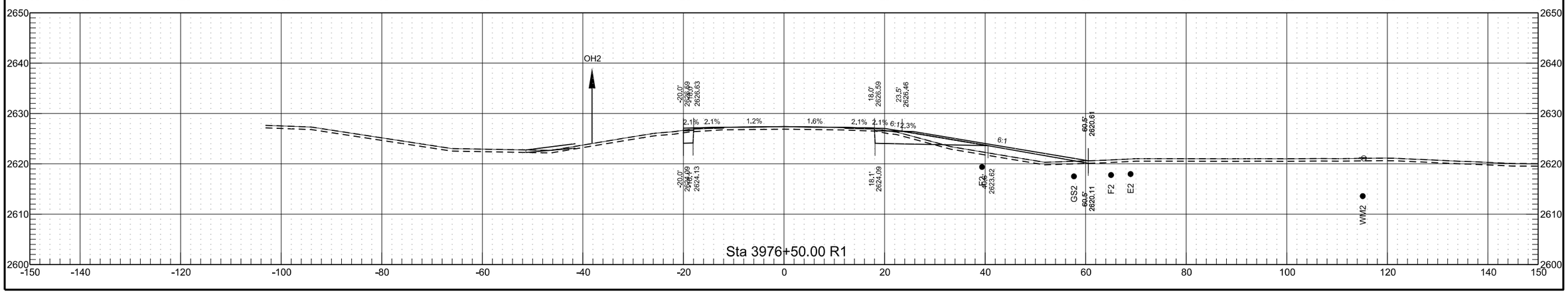




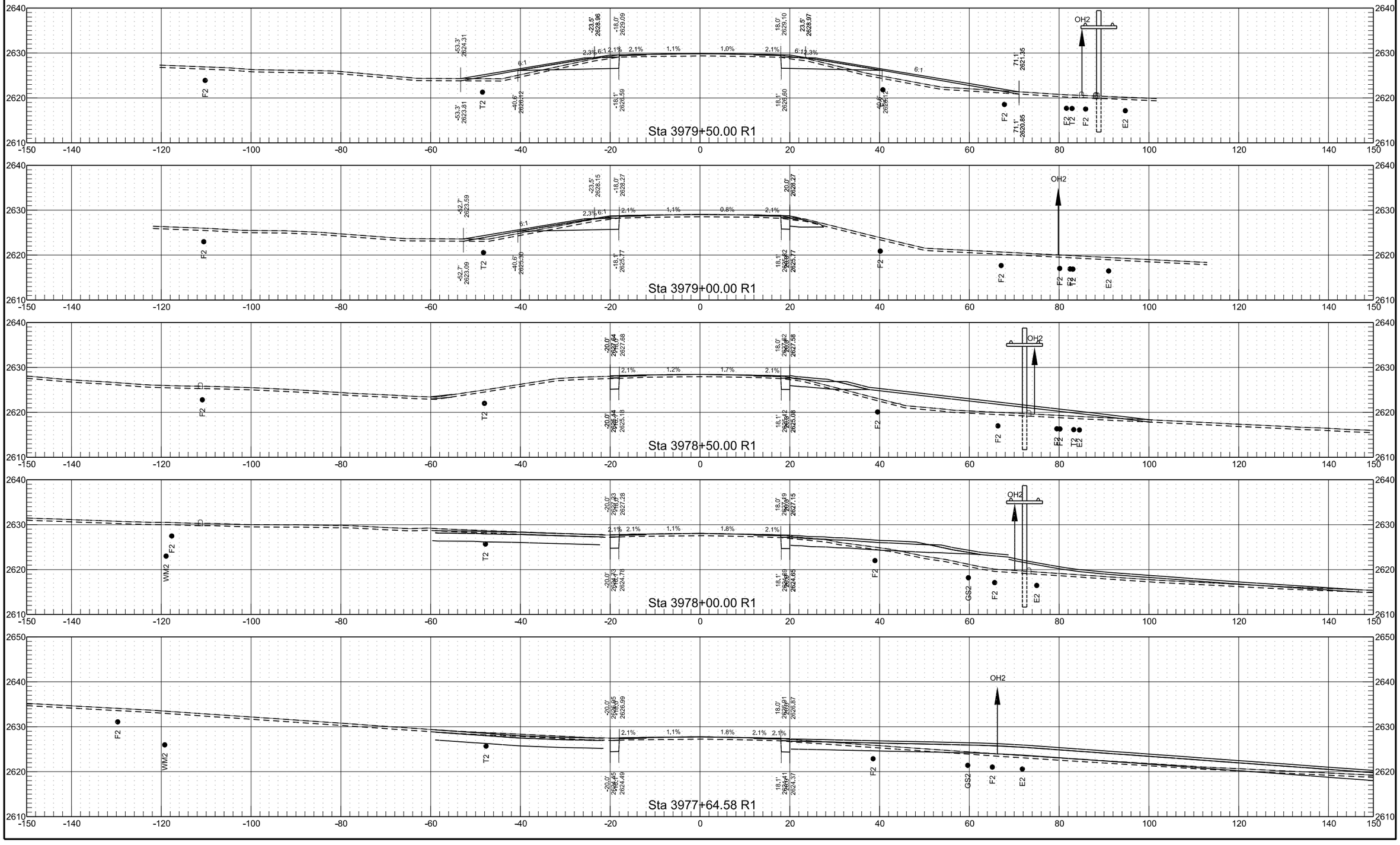
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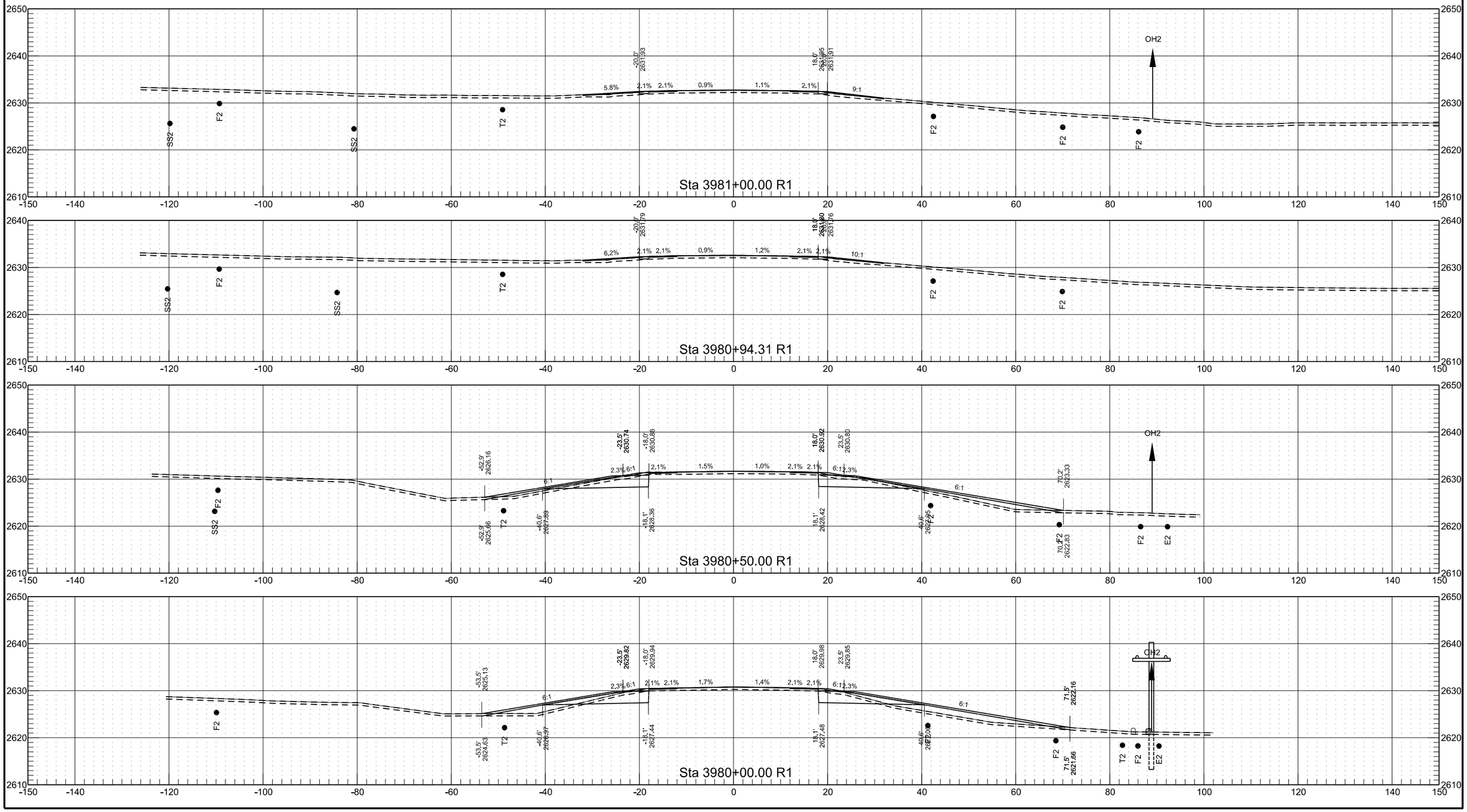




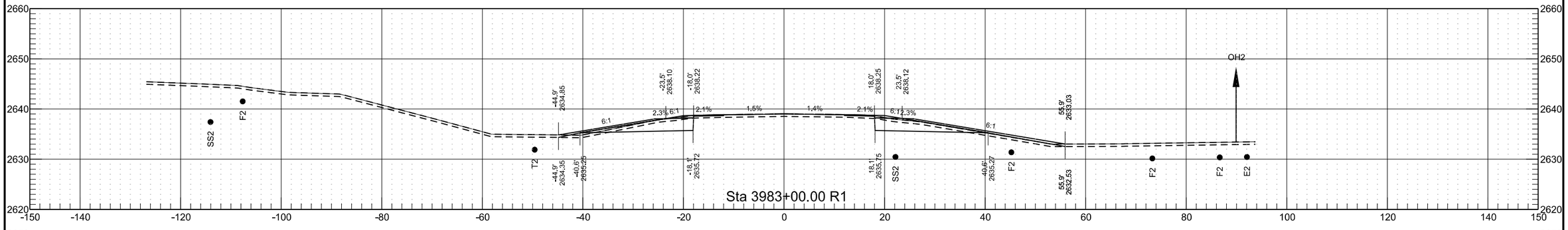
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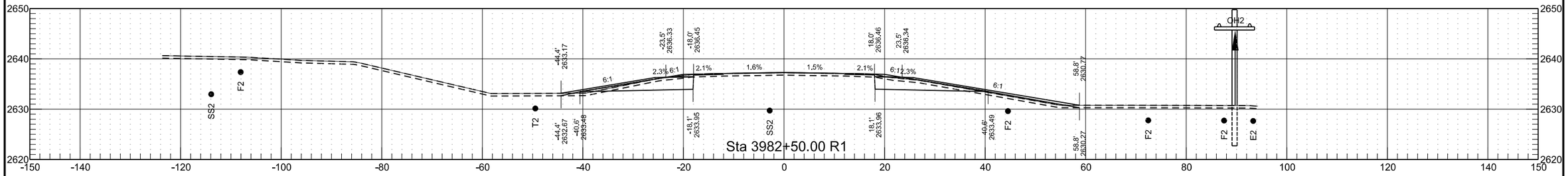


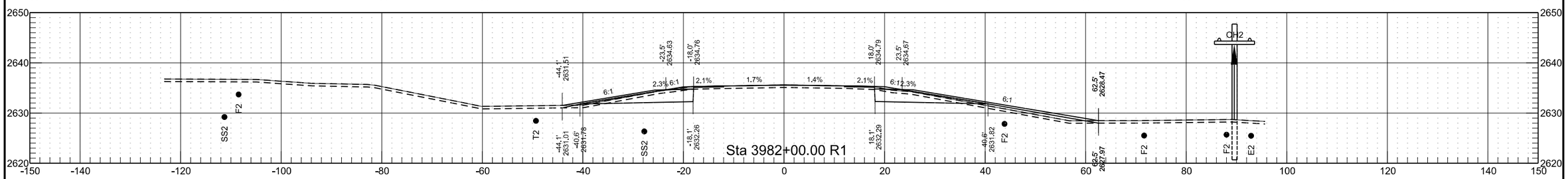
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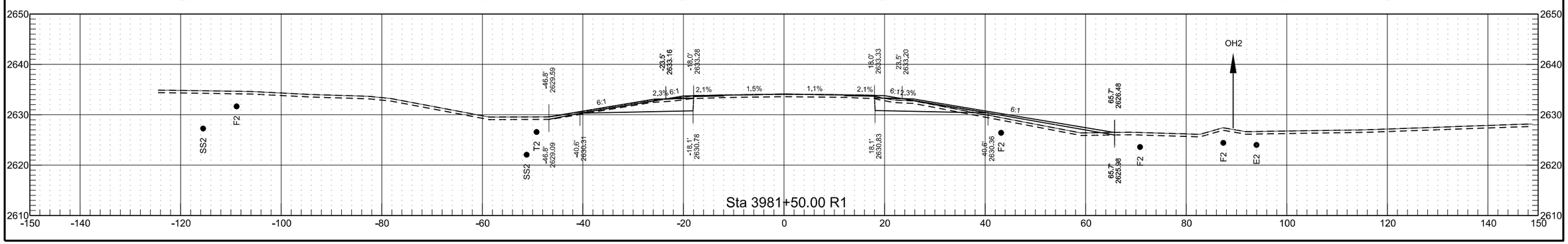


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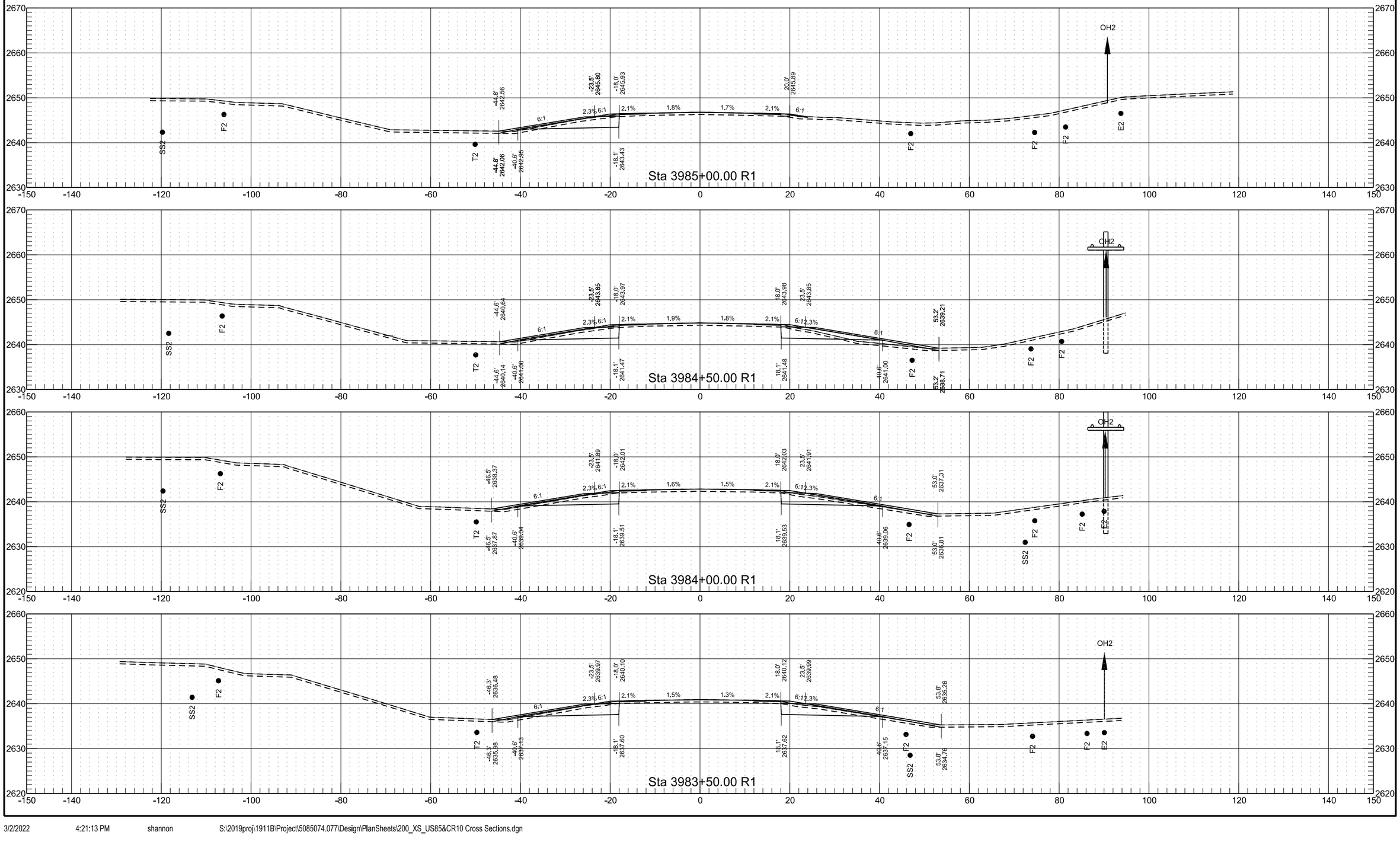




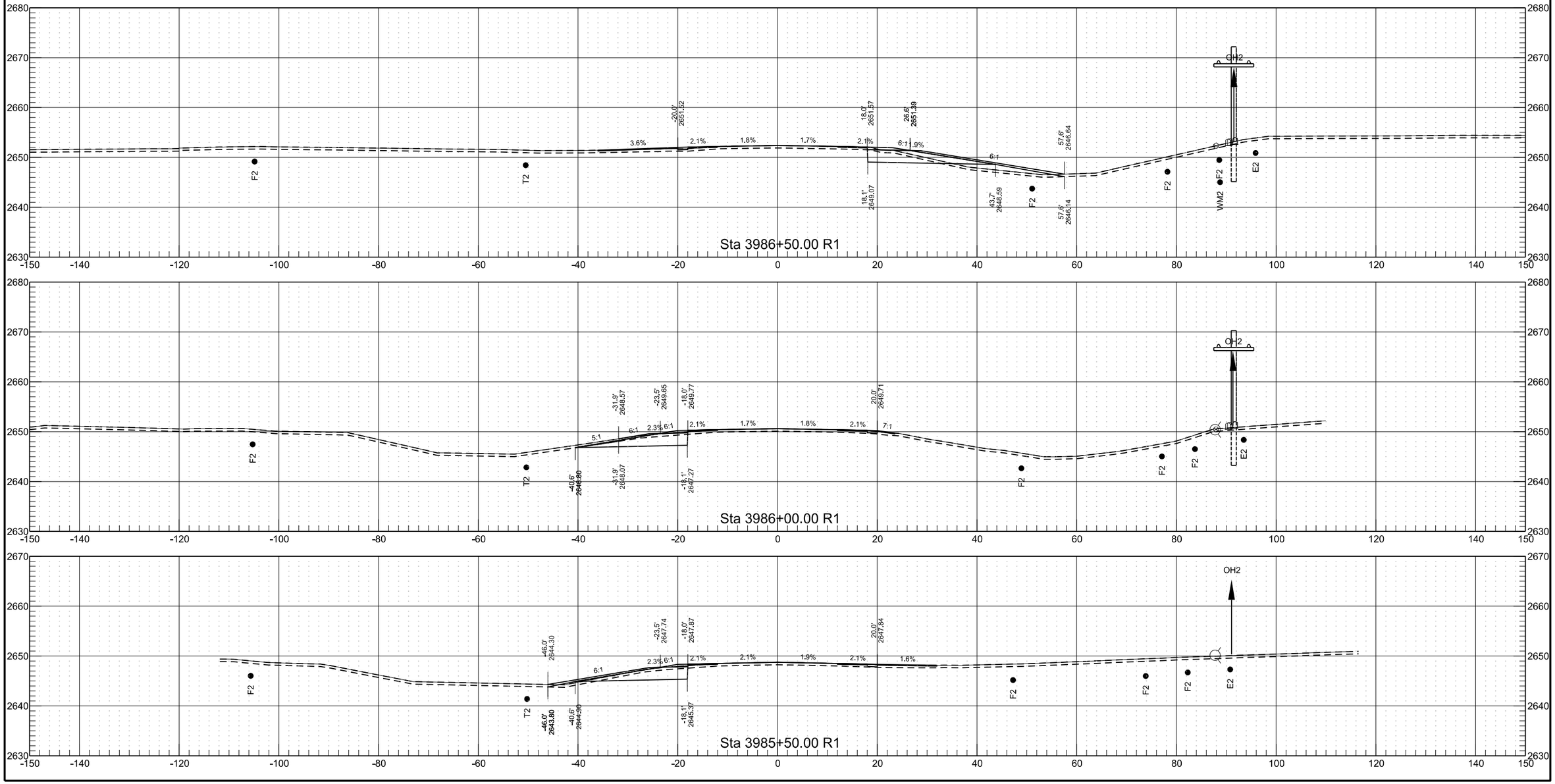




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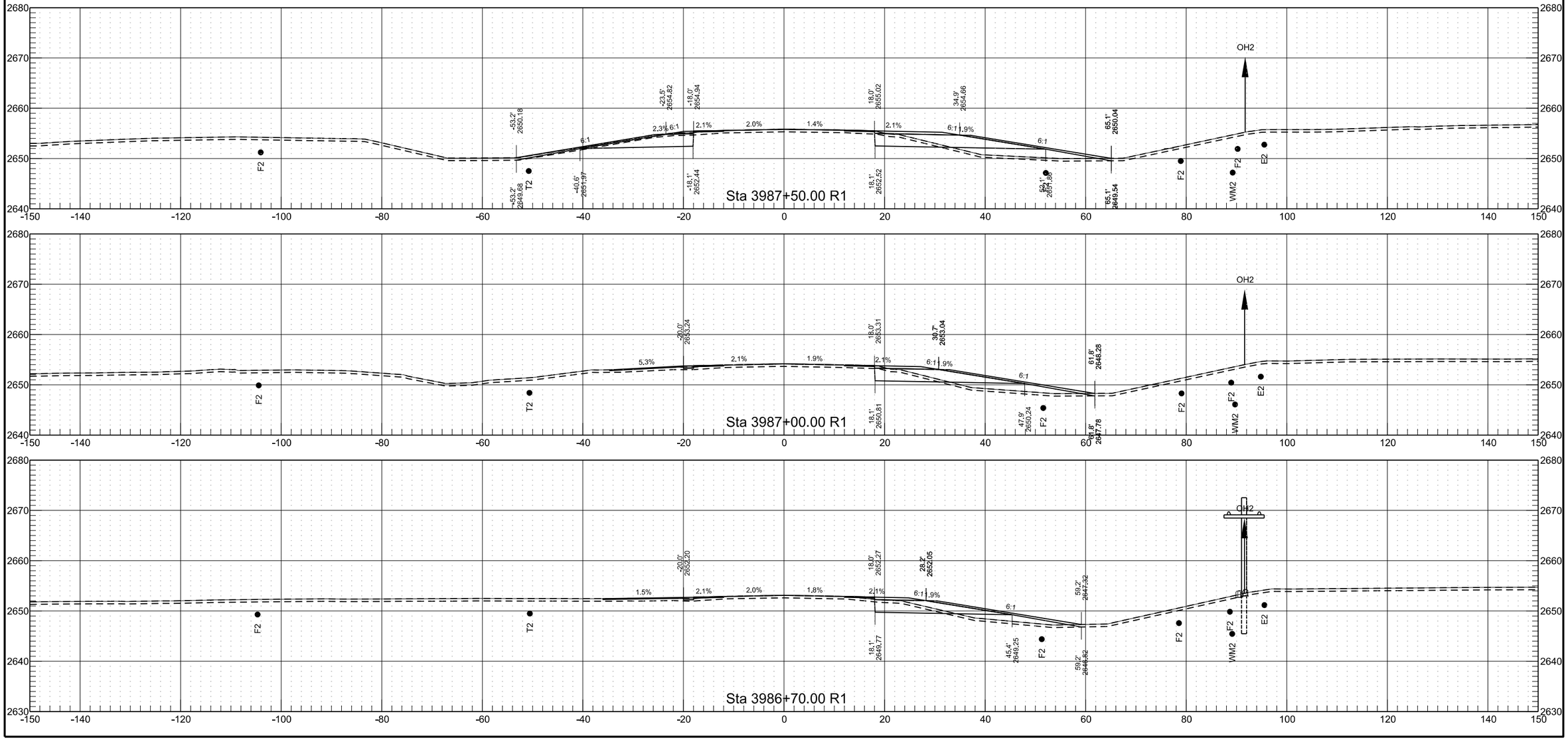


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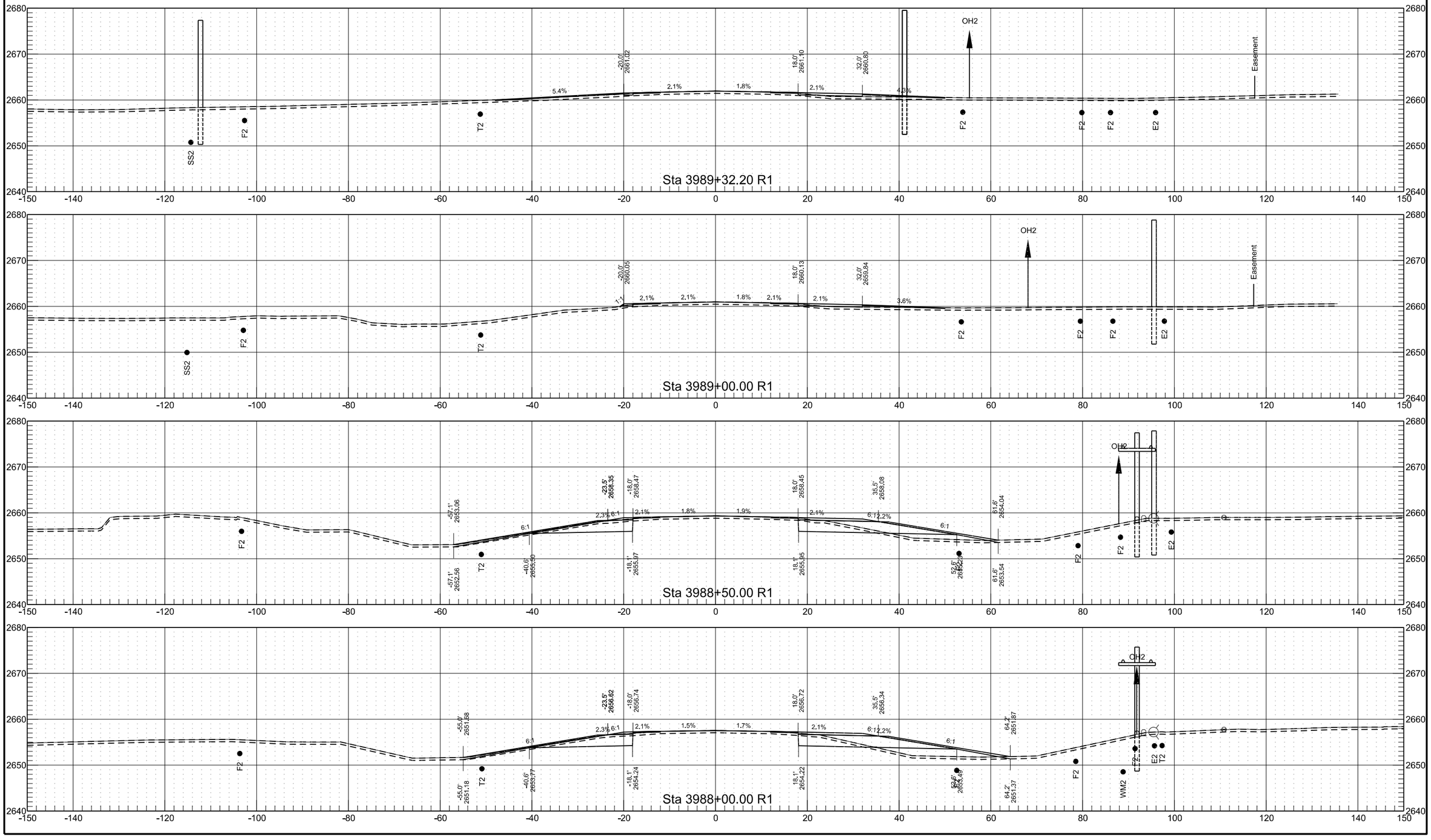


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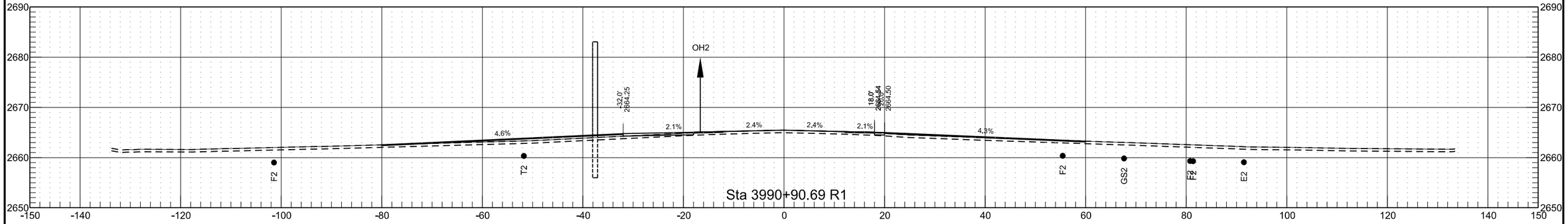
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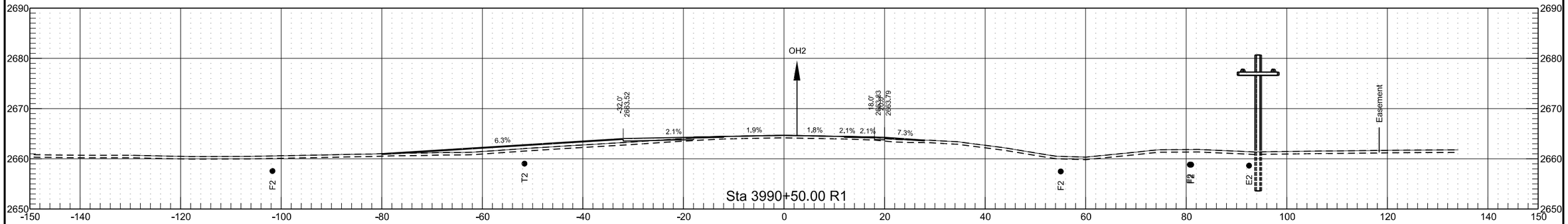


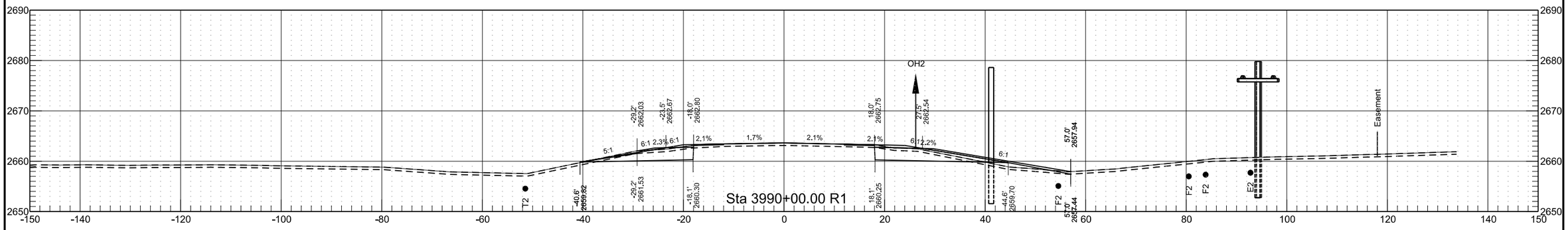
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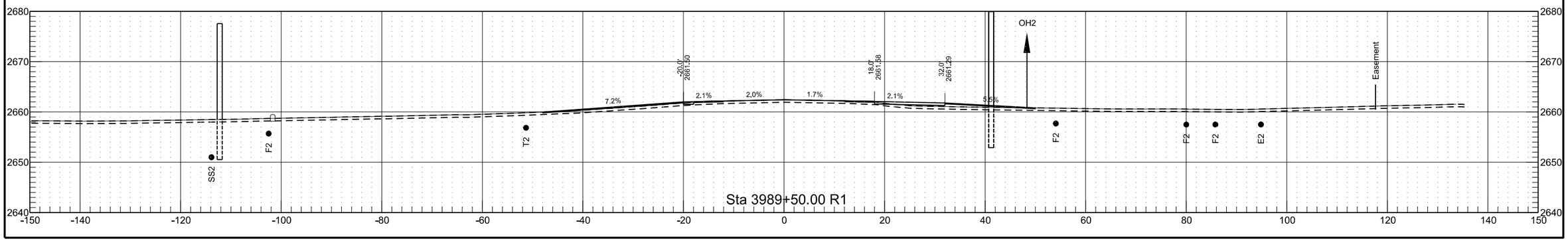


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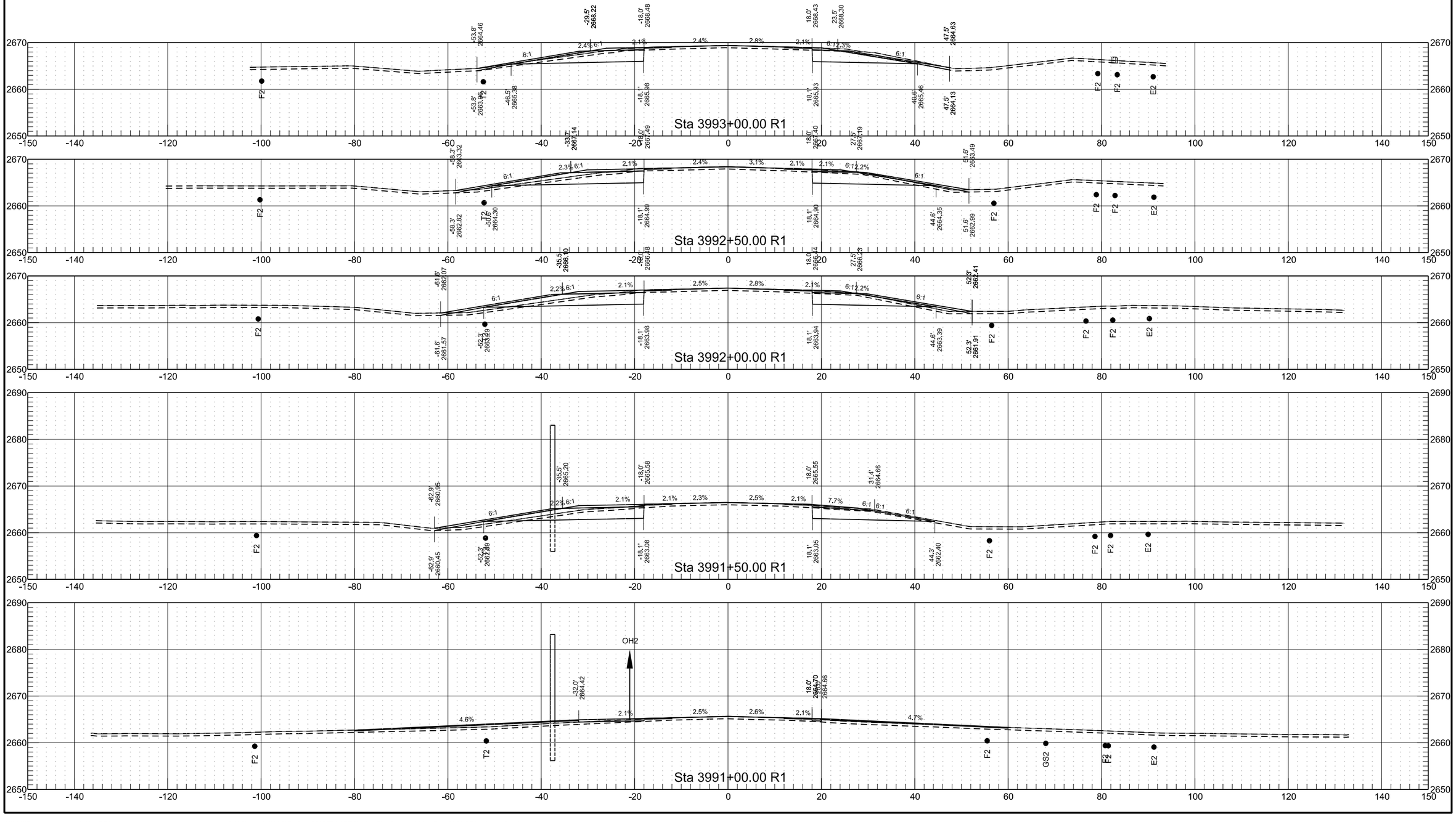




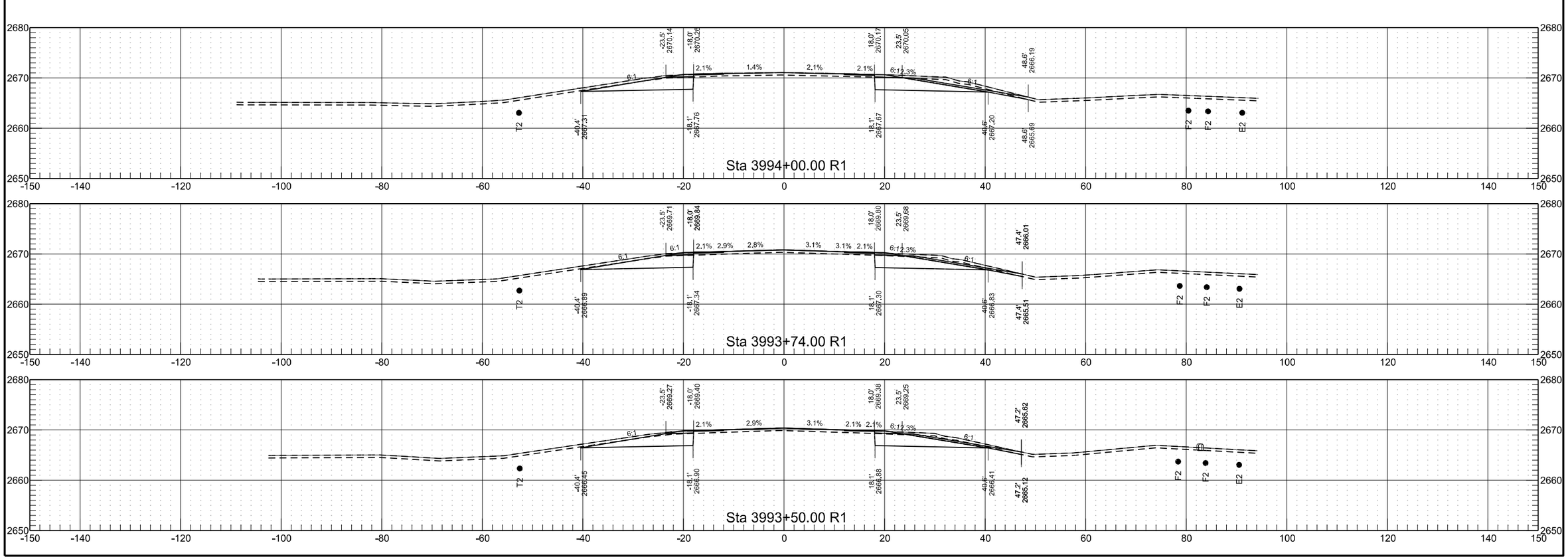




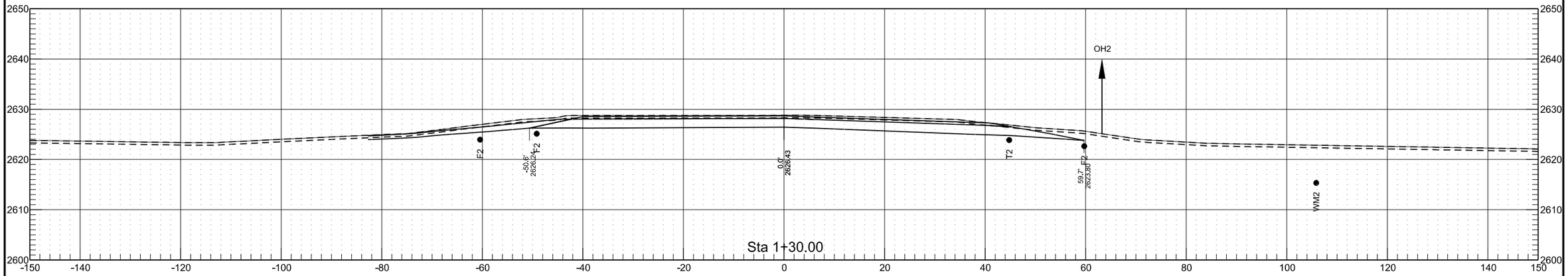
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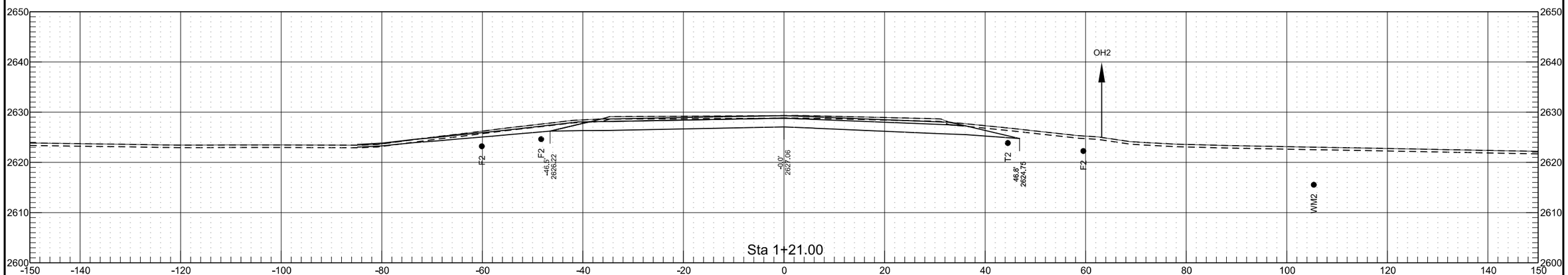


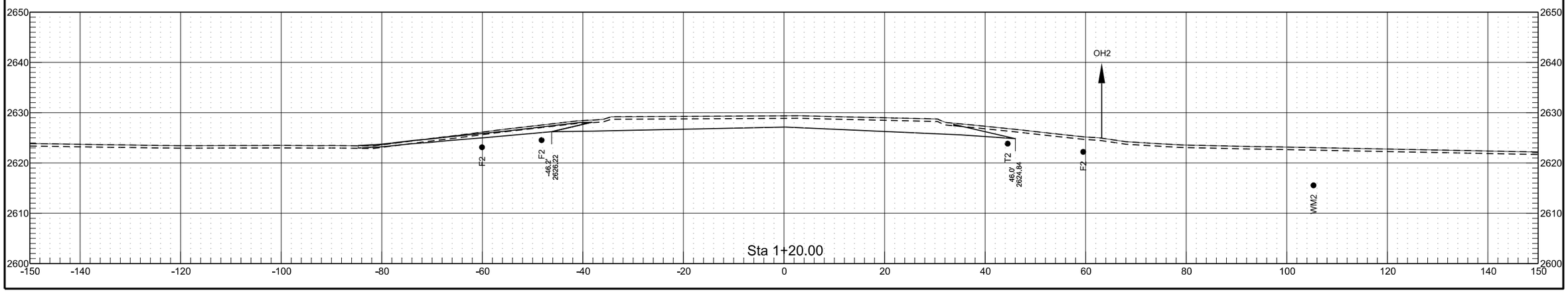
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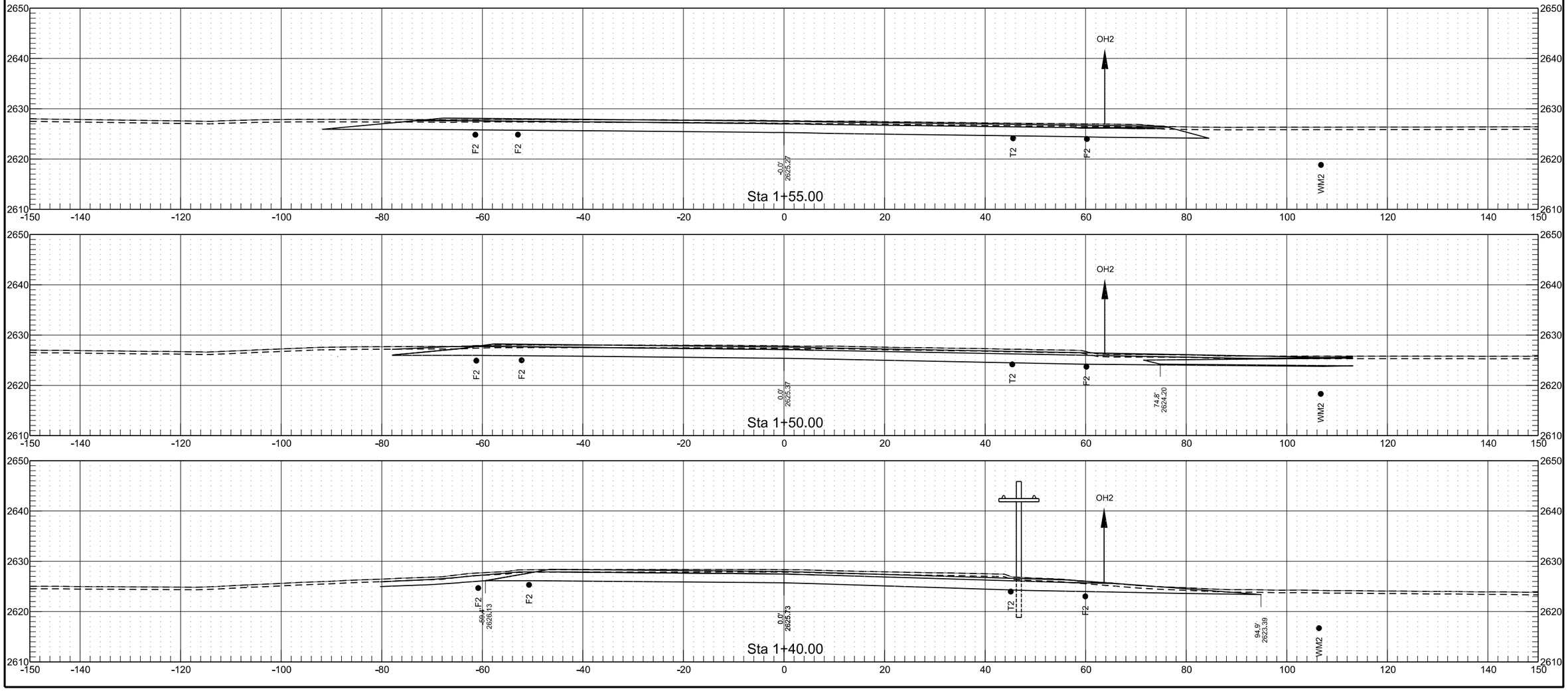
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	14



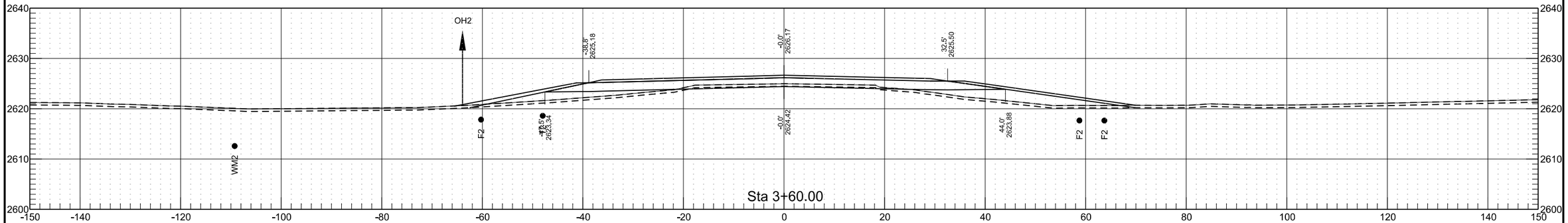
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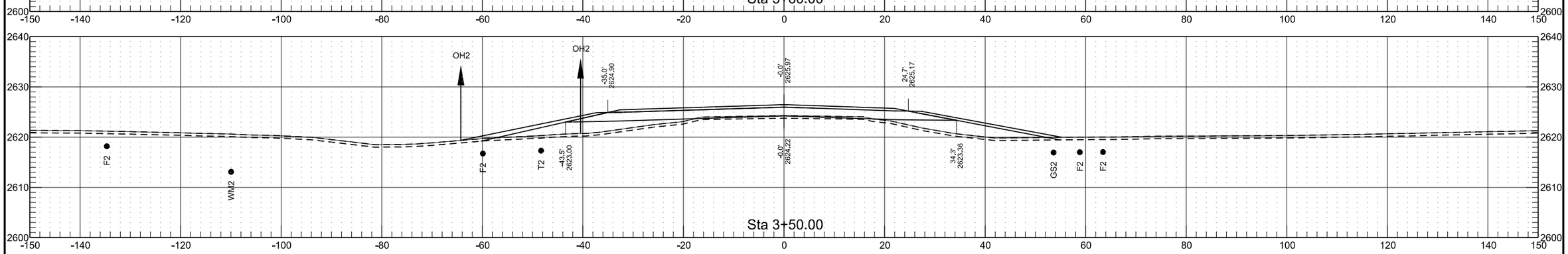
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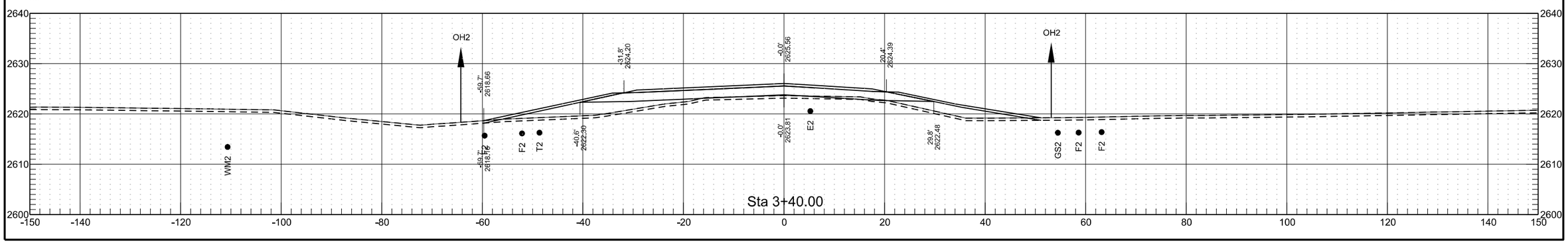
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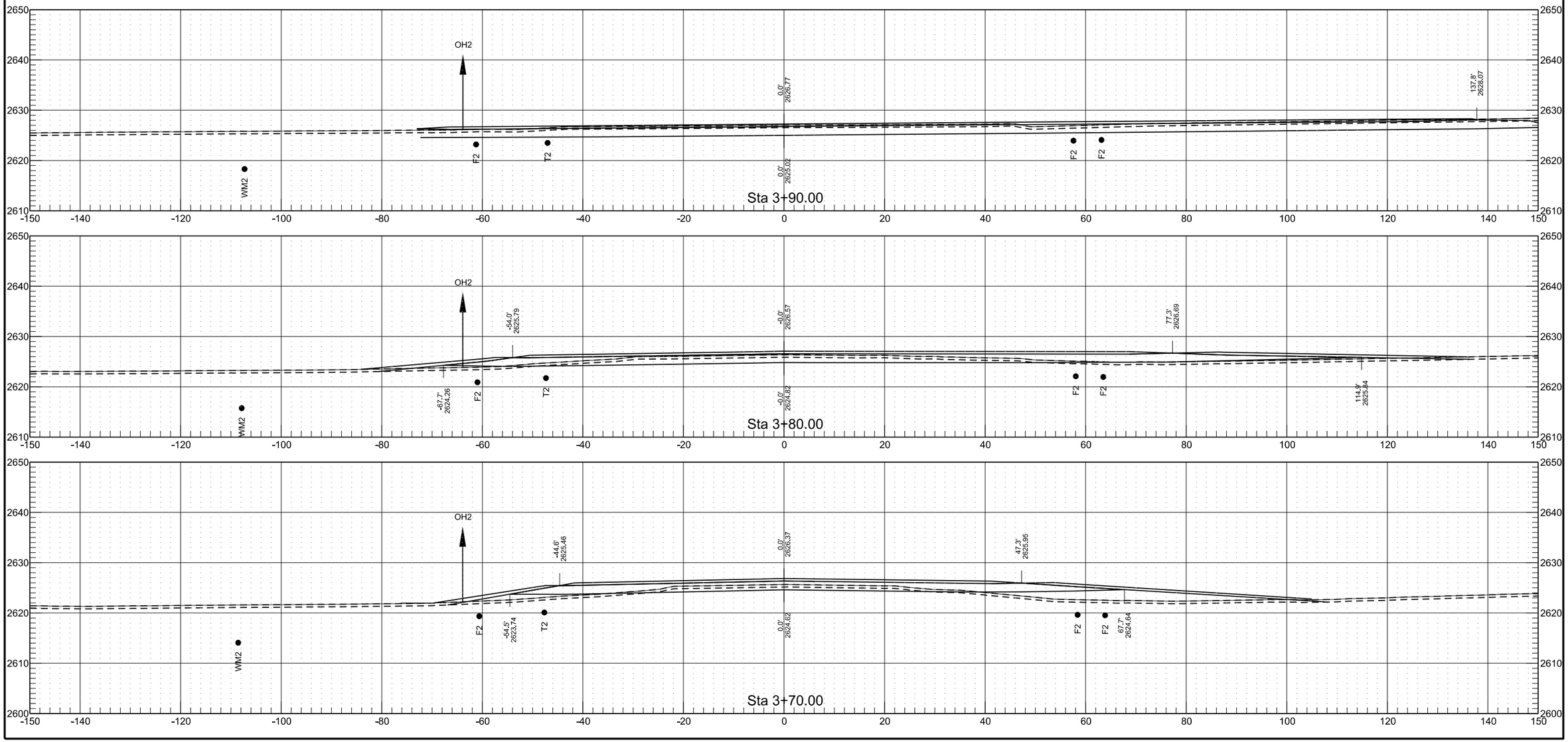
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	ND	NH-5-085(077)074	200	18



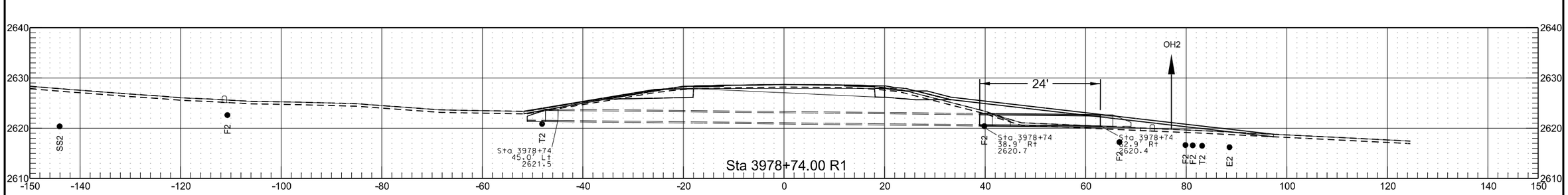




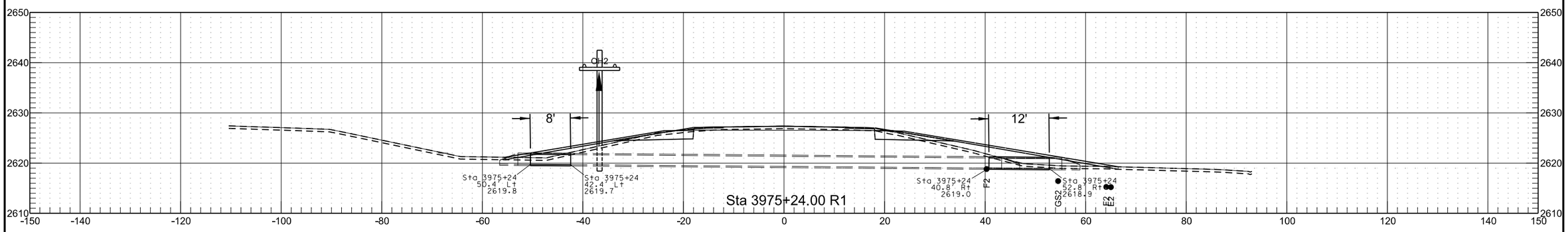
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	ND	NH-5-085(077)074	200	19



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	20



Install 24" x 24' Conduit RT
Install (2) 24" Flared End Sections LT & RT

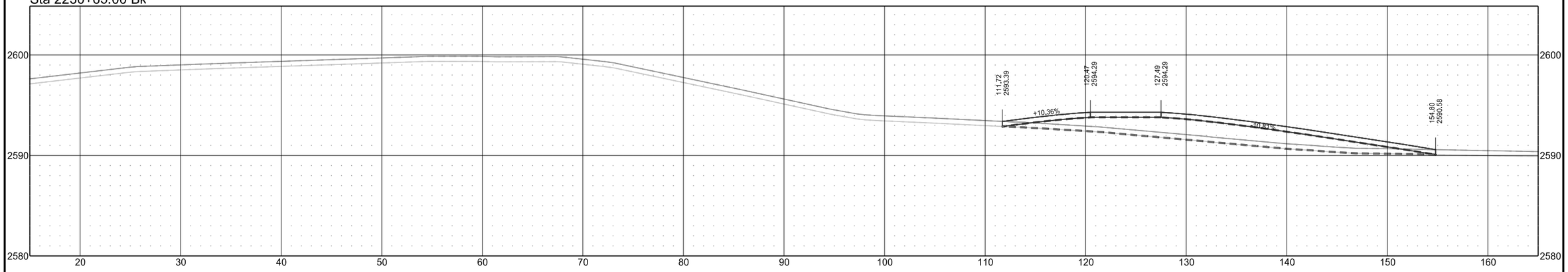


Install 24" x 8' Conduit LT
Install 24" x 12' Conduit RT
Remove & Reset
2 Flared End Sections

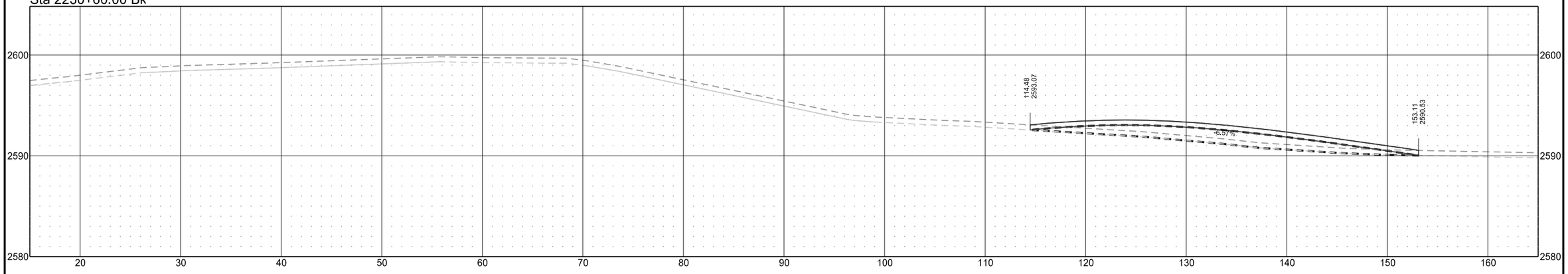
High Mast Light #1

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	ND	NH-5-085(077)074	200	21

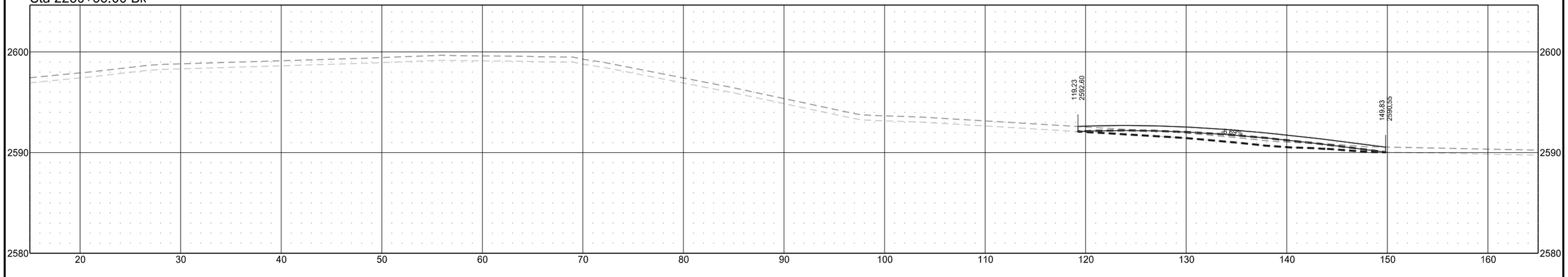
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Sta 2230+60.00 Bk



Sta 2230+55.00 Bk

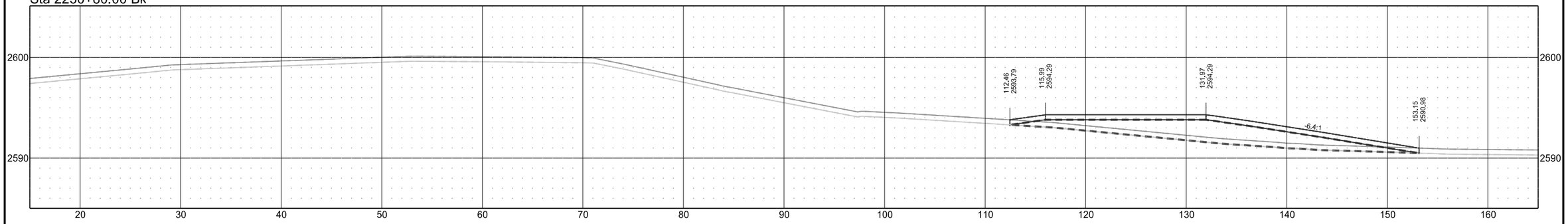


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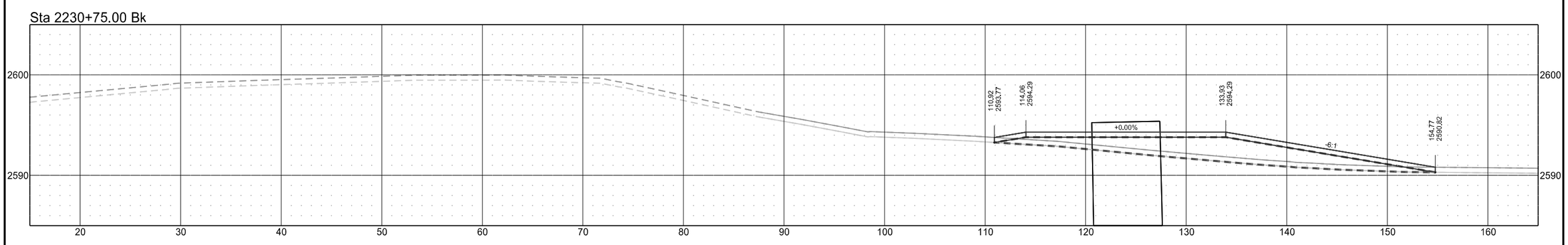
High Mast Light #1

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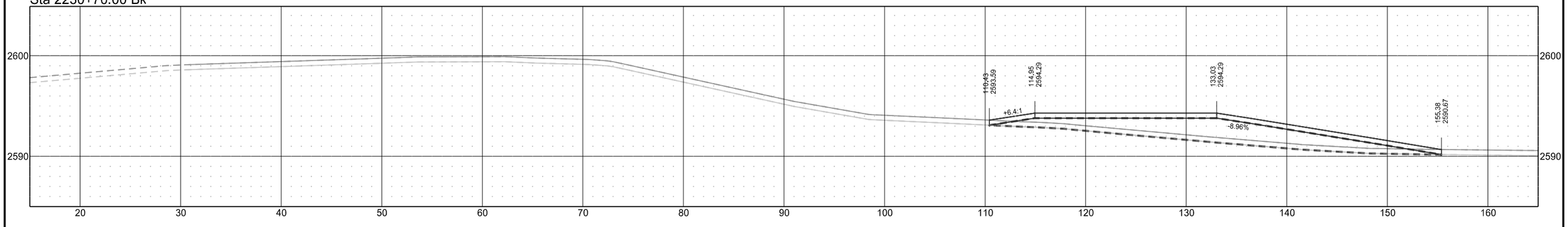
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Sta 2230+70.00 Bk

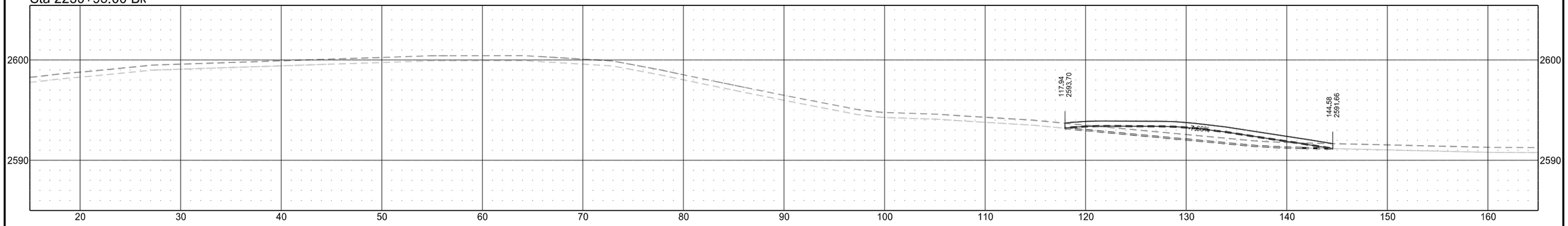


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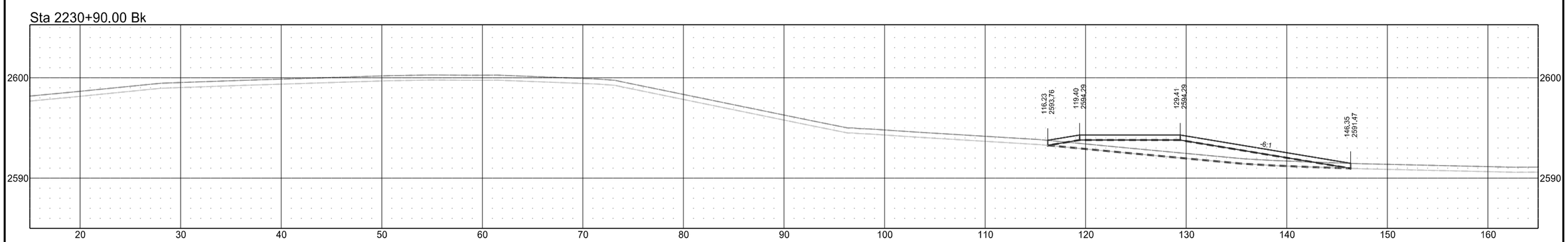
High Mast Light #1

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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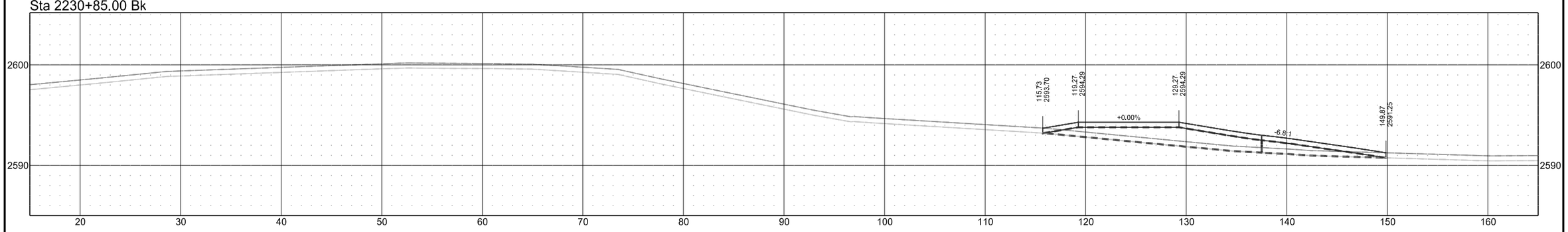
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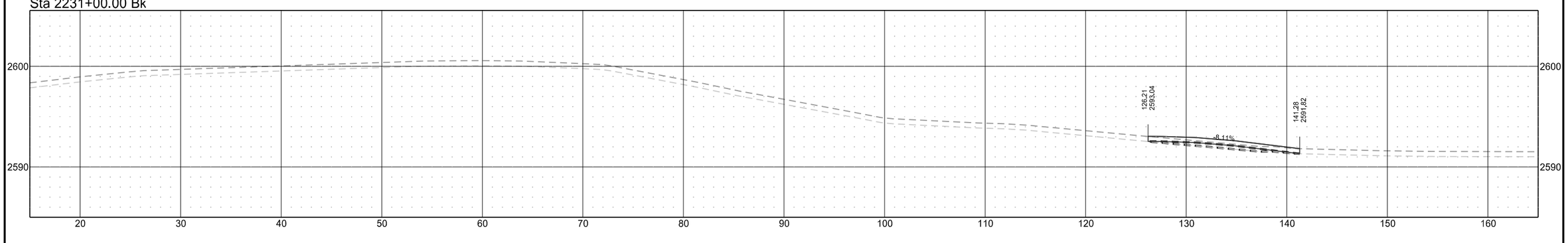
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High Mast Light #1

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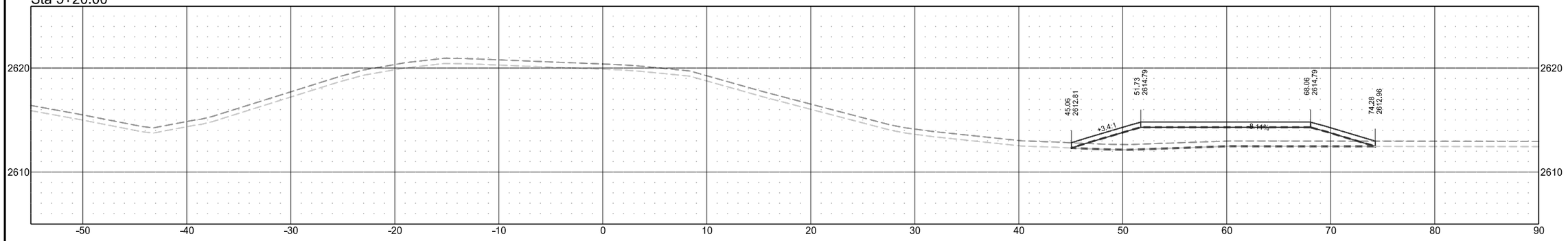
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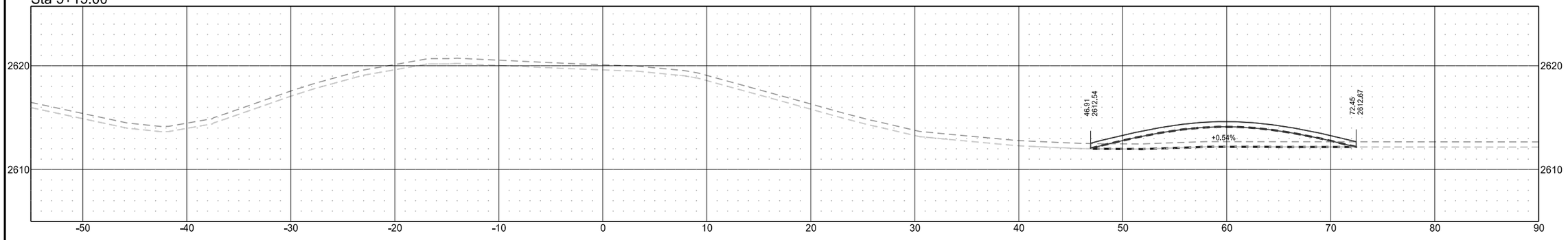
High Mast Light #2

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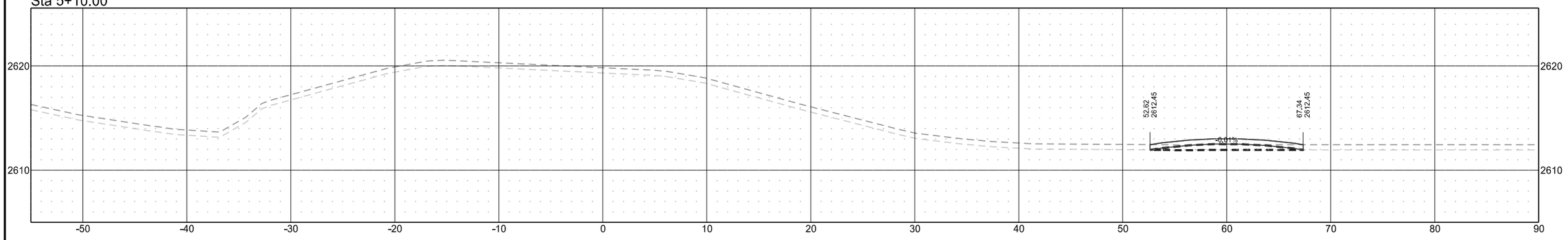
Sta 5+20.00



Sta 5+15.00



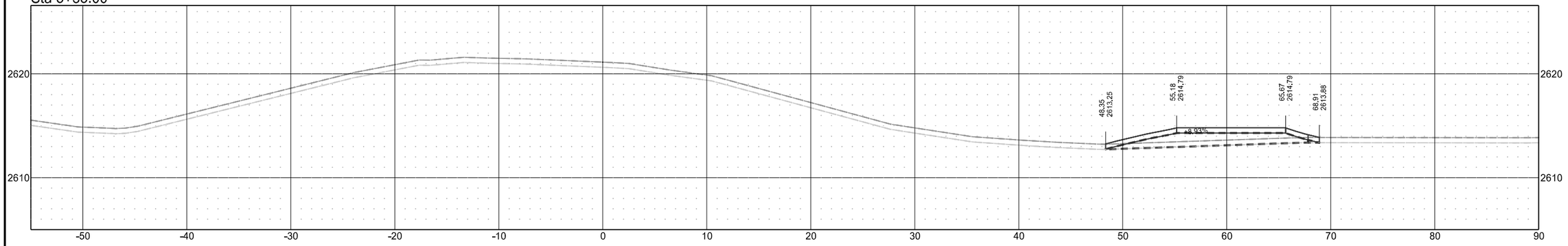
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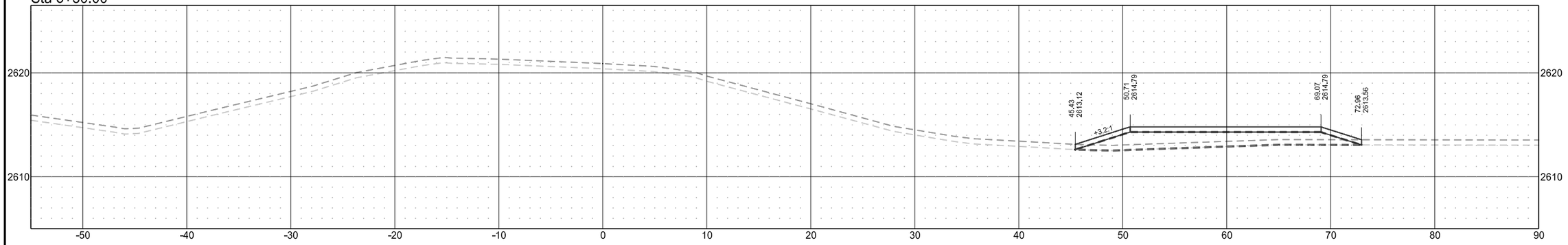
High Mast Light #2

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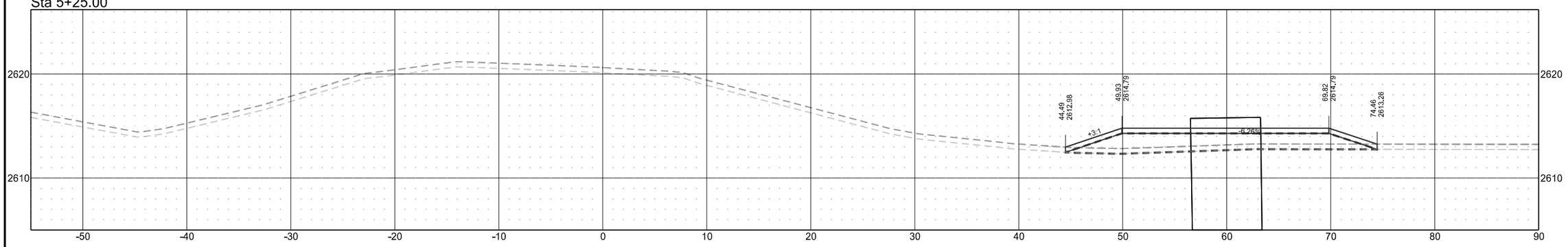
Sta 5+35.00



Sta 5+30.00



Sta 5+25.00

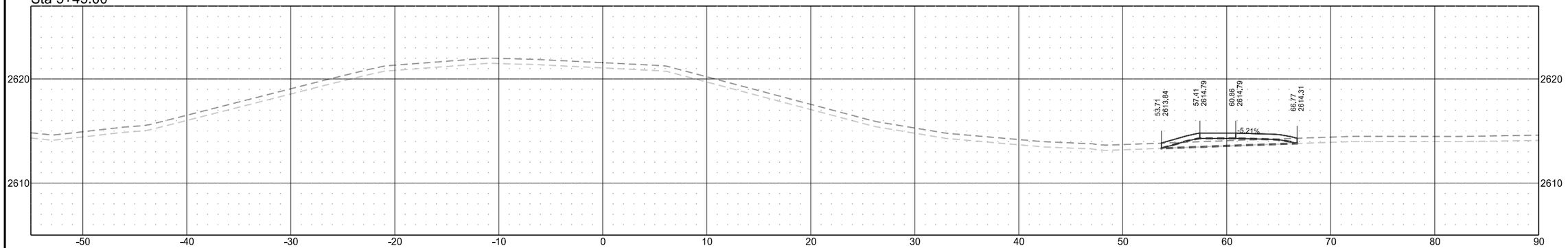


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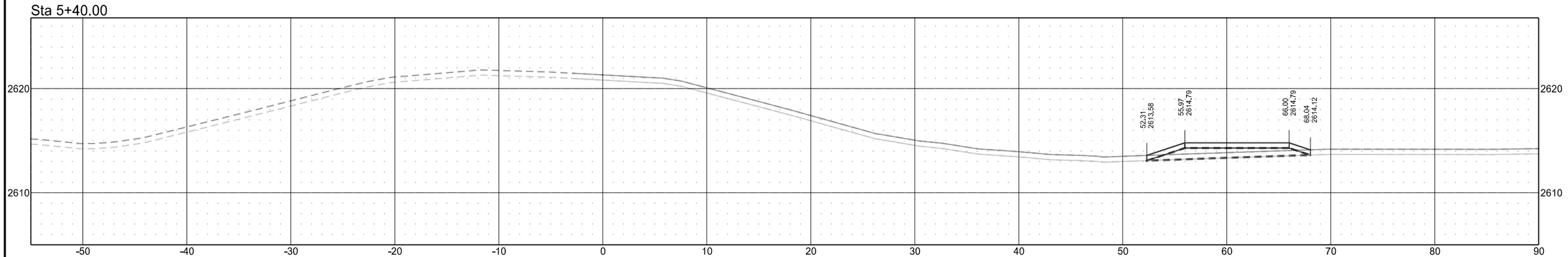
High Mast Light #2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Sta 5+45.00



Sta 5+40.00

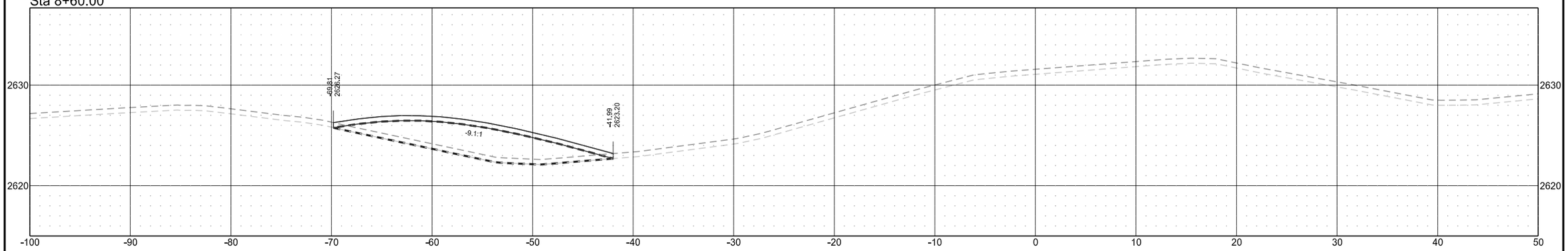


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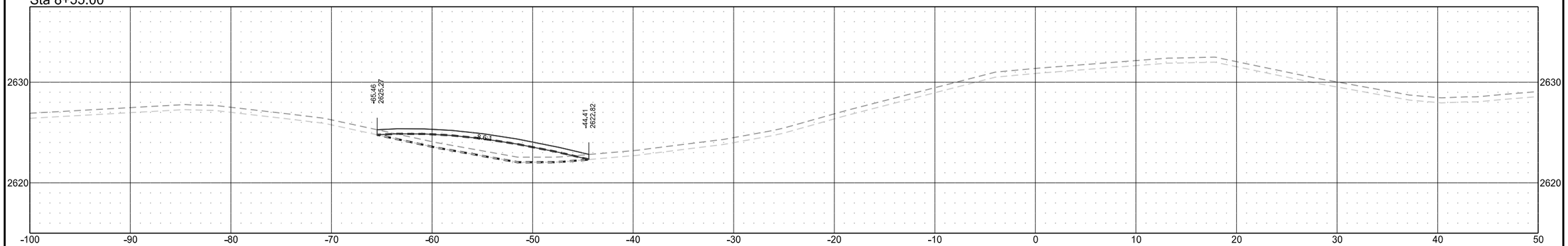
High Mast Light #3

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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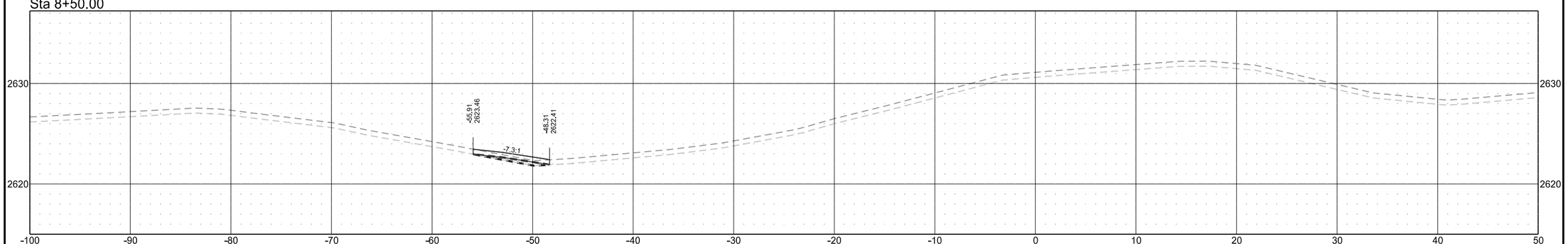
Sta 8+60.00



Sta 8+55.00



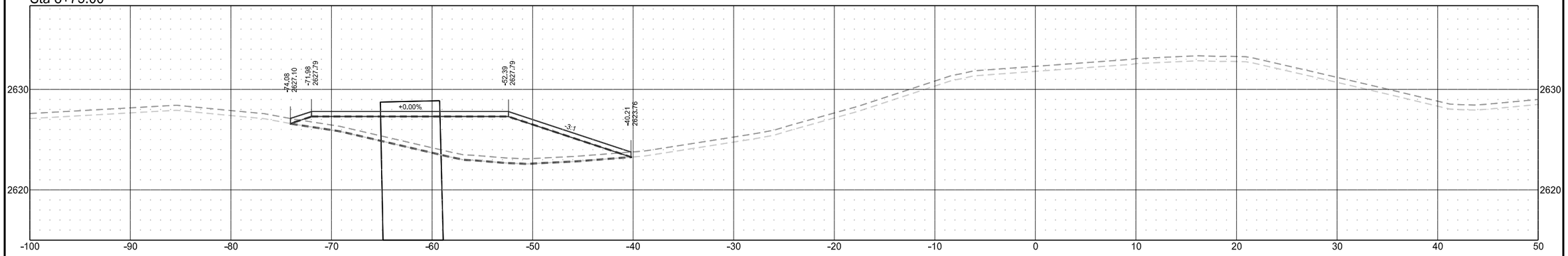
Sta 8+50.00



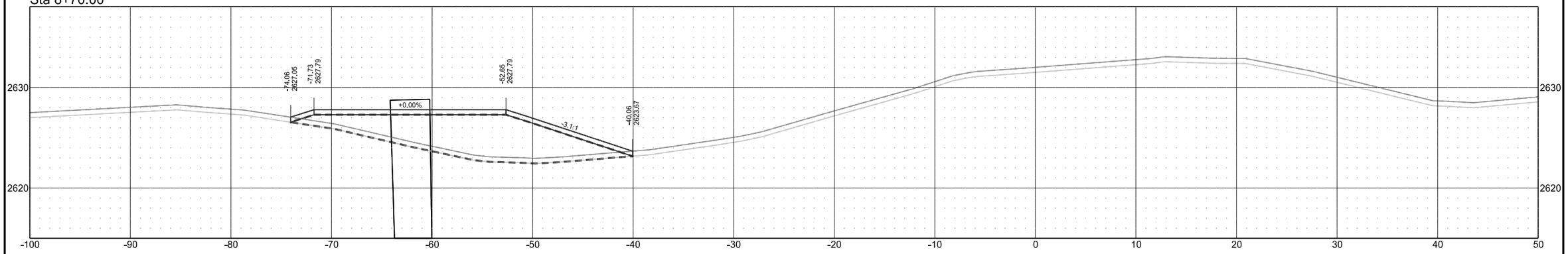
High Mast Light #3

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	29

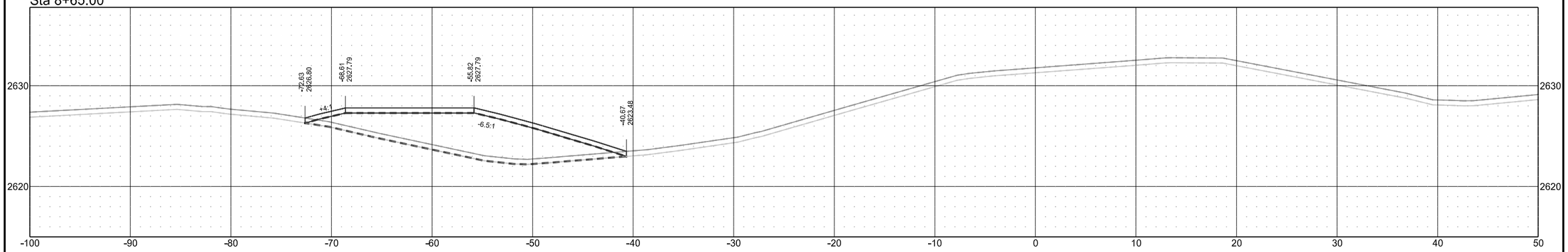
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Sta 8+70.00



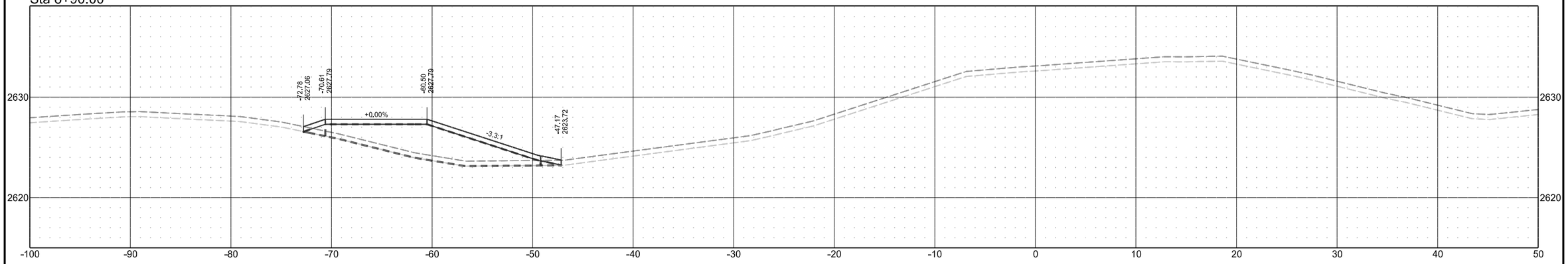
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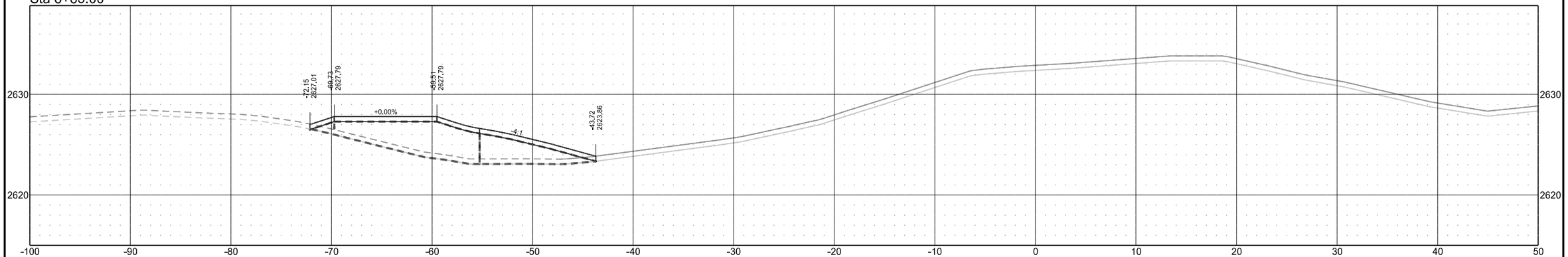
High Mast Light #3

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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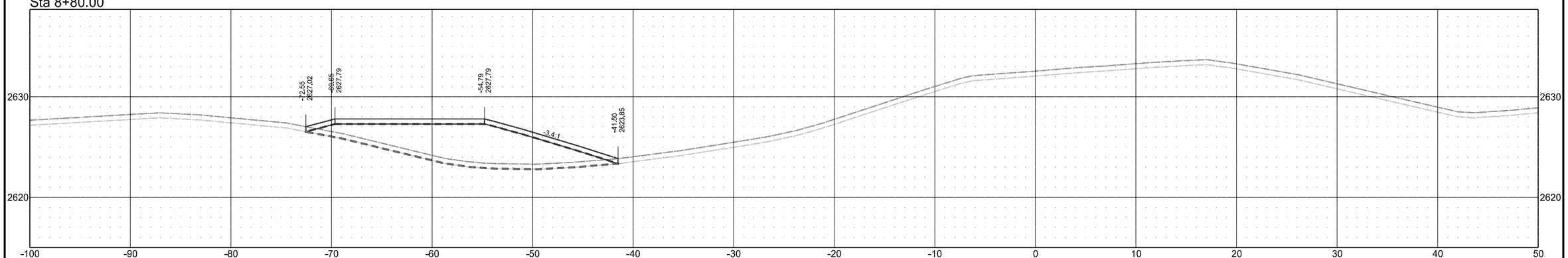
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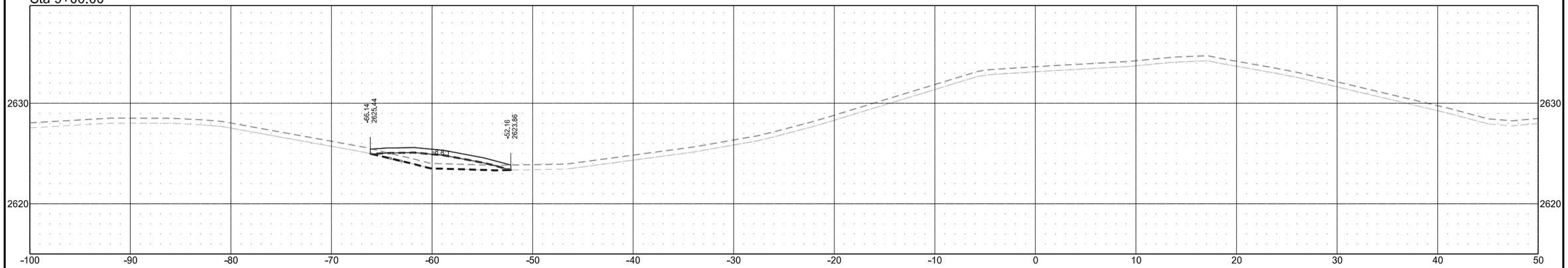
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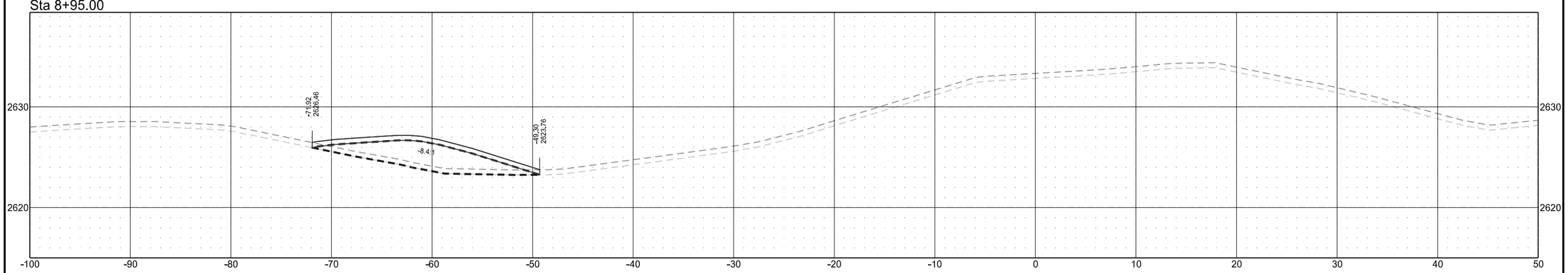
High Mast Light #3

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	31

Sta 9+00.00



Sta 8+95.00

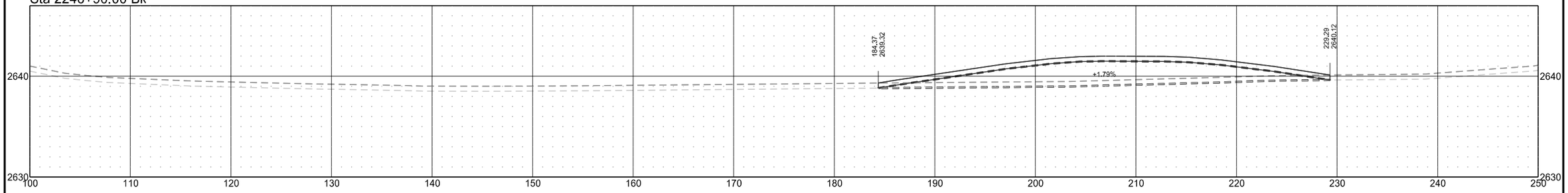


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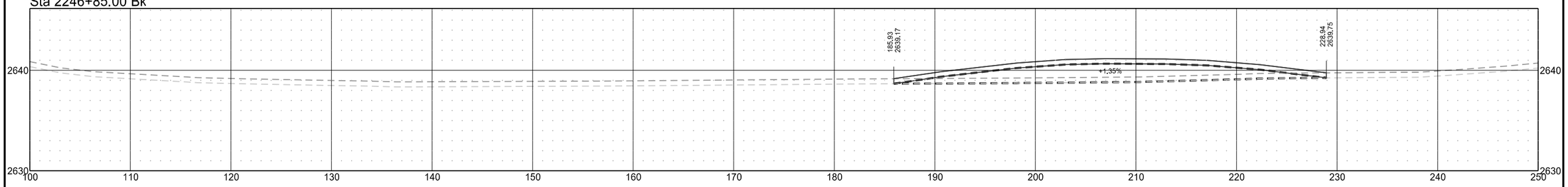
High Mast Light #4

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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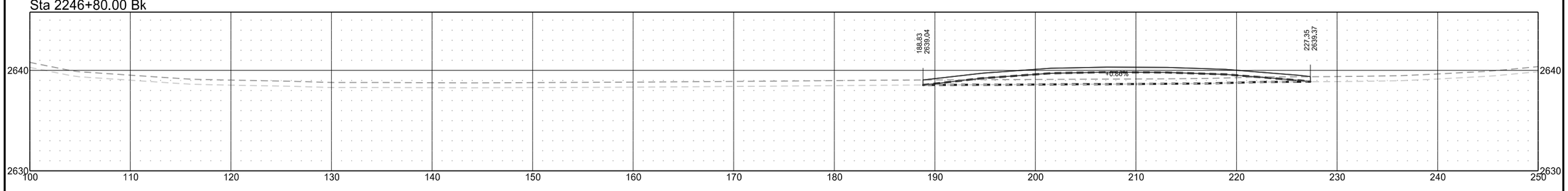
Sta 2246+90.00 Bk



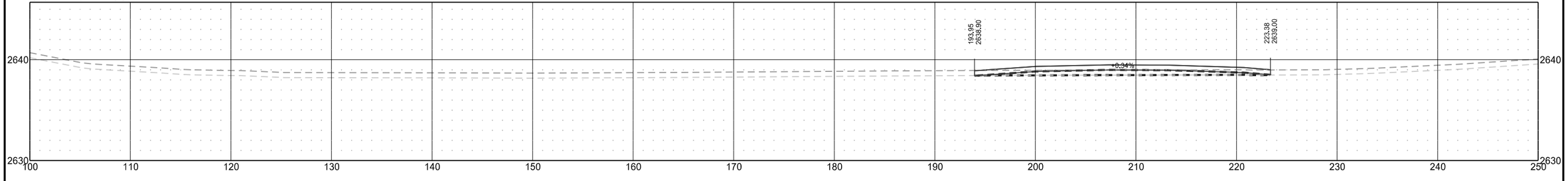
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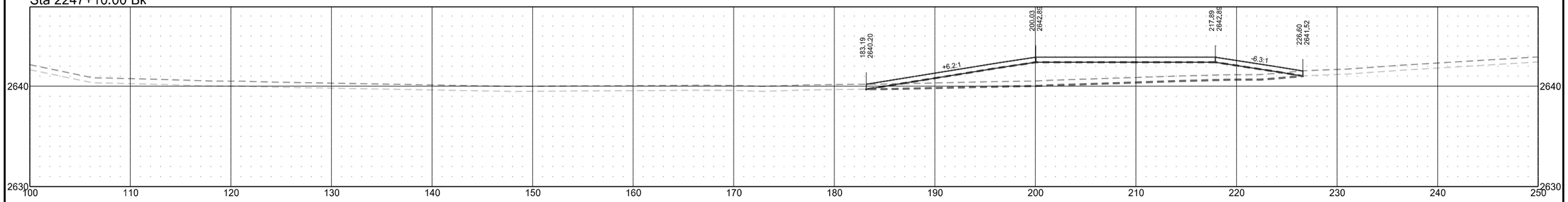
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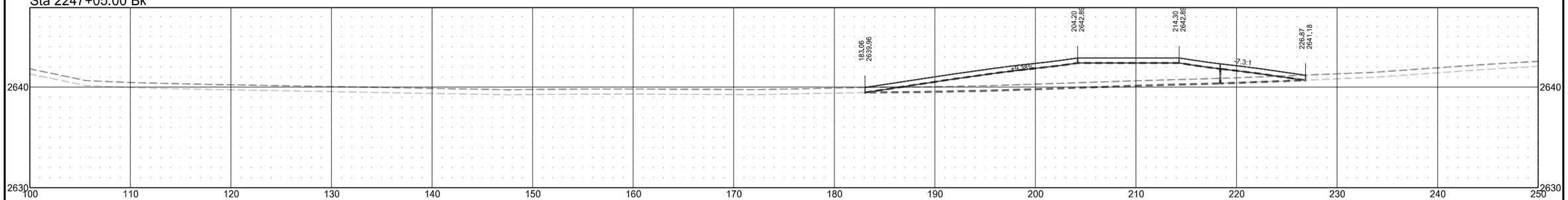
High Mast Light #4

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	33

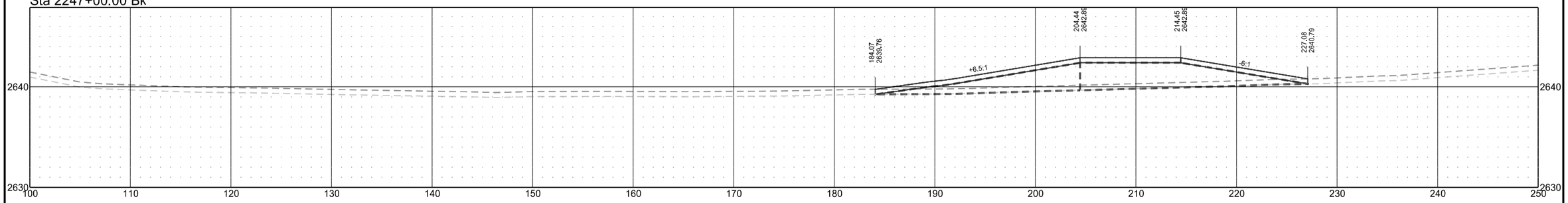
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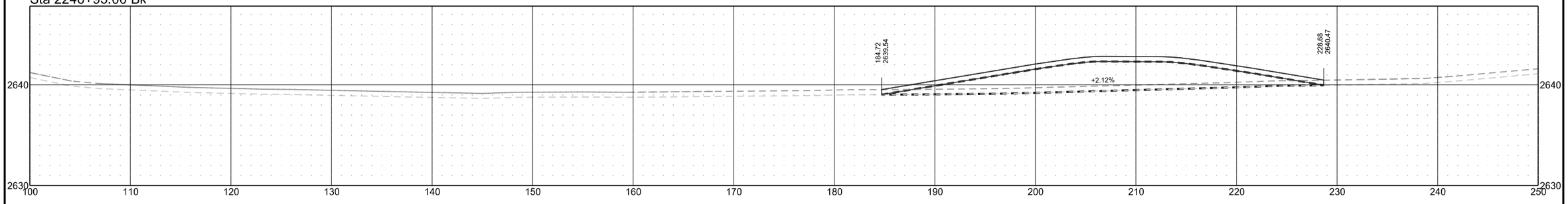
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Sta 2247+00.00 Bk



Sta 2246+95.00 Bk

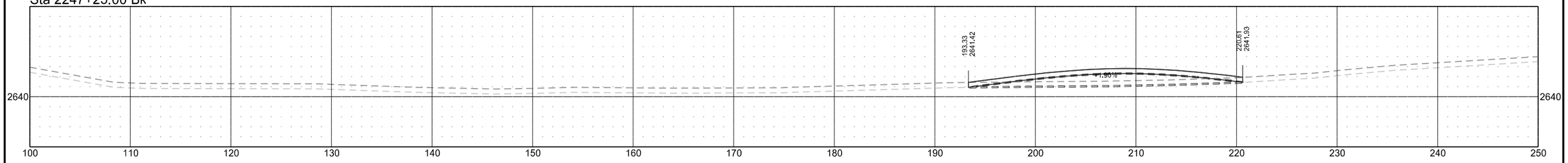


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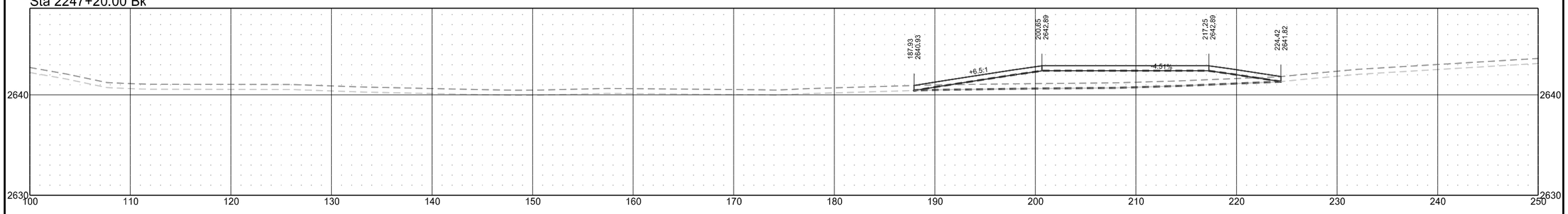
High Mast Light #4

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	34

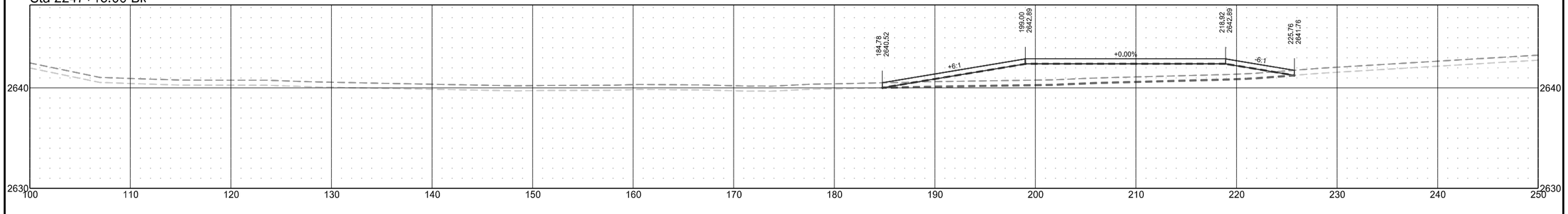
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Sta 2247+20.00 Bk



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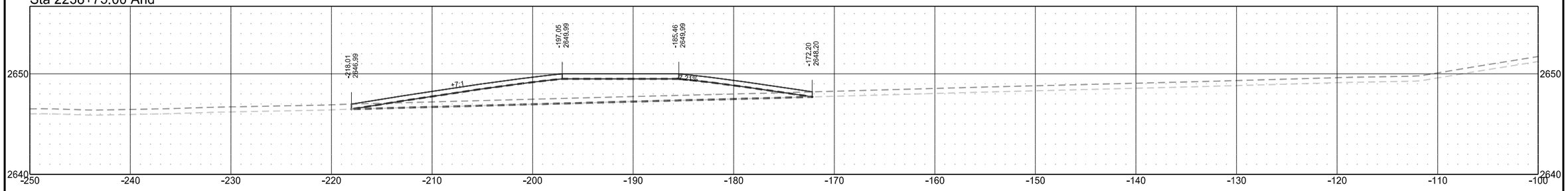


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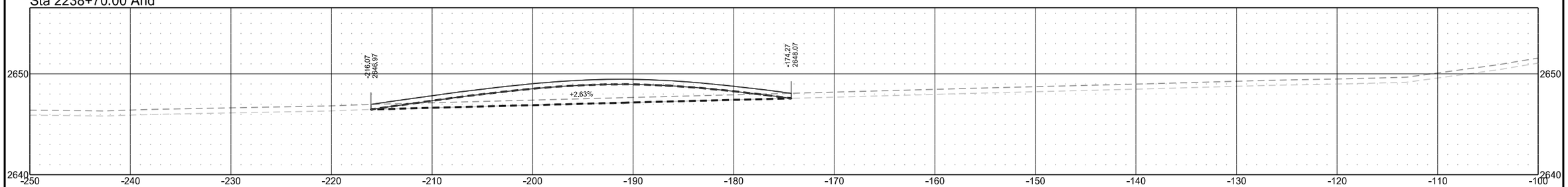
High Mast Light #5

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	35

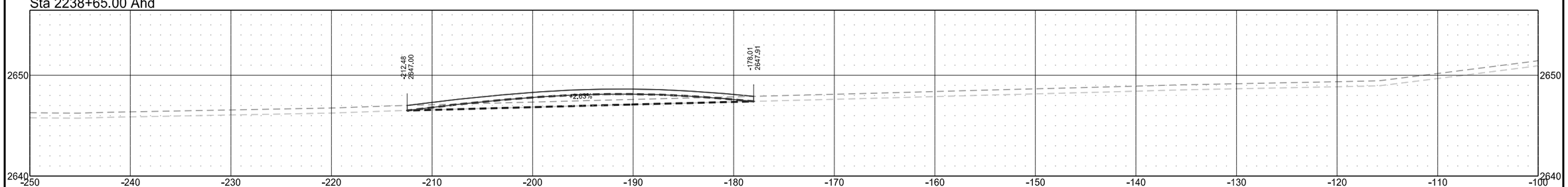
Sta 2238+75.00 Ahd



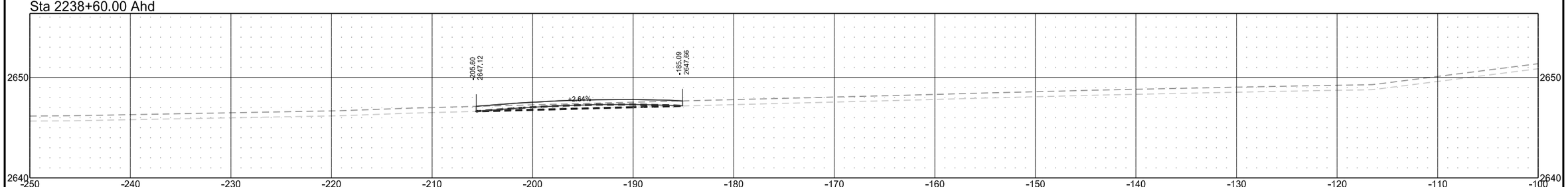
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Sta 2238+65.00 Ahd



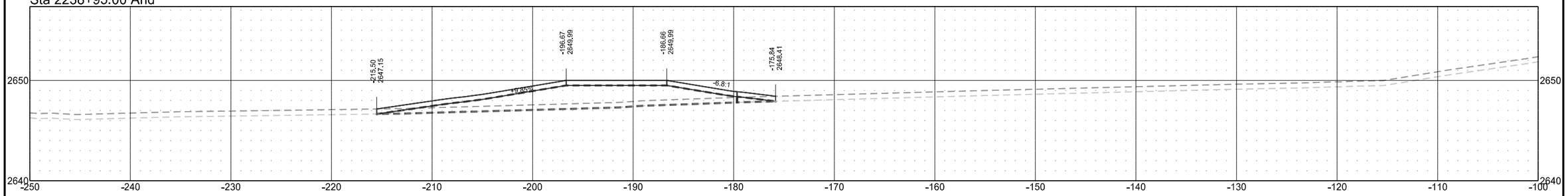
Sta 2238+60.00 Ahd



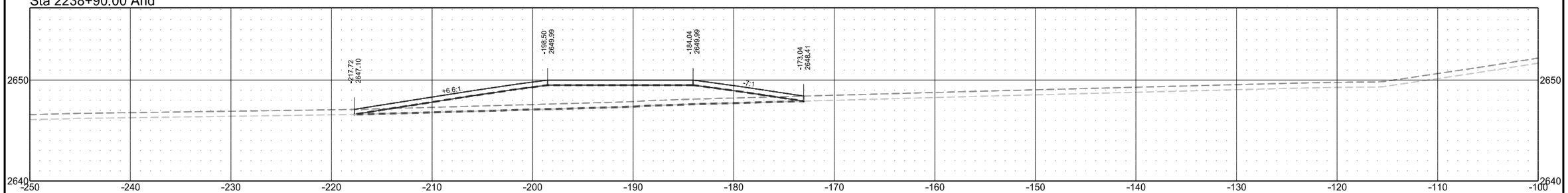
High Mast Light #5

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	36

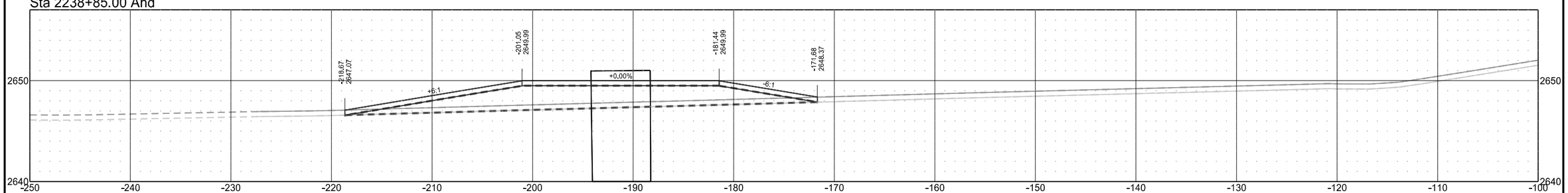
Sta 2238+95.00 Ahd



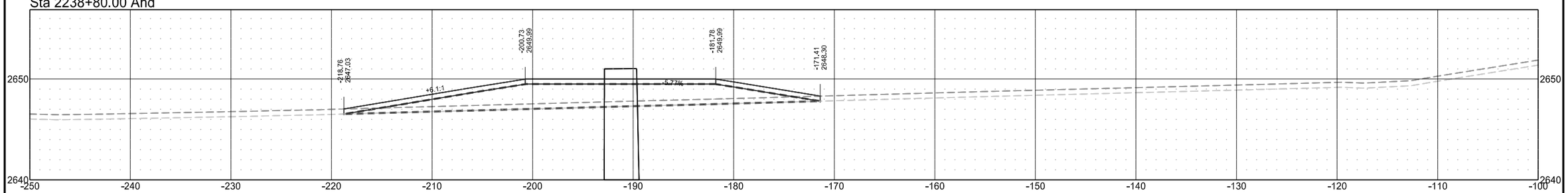
Sta 2238+90.00 Ahd



Sta 2238+85.00 Ahd



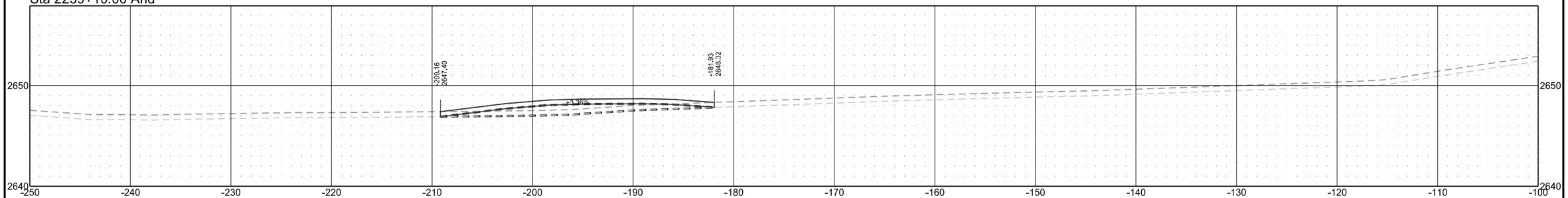
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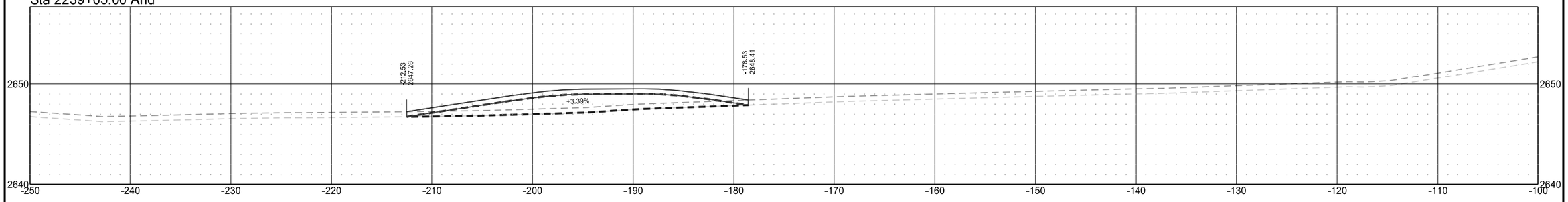
High Mast Light #5

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	37

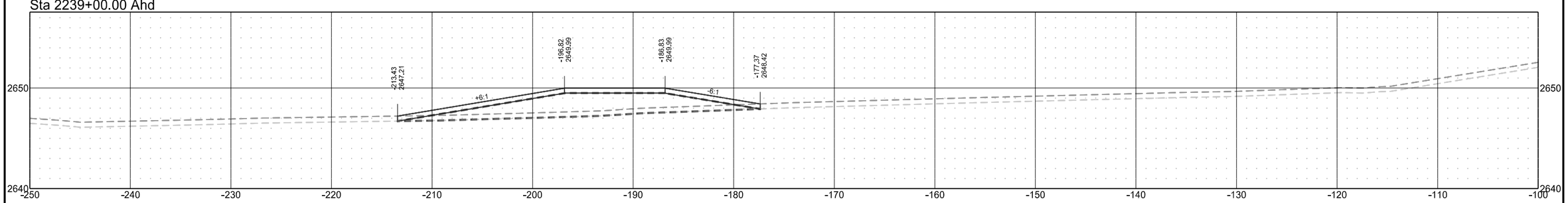
Sta 2239+10.00 Ahd



Sta 2239+05.00 Ahd



Sta 2239+00.00 Ahd

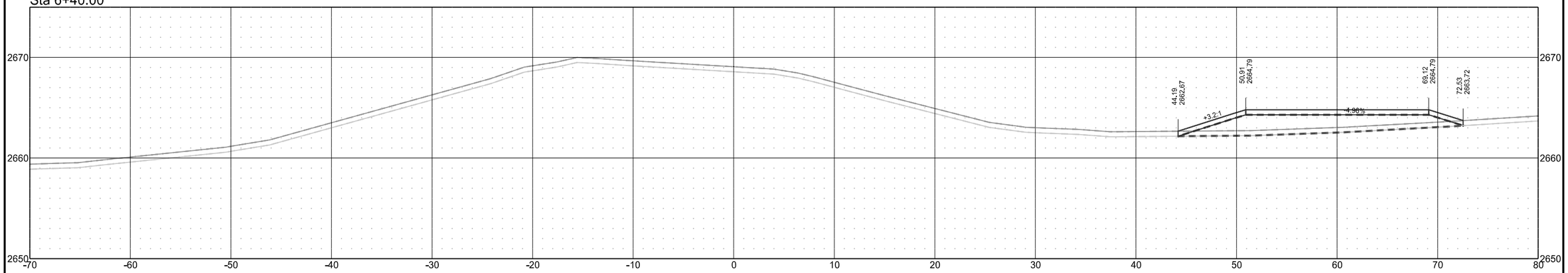


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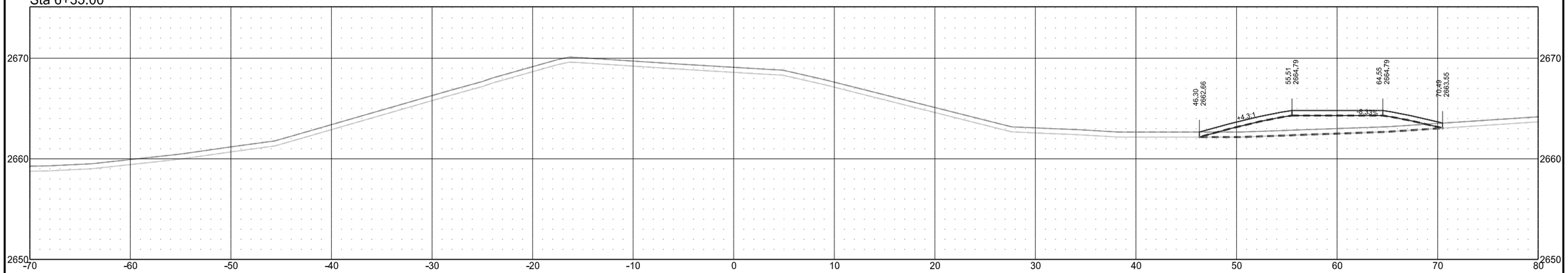
High Mast Light #6

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	38

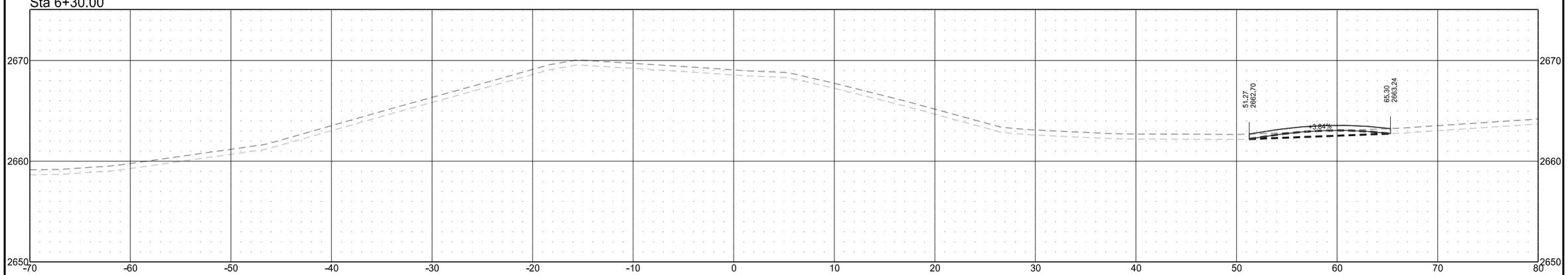
Sta 6+40.00



Sta 6+35.00



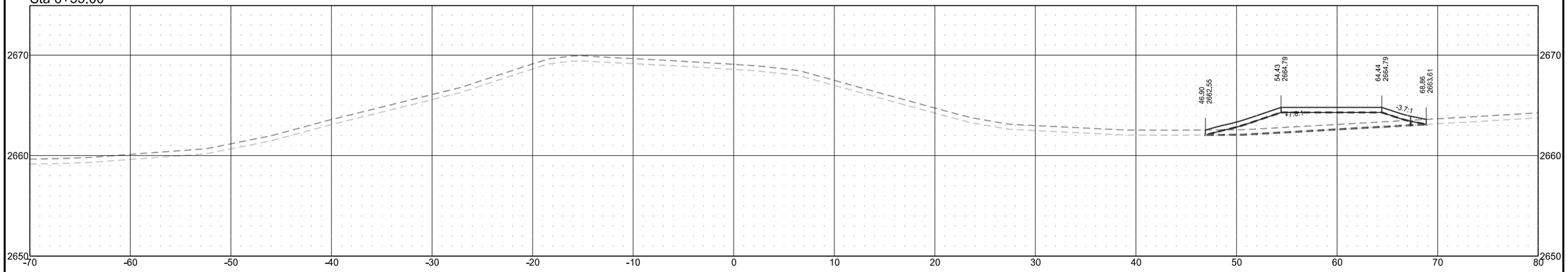
Sta 6+30.00



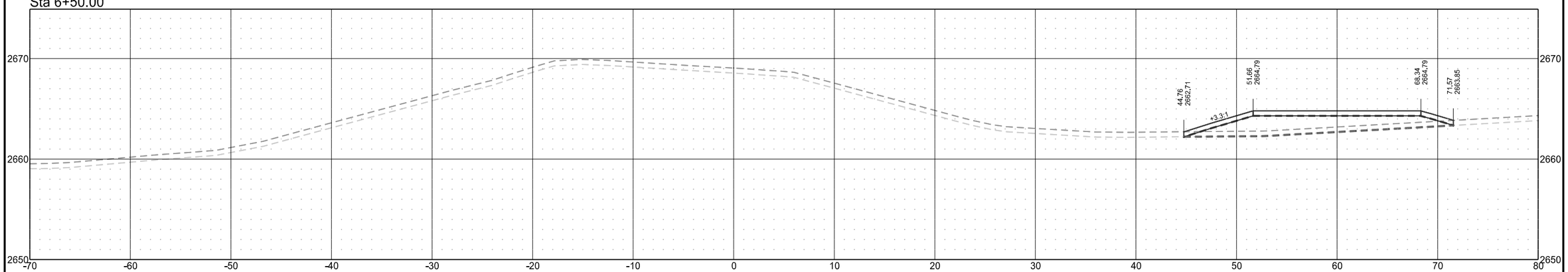
High Mast Light #6

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	39

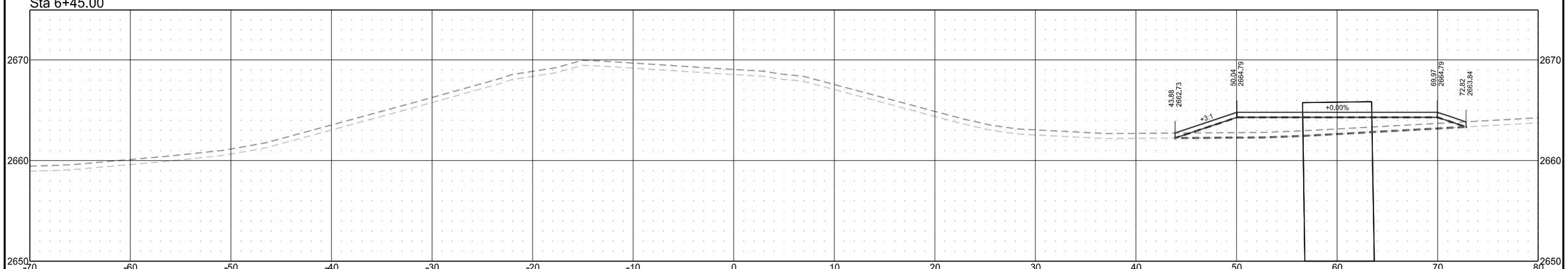
Sta 6+55.00



Sta 6+50.00



Sta 6+45.00

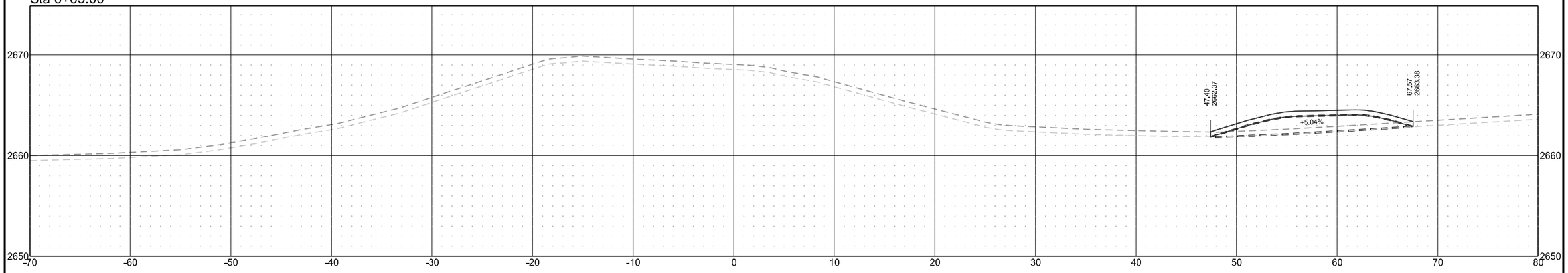


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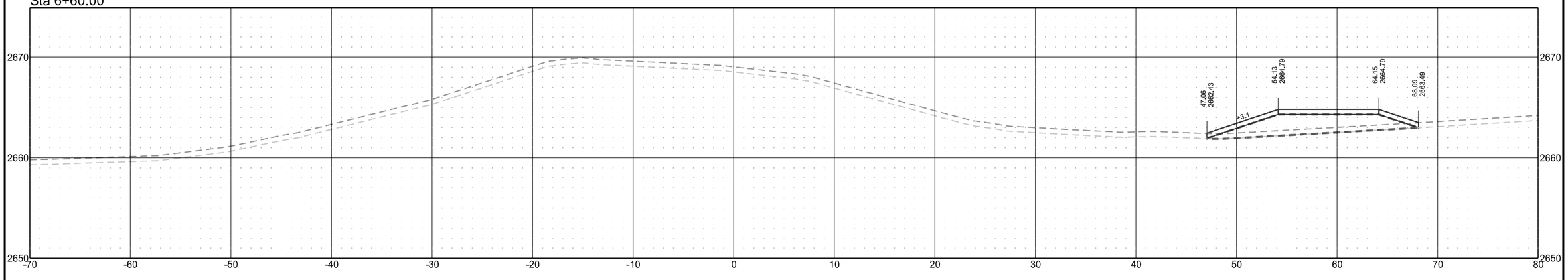
High Mast Light #6

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	40

Sta 6+65.00



Sta 6+60.00

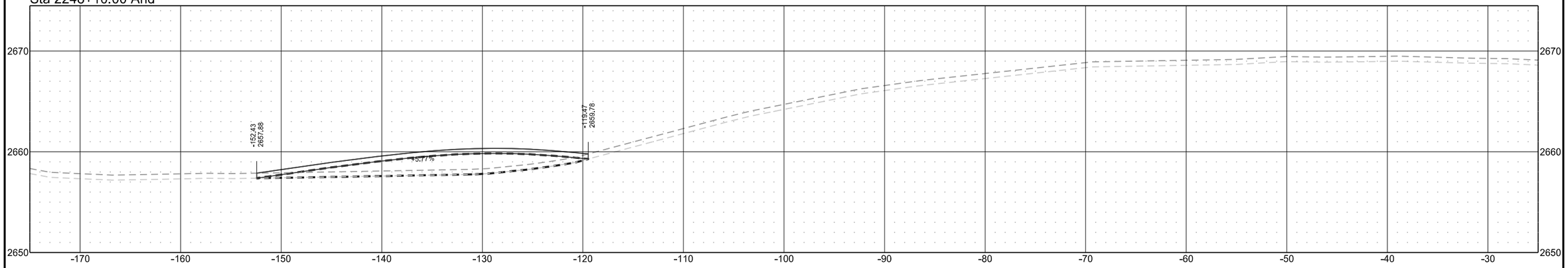


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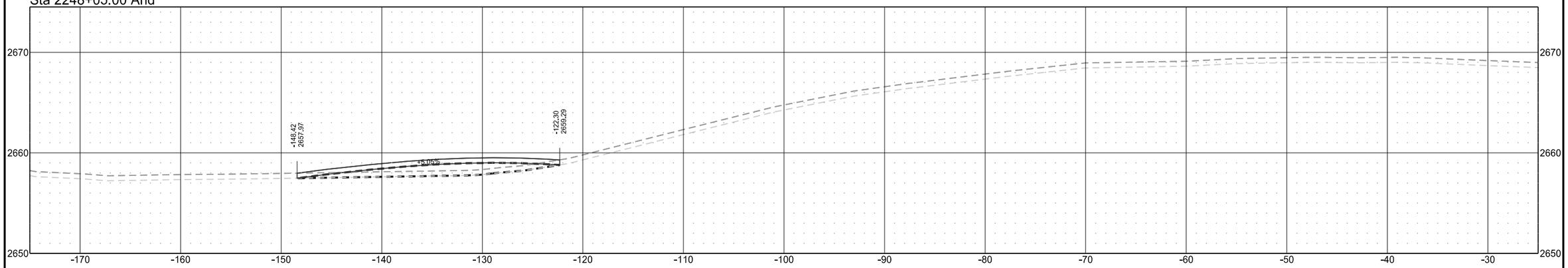
High Mast Light #7

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	41

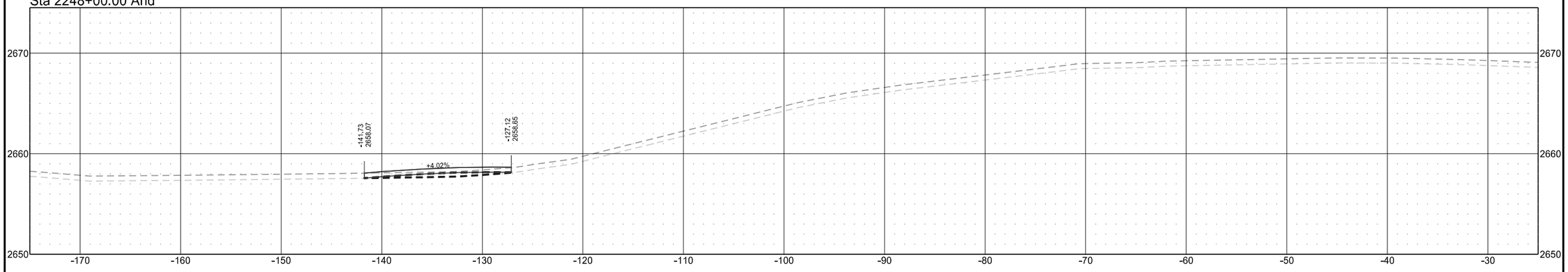
Sta 2248+10.00 Ahd



Sta 2248+05.00 Ahd



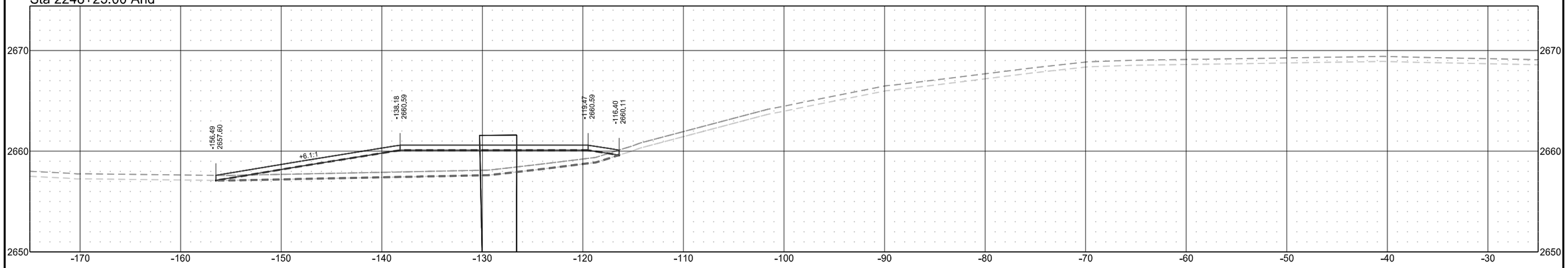
Sta 2248+00.00 Ahd



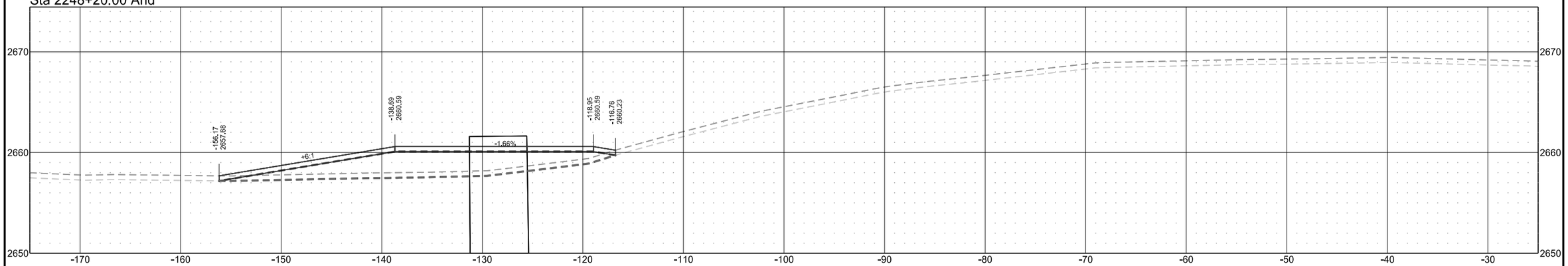
High Mast Light #7

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	42

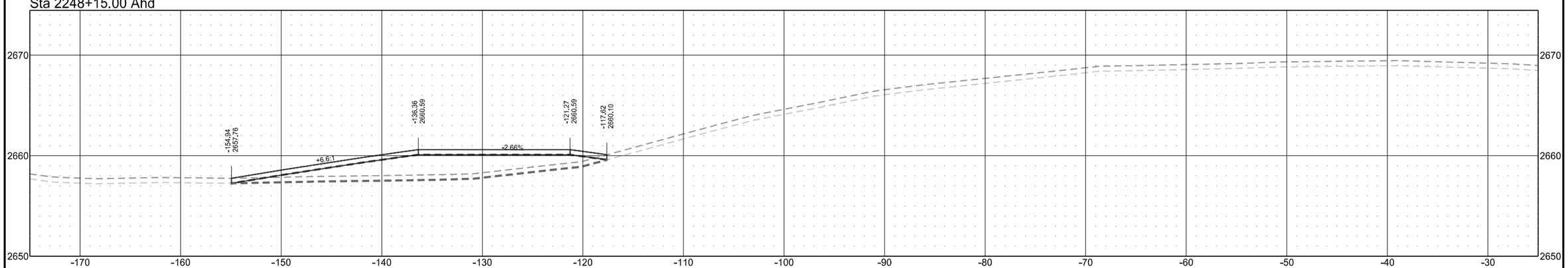
Sta 2248+25.00 Ahd



Sta 2248+20.00 Ahd



Sta 2248+15.00 Ahd

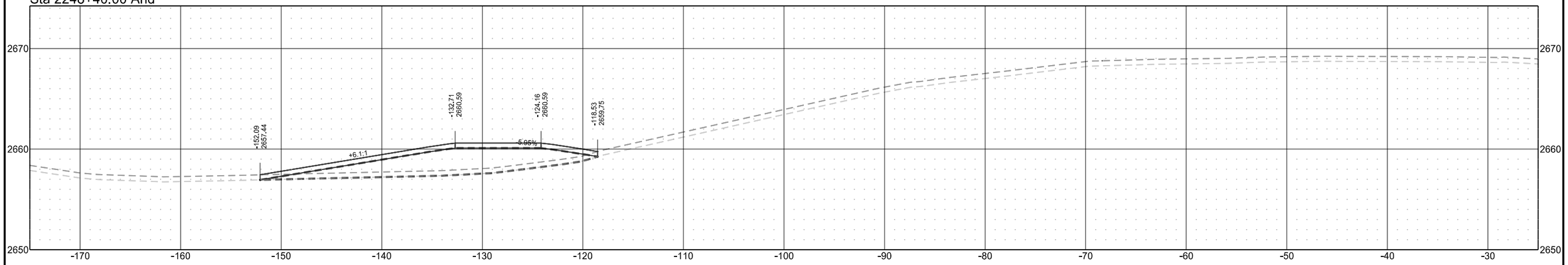


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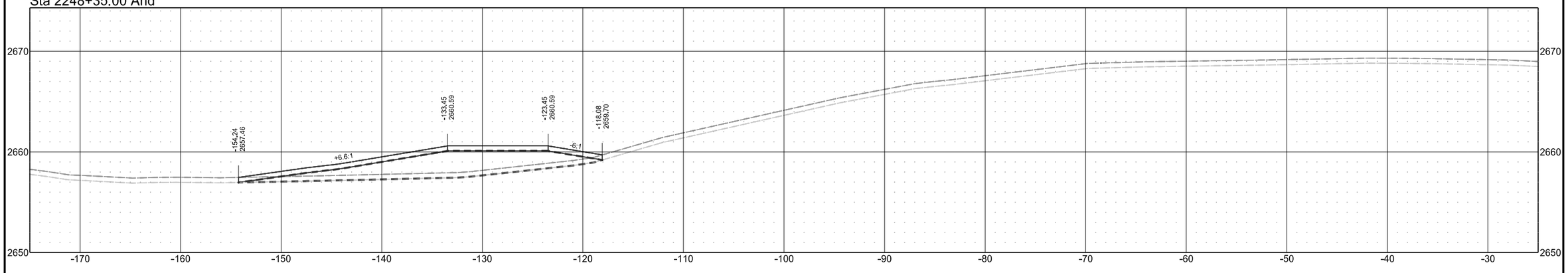
High Mast Light #7

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	43

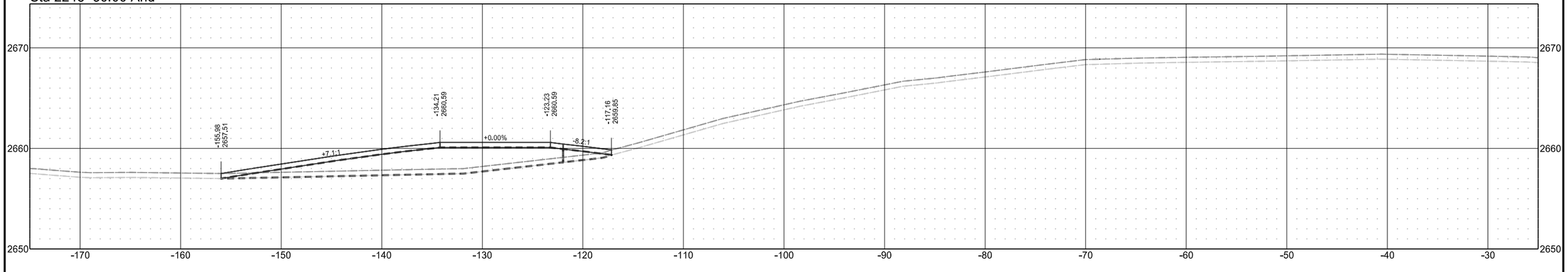
Sta 2248+40.00 Ahd



Sta 2248+35.00 Ahd



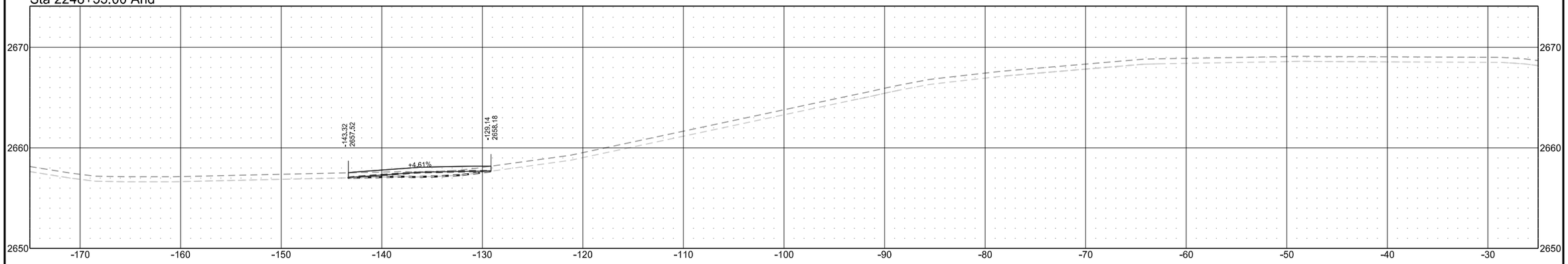
Sta 2248+30.00 Ahd



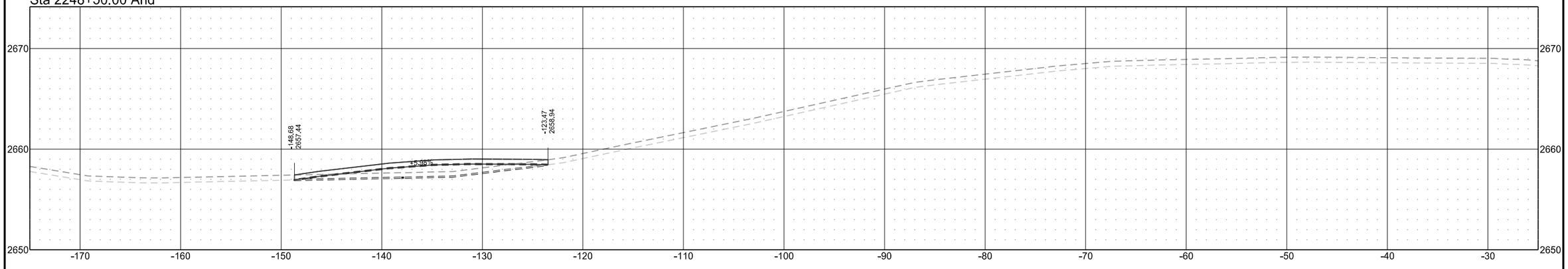
High Mast Light #7

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	44

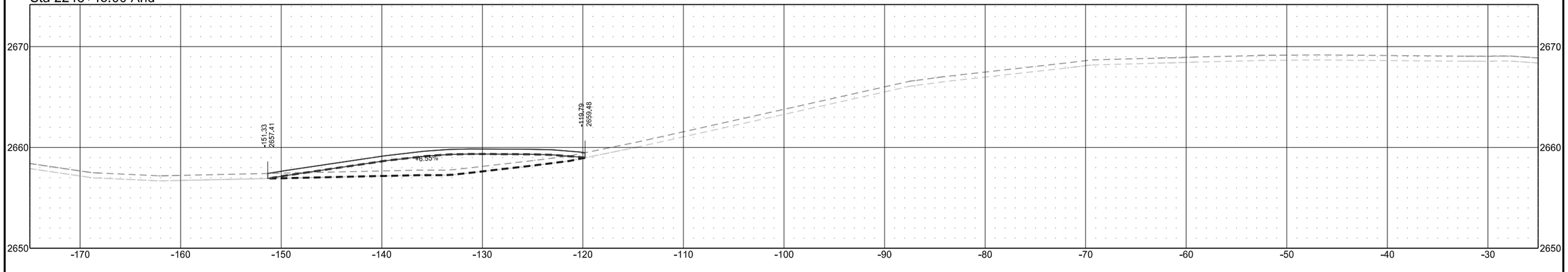
Sta 2248+55.00 Ahd



Sta 2248+50.00 Ahd



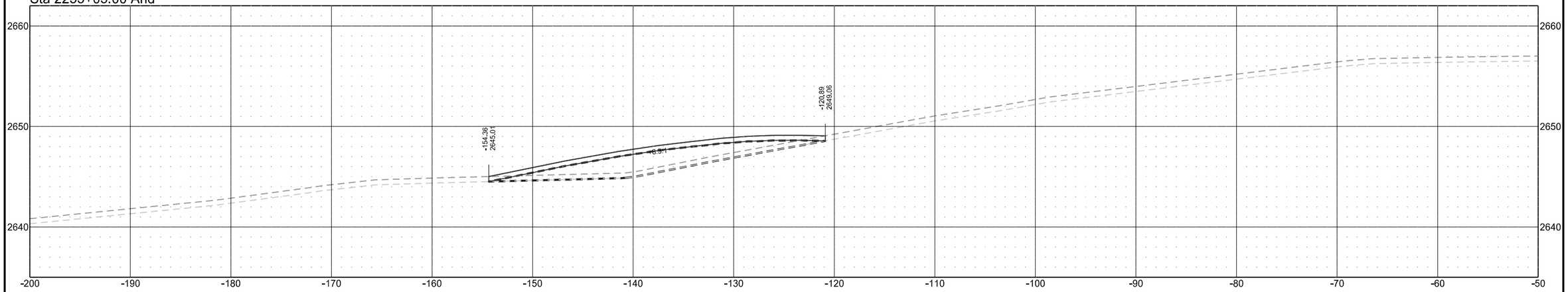
Sta 2248+45.00 Ahd



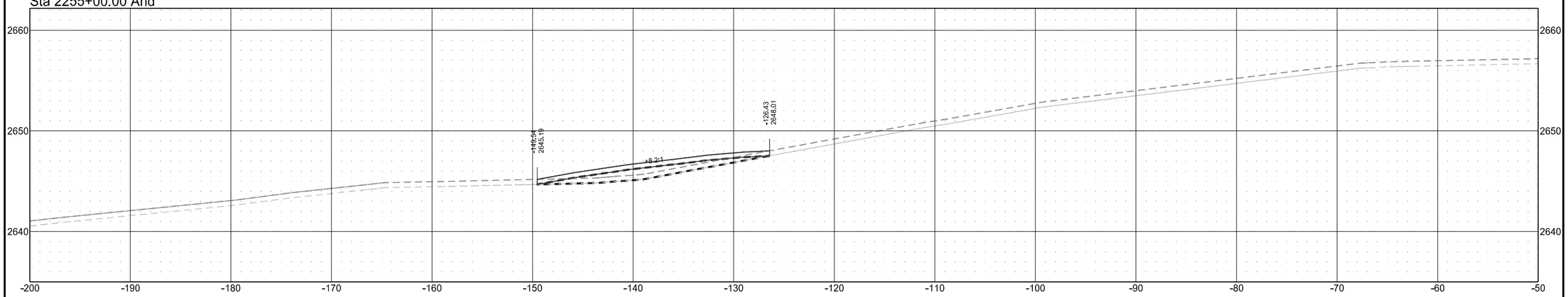
High Mast Light #8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	45

Sta 2255+05.00 Ahd



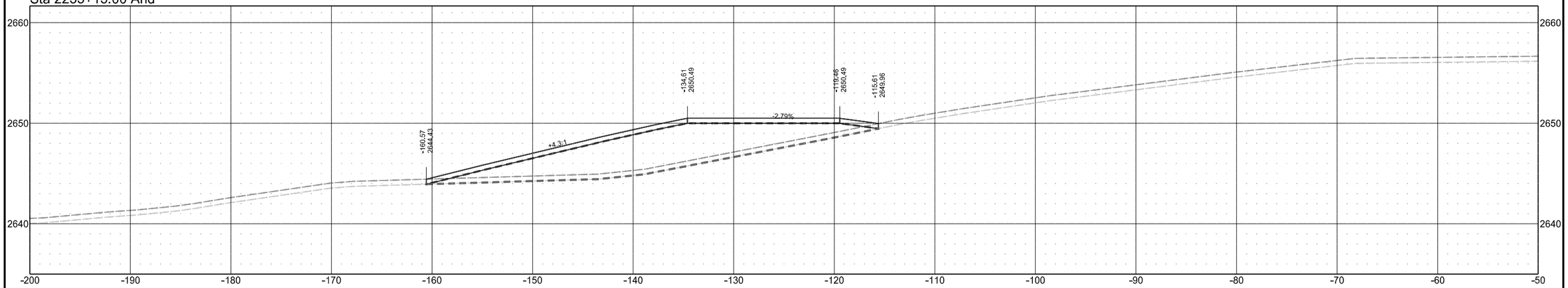
Sta 2255+00.00 Ahd



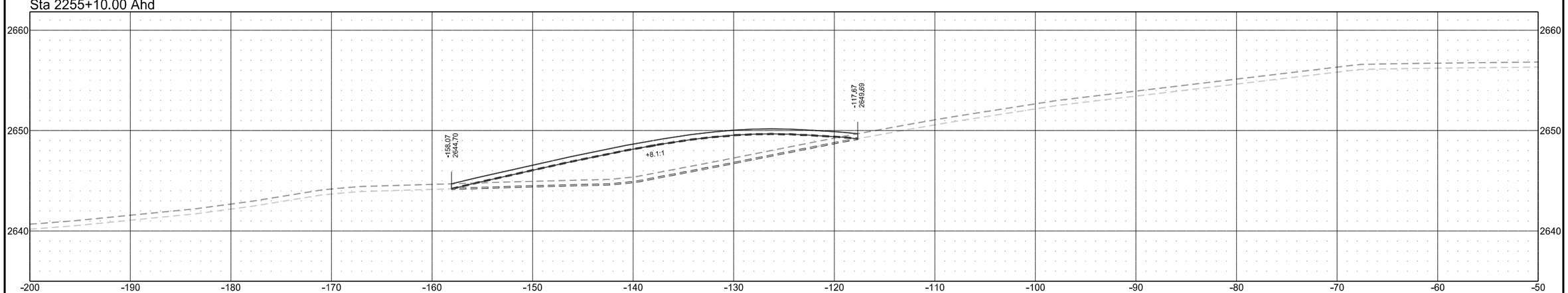
High Mast Light #8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	46

Sta 2255+15.00 Ahd



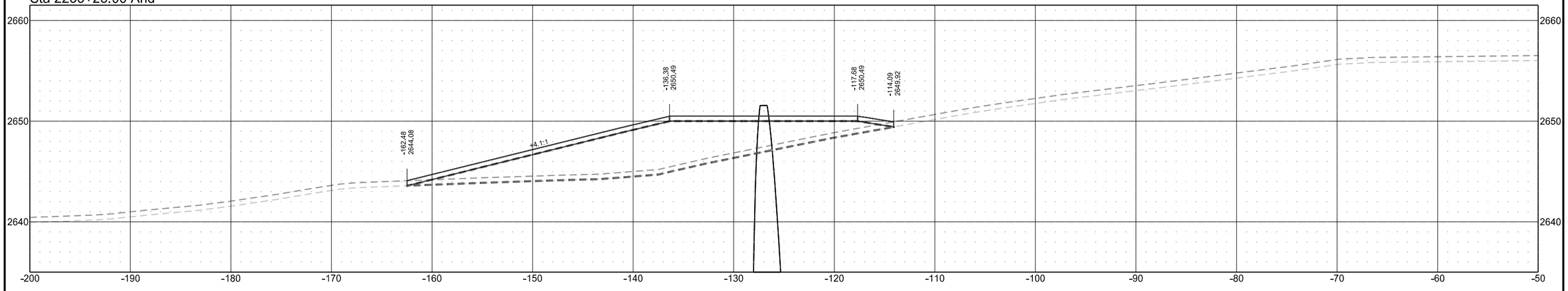
Sta 2255+10.00 Ahd



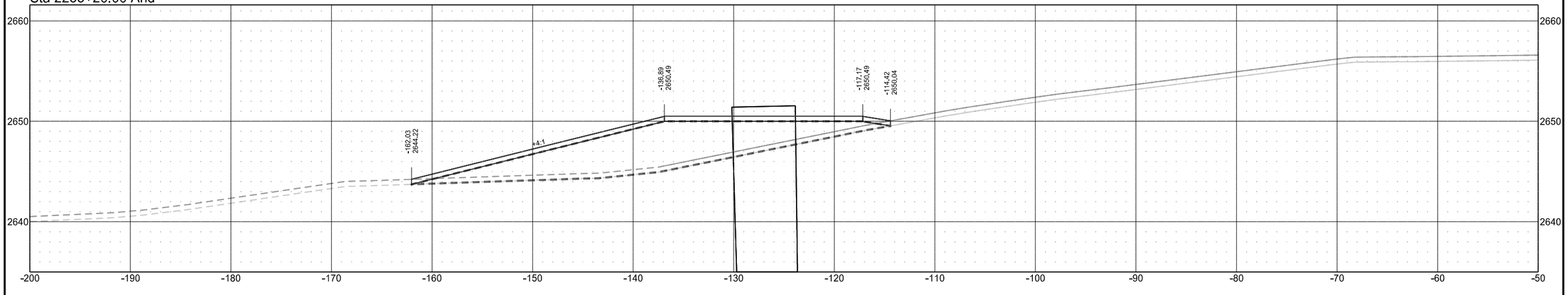
High Mast Light #8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	47

Sta 2255+25.00 Ahd



Sta 2255+20.00 Ahd

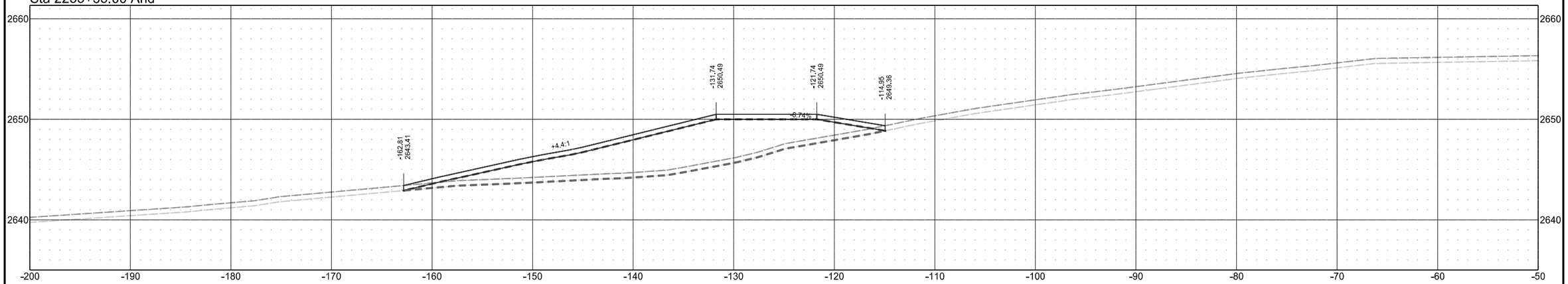


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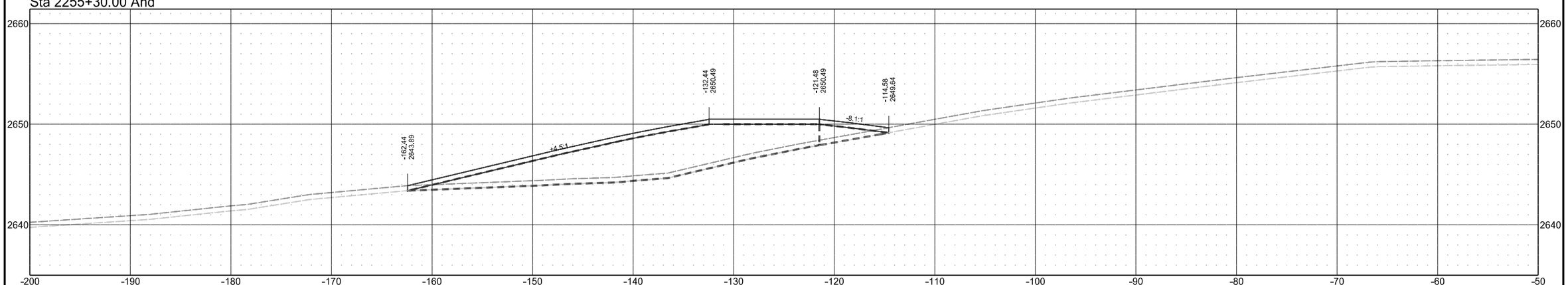
High Mast Light #8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	48

Sta 2255+35.00 Ahd



Sta 2255+30.00 Ahd

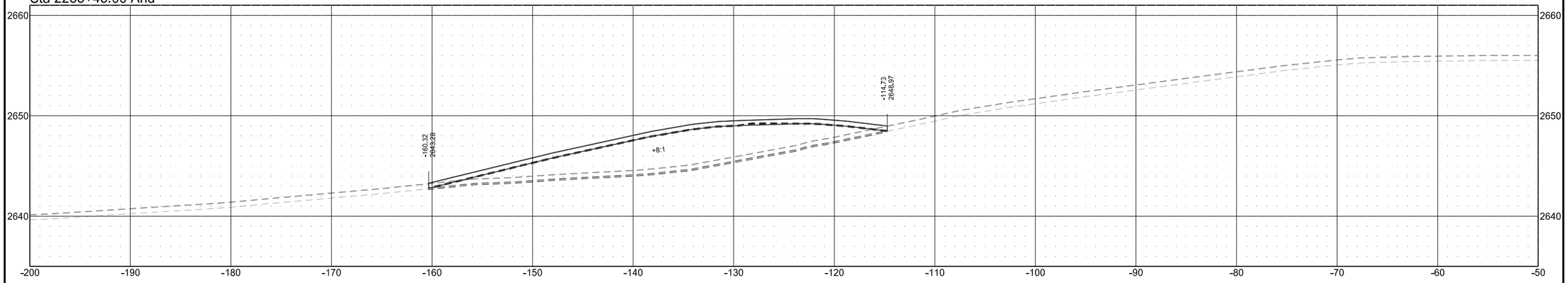


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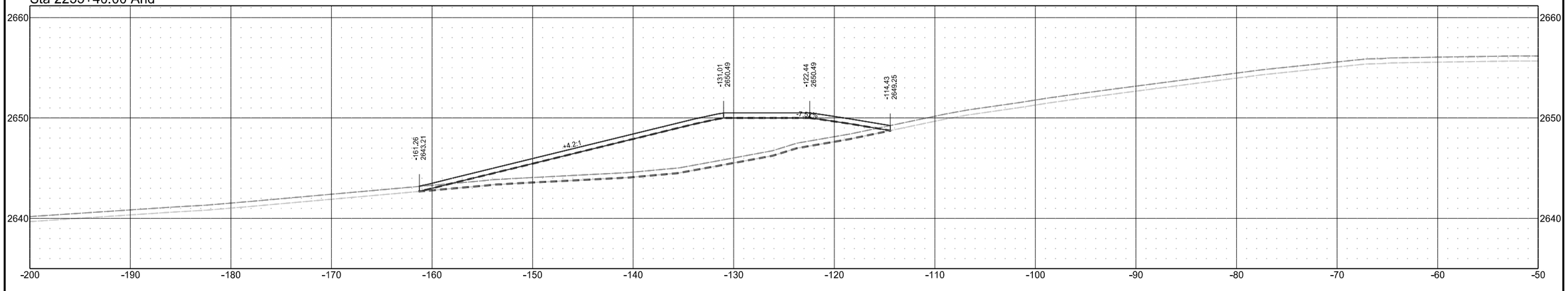
High Mast Light #8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	49

Sta 2255+45.00 Ahd



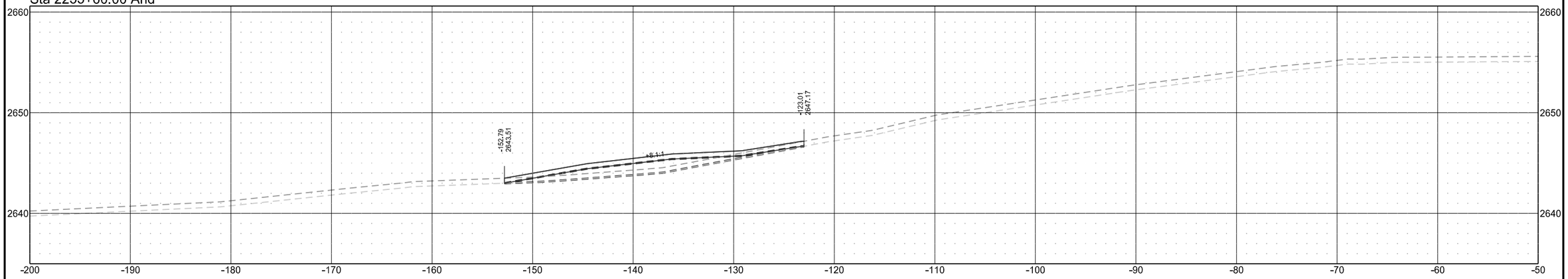
Sta 2255+40.00 Ahd



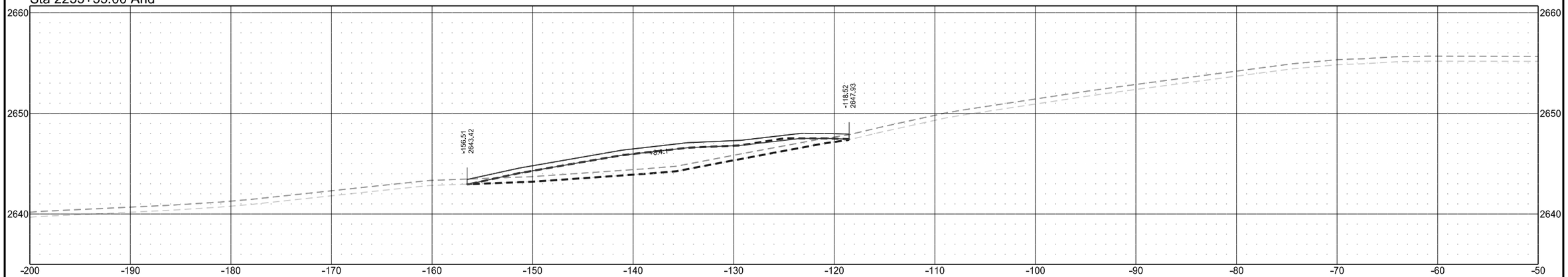
High Mast Light #8

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	NH-5-085(077)074	200	50

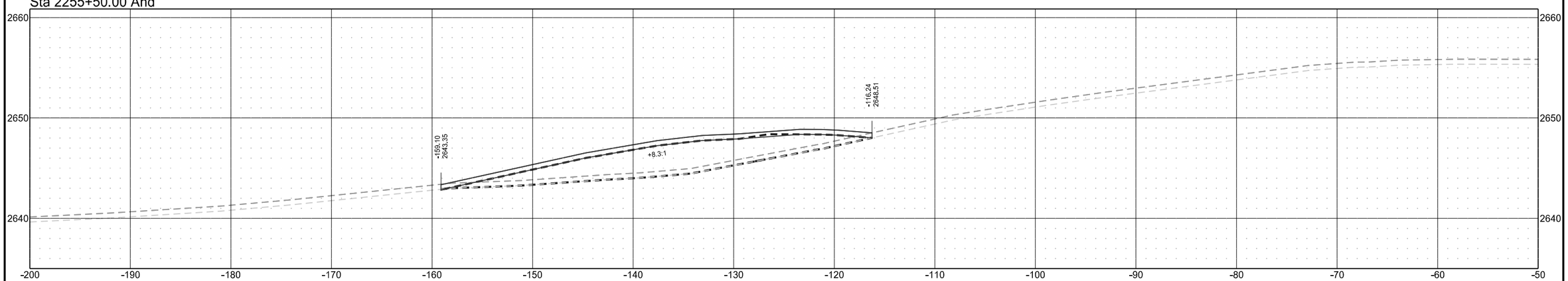
Sta 2255+60.00 Ahd



Sta 2255+55.00 Ahd



Sta 2255+50.00 Ahd



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NDDOT ABBREVIATIONS

D-101-1

?	This is a special text character used in the labeling of existing features. It indicates a feature that has an unknown characteristic, potentially based on: lack of description, location accuracy or purpose.
Abn	abandoned
Abut	abutment
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
&	and
Appr	approach
Approx	approximate
ACP	asbestos cement pipe
Asph	asphalt
AC	asphalt cement
Assmd	assumed
@	at
Atten	attenuation
ATR	automatic traffic recorder
Ave	Avenue
Avg	average
ADT	average daily traffic
Bk	back
BF	back face
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
BI	beehive inlet
Beg	begin
BG	below grade
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
BH	bore hole
Bot	bottom
Blvd	Boulevard
Bndry	boundary
Brkwy	breakaway
Br	bridge
Bldg	building
Bus.	business
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
CL or ℄	centerline
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
CECB	concrete erosion control blanket
Cond	conductor
Const	construction
Cont	continuous
CSB	continuous split barrel sample
Contr	contraction
Contr	contractor
CP	control point
Coord	coordinate
Cor	corner
Corr	corrected
CAES	corrugated aluminum end section
CAP	corrugated aluminum pipe
CMES	corrugated metal end section
CMP	corrugated metal pipe
CPVCP	corrugated poly-vinyl chloride pipe
CSES	corrugated steel end section
CSFES	corrugated steel flared end section
CSP	corrugated steel pipe
CSTES	corrugated steel traversable end section
Co	County
Crse	course
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	crossroad
Crn	crown
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia or ø	diameter
Dir	direction
Dist	distance
DM	disturbed material
DB	ditch block
DG	ditch grade
Dbl	double
Dn	down
Dwg	drawing
Dr	drive
Drwy	driveway
DI	drop inlet
D	dry density
DSDS	dynamic speed display sign
Ea	each
Esmt	easement
E	East
EB	Eastbound
Elast	elastomeric
EL	electric locker
E Mtr	electric meter
Elec	electric/al
EDM	electronic distance meter
Elev or El	elevation
Ellipt	elliptical
Emb	embankment
Emuls	emulsion/emulsified
ES	end section
Engr	engineer
ESS	environmental sensor station
Eq	equal
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

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NDDOT ABBREVIATIONS

D-101-2

Galv	galvanized
Gar	garage
Gs L	gas line
G Reg	gas line regulator
GMV	gas main valve
G Mtr	gas meter
GSV	gas service valve
GVP	gas vent pipe
GV	gate valve
Ga	gauge
Gov	government
Grd	graded/grade
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ht	height
Hel	helical
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IP	iron pipe
Jt	joint
Jct	junction

Ln	lane
Lg	large
Lat	latitude
Lt	left
Lens	lenses
Lvl	level
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Liq	liquid
LL	liquid limit
Loc	location
Long.	longitude
Lp	loop
LD	loop detector
Lum	luminaire
Mb	mailbox
ML	main line
MH	manhole
Mkd	marked
Mkr	marker
Mkg	marking
MA	mast arm
Matl	material
Max	maximum
MC	meander corner
Meas	measure
Mdn	median
MD	median drain
MC	medium curing
MGS	Midwest Guardrail System
MM	mile marker
MP	mile post
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Neop	neoprene
Ntwk	network
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number

Obsc	obscure(d)
Ocpd	occupied
Ocpy	occupy
O/s	offset
OC	on center
C	one dimensional consolidation
OC	organic content
Orig	original
O To O	out to out
OD	outside diameter
OH	overhead
PMT	pad mounted transformer
Pg	pages
Pntd	painted
Pr	pair
Pnl	panel
Pk	park
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
Perm	permanent
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl or ℄	plate
Pt	point
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd or Pref	preformed
Prep	preperation
Press.	pressure
PRV	pressure relief valve
Prestr	prestressed
Pvt	private
PD	private drive
Prod.	production/produce
Prog	programmed
Prop.	property
Prop Ln	property line
Ppsd	proposed
PB	pull box

Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RC	rapid curing
Rec	record
Rcy	recycle
RAP	recycled asphalt pavement
RPCC	recycled portland cement concrete
Ref	reference
R Mkr	reference marker
RM	reference monument
RP	reference point
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCFES	reinforced concrete flared end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
RCTES	reinforced concrete traversable end section
Reinf	reinforcement
Res	reservation
Res	residence
Ret	retaining
Rev	reverse
Rt	right
R/W	right of way
Riv	river
Rd	road
Rdbd	road bed
Rdwy	roadway
RWIS	roadway weather information system
Rk	rock
Rt	route

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NDDOT ABBREVIATIONS

Salv	salvage(d)
San	sanitary sewer line
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw or Sdwk	sidewalk
SD	sight distance
SN	sign number
Sig	signal
Sgl	single
SRCP	slotted reinforced concrete pipe
SC	slow curing
SS	slow setting
Sm	small
S	South
SE	South East
SW	South West
SB	Southbound
Sp	spaces
Spcl	special
SA	special assembly
SP	special provisions
G	specific gravity
Spk	spike
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Stm L	steam line
SEC	steel encased concrete
SMA	stone matrix asphalt
SSD	stopping sight distance
SD	storm drain
St	street
SPP	structural plate pipe
SPPA	structural plate pipe arch
Str	structure
Subd	subdivision
Sub	subgrade
Sub Prep	subgrade preperation
Ss	subsoil
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical

Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	thinwall tube sample
Ts	topsoil
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
Trans	transition
TT	transmission tower
TES	traversable end section
Trans	transverse
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VCP	vitrified clay pipe
Vol	volume
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
Wrng	wearing
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner

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NDDOT ABBREVIATIONS

MEASUREMENTS

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

SURVEY DESCRIPTIONS

Az	azimuth
Bs	backsight
Brg	bearing
BP Cap	blue plastic cap
BS	both sides
BC	brass cap
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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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

702COM	702 Communications
ACCENT	Accent Communications
AGASSIZ WU	Agassiz Water Users Incorporated
AGC	Assiociated General Contractors of America
ALL PL	Alliance Pipeline
ALL SEAS WU	All Seasons Water Users Association
AMOCO PI	Amoco Pipeline Company
AMRDA HESS	Amerada Hess Corporation
AT&T	AT&T Corporation
B PAW	Bear Paw Energy Incorporated
BAKER ELEC	Baker Electric
BASIN ELEC	Basin Electric Cooperative Incorporated
BEK TEL	Bek Communications Cooperative
BELLE PL	Belle Fourche Pipeline Company
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe Railway
BOEING	Boeing
BRNS RWD	Barnes Rural Water District
BURK-DIV ELEC	Burke-Divide Electric Cooperative
BURL WU	Burleigh Water Users
CABLE ONE	Cable One
CABLE SERV	Cable Services
CAP ELEC	Capital Electric Cooperative Incorporat
CASS CO ELEC	Cass County Electric Cooperative
CASS RWU	Cass Rural Water Users Incorporated
CAV ELEC	Cavalier Rural Electric Cooperative
CBLCOM	Cablecom Of Fargo
CENEX PL	Cenex Pipeline
CENT PL WATER DIST	Central Pipe Line Water District
CENT PWR ELEC	Central Power Electric Cooperative
CENTURYLINK	CenturyLink
COE	Corps of Engineers
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
ENVENTIS	Enventis Telephone
FALK MNG	Falkirk Mining Company
FHWA	Federal Highway Administration
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
GTR RAMSEY WD	Greater Ramsey Water District
GT PLNS NAT GAS	Great Plains Natural Gas Company
HALS TEL	Halstad Telephone Company
IDEA1	Idea1
INT-COMM TEL	Inter-Community Telephone Company
KANEB PL	Kaneb Pipeline Company
KEM ELEC	Kem Electric Cooperative Incorporated
KOCH GATH SYS	Koch Gathering Systems Incorporated
LKHD PL	Lakehead Pipeline Company
LNGDN RWU	Langdon Rural Water Users Incorporated
LWR YELL R ELEC	Lower Yellowstone Rural Electric
MCKNZ CON	McKenzie Consolidated Telcom
MCKNZ ELEC	McKenzie Electric Cooperative
MCKNZ WRD	McKenzie County Water Resource District
MCLEOD	McLeod USA
MCLN ELEC	McLean Electric Cooperative
MCLN-SHRDN R WAT	McLean-Sheridan Rural Water
MDU	Montana-dakota Utilities
MIDCO	MidContinent Communications
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
MISS VALL COMM	Missouri Valley Communications
MISS W W S	Missouri West Water System
MNKOTA PWR	Minnkota Power
MOR-GRAN-SOU ELEC	Mor-gran-sou Electric Cooperative
MOUNT-WILLI ELEC	Mountrail-williams Electric Cooperative
MRE LBTY TEL	Moore & Liberty Telephone
MUNICIPAL	City Water And Sewer
MUNICIPAL	City Of '.....'
N CENT ELEC	North Central Electric Cooperative
N VALL W DIST	North Valley Water District
ND PKS & REC	North Dakota Parks And Recreation
ND TEL	North Dakota Telephone Company
NDDOT	North Dakota Department of Transportation
NDSU SOIL SCI DEPT	NDSU Soil Science Department
NEMONT TEL	Nemont Telephone
NODAK R ELEC	Nodak Rural Electric Cooperative
NOON FRMS TEL	Noonan Farmers Telephone Company
NPR	Northern Plains Railroad
NSP	Northern States Power
NTH PRAIR RW	Northern Prairie Rural Water Association
NTHN BRDR PL	Northern Border Pipeline
NTHN PLNS ELEC	Northern Plains Electric Cooperative Incorporated
NTHWSTRN REF	Northwestern Refinery Company
NW COMM	Northwest Communication Cooperation
NWRWD	Northwest Rural Water District
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RED RIV COMM	Red River Rural Communications
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Cooperative
RRVW	Red River Valley & Western Railroad
S CENT REG WD	South Central Regional Water District
S E W U	South East Water Users Incorporated
SCOTT CABLE	Scott Cable Television Dickinson
SHERDN ELEC	Sheridan Electric Cooperative
SHEYN VLY ELEC	Sheyenne Valley Electric Cooperative
SKYTECH	Skyland Technologies Incorporated
SLOPE ELEC	Slope Electric Cooperative Incorporated
SOURIS RIV TELCOM	Souris River Telecommunications
ST WAT COMM	State Water Commission
STATE LN WATER	State Line Water Cooperative
STER ENG	Sterling Energy
STUT RWU	Stutsman Rural Water Users
SW PL PRJ	Southwest Pipeline Project
T M C	Turtle Mountain Communications
TCI	TCI of North Dakota
TESORO HGH PLNS PL	Tesoro High Plains Pipeline
TRI-CNTY WU	Tri-County Water Users Incorporated
TRL CO RWU	Traill County Rural Water Users
UNTD TEL	United Telephone
UPPR SOUR WUA	Upper Souris Water Users Association
US SPRINT	U.S. Sprint
USAF MSL CABLE	U.S.A.F. Missile Cable
USFWS	US Fish and Wildlife Service
USW COMM	U.S. West Communications
VRNDRY ELEC	Verendrye Electric Cooperative
W RIV TEL	West River Telephone Incorporated
WAPA	Western Area Power Administration
WEB	W. E. B. Water Development Association
WILLI RWA	Williams Rural Water Association
WILSTN BAS PL	Williston Basin Interstate Pipeline Company
WLSH RWD	Walsh Water Rural Water District
WOLVRTN TEL	Wolverton Telephone
XLENER	Xcel Energy
YSVR	Yellowstone Valley Railroad

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LINE STYLES

D-101-20

Existing Topography

- Existing Ground Void
- Existing Cemetary Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter
- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

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

Traffic Utilities

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

Sign Structures

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

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LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

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

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

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

Environmental

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

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SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

Right of Way Marker (Exst, Ppsd, Reset)

Existing Federal Reference Corner

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

Existing Witness Corner

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

Existing Traverse PI Aerial Panel

Existing Reference Marker Point NGS

Existing EFB Misc

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

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

KIRK J. HOFF
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ENGINEER
NORTH DAKOTA

Kirk J Hoff

12 18 2020

SYMBOLS

D-101-31

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

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

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

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12 18 2020

SYMBOLS

D-101-32

- Existing Luminaire
- Luminaire LED
- Existing Light Standard Luminaire
- Relocate Light Standard
- Light Standard Light LED Luminaire
- Light Standard 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 50 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 70 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 200 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 250 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 310 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 700 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Emergency Vehicle Detector
- Video Detection Camera

- High Mast Light Standard 3 Luminaire (Exst, Ppsd)
- High Mast Light Standard 4 Luminaire (Exst, Ppsd)
- High Mast Light Standard 5 Luminaire (Exst, Ppsd)
- High Mast Light Standard 6 Luminaire (Exst, Ppsd)
- High Mast Light Standard 7 Luminaire (Exst, Ppsd)
- High Mast Light Standard 8 Luminaire (Exst, Ppsd)
- High Mast Light Standard 9 Luminaire (Exst, Ppsd)
- High Mast Light Standard 10 Luminaire (Exst, Ppsd)
- Overhead Sign Structure Load Center (Exst, Ppsd)
- Traffic Signal Controller (Exst, Ppsd)
- Pad Mounted Traffic Signal Controller (Exst, Ppsd)
- Flashing Beacon (Exst, Ppsd)
- Concrete Foundation (Exst, Ppsd)
- Pipe Mounted Flasher (Exst, Ppsd)
- Pad Mounted Feed Point (Exst, Ppsd)
- Pipe Mounted Feed Point with Pad (Exst, Ppsd)
- Pole Mounted Feed Point (Exst, Ppsd)
- Junction Box (Exst, Ppsd)
- Existing Pedestrian Head with Number
- Existing Signal Head
- Pole Mounted Head
- Existing Lighting Standard Pole

- Existing Traffic Signal Standard
- Pull Box (Exst-Ppsd-Undefined)
- Intelligent Transportation Pull Box (Exst, Ppsd)
- Transformer (Exst, Ppsd)
- Power Pole (Exst-Ppsd-with Transformer)
- Wood Pole (Exst, Ppsd)
- Pedestrian Push Button Post (Exst, Ppsd)
- Existing Pole
- Existing Telephone Pole
- Existing Post
- Connection Conductor (Ground, Neutral, Phase 1, Phase 2)

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

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12 18 2020

SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

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

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

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

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

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

Existing Curb Inlet (Round, Square)

Existing Slotted Reinforced Concrete Pipe

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

Inlet Mountable Curb (Type A, Type B)

Inlet Saddle Base (Type 1, Type 2)

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

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

Median Drain

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

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

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

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

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

Pump
Sanitary, Storm Drain, Exst Water

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

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

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

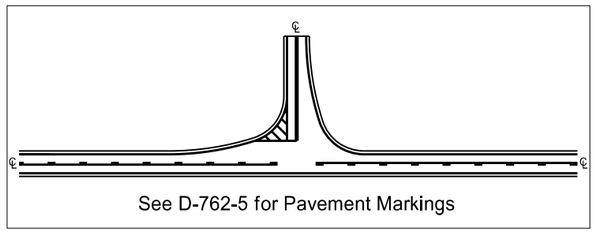
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
12-18-20	General Revisions Sheet added - Continued from D-101-32

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NORTH DAKOTA

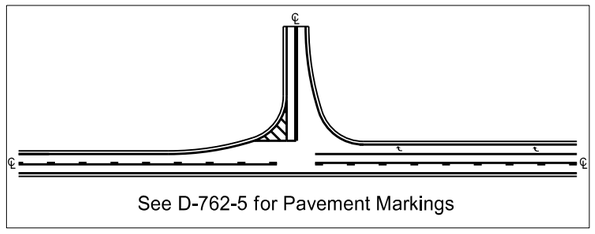
12 18 2020

STANDARD 90 DEGREE FLARED INTERSECTION

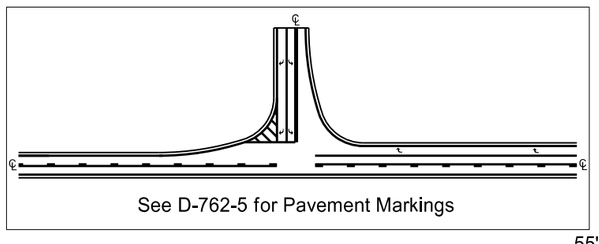
(No Center Left Turn Lane on Major Road)



Type A
(No turn lanes present)



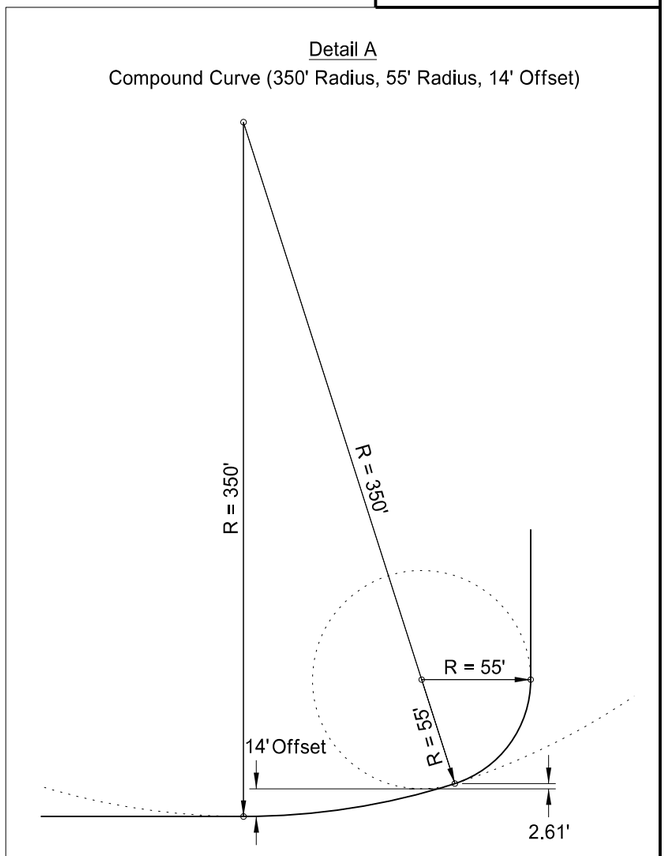
Type B
(Right Turn Lane on Major Road)



Type C
(Right Turn Lane on Major road, and Turn Lane on Minor Road)

Detail A

Compound Curve (350' Radius, 55' Radius, 14' Offset)



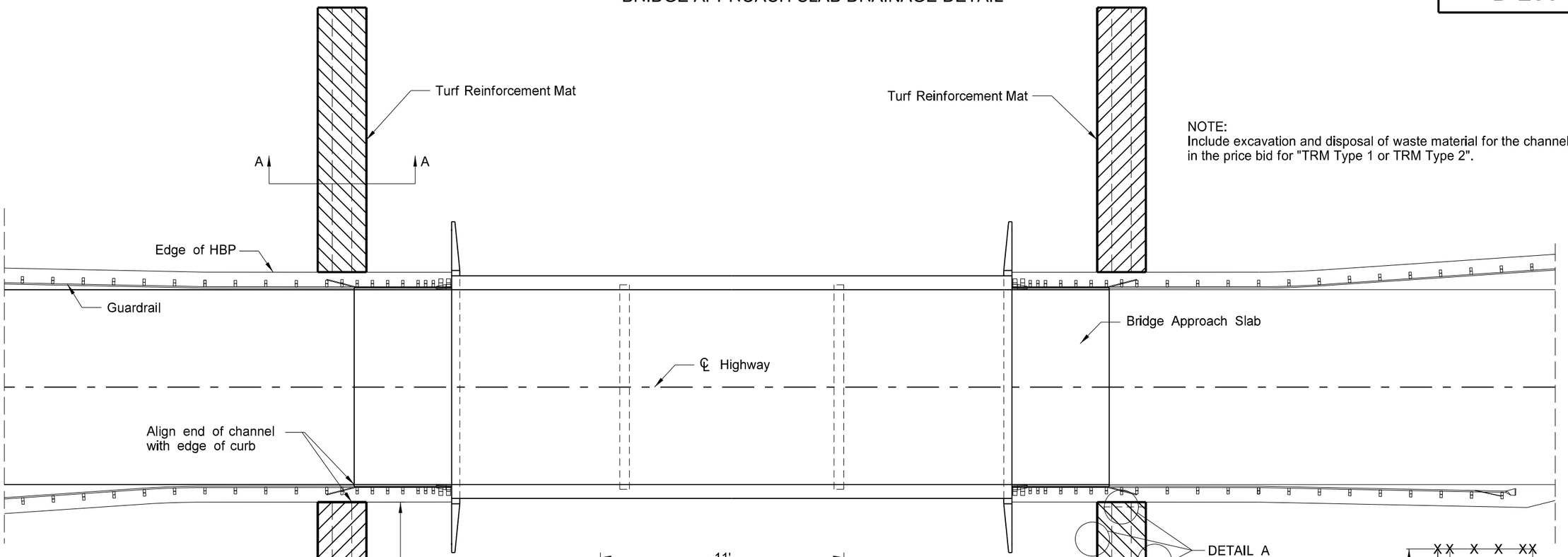
- ◦ Radius Tangent Point
- ⊢ xx.x' ⊣ Pavement widths
- ——— Proposed Pavement

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17	Corrected Pvmt Mkg Std reference.
8-30-18	Corrected pvmt mkg layouts.
10-25-19	Added Detail A ref to appr left side

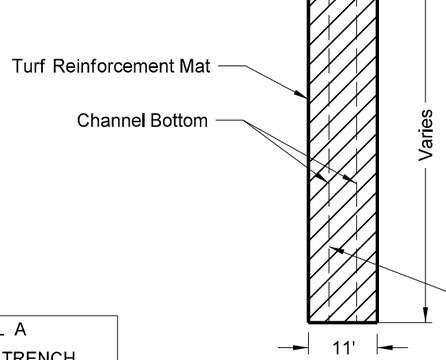
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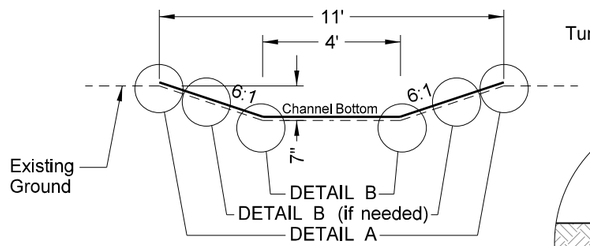
BRIDGE APPROACH SLAB DRAINAGE DETAIL

D-255-1

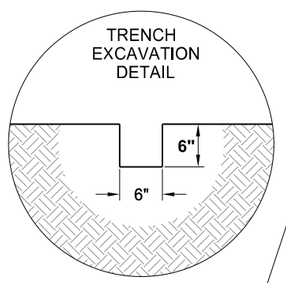


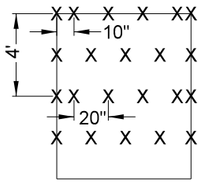
NOTE:
Include excavation and disposal of waste material for the channel in the price bid for "TRM Type 1 or TRM Type 2".



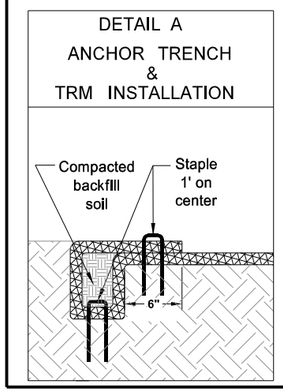


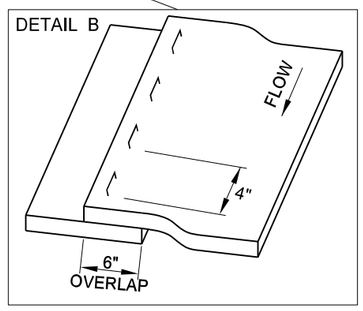
SECTION A-A

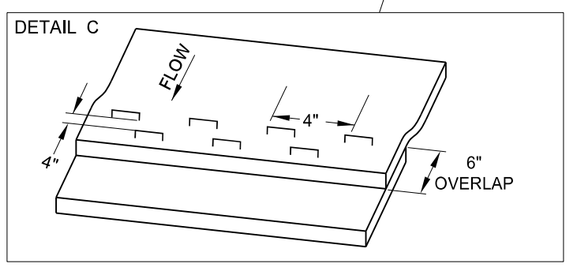




STAPLE PATTERN: 3.8 staples per square yard.





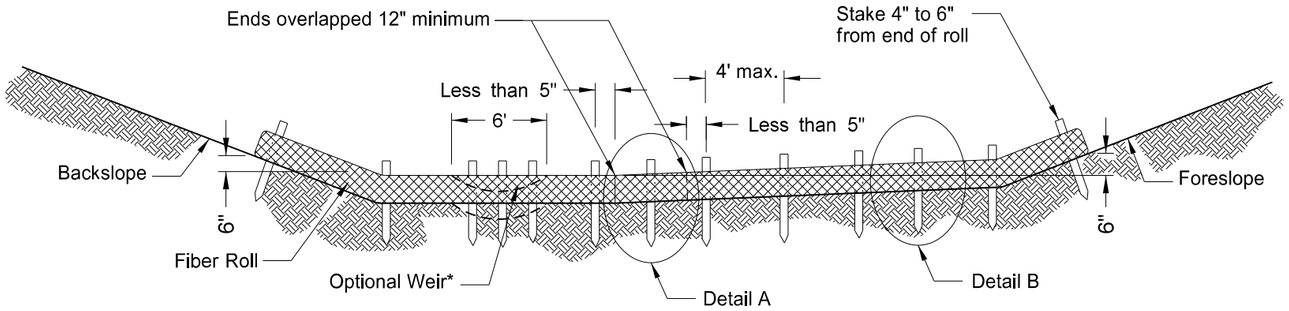


NOTES:
Don't place longitudinal seams along the channel bottom.
Top seam must be minimum 0.5' above the channel bottom.

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

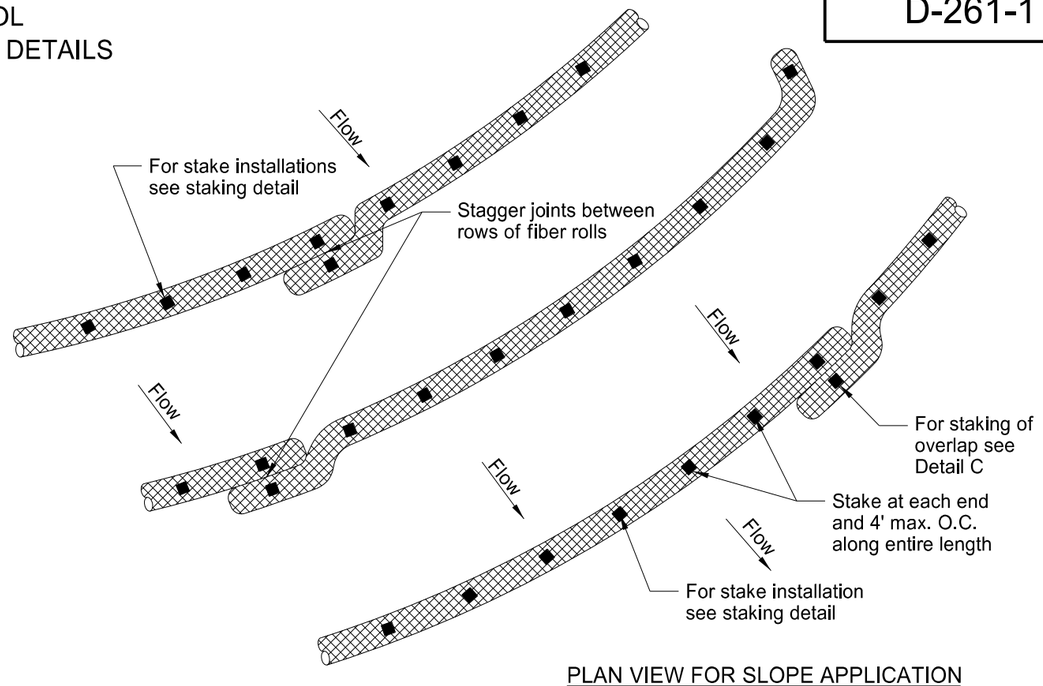
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EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

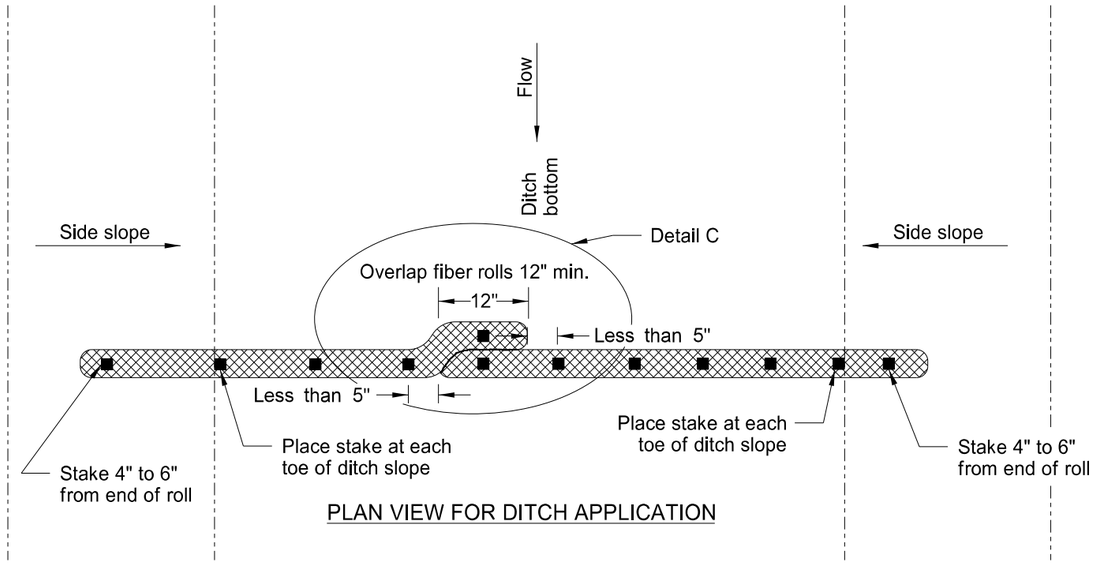


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

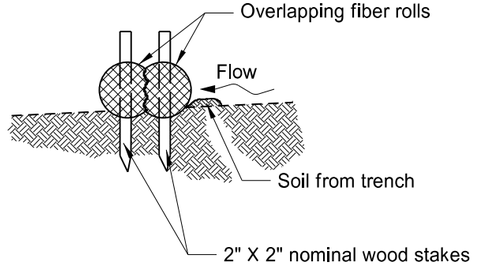
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

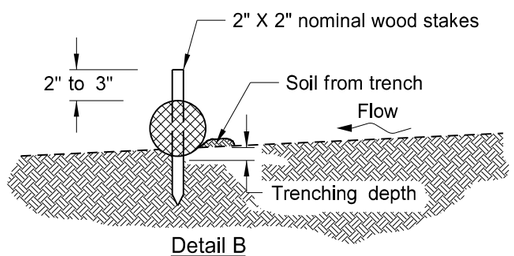


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

11-18-10

REVISIONS

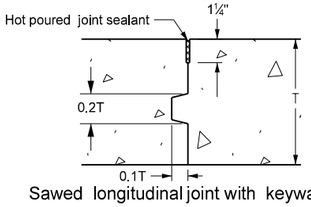
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp

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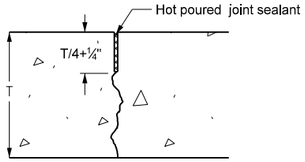
LONGITUDINAL JOINT DETAILS

D-550-2

UNTIED JOINTS

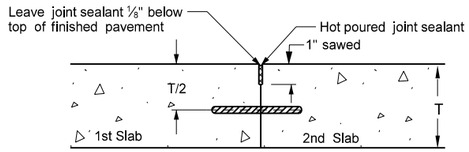


Sawed longitudinal joint with keyway



Sawed longitudinal joint without keyway

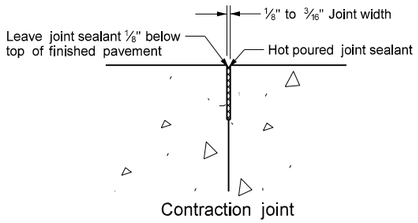
TIED JOINTS



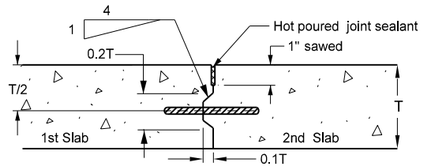
Longitudinal construction joint (tied butt joint)

Notes:

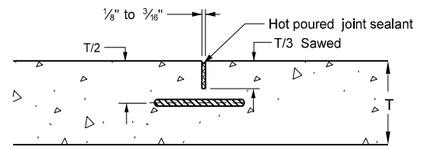
1. Provide hot poured joint sealant meeting the requirements of Section 826.02A.2 of the Standard Specifications.
2. Include all costs of the longitudinal joint and seal in the price bid for the PCC pavement.
3. Do not place tie bars within 18 inches of a transverse skewed joint.
4. Use Grade 40 steel for tie bars installed bent and later straightened.
5. Increase the tie bar spacing up to 10%, when necessary to facilitate construction.
6. Place tie Bars at a 48 inch maximum spacing.
7. A "Warp" joint is a sawed joint or a construction joint with a keyway.
8. A "Butt joint" is a construction joint with no keyway.



Contraction joint



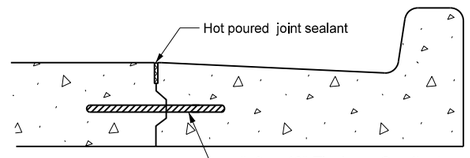
Longitudinal construction joint (tied keyed joint)



Sawed longitudinal joint

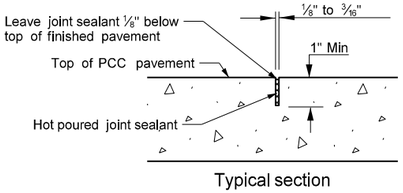
TIEBAR SPACINGS (In)

BAR SIZE / GRADE STEEL / BAR LENGTH / DIST TO FREE EDGE (FT) / JOINT TYPE / PVMT THICKNESS		# 3 BAR										# 4 BAR												# 5 BAR												# 6 BAR											
		GRADE 40				GRADE 60						GRADE 40					GRADE 60							GRADE 40						GRADE 60						GRADE 40						GRADE 60					
		24"				30"						24"					36"							30"						42"						36"						48"					
		4	6	8	10	4	6	8	10	12	14	8	10	12	14	16	8	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	22	24	10	12	14	16	19	22	24	10	12	14	16	19	22	24
6"	WARP		48	39			48	48				48					48																															
	BUTT		37	27			48	42				48					48																															
8"	WARP	48	39	29	24	48	48	44	35	29	25	48	42	35	30	26	48	48	48	45	39	28	26	48	48	47	41	30	27	48	48	48	48	45	41	48	48	48	48	48	43	39	48	48	48	48	48	48	48
	BUTT	42	27			48	42	31	25			37	29	24			48	44	37	32	27			46	39	33	29			48	48	48	43	32	29	48	48	48	48	35	30	27	48	48	48	48	48	45	41
8½"	WARP	48	37	28		48	48	42	33	28	24	48	39	33	28	24	48	48	48	42	37	27	24	48	48	44	38	28	25	48	48	48	48	42	38	48	48	48	48	47	40	37	48	48	48	48	48	48	48
	BUTT	39	26			44	39	29				35	27				48	42	35	29	26			44	36	31	27			48	48	47	41	30	27	48	48	45	39	33	28	26	48	48	48	48	48	42	39
9"	WARP	48	35	26		48	48	39	31	26		47	37	31	26		48	48	47	40	35	25		48	48	42	36	26	24	48	48	48	48	40	36	48	48	48	48	44	38	35	48	48	48	48	48	48	48
	BUTT	37	24			48	37	27				33	26				48	40	33	28	25			41	34	29	25			48	48	44	39	28	25	48	48	42	37	31	26	24	48	48	48	48	47	40	37
9½"	WARP	48	33	25		48	48	37	30	25		44	35	29	25		48	48	44	38	33	24		48	46	39	34	25		48	48	48	48	38	34	48	48	48	48	42	36	33	48	48	48	48	48	48	48
	BUTT	35				48	35	26				31	25				47	37	31	27				39	32	27	25			48	48	42	37	27	24	48	47	40	35	29	25		48	48	48	48	44	38	35
10"	WARP	47	31			48	47	35	28			42	34	28	24		48	48	42	36	31			48	44	37	33	24		48	48	48	48	36	33	48	48	48	48	40	34	31	48	48	48	48	48	48	47
	BUTT	33				48	33	25				29	24				45	36	29	25				37	31	26	24			48	46	40	35	25		48	45	38	33	28	24		48	48	48	48	42	36	33
10½"	WARP	45	30			48	45	34	27			40	32	26			48	48	40	34	30			48	42	36	31			48	48	48	47	34	31	48	48	48	48	45	38	33	30	48	48	48	48	48	48	45
	BUTT	32				48	32	24				28					42	34	28	24				35	29	25				48	44	38	33	24		48	42	36	32	27			48	48	48	48	40	34	31
11"	WARP	43	28			48	43	32	26			38	31	25			48	46	38	33	28			48	40	34	30			48	48	48	45	32	30	48	48	48	43	36	31	28	48	48	48	48	48	47	43
	BUTT	30				46	30					27					40	32	27					34	28	24				48	42	36	32			48	40	35	30	25			48	48	48	46	38	33	30
11½"	WARP	41	27			48	41	31	24			36	29	24			48	44	36	31	27			46	38	32	28			48	48	48	43	31	28	48	48	47	41	34	30	27	48	48	48	48	48	45	41
	BUTT	29				44	29					25					39	31	25					32	27					48	40	35	30			46	39	33	29	24			48	48	48	44	37	31	29
12"	WARP	39	26			48	39	29				35	28				48	42	35	30	26			44	36	31	28			48	48	47	41	30	27	48	48	45	40	33	28	26	48	48	48	48	48	43	39
	BUTT	27				42	27					25					37	30	25					31	25					46	39	33	29			45	37	32	28				48	48	48	42	35	30	27
12½"	WARP	38	25			48	38	28				33	27				48	40	33	29	25			42	35	30	26			48	48	45	39	28	26	48	48	43	38	32	27	25	48	48	48	48	48	41	38
	BUTT	27				40	27					25					35	28						29	25					44	37	32	27			42	35	30	27				48	48	45	40	34	29	26
13"	WARP	36	24			48	36	27				32	26				48	39	32	27	24			40	33	29	25			48	48	43	38	27	25	48	48	41	36	30	26	24	48	48	48	48	46	40	36
	BUTT	25				38	25					24					34	27						28						42	35	30	27			41	34	29	25				48	48	44	38	32	28	25
13½"	WARP	35				48	35	26				31	25				47	37	31	26				39	32	28	24			48	48	42	36	26	24	48	47	40	35	29	25		48	48	48	48	44	38	35
	BUTT	25				37	25					24					33	26						27						41	34	29	25			39	33	28	25				48	48	42	37	31	27	24
14"	WARP	34				48	34	25				30	24				45	36	30	25				37	31	27				48	47	40	35	25		48	45	38	34	28	24		48	48	48	48	43	37	34
	BUTT	24				35	24					23					32	25						26						39	33	28	25			38	32	27	24				48	47	40	35	30	26	
14½"	WARP	32				48	32	24				29					43	35	29	25				36	30	26				48	45	39	34	24		48	43	37	32	27			48	48	48	48	41	35	32
	BUTT					34						22					30	25						25						38	32	27	24			36	30	26					48	46	39	34	29	25	
15"	WARP	31				47	31					28					42	33	28	24				35	29	25				48	44	37	33	24		48	42	36	31	26			48	48	48	47	40	34	31
	BUTT					33						21					29							25						37	31	26				35	29	25					48	44	38	33	28	24	



Curb and gutter sections

JOINT SEALER DETAILS



Typical section

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-15-2010

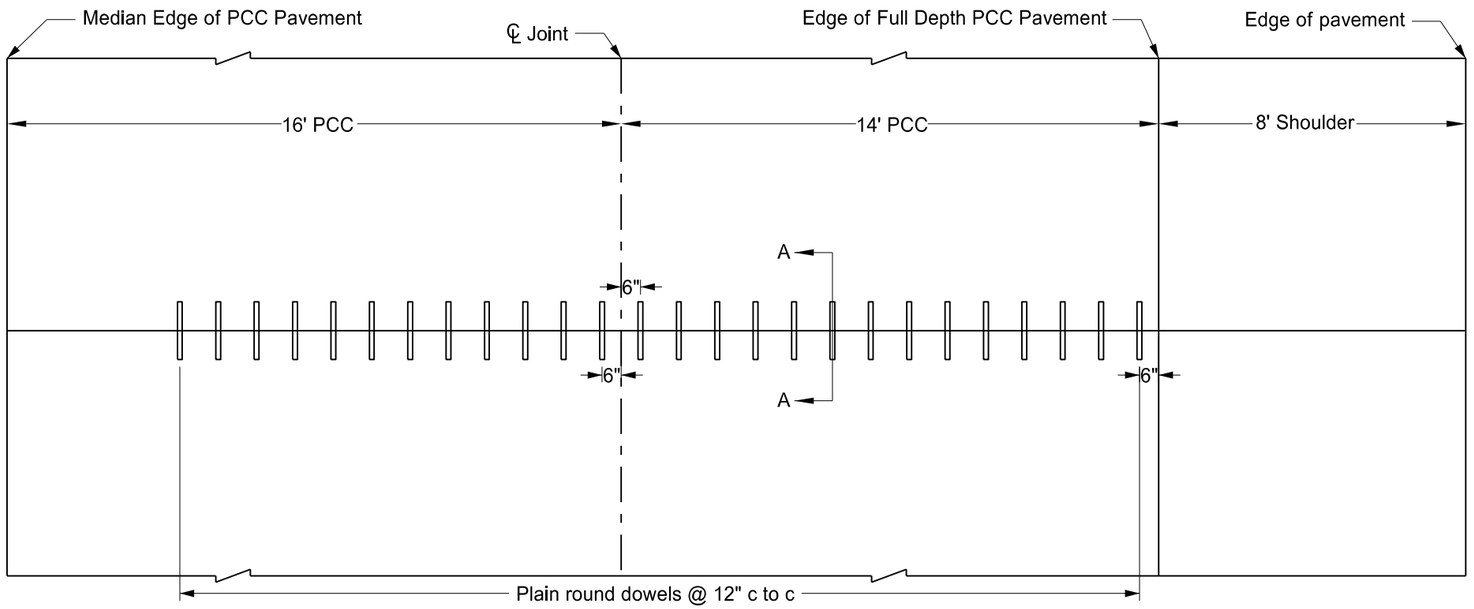
REVISIONS

DATE	CHANGE
10/23/2012	Expanded Tie Bar Table
03/16/2016	Updated Jt Details & notes
10/25/2019	Corrected "Typo" in Note 3

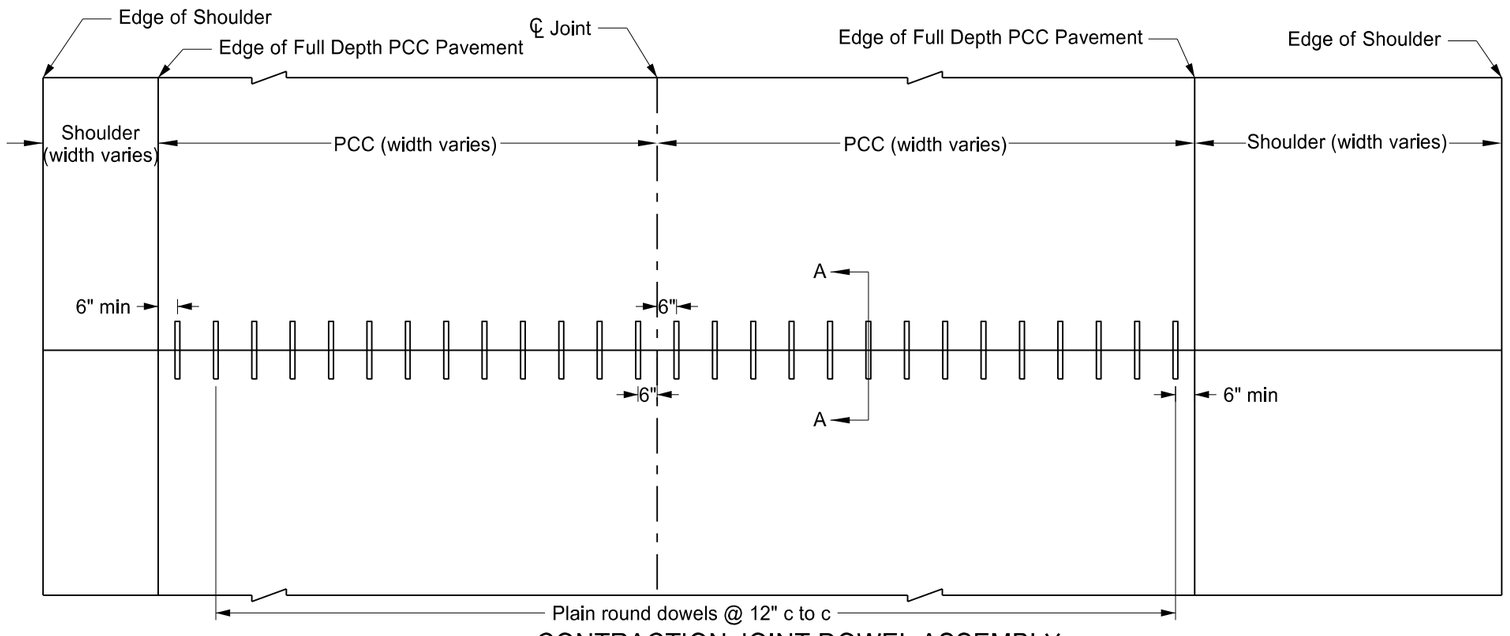
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TRANSVERSE CONTRACTION JOINT DETAILS

D-550-3



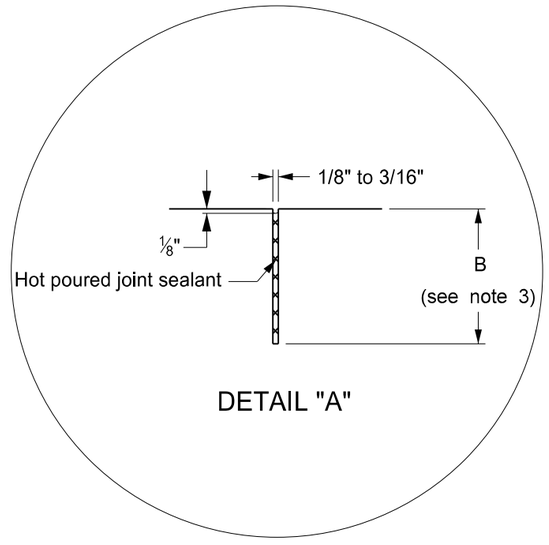
CONTRACTION JOINT DOWEL ASSEMBLY
INTERSTATE



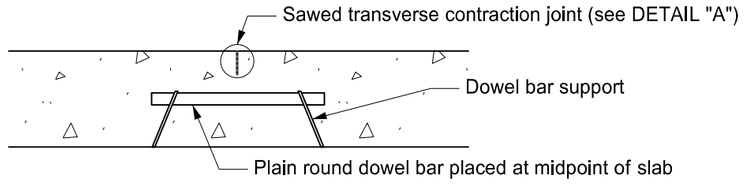
CONTRACTION JOINT DOWEL ASSEMBLY
NON-INTERSTATE

Notes

1. The joint seal details apply to both doweled and non-doweled (plain) transverse joints.
2. T = Thickness of pavement.
3. B = T/4 + ¼" for AE or YE for non-dowelled concrete pavement or
   B = T/3 for AAE or dowelled concrete pavement



DETAIL "A"



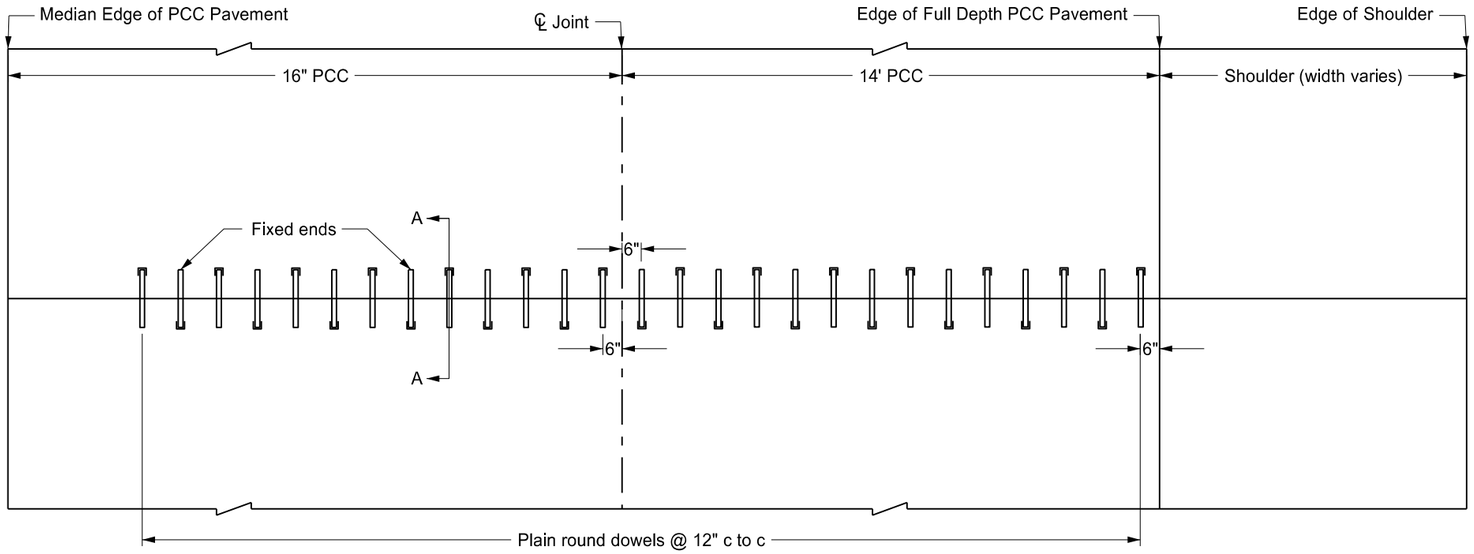
SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-10	
REVISIONS	
DATE	CHANGE
6/23/2014	Removed dowel size reference
3/16/2016	Revised Joint Details and notes
10/25/2019	Expanded Details for clarity

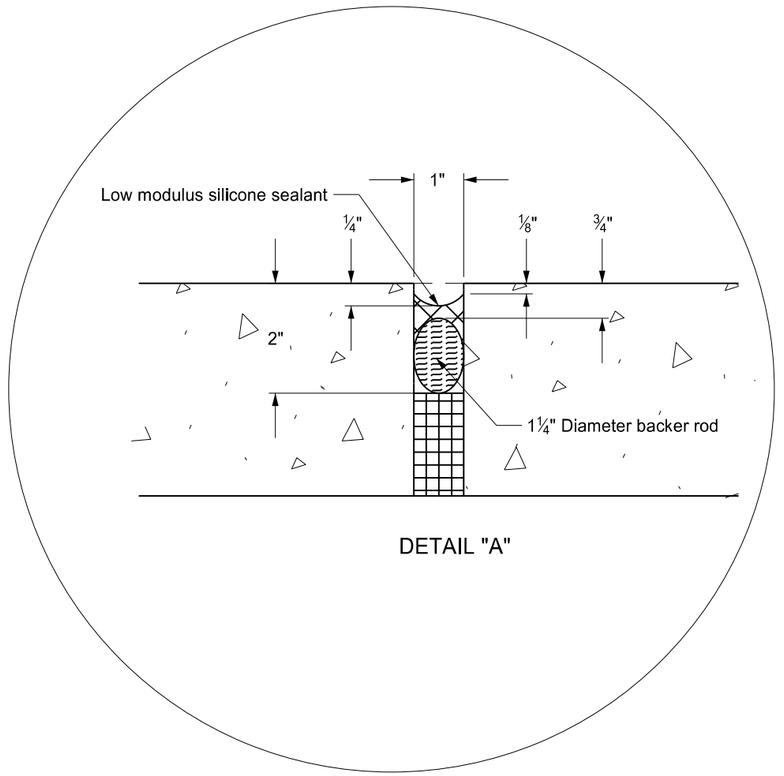
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TRANSVERSE EXPANSION JOINT DETAIL

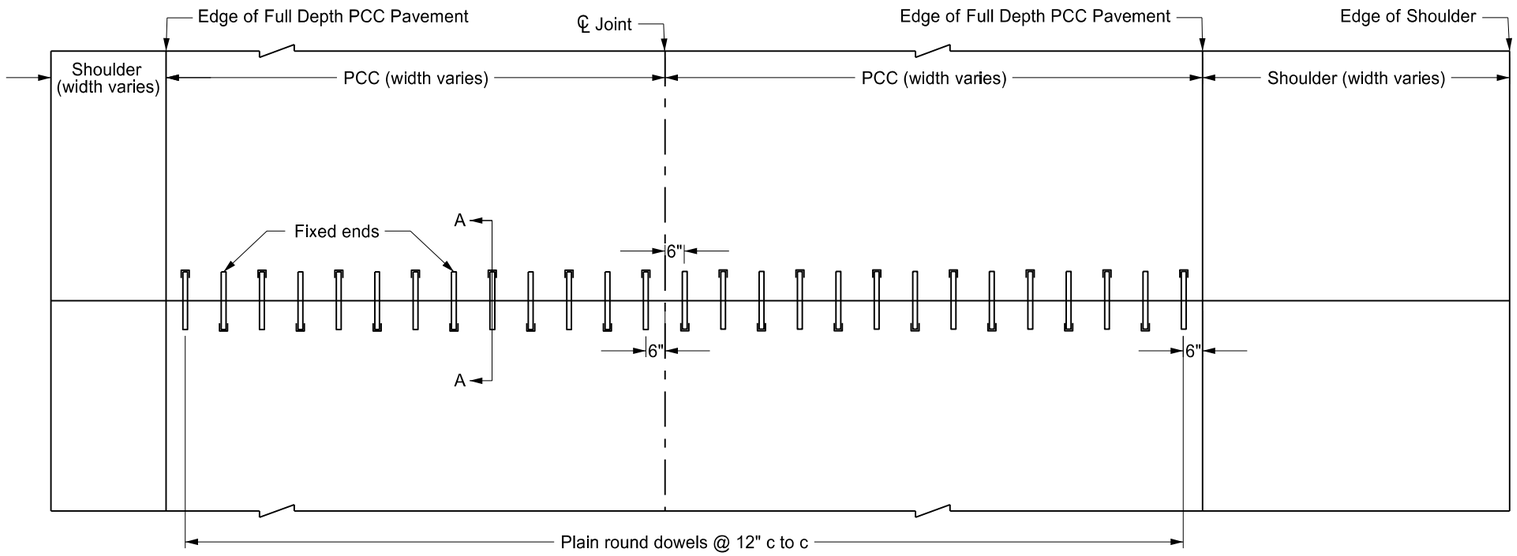
D-550-4



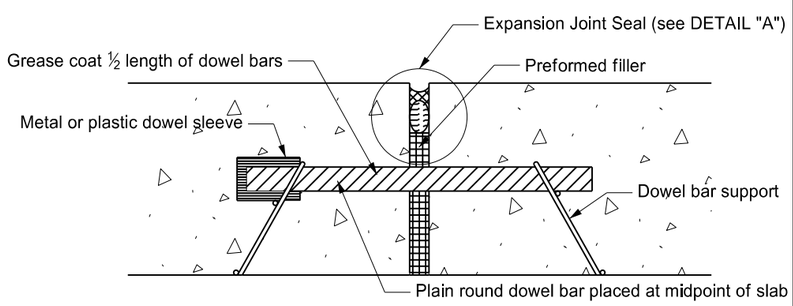
DOWELED EXPANSION JOINT ASSEMBLY
INTERSTATE



DETAIL "A"



DOWELED EXPANSION JOINT ASSEMBLY
NON-INTERSTATE



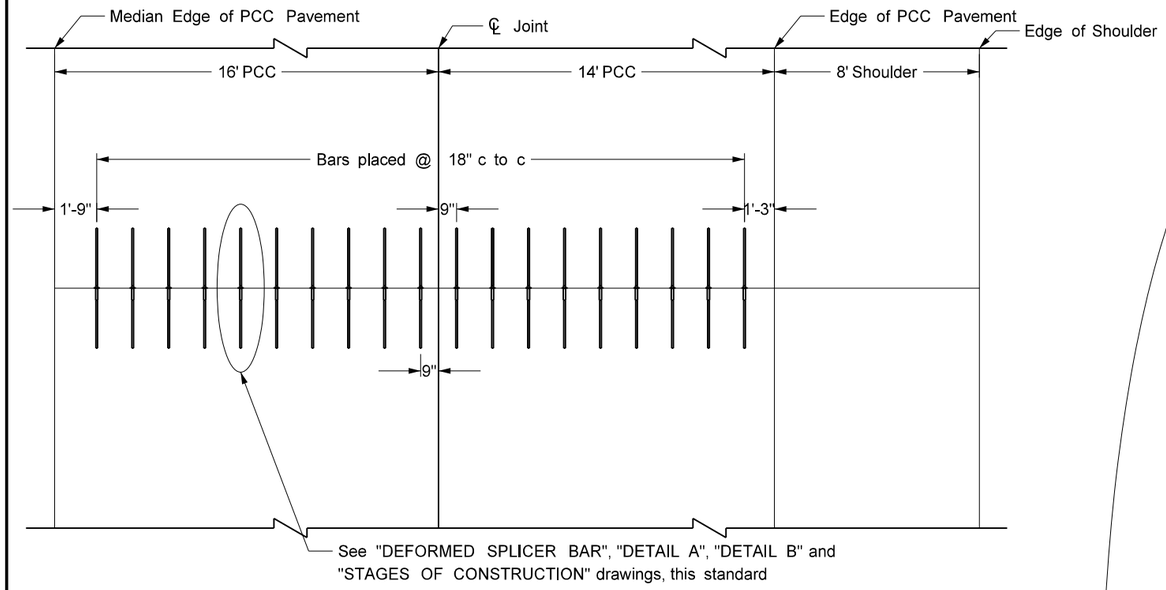
SECTION A-A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
6/23/2014 10/25/2019	Removed dowel bar sizes Expanded details for clarity

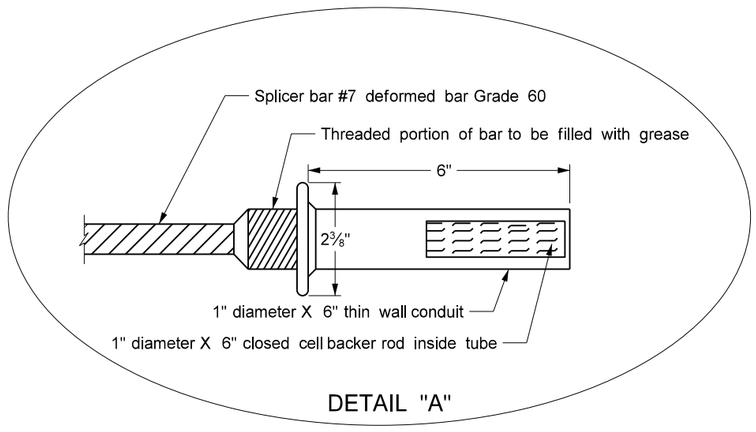
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TRANSVERSE CONSTRUCTION JOINT

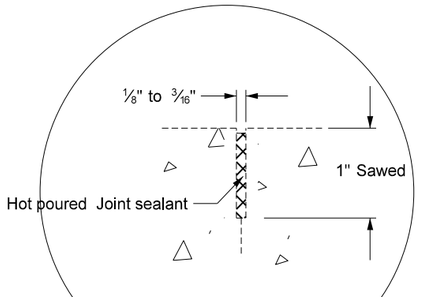
D-550-5



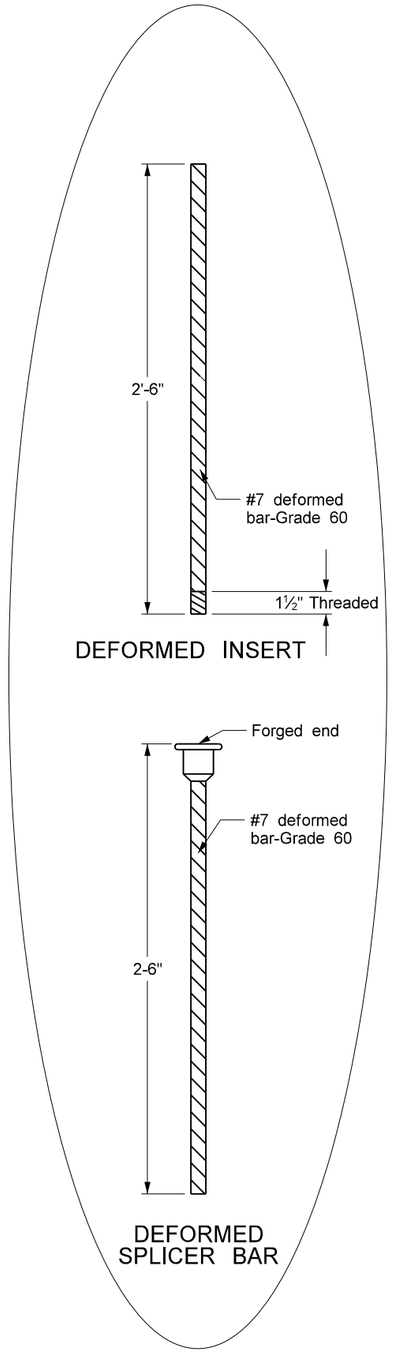
PLAN VIEW



DETAIL "A"



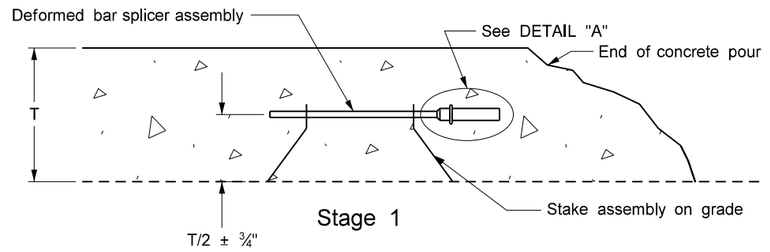
DETAIL "B"



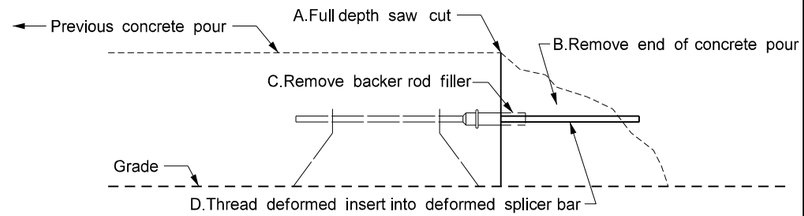
DEFORMED INSERT

DEFORMED SPLICER BAR

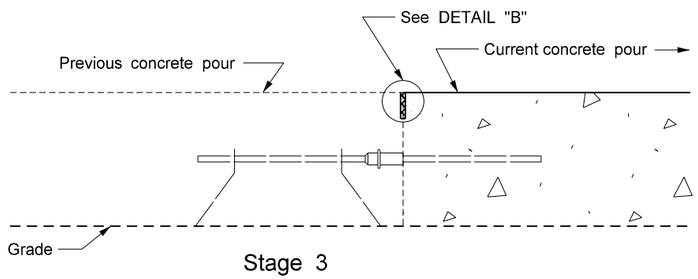
STAGES OF CONSTRUCTION



Stage 1



Stage 2



Stage 3

Notes

1. Saw and seal all construction joints.
2. Include all costs for transverse construction joints in the price bid for PCC pavement.
3. Do not saturate the subgrade during the sawing operation.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-15-2010	
REVISIONS	
DATE	CHANGE
3-16-16 8-27-19	Revised Joint Details & notes. New Design Engr PE Stamp.

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CONSTRUCTION SIGN DETAIL

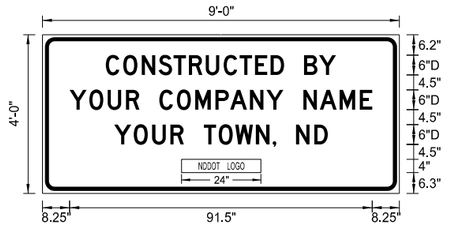
D-704-5

SIGN NUMBER	G20-10-108
WIDTH x HEIGHT	9'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Fluorescent Orange
LEGEND/BORDER	TYPE: Non-Refl
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
	42.1	6.2	24	4	0

STATION(S):

AREA: 36.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
C	O	N	S	T	R	U	C	T	E	D		B	Y					69.7	6	D 2000
19.2	24.5	30	35.1	39.7	44.3	49.4	54.8	59.7	64.3	69	73.1	79.1	83.7							
Y	O	U	R		C	O	M	P	A	N	Y		N	A	M	E		91.5	6	D 2000
8.3	14.2	19.8	25.3	29.4	35.4	40.7	46.2	52.4	56.8	62.8	67.8	72.9	78.9	83.9	89.9	96				
Y	O	U	R		T	O	W	N	,		N	D						64.6	6	D 2000
21.7	27.6	33.2	38.7	42.8	48.8	53.3	58.4	64.6	69.6	70.7	76.7	82.2								

Notes:

1. Post mount sign a distance of ½A following the End Road Work (G20-2-48) sign (maximum 2 signs per project.)

2. Use sign on rural projects with a 30 day or longer duration (not required on seal coats or other short duration projects.)

3. Do not place sign in urban areas or within city limits.

Advance Warning Sign Spacing (A)			
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	
8-22-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revise sheeting to type IV.
9-27-17	Updated to active voice.
8-30-18	Updated sign number in note 1.
10-03-19	New Design Engineer PE Stamp.

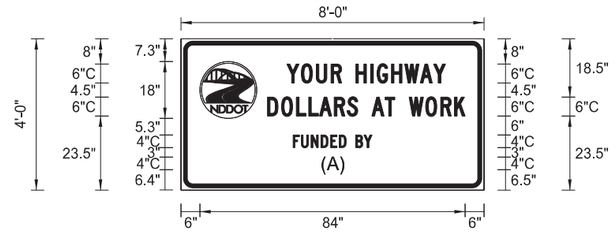
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CONSTRUCTION SIGN DETAILS
PROJECT FUNDING SIGN

SIGN NUMBER	I2-5-96
WIDTH X HEIGHT	8'-0" x 4'-0"
BORDER WIDTH	1.25" (inset 0.75")
CORNER RADIUS	3"
MOUNTING	Ground
BACKGROUND	TYPE: XI Reflective
	COLOR: White
LEGEND/BORDER	TYPE: Non-reflective
	COLOR: Black

SYMBOL	X	Y	WID	HT	ANGLE
ND_CIRCLE_LOGO	6	22.8	18	18	0
	44.2	4.2	7.5	8.6	0

STATION(S): AREA: 32.0 Sq.Ft.



Dimensions are in inches.tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_Reg_48_Large.ssi

LETTER POSITION (X)																			LENGTH	SIZE	SERIES
Y	O	U	R	H	I	G	H	W	A	Y									50.3	6	C 2000
33.5	38.1	42.8	47.5	55.4	60.1	62.1	66.7	70.9	75.8	80											
D	O	L	L	A	R	S	A	T	W	O	R	K							62.6	6	C 2000
27.4	31.8	36.5	40.4	43.9	48.5	52.6	60.5	64.7	72.2	77.5	82.3	86.6									
F	U	N	D	E	D	B	Y												25	4	C 2000
35.5	38.1	41.2	44.3	47.4	50.1	55.3	57.9														

(A)

FUNDING SOURCE MESSAGE VARIATIONS
FEDERAL
STATE
FEDERAL - STATE
FEDERAL - LOCAL
FEDERAL - STATE - LOCAL
STATE - LOCAL

Use a horizontal spacing of 3" between words and hyphens. Center message horizontally in sign panel.

Notes:

1) Contact the Communications Division of the NDDOT to obtain a copy of the image for the NDDOT Logo.

2) Contact Project Engineer for funding source message.

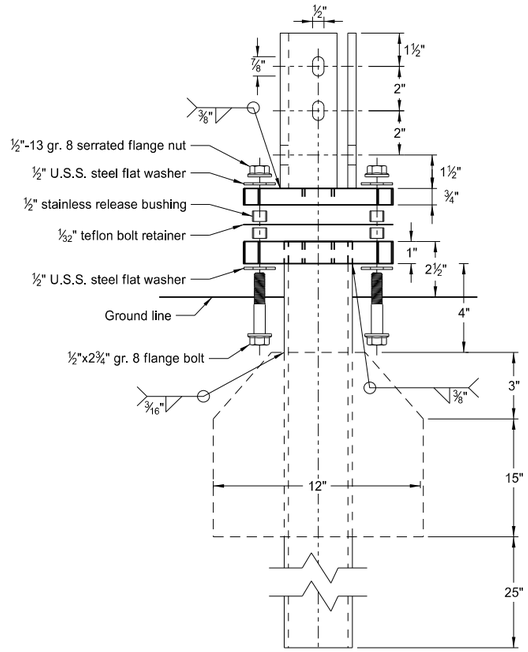
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-08-21	
REVISIONS	
DATE	CHANGE

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

12/08/21

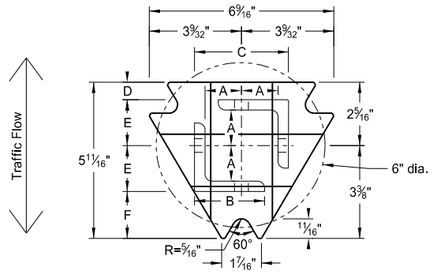
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

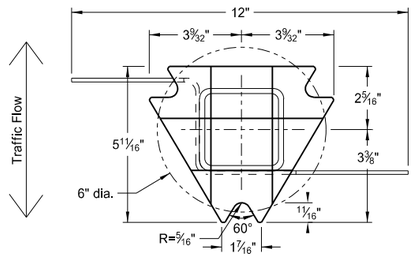


Multi-Directional
Slip Base Assembly

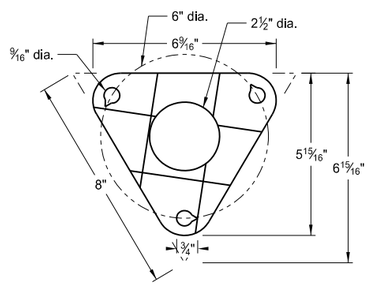
Perforated Tube



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



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



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

Notes:

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

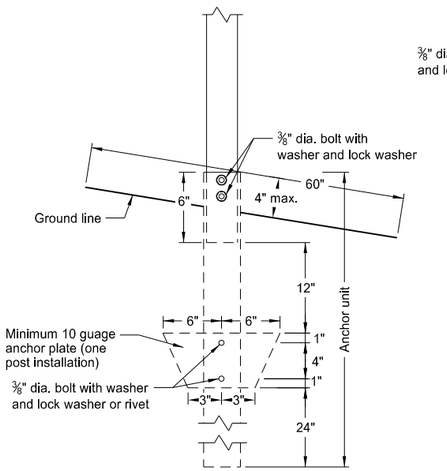
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½	12			Yes	
2	2½	12			Yes	
2	2¼	10	2	12	Yes	
2	2½	12	2¼	12	Yes	
3 & 4	2½	12			Yes	
3 & 4	2½	10			Yes	
3 & 4	2½	12	2¼	12	Yes	
3 & 4	2¼	12	2	12	Yes	
3 & 4	2½	10	2³/16	10	Yes	

Properties of Telescoping Perforated Tube						
Tube Size in.	Wall Thickness in.	U.S. Standard Gauge	Weight per Foot lbs.	Moment of Inertia in.⁴	Cross Sec. Area in.²	Section Modulus in.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2³/16 x 2³/16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.785

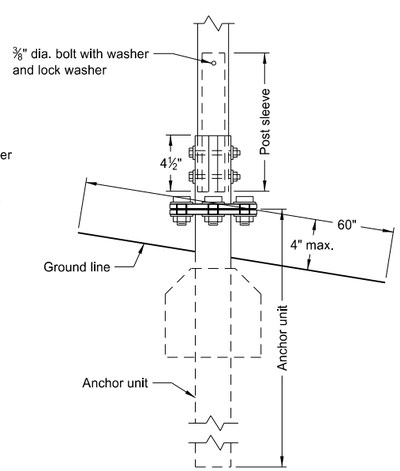
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³/16"x10 ga.	1⁹/64"	2½"	3¹/32"	2⁵/32"	1³³/64"	1⅞"
2½"x10 ga.	1⁹/32"	2½"	3⁵/16"	⅝"	1²¹/32"	1¾"

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

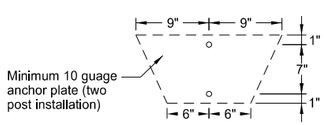
(B) For additional wind load, insert the 2³/16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



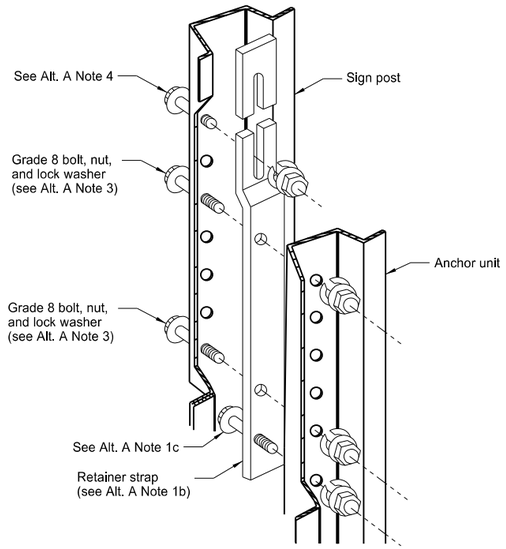
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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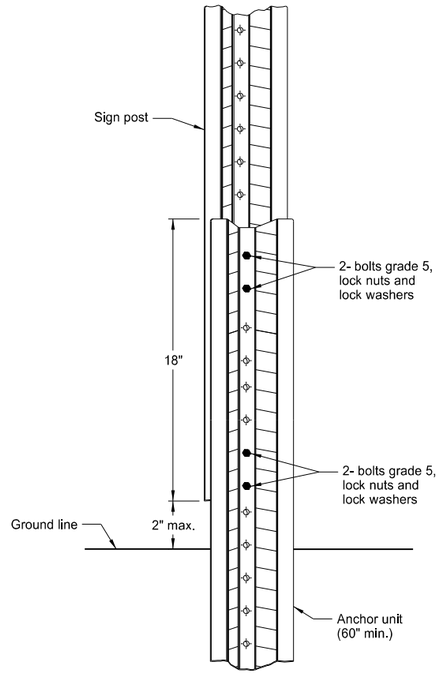
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post

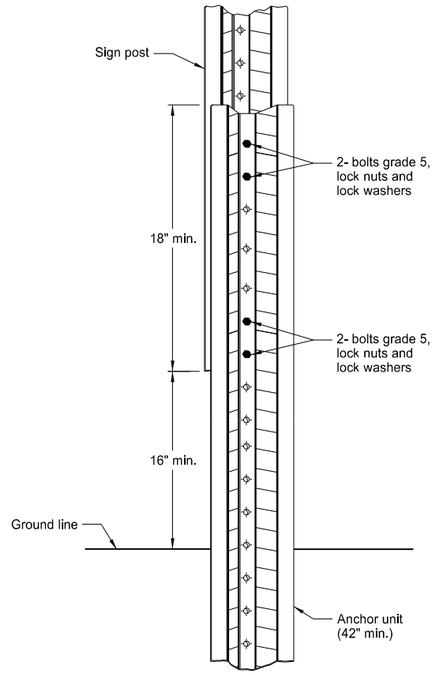


Detail A



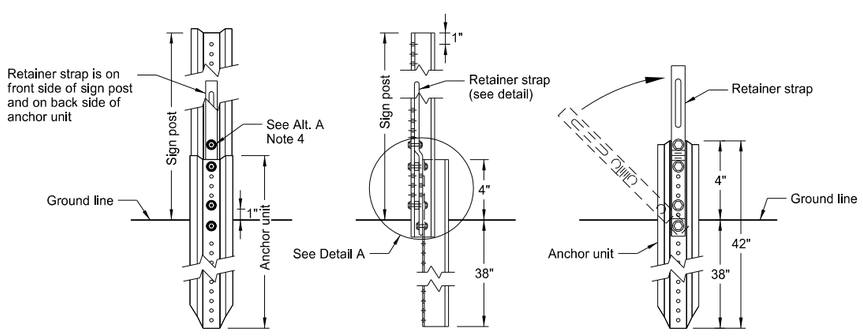
Breakaway U-Channel Splice Detail
Alternate B
(2.5 and 3 lb/ft)

Install a maximum of 3 posts within 7'.



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

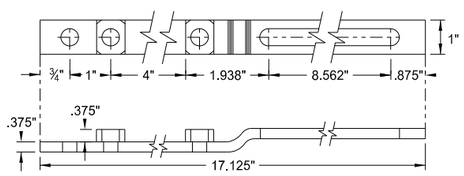
Install a maximum of 3 posts within 7'.



Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.



Retainer Strap Detail

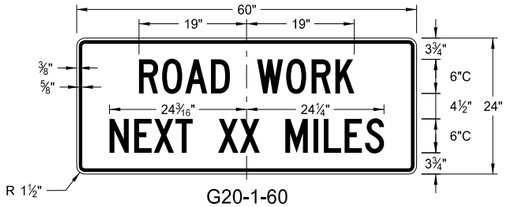
Alternate A Steps of Installation:

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

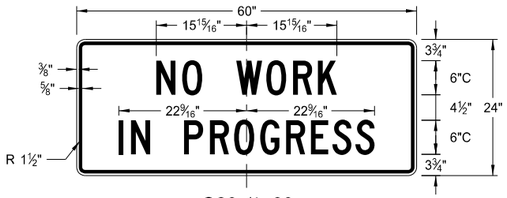
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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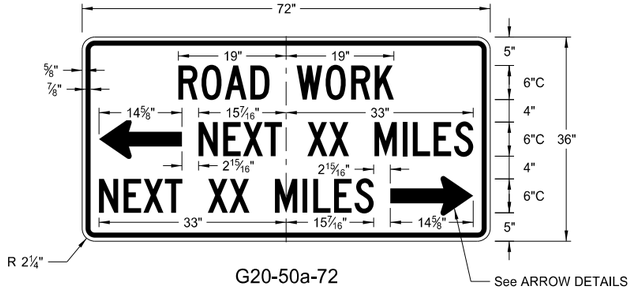
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



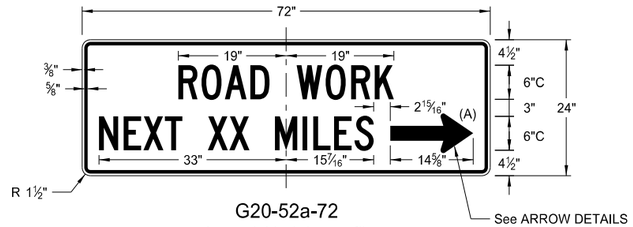
G20-1-60
Legend: black (non-refl)
Background: orange



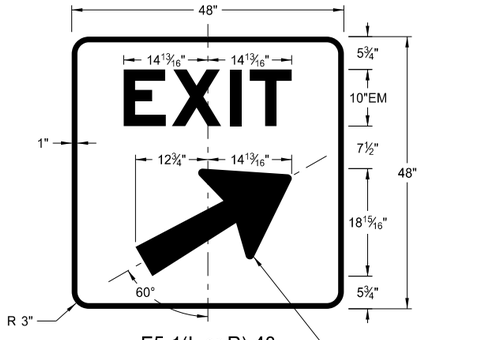
G20-1b-60
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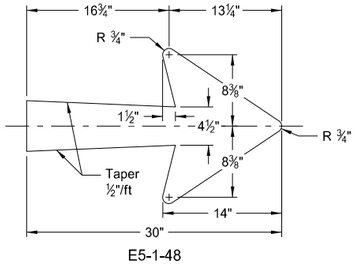
G20-50a-72
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Background: orange



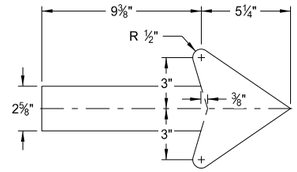
G20-52a-72
Legend: black (non-refl)
Background: orange



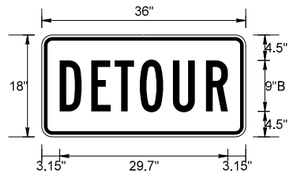
E5-1(L or R)-48
Legend: white
Background: green (orange optional)



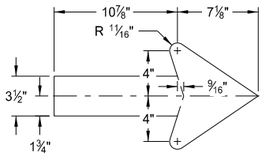
E5-1-48



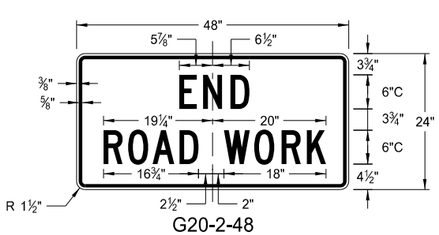
G20-50a-72
G20-52a-72



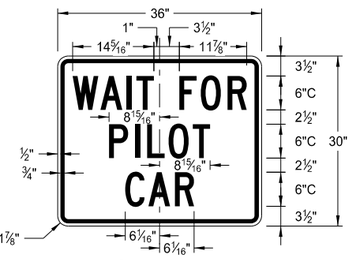
M4-8-36
Legend: black (non-refl)
Background: orange



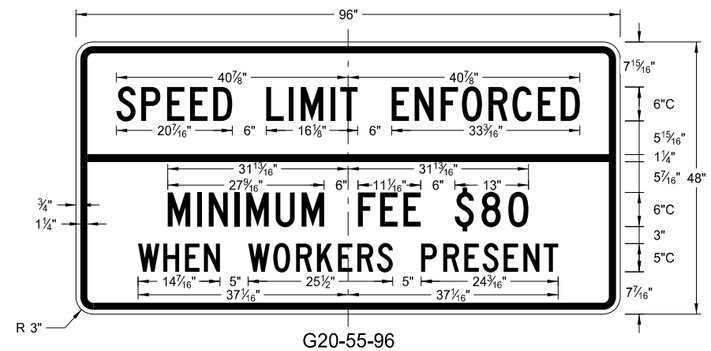
M4-9(L or R)-30
Right or Left



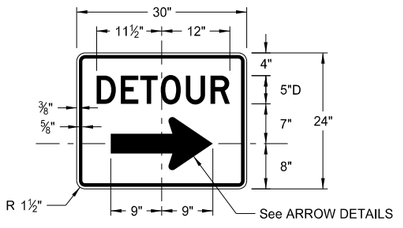
G20-2-48
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Background: orange



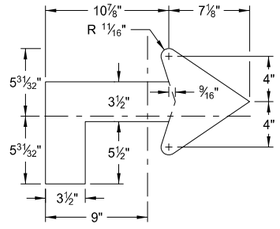
G20-4b-36
Legend: black (non-refl)
Background: orange



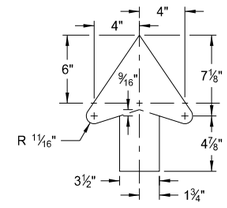
G20-55-96
Legend: black (non-refl)
Background: orange



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



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



M4-9-30
Straight

ARROW DETAILS

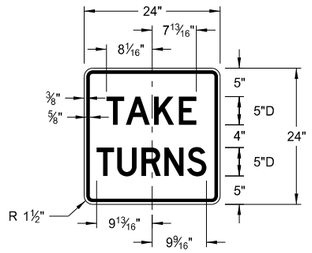
NOTES:

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

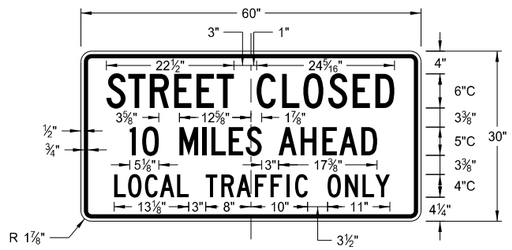
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Added sign & background color
10-03-19	New Design Engineer PE Stamp

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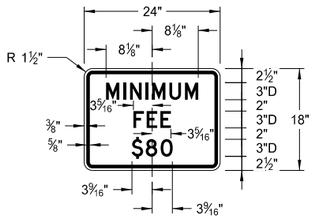
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



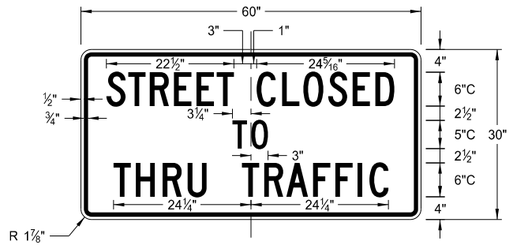
R1-50P-24
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Background: white



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



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



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

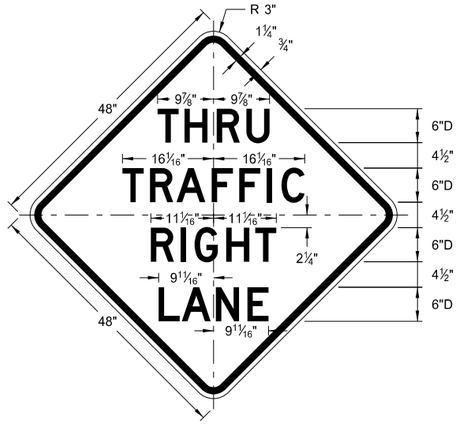


R11-2a-48
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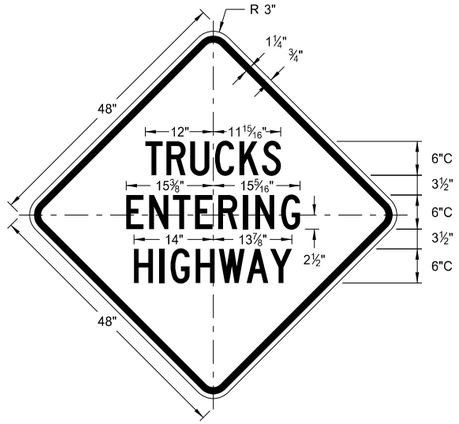
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

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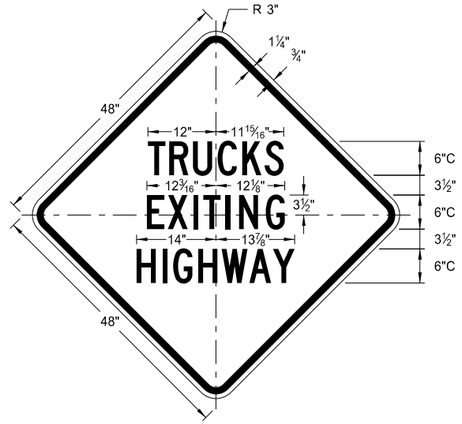
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



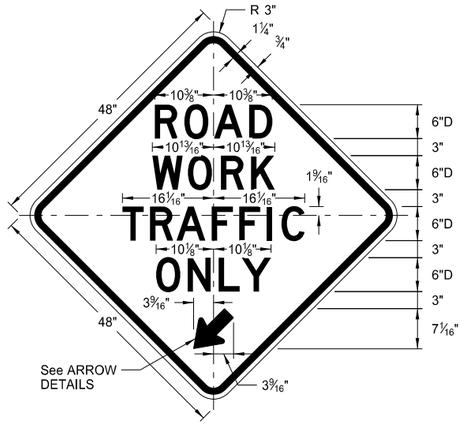
W5-8-48
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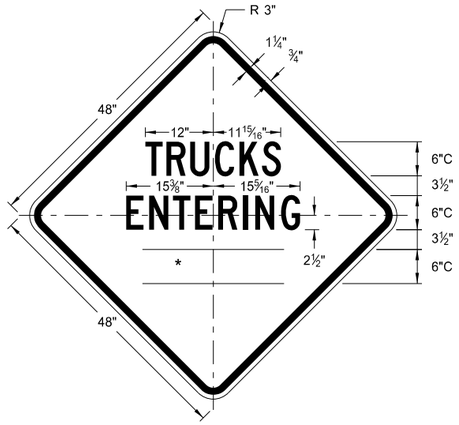
W8-53-48
Legend: black (non-refl)
Background: orange



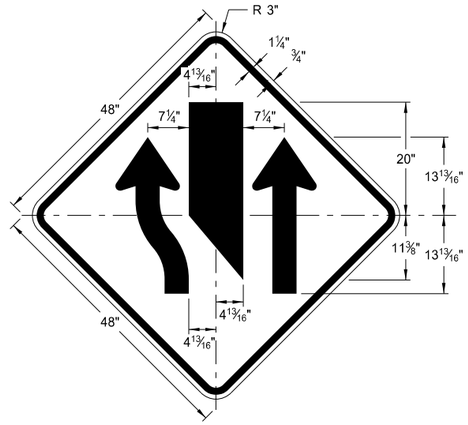
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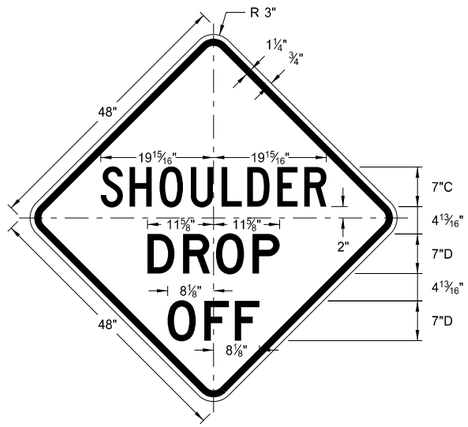
W5-9-48
Legend: black (non-refl)
Background: orange



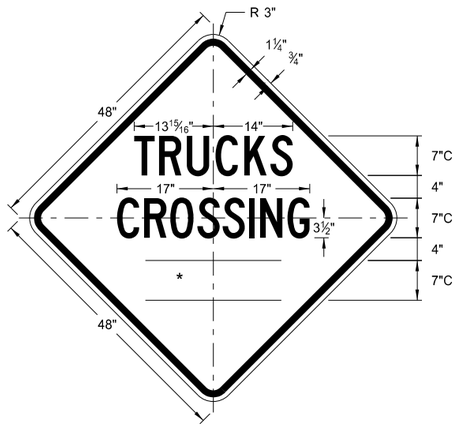
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Background: orange



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



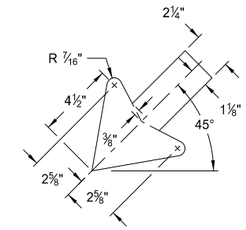
W8-9a-48
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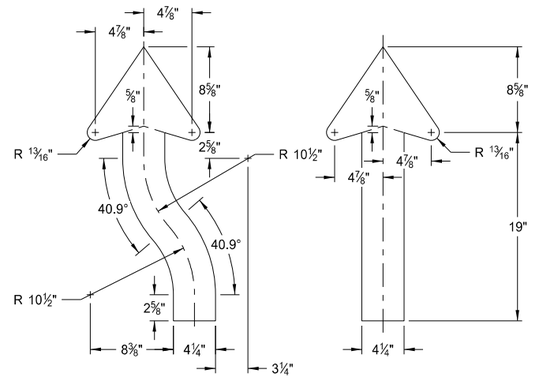
W8-55-48
Legend: black (non-refl)
Background: orange

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



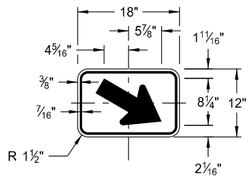
W9-3a-48

ARROW DETAILS

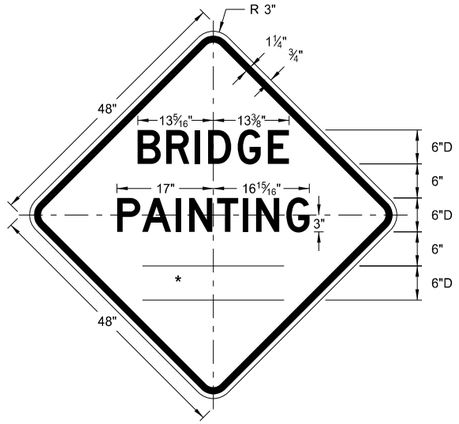
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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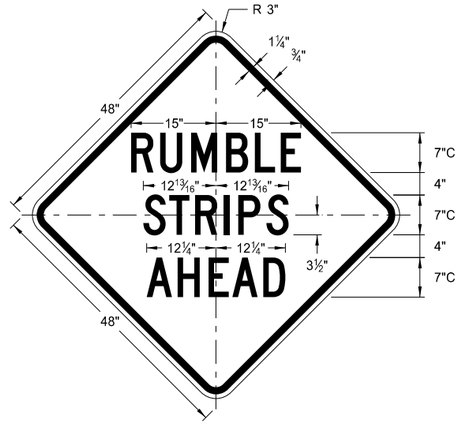
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



W16-7aP-18
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Background: orange



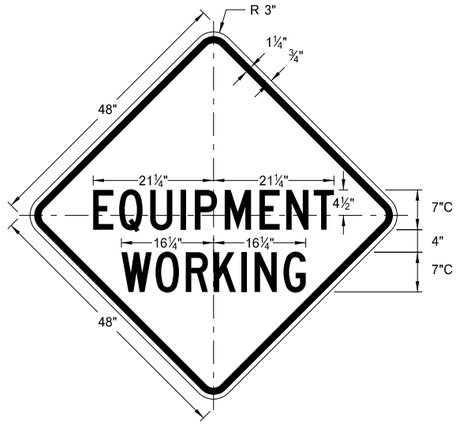
W21-50-48
Legend: black (non-refl)
Background: orange



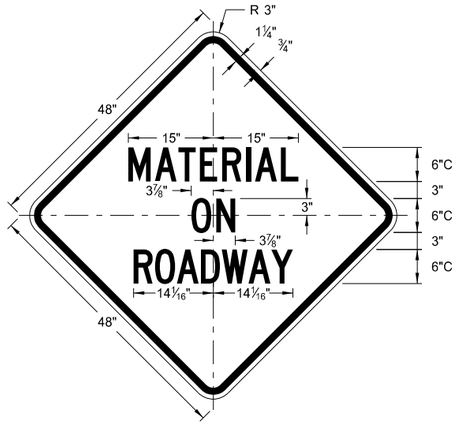
W21-53-48
Legend: black (non-refl)
Background: orange

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

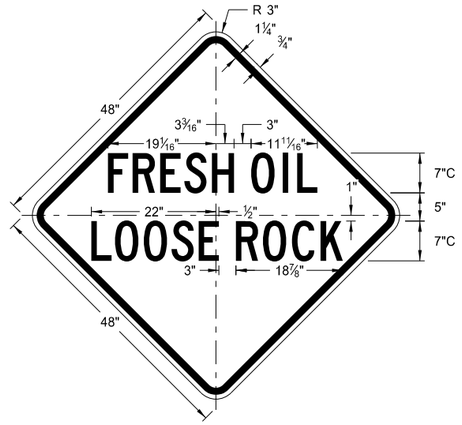
* DISTANCE MESSAGES



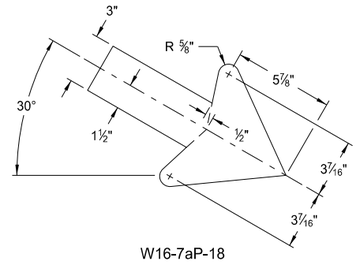
W20-51-48
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Background: orange



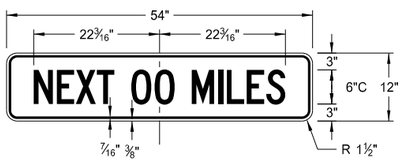
W21-51-48
Legend: black (non-refl)
Background: orange



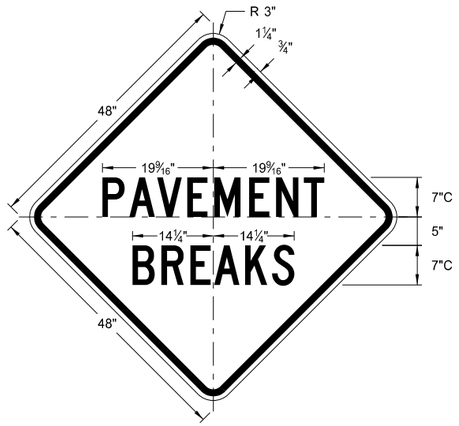
W22-8-48
Legend: black (non-refl)
Background: orange



W16-7aP-18



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



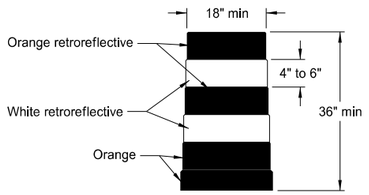
W21-52-48
Legend: black (non-refl)
Background: orange

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
5-31-18	
REVISIONS	
DATE	CHANGE
11-01-19	Added details for sign W16-7aP-18.

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

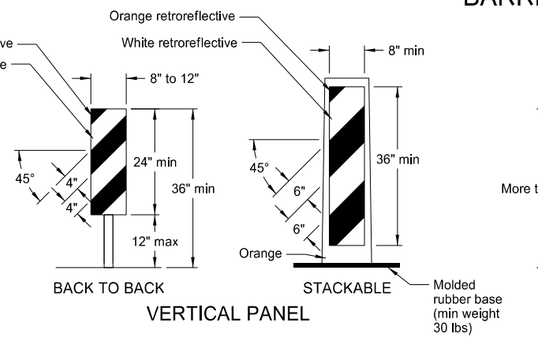
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



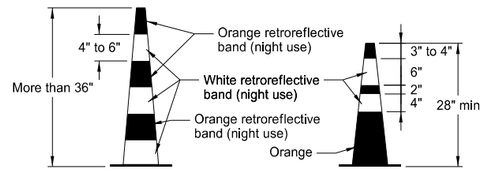
DELINEATOR DRUM

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



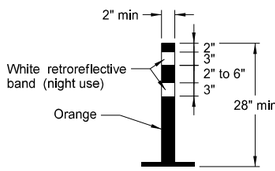
VERTICAL PANEL

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



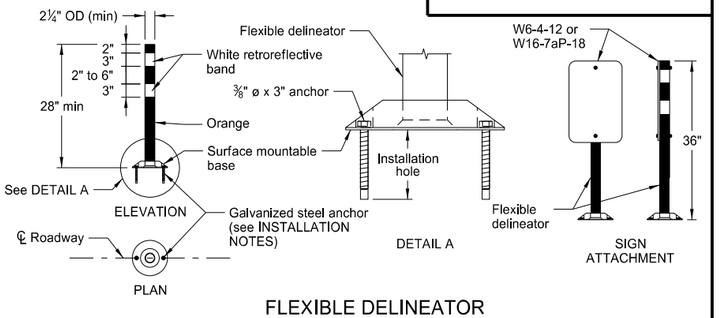
TRAFFIC CONE

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



TUBULAR MARKER

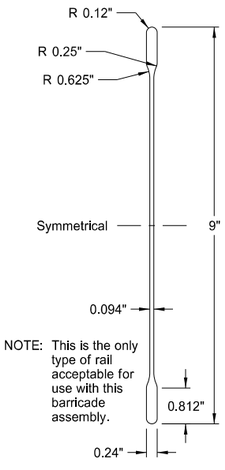
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

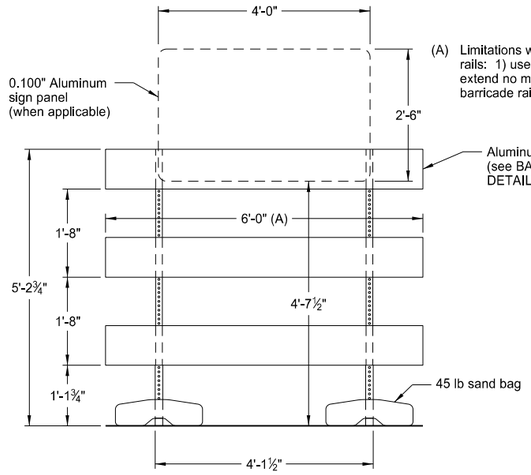
INSTALLATION NOTES:

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



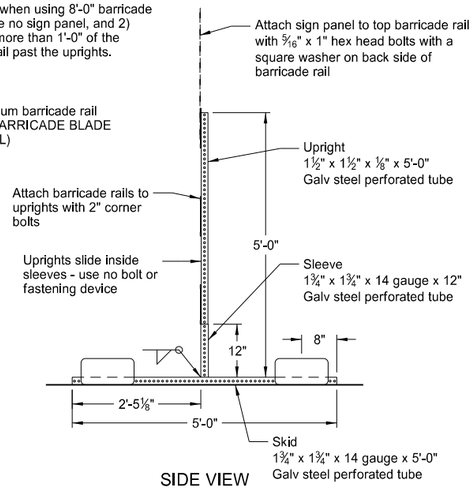
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



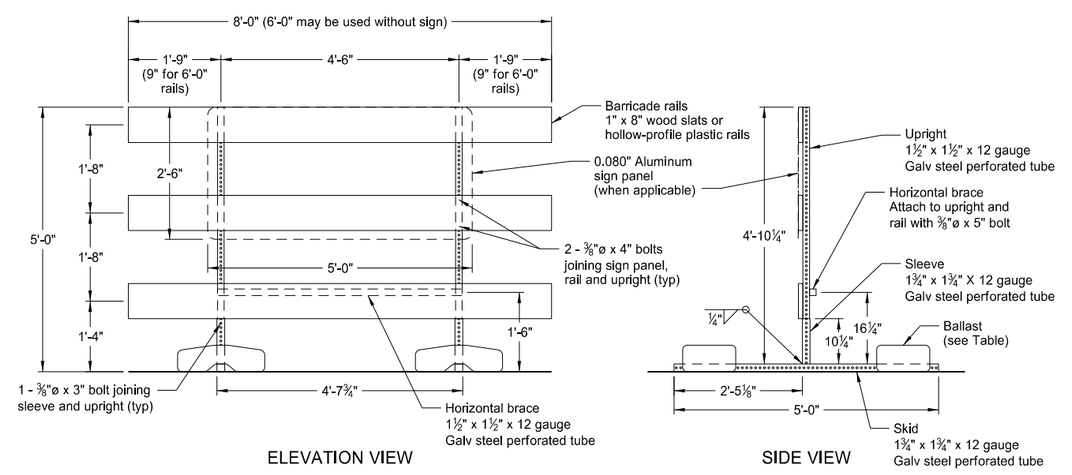
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



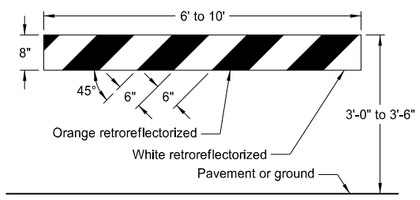
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

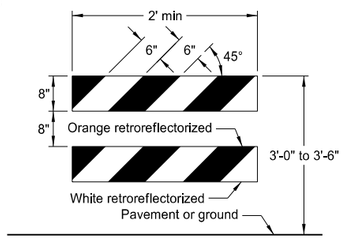


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

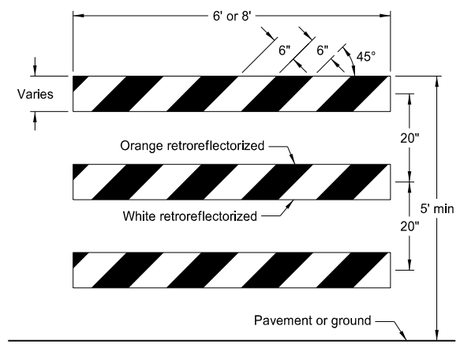
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

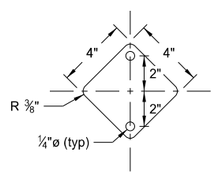


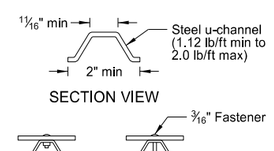
TYPE II BARRICADE

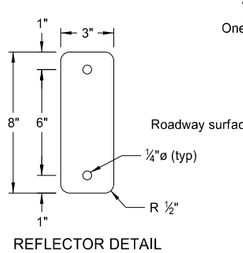


TYPE III BARRICADE

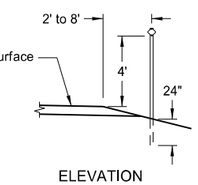
BARRICADE RAIL DETAILS







REFLECTOR DETAIL



ELEVATION

DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

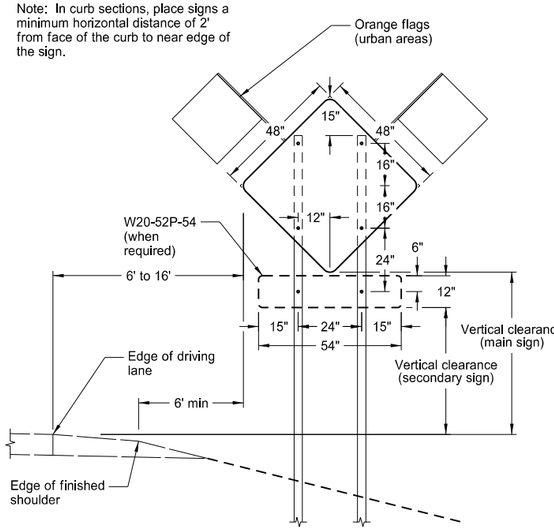
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

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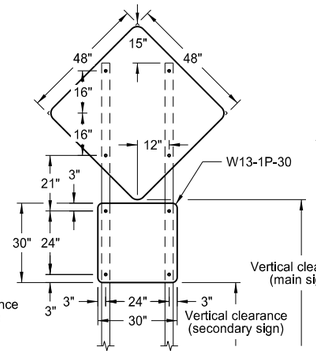
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

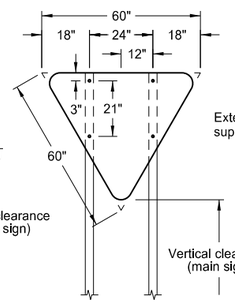
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



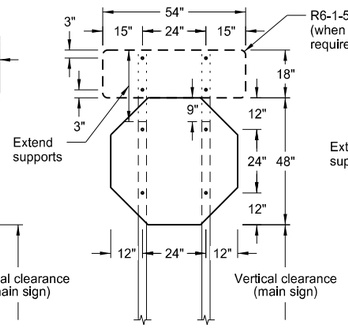
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



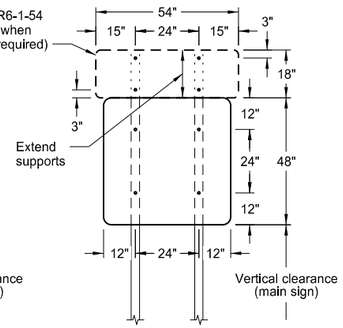
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



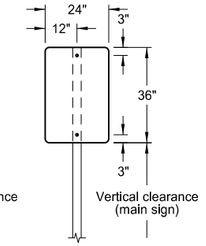
R1-2-60 - YIELD SIGN



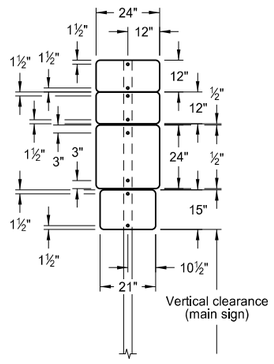
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



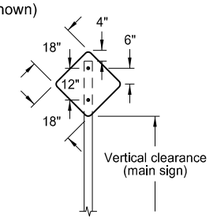
48" x 48" SIGN
(with R6-1-54 sign as required)



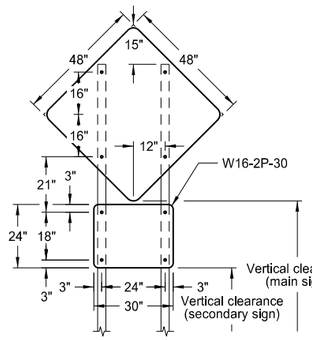
24" x 36" SIGN



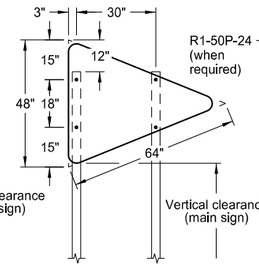
24" x 24"
ROUTE MARKER
ASSEMBLY



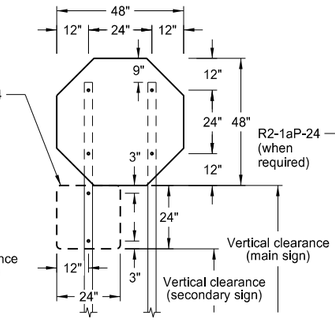
18" x 18"
DIAMOND SIGN



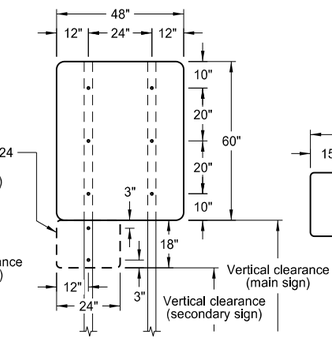
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



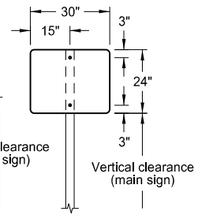
W14-3-64 - PENNANT SIGN



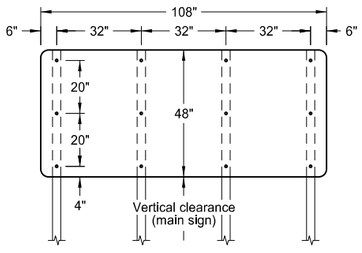
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



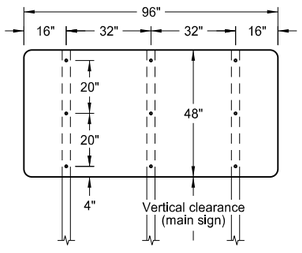
48" x 48" SIGN
(with R2-1aP-24 sign as required)



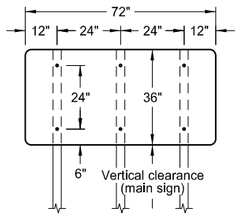
30" x 24" SIGN



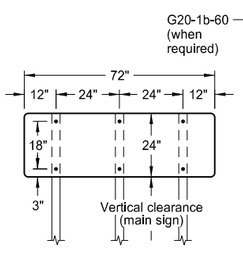
108" x 48" SIGN



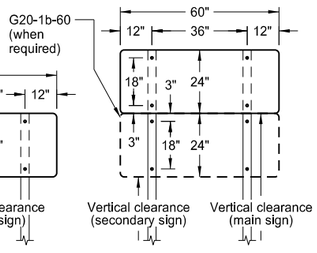
96" x 48" SIGN



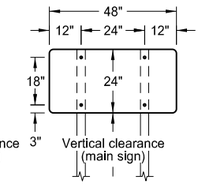
72" x 36" SIGN



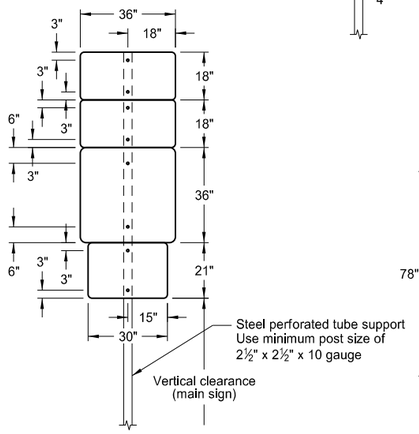
72" x 24" SIGN



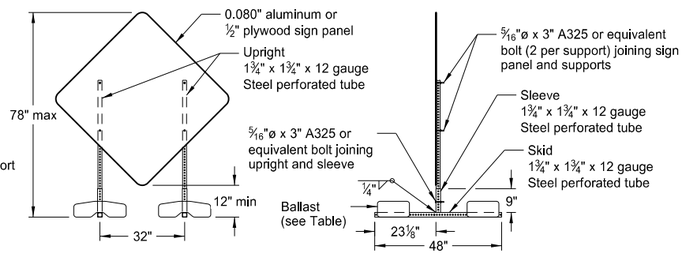
60" x 24" SIGN



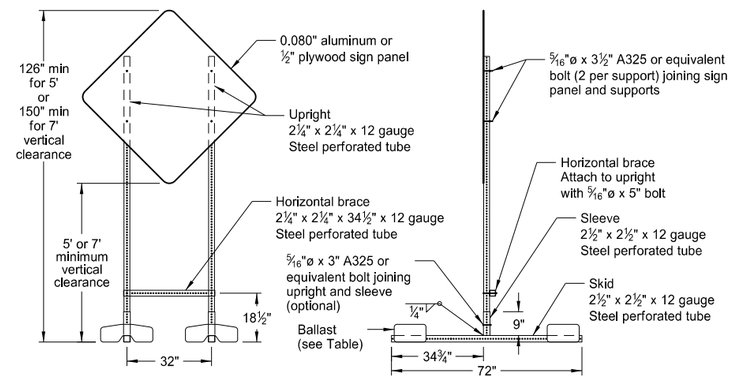
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

MINIMUM BALLAST
(For each side of sign support base)

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

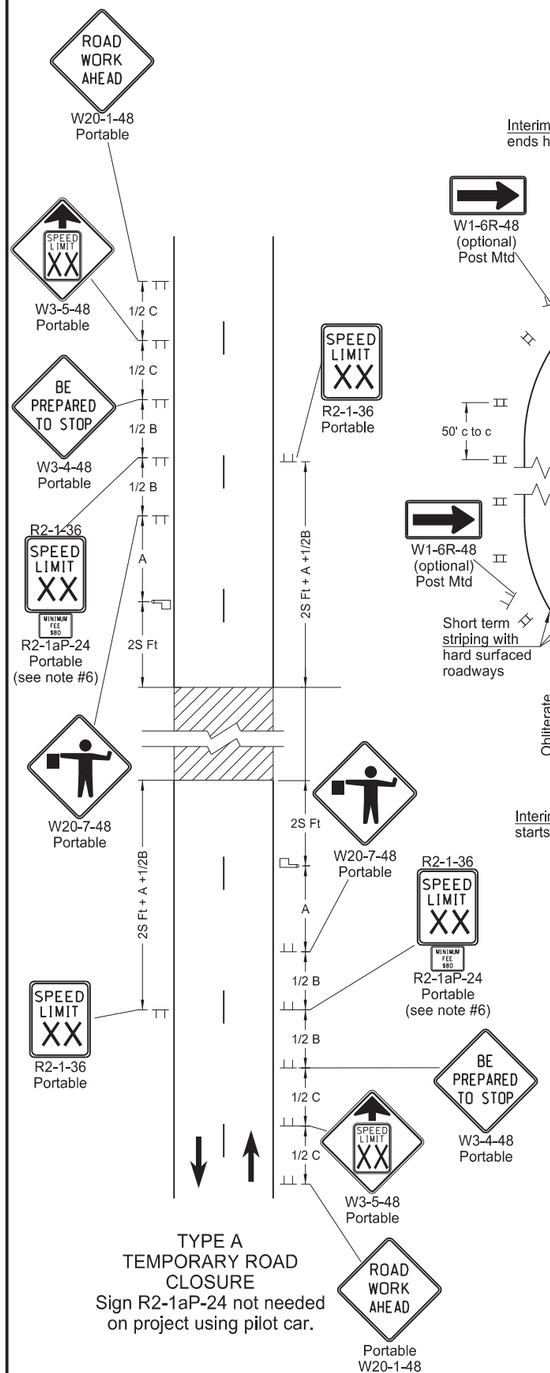
Note: The number of sandbags are based on a wind speed of 55 MPH. Place sandbags at or near the ends of skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

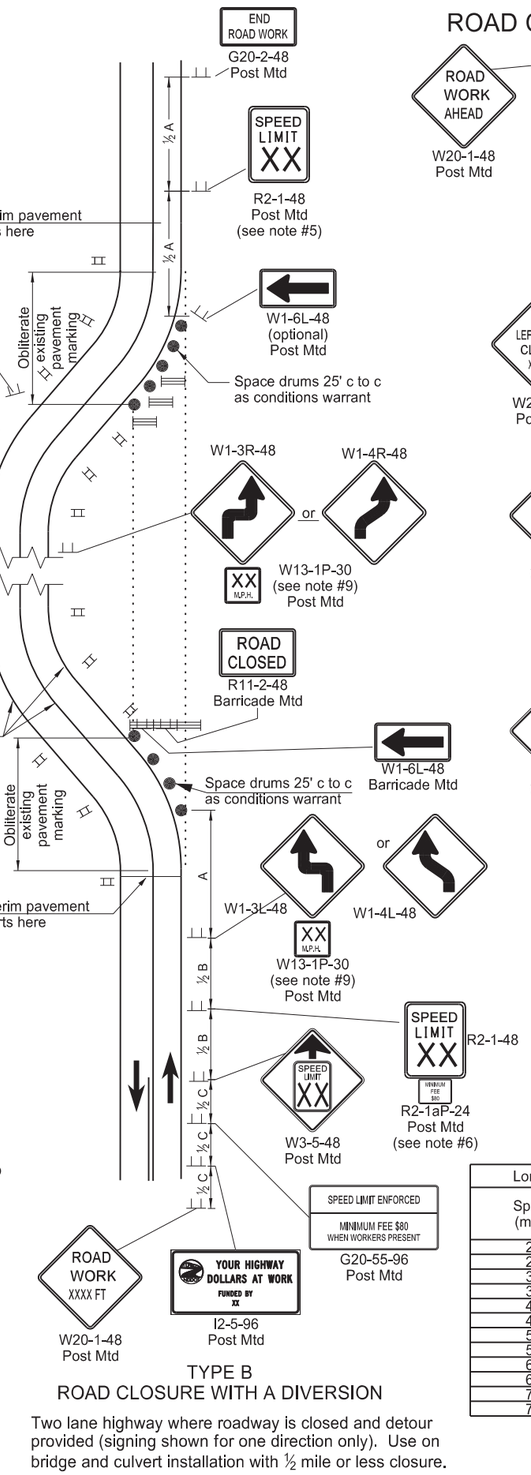
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D-704-15

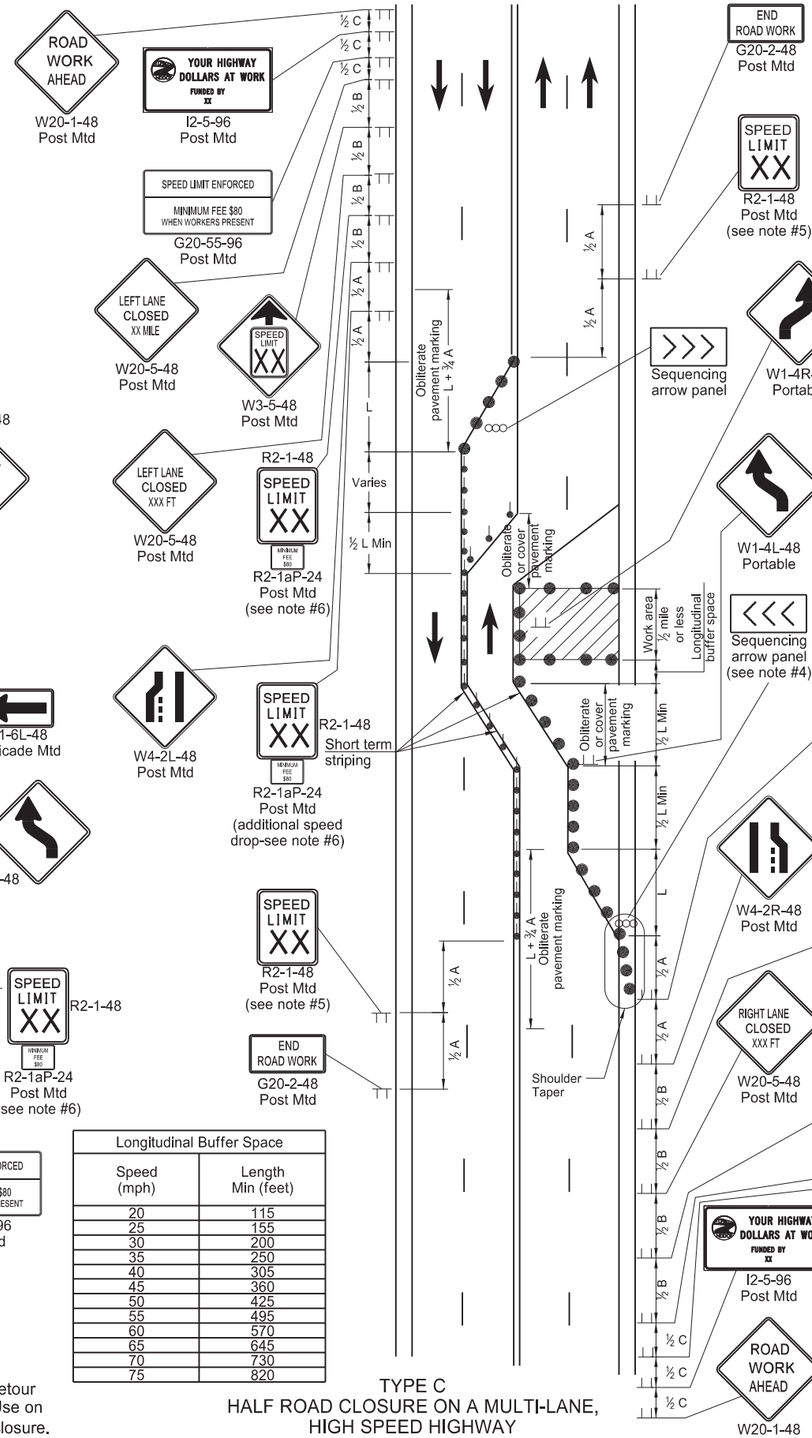
ROAD CLOSURE LAYOUTS



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



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



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

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

Notes:

1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and other roads with speeds of 45 mph or greater, or W x $S^2/60$ for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Place delineator drums, barricades or cones for tapering traffic at dimension "S" and for tangents space at 2 times dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on roadway surface. See Shoulder Closure Standard Drawing.
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-establish speed. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within reduced speed zones.
9. Where necessary, engineer will determine safe speed.
10. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
11. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
13. Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

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

KEY

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

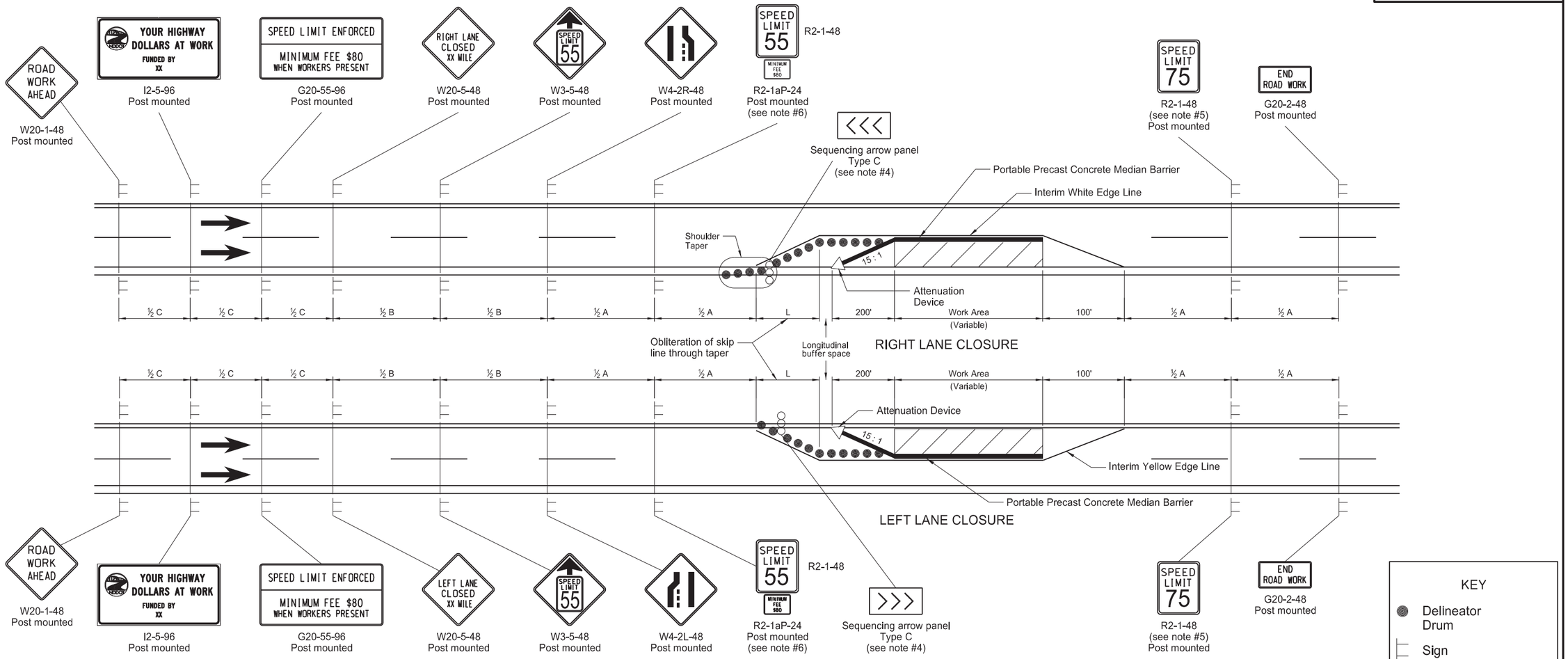
DATE	CHANGE
08-17-17 11-01-19 12-08-21	Updated Notes & Spd Limit signs Sign, Notes, & Pvmt Mk updates Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work

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12/08/21

SIGN LAYOUT FOR INTERSTATE SYSTEM ONE LANE CLOSURE

D-704-18



KEY

- Delineator Drum
- Sign
- Attenuation Device
- Sequencing Arrow Panel
- Work Area

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.

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

Notes:

1. Variables
   S = Numerical value of posted speed limit, off-peak 85th percentile speed prior to work starting, or anticipated operating speed in MPH.
   W = The width of offset in feet.
   L = Minimum taper length in feet. S x 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.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Space delineator drums used for tapering traffic and on tangent at dimension "S".
4. Place Sequencing Arrow Panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface. See Shoulder Closure Standard Drawing. Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
5. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within a reduced speed zone.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with the Standard D-704-14.
10. 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.
11. Reduce speed limit further, if location and conditions dictate.
12. Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

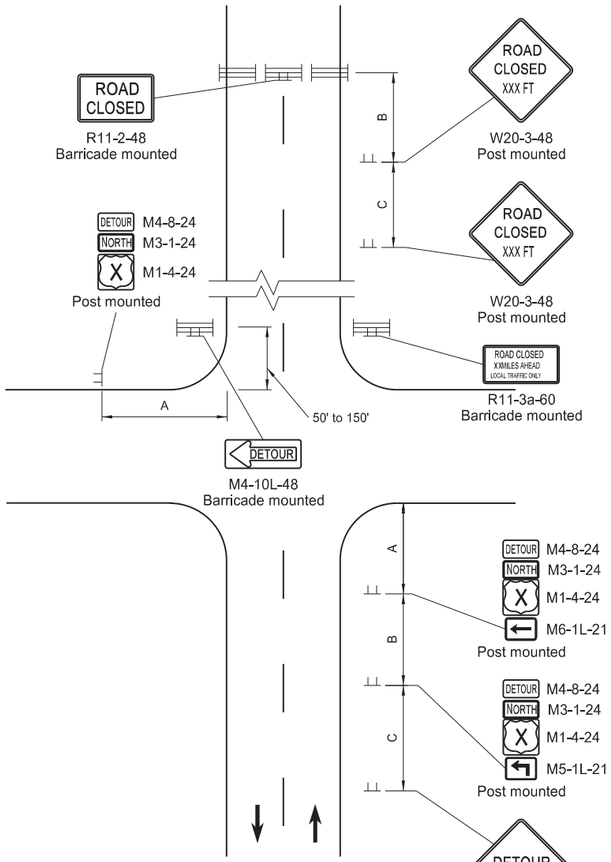
DATE	CHANGE
01-13-16	Changed to interim yellow edge line
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Updated notes & sign numbers
11-01-19	Note, sign #, & pvmt oblit change
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced & added Dollars At Work

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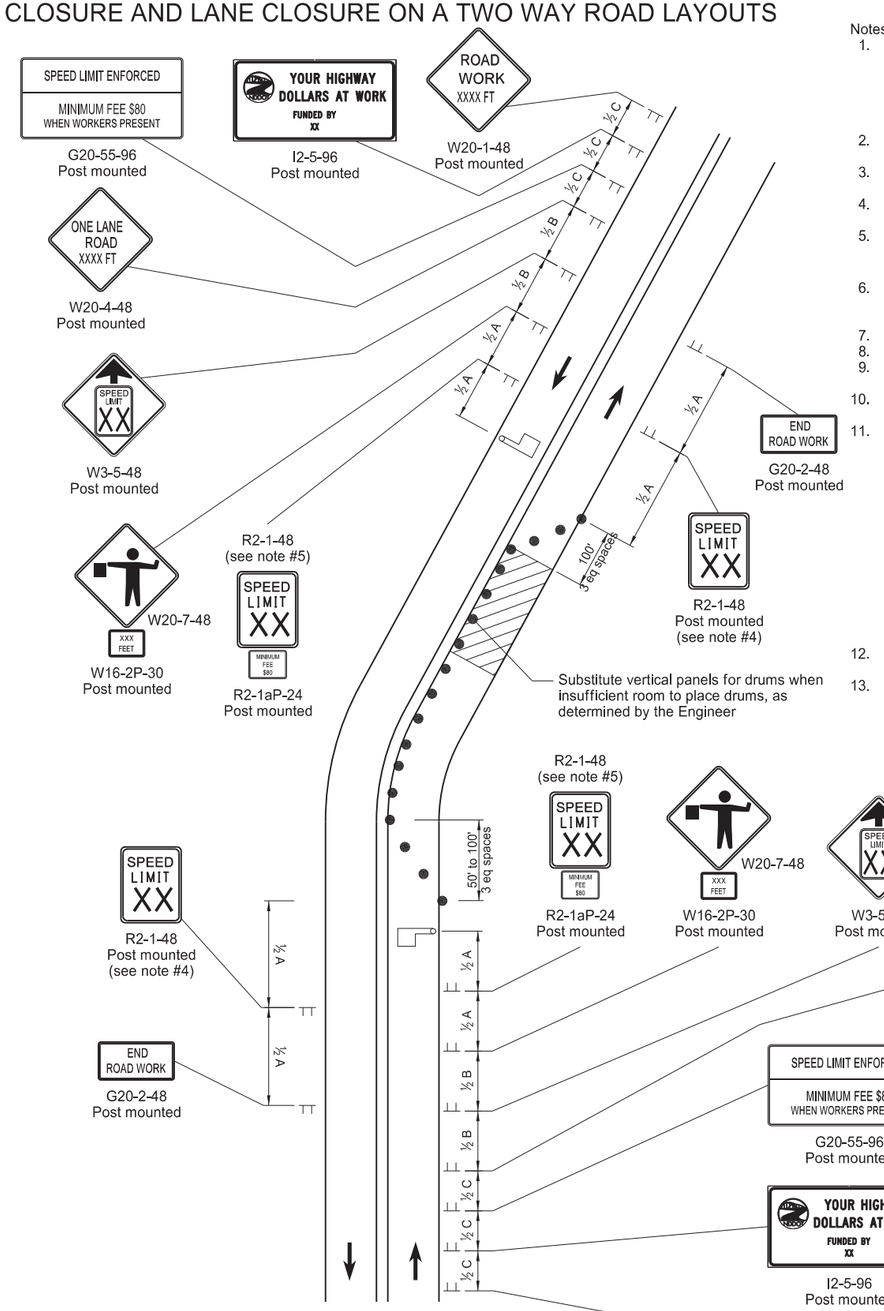
ROAD CLOSURE AND LANE CLOSURE ON A TWO WAY ROAD LAYOUTS

D-704-19



TYPE E
ROAD CLOSURE WITH OFF-SITE DETOUR

Road closed beyond detour point.
Signing shown for one direction only.
Install and maintain signs shown in plans.



TYPE F
LANE CLOSURE ON A TWO LANE ROAD USING FLAGGERS

Two lane highway with one lane closed.
Flagger at point visible to approaching traffic.

Notes:

1. 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 x W for freeways, expressways, and roads with speeds of 45 mph or greater, or W x S^2/60 for urban, residential, and streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on the roadway.
3. Place delineator drums for tapering traffic at 3 equal spaces and for tangents space them at 2 times dimension "S".
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. 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 ½B.
6. 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.
7. Cover existing speed limit signs within a reduced speed zone.
8. Where necessary, safe speed to be determined by the Engineer.
9. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
10. 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.
11. When highway-rail grade crossings exist either within or in the vicinity of the roadway work activities:
    a. 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.)
    b. Place "Do Not Stop on Tracks" sign (R8-8-24) near cross buck in each direction while lane closure is near tracks.
    c. 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.
    d. 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.)
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
13. Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

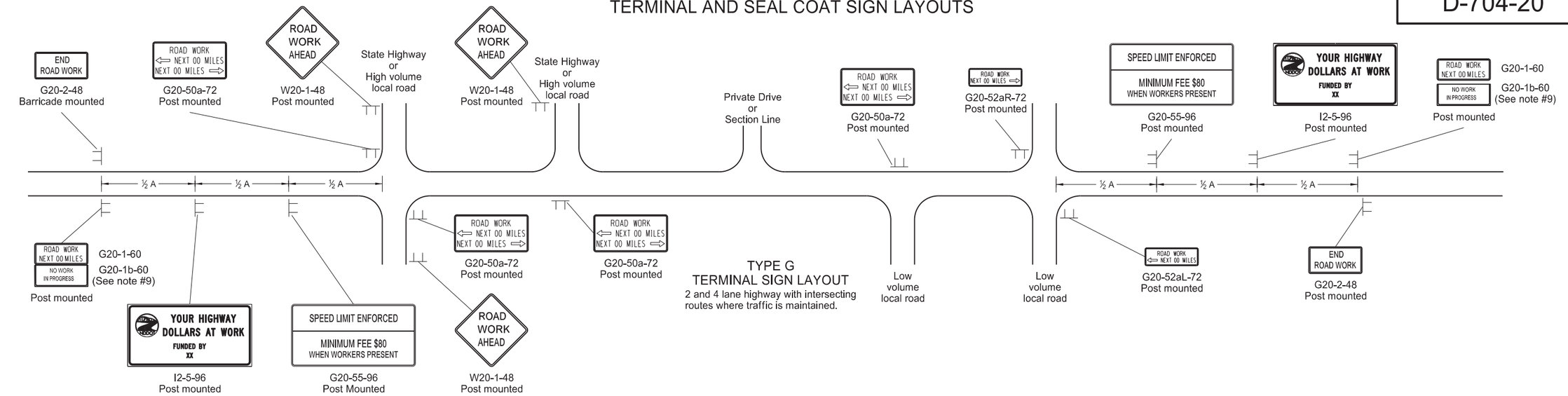
DATE	CHANGE
03-13-14	Revised Sign Cell "ROAD WORK XXX FT"
08-17-17	Update notes & sign numbers
11-01-19	Revised signs, sign #s, & notes
12-08-21	Switched order of Road Work XXX and Spd Limit Enforced & added Dollars At Work

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12/08/21

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



Notes:

1. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
2. Determine the exact speed limit in the field, based on location and conditions.
3. Determine the reduced speed limit based on the in place speed limit before construction. Where speed limit reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 MPH.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. On seal coat projects, place signs R2-1-48, R2-1aP-24, R4-1-48, W22-8-48 and W20-52P-54 after all important intersections and at five mile intervals. Place sign W8-12-48 after all important intersections and at 2 mile intervals until short term center line pavement marking is placed.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Drawing D-704-14.
8. Cover or remove speed limit signs from layout Type H when loose aggregate is removed.
9. Install sign G20-1b-60 when work is suspended for winter.
10. Use other traffic control layouts in immediate work areas. Place sign R2-1aP-24 below speed limit signs in reduced speed limit work areas.
11. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.
12. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
13. Sign I2-5-96 is not required if this layout is a part of other traffic control that contains this sign.

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 11-01-19 12-08-21	Updated notes & sign numbers Updated note & sign Switched order of Road Work and Spd Limit Enforced & added Dollars At Work

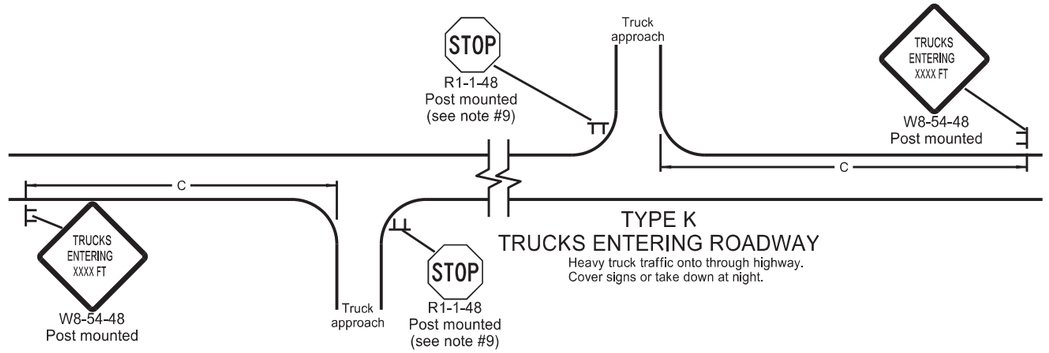
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12/08/21

CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

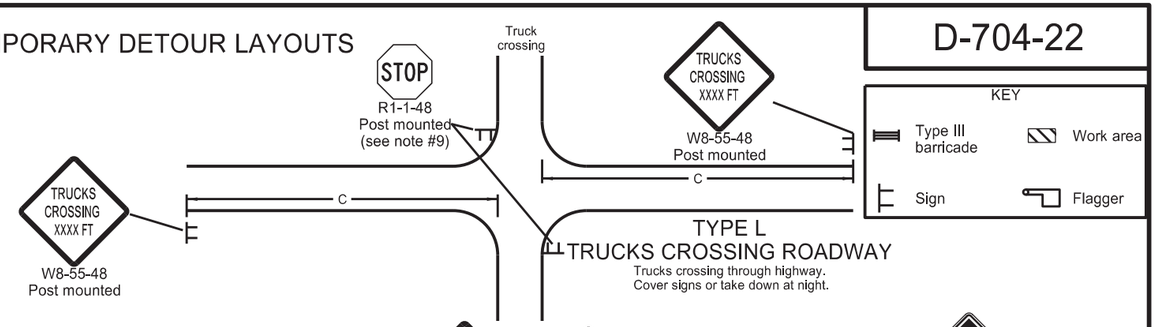
D-704-22

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



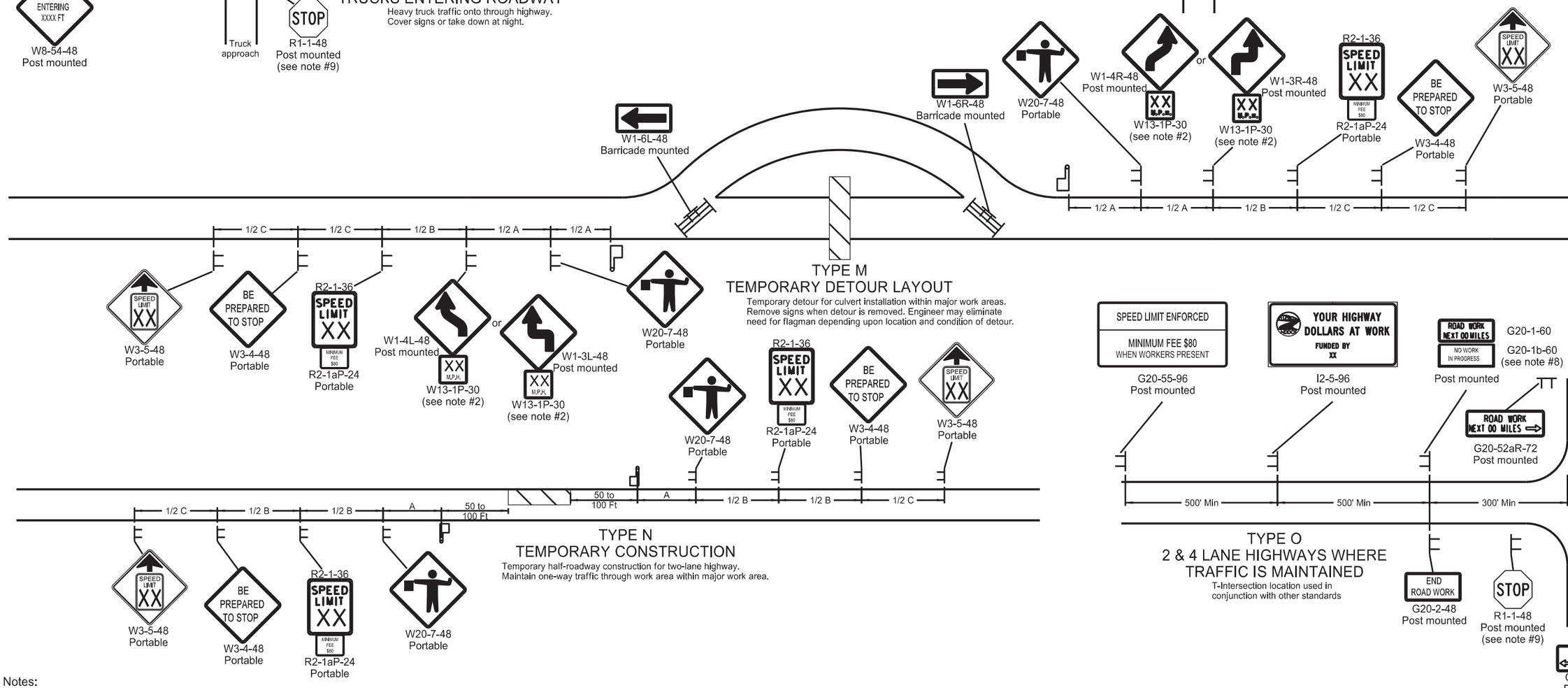
TYPE K
TRUCKS ENTERING ROADWAY

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



TYPE L
TRUCKS CROSSING ROADWAY

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



TYPE M
TEMPORARY DETOUR LAYOUT

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

TYPE N
TEMPORARY CONSTRUCTION

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

TYPE O
2 & 4 LANE HIGHWAYS WHERE TRAFFIC IS MAINTAINED

T-Intersection location used in conjunction with other standards

Notes:

1. Place barricades on a moveable assemblies and signs on portable assemblies when located on roadway.
2. Where necessary, safe speed to be determined by the Engineer.
3. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
4. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
5. Cover existing speed limit signs within a reduced speed zone.
6. Covered (when approved by engineer) or obliterated pavement marking measured as Obliteration of Pavement Marking.
7. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
8. Install sign G20-1b-60 when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. Sign G20-55-96 is not required if layout is part of other traffic control that contains this sign, or if work is less than 15 days.
11. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.
12. Sign I2-5-96 is not required if layout is part of other traffic control that contains this sign.

ADVANCE WARNING SIGN SPACING

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

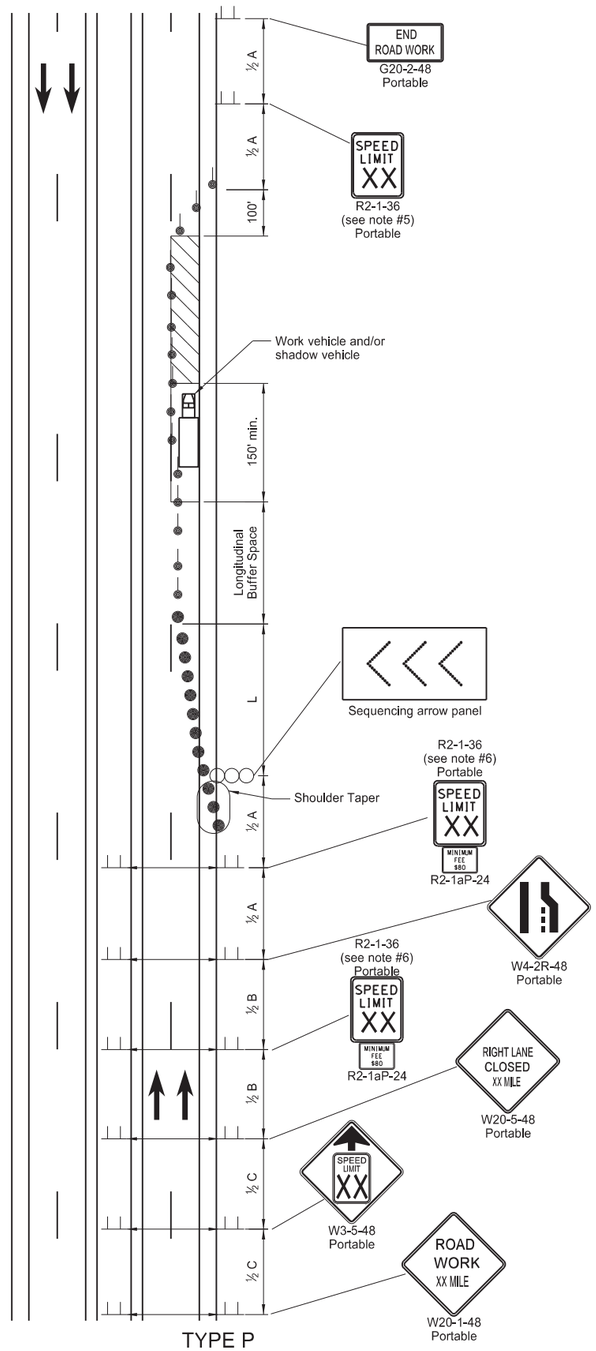
DATE	CHANGE
08-17-17 11-01-19 12-09-21	Update notes & sign numbers Revised sign numbers & note 7 Added Speed Limit Enforced and Dollars At Work signs

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12/09/21

SHORT TERM URBAN DETOUR AND LANE CLOSURE ON A DIVIDED HIGHWAY LAYOUTS

D-704-23

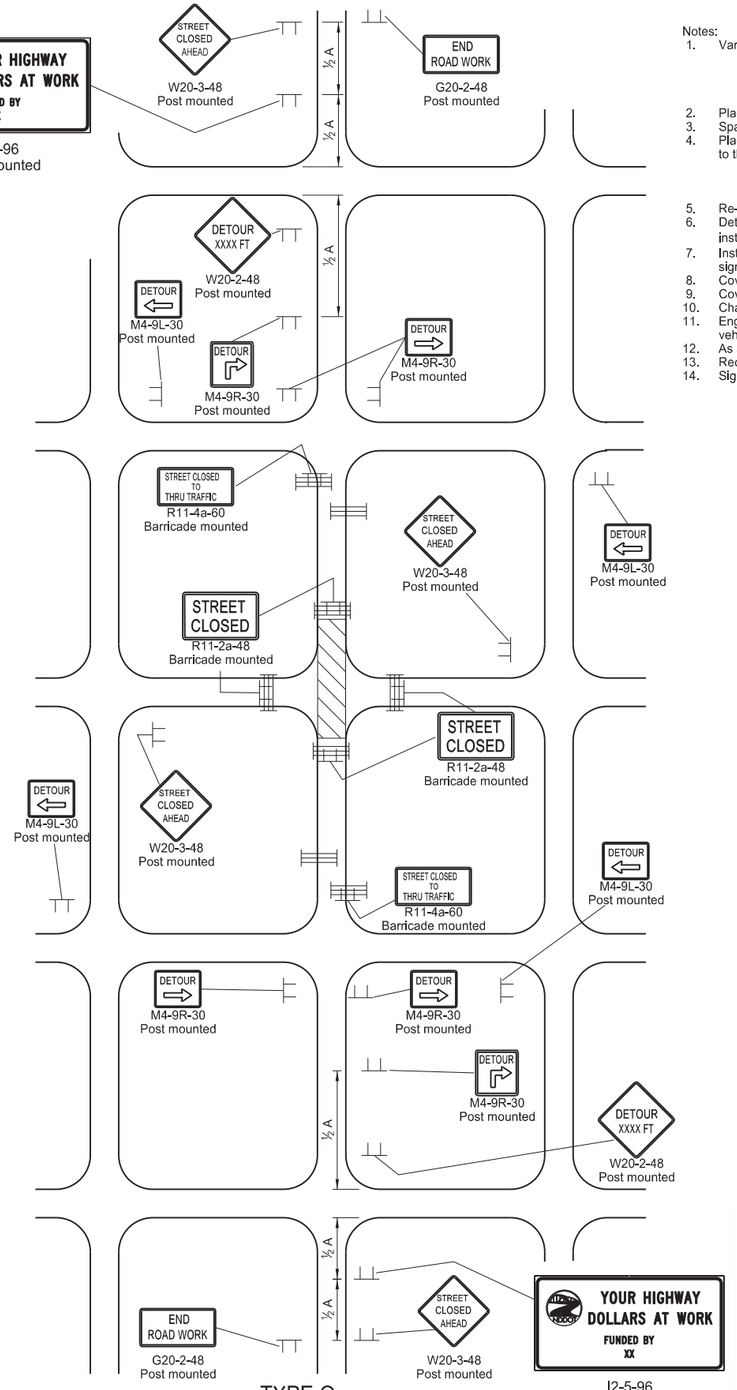


TYPE P

STATIONARY LANE CLOSURE ON A DIVIDED HIGHWAY

4 lane divided roadway where ½ of roadway is closed.

Short-term (more than 1 hour within a single daylight period.)



TYPE Q

DETOUR FOR A CLOSED STREET

Where city streets are used for detouring traffic.

Urban projects do not require the G20-55-96 and R2-1aP-24 signs.

Notes:

1. Variables
   - S = Numerical value of speed limit or 85th percentile.
   - W = The width of taper in feet
   - L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Place barricades on moveable assemblies and signs on portable assemblies when located on roadway.
3. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
4. Place Sequencing Arrow Panels at the beginning of taper. Where shoulder width does not provide sufficient room, move panel closer to the work area and place on roadway surface.
   - Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   - Use Type B on roadways with moderate traffic speeds and volumes (40 mph or less and 5000 ADT or less).
   - Use Type C on roadways with high traffic speeds and volumes (over 40 mph or over 5000 ADT).
5. Re-established speed limit. Determine exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit based on the in-place speed limit before construction. Where speed reductions exceed 30 MPH, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½ B.
7. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the sign, and at such a distance above the edge that the flag does not touch the sign when limp.
8. Cover existing speed limit signs within a reduced speed zone.
9. Covered (when approved by engineer) or obliterated payment marking measured as as Obliteration of Pavement Marking.
10. Change intersection control on detour for Type Q when determined necessary by the engineer.
11. Engineer to determine safe speed where necessary. When parking is present, place signs so they are entirely visible above parked vehicles or at the edge of the parking area so they are visible to oncoming traffic.
12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
13. Recommend using 40 mph speed limit in vicinity of workers for Layout Type P, unless location and conditions dictate otherwise.
14. Sign I2-5-96 is not required if this layout is part of other traffic control that contains this sign.

KEY

Type III barricade	Work area
Sign	Sequencing arrow panel
Delineator Drum	Tubular Markers

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

REVISIONS

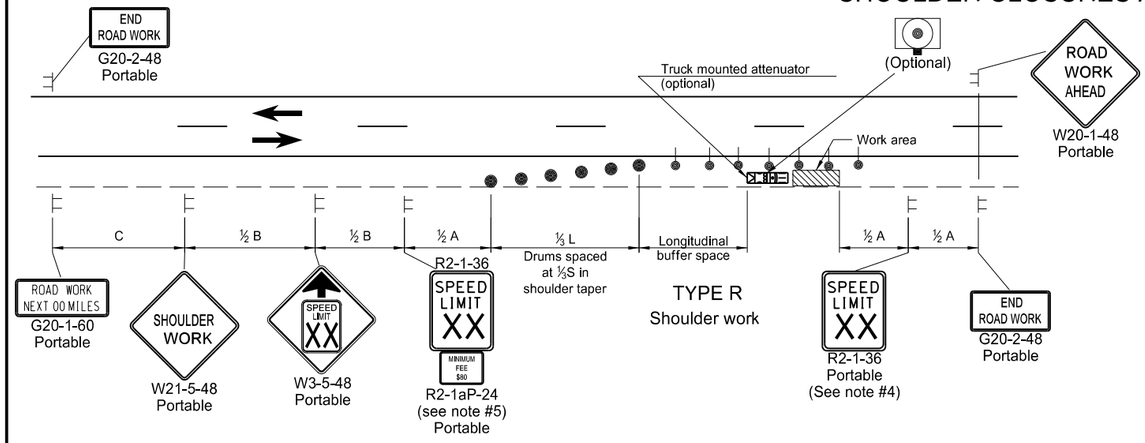
DATE	CHANGE
08-17-17	Removed speed limit signs, & updated notes & sign numbers
11-01-19	Revised sign numbers & note
12-08-21	Added Dollars At Work sign

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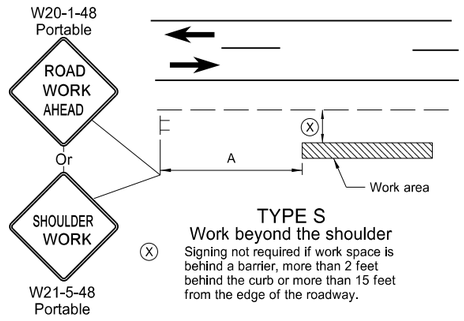
12/08/21

SHOULDER CLOSURES AND BRIDGE PAINTING LAYOUTS

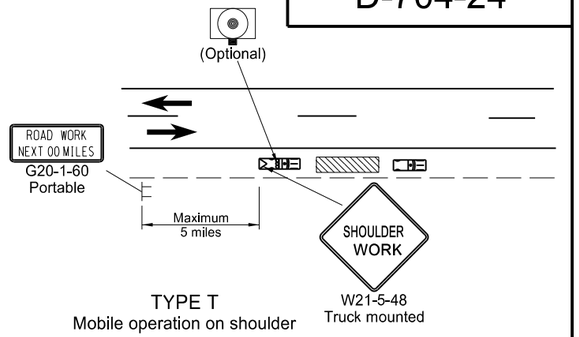
D-704-24



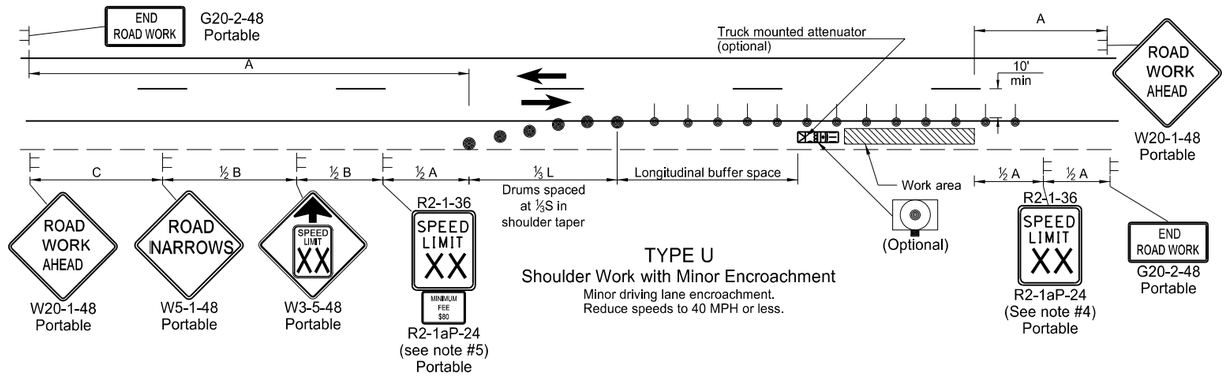
TYPE R
Shoulder work



TYPE S
Work beyond the shoulder
Signing not required if work space is behind a barrier, more than 2 feet behind the curb or more than 15 feet from the edge of the roadway.

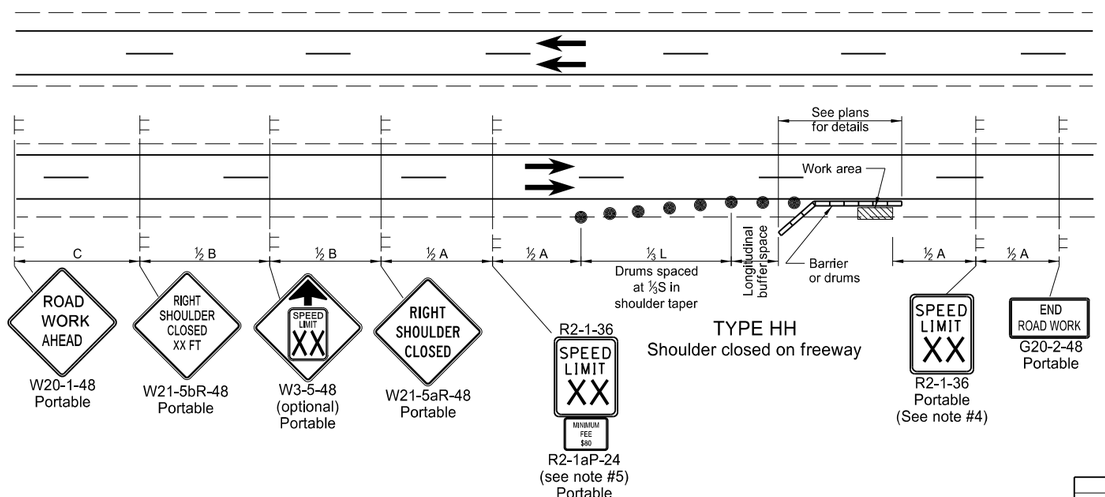


TYPE T
Mobile operation on shoulder

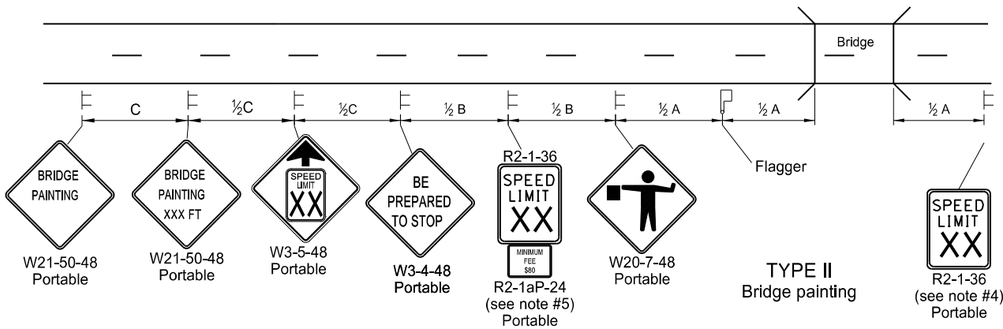


TYPE U
Shoulder Work with Minor Encroachment
Minor driving lane encroachment.
Reduce speeds to 40 MPH or less.

Notes
1. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper in feet.
   L = Minimum length of taper, S x W for freeways, expressways, and all other roads with speeds of 45 mph or greater, or W x S^2 /60 for urban, residential, and other streets with speeds of 40 mph or less.
2. Space delineator drums for tapering traffic at dimension "S". Space delineator drums or tubular markers for tangents at 2 times "S".
3. Sequencing Arrow Panels
   Use Type A on roadways with slow moving traffic speeds and low volume (25 mph or less and 750 ADT or less).
   UseType 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).
4. Re-establish speed limit. Determine exact speed limit in the field, dependent on location and conditions.
5. 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 ½B.
6. 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.
7. Cover existing speed limit signs within a reduced speed zone.
8. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
9. Recommend 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.



TYPE HH
Shoulder closed on freeway



TYPE II
Bridge painting

KEY

Sign	Work area
Delineator Drum	Tubular Marker
Sequencing Arrow Panel (Caution Mode)	

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

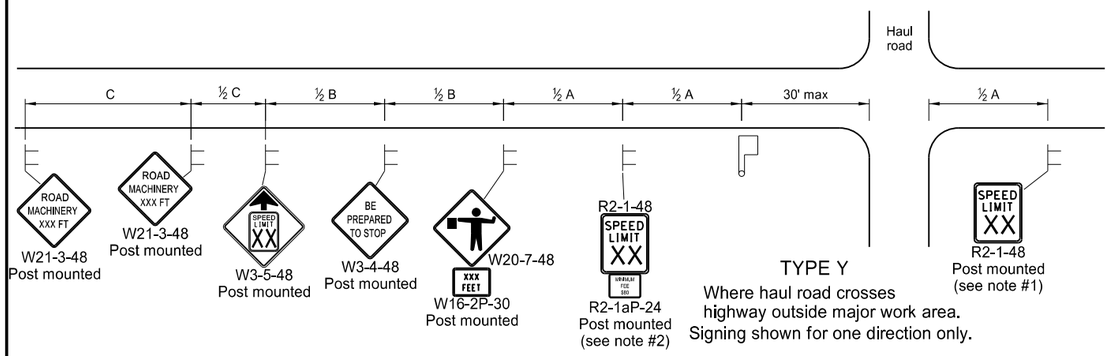
REVISIONS

DATE	CHANGE
8-17-17	Updated notes & revised signs
11-01-19	Revised drum spacing & signs nos.

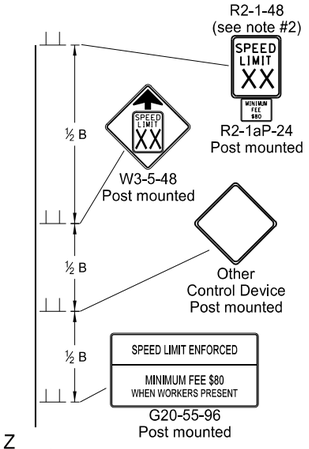
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MISCELLANEOUS SIGN LAYOUTS

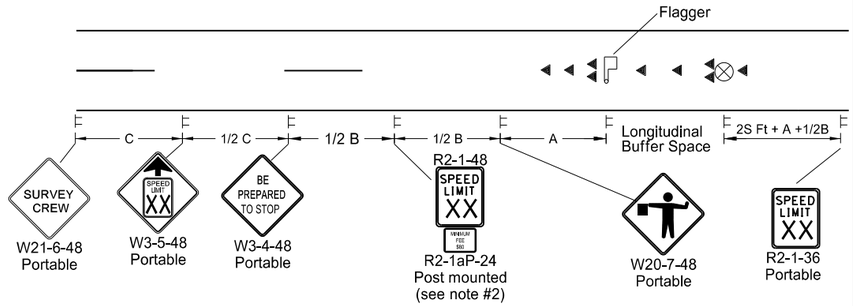
D-704-26



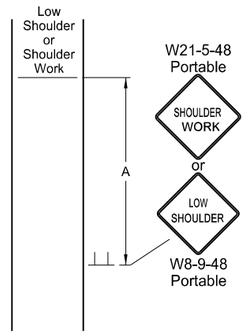
TYPE Y
Where haul road crosses highway outside major work area.
Signing shown for one direction only.



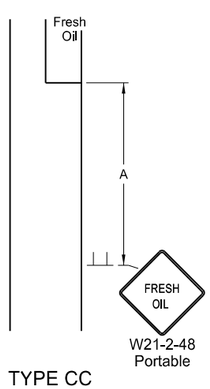
TYPE Z
Where speed zone is needed
Signing shown for one direction only.



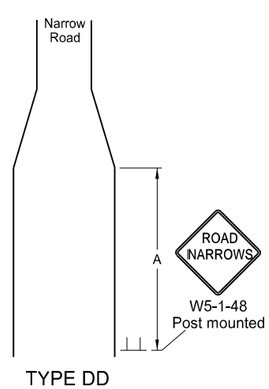
TYPE AA
Where survey crew is used
Signing shown for one direction only.



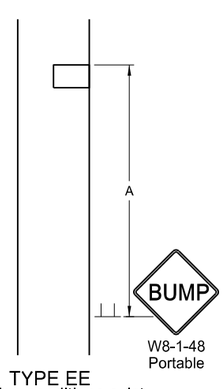
TYPE BB
Within major work area where sign conditions exist



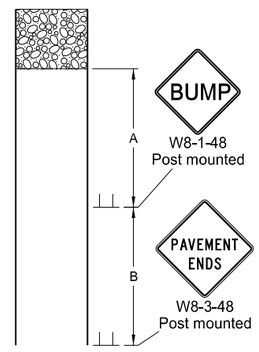
TYPE CC
Where sign conditions exist



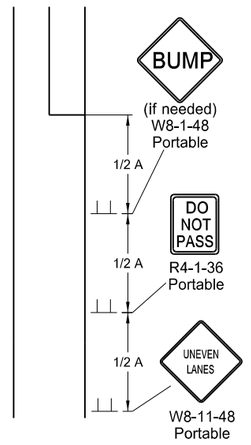
TYPE DD
Where sign conditions exist



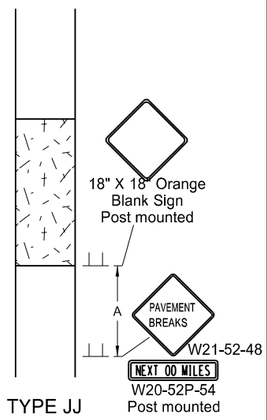
TYPE EE
Where sign conditions exist



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



TYPE GG
Where elevation difference exists between lanes

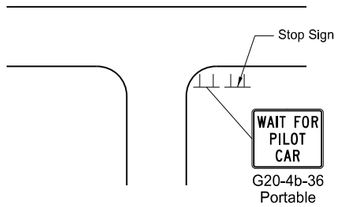


TYPE JJ
For break in pavement.
Install signs when conditions exist and remove when not applicable.
Signing shown for one direction only.

KEY

Flagger	Sign
Cones	Survey Equipment

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



TYPE KK
At major intersections within pilot car control area

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

ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40 mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 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

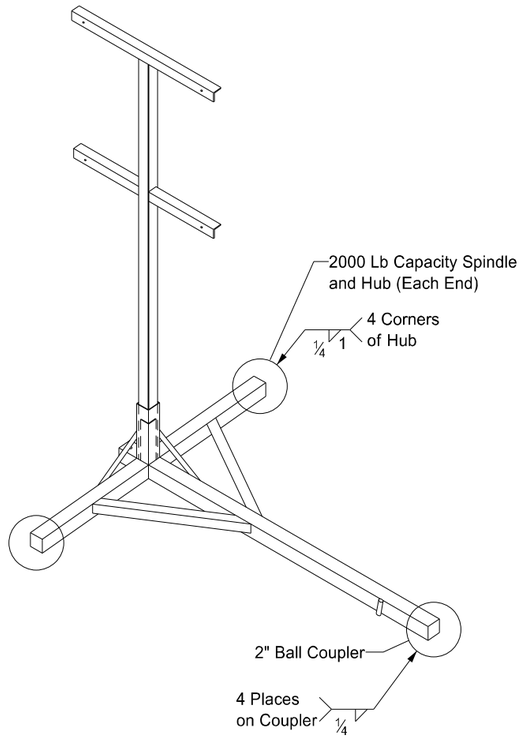
REVISIONS

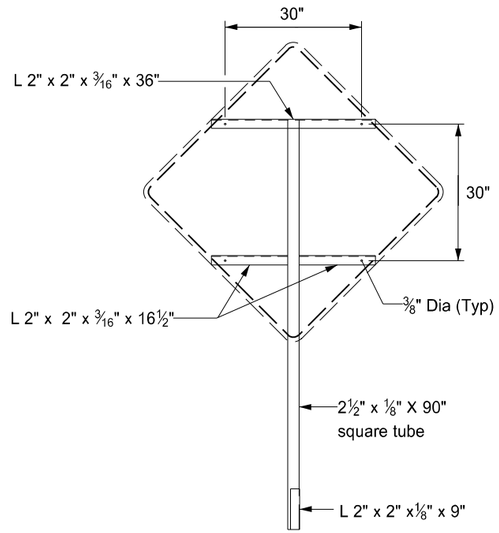
DATE	CHANGE
8-17-17	Added speed limit signs. Updated notes & sign numbers
11-01-19	Revised note 5 & sign numbers

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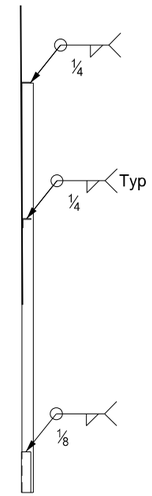
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

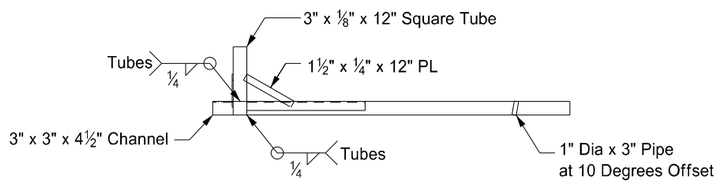


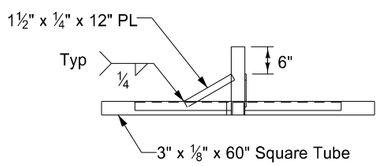
RIGHT

SIGN SUPPORT

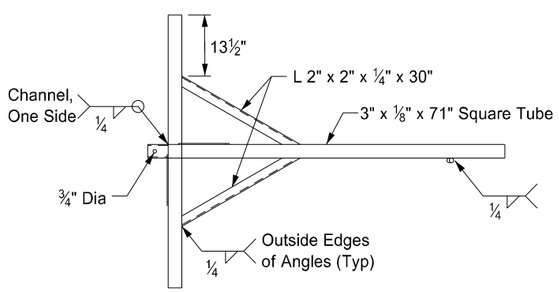
Notes:

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





RIGHT



TOP

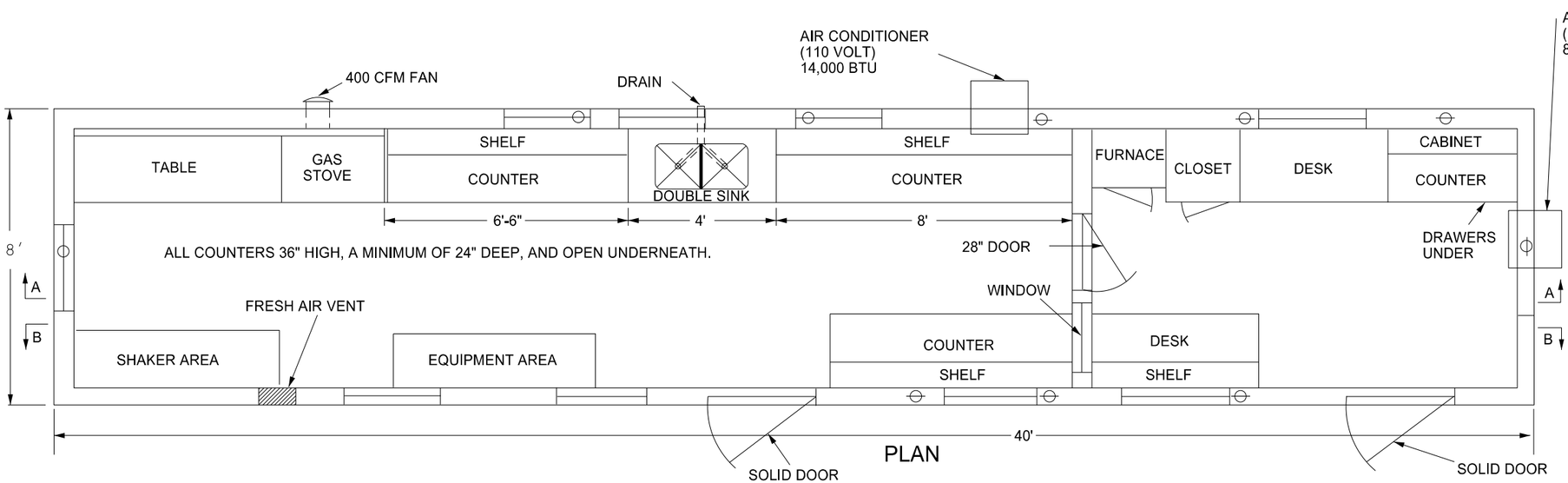
TRAILER

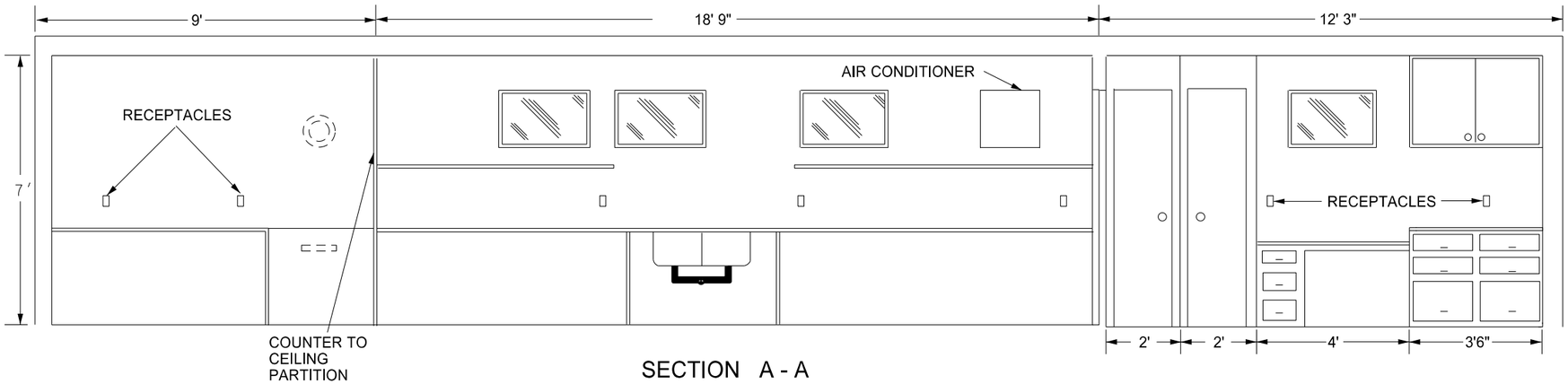
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

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

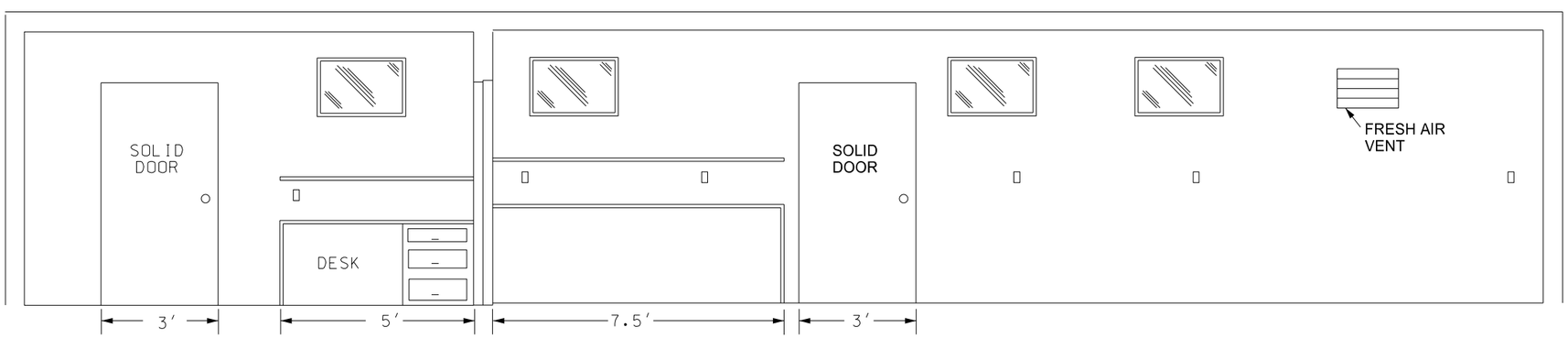
BITUMINOUS LABORATORY

D-706-1





SECTION A - A



SECTION B - B

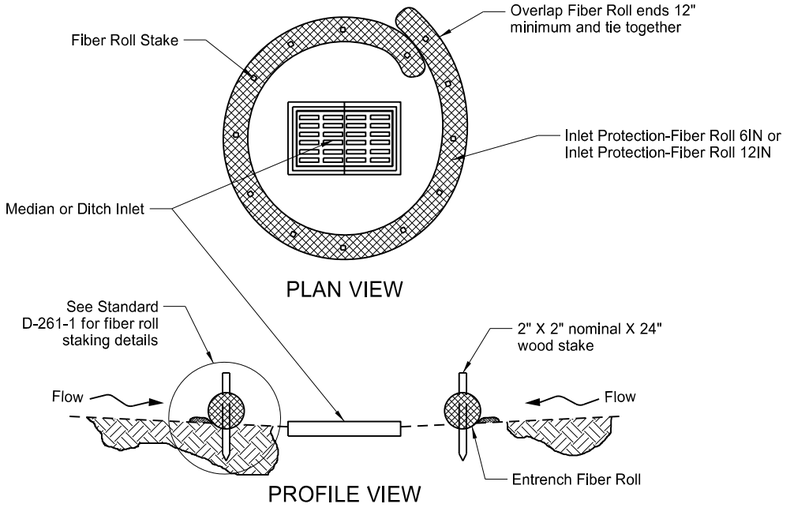
Provide a laboratory with the following:

1. A 1'x1' shelf at 36" above the regular countertop.
2. Double compartment stainless steel sink, with each compartment a minimum of 16"x14"x10" deep. Provide water service lines made of copper or plastic and a diameter of ½ inch.
3. An exhaust fan capable of removing inside air at a rate of 400 CFM.
4. Fresh air vent hinged to open or close manually.
5. 24" x 48" table capable of holding a 200 lb masonry saw with a minimum clearance of 36" above the table.
6. A water supply tank with a capacity of 500 gallons and a 20 gallon capacity pressure tank on the pump.
7. Heavy duty type locks, latches, and hinges for doors made to withstand the intense use in service.
8. A wall between the office and the work area properly insulated to prevent the transmission of heat and noise.
9. The steel cable tie downs and ground anchors at each corner of the lab.
10. Electrical service entrance wired for 100 amps and separate circuits for air conditioners. Space convenience outlets in counter areas a minimum of four feet apart.

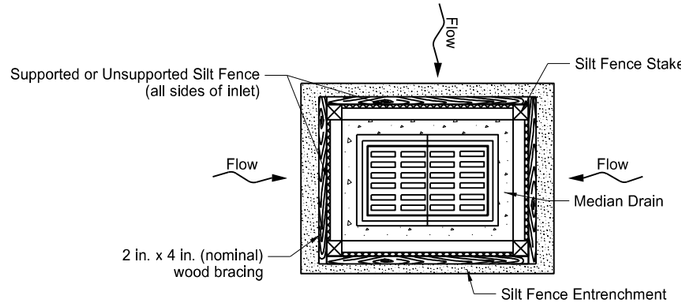
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
07-30-14	Changed standard's title and revised notes.
01-11-16	Revised notes.
08-27-19	New Design Engineer PE Stamp

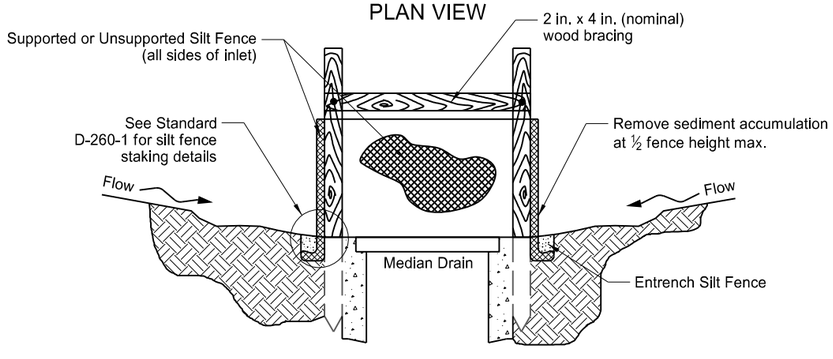
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EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION

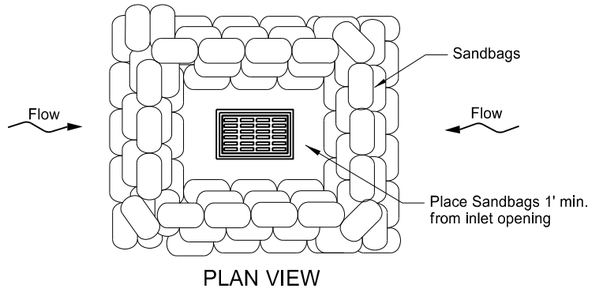


FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)

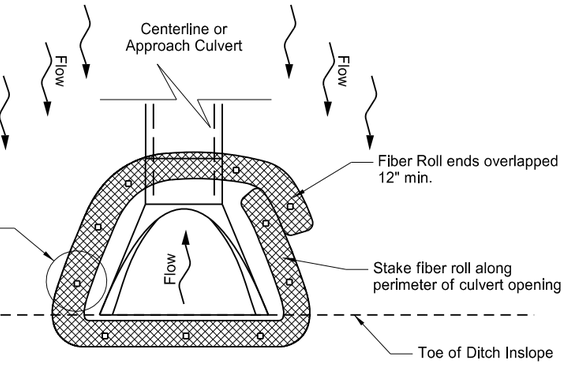




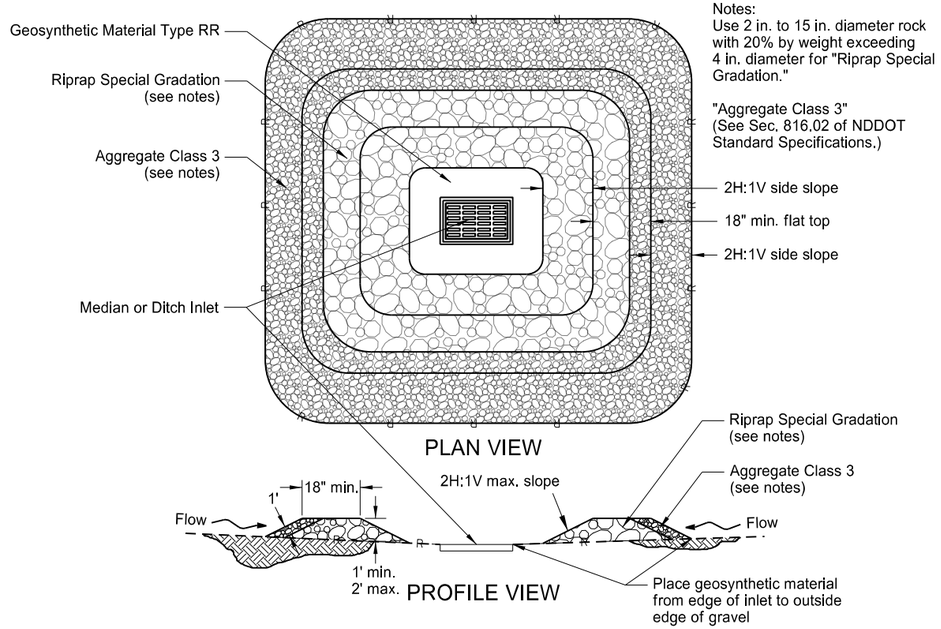
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



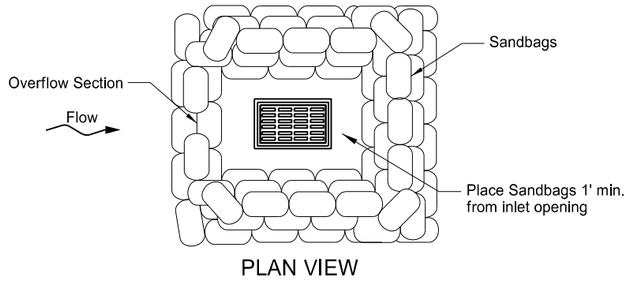
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



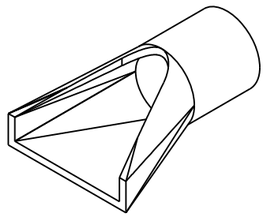
SANDBAG PROTECTION (ON SLOPE)

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.

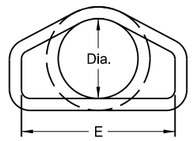
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REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

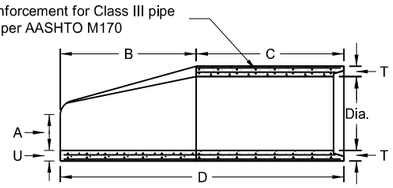
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30	1'-0"	4'-6"	1'-7¾"	6'-1¾"	5'-0"	3½"
36	1'-3"	5'-3"	2'-9"	8'-0"	6'-0"	4"
42	1'-9"	5'-3"	2'-9"	8'-0"	6'-6"	4½"
48	2'-0"	6'-0"	2'-0"	8'-0"	7'-0"	5"
54	2'-3"	5'-5"	2'-9¼"	8'-2¼"	7'-6"	5½"
60	2'-11"	5'-0"	3'-3"	8'-3"	8'-0"	5"
66	2'-6"	6'-0"	2'-3"	8'-3"	8'-6"	5½"
72	3'-0"	6'-6"	1'-9"	8'-3"	9'-0"	6"
78	3'-0"	7'-6"	1'-9"	9'-3"	9'-6"	6½"
84	3'-0"	7'-6½"	1'-9"	9'-3½"	10'-0"	6½"
90	3'-5"	7'-3½"	2'-0"	9'-3½"	11'-0"	6½"



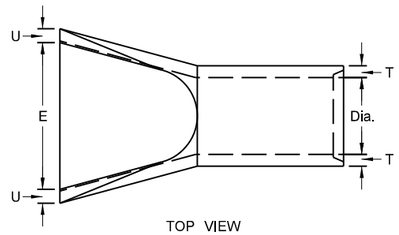
PERSPECTIVE



END VIEW



SIDE VIEW



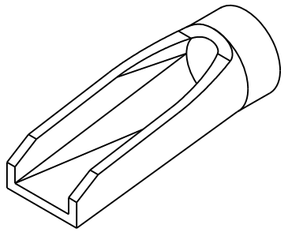
TOP VIEW

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

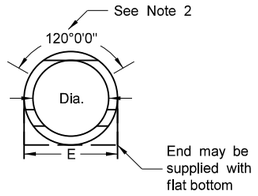
NOTES:

1. All reinforcing steel shall meet AASHTO M170 requirements.
2. All circular, longitudinal, and elliptical reinforcement shall be assembled and securely fastened in cage fashion so as to maintain reinforcement in exact shape and correct positions within the forms.
3. Laying length of pipe: 12" to 66" (incl.) = not less than 4 feet
   66" to 108" (incl.) = not less than 6 feet
4. Joints shall be sealed with rubber gaskets or with sealer approved by the engineer whenever pipe are specified for storm drain or sanitary sewers.
5. For Class IV and Class V reinforced concrete pipe and end section sizes which do not have reinforcement specified by AASHTO M170, shop drawings and design calculations shall be prepared and sealed by a Professional Engineer and submitted for the Engineer's review.

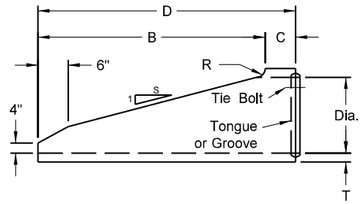
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



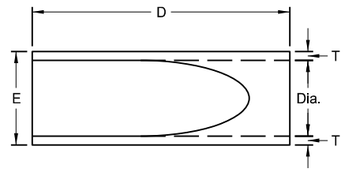
PERSPECTIVE



END VIEW



SIDE VIEW



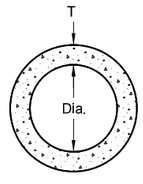
TOP VIEW

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

NOTES (Traversable End Section):

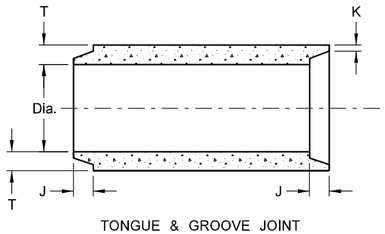
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

All Classifications of Round Concrete Pipe					
Internal Dia. of pipe in Inches	Cross-Sectional Water Area	Weight per lin. foot of Pipe Std. Wall	Joint J Groove End Min./Max.	Joint K Tongue End Min.	Minimum Wall Thickness (T)
Dia	Sq. ft.	Lbs.	In.	In.	In.
12	0.79	92	1⅛-2⅛	¾	2
15	1.23	127	1⅛-2¼	⅞	2¼
18	1.77	168	1⅛-2⅛	1	2½
21	2.40	214	1⅛-3⅛	1⅛	2¾
24	3.14	265	2¾-3¾	1⅛	3
27	3.98	322	2¾-4	1¼	3¼
30	4.91	384	3¼-4¼	1¼	3½
33	5.94	452	3¼-4¼	1½	3¾
36	7.07	524	3¼-4¼	1½	4
42	9.62	685	3¾-4¾	1¾	4½
48	12.57	685	3⅞-4¾	1⅞	5
54	15.90	1070	4⅛-5¼	2	5½
60	19.63	1296	4½-5½	2¼	6
66	23.76	1542	5-6	2⅝	6½
72	28.27	1810	5⅛-6¾	2⅞	7
78	33.18	2098	6¼-7¼	2⅞	7½
84	38.48	2410	5⅛-7¾	3⅜	8
90	44.18	2793	6¾-8½	3⅛	8½
96	50.27	3092	7-8¼	3½	9
102	56.75	3466	7-8¼	3½	9½
108	63.62	3864	7¼-8½	3¾	10

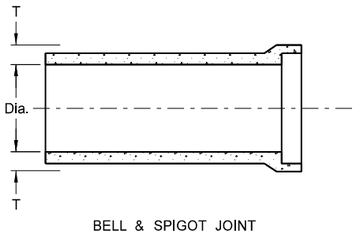


END VIEW

CIRCULAR PIPE

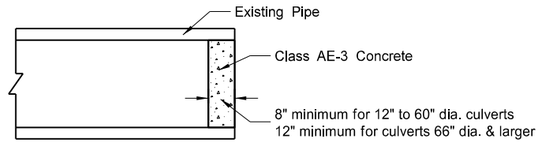


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

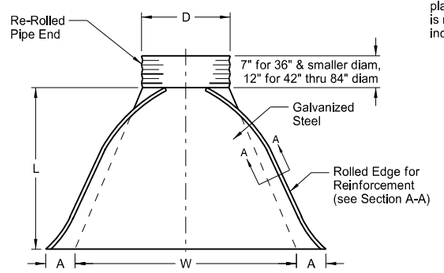
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
05-12-14	
REVISIONS	
DATE	CHANGE
01-21-15	Revised Note 5
11-21-16	Revised End Section Dimensions
09-18-19	Updated Perspective View Details

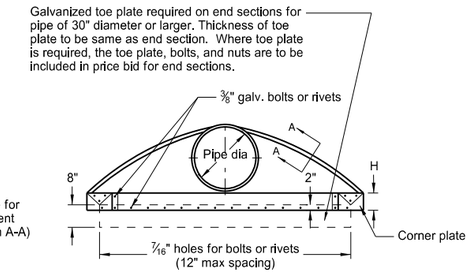
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

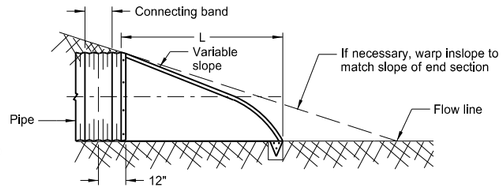
D-714-4



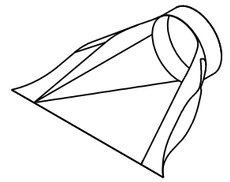
PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

* * PIPE DIA.	GALV. THICK.	END SECTION DIMENSIONS A	B	H	L	W	APPROX. SLOPE	BODY PIECE
IN	IN	IN	IN	IN	IN	IN	RATE	
15	0.064	7	8	6	26	30	2½:1	1
18	0.064	8	10	6	31	36	2½:1	1
24	0.064	10	13	6	41	48	2½:1	1
30	0.079	12	16	8	51	60	2½:1	1 or 2
36	0.079	14	19	9	60	72	2½:1	2
42	0.109	16	22	11	69	84	2½:1	2
48	0.109	18	27	12	78	90	2¼:1	2
54	0.109	18	30	12	84	102	2:1	2
* 60	0.109	18	33	12	87	114	1¾:1	3
* 66	0.109	18	36	12	87	120	1½:1	3
* 72	0.109	18	39	12	87	126	1 1/3 :1	3
* 78	0.109	18	42	12	87	132	1¼:1	3
* 84	0.109	18	45	12	87	138	1 1/6 :1	3

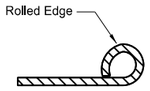
* These sizes have 0.109" sides and 0.138" center panels.

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

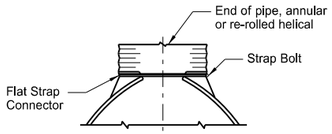
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

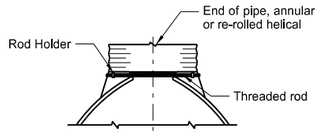
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



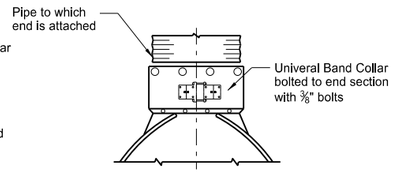
SECTION A-A



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



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

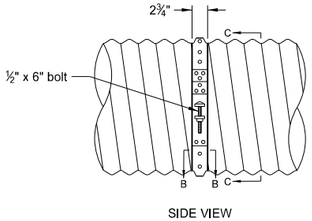


TYPE #3
For all pipe sizes

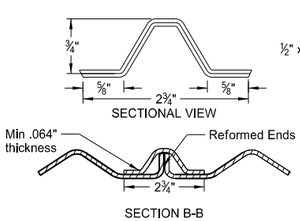
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"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

NOTES:

1. Pipes and connecting bands shall conform to applicable sections of NDDOT Standard Specifications and to AASHTO M-36.
2. Top edge of all end sections to have rolled edges for reinforcement (see Section A-A). The reinforced edges are to be supplemented with 2" x 2" x ¼" galv. angle for 60" through 72" dia. and 2½" x 2½" x ¼" galv. angle for 78" and 84" dia.. Angles to be attached by galv. ⅜" dia. bolts and nuts. Angles are to extend from pipe to the corner wing bend.
3. Elongated pipes shall be factory preformed so that the vertical diameter shall be 5% greater and the horizontal diameter 5% less than a circular pipe.
4. Coupling bands shall be two-piece for pipes larger than 36" as shown in Section C-C & D-D details. For pipes 36" and smaller, a one-piece band is acceptable.
5. ½" x 8" bolts may be used as a substitute for the ½" x 6" bolts shown in the details.
6. Coupling bands wider than 14" may be used if a minimum of four ½" bolts with maximum spacing of 5½" are used for the connection.
7. Length of spot welds shall be minimum ½".

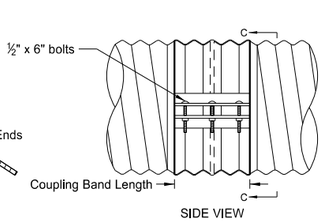


SIDE VIEW

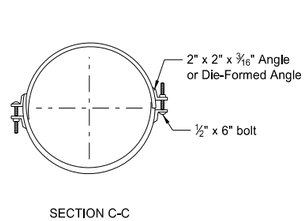


SECTION B-B

HAT BAND FOR FLANGED END PIPE

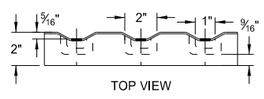


SIDE VIEW



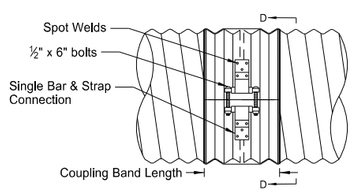
SECTION C-C
Angle Connection

ANNULAR BAND

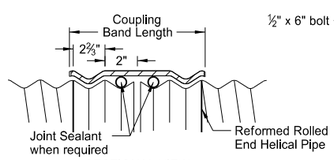


TOP VIEW

Die-Formed Angle Connector

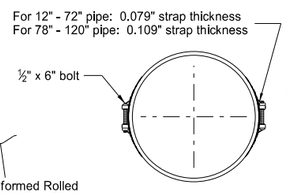


SIDE VIEW

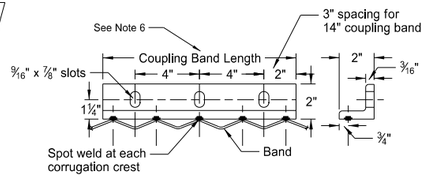


SECTIONAL VIEW

HUGGER COUPLING BAND

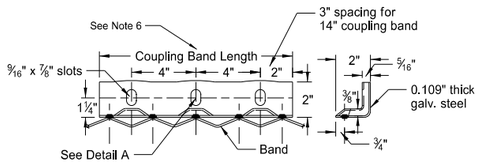


SECTION D-D
Bar & Strap Connection



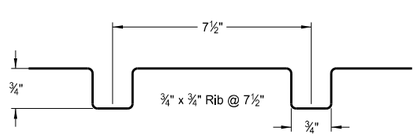
SIDE VIEW END VIEW

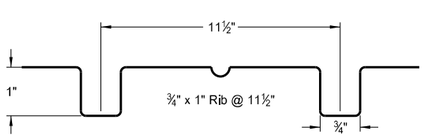
2" x 2" x 3/16" Angle Connector



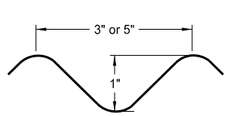
SIDE VIEW END VIEW

Die-Formed Angle Connector

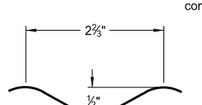




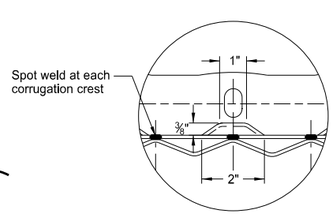
SPIRAL RIB CORRUGATIONS



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



2⅔" x ½" CORRUGATIONS



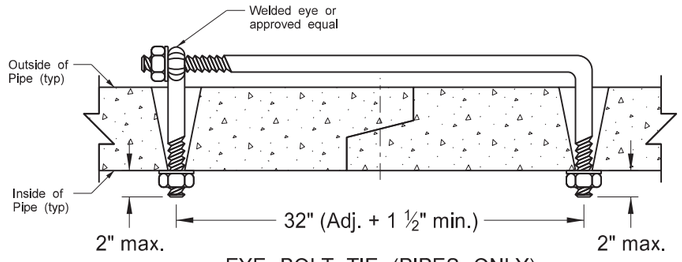
Detail A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
08-16-13	
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

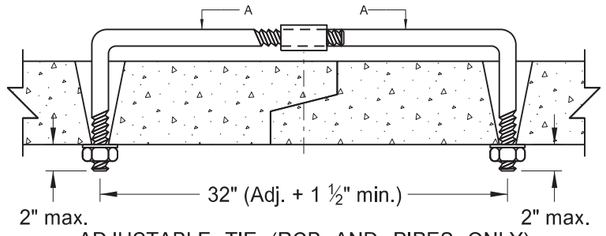
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CONCRETE PIPE, CATTLE PASS, OR PRECAST CONCRETE BOX CULVERT TIES

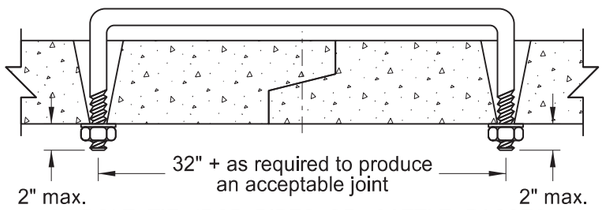
D-714-22



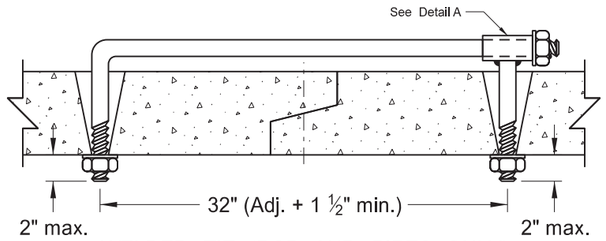
EYE BOLT TIE (PIPES ONLY)



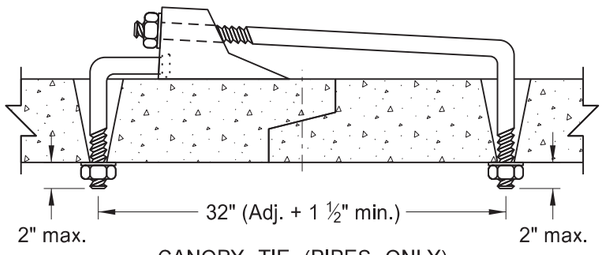
ADJUSTABLE TIE (RCB AND PIPES ONLY)



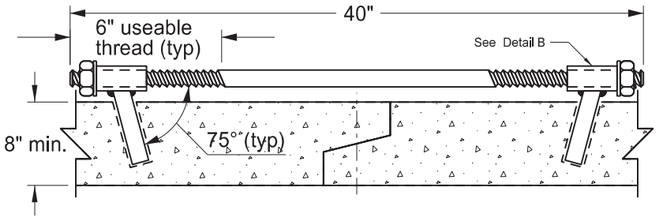
U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



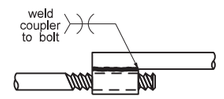
WELDED TIE (RCB AND PIPES ONLY)



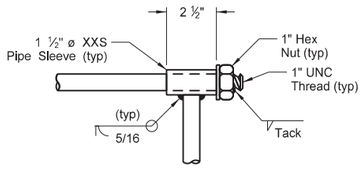
CANOPY TIE (PIPES ONLY)



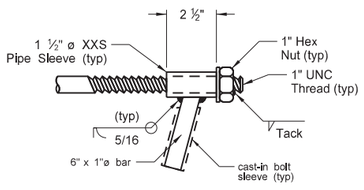
HIDDEN TIE (RCB ONLY)



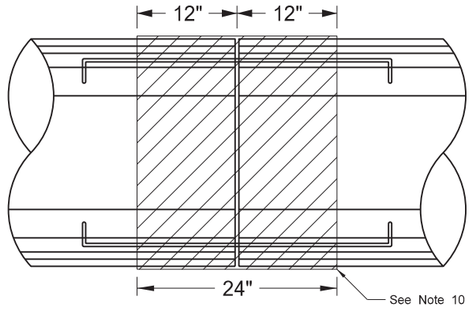
SECTION A-A



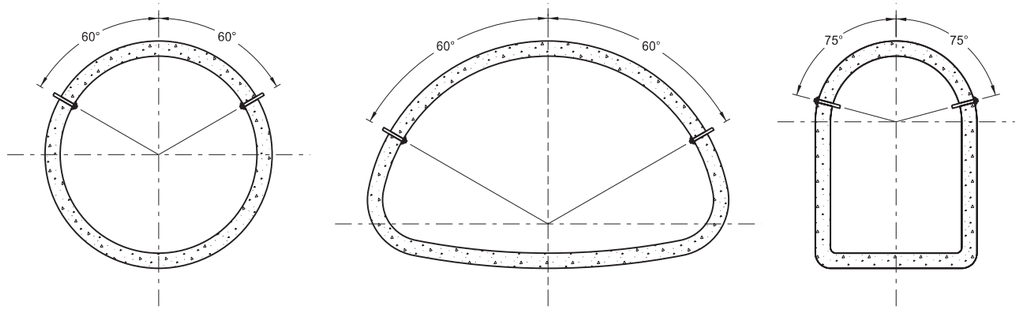
DETAIL A



DETAIL B



PLAN VIEW (PIPES ONLY)



END VIEW

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ø	XXS Pipe Sleeve Inner ø
18" - 24"	⅝" See note 3	¾"
30" - 66"	¾"	1"
72" - 120"	1"	1 ¼"
RCB/Cattle Pass		

NOTES:

1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Insert pipe ties from the inside of the pipes and grout into place for Cattle Pass and Jacked and Bored pipes. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
3. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Insert and grout tie bars into place where nuts and washers are not used.
4. Do not use pipe ties to pull the pipe or RCB sections tight. The ties are only for holding sections together.
5. Use only tie bolt assemblies that have been hot dip galvanized in accordance with ASTM A 153.
6. Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Use holes that have a diameter ¼" larger than the diameter of the thread. In precast RCB's, use holes that contain cast-in bolt sleeves with an inside diameter of 1 ¼".
7. Select the type of tie bolt used from those shown.
8. Include the cost of precasting or drilling the required holes and furnishing and installing the tie bolts in the price bid for the appropriate conduit or RCB pay item.
9. Tie all centerline and approach RCP culvert joints. Tie the first three joints including the end section of all free ends of storm drain systems. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
10. Place joint wrap prior to installing ties. Firmly secure the wrap around the full perimeter. For concrete pipes, overlap the joint by 12" in both directions. For box culverts, use a waterproof membrane that meets ASTM C877 (Type III). Provide a membrane that is a minimum of 12" wide and center it at the joint. Provide a minimum overlap of 2.5" at the seams.
11. Use tie bolts that conform to ASTM A 36. Use heavy hex nuts that conform to ASTM A 563. Use washers that conform to ASTM F 436, Type 1. Use welded pipe sleeves and cast-in bolt sleeves that conform to ASTM A 53, Grade B.
12. Tie RCB's at locations shown on the plans.

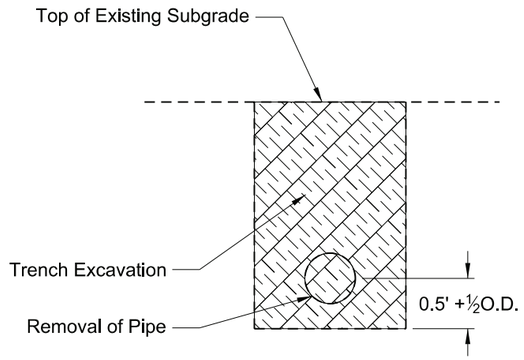
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11, Table, Title, Lables
8-11-21	Notes 2-12, Table, Lable

JONATHAN D KETTERLING
REGISTERED
PROFESSIONAL
PE-4684
ENGINEER
NORTH DAKOTA
08/11/21

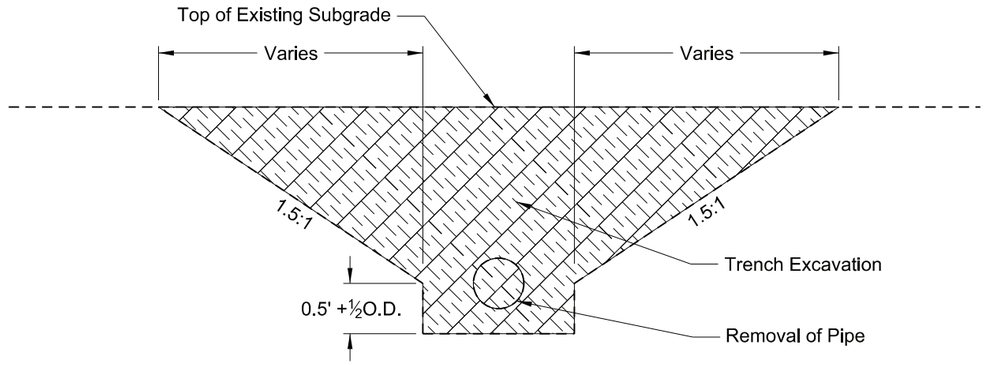
DocuSign

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

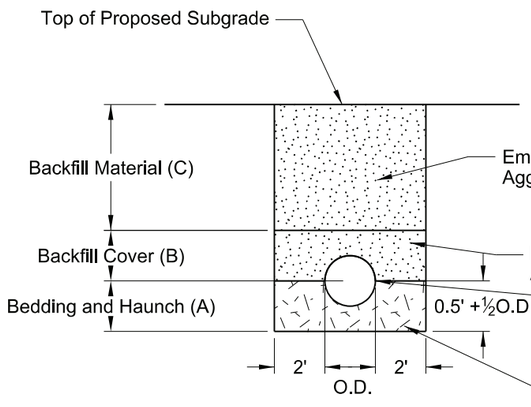
D-714-27



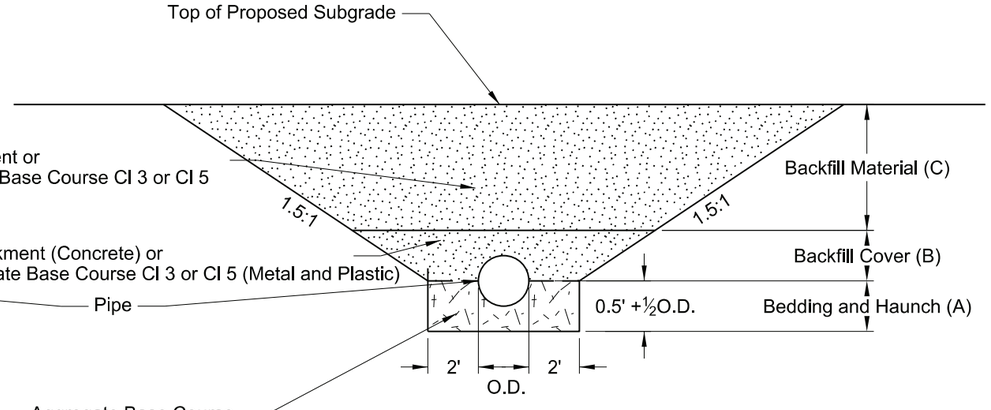
EXCAVATION DETAIL A



EXCAVATION DETAIL B



BACKFILL DETAIL A



BACKFILL DETAIL B

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

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

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

Bedding and Haunch (A)
Pipes Not Under Roadway = 0.5 O.D. + 0.5 Feet
Pipes Under the Roadway = 0.5 O.D. + 0.5 Feet
Backfill Cover (B)
Concrete Pipe = 0.5 O.D.
Metal and Plastic = 0.5 O.D. + 1 Foot
Backfill Material (C)
Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course CI3 or CI 5
Top of Pipe Greater than 4 Feet Below the Top of Proposed Subgrade = Common Excavation - Type A
Pipe Not Under Roadway = Common Excavation - Type B

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-26-13

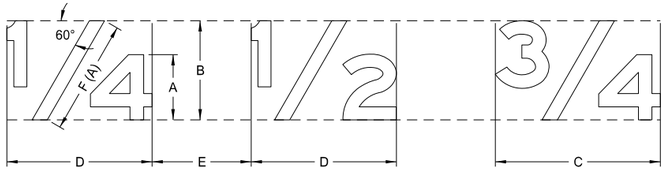
REVISIONS

DATE	CHANGE
10-15-13	Label Formatting
1-21-15	Nomenclature
12-10-15	Added Plastic Pipe
5-27-20	Changed bedding depth and updated table

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

LETTER AND ARROW DETAILS

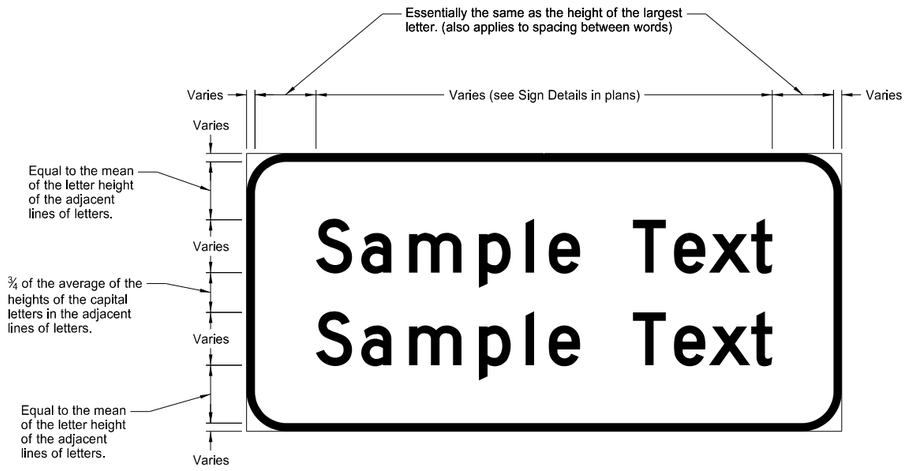
D-754-9



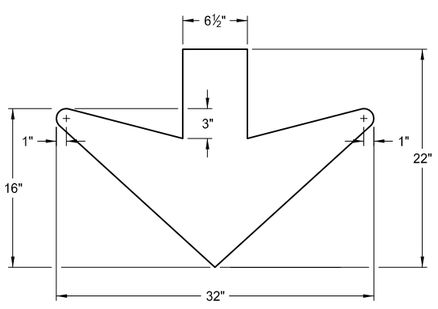
DETERMINE SIZE OF THE FRACTION AS FOLLOWS:

SYMBOL	TITLE	RATIO TO HEIGHT OF CAPITAL OR UPPER CASE
A	Letter height	1.0 of capital or upper case
B	Fraction height	1.5 X A
C	Fraction width	2.5 X A
D	Fraction width	2 X A
E	Space to next character	1 to 1.5 X A
F(A)	Length of diagonal	1.75 X A

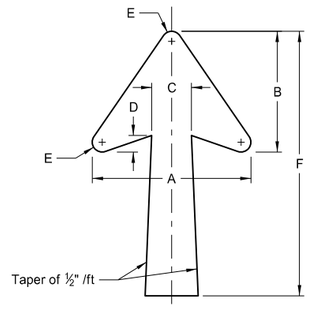
(A) Center diagonal stroke of fraction optically.



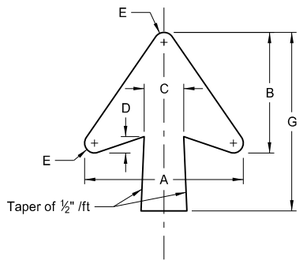
TYPICAL SPACING



DOWN ARROW



TYPE A

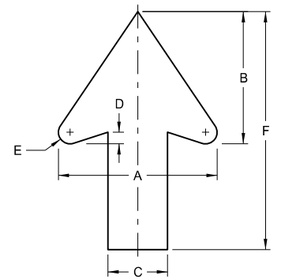


TYPE B

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G
ND_6IN	6"	12"	9.125"	3"	1"	0.625"	20"	13.5"
ND_8IN	8"	15.125"	11.563"	3.75"	1.313"	0.813"	25"	17"
ND_10IN	10"	18.25"	14"	4.5"	1.5"	0.75"	30"	20"
ND_12IN	12"							
ND_13IN	13.3"							
ND_16IN	16"	22.25"	17"	5.375"	1.75"	1"	35"	25"
ND_20IN	20"							

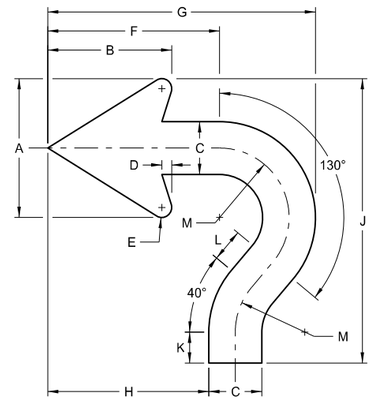
NOTE: Arrow size on gore signs is based on the letter size of "EXIT".

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



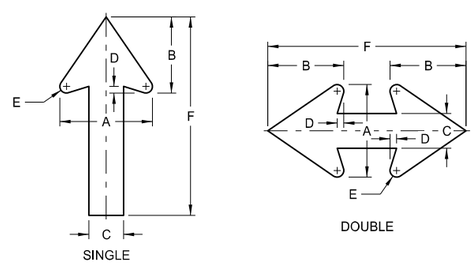
TYPE D

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F
ND_2IN	2"	2"	1.625"	0.75"	0.125"	0.125"	3"
ND_4IN	4"	4"	3.313"	1.5"	0.25"	0.25"	6"
ND_6IN	6"	6"	4.875"	2.25"	0.375"	0.375"	9"
ND_8IN	8"	8"	6.625"	3"	0.5"	0.5"	12"
ND_10IN	10"	10"	8.375"	3.75"	0.75"	0.75"	15"
ND_12IN	12"	12"	10"	4.5"	0.875"	0.875"	18"



ROUNDABOUT

DESIGNATION	LETTER SIZE (Upper Case)	A	B	C	D	E	F	G	H	J	K	L	M
ND_6IN	6"	5.25"	4.688"	2"	0.375"	0.375"	6.5"	10.125"	6.094"	10.75"	1.168"	1.25"	2.625"
ND_8IN	8"	7"	5.75"	2.625"	0.5"	0.5"	8.688"	13.5"	8.166"	14.333"	1.557"	1.667"	3.5"



SPECIAL

DESIGNATION	A	B	C	D	E	F	USES
ND_0.75IN	2"	1.625"	0.75"	0.125"	0.125"	7.75"	Parking Signs (Regulatory)
ND_2.625IN	7"	5.75"	2.625"	0.5"	0.5"	15"	Frontage Road Signs

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

8-3-11

REVISIONS

DATE	CHANGE
7-8-14	Revised gore sign and added 4" D & D arrow
5-4-16	Revised Distance & Destination and Typical Spacing details
4-23-18	Revised arrow details
8-30-18	Updated notes to active voice.
8-29-19	New Design Engr PE Stamp.

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

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

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

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

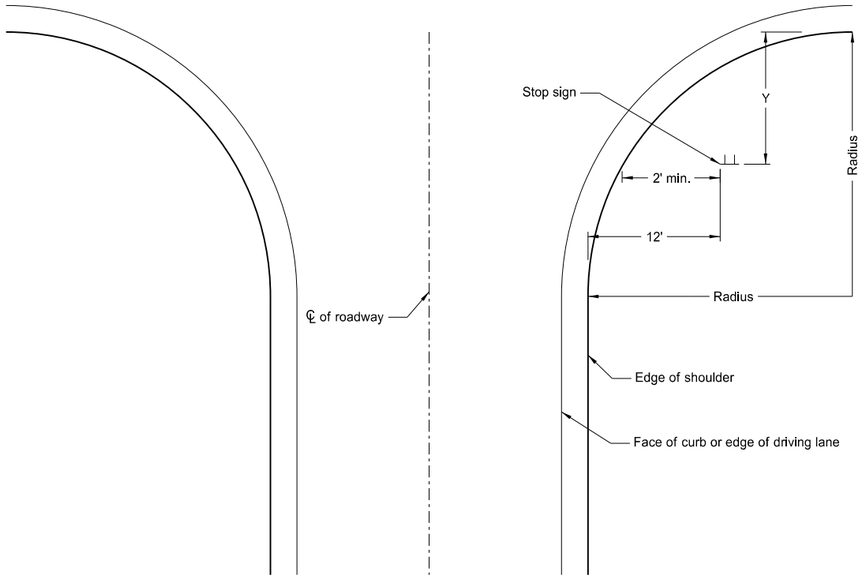
   Install signs on expressways a minimum height of 7'.

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

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

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

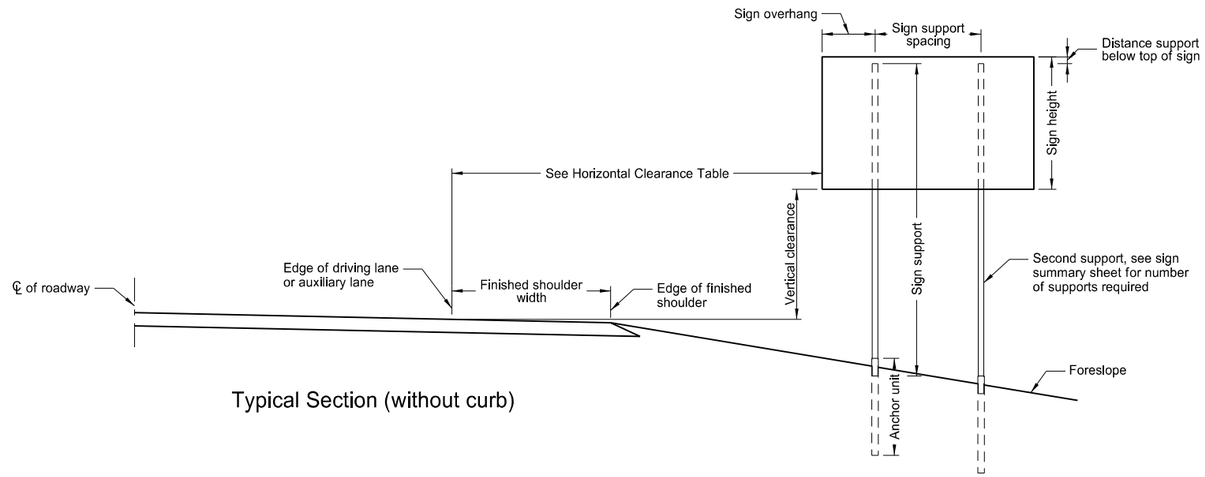
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

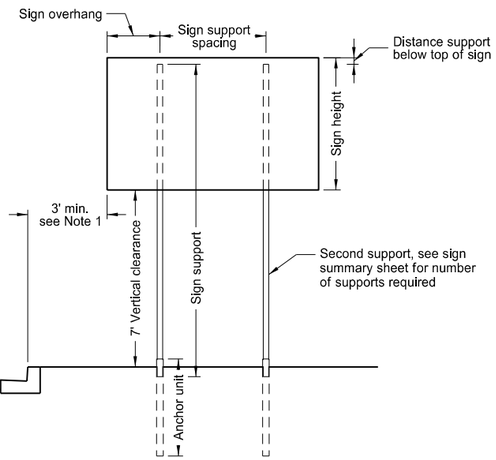
Use layout for the placement of "Stop" signs.

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



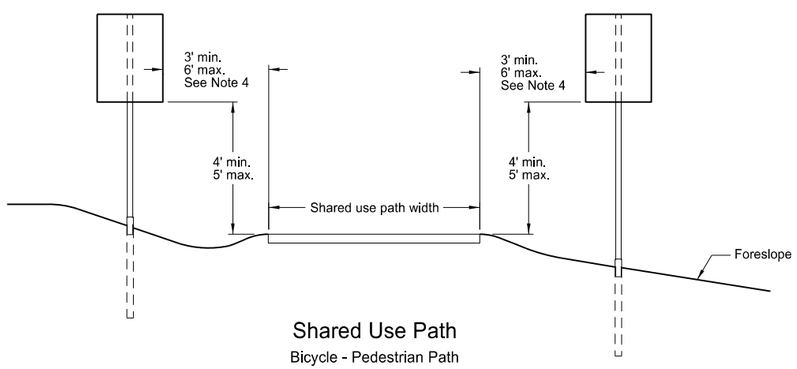
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

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

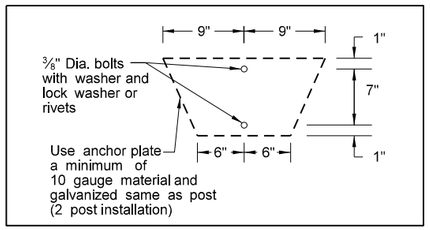
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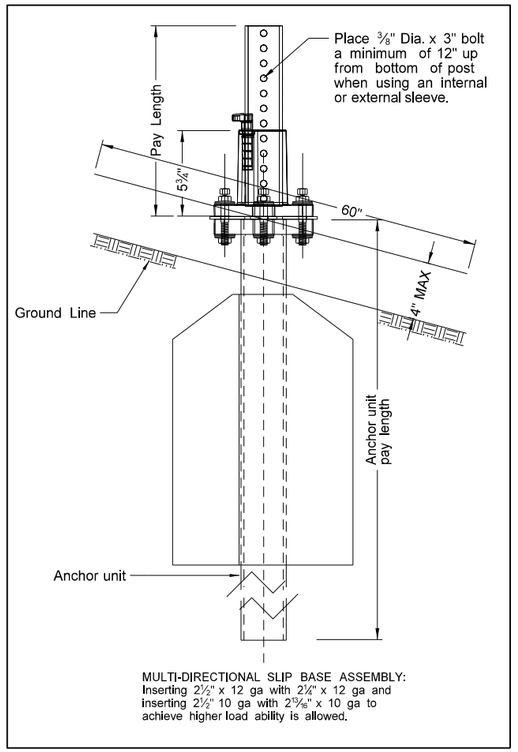
Mounting Details Perforated Tube

D-754-24

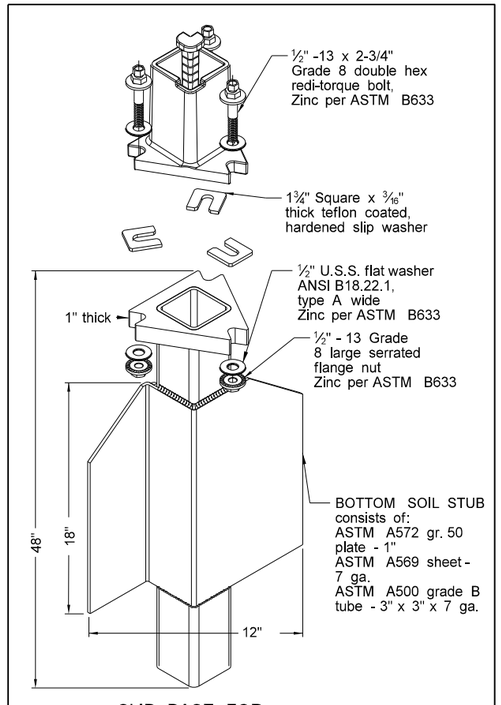
Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2⅜16	10	Yes		7

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

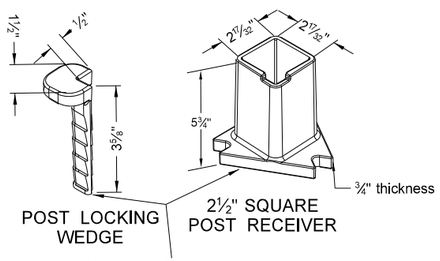




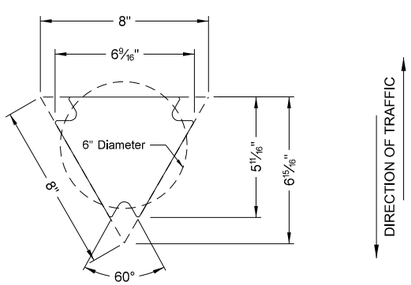
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2⅜16" x 10 ga to achieve higher load ability is allowed.



SLIP BASE FOR 2½" POST



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



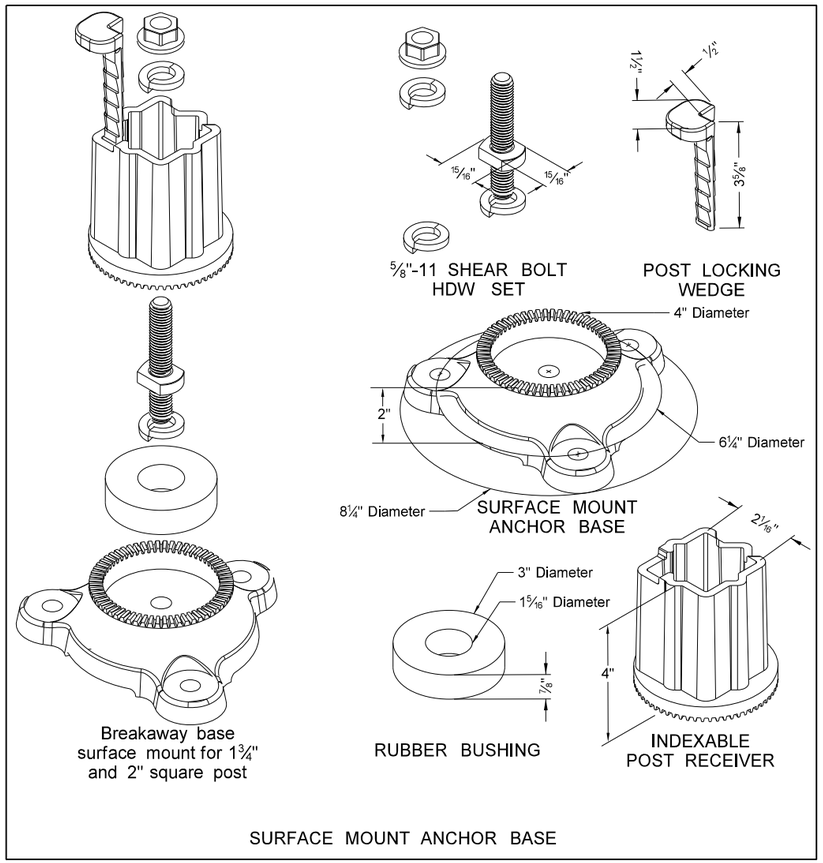
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section Modulud In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695	0.499
2⅜16 x 2⅜16	0.135	10	3.432	0.605	0.841	0.590
2½ x 2½	0.105	12	3.141	0.804	0.803	0.643
2½ x 2½	0.135	10	4.006	0.979	1.010	0.783

The 2 ⅜16" size 10 gauge is shown as 2.19" size on the plans;
The 2½" size is shown as 2.51" size on the plans.

NOTE:

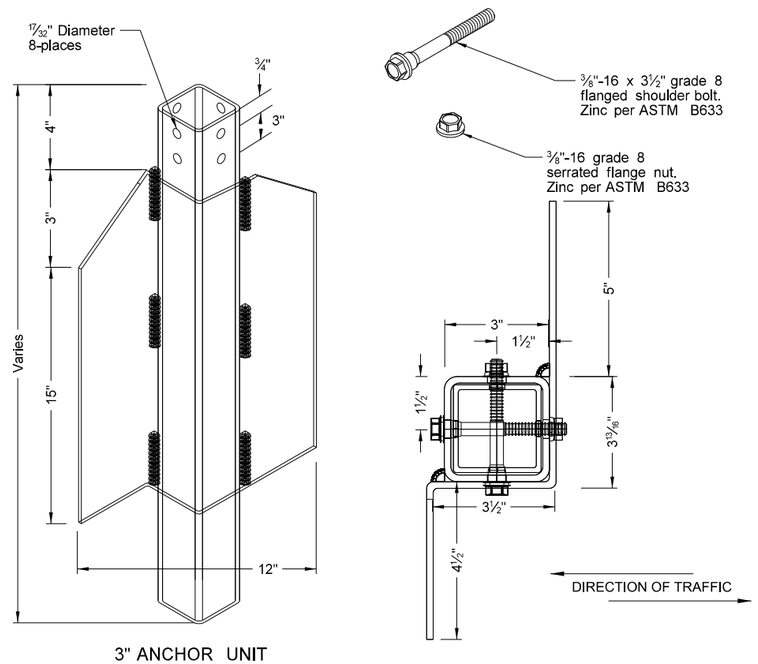
1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Provide 7 guage HRPO commmercial quality ASTM A569 and 3" x 3" x 7" guage ASTM A500 grade B anchor material with 43.9 KSI yield strength and 59.3 KSI tensile strength. Hot dip galvanize anchor per ASTM A123/153. Tolerances on anchor unit and slip base bottom assembly are +/- 0.005" unless ortherwise noted.
3. Eliminate wings when anchor is used in concrete sidewalk.
4. Provide a minimum 8' distance between the first and fourth post on four post signs.
5. Install in accordance with manufacturers recommendation.
6. Use a minimum ½" diameter x 4" grade 8 concrete fastener for surface mount breakaway base.



SURFACE MOUNT ANCHOR BASE

SHOULDER BOLT

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



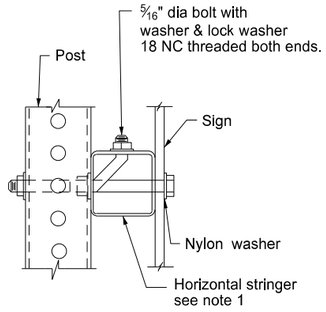
3" ANCHOR UNIT

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

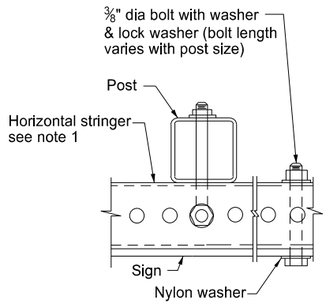
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Mounting Details Perforated Tube

D-754-25

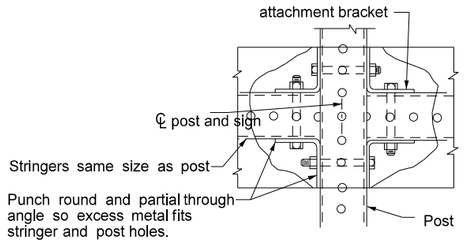


Side View



Top View

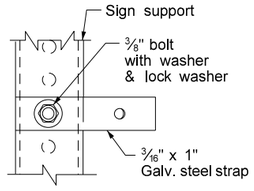
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



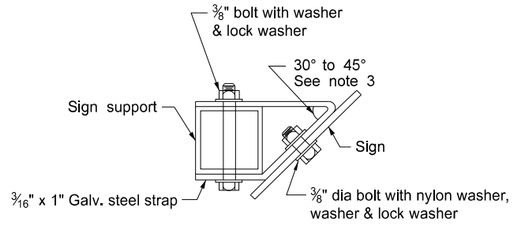
STREET NAME SIGNS AND ONE WAY SIGNS
SINGLE POST ASSEMBLY
ONE STRINGER OR BACK TO BACK MOUNTING

Note:

1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with the line of traffic flow. Turning the support to the correct angle for No Parking signs requiring the above angles is allowed. If the No Parking sign is placed with another sign that requires placement at a 90 degree angle with the line of traffic flow, use the detailed angle strap to mount the No Parking sign. Use flat washers and lock washers with all nylon washers.
4. Punching the sign backing and placing the bolt through the sign, the stringer and the post is allowed in lieu of using the bent bolt to attach the post to the stringer.
5. 4" vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.

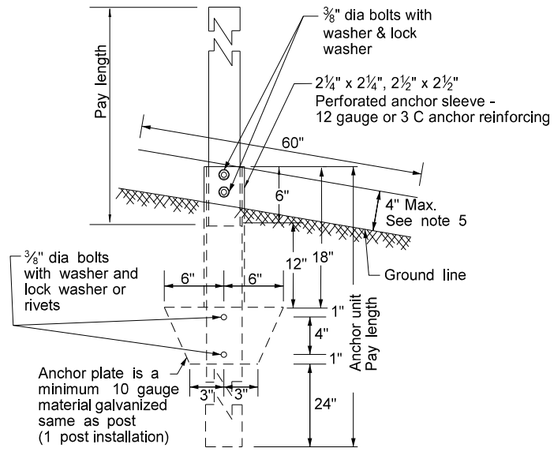


Side View



Top View

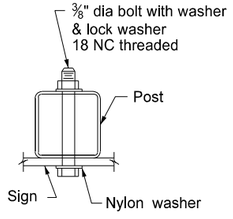
STRAP DETAIL



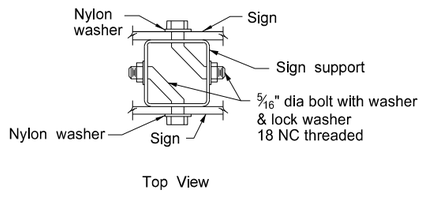
ANCHOR UNIT AND POST ASSEMBLY

Number of Posts	Telescoping Perforated Tube						
	Post Size In.	Wall Thick-ness Gauge	Sleeve Size In.	Wall Thick-ness Gauge	Slip Base	Anchor Size Without Slip Base In.	Anchor Wall Thick-ness Gauge
1	2	12			No	2¼	12
1	2¼	12			No	2½	12
1	2½	12			(B)	3(C)	7
1	2½	10			Yes		7
1	2¼	12	2½(D)	12	Yes		7
1	2½	12	2¼	12	Yes		7
2	2½	10			Yes		7
2	2¼	12	2½(D)	12	Yes		7
2	2½	12	2¼	12	Yes		7
3 & 4	2½	12			Yes		7
3 & 4	2½	10			Yes		7
3 & 4	2½	12	2¼	12	Yes		7
3 & 4	2¼	12	2½(D)	12	Yes		7
3 & 4	2½	10	2 3/16	10	Yes		7

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

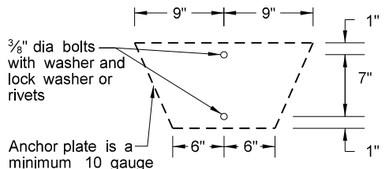


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



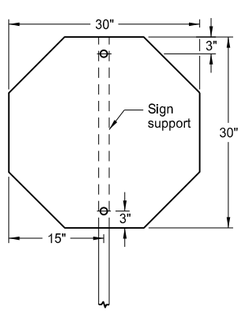
Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness In.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. area In.²	Section Modulus In.³
1½ x 1½	0.105	12	1.702	0.129	0.380	0.172
2 x 2	0.105	12	2.416	0.372	0.590	0.372
2¼ x 2¼	0.105	12	2.773	0.561	0.695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

The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

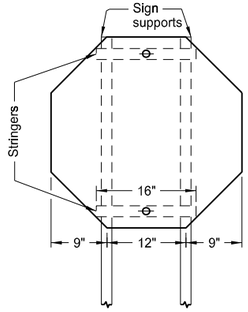
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
7-8-14	Revised Note 3.
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

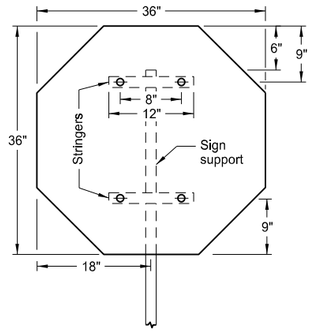


1 Post

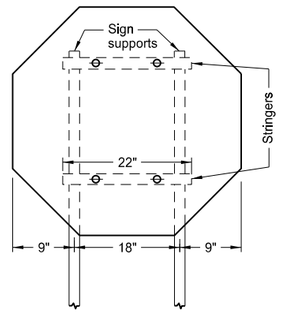


2 Posts

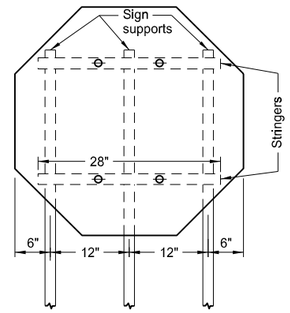
Assembly No. 1



1 Post



2 Posts

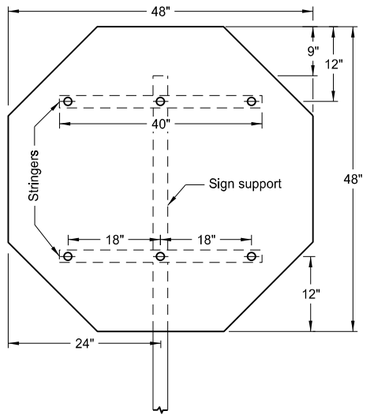


3 Posts

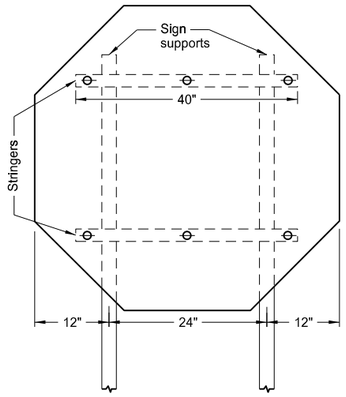
Assembly No. 2

Notes:

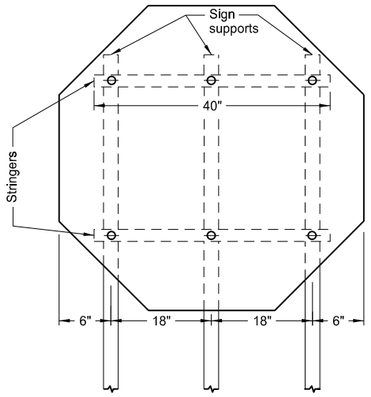
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



1 Post

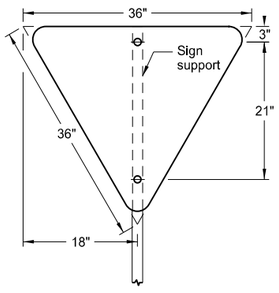


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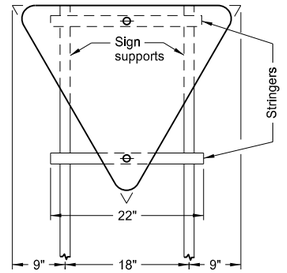


3 Posts

Assembly No. 3

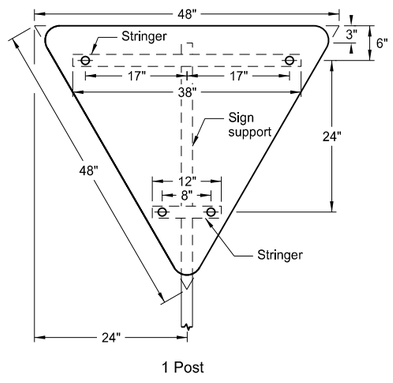


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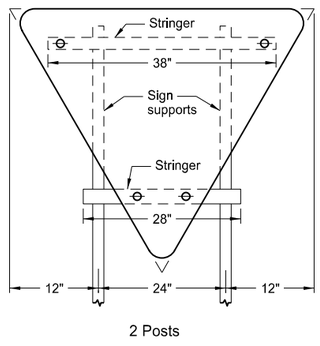


2 Posts

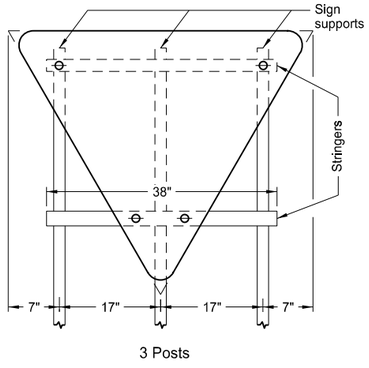
Assembly No. 4



1 Post



2 Posts



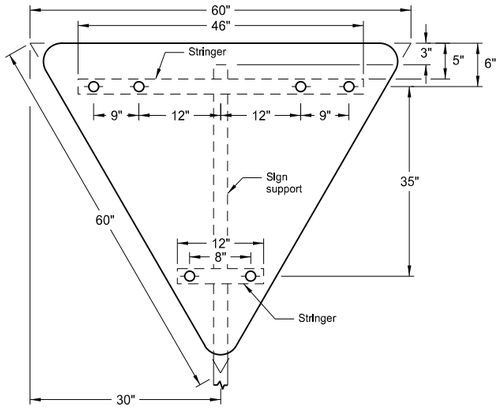
3 Posts

Assembly No. 5

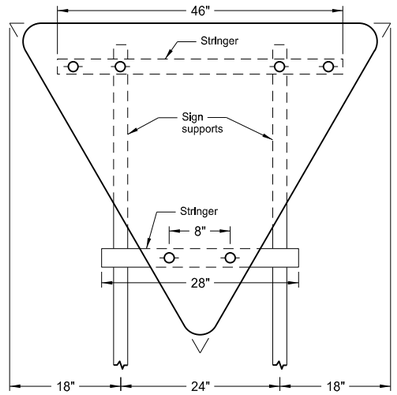
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

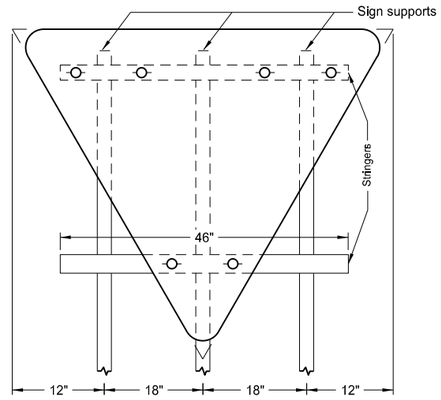
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

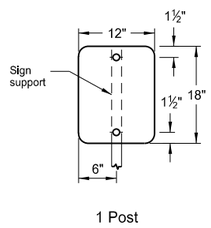


3 Posts

Assembly No. 6

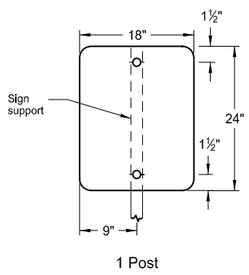
Notes:

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



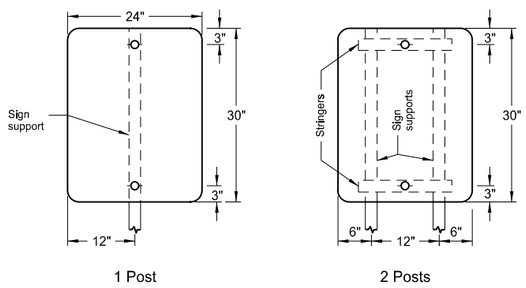
1 Post

Assembly No. 7



1 Post

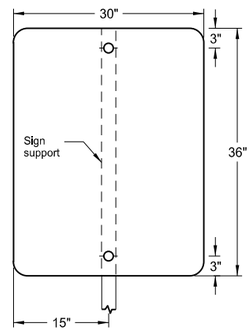
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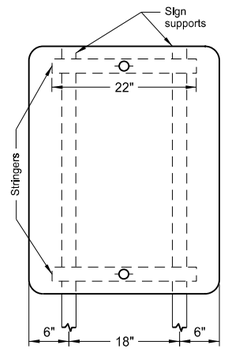
1 Post

2 Posts

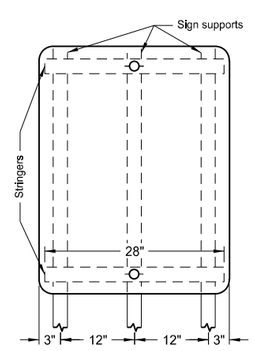
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1 Post

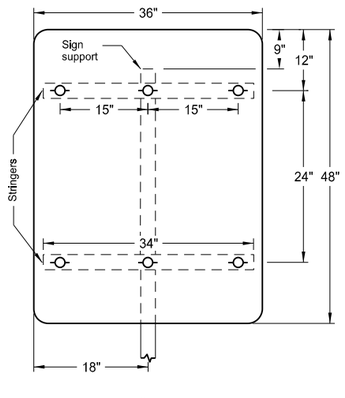


2 Posts

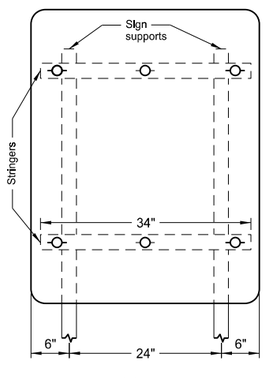


3 Posts

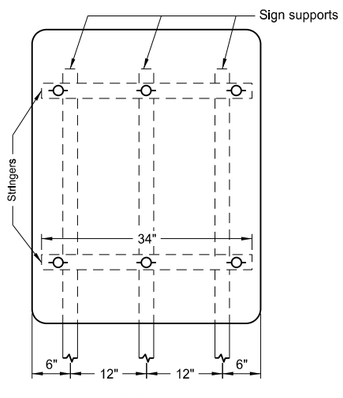
Assembly No. 10



1 Post



2 Posts



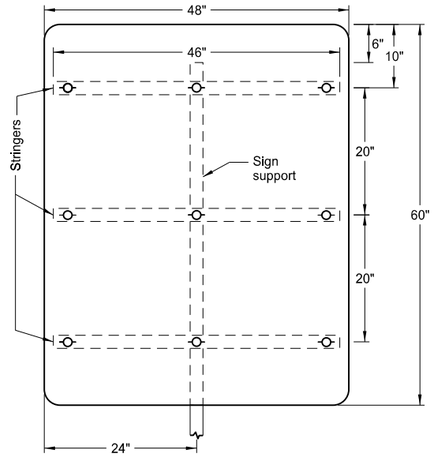
3 Posts

Assembly No. 11

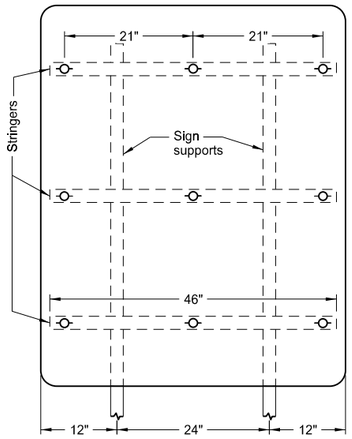
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

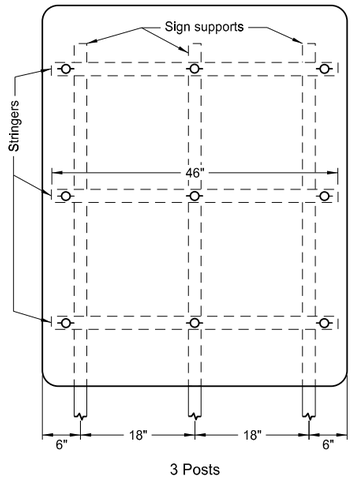
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post

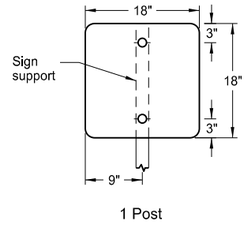


2 Posts



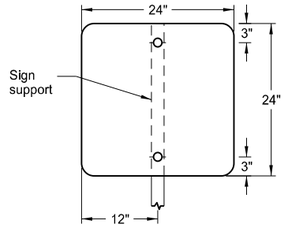
3 Posts

Assembly No. 12

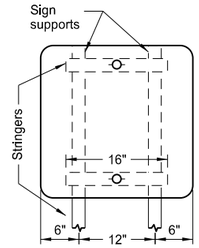


1 Post

Assembly No. 13

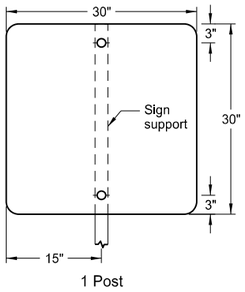


1 Post

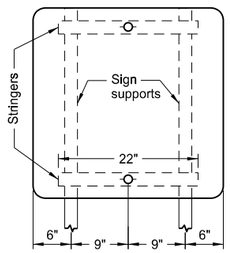


2 Posts

Assembly No. 14

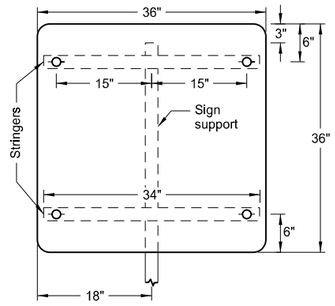


1 Post

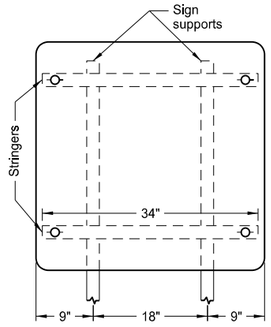


2 Posts

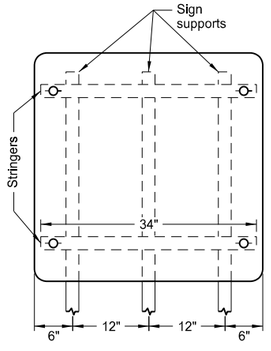
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1 Post

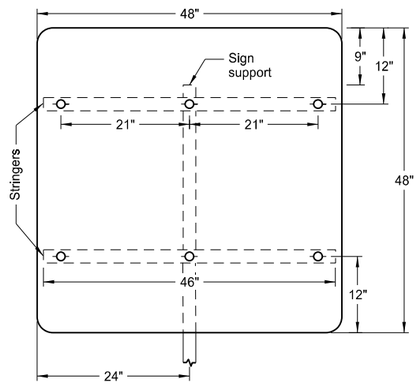


2 Posts

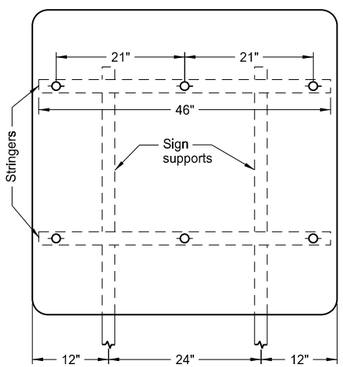


3 Posts

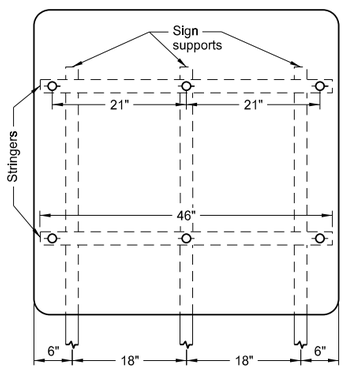
Assembly No. 16



1 Post



2 Posts



3 Posts

Assembly No. 17

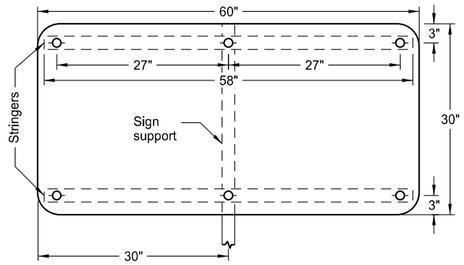
Notes:

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

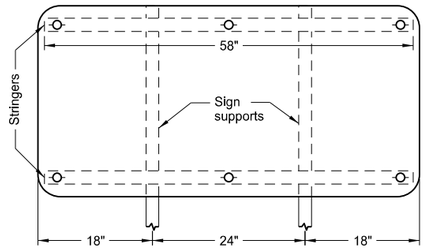
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & changed Assembly 16 post spacing.
8-30-19	New Design Engineer PE Stamp.

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

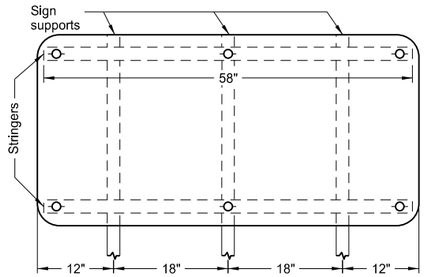
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post

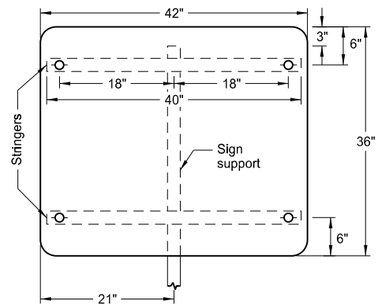


2 Posts

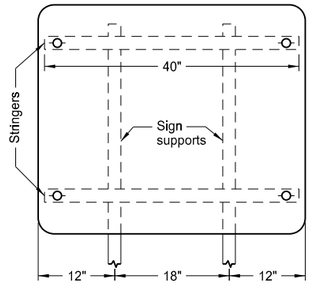


3 Posts

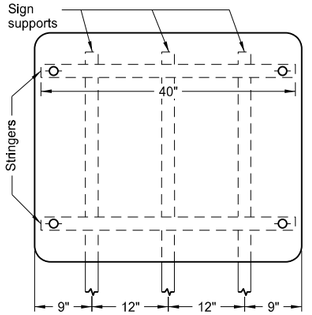
Assembly No. 38



1 Post

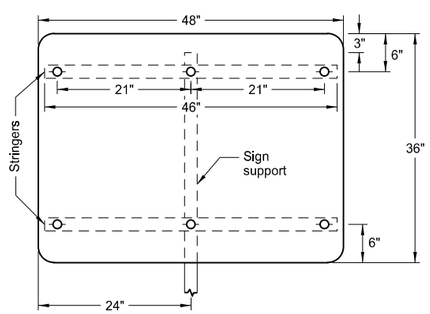


2 Posts

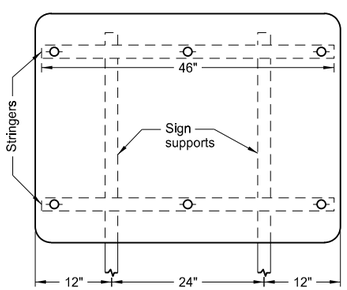


3 Posts

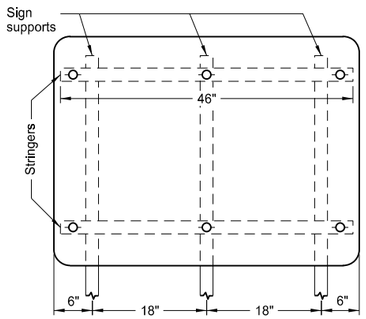
Assembly No. 39



1 Post



2 Posts



3 Posts

Assembly No. 40

Notes:

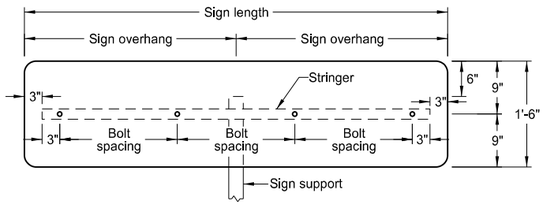
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

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

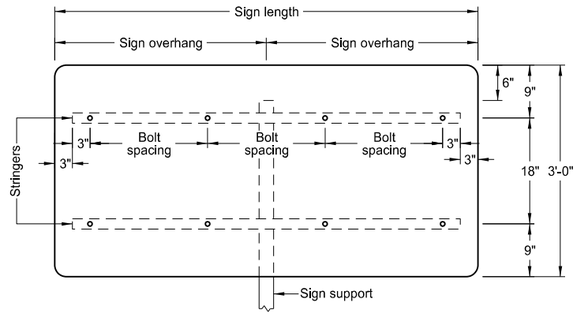
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

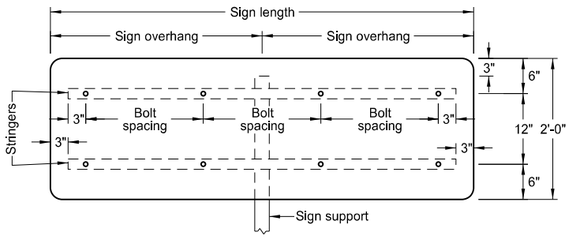
D-754-47



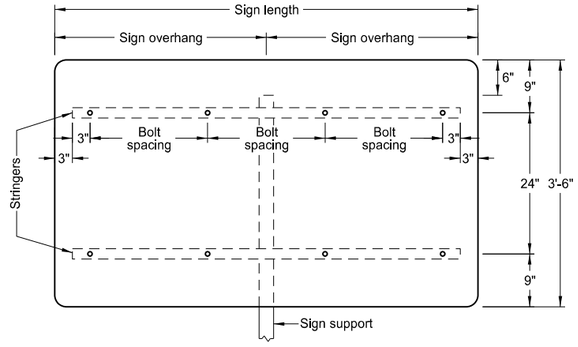
VARIES X 1'-6"



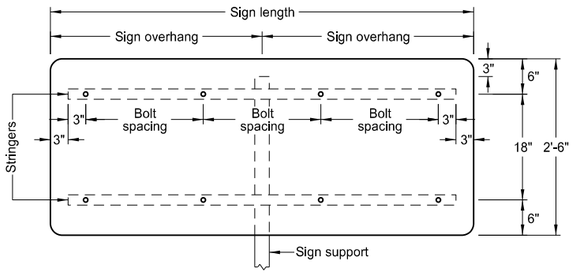
VARIES X 3'-0"



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:

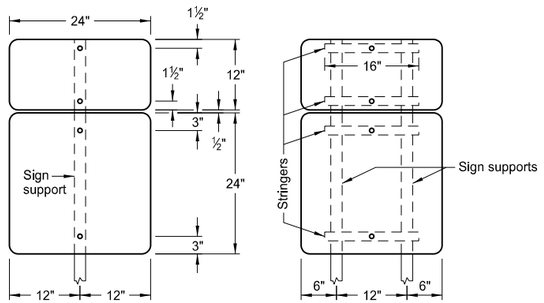
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.
4. Attach single stringer to single post signs with special stringer angle, shown on "Mounting Details Perforated Tube" standard drawing.

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.

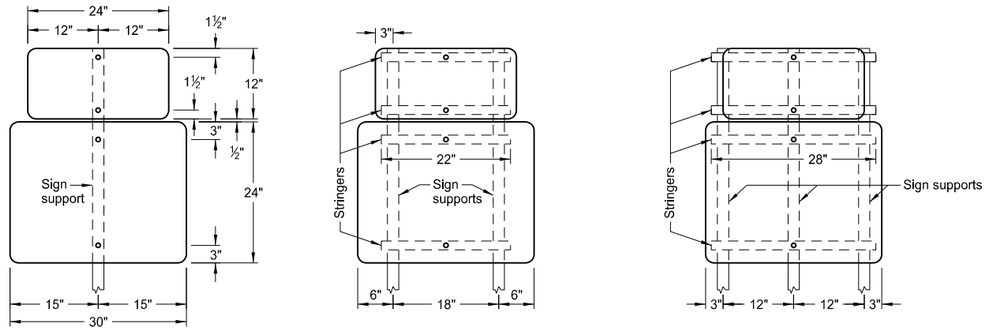
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

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

D-754-51



1 Post 2 Posts

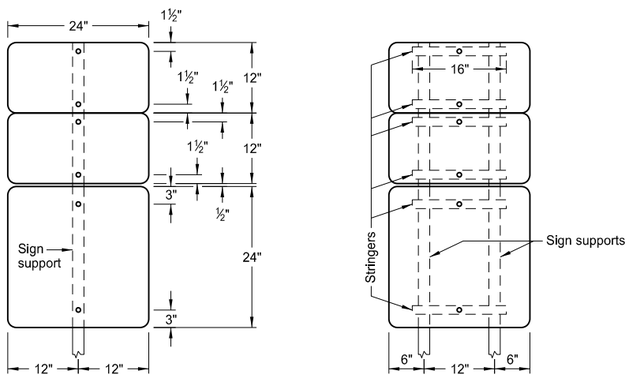


1 Post 2 Posts 3 Posts

ASSEMBLY NO. 371 ASSEMBLY NO. 372

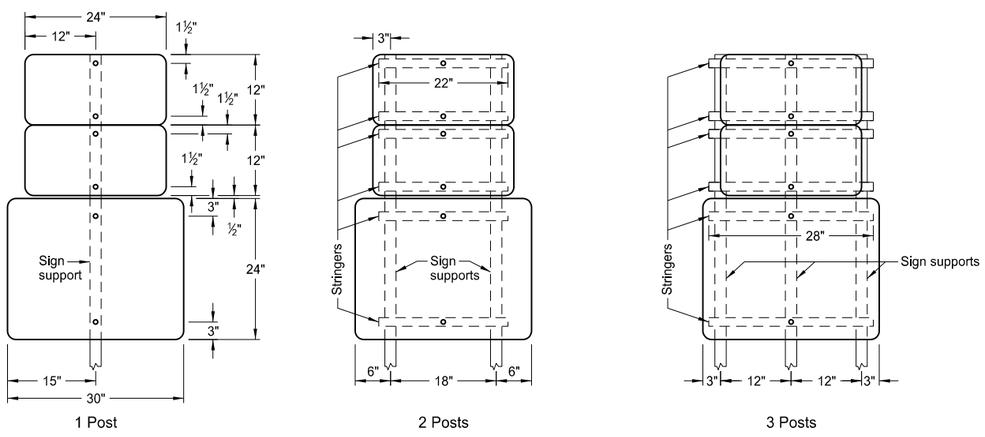
Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



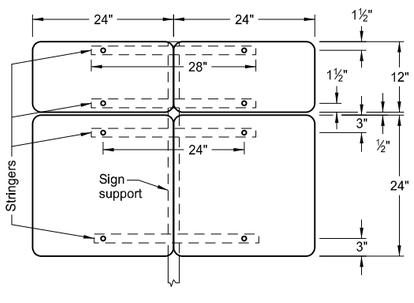
1 Post 2 Posts 3 Posts

ASSEMBLY NO. 373

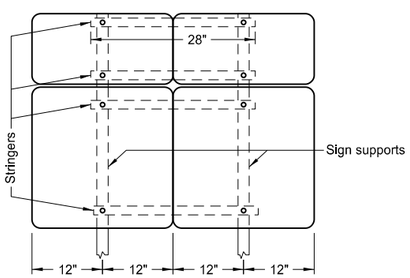


1 Post 2 Posts 3 Posts

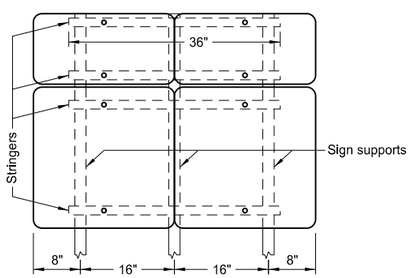
ASSEMBLY NO. 374



1 Post



2 Posts



3 Posts

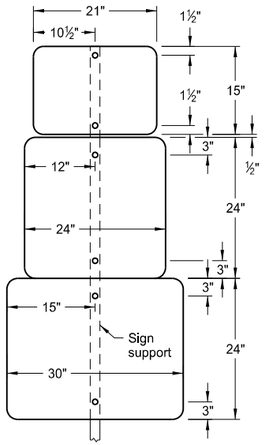
ASSEMBLY NO. 375

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

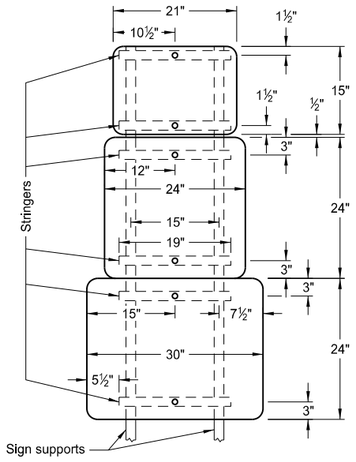
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

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

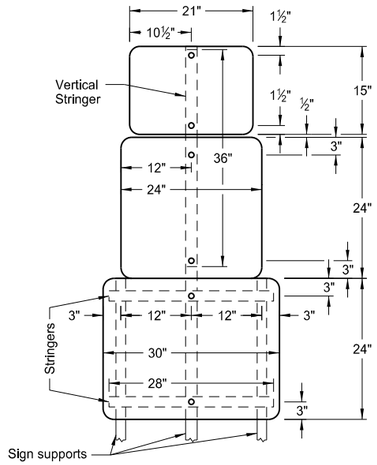
D-754-58



1 Post

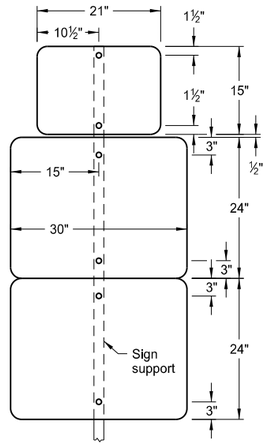


2 Posts

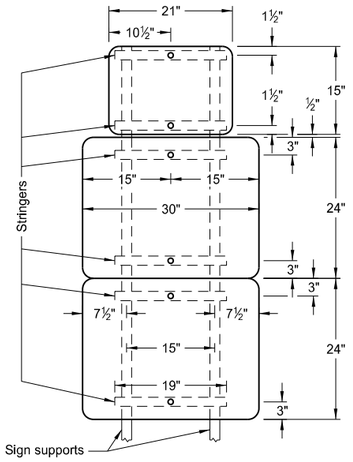


3 Posts

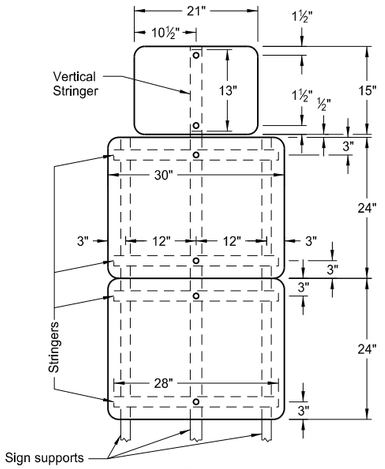
ASSEMBLY 396



1 Post

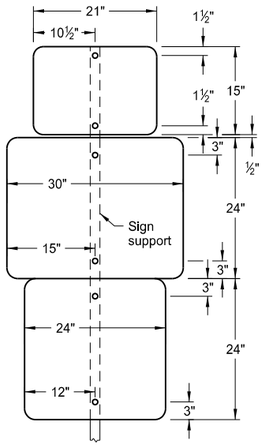


2 Posts

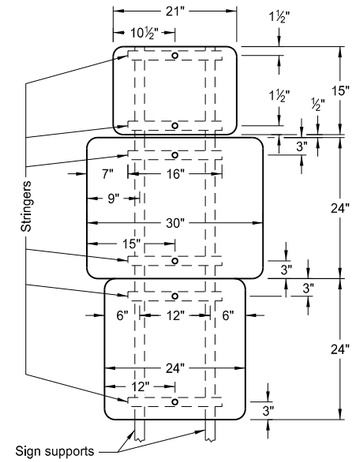


3 Posts

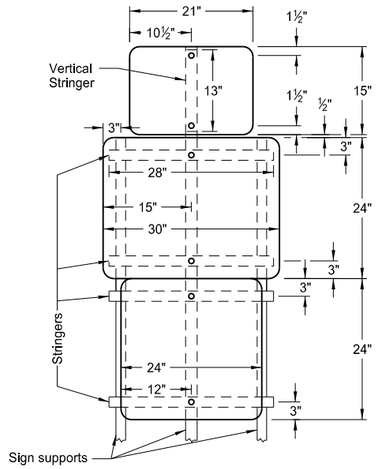
ASSEMBLY 397



1 Post

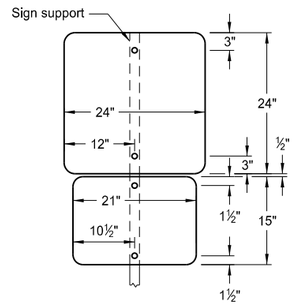


2 Posts

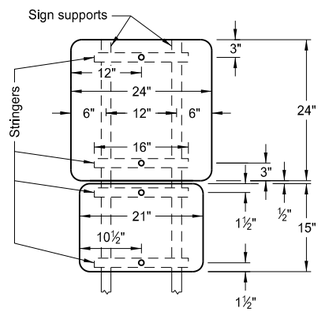


3 Posts

ASSEMBLY 398



1 Post



2 Posts

ASSEMBLY 399

Notes:

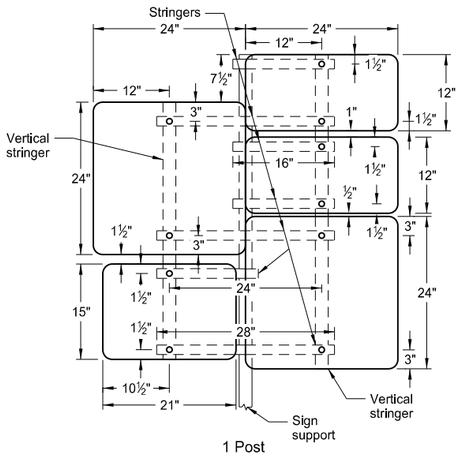
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-22-12	
REVISIONS	
DATE	CHANGE
8-30-18	Updated to active voice & added Assembly 398 dimension.
9-04-19	New Design Engineer PE Stamp.

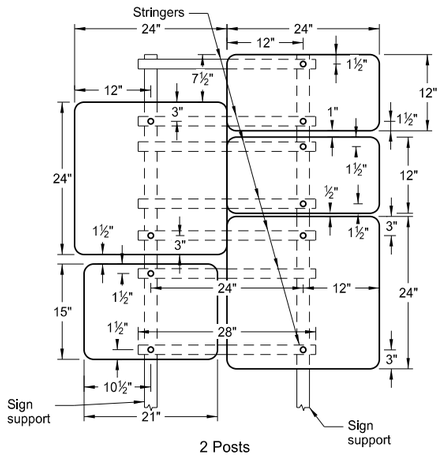
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/04/19 and the original document is stored at the North Dakota Department of Transportation

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

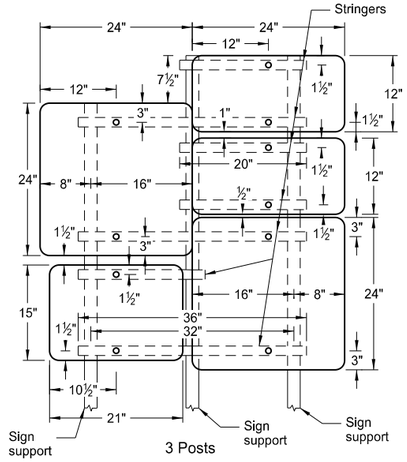
D-754-74



1 Post

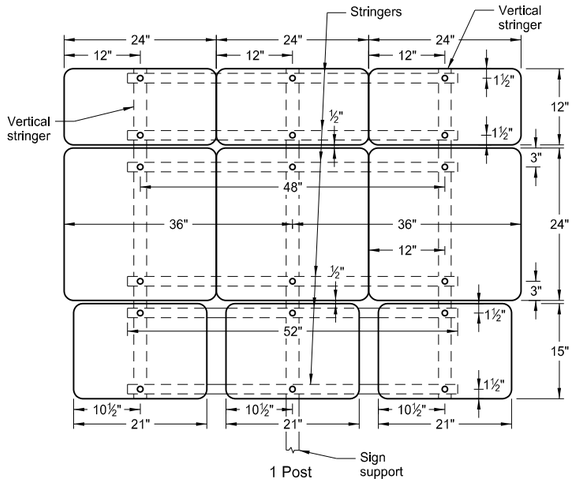


2 Posts

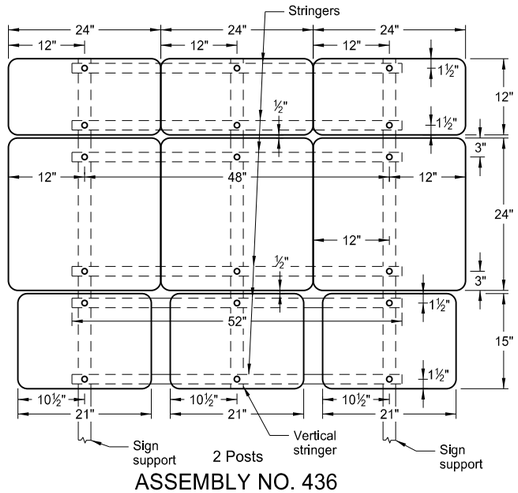


3 Posts

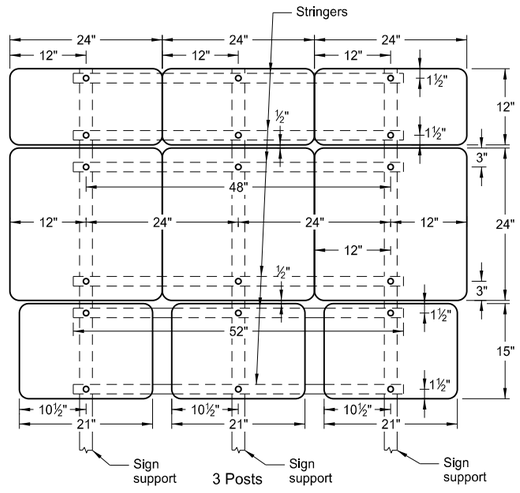
ASSEMBLY NO. 435



1 Post

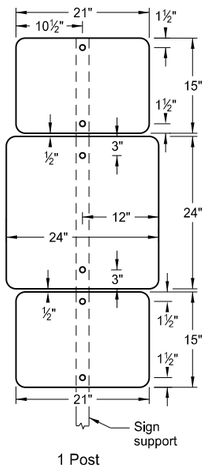


2 Posts

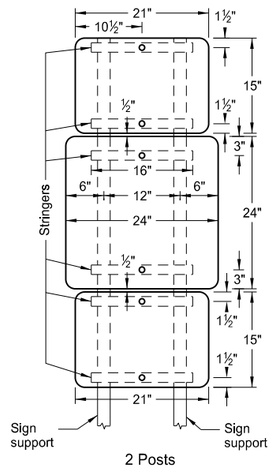


3 Posts

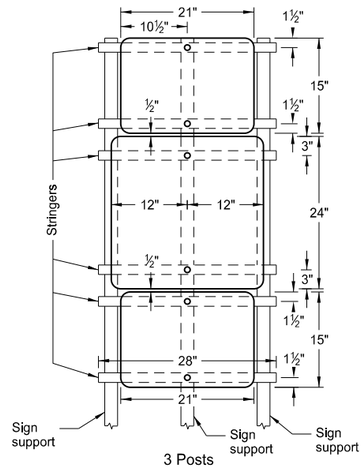
ASSEMBLY NO. 436



1 Post



2 Posts



3 Posts

ASSEMBLY NO. 437

Notes:

1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½"x1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.

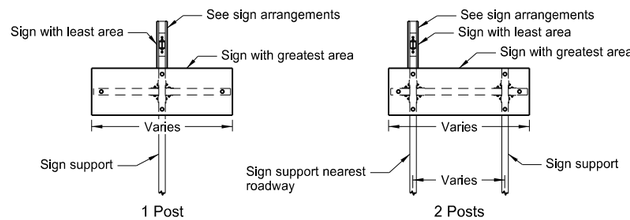
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
8-30-18 9-05-19	Updated notes to active voice. New Design Engineer PE Stamp.

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

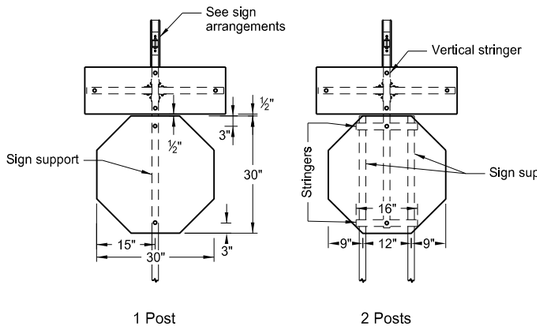
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS FOR STREET NAME SIGNS AND 911 SIGNS

D-754-87

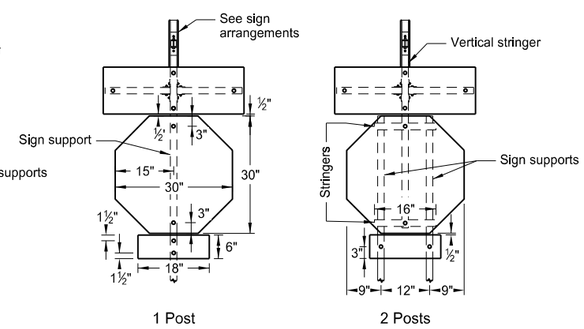
A - Single sign
B - Single sign back to back
C - Single sign each direction
D - Single sign one direction, back to back other direction
E - Back to back both directions



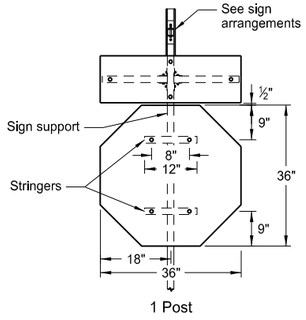
Special Assembly 1 (A, B, C, D or E)



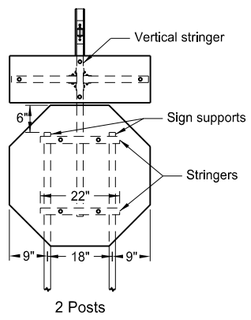
Special Assembly 2 (A, B, C, D or E)



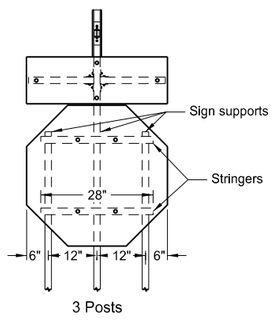
Special Assembly 3 (A, B, C, D or E)



1 Post

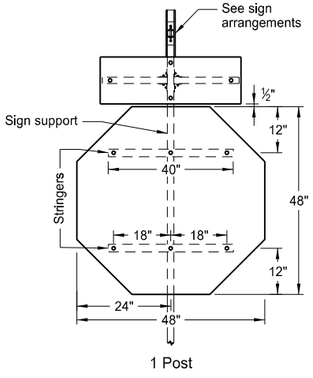


2 Posts

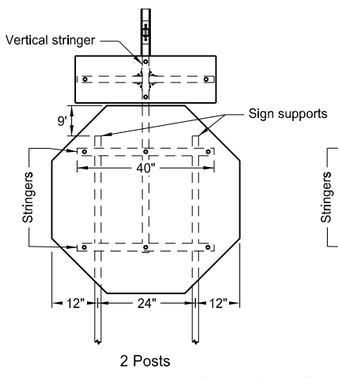


3 Posts

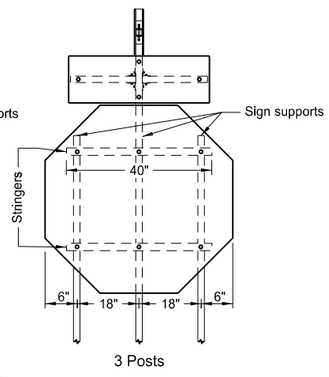
Special Assembly 4 (A, B, C, D or E)



1 Post

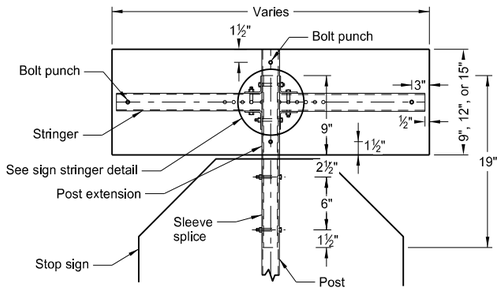


2 Posts



3 Posts

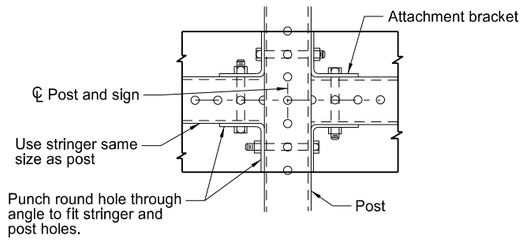
Special Assembly 5 (A, B, C, D or E)



Front View

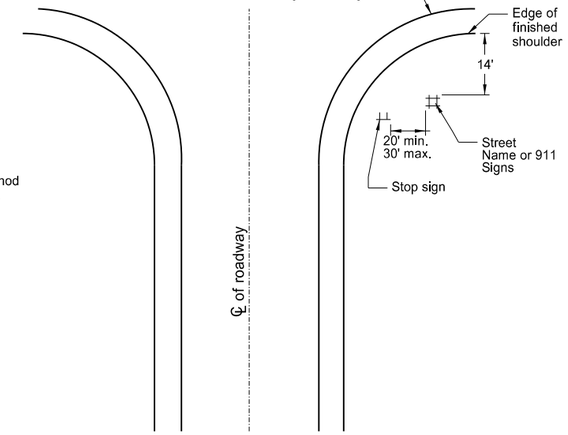
Sleeve Splice Detail

Note: Only use splice method with approval of engineer.



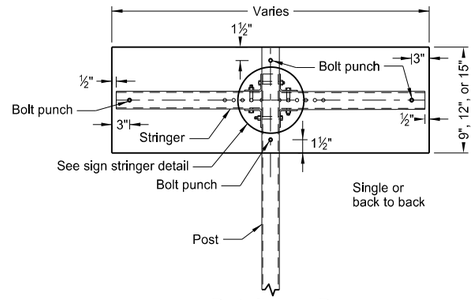
Sign Stringer Detail

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

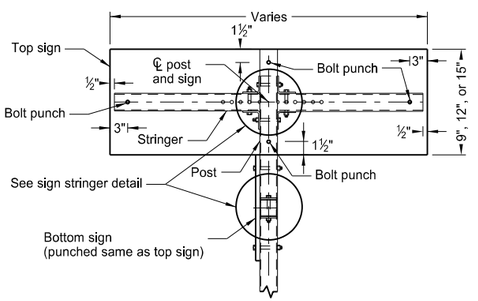


Intersection Layout

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

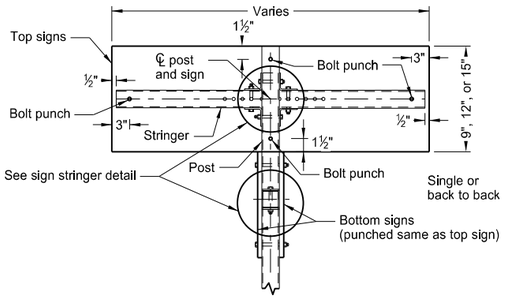


Detail A or B



Detail C

Sign Arrangements



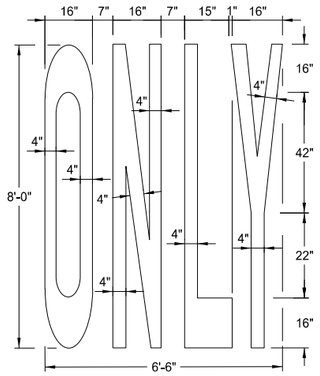
Detail D or E

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

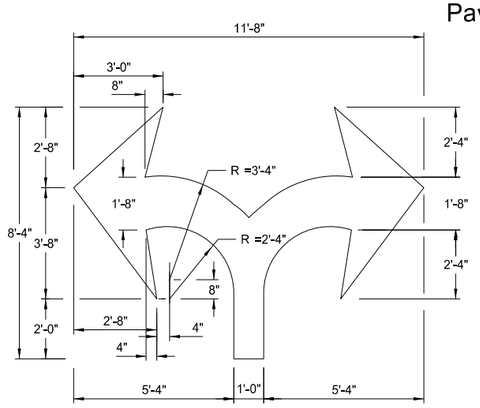
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 9/05/19 and the original document is stored at the North Dakota Department of Transportation

Pavement Marking Message Details

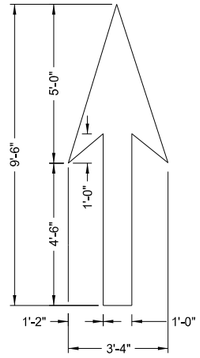
D-762-1



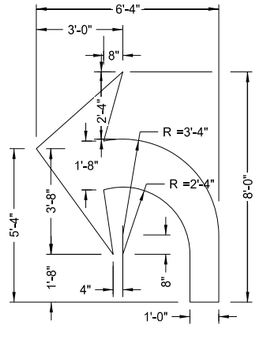
22 S. F.



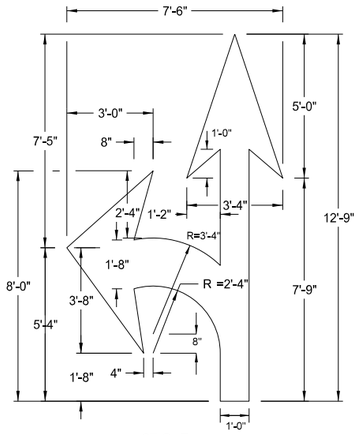
29 S. F.



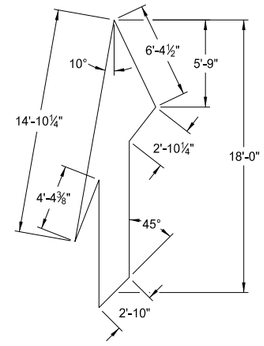
12 S. F.



16 S. F.

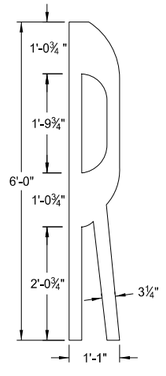


27 S. F.

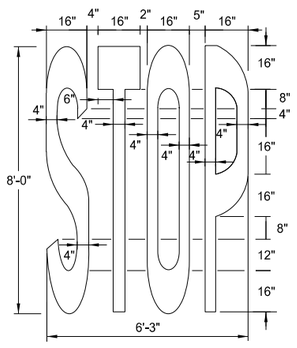


41 S. F.

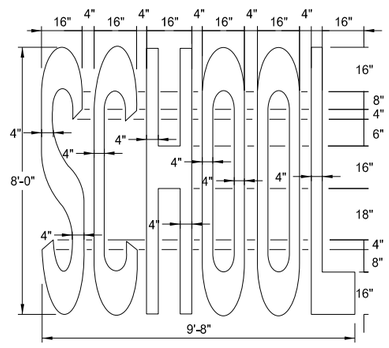
Note: Rotate merge arrow 20° from edge of roadway.



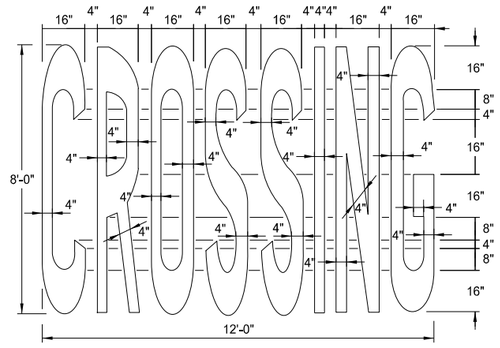
4 S. F.



22 S. F.



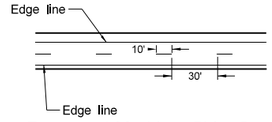
34.5 S. F.



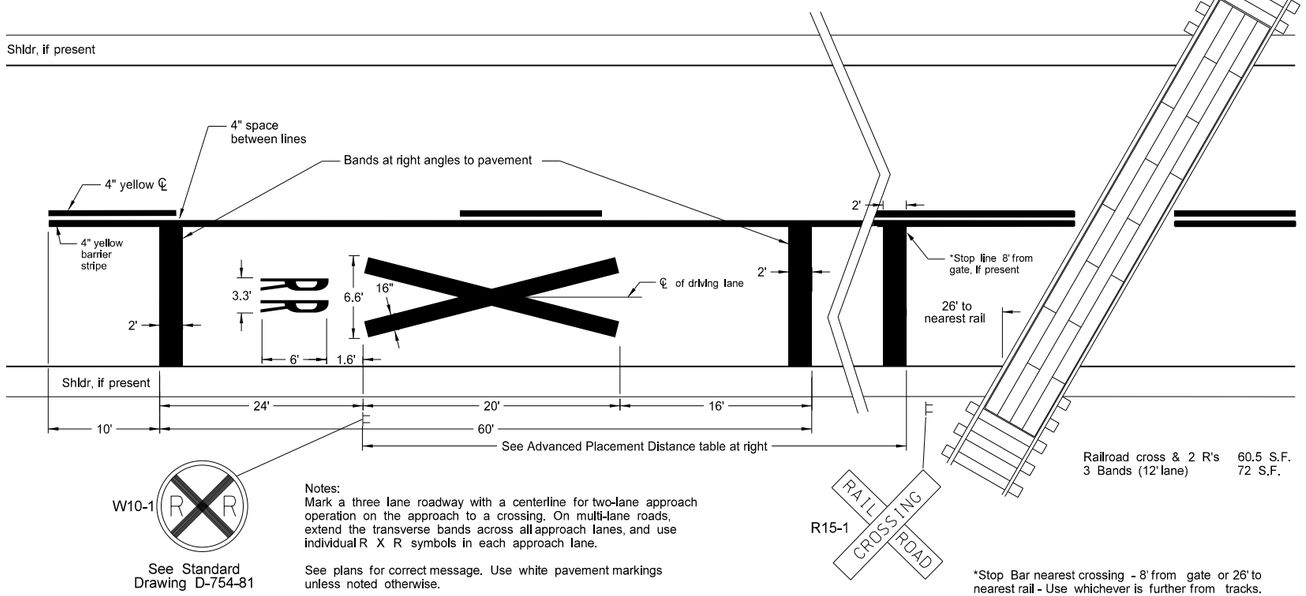
46 S. F.

Speed Limit	Chevron Width	Chevron Spacing 45° to Traffic
0-25 mph	8"	5'
30-40 mph	8"	15'
45 mph and above	12"	25'

Chevron Crosshatching Table



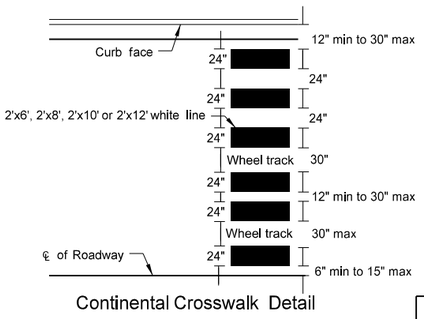
Centerline Pavement Marking Skip Spacing Detail



Notes:
Mark a three lane roadway with a centerline for two-lane approach operation on the approach to a crossing. On multi-lane roads, extend the transverse bands across all approach lanes, and use individual R X R symbols in each approach lane.

See plans for correct message. Use white pavement markings unless noted otherwise.

*Stop Bar nearest crossing - 8' from gate or 26' to nearest rail - Use whichever is further from tracks.



Continental Crosswalk Detail

Advance Placement Distance for Railroad Warning Signs	
Posted or 85th Percentile Speed	Advance Distance
20 mph	min. 100 ft
25 mph	min. 100 ft
30 mph	min. 100 ft
35 mph	min. 100 ft
40 mph	125 ft
45 mph	175 ft
50 mph	250 ft
55 mph	325 ft
60 mph	400 ft
65 mph	475 ft
70 mph	550 ft

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

12-6-11

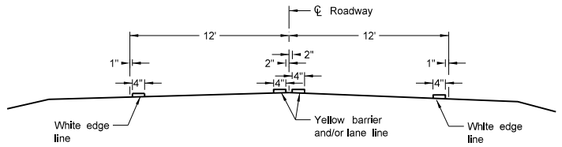
REVISIONS

DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
01-28-2020	Revised min Stop Bar distance to rail.

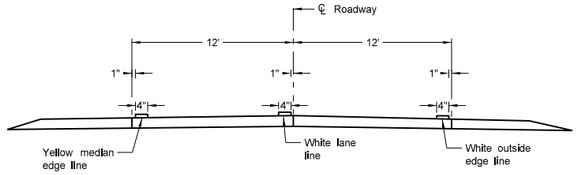
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PAVEMENT MARKING

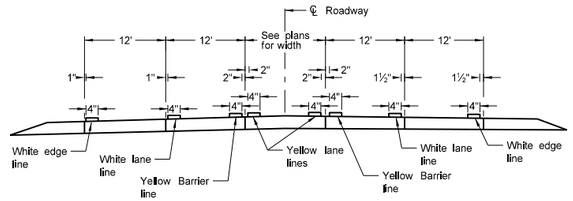
D-762-4



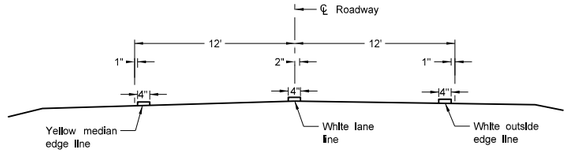
Two Lane Two Way
RURAL ROADWAY



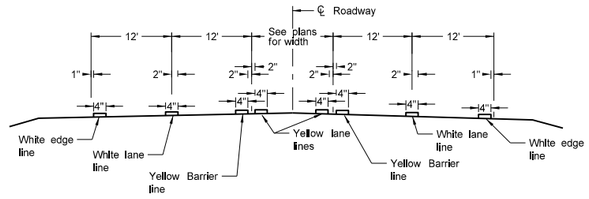
Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



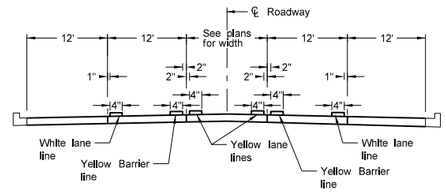
RURAL FIVE LANE ROADWAY
Concrete Section



Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



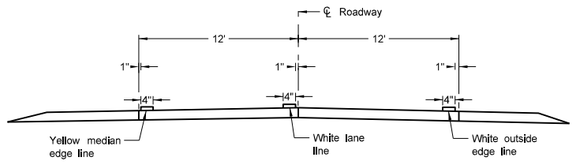
RURAL FIVE LANE ROADWAY
Asphalt Section



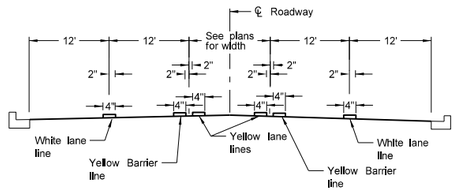
URBAN FIVE LANE SECTION
Concrete Section

NOTES:

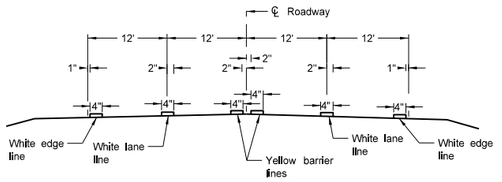
1. Continue edge lines through private drives and field drives. Break edge lines for intersections.



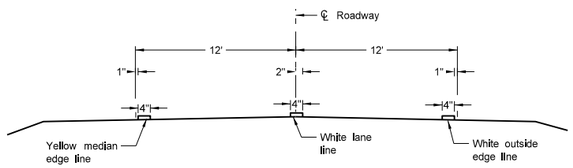
Two Lane Roadway
PRIMARY HIGHWAY
Concrete Section



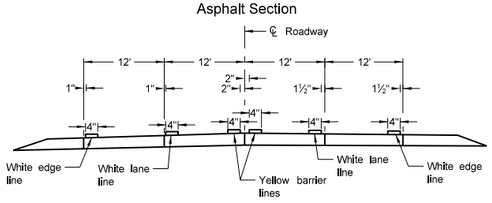
URBAN FIVE LANE SECTION
Asphalt Section



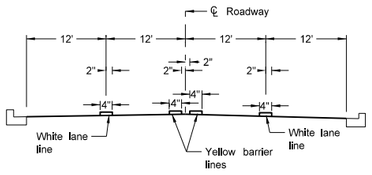
RURAL FOUR LANE ROADWAY
Asphalt Section



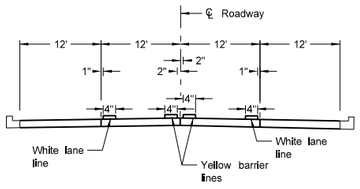
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



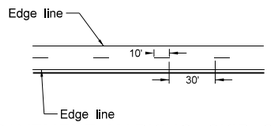
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



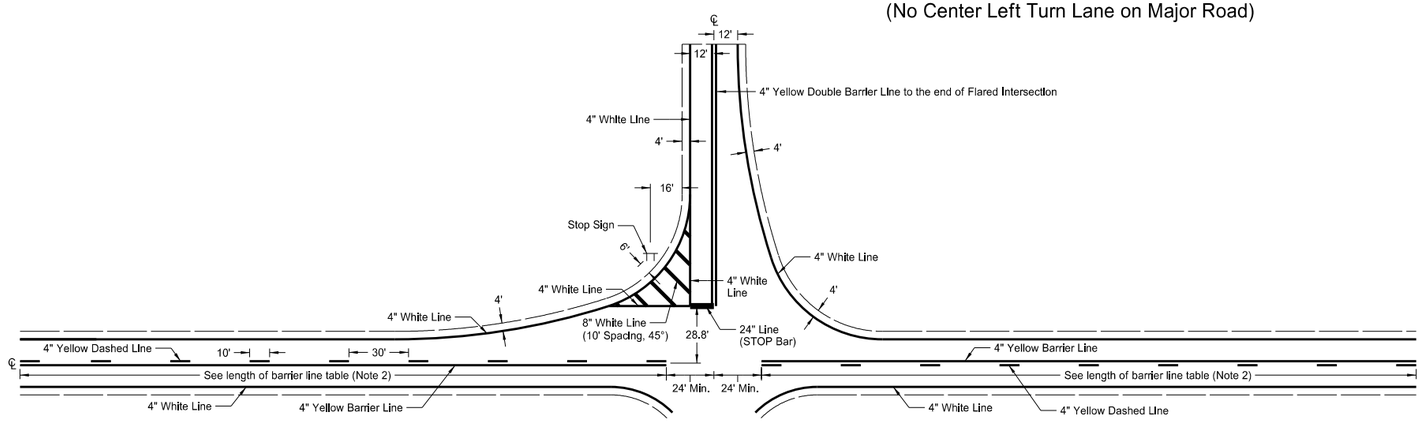
CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

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

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/27/19 and the original document is stored at the North Dakota Department of Transportation

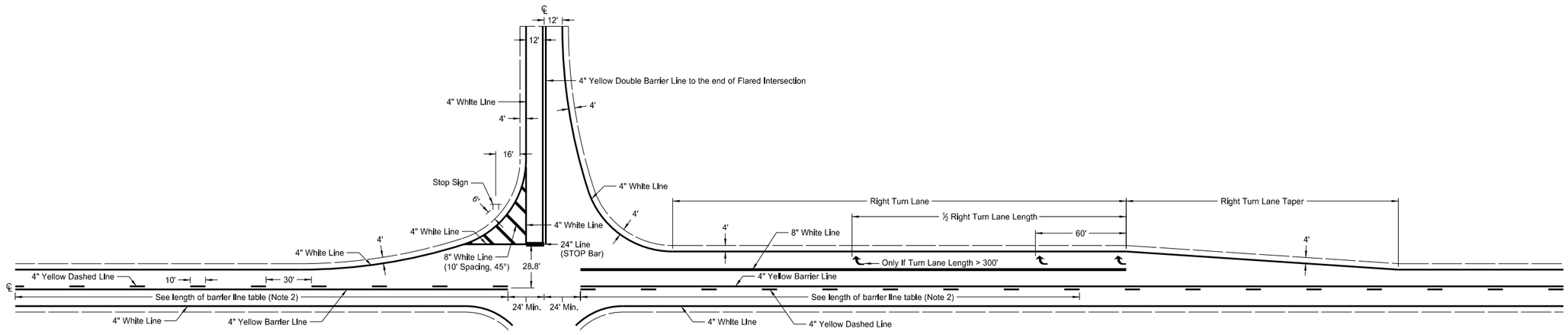
PAVEMENT MARKING FOR STANDARD 90 DEGREE FLARED INTERSECTION

(No Center Left Turn Lane on Major Road)



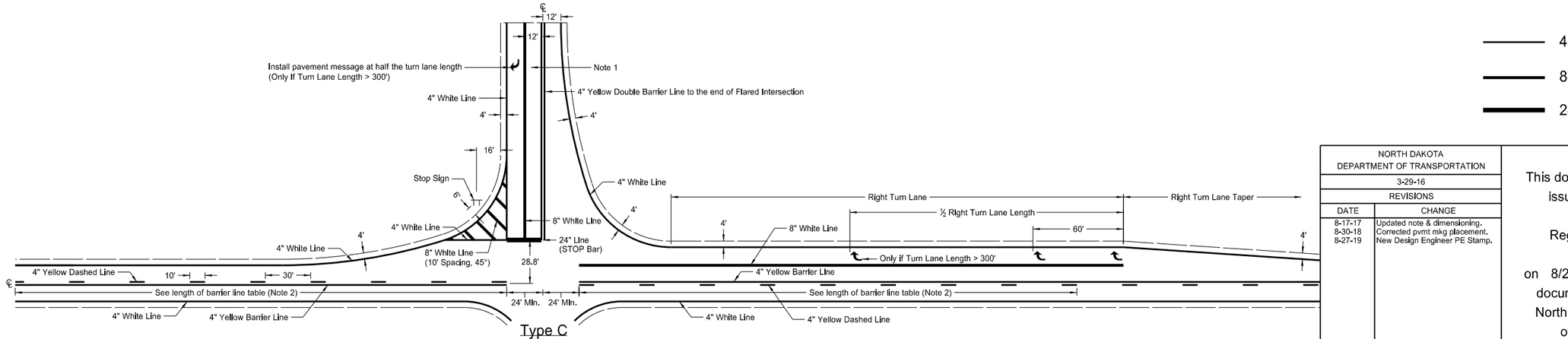
Type A

(No turn lanes present)



Type B

(Right Turn Lane on Major Road)



Type C

(Right Turn Lane on Major Road, and Turn Lane on Minor Road)

Notes

1. At "T" intersections (3-leg), additionally install left turn pavement marking message arrow.
2. The barrier lines have variable distances dependent on speed limit. Obtain barrier line length from table below (stopping sight distance.)

Table for Length of Barrier Line									
Speed Limit (mph)	30	35	40	45	50	55	60	65	70
Minimum Length	200'	250'	305'	360'	425'	495'	570'	645'	730'

4" Marking

8" Marking

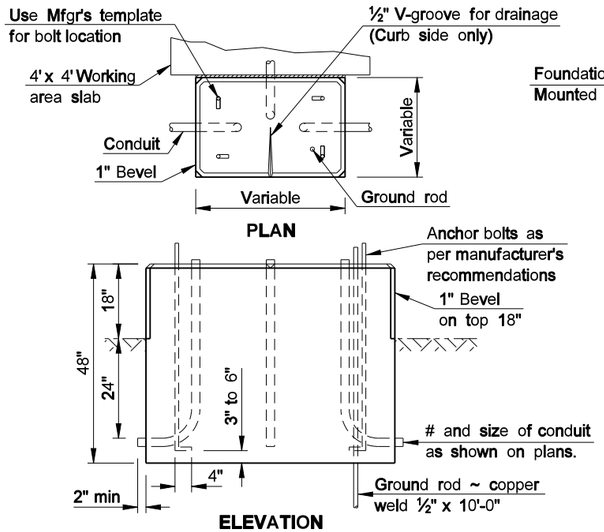
24" Marking

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-29-16	
REVISIONS	
DATE	CHANGE
8-17-17 8-30-18 8-27-19	Updated note & dimensioning. Corrected pvmt mkg placement. 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

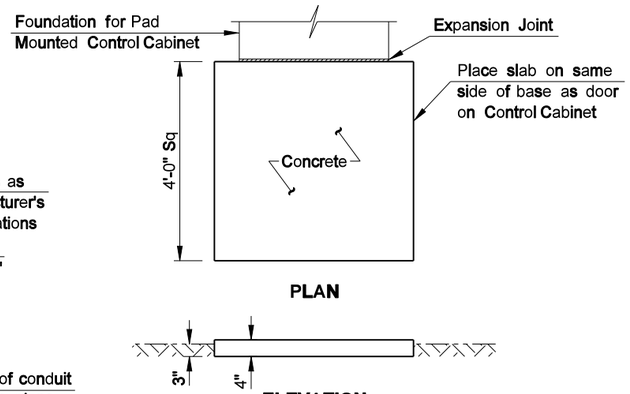
CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

D-770-1



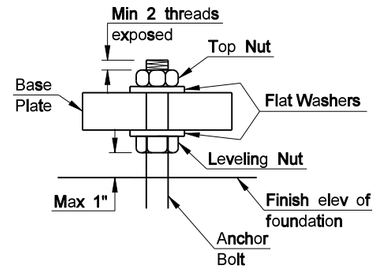
CONTROLLER CABINET FOUNDATION PAD MOUNT

The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.

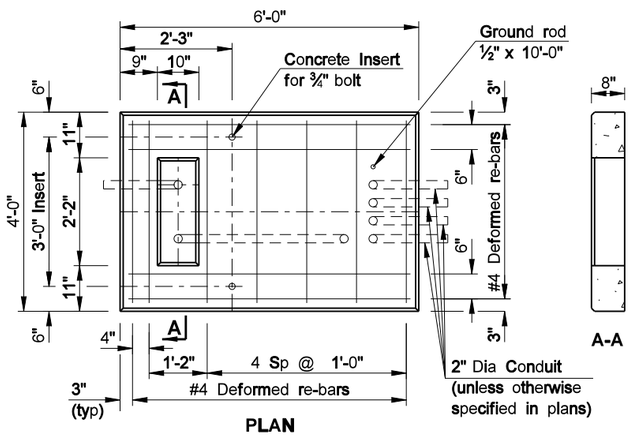


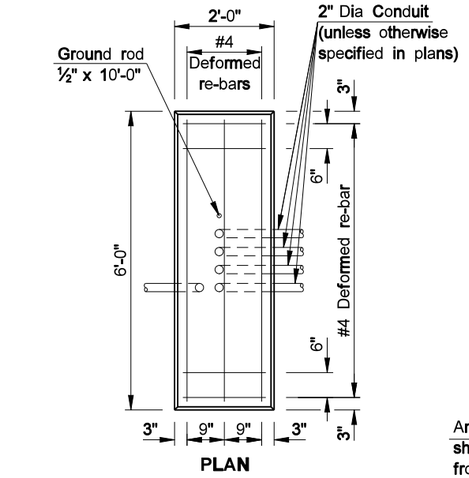
WORKING AREA SLAB

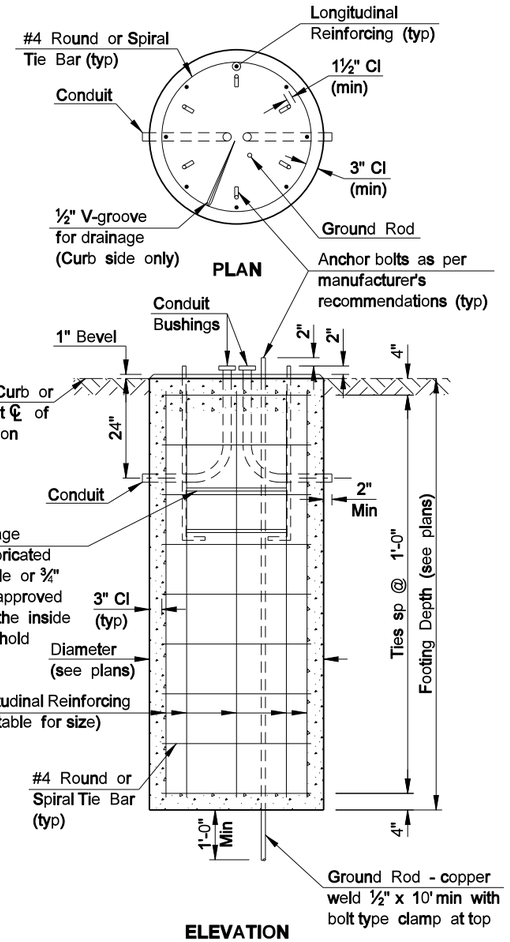
The Working Area Slab shall be installed where shown on the plans and shall not be bid separately but shall be included in the price bid for Concrete Foundation - Traffic Signals.



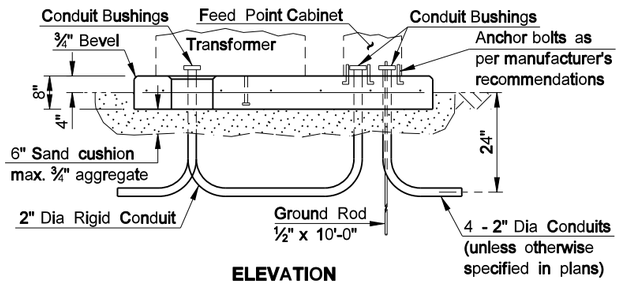
ANCHOR BOLT DETAIL





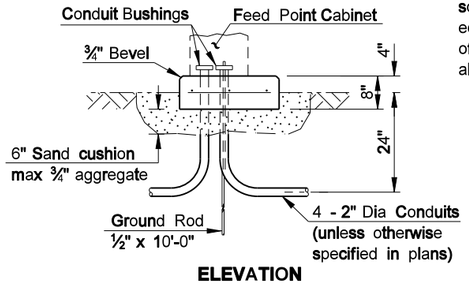


LIGHT & SIGNAL STANDARD FOUNDATION



TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

The Transformer & Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type A.



FEED POINT CABINET FOUNDATION PAD MOUNT

The Feed Point Cabinet Foundation Pad Mount shall be bid as Concrete Foundation ~ Feed Point ~ Type B.

NOTES:

LIGHT & SIGNAL STANDARD FOUNDATIONS: See plans for conduit size, number of bends and correct position for each foundation. When conduit does not continue beyond the foundation, conduit with a 105° bend and bushings on both ends may be substituted for the 90° bends shown. See plans for correct size & location of foundations. The grade and exact location shall be established by the Engineer in the field. All reinforcing shall be Grade 60. Tie bars shall have a minimum of a 12" lap. Reinforcing may be omitted for Type I, II, V, VI & VII signal standard foundations if the anchor bolts extend to within 3" to 6" above the bottom of the foundation. A minimum of 6 anchor bolts shall be used for cantilevered structures.

CONTROLLER CABINET FOUNDATION PAD MOUNT FOUNDATION: See plans for the number of 90° bends per foundation and correct positioning. The foundation for Pad Mounted Controller Cabinet shall be of sufficient size so that there is a minimum of 3" of clearance from the outside edge of cabinet to the outside edge of the foundation on any side. The contractor shall ensure a water-tight seal between the controler cabinet and the foundation by caulking, except for V-groove.

WORKING AREA SLAB: The materials and preparation of this slab shall be as approved by the Engineer in the field.

TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

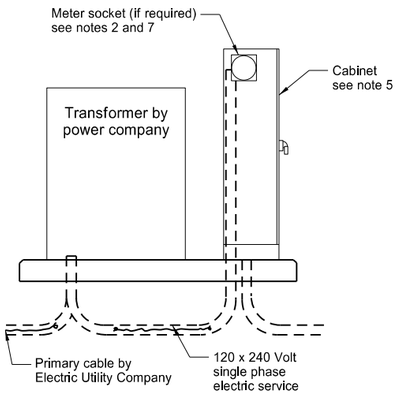
FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

LIGHT & SIGNAL FOUNDATION TABLE	
FOOTING DEPTH (ft)	LONGITUDINAL REINFORCING
≤ 12	8 - #5
13 - 14	8 - #6
15 - 16	8 - #7
17 - 19	8 - #8

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
6-15-10	
REVISIONS	
DATE	CHANGE

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FEED POINTS
(ROADWAY LIGHTING)



Elevation

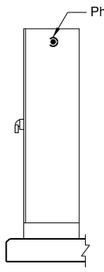
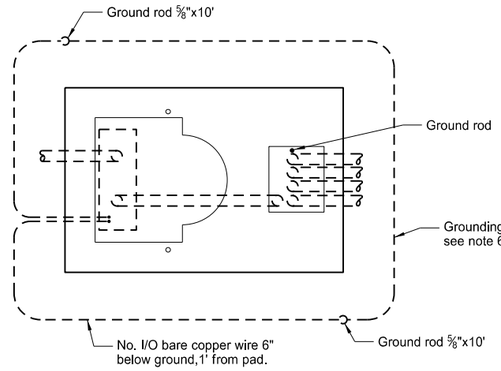
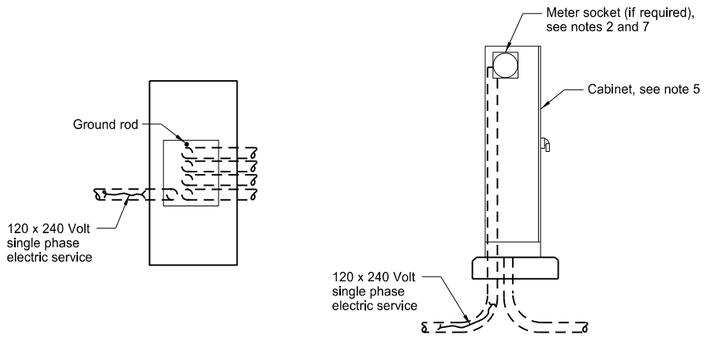


Photo Cell
Mounting Detail



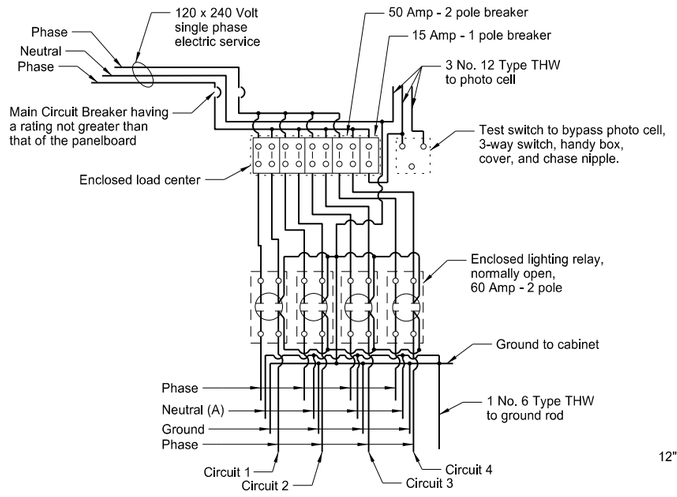
Plan

Transformer and Feed Point Cabinet Pad Mounted



Plan Elevation

Feed Point Cabinet Pad Mounted



Feed Point Type IV

Provide Type I feed point similar to Type IV, except with one electrical circuit, one 50 Amp - 2 pole breakers, and one lighting relay, normally open.

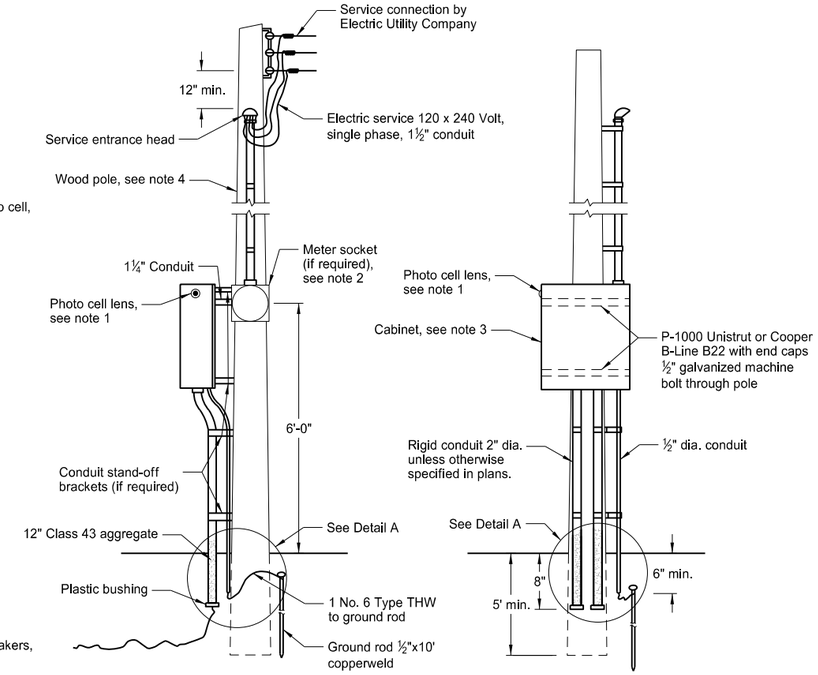
Provide Type II feed point similar to Type IV, except with two electrical circuit, two 50 Amp - 2 pole breakers, and two lighting relays, normally open.

Provide Type III feed point similar to Type IV, except with three electrical circuits, three 50 Amp - 2 pole breakers, and three lighting relays, normally open.

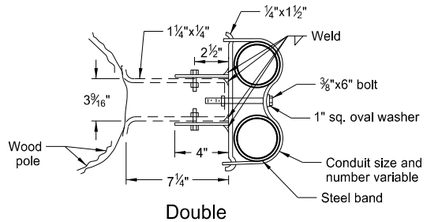
(A) Install when festoon circuit is required.

Detail A

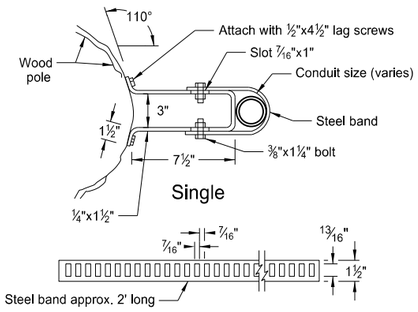
Use this detail for a continuous run of conduit from the feed point to the first light standard.



Feed Point Pole Mounted



Double



Single

Conduit Standoff Bracket

Omission of conduit standoff brackets allowed when not required by local utility company.

Notes:

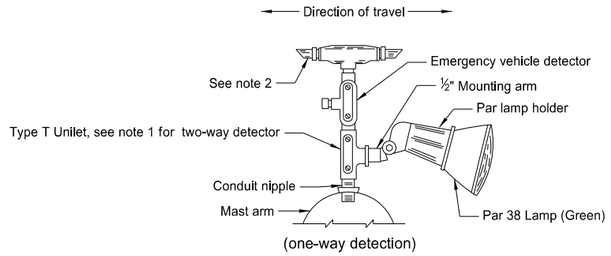
1. Photo Cell: Furnish and install the photoelectric cell. Face photo lens north.
2. Meter Socket: Install meter socket and trim if the meter is required by local Utility Company. Meter furnished and installed by Utility Company.
3. Pole Mounted Cabinet: Provide cabinet with lock drip shield, factory installed steel backing, stainless steel hardware, and side hinge door. Shop coat cabinet with one coat of primer and two coats of exterior gray enamel.

   Provide 30" high x 24" wide x 8" deep Type I and II feed points. Provide 30" high x 42" wide x 10" deep or 36" high x 36" wide x 10" deep Type III and IV feed points.
4. Wood Pole: Provide minimum 20' Class VII full length penta pressure treated wood pole. (if required, see layout sheets)
5. Pad Mounted Cabinet: Provide 56" high x 26" wide x 14" deep weatherproof cabinet. Minimum 12 gauge steel or aluminum with provisions for padlock. Provide steel cabinet with one coat of primer and two coats of exterior dark green enamel.
6. Grounding Grid: Provide grounding grid with a maximum ground resistance of 25 ohms, using one or more ⅝"x10' copperweld ground rods in parallel or series at two corners. Provide a minimum distance between ground unit assemblies of 6'0".
7. Meter Location: Do not mount the meter (if required) on the same side of the cabinet as the photo cell.

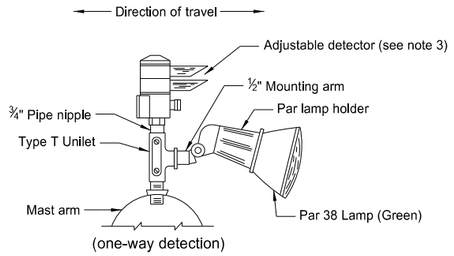
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
7-8-14 10-17-17 8-28-19	Revised note 3. Updated to active volce. New Design Engineer PE Stamp.

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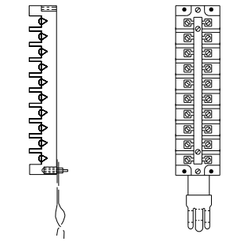
LIGHTING AND SIGNAL DETAILS



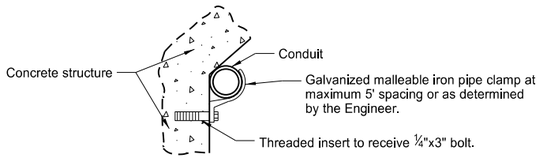
Emergency Vehicle Detector Detail



Alternate Emergency Vehicle Detector Detail (adjustable)

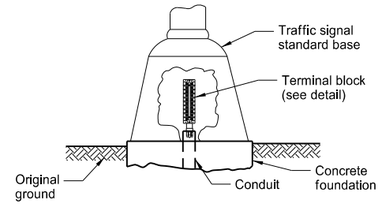


Terminal Block Detail

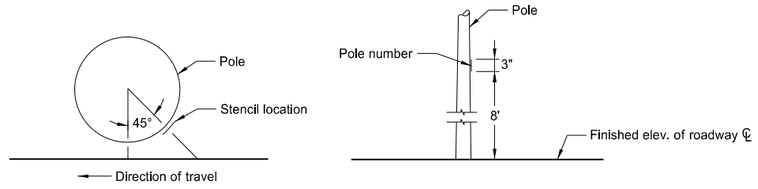


Bridge Mounted Conduit Hanger

Notes:
1. Use Type X Unilet with two Par lamp holders and lamps for Two-way Detectors. (one in each direction).
2. Plug unused end of One-way Detector with metal pipe plug.
3. Rotate detector lens to face direction of travel on Two-way Detectors.

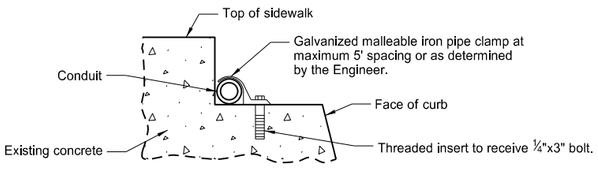


Terminal Block
(rigid mounted)

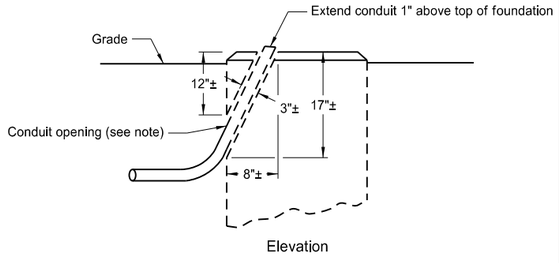


Light Standard Numbering

Note: On the roadway side of each light standard, stencil the pole number using black paint or an adhesive coated plastic such as Scotchcal by 3M or as approved by the Engineer. See layout sheets for pole numbers.

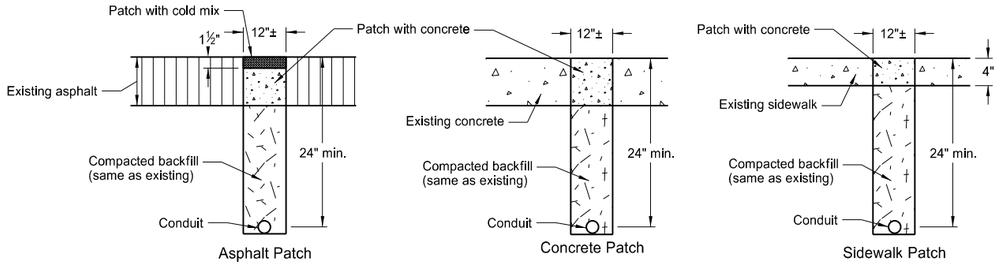


Bridge Curb Mounted Conduit



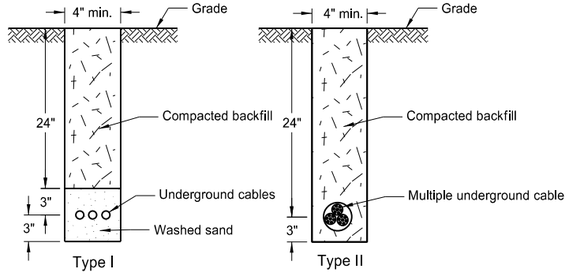
Revise Concrete Foundation

Note: Jackhammer or drill to remove material and provide a location for conduit. Make opening no larger than necessary. Place conduit, fill with concrete and finish foundation to original appearance.



Surface Patch Details

Note: Saw cut trenches. Use PCC pavement for replacement concrete with the coarse aggregate gradation, maximum size and method of curing as approved by the Engineer. Immediately prior to pouring replacement concrete, paint all surfaces with an approved epoxy compound.



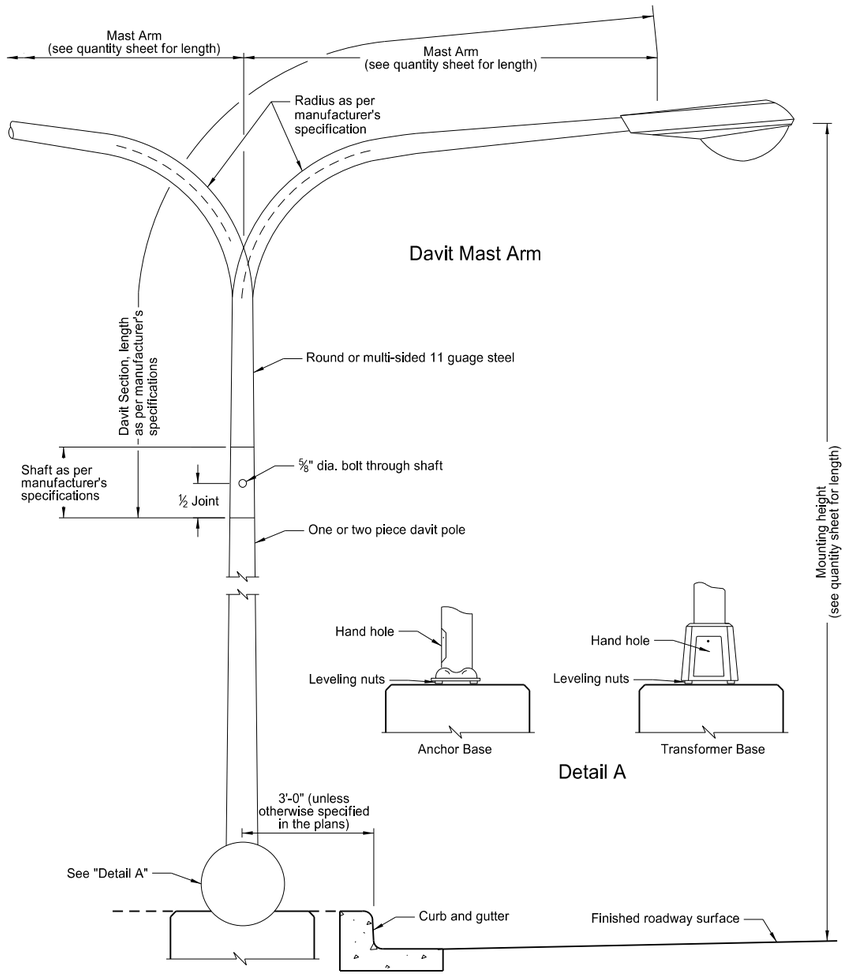
Cable Trench

Note: Sod entire area disturbed by trenching, unless directed otherwise by the Engineer.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17 10-25-19	Updated to active voice. Removed conduit under RR detail.

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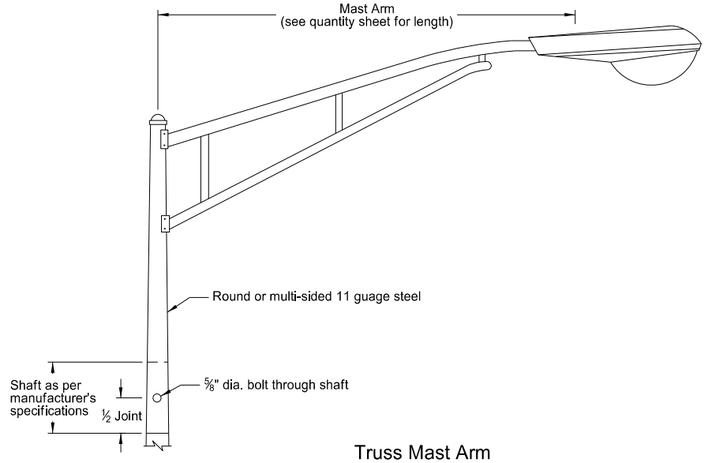
LIGHT STANDARD DETAILS



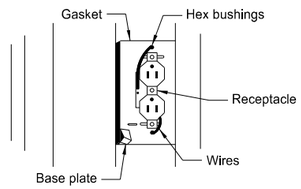
Davit Mast Arm

Detail A

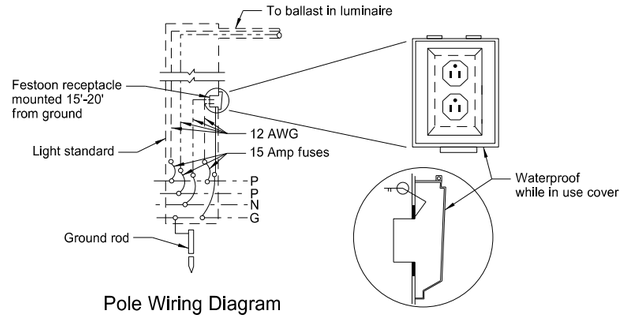
Light Standard Details



Truss Mast Arm



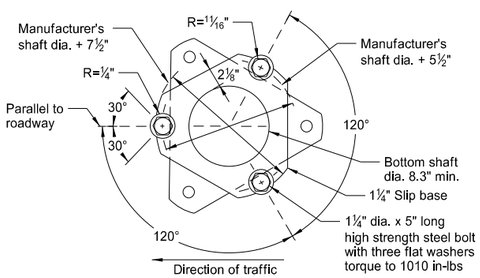
Optional: Festoon receptacle
mounted on multi-sided pole.



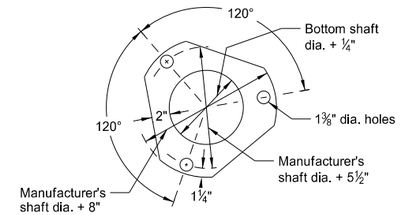
Pole Wiring Diagram

Receptacle Mounting Detail (B)

(B) Mount receptacle on side of pole that faces the street.
Install Festoon Receptacle only when specified in the plans.



Top View



Plan View

Keeper Plate Detail (A)

(A) ASTM A446 Grade "A" 28 gauge keeper plate on top of middle flat washer. Galvanize Keeper plate after fabrication.

Notes:

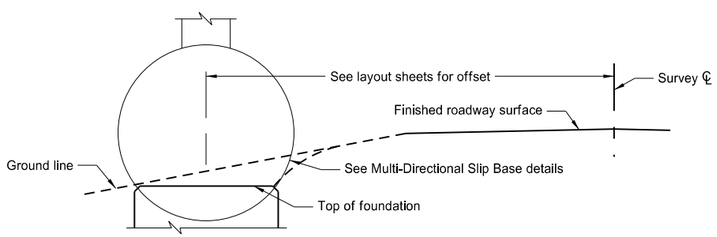
Light Standard Locations: The minimum offset distance from the curb face is 3 feet. Offset light standards at least 3 feet in urban areas and where speeds are less than 30 mph. Where speeds are 30 mph or more, place light standards at least 16 feet from the driving lane.

Steel Standards: Touch up marred or scratched areas after erection.

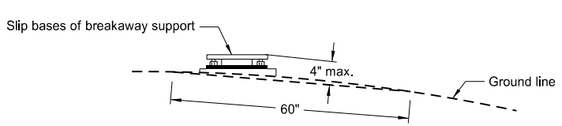
Luminaire: Use internal ballast-constant wattage 120x240 voltage. See layout sheets for type of luminaire, wattage, I.E.S. distribution, and operating system.

Fusing: Fusing in base, see specifications.

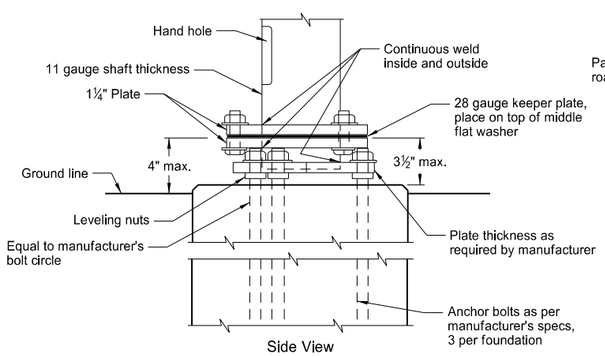
Slip Base Bolt Torque Procedure:
1. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and to clean bolt threads, then loosen.
2. Retighten bolts with a systematic order to prescribed torque.
3. Loosen each bolt and retighten to prescribed torque in the same order as initial retightening.
4. Burr threads of junction with nut using center punch to prevent nut loosening.



Concrete Foundation Location

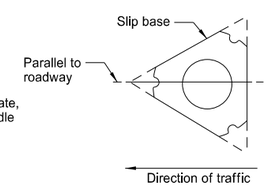


Breakaway Support Stub Clearance Diagram

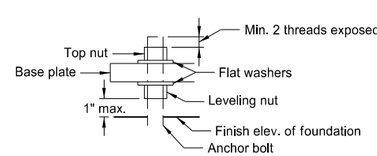


Side View

Steel Base Detail



Slip Base Placement Detail



Anchor Bolt Detail

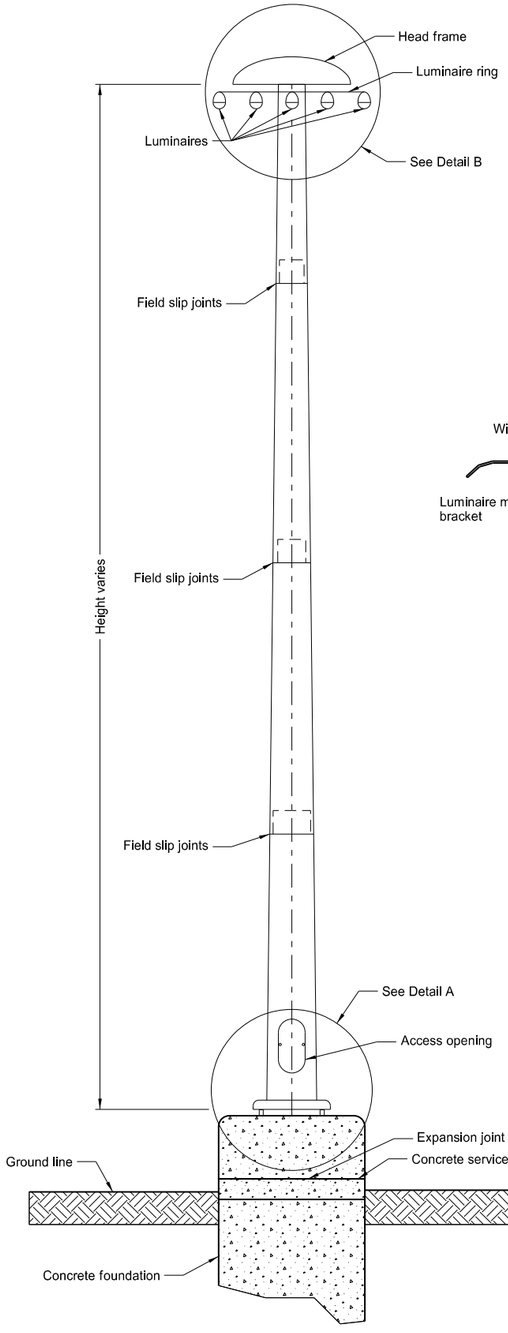
Multi-Directional Slip Base

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17 8-28-19	Updated to active voice. New Design Engineer PE Stamp.

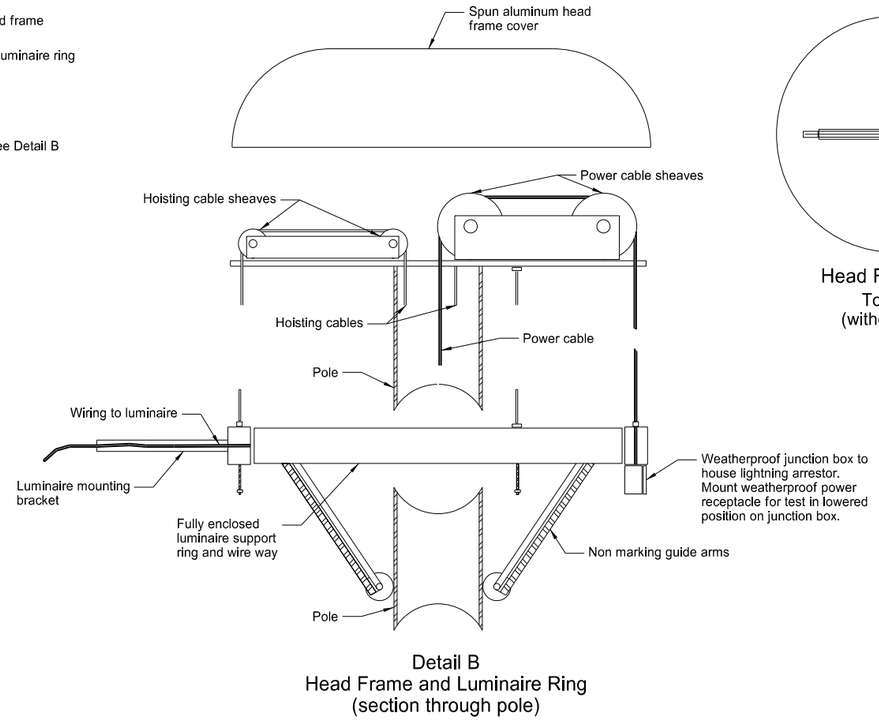
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HIGH MAST LIGHTING

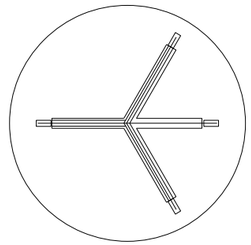
D-770-8



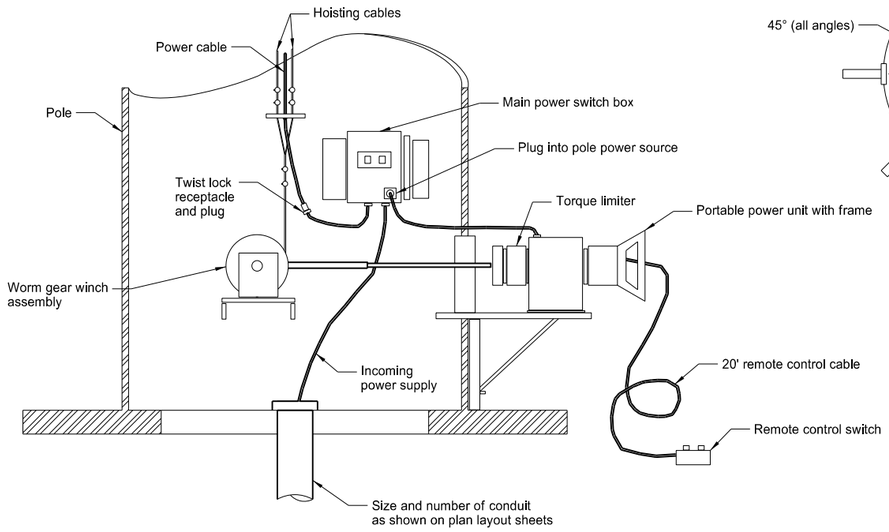
High Mast Lighting Pole Detail



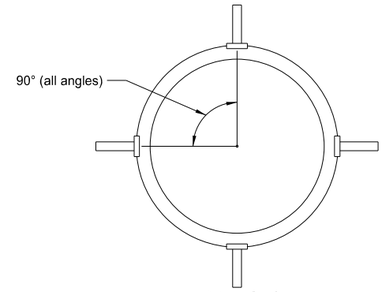
Detail B
Head Frame and Luminaire Ring
(section through pole)



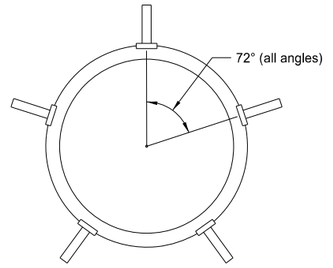
Head Frame Detail
Top View
(without cover)



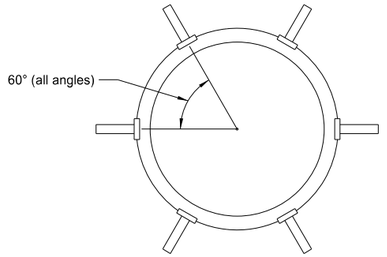
Detail A
Lowering Device
(section through base)



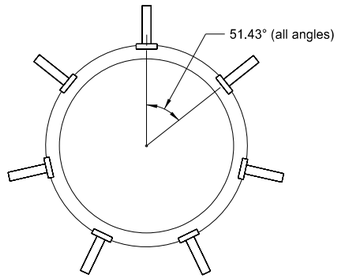
For 4 Luminaires



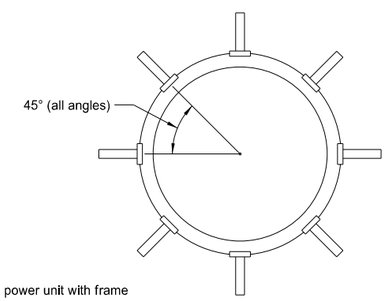
For 5 Luminaires



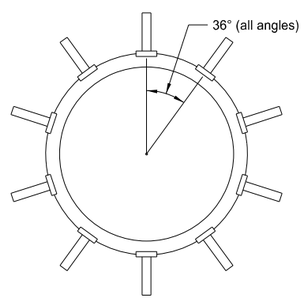
For 6 Luminaires



For 7 Luminaires



For 8 Luminaires



For 10 Luminaires

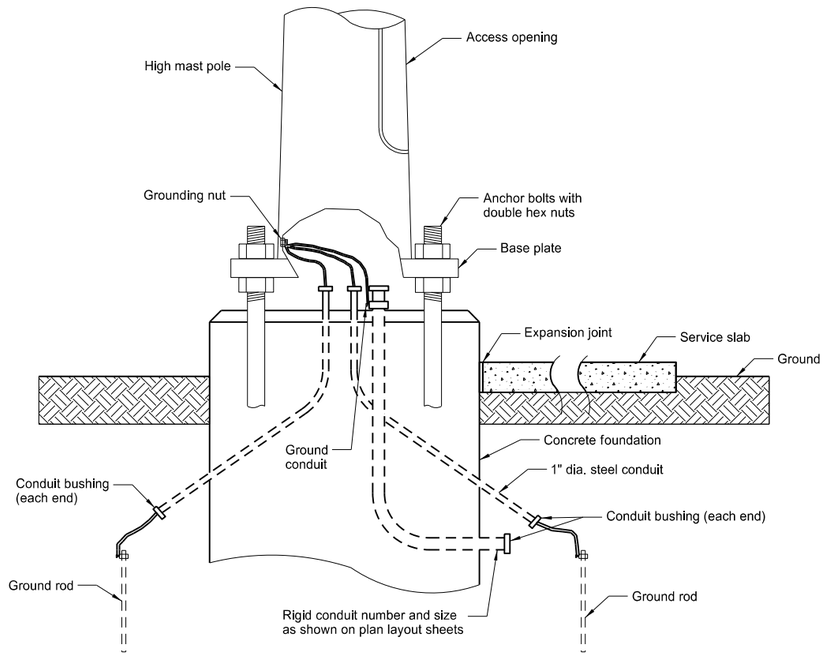
Luminaire Support Ring Details

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
10-17-17 8-28-19	Updated to active voice. New Design Engineer PE Stamp.

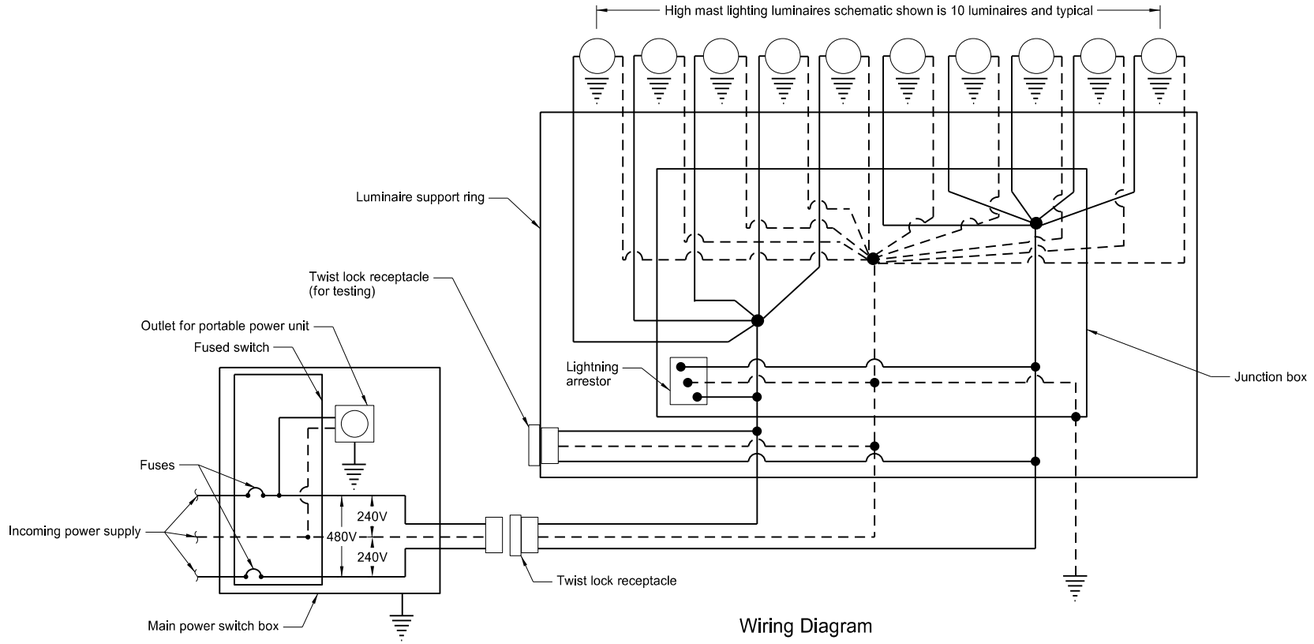
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HIGH MAST LIGHTING

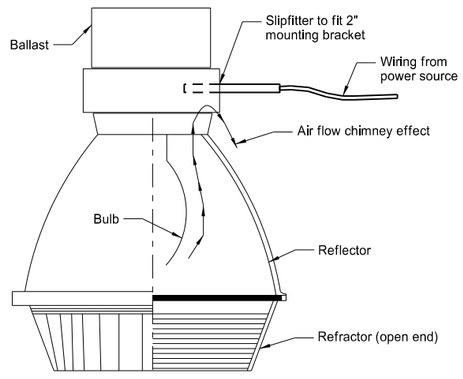
D-770-9

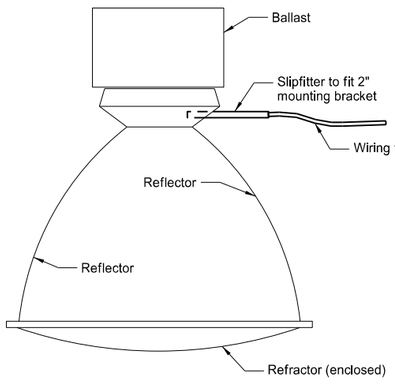


Conduit and Grounding Detail at Base

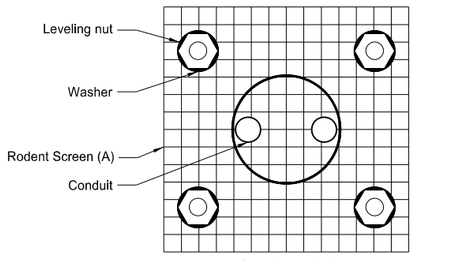


Wiring Diagram

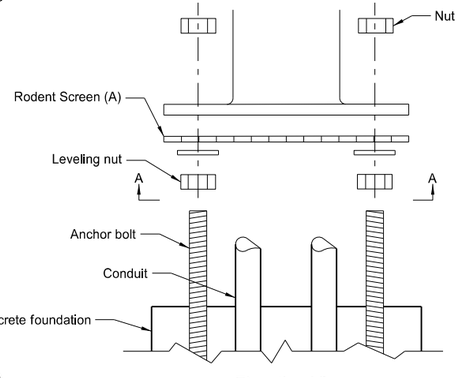




Typical Luminaire Details
(1000 watt)

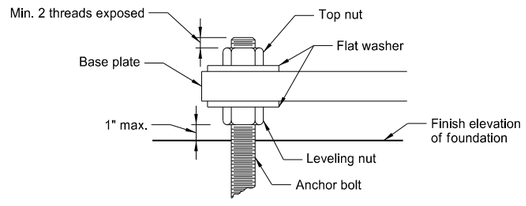


Section A-A



Elevation View
Rodent Screen

(A) ¼"x¼" galvanized steel welded wire fabric (wire dia. 0.025") cut same size as base plate and form tightly around the conduit.



Anchor Bolt Detail

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-8-13	
REVISIONS	
DATE	CHANGE
8-28-19	New Design Engineer PE Stamp.

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