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DESIGN DATA				
Traffic	Average Daily			
Current 2021:	Pass: 165	Trucks: 95	Total: 260	WB Ramps
Forecast:	Pass:	Trucks:	Total:	
Current:	Pass: 190	Trucks: 90	Total: 280	EB Ramps
Forecast 2021:	Pass:	Trucks:	Total:	
Clear Zone Dist (75 mph): 36 ft (I-94 Mainline)		Design Speed: 75 mph		
Clear Zone Dist (55 mph): 14 ft (Ramps)		Design Speed: 55 mph (Ramps)		
Minimum Sight Dist. for Stopping (75 mph): 820 ft		Bridges: NONE		
Full Control of Access, No Point of Access Other Than at Interchange Ramps				
Pavement Design Life:				
Design Accumulated One-way Flexible ESALs: N/A				

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	23802	1	1

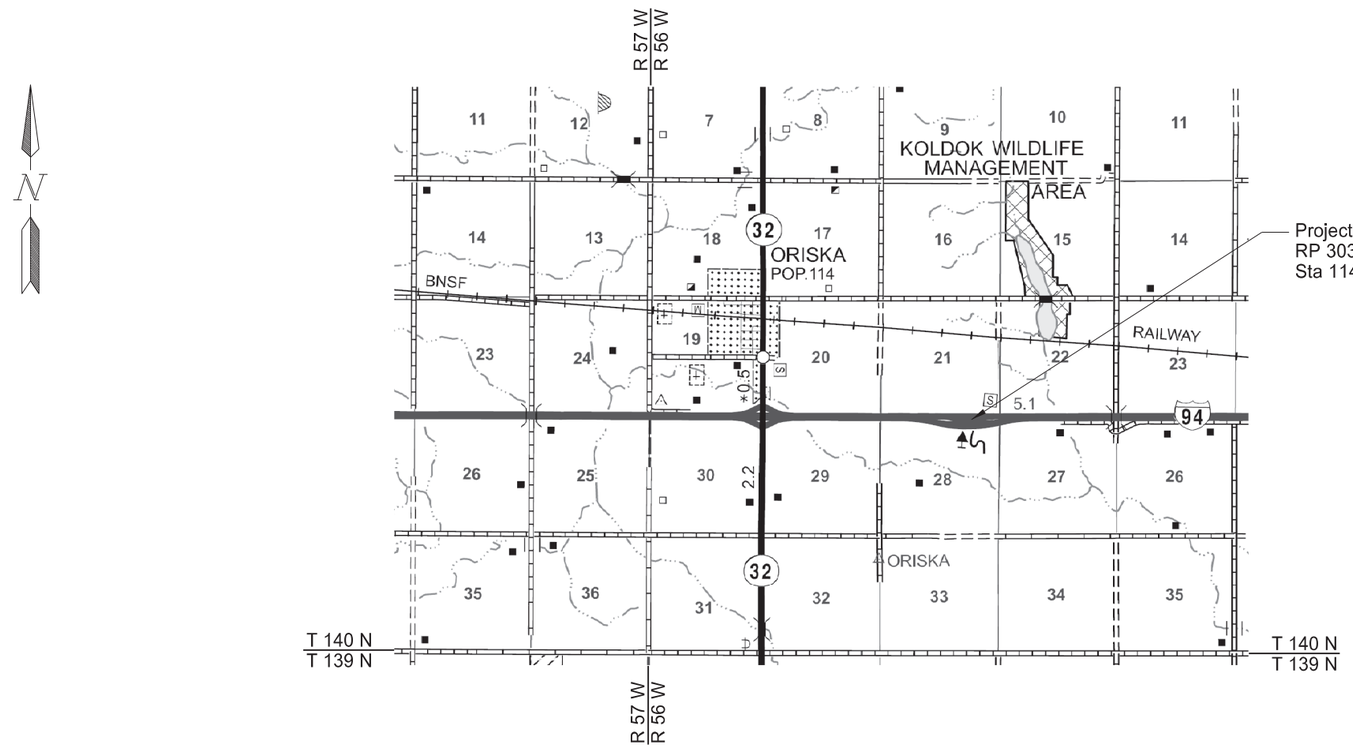
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

IM-2-094(198)304

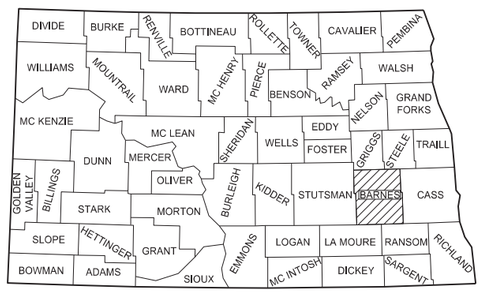
Barnes County
I-94 Oriska Rest Area Ramps & Parking
Grading, Aggregate Base, HMA Pavement, Culverts
Signing, Pavement Marking

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

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-2-094(198)304 / Westbound Ramps	0.794	0.794
IM-2-094(198)304 / Eastbound Ramps	0.683	0.683



Project Location Oriska Rest Area
RP 303.91 to RP 304.90
Sta 114+03.46 (SCL94) to Sta 165+96.74 (SCL94)



STATE COUNTY MAP

DESIGNER
Dan Green
DESIGNER
Andrew Gottsman
DESIGNER
Johnathan Nannenga

ND DEPARTMENT OF TRANSPORTATION
OFFICE OF PROJECT DEVELOPMENT

Kirk Hoff
12/18/24

BARTLETT & WEST

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6	2	Environmental Notes
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SPECIAL PROVISIONS

Number	Description
SSP 1	Temporary Erosion and Sediment Best Management Practices
SP 213(24)	Utility Coordination
SP 214(24)	Soil Stabilization
SP 215(24)	E-ticketing

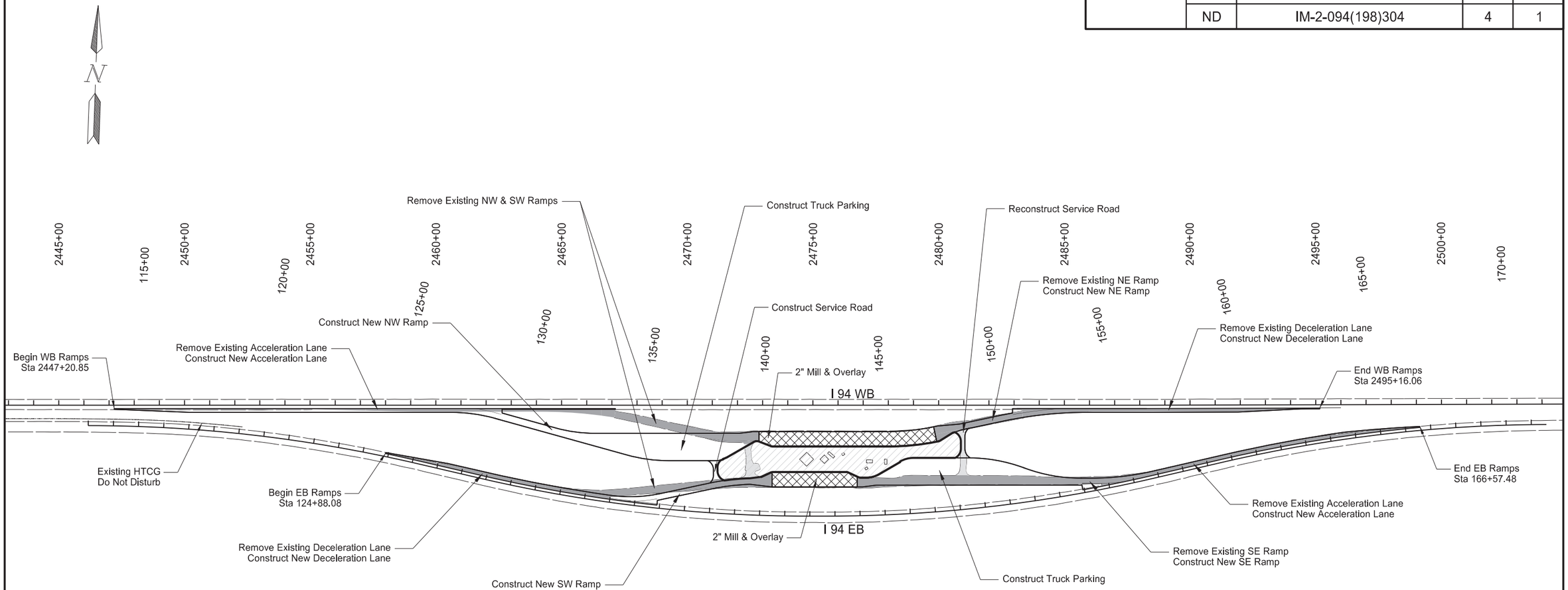
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D-754-1	Pipe Or W-Shape Assembly Details
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D-754-3	Breakaway System for Standard Pipe - Stub Post
D-754-4	Multi-Directional Breakaway System for Standard Pipe - Stub Post
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D-754-21	Reflectorized Delineators - Divided Highway
D-754-22B	Typical Rest Area Delineation
D-754-23	Perforated Tube Assembly Details
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Legend

- Removal of Existing Ramp
- Removal of Existing Service Road
- 2" Mill & Overlay
- Rest Area Building Replacement Project Limits
  PCN: 23501 - Constructed by Others

Scope of Work

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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NOTES

100-P01 COORDINATION OF PROJECTS: ARP-2-094(190)304 is a building replacement project that is immediately adjacent to this project. The limits of the building project run from back of curb of parking to back of curb of parking lot. Coordinate between contractors to ensure access through each project and protect any improvements performed to the site.

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

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

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

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

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

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

107-P01 HAUL ROAD RESTORATION: Use Class 13 aggregate for haul road restoration.

202-P01 REMOVAL OF PAVEMENT: Removal of pavement consists of removing concrete and bituminous pavements, curb and gutter, and aggregate base. The tonnage of “Removal of Pavement” is based on the quantities shown in Section 40.

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

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

704-P01 SEQUENCING ARROW PANEL – TYPE C: Provide solar powered arrow panels that meet the requirements of the MUTCD and ITE and that are capable of operating for 20 days without a solar charge.

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

704-P02 TRAFFIC CONTROL DEVICES: The traffic control devices list for each phase has been developed using traffic control signing layouts (shown in Section 100 of the plans) and Standard Drawings listed below:

- D-704-12 for shoulder closure tapers
- D-704-32 for moving operation
- D-704-35 for one lane closure on the interstate system

704-P03 TRAFFIC CONTROL LAYOUTS: Use Section 100 Sheet 4 for rest area ramp closures when no work is adjacent to the roadway. When work is adjacent to the roadway, utilize a one lane closure and ensure the ramps remain closed to traffic.

708-P01 INLET PROTECTION SPECIAL: Place inlet protection as per the details. Include all costs for furnishing, installing, cleaning, removing sediment, maintaining and replacing damaged devices in the cost for other bid items.

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

770-P01 EXISTING CONDUIT AND CONDUCTOR: Abandon existing conduit and conductor in place unless specified otherwise in the plan or directed by the Engineer. Include all costs in the price bid for “Lighting System”.

990-P01 CAP EXISTING WELL: A water well no longer in use exists in the proposed eastbound truck parking area near Sta 20+30, 76’ Left. EB Ramp Alignment. Utilize a contractor licensed by the State Board of Water Well Contractors to abandon the well following North Dakota Administrative Code requirements. Include all costs to facilitate the abandonment of the well in the price bid for “Abandon Well.”

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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.

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline						TOTAL
103	0100	CONTRACT BOND	L SUM	1						1
109	1000	E-TICKETING	L SUM	1						1
201	0330	CLEARING & GRUBBING	L SUM	1						1
202	0136	REMOVAL OF PAVEMENT	TON	23968						23968
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES	LF	207						207
203	0101	COMMON EXCAVATION-TYPE A	CY	6820						6820
203	0109	TOPSOIL	CY	8595						8595
203	0140	BORROW-EXCAVATION	CY	6076						6076
216	0100	WATER	M GAL	781						781
230	0165	SUBGRADE PREPARATION-TYPE A-12IN	STA	84						84
251	0200	SEEDING CLASS II	ACRE	17.64						17.64
251	2000	TEMPORARY COVER CROP	ACRE	17.64						17.64
253	0061	SOIL STABILIZATION	ACRE	35.28						35.28
255	0102	ECB TYPE 2	SY	259						259
261	0112	FIBER ROLLS 12IN	LF	10828						10828
261	0113	REMOVE FIBER ROLLS 12IN	LF	6062						6062
302	0120	AGGREGATE BASE COURSE CL 5	TON	30077						30077
401	0050	TACK COAT	GAL	1770						1770
401	0060	PRIME COAT	GAL	10796						10796
411	0100	MILLING PAVEMENT SURFACE	TON	760						760
430	0045	SUPERPAVE FAA 45	TON	9509						9509
430	1000	CORED SAMPLE	EA	22						22
430	5818	PG 58H-34 ASPHALT CEMENT	TON	571						571
702	0100	MOBILIZATION	L SUM	1						1
704	0100	FLAGGING	MHR	500						500
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1890						1890
704	1052	TYPE III BARRICADE	EA	14						14
704	1060	DELINEATOR DRUMS	EA	130						130
704	1067	TUBULAR MARKERS	EA	160						160
704	1080	STACKABLE VERTICAL PANELS	EA	50						50
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2						2
704	1500	OBLITERATION OF PAVEMENT MARKING	SF	3492						3492
706	0500	AGGREGATE LABORATORY	EA	1						1
706	0550	BITUMINOUS LABORATORY	EA	1						1
706	0600	CONTRACTOR'S LABORATORY	EA	1						1
709	0100	GEOSYNTHETIC MATERIAL TYPE G	SY	167						167
714	4105	PIPE CONDUIT 24IN	LF	167						167
714	4106	PIPE CONDUIT 24IN-APPROACH	LF	77						77
714	4110	PIPE CONDUIT 30IN	LF	64						64
748	0140	CURB & GUTTER-TYPE I	LF	1527						1527
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	63						63
754	0154	DELINEATORS-TYPE A-SINGLE SIDED	EA	6						6
754	0160	DELINEATORS-TYPE B	EA	42						42
754	0168	DELINEATORS-TYPE D	EA	8						8
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	154						154
754	0210	GALV STEEL POST-STANDARD PIPE	LF	89						89
754	0214	GALV STEEL POSTS-W-SHAPE POSTS(TWO OR MORE)	LF	29						29

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Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline						TOTAL
754	0534	PANEL FOR SIGNS-TYPE IV REFLECTIVE SHEETING	SF	55						55
754	0592	RESET SIGN PANEL	EA	9						9
754	0801	OBJECT MARKERS - TYPE I	EA	4						4
754	0803	OBJECT MARKERS - TYPE III	EA	2						2
754	1100	CLASS AE CONCRETE-SIGN FOUNDATIONS	CY	3						3
754	1104	REMOVE SIGN FOUNDATION	EA	8						8
762	0103	PVMT MK PAINTED-MESSAGE	SF	120						120
762	0422	SHORT TERM 6IN LINE-TYPE R	LF	13968						13968
762	1106	PVMT MK PAINTED 6IN LINE	LF	35160						35160
762	1108	PVMT MK PAINTED 8IN LINE	LF	568						568
762	1112	PVMT MK PAINTED 12IN LINE	LF	1451						1451
762	1307	PREFORMED PATTERNED PVMT MK 6IN LINE-GROOVED	LF	2380						2380
770	0001	LIGHTING SYSTEM	EA	1						1
990	0450	ABANDON WELL	EA	1						1

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BASIS OF ESTIMATE

Water

10Gal/CY of Embankment:

12,896 CY x 10/1000 — 129 MGAL

Water for Dust Palliative: 25 MGAL/Mile — 50 MGAL

Water for Aggregates: 20 Gallons/Ton
30,077. TON x 20/1000 = 602 MGAL

TOTAL = 781 MGAL

CL 5 Aggregate
1.875 TON/CY

Tack Coat
0.05 GAL/SY
0.10 GAL/SY Milled Areas

Prime Coat
0.35 GAL/SY

Superpave FAA 45
2 TON/CY

PG 58H-34 Asphalt Cement
6.0%/TON of Superpave FAA 45

Removal of Pavement
Aggregate Base – 1.875 TON/CY
Asphalt – 2 TON/CY
Concrete – 2 TON/CY
Curb and Gutter – 2 TON/CY

Milling Pavement Surface
2 TON/CY

Earthwork Summary

Location	Common Excavation Type A (CY)	Embankment (CY)	Embankment Shrinkage 25% (CY)	Borrow - Excavation (CY)	Topsoil (CY)
	Pay Item			Pay Item	Pay Item
	(A)		(B)	(C) = (A) - (B)	
OCL WB 94 (Existing WB 94) (Sta 2447+20.85 to Sta 2450+20.85; Sta 2462+63.43 to Sta 2470+32.70; Sta 2491+91.10 to Sta 2494+41.19; Sta 2494+41.19 to Sta 2495+16.06)	3,723	229	286	(3,437)	2,005
WB RA RAMPS (Proposed WB RAMPS) (Sta 0+00.00 to Sta 41+93.27)	10,497	5,989	7,486	(3,011)	1,960
DB11 (Proposed North Ditch Bottom Cleanout) (Sta 7+22.51 to Sta 15+48.15)	1,639	0	0	(1,639)	445
DB13 (Proposed East Drainage Ditch) (Sta 0+00.00 to Sta 7+10.83)	1,081	0	0	(1,081)	331
OCL EB94 (Existing EB 94) (Sta 124+88.08 to Sta 134+00.00; Sta 155+80.00 to Sta 166+57.33)	2,567	2,479	3,099	532	2,451
EB RA RAMPS (Proposed EB RAMPS) (Sta 6+60.00 to Sta 28+26.10)	8,793	1,534	1,918	(6,876)	1,008
DB4 (Proposed South Ditch Bottom Cleanout) (Sta 0+00.00 to Sta 11+13.57)	908	0	0	(908)	343
Service Rd W (Proposed West Service Rd) (Sta 0+04.07 to Sta 0+88.87)	10	64	80	70	22
Service Rd E (Proposed East Service Rd) (Sta 0+84.50 to Sta 1+96.92)	15	22	28	13	30
Pavement Removal From Excavation Area (Existing Concrete Pvmt, Aggregate Base, and Asphalt Pvmt Removal Volumes. See Sec 40)	(12,335)			12,335	
Topsoil Stripped from Excavation Area	(10,078)			10,078	
TOTALS:	**6,820**		12,896	**6,076**	**8,595**

HMA Cored Samples

	A	B		C			
Specification Section	**Distance (Ft)÷1000**	**Lanes**	**Joints**	**Lifts**	**Quantity (A x B x C)**	**Quantity (1 per mile)**	**Unit**
430.04 I.2.b(2), "Pavement Density Cores"	10	1	N/A	2	20	N/A	EA
430.04 I.2.b(3),"Pavement Thickness Determination Cores"					N/A	2	EA
				Total	20	2	EA

Subgrade Preparation-Type A-12IN

Location	Distance (Ft) / 100
	STA
WB I-94 Sta 2447+20.85 to Sta 2467+14.15	19.9
WB I-94 Sta 2482+93.89 to Sta 2495+16.06	12.2
EB I-94 Sta 124+88.08 to Sta 135+89.18	11.0
EB I-94 Sta 152+93.66 to Sta 166+57.33	13.6
WB Ramps Sta 12+39.17 to 22+77.68	10.4
WB Ramps Sta 29+80.07 to Sta 32+97.98	3.2
EB Ramps Sta 8+45 to Sta 13+10.93	4.7
EB Ramps Sta 16+49.60 to Sta 25+43.60	8.9
TOTAL:	84.0

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WB I-94 Entrance Ramp
45 MPH Design

PC	10+40.00
PI	11+27.51
PT	12+13.95
Delta:	15°30'00" RT
Degree:	08°54'39"
Radius:	643.00
Length:	173.95
Tangent:	87.51

Station		Left Slope	Right Slope
9+64.00		2.1	-2.1
10+40.00	PC	4.0	-4.0
11+20.00		6.0	-6.0
11+33.95		6.0	-6.0
12+13.95	PT	4.0	-4.0
12+89.95		2.1	-2.1

WB I-94 Entrance Ramp
25 MPH Design

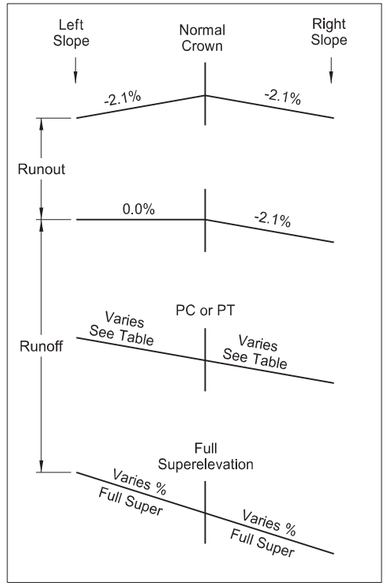
PC	14+63.13
PI	15+44.79
PT	16+25.45
Delta:	15°30'00" LT
Degree:	09°32'57"
Radius:	600.00
Length:	162.32
Tangent:	81.66

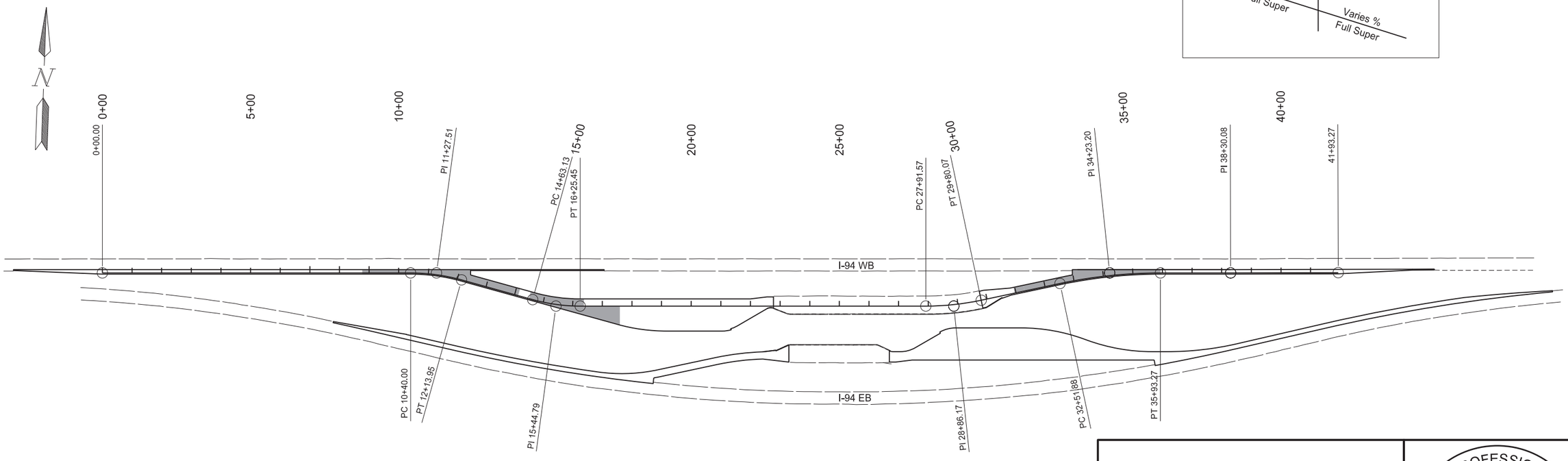
Station		Left Slope	Right Slope
13+20.17		2.1	-2.1
13+85.01		0.0	0.0
14+49.85		-2.1	2.1
14+63.13	PC	-2.53	2.53
14+69.61		-2.74	2.74
15+02.34		-3.8	3.8
15+86.24		-3.8	3.8
16+25.45	PT	-2.53	2.53
16+38.73		-2.1	2.1
17+03.57		-2.1	0.0
17+68.41		-2.1	-2.1

WB I-94 Exit Ramp
25 MPH Design

PC	32+51.88
PI	34+23.20
PT	35+93.27
Delta:	12°00'00" RT
Degree:	03°30'54"
Radius:	1630.00
Length:	341.39
Tangent:	171.32

Station		Left Slope	Right Slope
31+51.02		-2.1	-2.1
32+01.45		0.0	-2.1
32+51.88	PC	2.1	-2.1
35+93.27	PT	2.1	-2.1





Note: Calculations based on AASHTO method five.
A maximum superelevation of 6% was used.

I-94 WB Ramp Superelevations

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	20	2

EB I-94 Exit Ramp
25 MPH Design

PCC 6+60.00
PI 7+62.52
PT 8+62.97
Radius: 583.00
Delta: 19°56'51" LT
Degree: 09°49'40"
Radius: 583.00
Length: 202.97
Tangent: 102.52

Station		Left Slope	Right Slope
6+60.00	PCC	-3.3	3.3
6+72.01		-3.8	3.8
8+32.06		-3.8	3.8
8+62.56	PT	-2.53	2.53
8+72.65		-2.1	2.1
9+23.08		0.0	0.0
9+73.51		2.1	-2.1

EB I-94 Exit Ramp
15 MPH Design

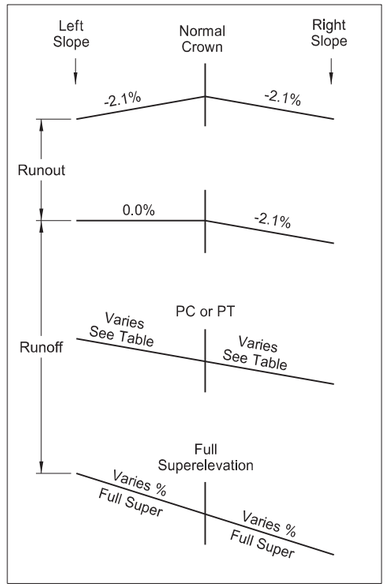
PC 10+63.01
PI 11+57.61
PT 12+51.51
Delta: 12°00'00" RT
Degree: 06°21'58"
Radius: 900.00
Length: 188.50
Tangent: 94.59

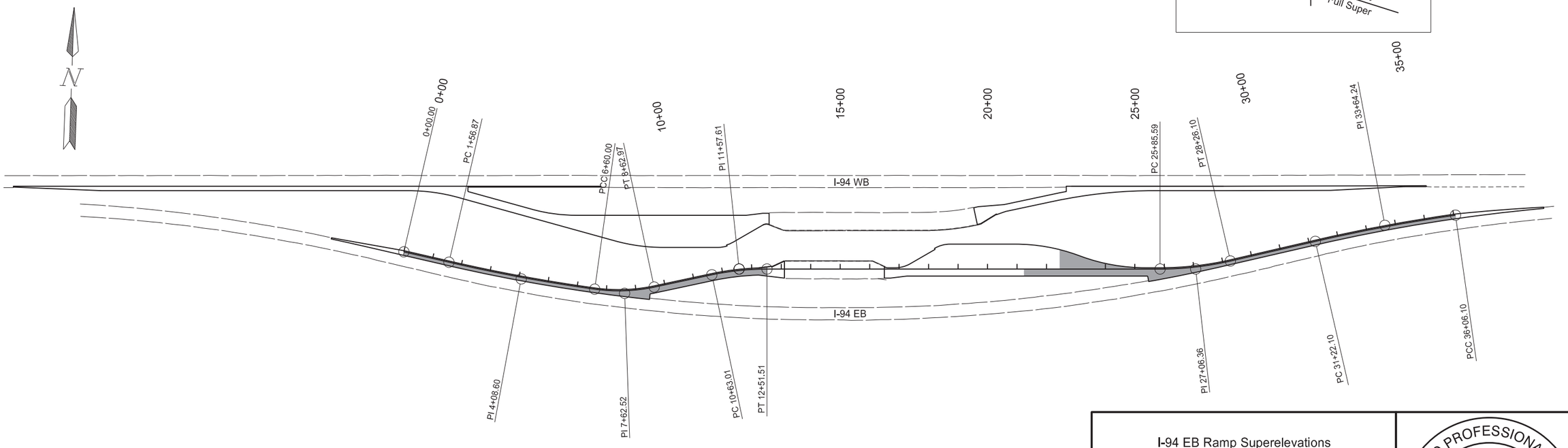
Station		Left Slope	Right Slope
10+63.01	PC	2.1	-2.1
12+01.09		2.1	-2.1
12+23.09		-2.1	-2.1
12+51.51	PT	-2.1	-2.1

EB I-94 Entrance Ramp
55 MPH Design

PC 25+85.59
PI 27+06.36
PT 28+26.10
Radius: 1060.00
Delta: 13°00'00" LT
Degree: 05°24'19"
Radius: 1060.00
Length: 240.51
Tangent: 120.77

Station		Left Slope	Right Slope
22+36.57		-2.1	-2.1
23+33.00		-2.1	0.0
24+01.92		-2.1	2.1
24+98.35		-2.1	2.1
25+85.59	PC	-4.0	4.0
26+77 43		-6.0	6.0
27+34.26		-6.0	6.0
28+26.10	PT	-4.0	4.0
29+13.34		-2.1	2.1





Note: Calculations based on AASHTO method five.
A maximum superelevation of 6% was used.

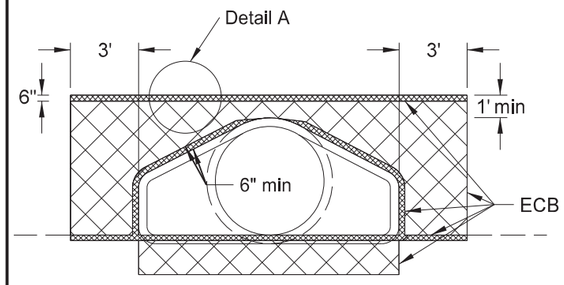
I-94 EB Ramp Superelevations

I-94 Oriska Rest Area

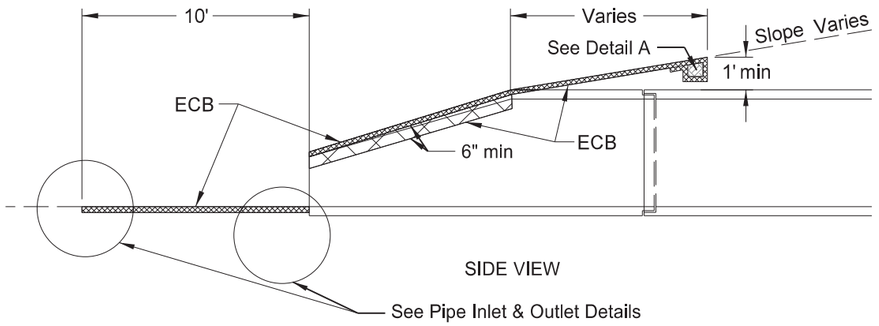
Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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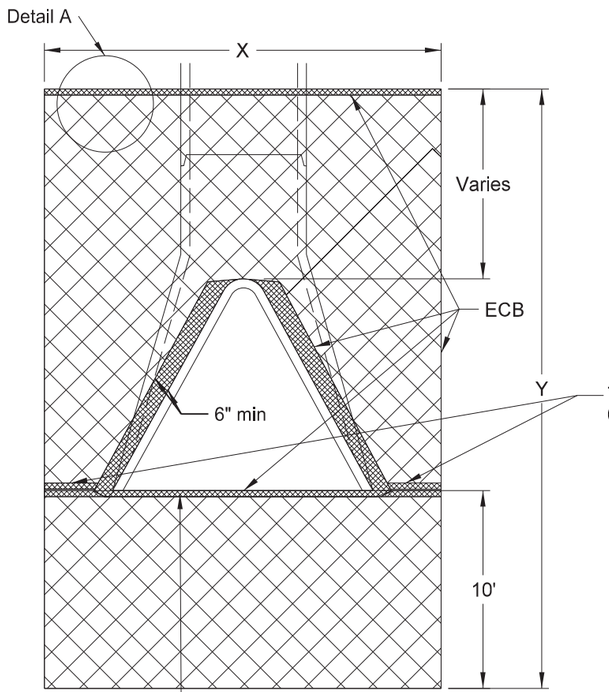


FRONT VIEW



SIDE VIEW

Erosion Control Blanket (ECB)								
Location to be Protected Station	Culvert Type Appr/CL	Pipe Diam (Inch)	No	Unit Quantity (SY)	Total Quantity Type 1 (SY)	Type 2 (SY)	Type 3 (SY)	Type 4 (SY)
WB Ramp								
15+50 (2)	CL	24		22		44		
30+75 (2)	Appr.	24		24		48		
31+40 (2)	CL	24		22		44		
EB Ramp								
9+75 (2)	CL	30		25		50		
10+89 (2)	Appr.	24		24		48		
24+06	CL	30		25		25		
Total (SYs)						259		



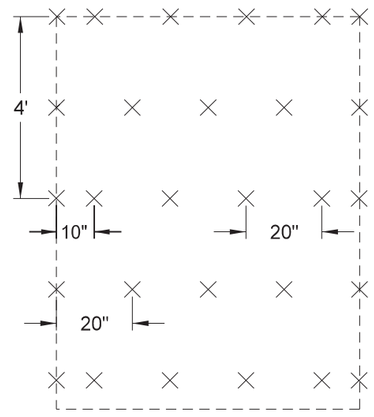
TOP VIEW

Inlet side - see applicable detail for pipe inlet.
Outlet side - see applicable detail for pipe outlet.

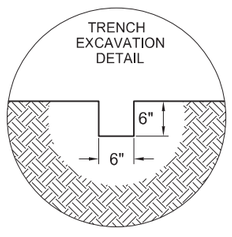
NOTE: Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.

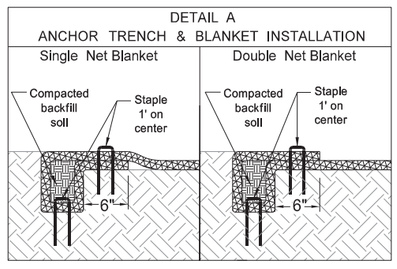
CENTERLINE CULVERTS									
DIA	X	Y	Surface area to be protected	ECB	DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY	In	Ft	Ft	SF	SY
24	10.5	19.6	193.1	22					
30	11.6	20.5	218.3	25	30	11.6	18.5	195.1	22
Note: Quantities based on 6:1 slope.					Note: Quantities based on 4:1 slope.				

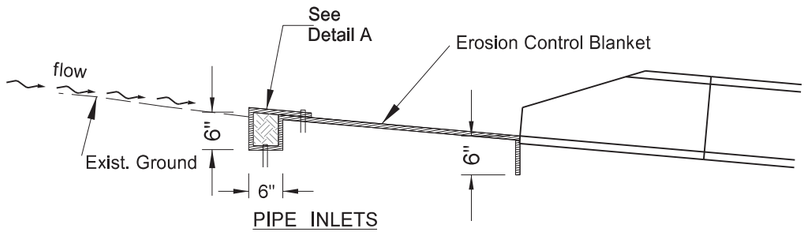
APPROACH CULVERTS				
DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY
24	10.5	21.6	214.1	24
Note: Quantities based on 8:1 slope.				



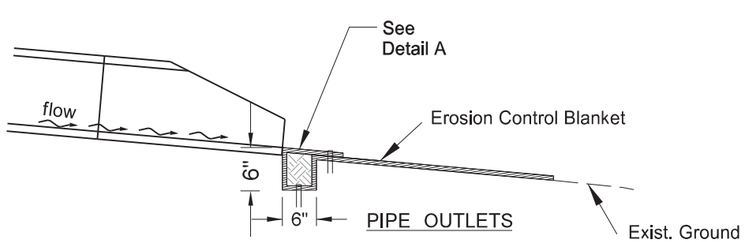
STAPLE PATTERN







PIPE INLETS



PIPE OUTLETS

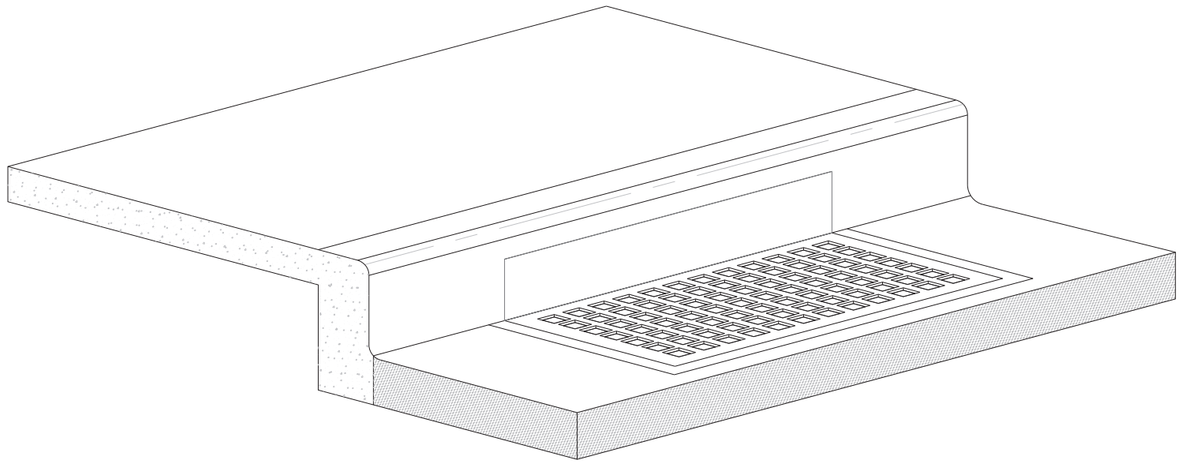
Erosion Control at Culvert Flared End Sections

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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PE-7616
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NORTH DAKOTA

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Inlet Protection Device

Installation Notes:

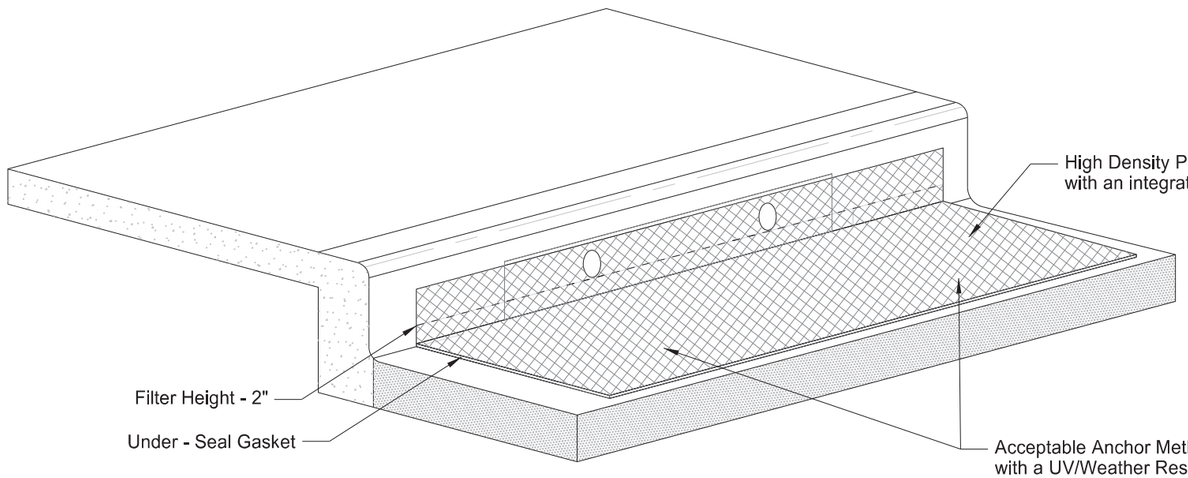
1. Place device tightly against drain opening and cover entire grate. Extend the device at least 2 inches past the grate toward the street.

2. Overlap the segments at longer openings.

3. Anchor the device so that water cannot flow behind it.

General Notes:

1. Remove material that falls into the inlet during maintenance or removal of the device.



Inlet Protection Device

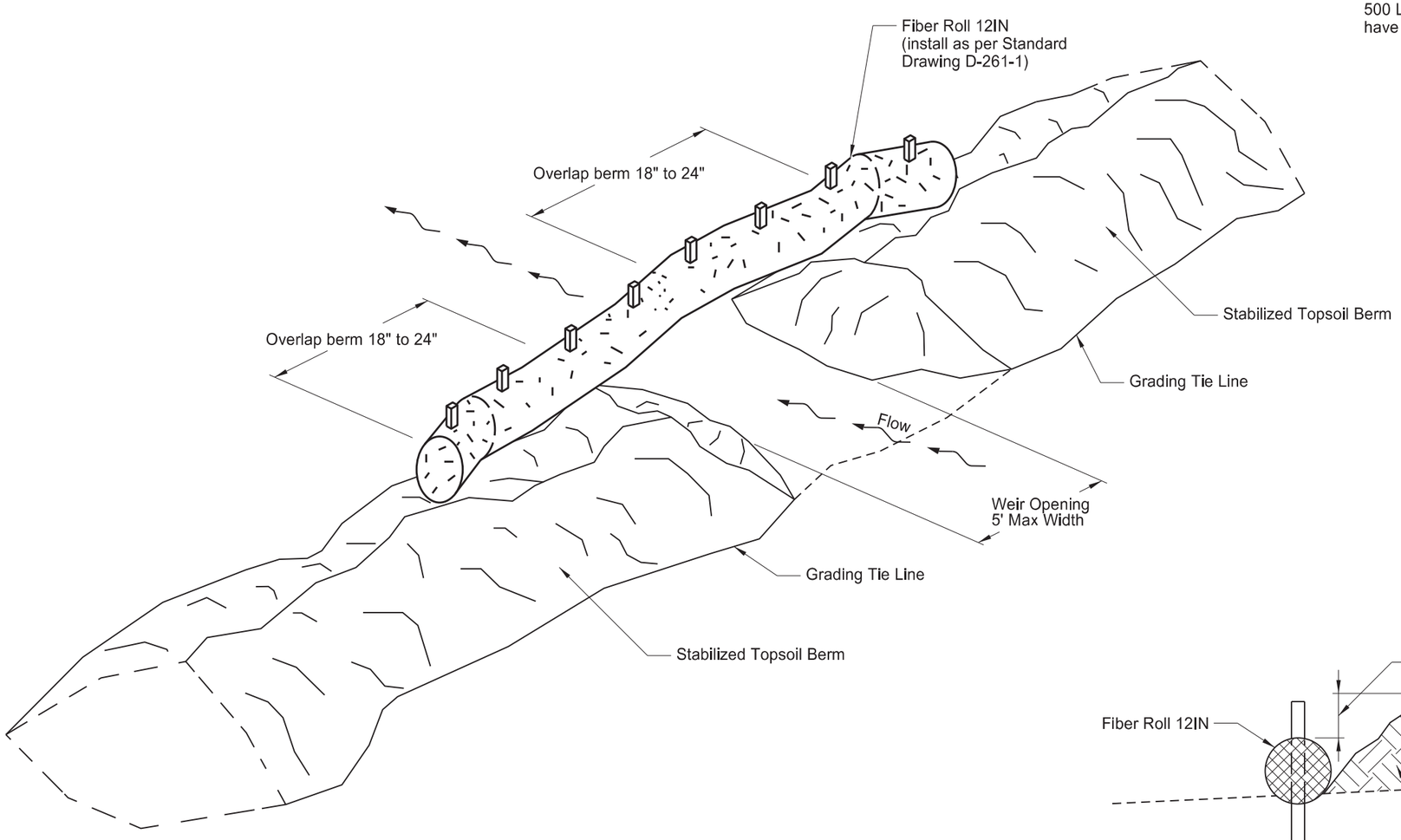
I-94 Oriska Rest Area

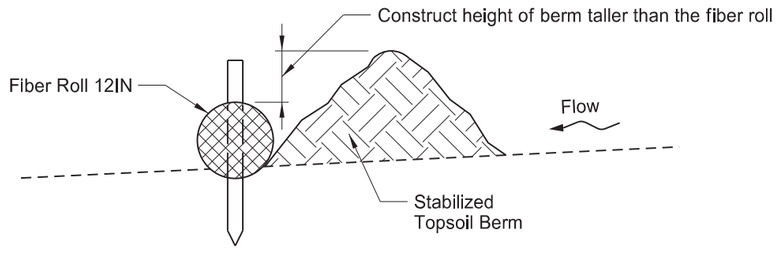
Ramp Improvements
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500 LF of Fiber Roll 12IN and 500 LF of Remove Fiber Roll 12IN have been included in the quantities for use at weirs.





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. The Engineer will measure and pay for fiber rolls separately.
7. The Engineer will measure and pay for removal of fiber rolls separately when required by the specifications.
8. The Engineer will measure and pay for soil stabilization and temporary cover crop separately.
9. Include the costs to create, maintain, and dismantle the berm in the unit price bid for "Topsoil".

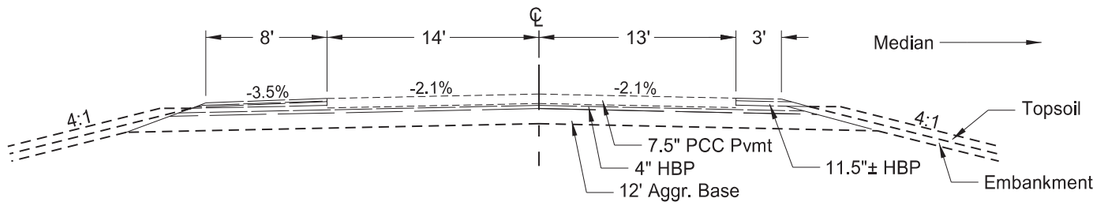
Temporary Topsoil Berm and Weir Detail

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

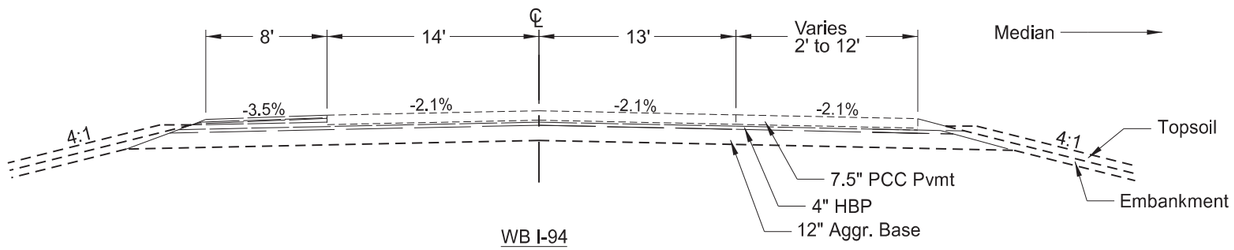
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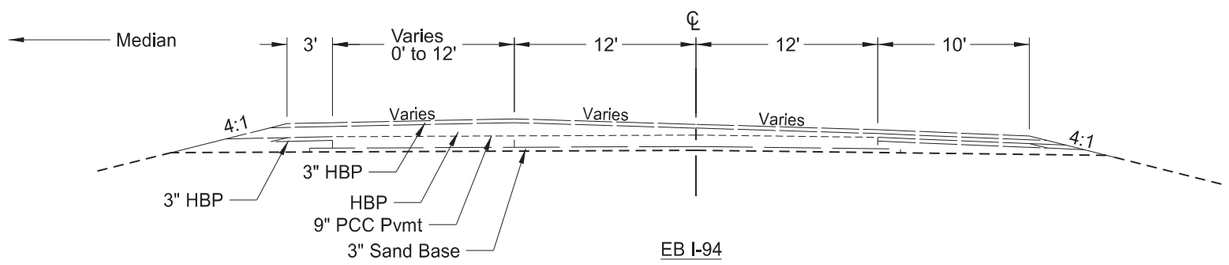
WB I-94

Sta 2447+20.85 to Sta 2455+07.96
Sta 2482+93.89 to Sta 2483+93.89



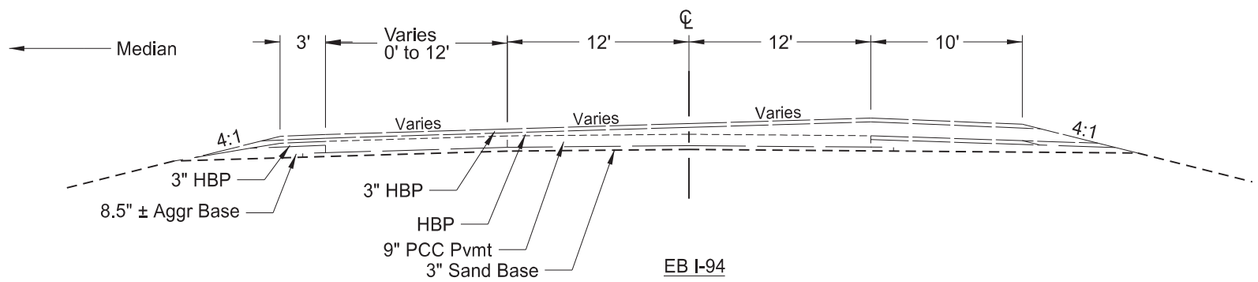
WB I-94

Sta 2455+07.96 to Sta 2467+14.15
Sta 2483+31.31 to Sta 2495+16.06



EB I-94

Sta 124+88.08 to Sta 125+37
Sta 159+38 Sta 166+57.33



EB I-94

Sta 125+37 to Sta 135+89.18
Sta 152+93.66 to Sta 159+38

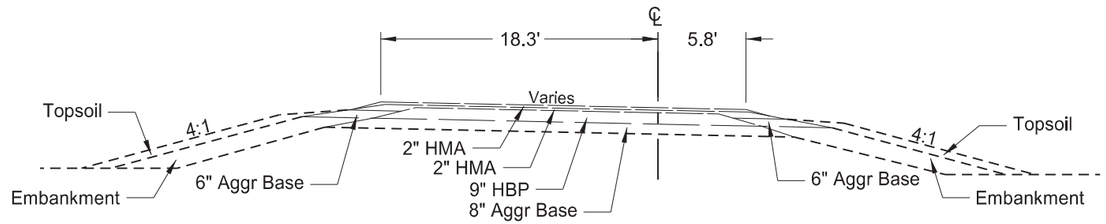
Existing Typical Section
I-94 WB and EB

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

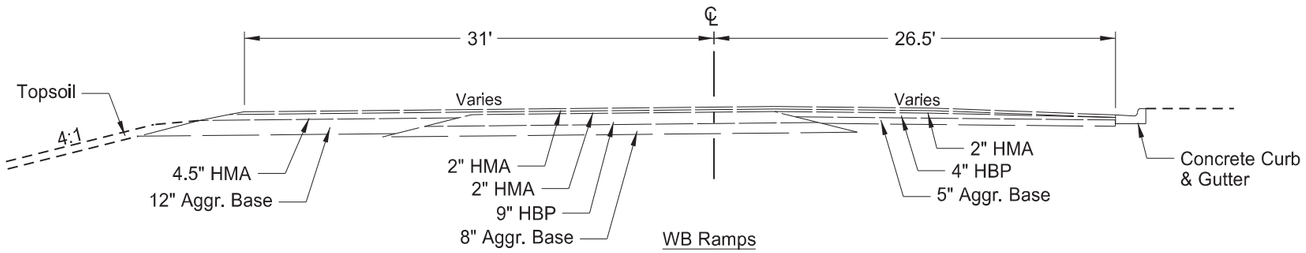
REGISTERED PROFESSIONAL ENGINEER
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Daniel N. Green
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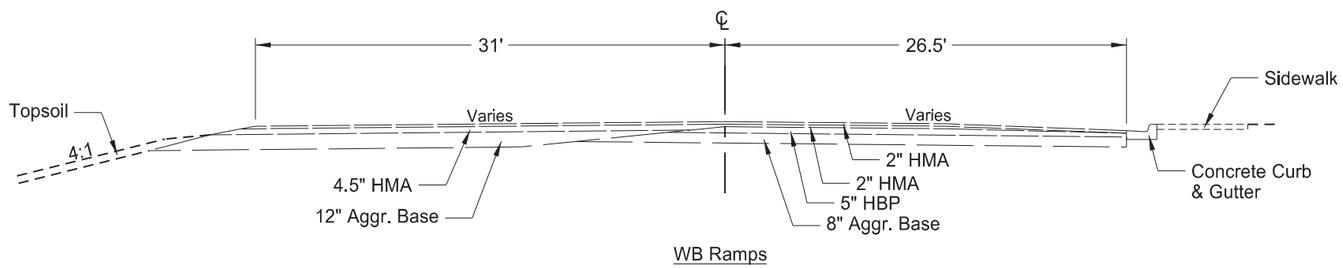
WB Ramps

Sta 17+02.51 to Sta 22+77.68
Sta 30+50.72 to Sta 33+36.03



WB Ramps

Sta 22+77.68 to Sta 23+35.76
Sta 27+89.52 to Sta 30+50.72



WB Ramps

Sta 23+35.76 to Sta 27+89.52

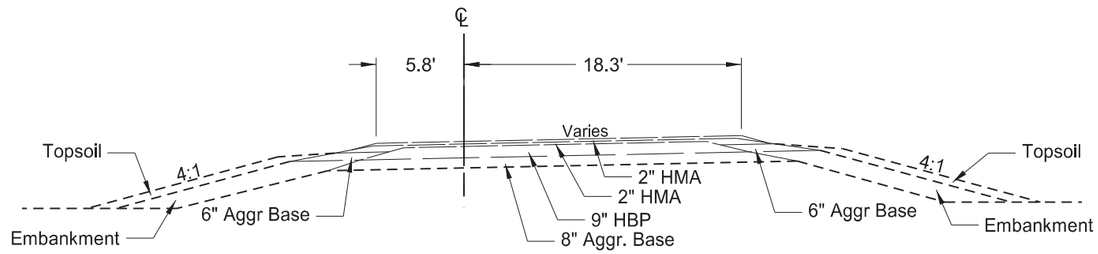
Existing Typical Section
I-94 WB Ramps

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

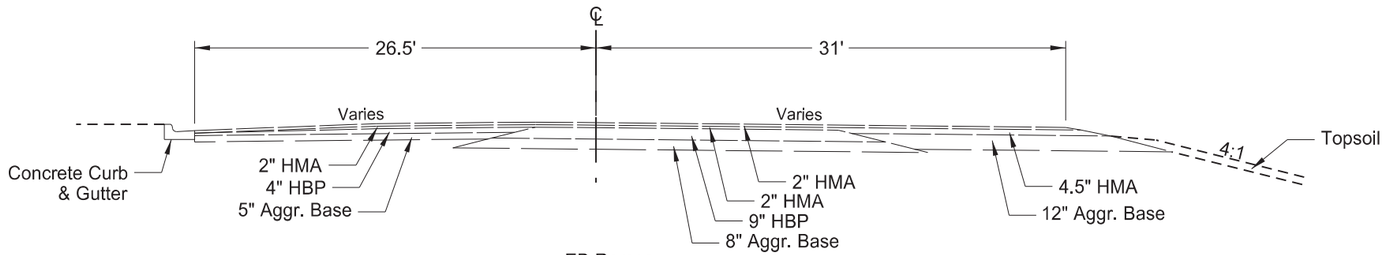
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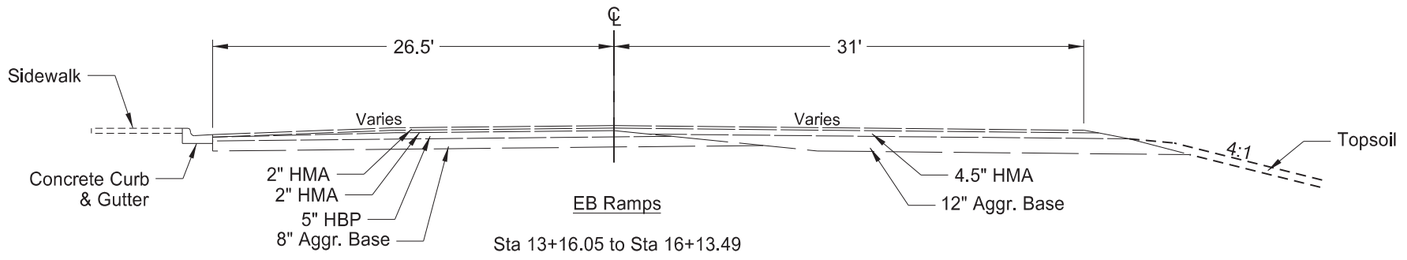
EB Ramps

Sta 6+53.40 to Sta 12+67.51
Sta 24+07.78 to Sta 26+21.77



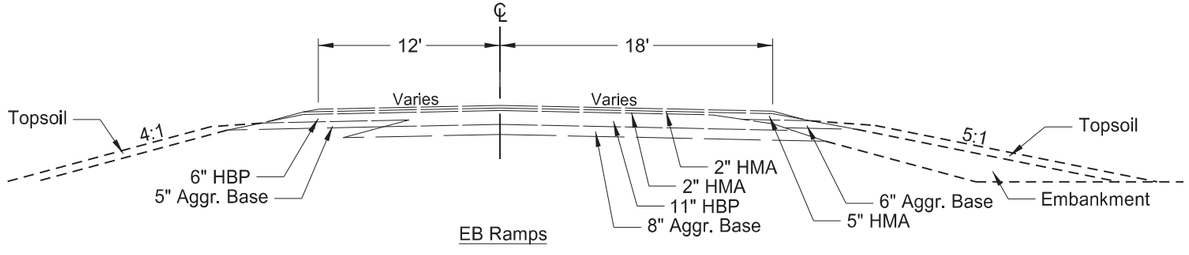
EB Ramps

Sta 12+67.51 to Sta 13+16.05
Sta 16+13.49 to Sta 16+51.87



EB Ramps

Sta 13+16.05 to Sta 16+13.49



EB Ramps

Sta 16+51.87 to Sta 24+07.78

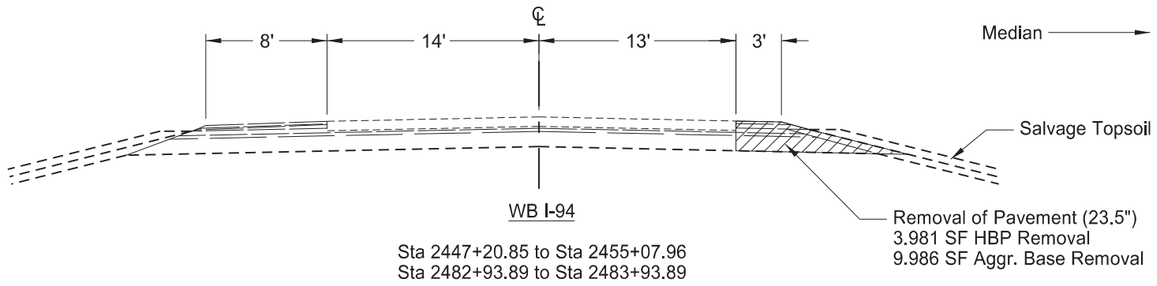
Existing Typical Section
I-94 EB Ramps

I-94 Oriska Rest Area

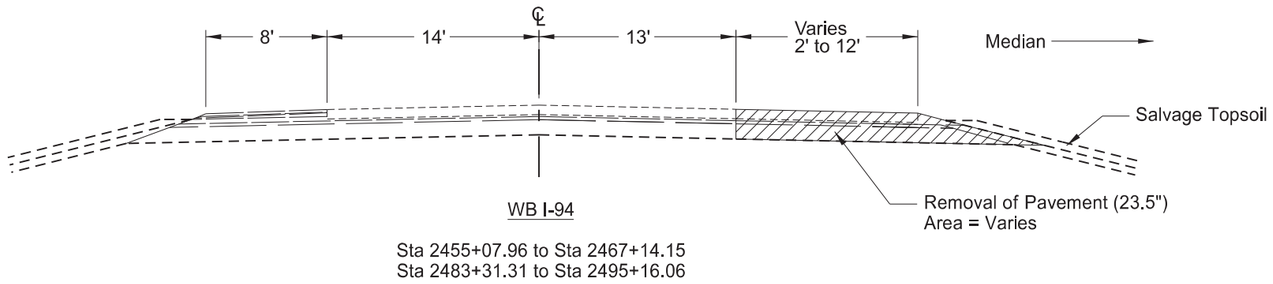
Ramp Improvements
Parking Improvements

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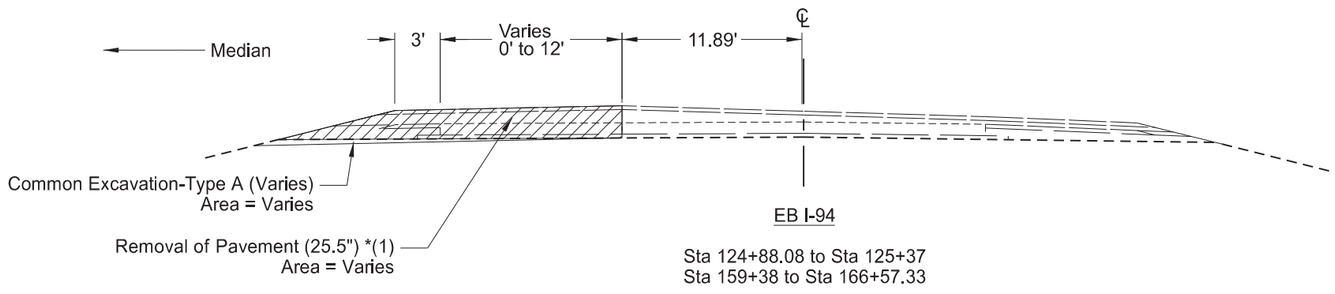
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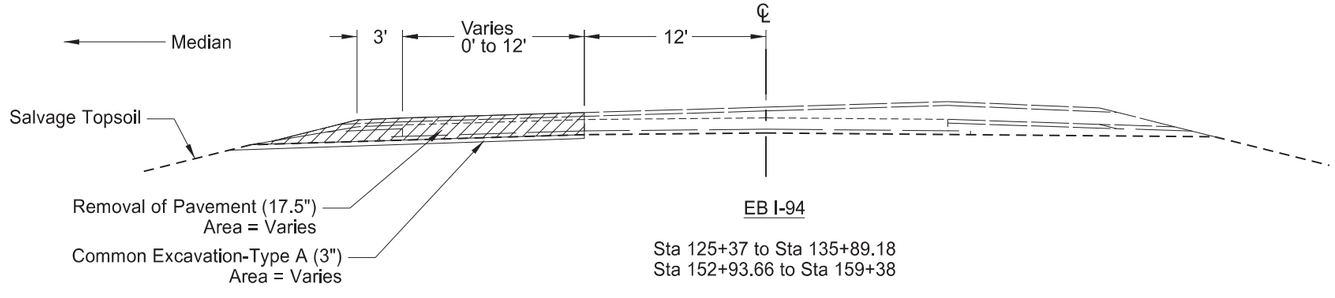
Sta 2447+20.85 to Sta 2455+07.96
Sta 2482+93.89 to Sta 2483+93.89



Sta 2455+07.96 to Sta 2467+14.15
Sta 2483+31.31 to Sta 2495+16.06



Sta 124+88.08 to Sta 125+37
Sta 159+38 to Sta 166+57.33



Sta 125+37 to Sta 135+89.18
Sta 152+93.66 to Sta 159+38

NOTES:
*(1) Remove Full Depth of PCC Pavement

*

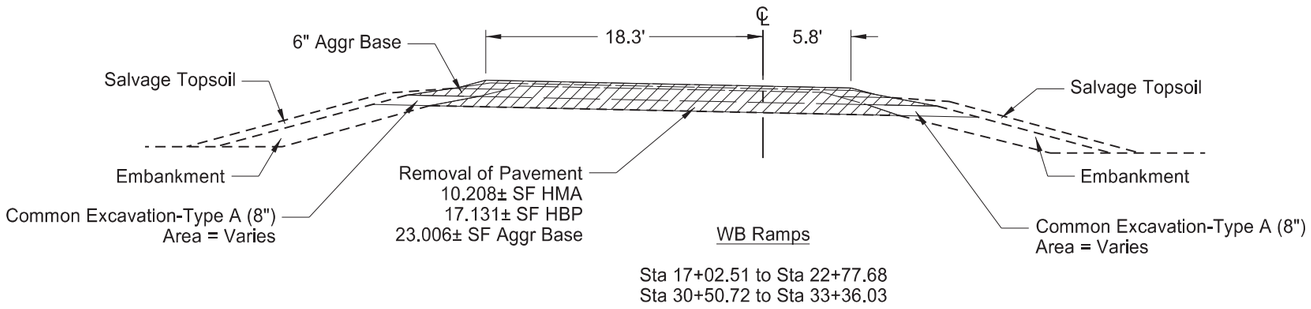
Removal Typical Section
I-94 WB and EB

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

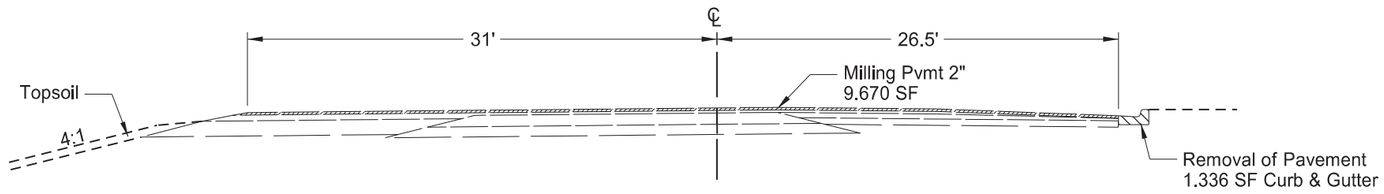
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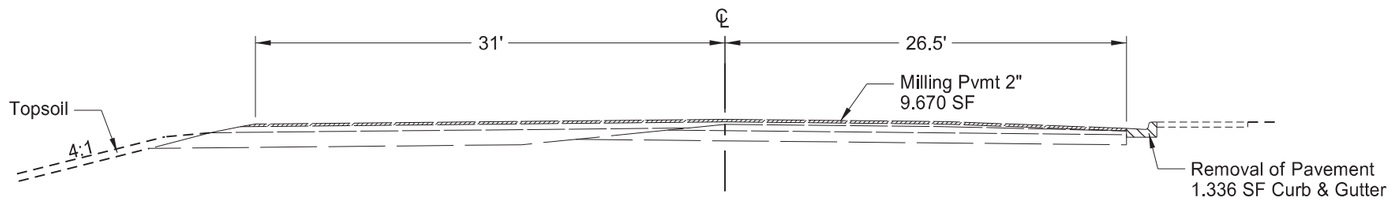
WB Ramps

Sta 17+02.51 to Sta 22+77.68
Sta 30+50.72 to Sta 33+36.03



WB Ramps

Sta 22+77.68 to Sta 23+35.76
Sta 27+89.52 to Sta 30+50.72



WB Ramps

Sta 23+35.76 to Sta 27+89.52

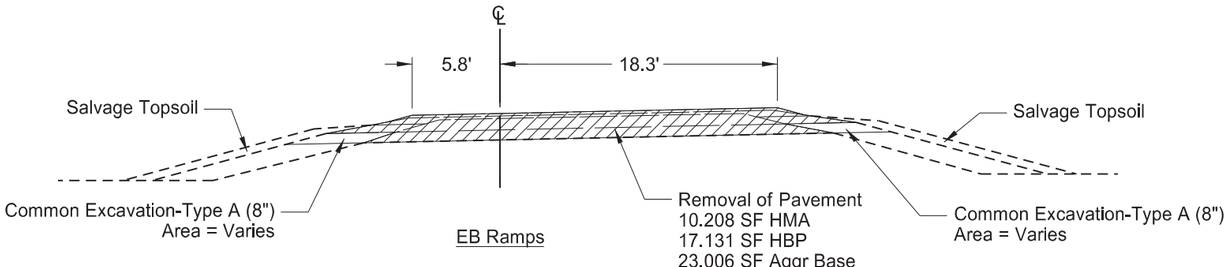
Removal Typical Section
WB Ramps

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

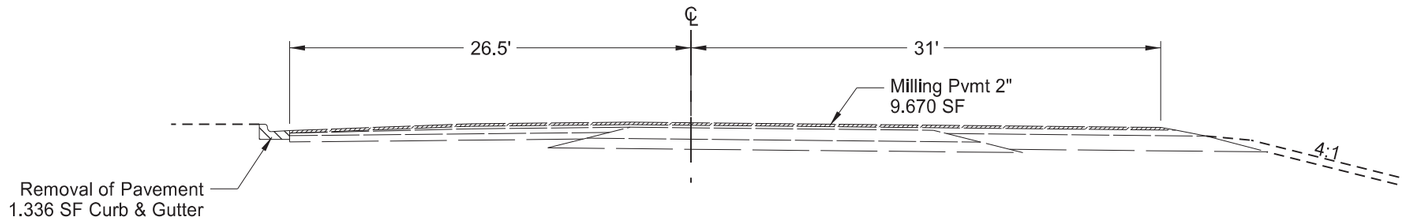
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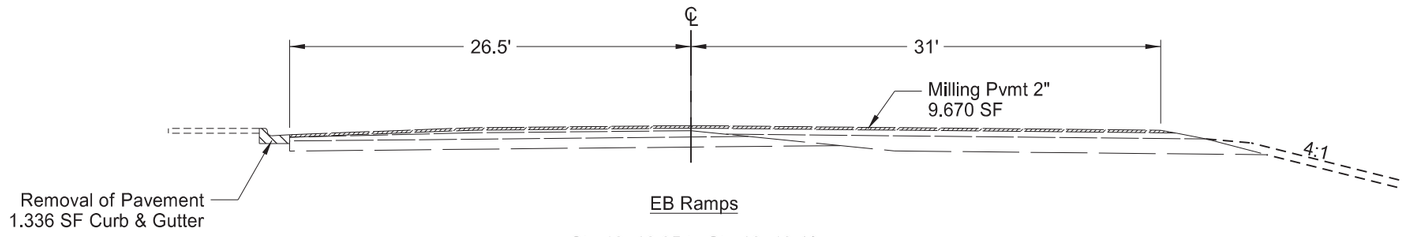
EB Ramps

Sta 6+53.40 to Sta 12+67.51
Sta 24+07.78 to Sta 26+21.77



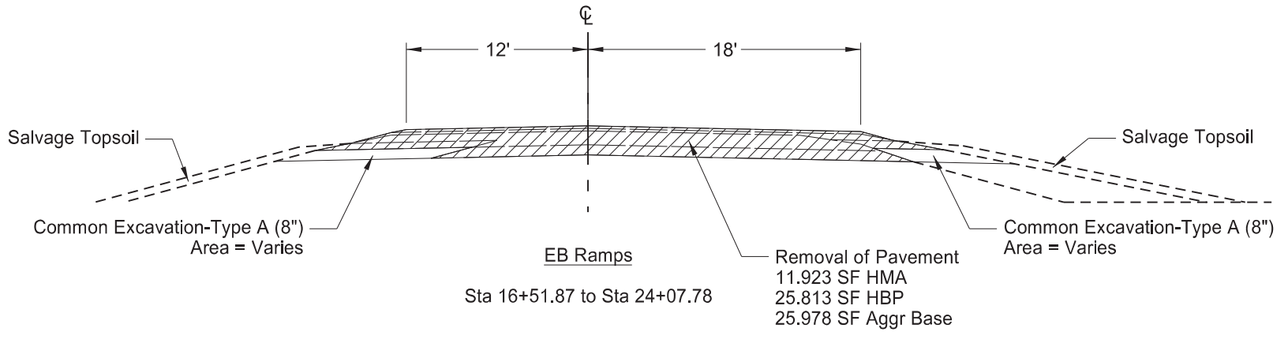
EB Ramps

Sta 12+67.51 to Sta 13+16.05
Sta 16+13.49 to Sta 16+51.87



EB Ramps

Sta 13+16.05 to Sta 16+13.49



EB Ramps

Sta 16+51.87 to Sta 24+07.78

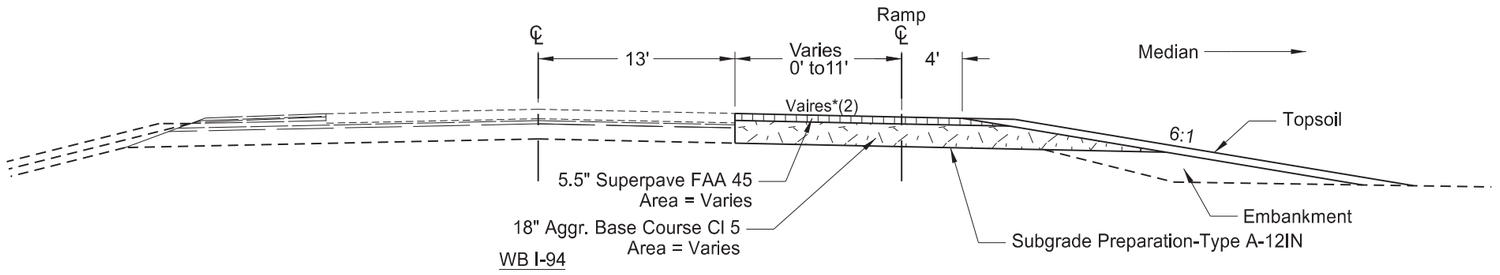
Removal Typical Section
EB Ramps

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

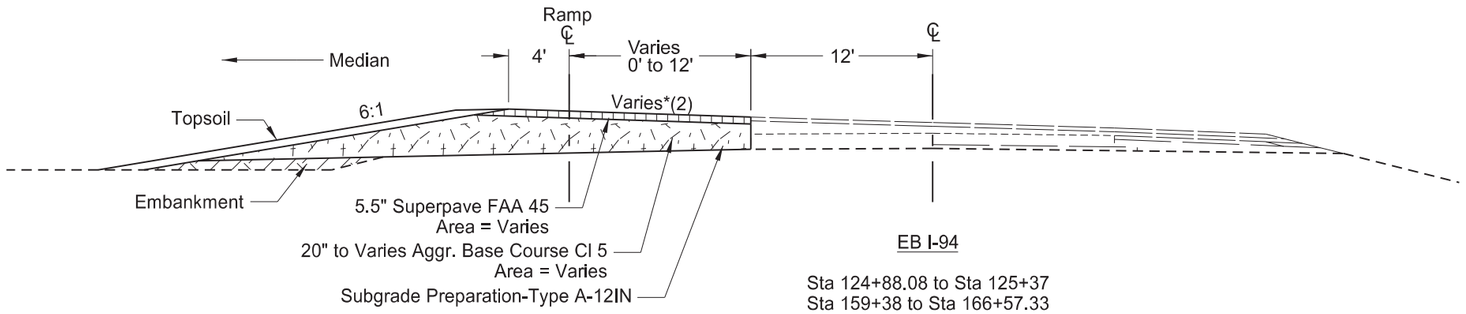
REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	30	7



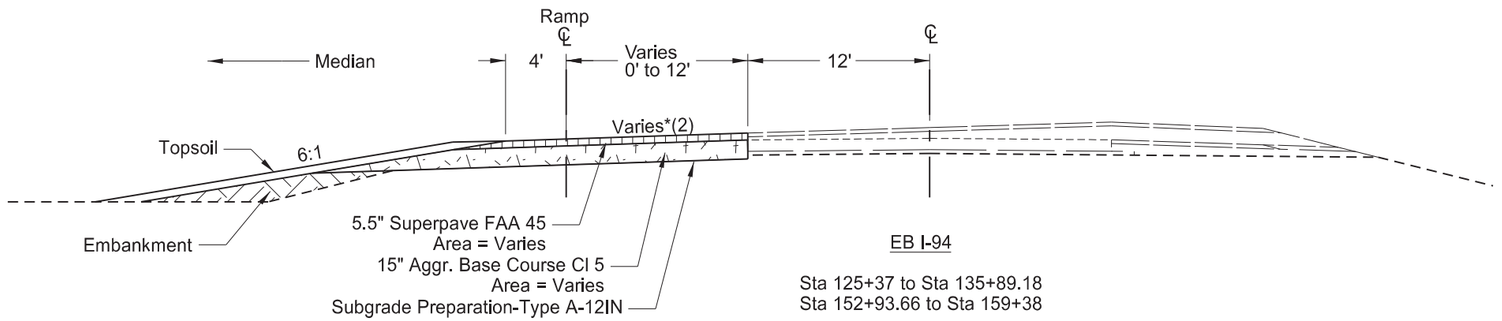
WB I-94

Sta 2447+20.85 to Sta 2467+14.15
Sta 2482+93.89 to Sta 2495+16.06



EB I-94

Sta 124+88.08 to Sta 125+37
Sta 159+38 to Sta 166+57.33



EB I-94

Sta 125+37 to Sta 135+89.18
Sta 152+93.66 to Sta 159+38

NOTES:
*(2) Superelevation varies - See Sec. 20 Sheets

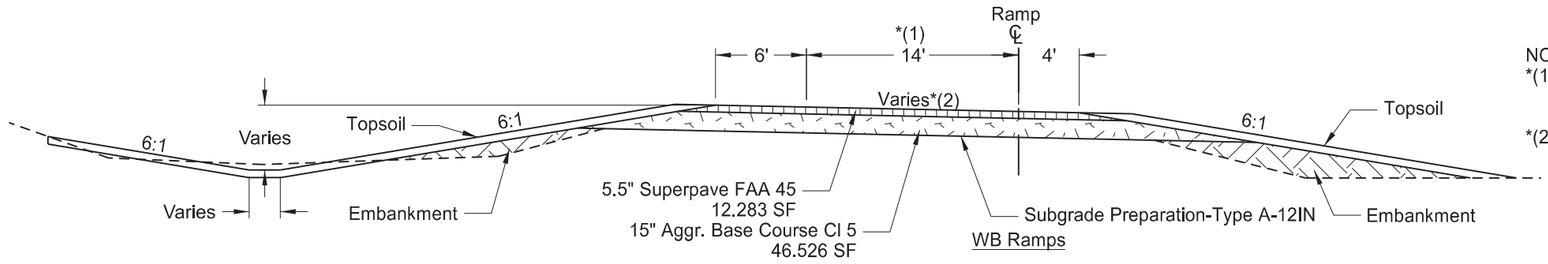
Proposed Typical Section
I-94 WB and EB

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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Daniel N. Green
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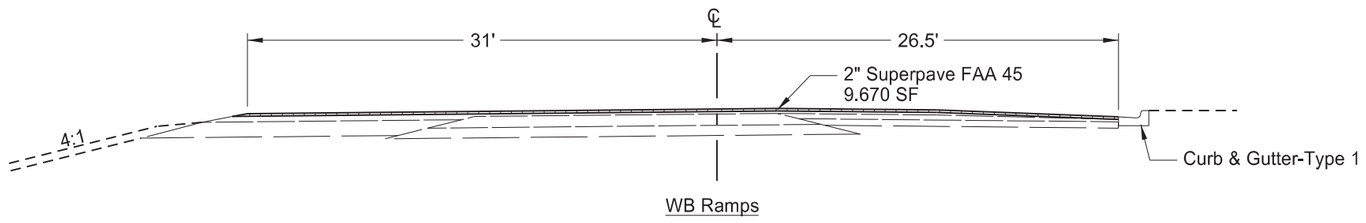
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	30	8



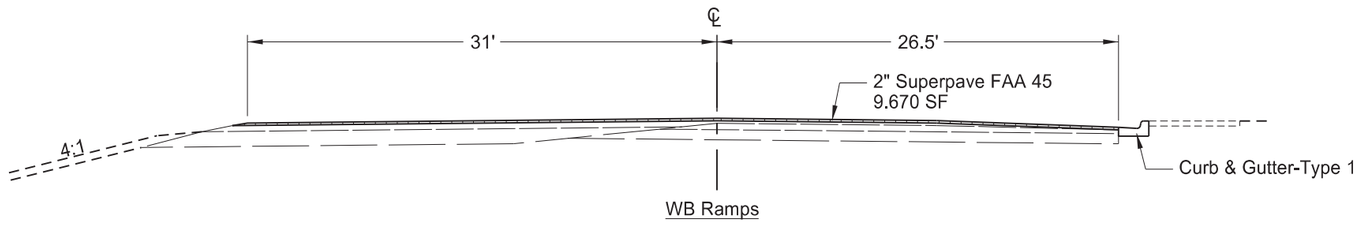
Sta 12+39.17 to Sta 14+63.13
Sta 29+80.07 to Sta 32+97.98

NOTES:
*(1) Lane Width 18'
WB Ramp Sta 12+39.17 to Sta 14+63.13

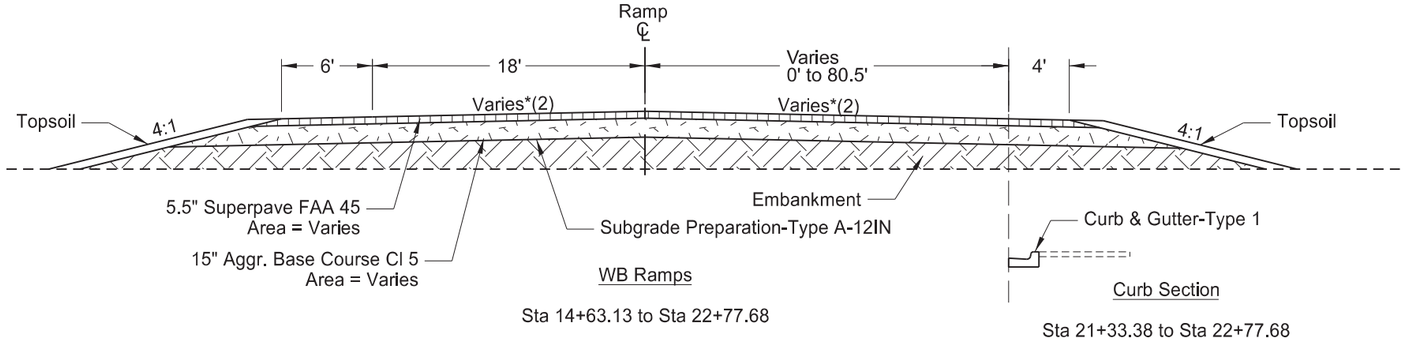
*(2) Superelevation varies - See Sec. 20 Sheets



Sta 22+77.68 to Sta 23+35.76
Sta 27+89.52 to Sta 30+50.72



Sta 23+35.76 to Sta 27+89.52



Sta 14+63.13 to Sta 22+77.68
Sta 21+33.38 to Sta 22+77.68

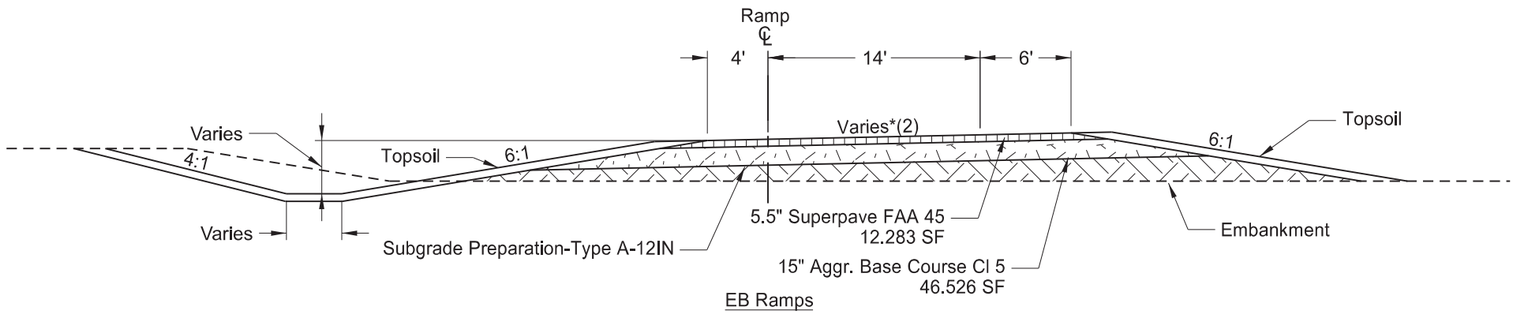
Proposed Typical Section
WB Ramps

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

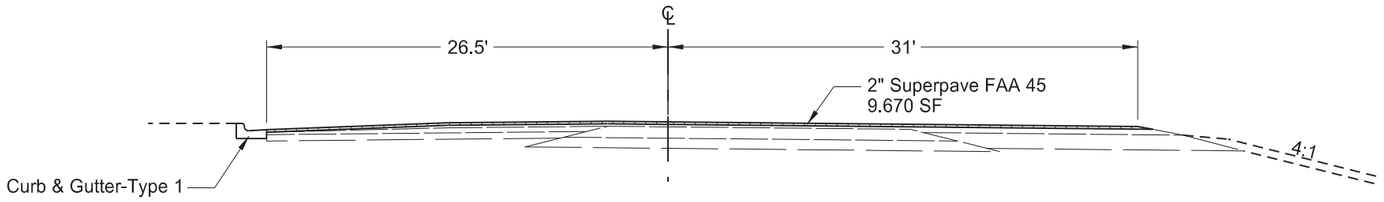
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Daniel N. Green
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	30	9



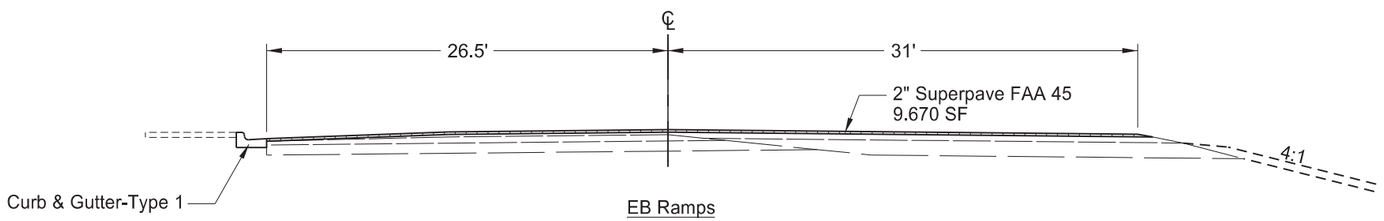
EB Ramps

Sta 8+45.00 to Sta 13+10.93



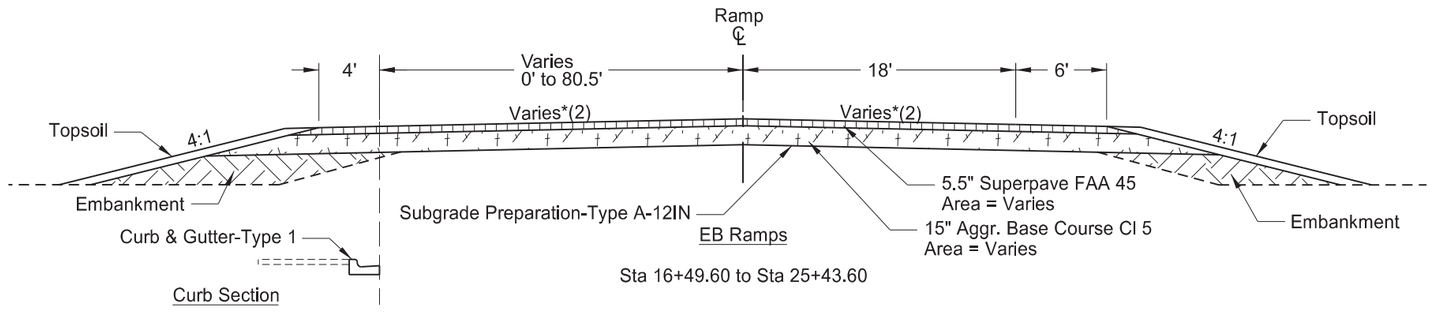
EB Ramps

Sta 12+67.51 to Sta 13+16.05
Sta 16+13.49 to Sta 16+51.87



EB Ramps

Sta 13+16.05 to Sta 16+13.49



Curb Section

Sta 16+49.60 to Sta 18+21.89

EB Ramps

Sta 16+49.60 to Sta 25+43.60

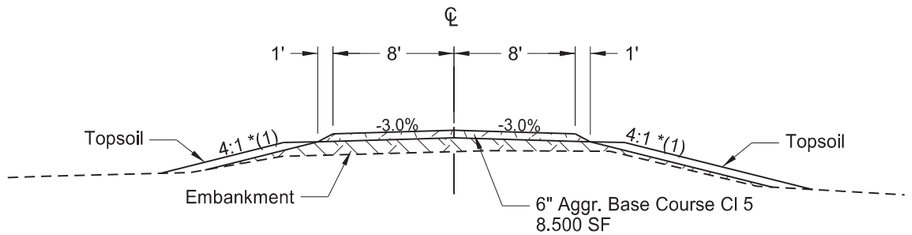
Proposed Typical Section
EB Ramps

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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Service Roads

Sta 0+04.00 to Sta 0+88.87
Sta 0+84.50 to Sta 1+97.01

NOTES:
*(1) 8:1 in ramp clearzone

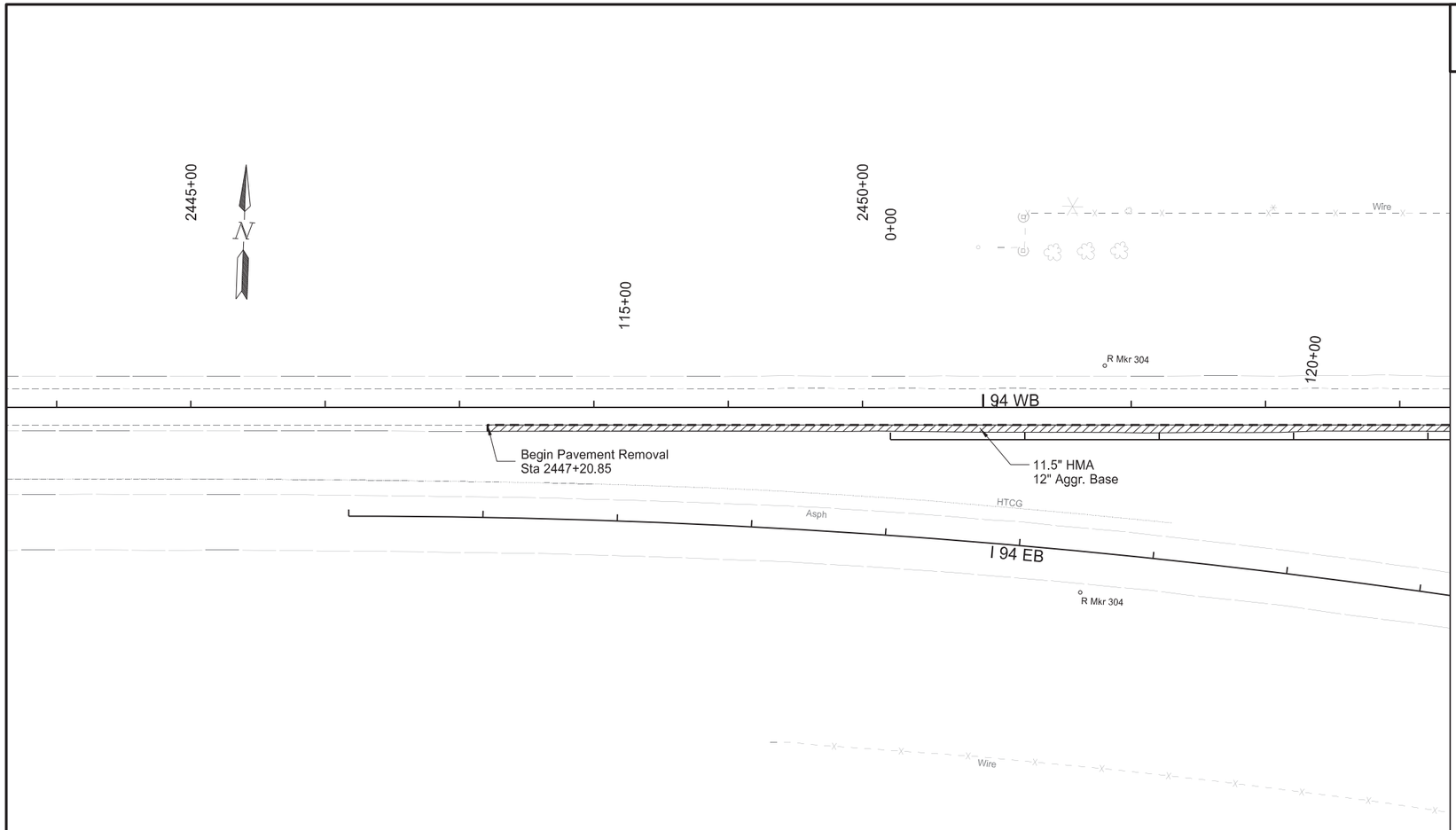
Proposed Typical Section
Access Roads

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	40	1



SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		Aggregate Base		
		WB Sta 2447+21 Rt to Sta 2450+21Rt	208	TON
		WB Sta 0+00 Lt to Sta 4+00 Lt	202	TON
		Asphalt		
		WB Sta 2447+21 Rt to Sta 2450+21 Rt	88	TON
		WB Sta 0+00 Lt to Sta 4+00 Lt	118	TON

Asphalt/Aggregate Removal

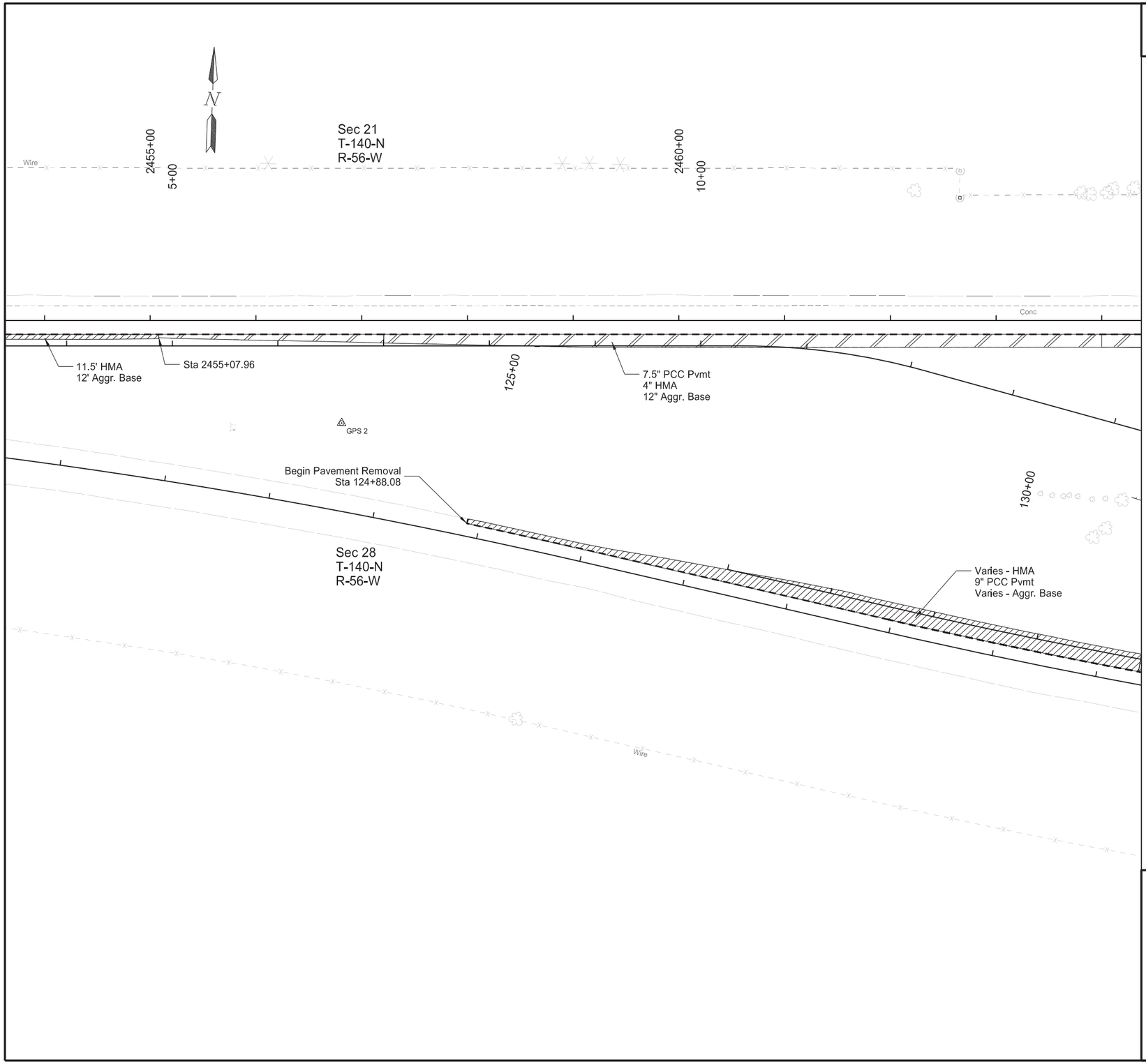
Removals

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
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Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	40	2



SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		Aggregate Base		
		EB Sta 124+88 Lt to Sta 125+37 Lt	101	TON
		WB Sta 4+00 Lt to Sta 4+87 Lt	60	TON
		WB Sta 4+87 Lt to Sta 13+50 Lt	1,075	TON
		Asphalt		
		EB Sta 124+88 Lt to Sta 125+37 Lt	16	TON
		EB Sta 125+37 Lt to Sta 127+38 Lt	129	TON
		EB Sta 0+00 Rt to Sta 3+50 Rt	249	TON
		WB Sta 4+00 Lt to Sta 4+87 Lt	26	TON
		WB Sta 4+87 Lt to Sta 13+50 Lt	252	TON
		Concrete		
		EB Sta 124+88 Lt to Sta 125+37 Lt	5	TON
		EB Sta 125+37 Lt to Sta 127+38 Lt	121	TON
		EB Sta 0+00 Rt to Sta 3+50 Rt	2	TON
		WB Sta 4+87 Lt to Sta 13+50 Lt	425	TON

Asphalt/Aggregate Removal

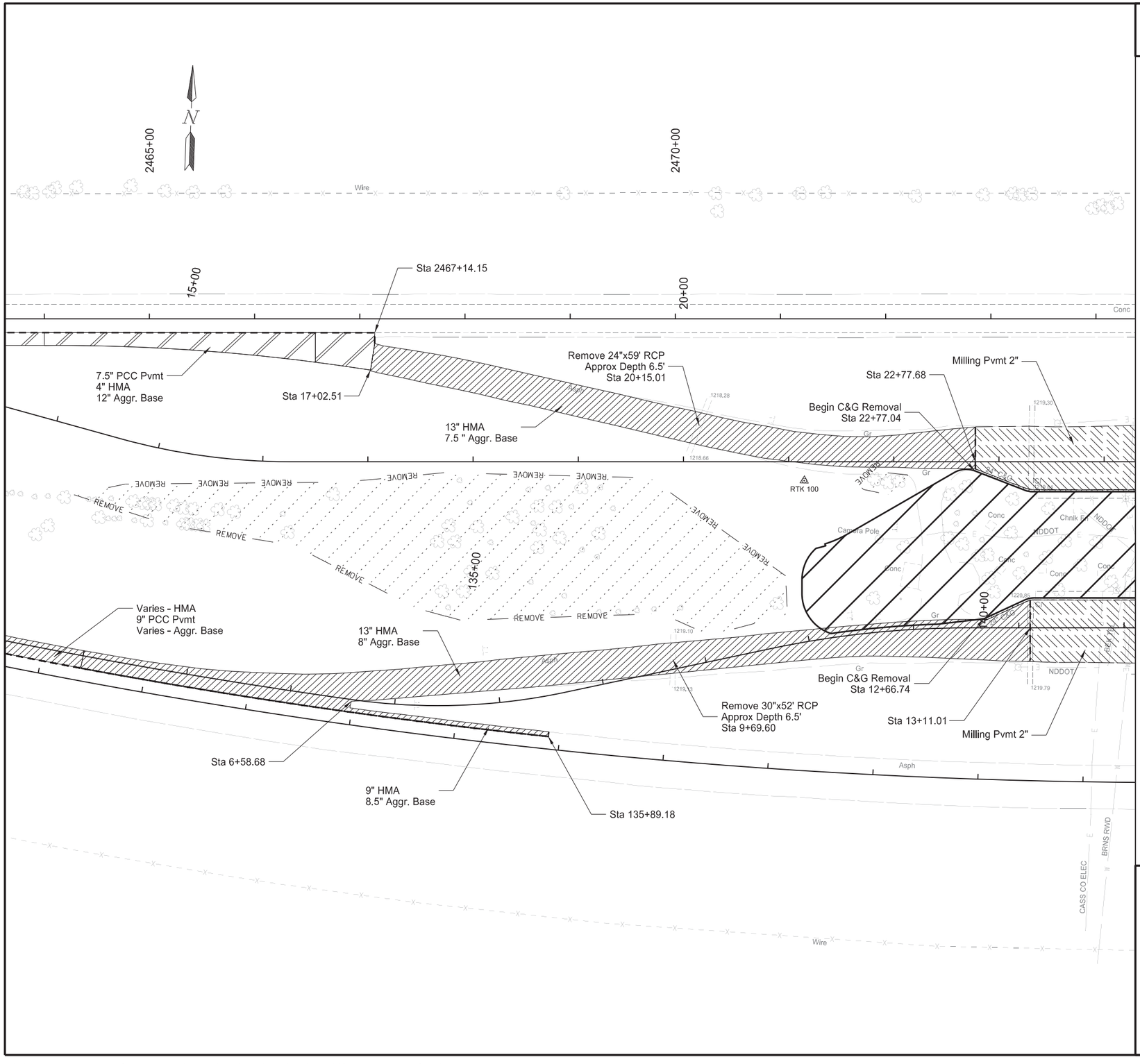
Concrete Pavement/Aggregate Removal

Removals

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	40	3

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		Aggregate Base		
		EB Sta 6+54 Lt to Sta 13+11 Lt	1,437	TON
		WB Sta 13+50 Lt to Sta 17+03 Lt	581	TON
		WB Sta 17+03 Lt to Sta 22+78 Lt	1,064	TON
		Asphalt		
		EB Sta 3+50 Rt to Sta 13+11 Rt	3,108	TON
		WB Sta 13+50 Lt to Sta 17+03 Lt	165	TON
		WB Sta 17+03 Lt to Sta 22+78 Lt	1,178	TON
		Concrete		
		EB Sta 3+50 Rt to Sta 8+41 Lt	444	TON
		WB Sta 13+50 Lt to Sta 17+03 Lt	287	TON
		Curb & Gutter		
		EB Sta 12+68 Lt to Sta 14+00 Lt	14	TON
		WB Sta 22+78 Rt to Sta 24+00 Rt	13	TON
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES		
		EB Sta 9+68 Lt	52	LF
		WB Sta 20+15 Lt	59	LF
411	0100	MILLING PAVEMENT SURFACE		
		EB Sta 12+68 Rt to Sta 14+00 Rt	65	TON
		WB Sta 22+78 Lt to Sta 24+00 Lt	85	TON

- Asphalt/Aggregate Removal
- Concrete Pavement/Aggregate Removal
- Curb and Gutter Removal
- Milling Pavement Surface
- Clearing and Grubbing
- Rest Area Building Project
  PCN 23501 - Constructed by Others

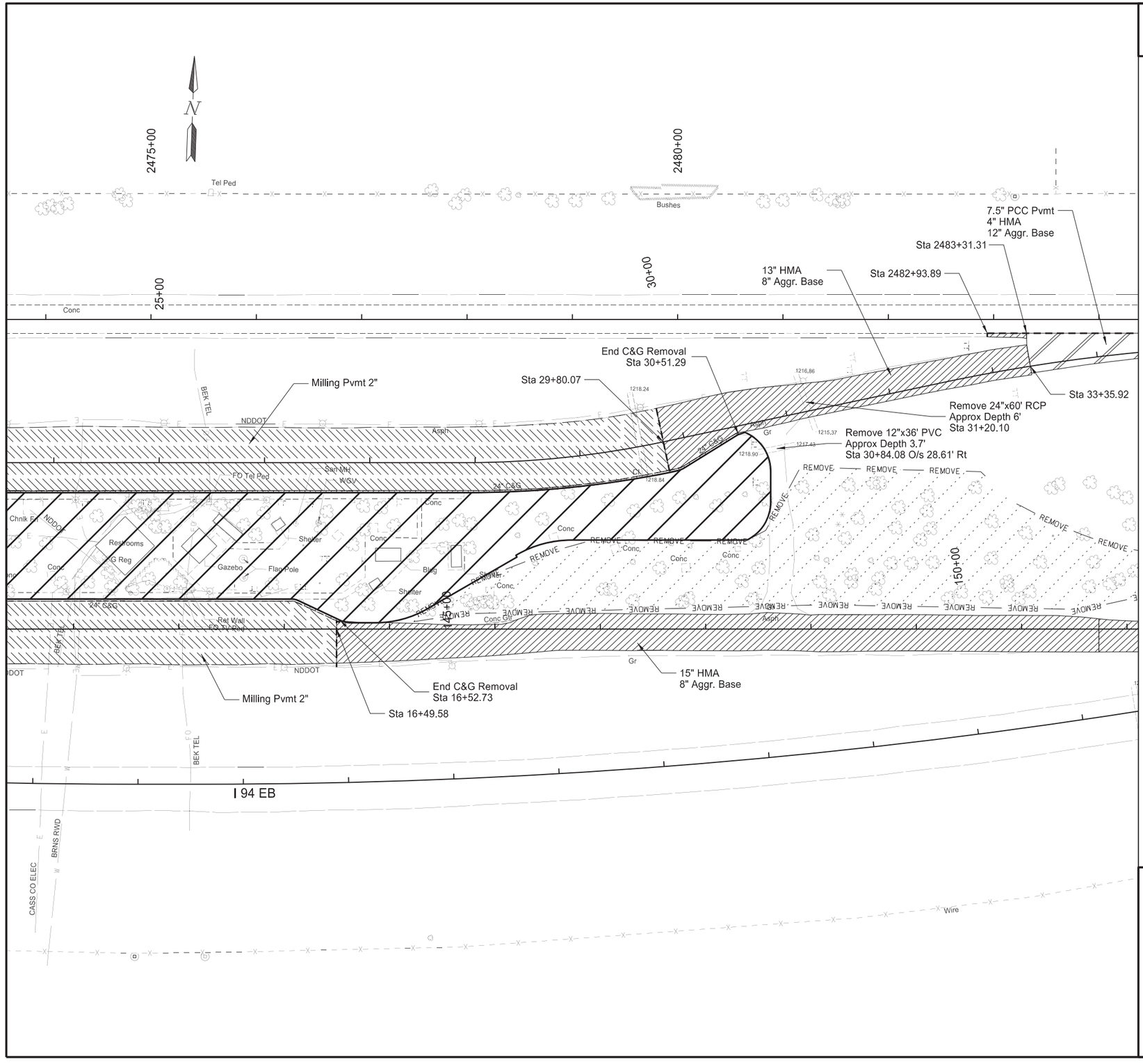
Removals

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	40	4

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		Aggregate Base		
		EB Sta 16+52 Rt to Sta 23+50 Rt	1,462	TON
		WB Sta 29+80 Rt to Sta 30+51 Rt	174	TON
		WB Sta 30+51 Lt to Sta 33+36 Lt	601	TON
		WBSta 33+36 Lt to Sta 34+00 Lt	179	TON
		Asphalt		
		EB Sta 16+52 Rt to Sta 23+50 Rt	2,026	TON
		WB Sta 29+80 Rt to Sta 30+51 Rt	197	TON
		WB Sta 30+51 Lt to Sta 33+36 Lt	641	TON
		WB Sta 33+36 Lt to Sta 34+00 Lt	57	TON
		Concrete		
		EB Sta 33+36 Lt to Sta 34+00 Lt	103	TON
		Curb Gutter		
		EB Sta 14+00 Lt to Sta 16+52 Lt	25	TON
		WB Sta 24+00 Rt to Sta 30+51 Rt	65	TON
202	0170	REMOVAL OF CULVERTS-ALL TYPES & SIZES		
		WB Sta 30+85 Rt	36	LF
		WB Sta 31+21 Lt	60	LF
411	0100	MILLING PAVEMENT SURFACE		
		EB Sta 14+00 Rt to Sta 16+52 Rt	179	TON
		WB Sta 24+00 Lt to Sta 30+51 Lt	431	TON

Asphalt/Aggregate Removal

Concrete Pavement/Aggregate Removal

Curb and Gutter Removal

Milling Pavement Surface

Clearing and Grubbing

Rest Area Building Project
PCN 23501 - Constructed by Others

Removals

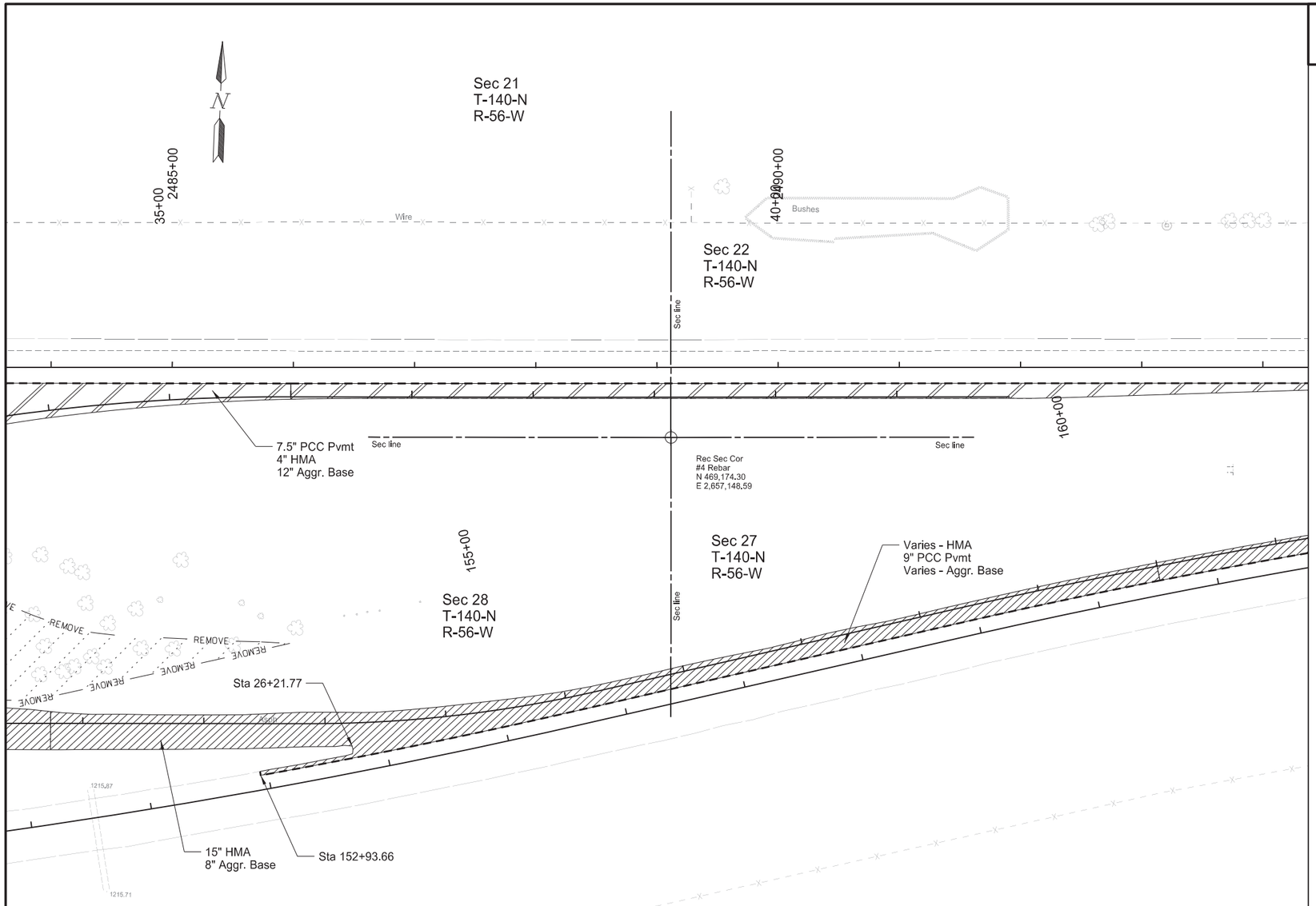
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	40	5

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		Aggregate Base		
		EB Sta 23+50 Rt to Sta 26+22 Rt	421	TON
		EB Sta 26+22 Rt to Sta 31+84.2 Rt	981	TON
		EB Sta 159+38 Lt to Sta 161+50 Lt	209	TON
		WB Sta 34+00 Lt to Sta 44+00 Lt	1,389	TON
		Asphalt		
		EB Sta 23+50 Rt to Sta 26+22 Rt	529	TON
		EB Sta 26+22 Rt to Sta 31+84.2 Rt	1,013	TON
		EB Sta 159+38 Lt to Sta 161+50 Lt	291	TON
		WB Sta 34+00 Lt to Sta 44+00 Lt	359	TON
		Concrete		
		EB Sta 25+39 Rt to Sta 31+84.2 Rt	226	TON
		EB Sta 159+38 Lt to Sta 161+50 Lt	141	TON
		WB Sta 34+00 Lt to Sta 44+00 Lt	605	TON



Asphalt/Aggregate Removal

Concrete Pavement/Aggregate Removal

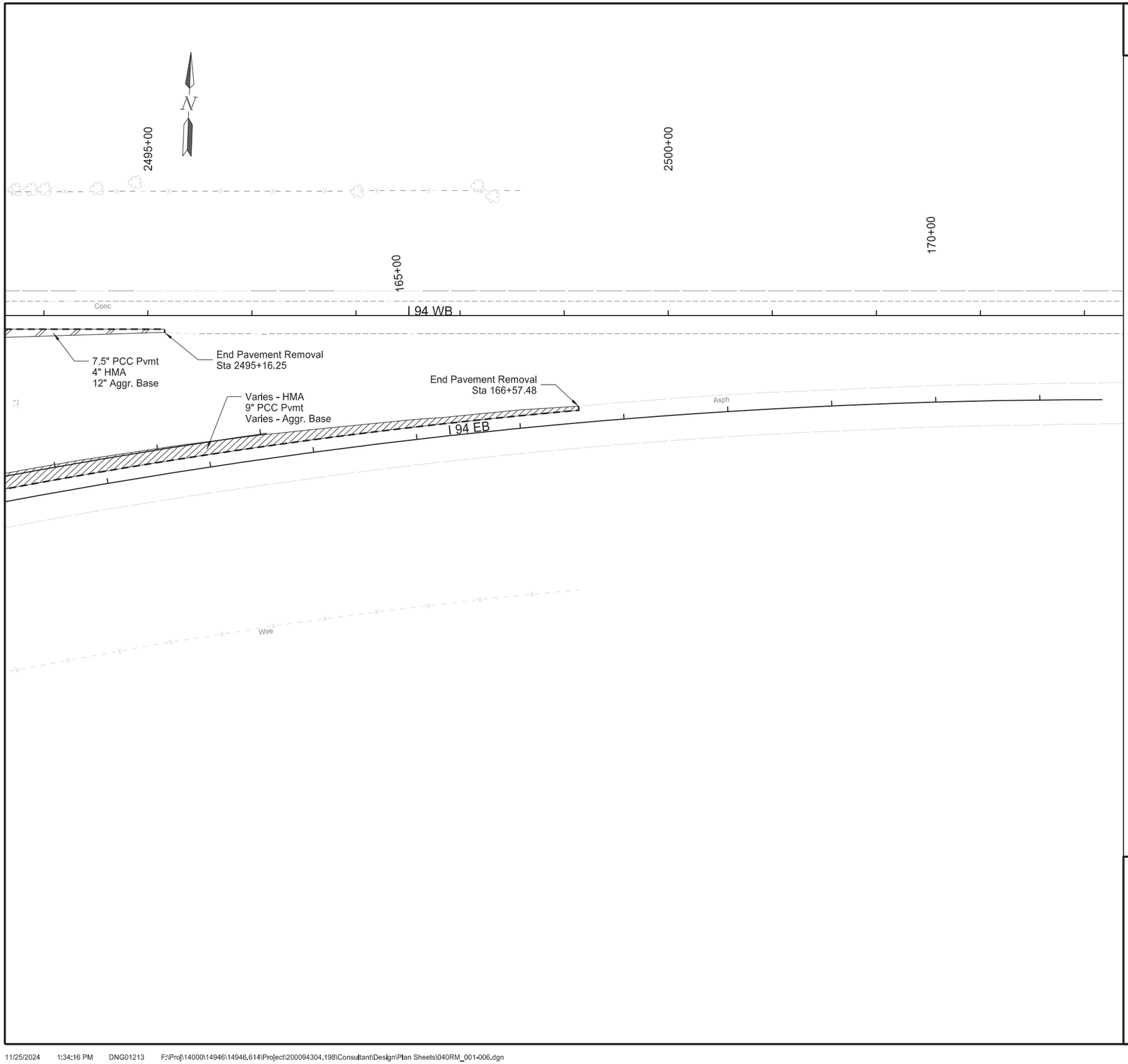
Clearing and Grubbing

Removals

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	40	6

SPEC	CODE	BID ITEM	QTY	UNIT
202	0136	REMOVAL OF PAVEMENT		
		Aggregate Base		
		EB Sta 161+50 Lt to Sta 166+57.33 Lt	275	TON
		WB Sta 44+00 Lt to Sta 45+18 Lt	94	TON
		Asphalt		
		EB Sta 161+50 Lt to Sta 166+57.33 Lt	291	TON
		WB Sta 44+00 Lt to Sta 45+18 Lt	18	TON
		Concrete		
		EB Sta 161+50 Lt to Sta 166+57.33 Lt	195	TON
		WB Sta 44+00 Lt to Sta 45+18 Lt	33	TON

Asphalt/Aggregate Removal

Concrete Pavement/Aggregate Removal

Removals

I-94 Oriska Rest Area

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Parking Improvements

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	50	1

HYDRAULIC DATA FOR IM-2-094(198)304 (A)

STATION	EXISTING PIPE	PROPOSED PIPE SIZE	DRAINAGE AREA (ACRES)	50-YEAR DATA				100-YEAR DATA	
				DESIGN DISCHARGE (CFS)	DESIGN HEADWATER (FT)	DESIGN VELOCITY (FPS)	DESIGN STAGE (NAVD 88)	100-YEAR DISCHARGE (CFS)	100-YEAR STAGE (NAVD 88)
WB 15+50	24"x52' RCP	24"	4.4	6.3	1.28	4.95	1220.02	5.2	1220.18
WB 31+48	24"x54' RCP	24"	11.1	10.0	1.70	7.63	1218.57	12.2	1218.80
EB 9+75	30"x48' RCP	30"	5.9	7.3	1.24	2.90	1220.72	8.8	1220.85
EB 24+13 RT	30"x82' RCP	30"	11.5	10.2	1.53	5.10	1217.52	12.4	1217.72

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

Culvert Hydraulic Data

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	Geosythetic Material - Type G (Pay Item)	(*) End Sections		Applicable Backfill
				In	Bid Item	LF		In	Type		In	SY	Begin EA	End EA	
WB 15+50	36.4' Rt	WB 15+50	47.4' Lt	24	Pipe Conduit	84	Reinforced Concrete Pipe - Class III **(barrel length = 80 LF)**	24				58	FES	FES	Standard D-714-26
WB 30+63.50	30' Rt	WB 31+08.40	30' Rt	24	Pipe Conduit - Approach	45	Reinforced Concrete Pipe - Class III **(barrel length = 40 LF)**	24					FES	FES	Specification 714.04 A
							Corrugated Steel Pipe	24	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	24	Z, A, P	3/4, 1	0.064				
WB 31+20.40	38.8' Lt	WB 31+67.14	27.3' Rt	24	Pipe Conduit	83	Reinforced Concrete Pipe - Class III **(barrel length = 78 LF)**	24				60	FES	FES	Standard D-714-26
EB 9+75	28.3' Lt	EB 9+75	35.7' Rt	30	Pipe Conduit	64	Reinforced Concrete Pipe - Class III **(barrel length = 62 LF)**	30				49	FES	FES	Standard D-714-26
EB 10+74	38.8' Lt	EB 11+04	33.2' Lt	24	Pipe Conduit - Approach	32	Reinforced Concrete Pipe - Class III **(barrel length = 28 LF)**	24					FES	FES	Specification 714.04 A
							Corrugated Steel Pipe	24	Z, A, P	2	0.064				
							Spiral Rib Steel Pipe	24	Z, A, P	3/4, 1	0.064				

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

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

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

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

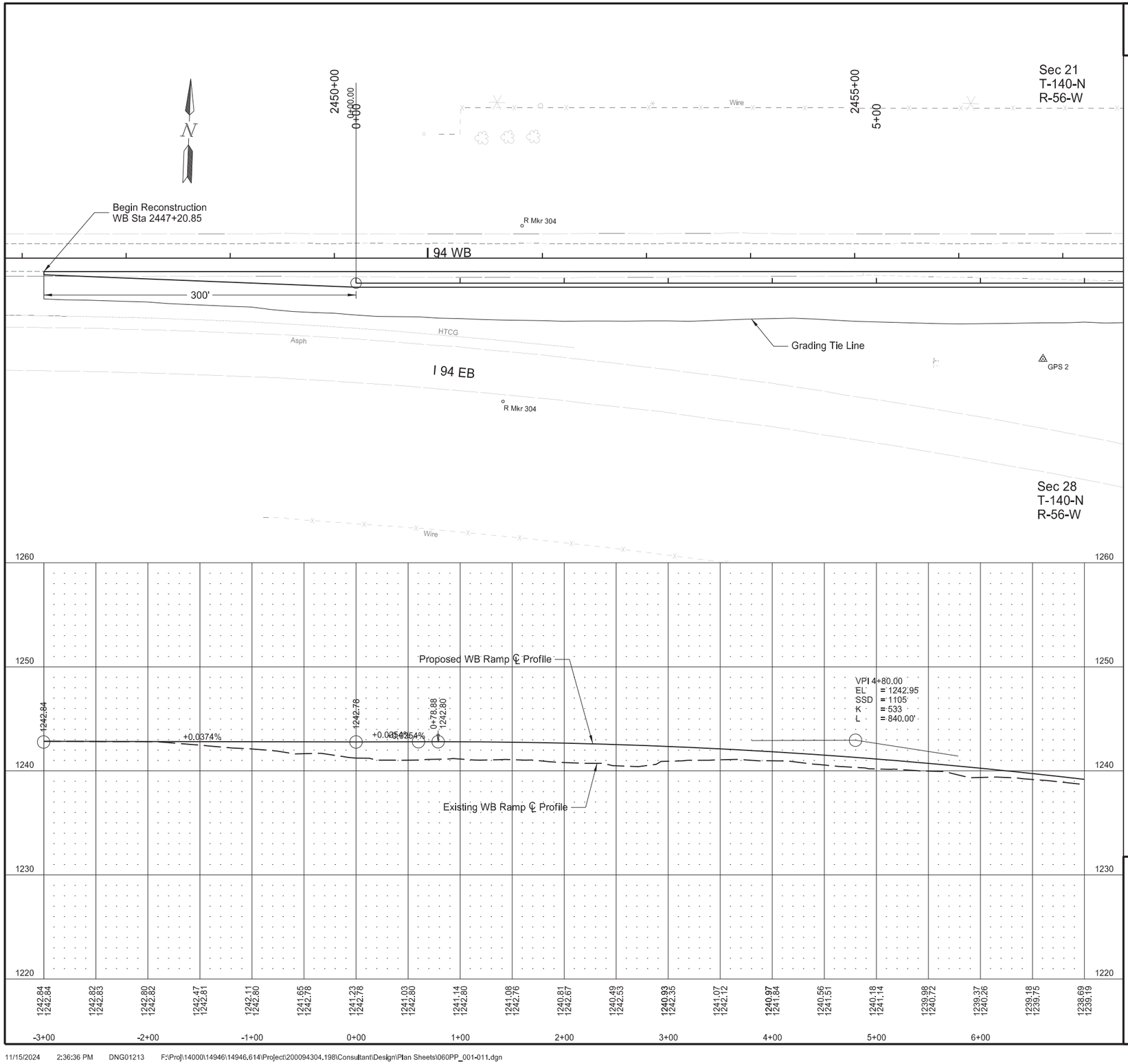
Pipe List

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	60	1



Plan and Profile
Westbound Ramps

I-94 Oriska Rest Area

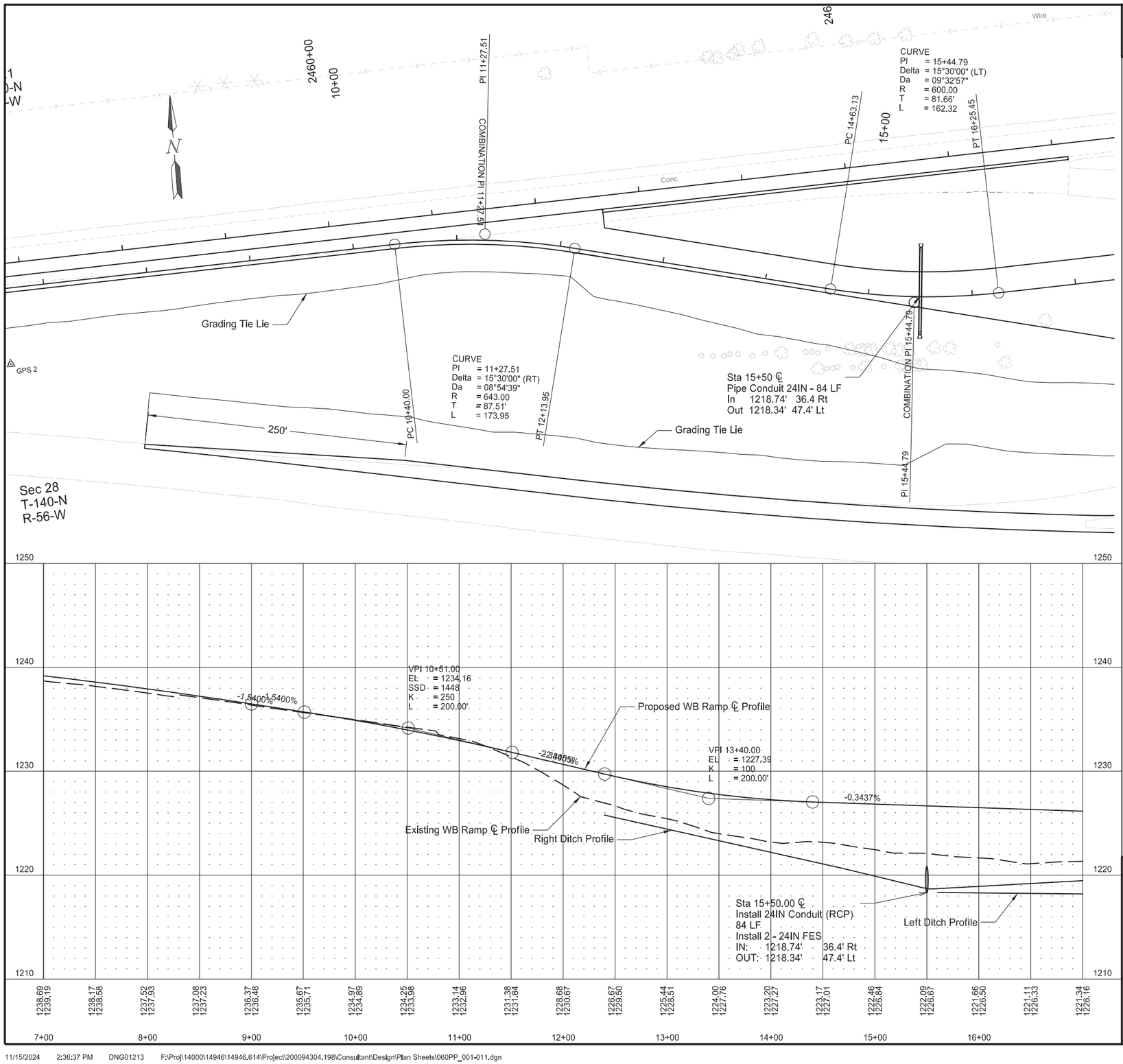
Ramp Improvements
Parking Improvements

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	60	2

SPEC	CODE	BID ITEM	QTY	UNIT
714	4105	PIPE CONDUIT 24IN		
		WB Sta 15+50 ℄	84	LF



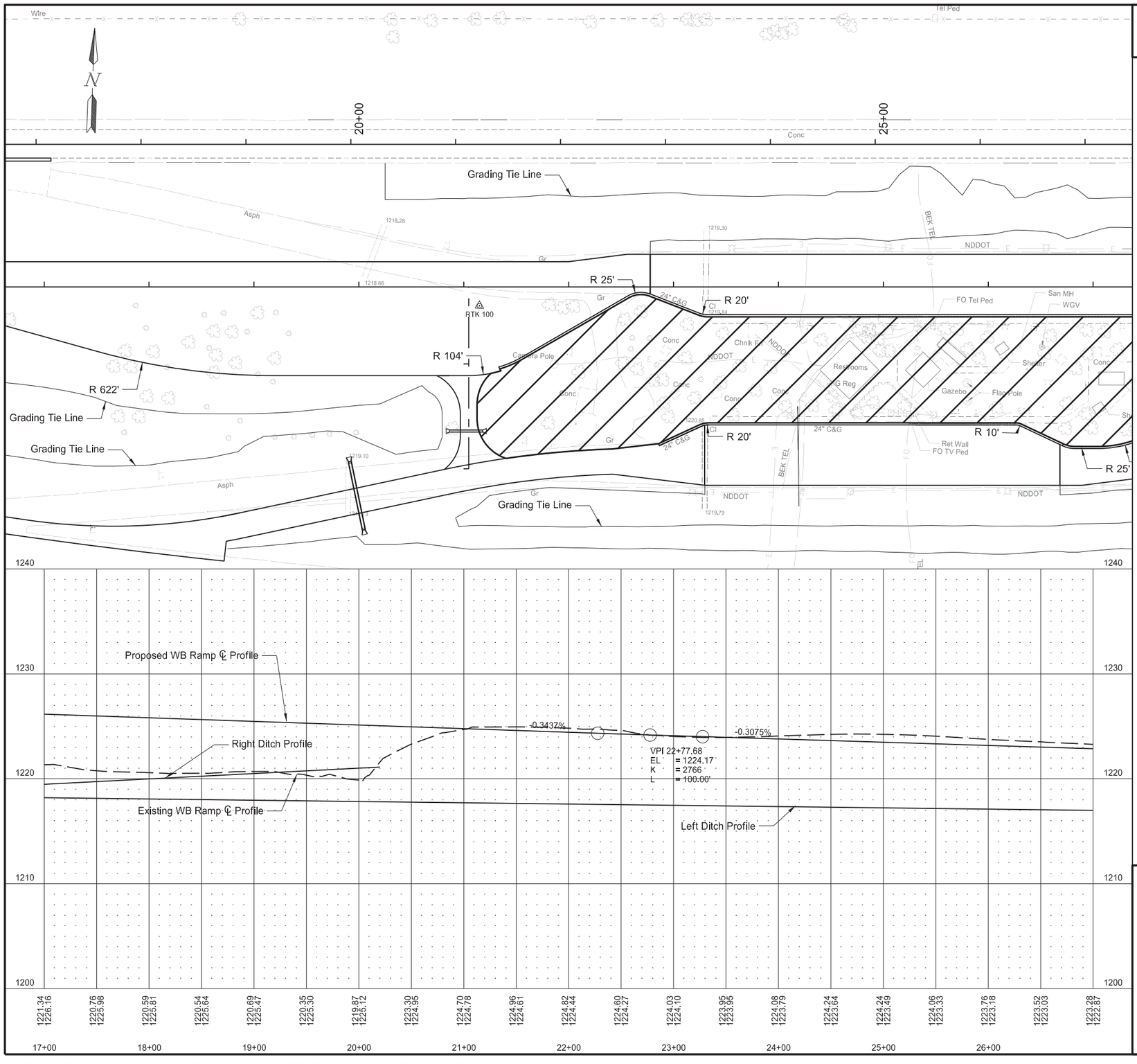
Plan and Profile
Westbound Ramps

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	60	3



Rest Area Building Project
PCN 23501 - Constructed by Others

Plan and Profile
Westbound Ramps

I-94 Oriska Rest Area

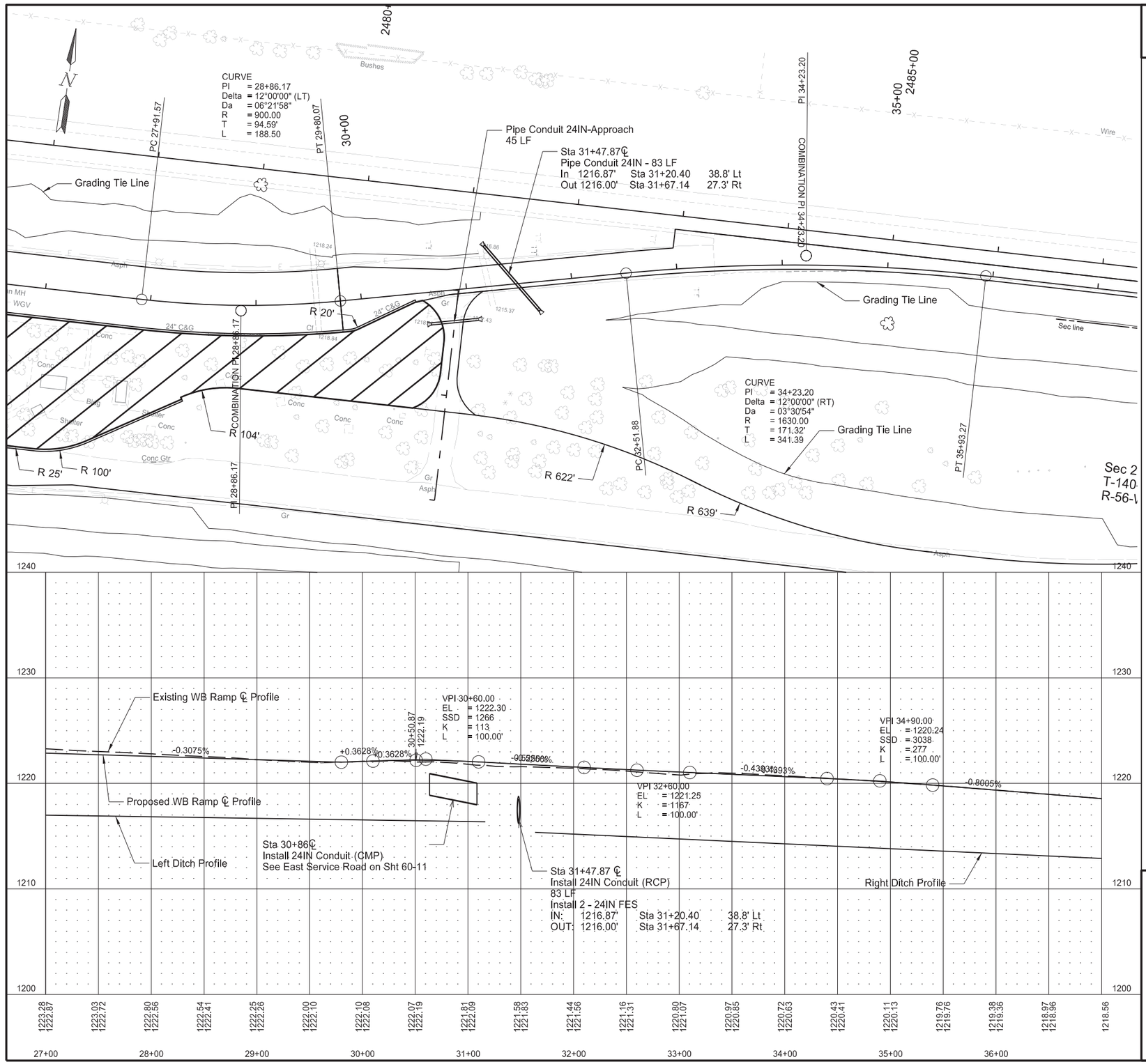
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	60	4

SPEC	CODE	BID ITEM	QTY	UNIT
714	4105	PIPE CONDUIT 24IN WB Sta 31+48 ℄	83	LF
714	4106	PIPE CONDUIT 24IN-APPROACH WB Sta 30+86 Rt	45	LF



Rest Area Building Project
PCN 23501 - Constructed by Others

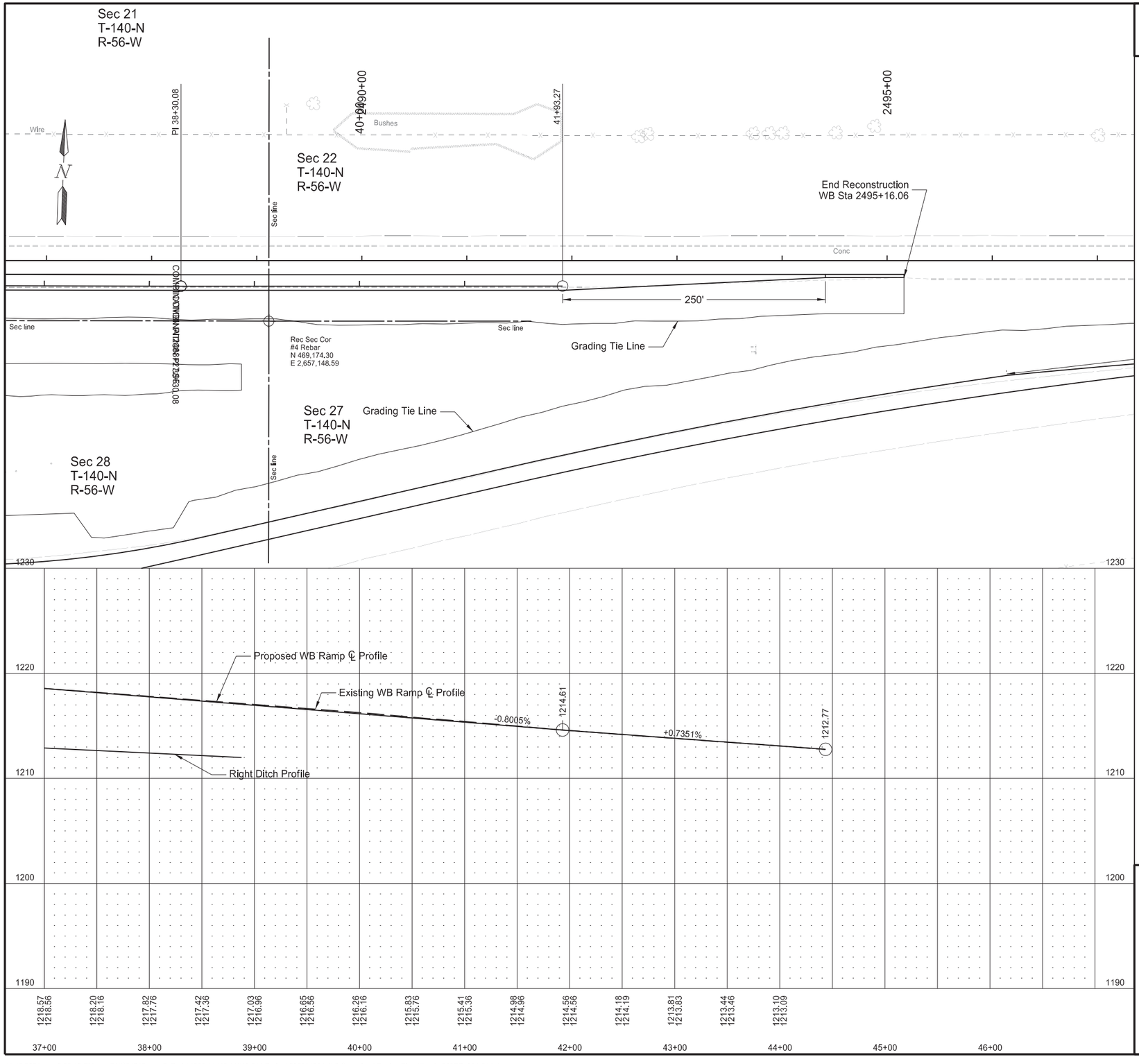
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ND	IM-2-094(198)304	60	5



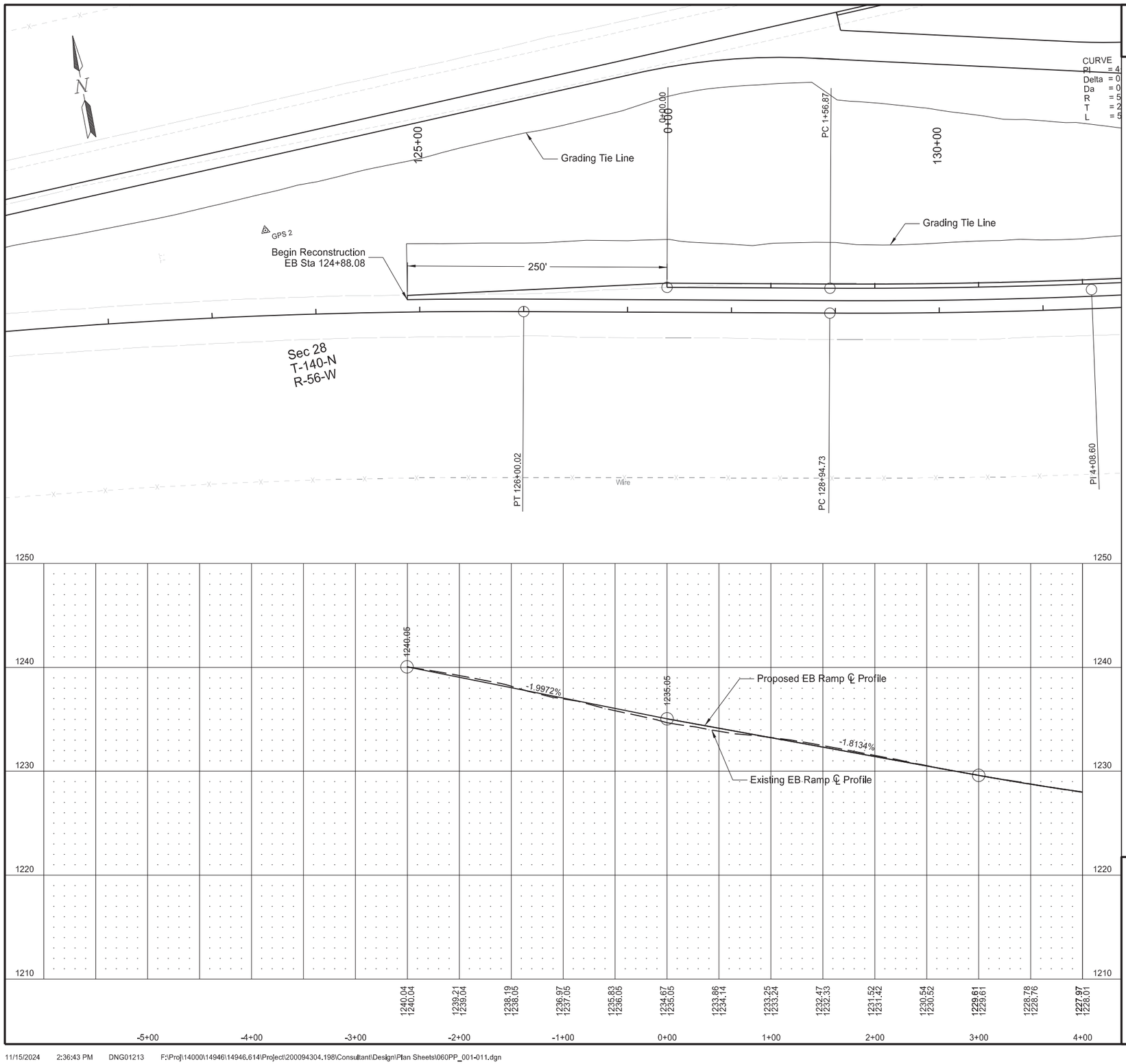
Plan and Profile
Westbound Ramps

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	60	6



Plan and Profile
Eastbound Ramps

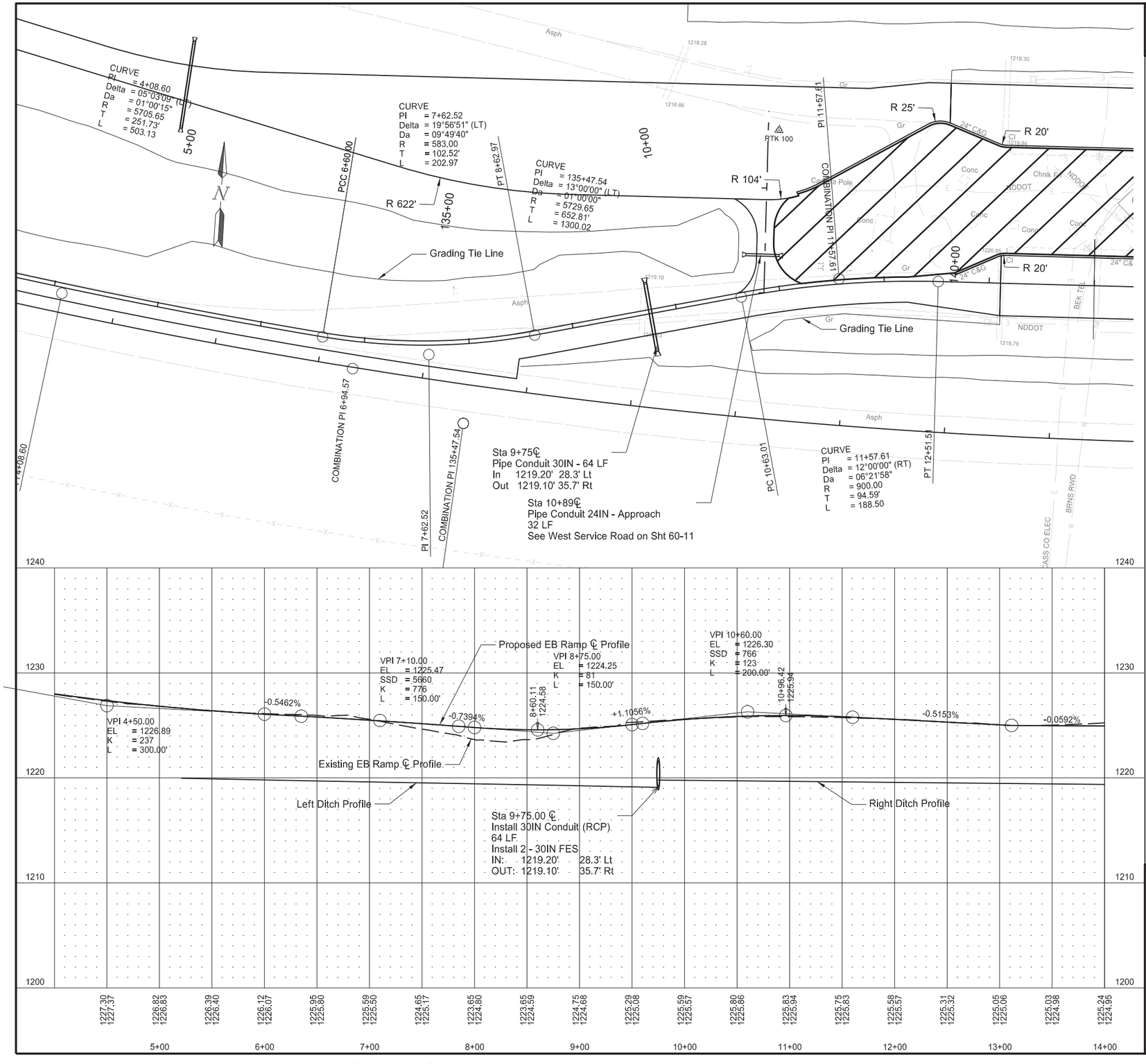
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	60	7

SPEC	CODE	BID ITEM	QTY	UNIT
714	4110	PIPE CONDUIT 30IN EB Sta 9+75 ℄	64	LF
714	4106	PIPE CONDUIT 24IN-APPROACH EB Sta 10+89 Lt	32	LF



Rest Area Building Project
PCN 23501 - Constructed by Others

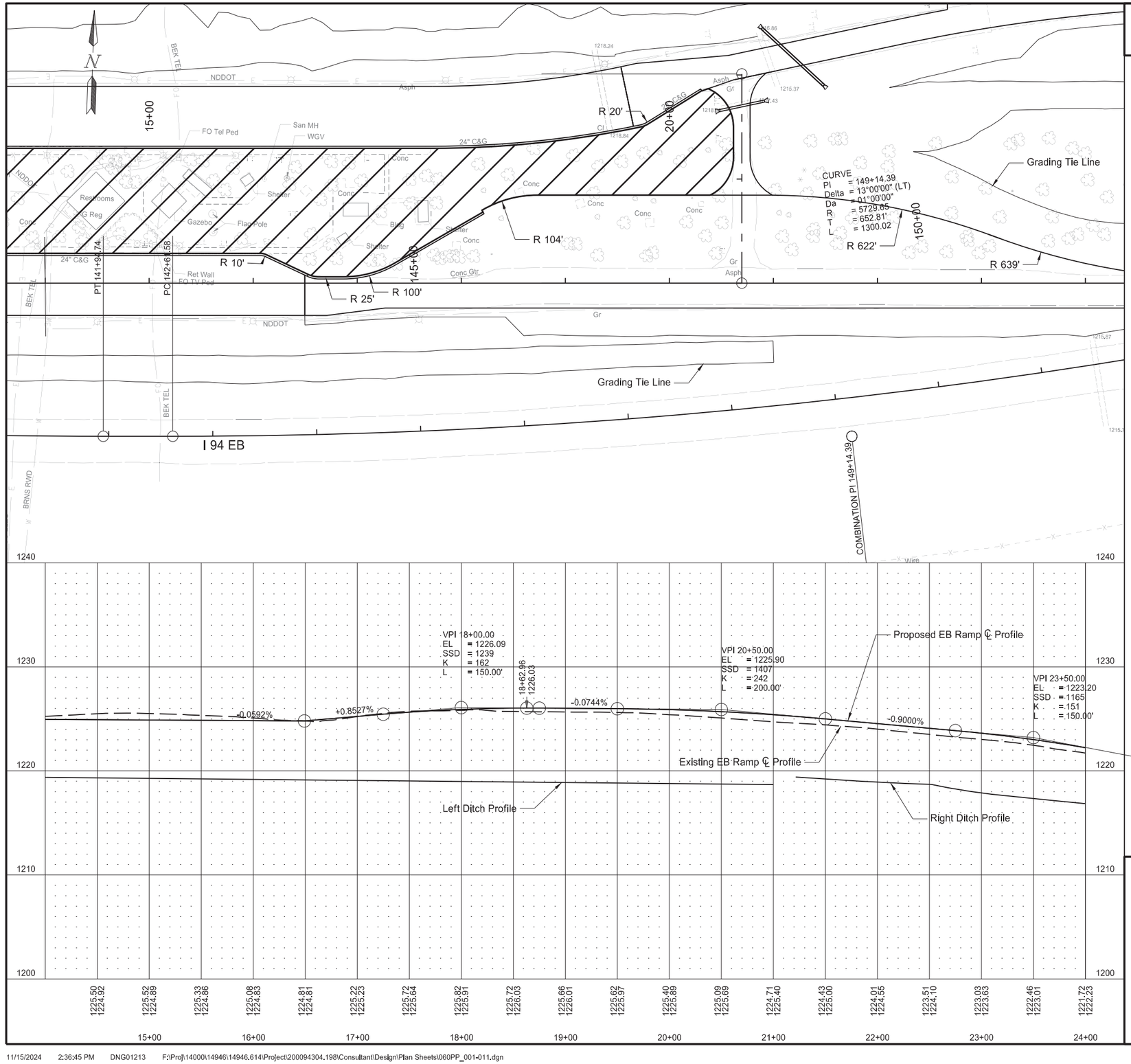
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ND	IM-2-094(198)304	60	8



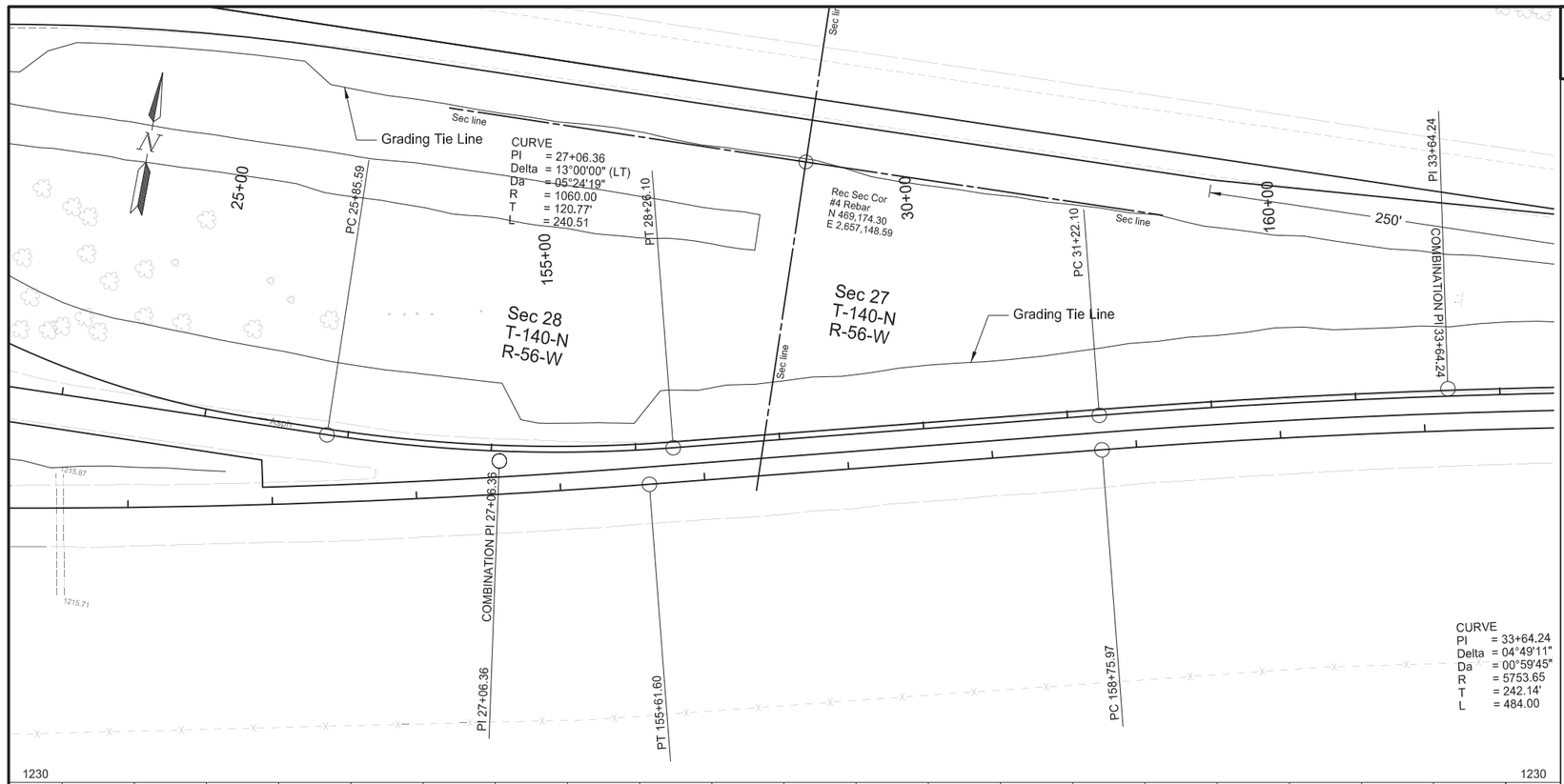
Rest Area Building Project
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	60	9

Plan and Profile
Eastbound Ramps

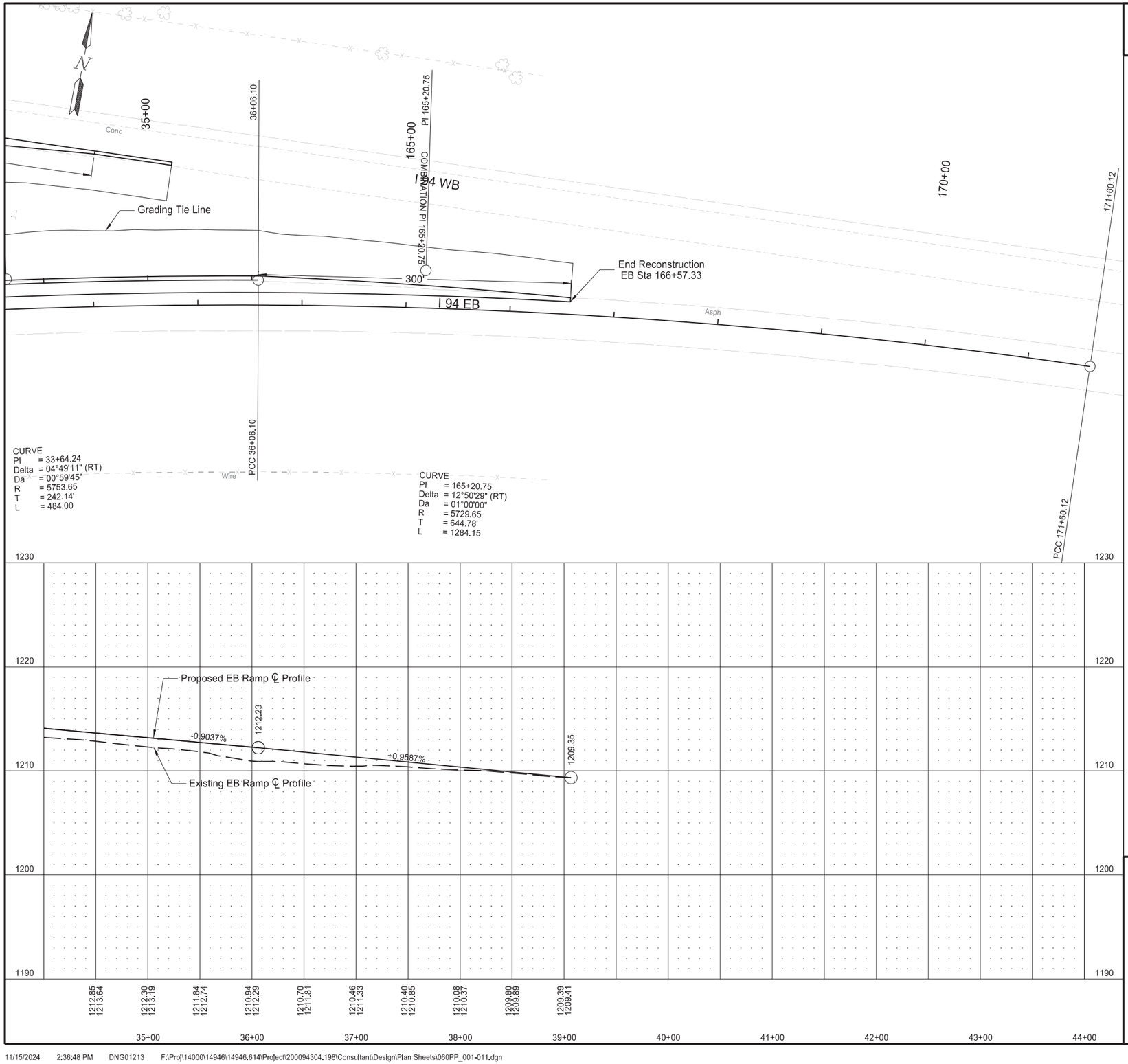
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ND	IM-2-094(198)304	60	10

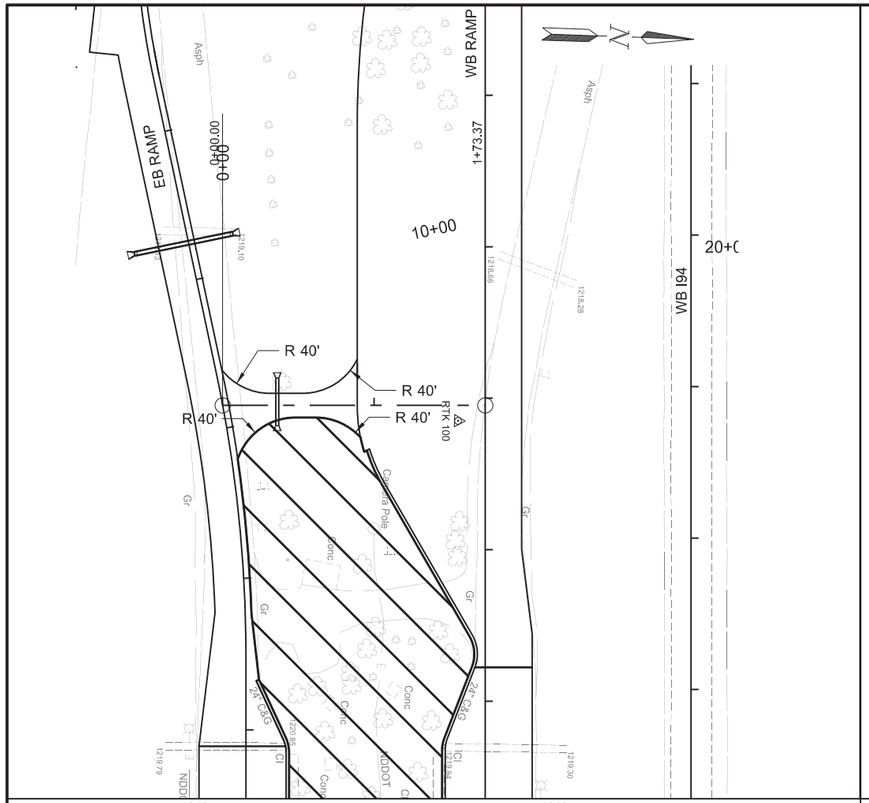


Plan and Profile
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EB RAMP
WB RAMP
WB I94
0+00.00
0+00
1+73.37
10+00
20+0
R 40'
R 40'
R 40'
R 40'
RTK 100
Asph
Conc
Gr
Gravel
Cl
Cl
Cl

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	75	1

Wetland Impact Table

Wetland Number	Location	Wetland Type	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impact		
					Wetland Impacts Acre(s)		
					Temp.	Perm. (Fill/Drain)	Perm. (Cut)
1a	Sec 28, T140N, R56W	Ditch	Created	N	0.39	0.07	0.06
1b	Sec 28, T140N, R56W	Ditch	Created	N	0.36	0.02	0.48
2a	Sec 28, T140N, R56W	Ditch	Created	N	0.00	0.11	0.00
2b	Sec 28, T140N, R56W	Ditch	Created	N	0.00	0.02	0.58
2c	Sec 28, T140N, R56W	Ditch	Created	N	0.12	0.03	0.21
				Totals	**0.87**	**0.25**	**1.33**

[1] A wetland Jurisdictional Determination was issued by the USACE on 3/28/2024; NWO-2024-00426-BIS.

Impact Summary Table

Permanent Impact Summary		Temporary Impacts and additional information	
Wetland Type	**Total Acre(s)**	**WaterType**	**Total Acre(s)**
Natural/JD (Fill/Drain)	0.000	**Wetland JD Temporary**	0.000
Natural/Non-JD (Fill/Drain)	0.000	**Non-JD Wetland Temporary**	0.870
Artificial/JD (Fill/Drain)	0.000		
Artificial /Non-JD (Fill/Drain))	0.250	**Permanent OW**	0.000
Total	**0.250**	**Temporary OW**	0.000
JD Natural (Cut)	0.000	**Permanent OW-d**	0.000
JD Artificial (Cut)	0.000	**Temporary OW-d**	0.000
Non-JD Natural (Cut)	0.000		
Non-JD Artificial (Cut)	1.330		
Total	**1.330**		

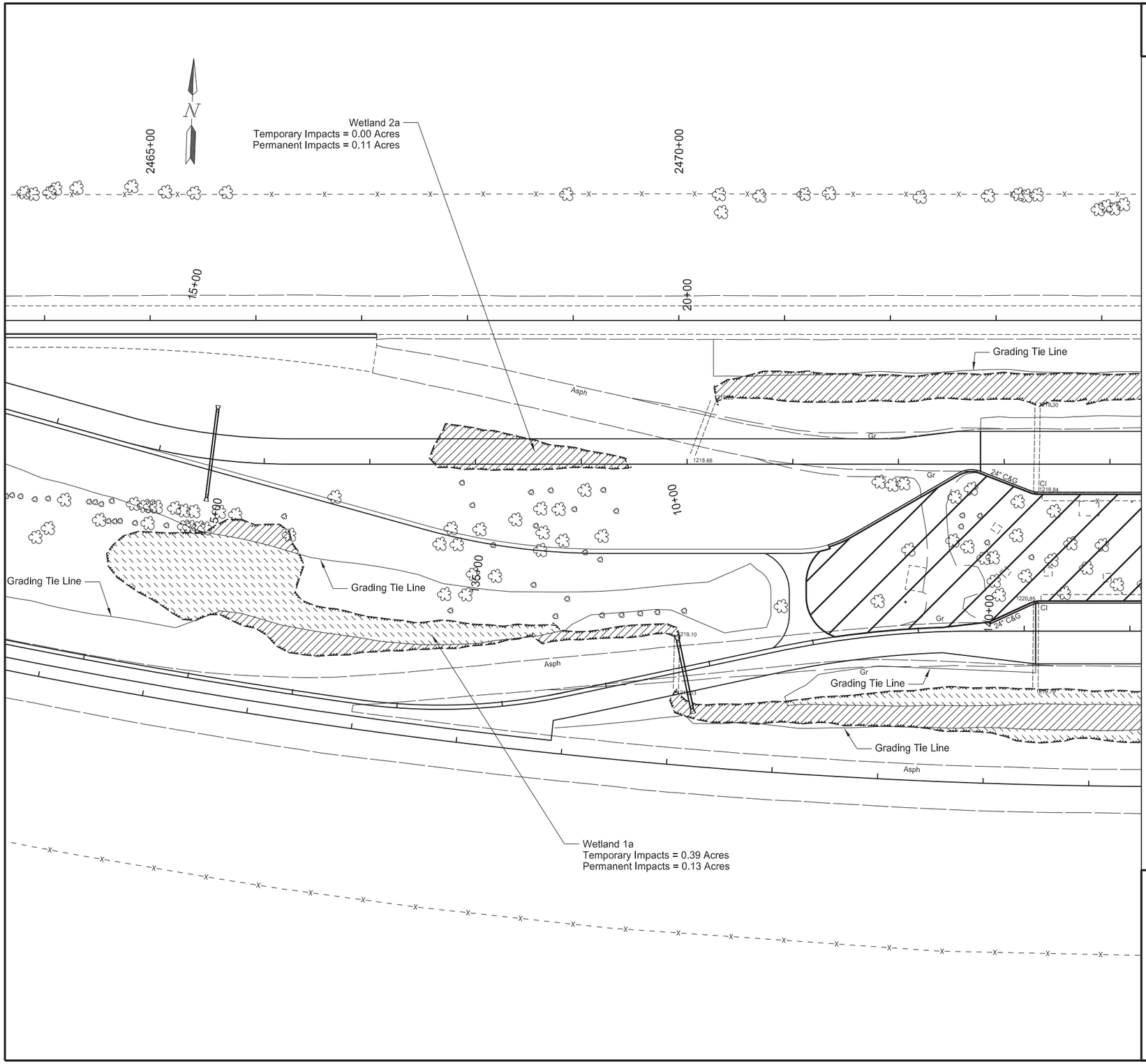
Wetland Impact Tables

I-94 Oriska Rest Area

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	ND	IM-2-094(198)304	75	2



Permanent Wetland Impact

Temporary Wetland Impact

Rest Area Building Project
PCN 23501 - Constructed by Others

Wetland Impacts

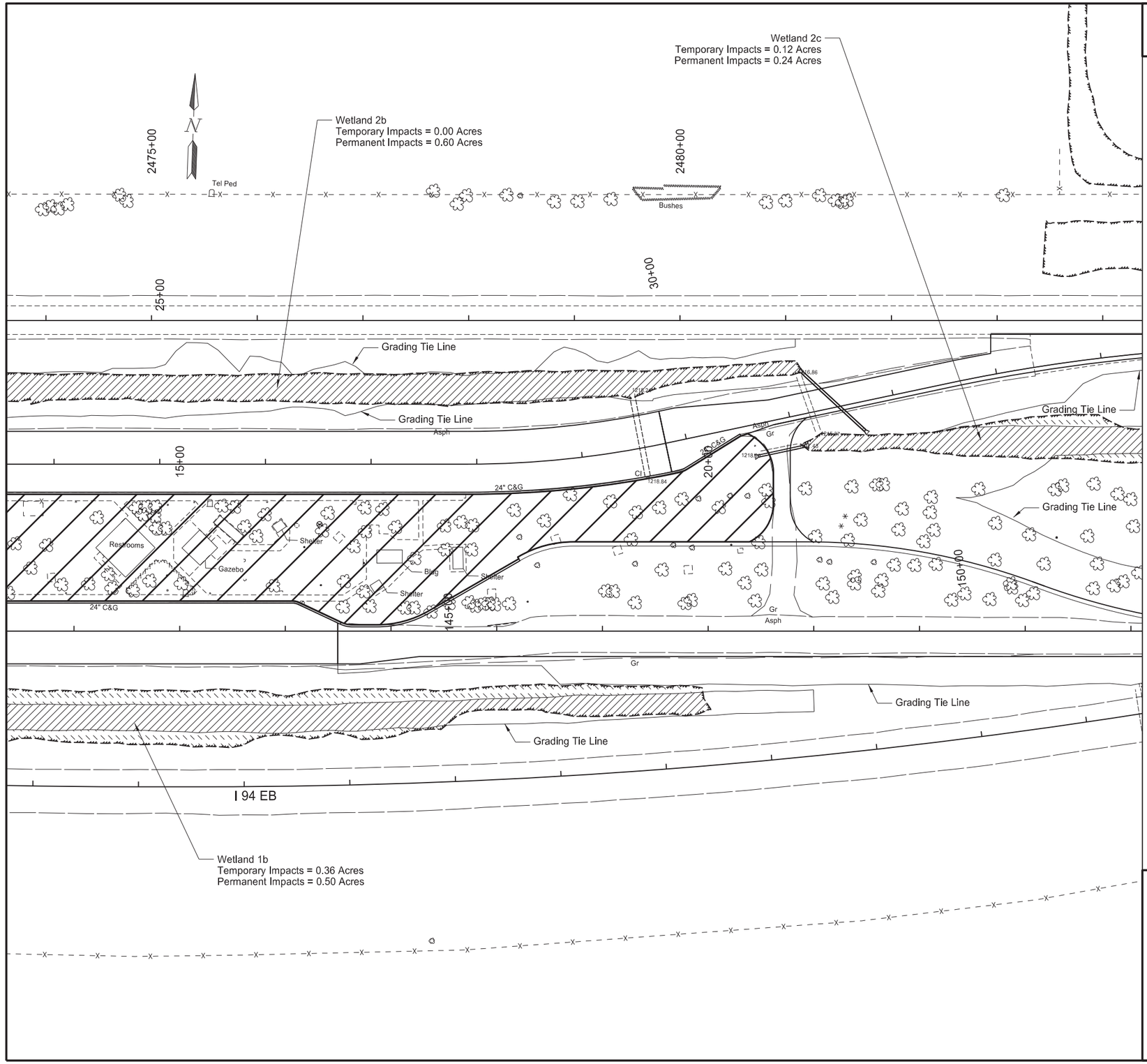
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	ND	IM-2-094(198)304	75	3



Permanent Wetland Impact

Temporary Wetland Impact

Rest Area Building Project
PCN 23501 - Constructed by Others

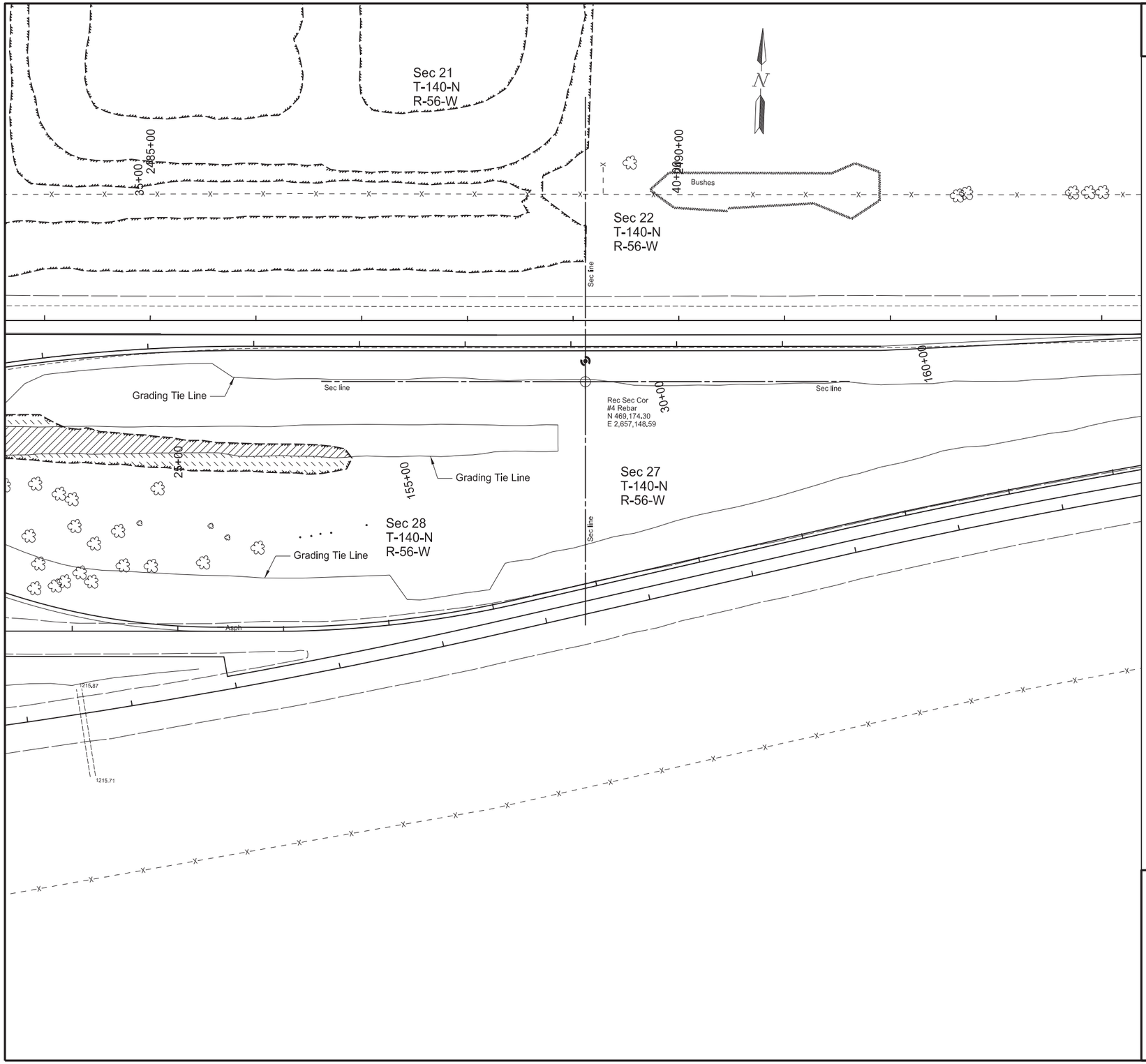
Wetland Impacts

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	ND	IM-2-094(198)304	75	4



Permanent Wetland Impact

Temporary Wetland Impact

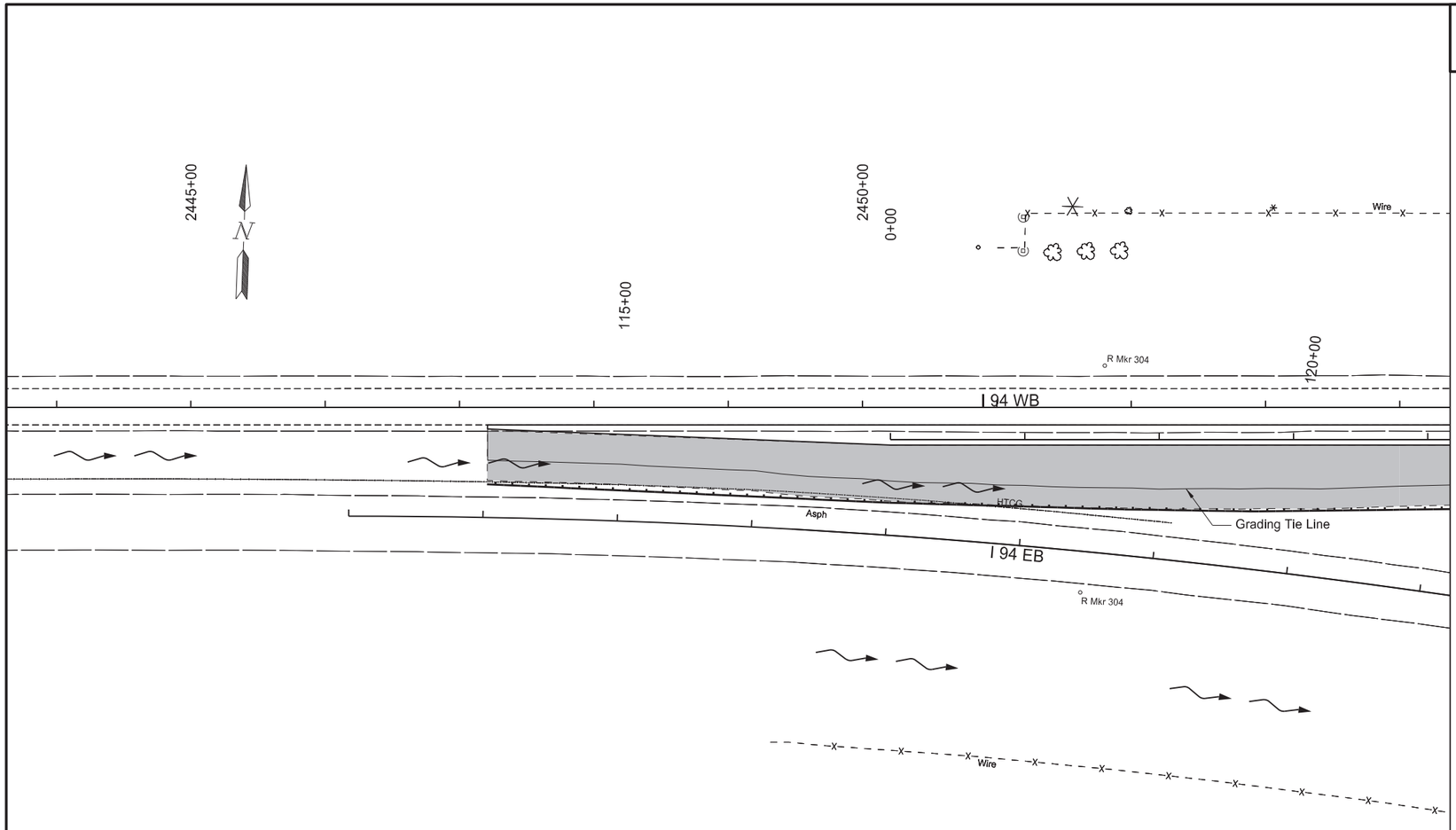
Wetland Impacts

I-94 Oriska Rest Area

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	76	1



SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	0.68	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	0.68	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	681	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	681	LF

Fiber Rolls 12IN

Temporary Cover Crop, Soil Stabilization

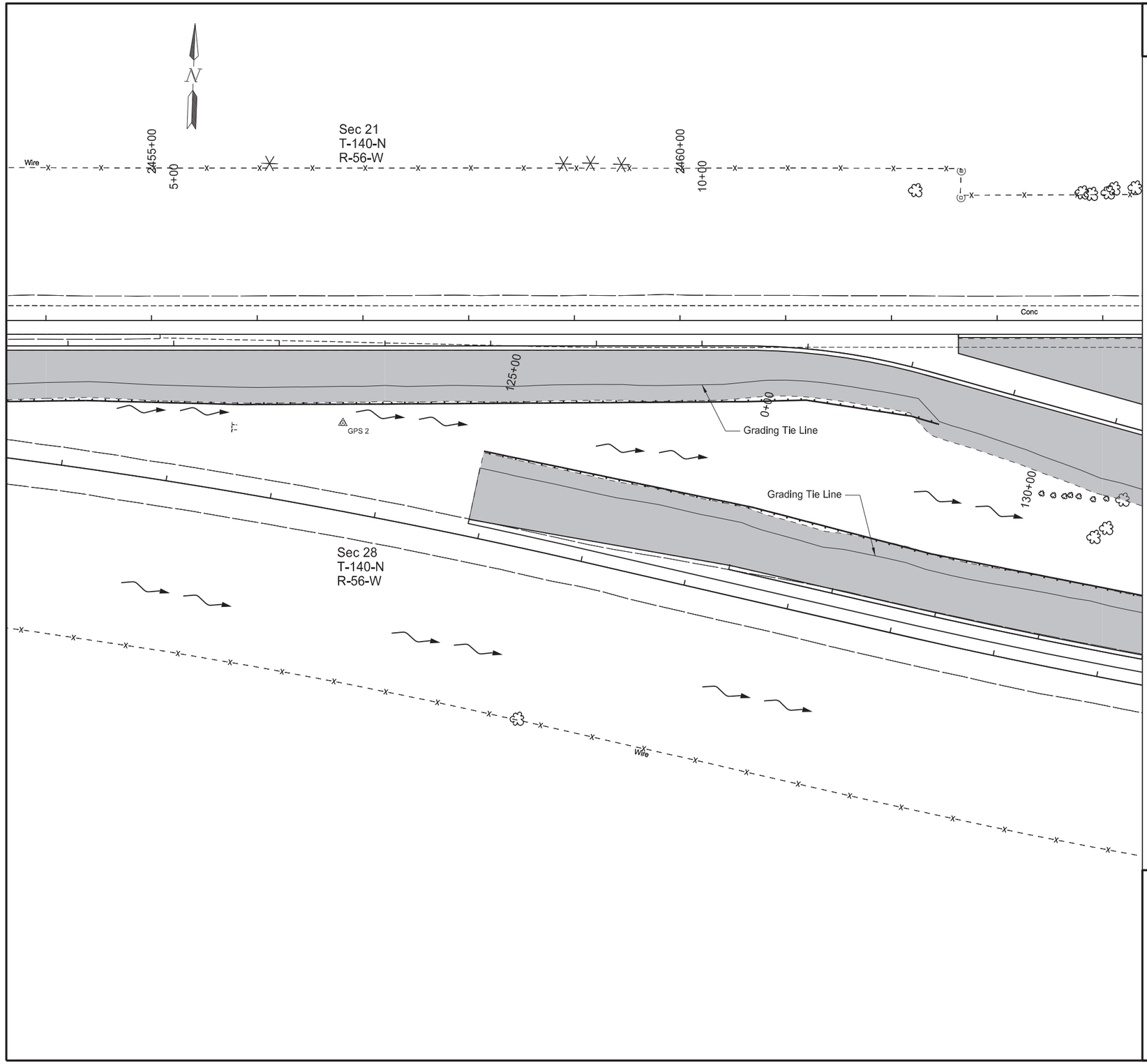
Temporary Erosion Control

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	76	2



SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		EB Sta 3+79 Rt to Sta 13+88 Rt	1.13	ACRE
		EB Sta 12+36 Lt to Sta 13+88 Lt	0.11	ACRE
		WB Sta 124+88 Lt to Sta 127+38 Lt	0.80	ACRE
253	0061	SOIL STABILIZATION		
		EB Sta 3+79 Rt to Sta 13+88 Rt	1.13	ACRE
		EB Sta 12+36 Lt to Sta 13+88 Lt	0.11	ACRE
		WBSta 0+00 Lt to Sta 3+63 Lt	0.80	ACRE
261	0112	FIBER ROLLS 12IN		
		EB Sta 3+79 to Sta 12+40 48' to 56' Rt	848	LF
		WB Sta 124+88 to Sta 127+38 81' to 87' Lt	600	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		EB Sta 3+79 to Sta 12+40 48' to 56' Rt	848	LF
		WB Sta 124+88 to Sta 127+38 81' to 87' Lt	600	LF

Fiber Rolls 12IN

Temporary Cover Crop, Soil Stabilization

Temporary Erosion Control

I-94 Oriska Rest Area

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ND	IM-2-094(198)304	76	3

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		WB Sta 13+88 Rt to Sta 20+98 Rt	1.09	ACRE
		WB Sta 13+88 Lt to Sta 23+93 Lt	2.06	ACRE
		WB Sta 21+13 Rt to Sta 23+37 Rt	0.34	ACRE
		EB Sta 3+63 Lt to Sta 10+86 Lt	1.32	ACRE
		EB Sta 8+40 Rt to Sta 13+74 Rt	0.93	ACRE
		EB Sta 11+00 Lt to Sta 12+87 Lt	0.19	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 13+88 Rt to Sta 20+98 Rt	1.09	ACRE
		WB Sta 13+88 Lt to Sta 23+93 Lt	2.06	ACRE
		WB Sta 21+13 Rt to Sta 23+37 Rt	0.34	ACRE
		EB Sta 3+63 Lt to Sta 10+86 Lt	1.32	ACRE
		EB Sta 8+40 Rt to Sta 13+74 Rt	0.93	ACRE
		EB Sta 11+00 Lt to Sta 12+87 Lt	0.19	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 20+20 to Sta 20+80 48' to 124' Rt	69	LF
		WB Sta 18+36 42' Lt to 89' Lt	47	LF
		WB Sta 21+17 40' Lt to 91' Lt	51	LF
		EB Sta 3+63 to Sta 4+92 59' to 60' Lt	141	LF
		EB Sta 9+77 to Sta 10+70 51' to 61' Lt	94	LF
		EB Sta 11+95 to Sta 12+03 40' Rt to 115' Rt	76	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		WB Sta 20+20 to Sta 20+80 48' to 124' Rt	69	LF
		WB Sta 18+36 42' Lt to 89' Lt	47	LF
		WB Sta 21+17 40' Lt to 91' Lt	51	LF
		EB Sta 3+63 to Sta 4+92 59' to 60' Lt	141	LF
		EB Sta 9+77 to Sta 10+70 51' to 61' Lt	94	LF
		EB Sta 11+95 to Sta 12+03 40' Rt to 115' Rt	76	LF

Fiber Rolls 12IN

Temporary Cover Crop, Soil Stabilization

Rest Area Building Project
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	76	4

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		WB Sta 23+93 Lt to Sta 33+01 Lt	1.50	ACRE
		WB Sta 30+37 Rt to Sta 30+75 Rt	0.05	ACRE
		WB Sta 30+84 Rt to Sta 34+01 Rt	0.42	ACRE
		EB Sta 13+74 Rt to Sta 23+73 Rt	2.00	ACRE
		EB Sta 16+50 Lt to Sta 20+62 Lt	0.28	ACRE
		EB Sta 20+78 Lt to Sta 23+73 Lt	0.62	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 23+93 Lt to Sta 33+01 Lt	1.50	ACRE
		WB Sta 30+37 Rt to Sta 30+75 Rt	0.05	ACRE
		WB Sta 30+84 Rt to Sta 34+01 Rt	0.42	ACRE
		EB Sta 13+74 Rt to Sta 23+73 Rt	2.00	ACRE
		EB Sta 16+50 Lt to Sta 20+62 Lt	0.28	ACRE
		EB Sta 20+78 Lt to Sta 23+73 Lt	0.62	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 23+96 46' Lt to 95' Lt	49	LF
		WB Sta 26+77 41' Lt to 99' Lt	58	LF
		WB Sta 29+65 to Sta 29+77 37' RT to 86' Rt	50	LF
		WB Sta 32+30 to Sta 33+97 39' to 52' Rt	164	LF
		EB Sta 14+19 45' Rt to 121' Rt	76	LF
		EB Sta 16+34 42' Rt to 118' Rt	76	LF
		EB Sta 18+48 44' Rt to 102' Rt	58	LF
		EB Sta 20+64 38' Rt to 89' Rt	51	LF
		EB Sta 22+79 32' Rt to 73' Rt	41	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		WB Sta 23+96 46' Lt to 95' Lt	49	LF
		WB Sta 26 +77 41' Lt to 99' Lt	58	LF
		WB Sta 29+65 to Sta 29+77 37' Rt to 86' Rt	50	LF
		WB Sta 32+30 to Sta 33+97 39' to 52' Rt	164	LF
		EB Sta 14+19 45' Rt to 121' Rt	76	LF
		EB Sta 16+34 42' Rt to 118' Rt	76	LF
		EB Sta 18+48 44' Rt to 102' Rt	58	LF
		EB Sta 20+64 38' Rt to 89' Rt	51	LF
		EB Sta 22+79 32' Rt to 73' Rt	41	LF

Fiber Rolls 12IN

Temporary Cover Crop, Soil Stabilization

Rest Area Building Project
PCN 23501 - Constructed by Others

Temporary Erosion Control

I-94 Oriska Rest Area

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	76	5

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		WB Sta 34+01 Rt to Sta 44+02 Rt	1.57	ACRE
		EB Sta 23+73 Rt to Sta 25+46 Rt	0.12	ACRE
		EB Sta 23+73 Lt to Sta 29+08 Lt	0.27	ACRE
		EB Sta 23+73 Lt to Sta 33+88 Lt	1.35	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 34+01 Rt to Sta 44+02 Rt	1.57	ACRE
		EB Sta 23+73 Rt to Sta 25+46 Rt	0.12	ACRE
		EB Sta 23+73 Lt to Sta 29+08 Lt	0.27	ACRE
		EB Sta 23+73 Lt to Sta 33+88 Lt	1.35	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 33+97 to Sta 43+99 35' to 56' Rt	1006	LF
		EB Sta 27+09 to Sta 34+00 49' to 71' Lt	691	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		WB Sta 33+97 to Sta 43+99 35' to 56' Rt	1006	LF
		EB Sta 27+09 to Sta 34+00 49' to 71' Lt	691	LF

Fiber Rolls 12IN

Temporary Cover Crop, Soil Stabilization

Temporary Erosion Control

I-94 Oriska Rest Area

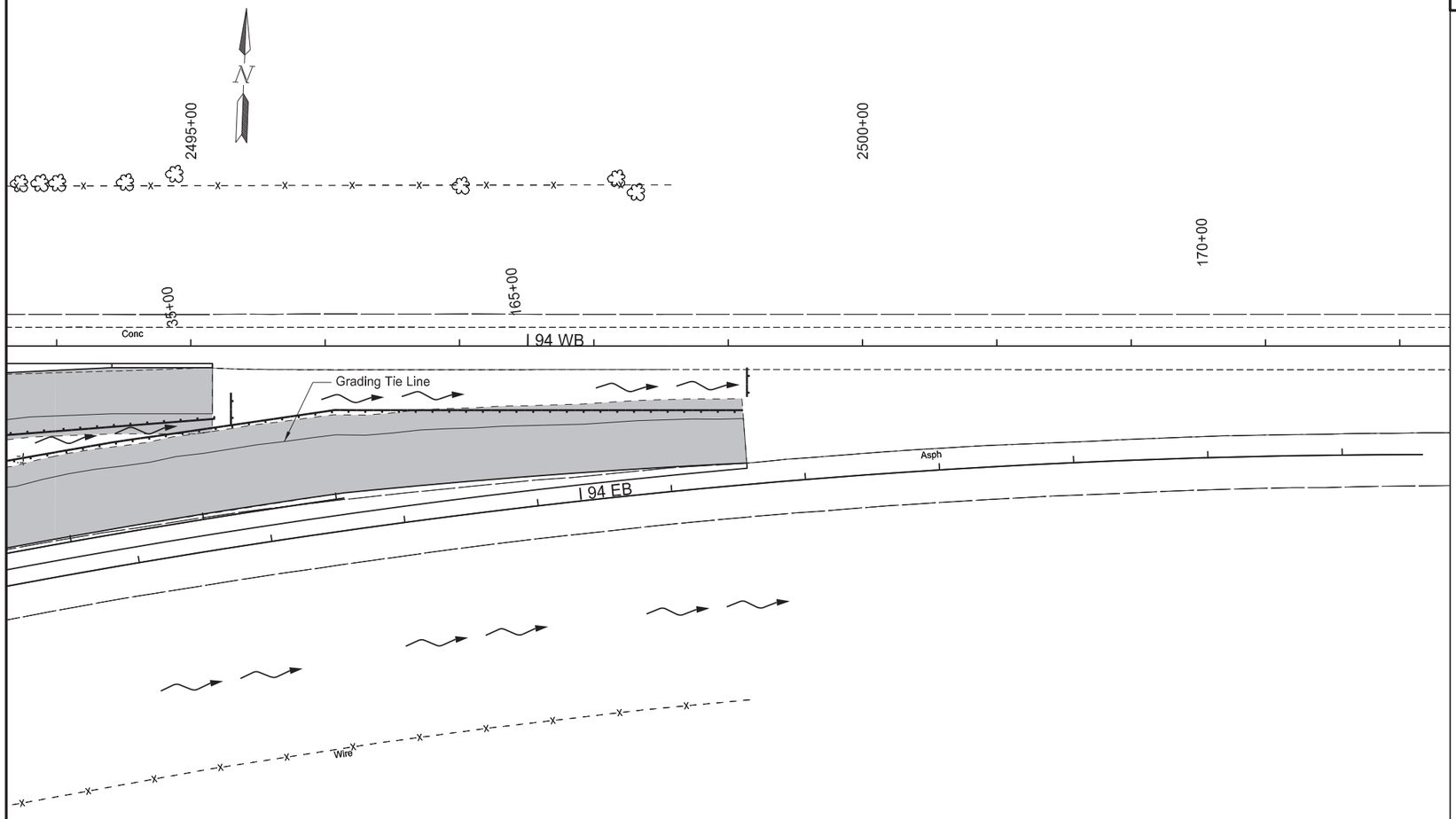
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	76	6

SPEC	CODE	BID ITEM	QTY	UNIT
251	2000	TEMPORARY COVER CROP		
		WB Sta 44+02 Rt to Sta 45+19 Rt	0.14	ACRE
		EB Sta 33+88 Lt to Sta 39+07 Lt	0.67	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 44+02 Rt to Sta 45+19 Rt	0.14	ACRE
		EB Sta 33+88 Lt to Sta 39+07 Lt	0.67	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 44+00 to Sta 45+19 42' to 50' Rt	120	LF
		EB Sta 34+00 to Sta 39+05 43' to 68' Lt	515	LF
261	0113	REMOVE FIBER ROLLS 12IN		
		WB Sta 44+00 to Sta 45+19 42' to 50' Rt	120	LF
		EB Sta 34+00 to Sta 39+05 43' to 68' Lt	515	LF



Fiber Rolls 12IN

Temporary Cover Crop, Soil Stabilization

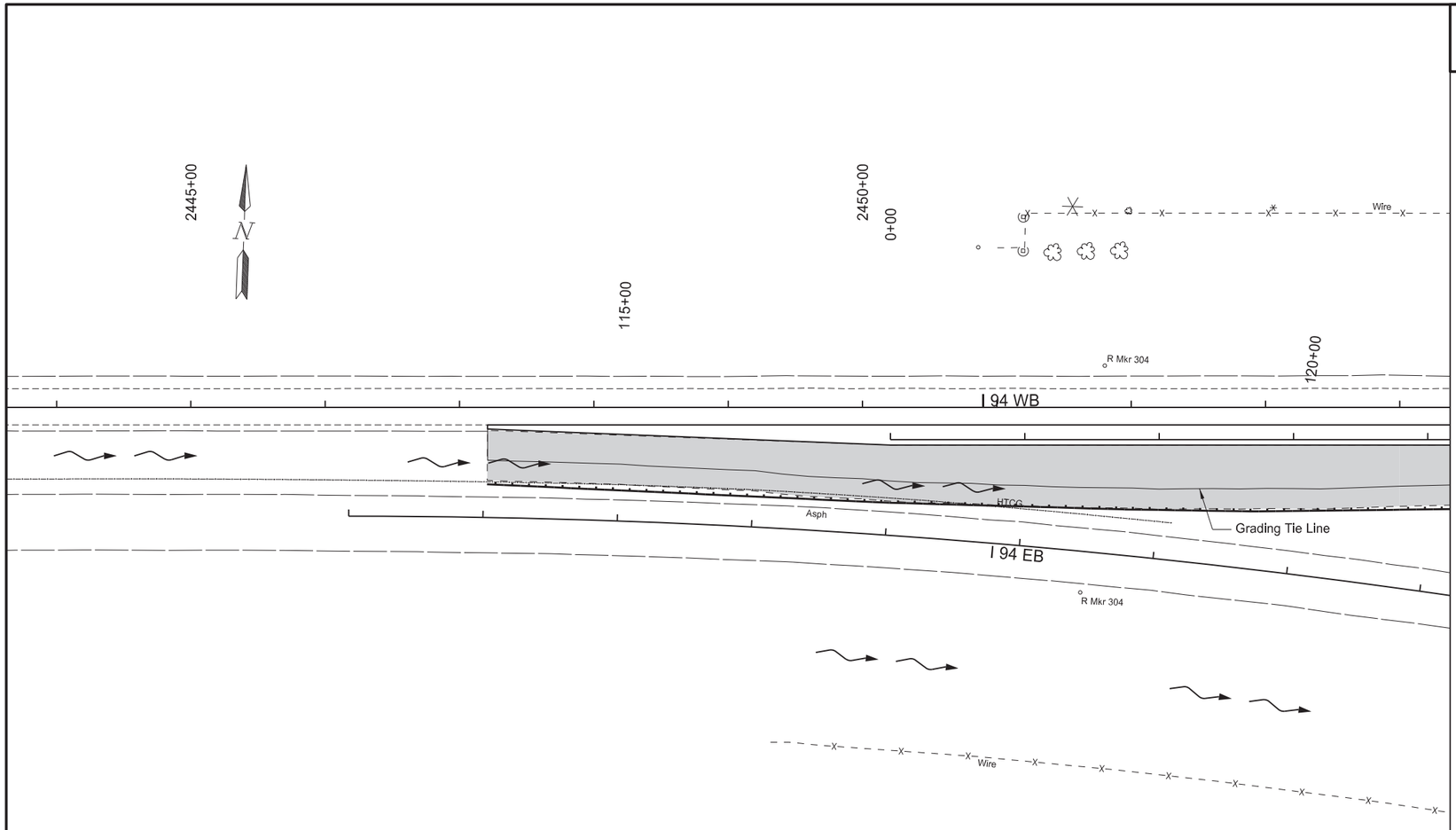
Temporary Erosion Control

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	77	1



SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	0.68	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	0.68	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 2447+21 Rt to Sta 2454+00 Rt	681	LF

Fiber Rolls 12IN

Seeding Class II, Soil Stabilization

Permanent Erosion Control

I-94 Oriska Rest Area

Ramp Improvements
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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	77	2

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		WB Sta 3+79 Rt to Sta 13+88 Rt	1.13	ACRE
		WB Sta 12+36 Lt to Sta 13+88 Lt	0.11	ACRE
		EB Sta 124+88 Lt to Sta 127+38 Lt	0.80	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 3+79 Rt to Sta 13+88 Rt	1.13	ACRE
		WB Sta 12+36 Lt to Sta 13+88 Lt	0.11	ACRE
		EB Sta 124+88 Lt to Sta 127+38 Lt	0.80	ACRE
261	0112	FIBER ROLLS 12IN		
		EB Sta 3+79 to Sta 12+40 48' to 56' Rt	848	LF
		WB Sta 124+88 to Sta 127+38 81' to 87' Lt	600	LF

Fiber Rolls 12IN

Seeding Class II, Soil Stabilization

Permanent Erosion Control

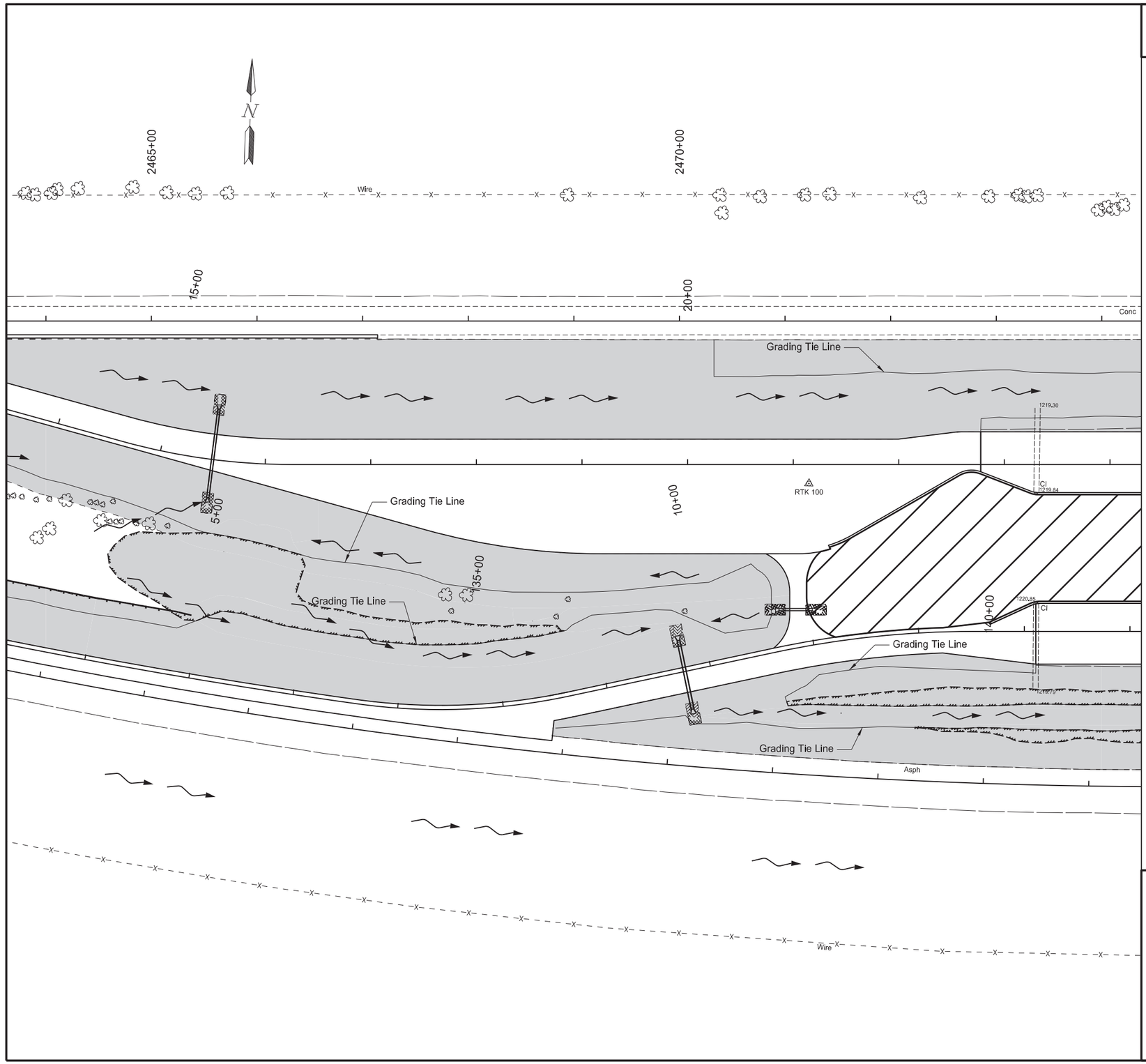
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
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Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	77	3



SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		WB Sta 13+88 Rt to Sta 20+98 Rt	1.09	ACRE
		WB Sta 13+88 Lt to Sta 23+93 Lt	2.06	ACRE
		WB Sta 21+13 Rt to Sta 23+37 Rt	0.34	ACRE
		EB Sta 3+63 Lt to Sta 10+86 Lt	1.32	ACRE
		EB Sta 8+40 Rt to Sta 13+74 Rt	0.93	ACRE
		EB Sta 11+00 Lt to Sta 12+87 Lt	0.19	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 13+88 Rt to Sta 20+98 Rt	1.09	ACRE
		WB Sta 13+88 Lt to Sta 23+93 Lt	2.06	ACRE
		WB Sta 21+13 Rt to Sta 23+37 Rt	0.34	ACRE
		EB Sta 3+63 Lt to Sta 10+86 Lt	1.32	ACRE
		EB Sta 8+40 Rt to Sta 13+74 Rt	0.93	ACRE
		EB Sta 11+00 Lt to Sta 12+87 Lt	0.19	ACRE
255	0102	ECB TYPE 2		
		WB Sta 15+50 46' Lt	22	SY
		WB Sta 15+50 33' Rt	22	SY
		EB Sta 9+75 20' Lt	25	SY
		EB Sta 9+75 39' Rt	25	SY
		EB Sta 10+74 39' Lt	24	SY
		EB Sta 11+04 33' Lt	24	SY
261	0112	FIBER ROLLS 12IN		
		EB Sta 3+63 to Sta 4+92 59' to 60' Lt	141	LF

Fiber Rolls 12IN

Seeding Class II, Soil Stabilization

Rest Area Building Project
PCN 23501 - Constructed by Others

Permanent Erosion Control

I-94 Oriska Rest Area

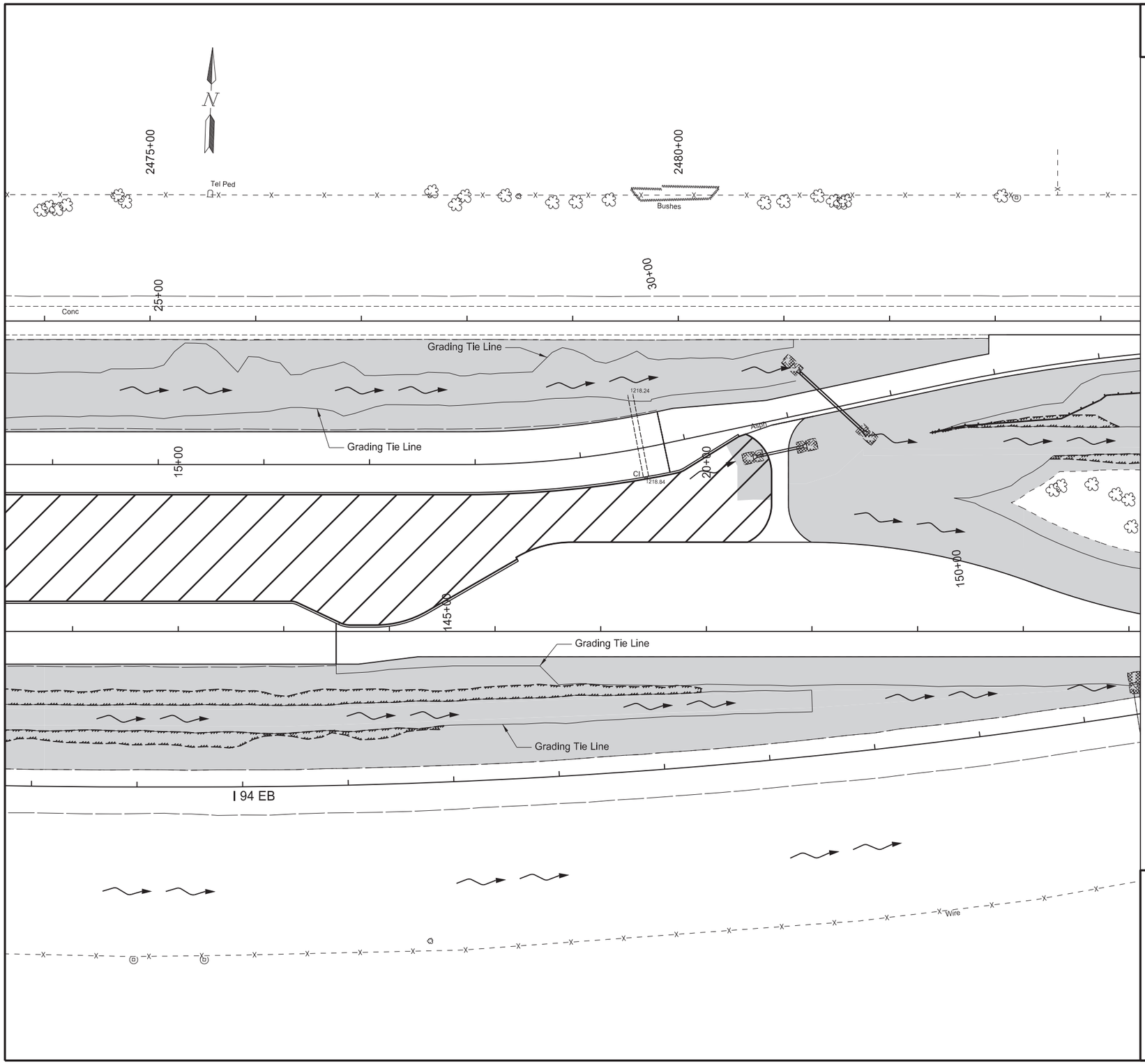
Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

11/15/2024 1:34:02 PM DNG01213 F:\Proj\14000\14946\14946.614\Project\200094304.198\Consultant\Design\Plan Sheets\077PE_001-006.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	77	4

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		WB Sta 23+93 Lt to Sta 33+01 Lt	1.50	ACRE
		WB Sta 30+37 Rt to Sta 30+75 Rt	0.05	ACRE
		WB Sta 30+84 Rt to Sta 34+01 Rt	0.42	ACRE
		EB Sta 13+74 Rt to Sta 23+73 Rt	2.00	ACRE
		EB Sta 16+50 Lt to Sta 20+62 Lt	0.28	ACRE
		EB Sta 20+78 Lt to Sta 23+73 Lt	0.62	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 23+93 Lt to Sta 33+01 Lt	1.50	ACRE
		WB Sta 30+37 Rt to Sta 30+75 Rt	0.05	ACRE
		WB Sta 30+84 Rt to Sta 34+01 Rt	0.42	ACRE
		EB Sta 13+74 Rt to Sta 23+73 Rt	2.00	ACRE
		EB Sta 16+50 Lt to Sta 20+62 Lt	0.28	ACRE
		EB Sta 20+78 Lt to Sta 23+73 Lt	0.62	ACRE
255	0102	ECB TYPE 2		
		WB Sta 30+60 30' Rt	24	SY
		WB Sta 31+12 30' Rt	24	SY
		WB Sta 31+16 46' Lt	22	SY
		WB Sta 31+68 29' Rt	22	SY
261	0112	FIBER ROLLS 12IN		
		WB Sta 32+30 to Sta 33+97 39' to 52' Rt	164	LF



Fiber Rolls 12IN

Seeding Class II, Soil Stabilization

Rest Area Building Project
PCN 23501 - Constructed by Others

Permanent Erosion Control

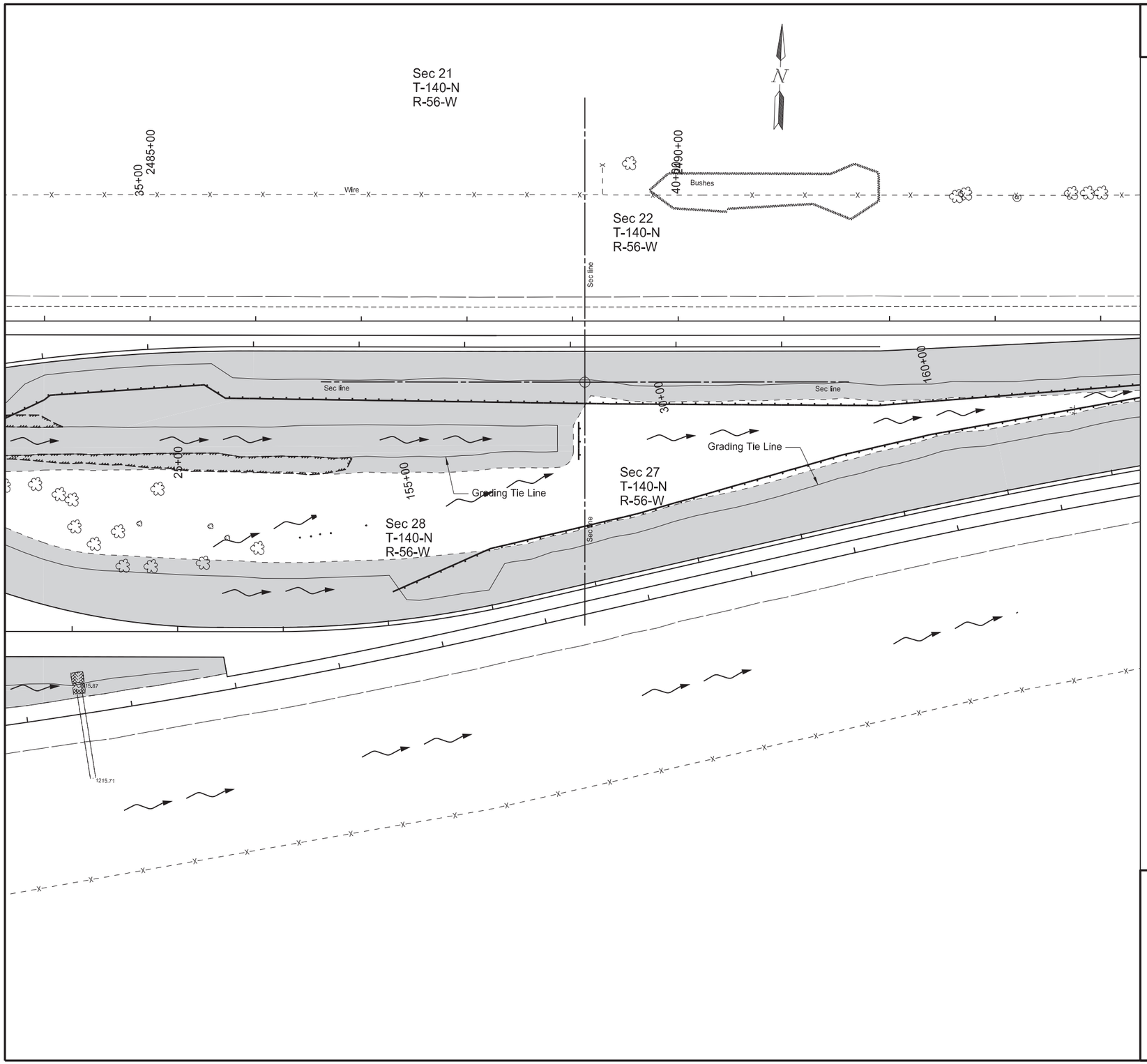
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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Daniel N. Green
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	77	5



SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		WB Sta 34+01 Rt to Sta 44+02 Rt	1.57	ACRE
		EB Sta 23+73 Rt to Sta 25+46 Rt	0.12	ACRE
		EB Sta 23+73 Lt to Sta 29+08 Lt	0.27	ACRE
		EB Sta 23+73 Lt to Sta 33+88 Lt	1.35	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 34+01 Rt to Sta 44+02 Rt	1.57	ACRE
		EB Sta 23+73 Rt to Sta 25+46 Rt	0.12	ACRE
		EB Sta 23+73 Lt to Sta 29+08 Lt	0.27	ACRE
		EB Sta 23+73 Lt to Sta 33+88 Lt	1.35	ACRE
255	0102	ECB TYPE 2		
		EB Sta 24+06 49' Rt	25	SY
261	0112	FIBER ROLLS 12IN		
		WB Sta 33+97 to Sta 43+99 35' to 56' Rt	1006	LF
		EB Sta 27+09 to Sta 34+00 49' to 71' Lt	691	LF

Fiber Rolls 12IN

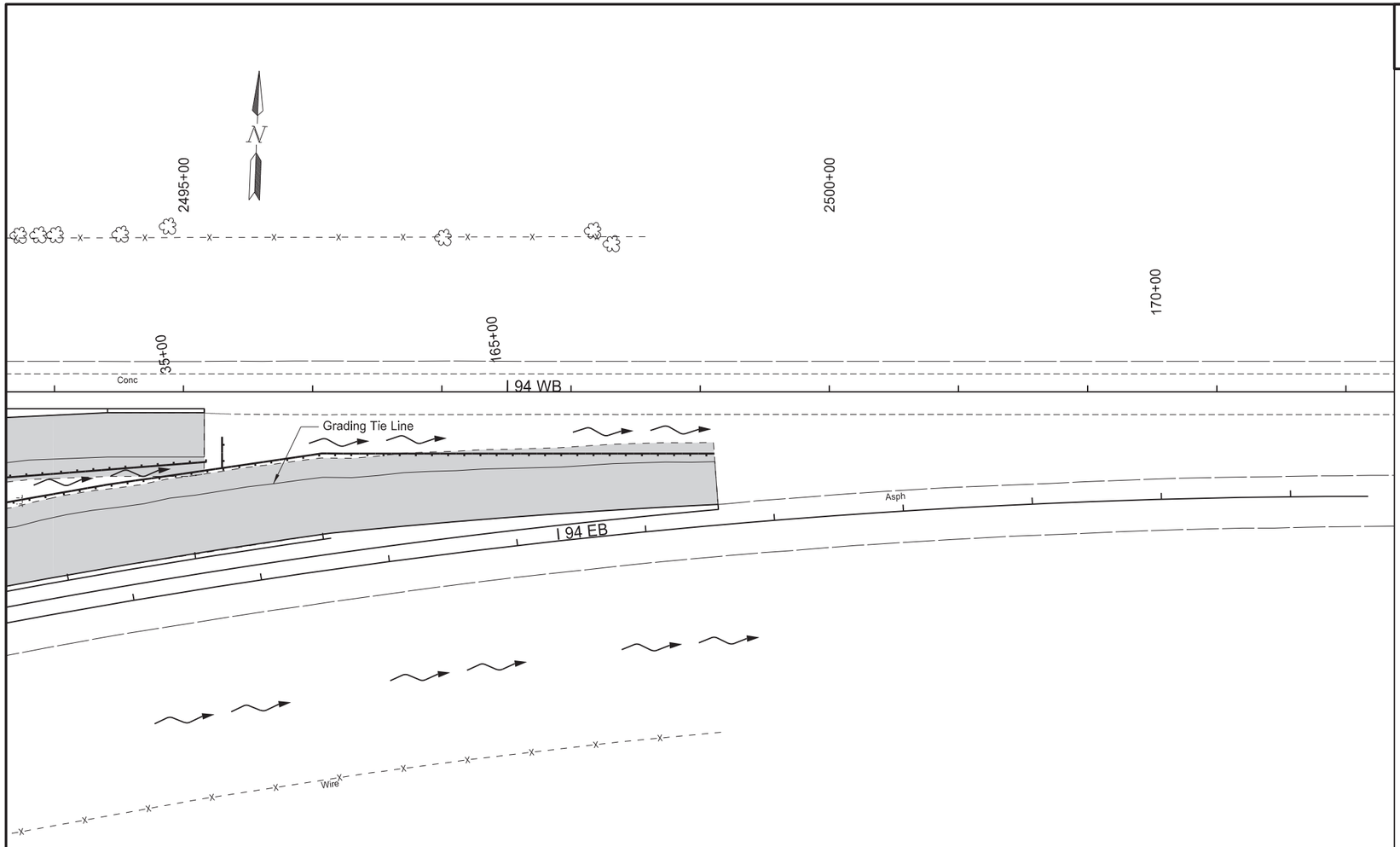
Seeding Class II, Soil Stabilization

Permanent Erosion Control

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	77	6

SPEC	CODE	BID ITEM	QTY	UNIT
251	0200	SEEDING CLASS II		
		WB Sta 44+02 Rt to Sta 45+19 Rt	0.14	ACRE
		EB Sta 33+88 Lt to Sta 39+07 Lt	0.67	ACRE
253	0061	SOIL STABILIZATION		
		WB Sta 44+02 Rt to Sta 45+19 Rt	0.14	ACRE
		EB Sta 33+88 Lt to Sta 39+07 Lt	0.67	ACRE
261	0112	FIBER ROLLS 12IN		
		WB Sta 44+00 to Sta 45+19 42' to 50' Rt	120	LF
		EB Sta 34+00 to Sta 39+05 43' to 68' Lt	515	LF

Fiber Rolls 12IN

Seeding Class II, Soil Stabilization

Permanent Erosion Control

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
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Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - Oriska Rest Area Parking

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	81	1

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
I-94 (Chain: SCL94)			
Begin	102+88.70	469,006.54	2,651,845.61
PI	155+94.27	469,193.79	2,657,147.88
End	208+47.76	469,391.09	2,662,397.66
I-94 WB Exst CL (Chain: OCL WB94)			
Begin, PI	2383+75.66	468,876.63	2,646,616.54
PI	2436+06.15	469,045.52	2,651,844.30
PI	2488+27.95	469,228.39	2,657,062.89
End, PI	2541+65.06	469,429.56	2,662,396.21
I-94 EB Exst CL (Chain: OCL EB94)			
Begin, PC	113+00.00	468,999.98	2,652,857.80
PI	119+52.81	469,022.84	2,653,510.21
PT	126+00.02	468,898.36	2,654,151.02
PC	128+94.73	468,842.16	2,654,440.34
PI	135+47.54	468,717.68	2,655,081.17
PT	141+94.74	468,740.54	2,655,733.58
PC	142+61.58	468,742.88	2,655,800.35
PI	149+14.39	468,765.74	2,656,452.79
PT	155+61.60	468,934.78	2,657,083.34
PC	158+75.97	469,016.18	2,657,386.99
PI	165+20.75	469,183.13	2,658,009.78
End, PT	171+60.12	469,207.50	2,658,654.09

CURVE DATA

ARC DEFINITION	
PCR01 (Chain:OCL EB94)	
PI Sta =	119+52.81
Delta =	13° 00' 00" (RT)
Da =	01° 00' 00"
R =	5729.65'
T =	652.81'
L =	1300.02'
PCR02 (Chain:OCL EB94)	
PI Sta =	135+47.54
Delta =	13° 00' 00" (LT)
Da =	01° 00' 00"
R =	5729.65'
T =	652.81'
L =	1300.02'
PCR03 (Chain:OCL EB94)	
PI Sta =	149+14.39
Delta =	13° 00' 00" (LT)
Da =	01° 00' 00"
R =	5729.65'
T =	652.81'
L =	1300.02'
PCR04 (Chain:OCL EB94)	
PI Sta =	165+20.75
Delta =	12° 50' 29"
Da =	01° 00' 00"
R =	5729.65'
T =	644.78'
L =	1284.15'

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-140-N R-56-W			
SW Sec Cor 22	7-J	469,174.30	2,657,148.59

REFERENCE MARKERS

#	NORTHING	EASTING	STATION	OFFSET	ALIGN
304	469,131.75	2,653,416.50	118+63	70' Lt	SCL94
304	469,061.45	2,653,400.60	118+45	99' Rt	SCL94

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	ALIGNMENT	MONUMENT
PRIMARY CONTROL (SCL94)							
GPS 1	469,270.95	2,659,178.96	1,203.57'	176+27	1' Lt	SCL94	#4 Rebar w/ control cap
GPS 2	469,021.30	2,653,921.23	1,234.47'	123+64	59' Rt	SCL94	#4 Rebar w/ control cap
SECONDARY CONTROL (SCL94)							
RTK 100	469,014.98	2,655,363.99	1,223.15'	133+05	116' Rt	SCL94	#4 Rebar w/ control cap

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

INITIALIZING BENCH MARK OPUS

☒ NAVD-88 ☐ _____

☐ GEOID12B ☐ _____

☒ GEOID18

Date Survey Completed _/_/_

☐ Assumed Coordinates

☒ All coordinates on this sheet are Barnes County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998710

REGISTERED PROFESSIONAL ENGINEER
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PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

NOTES: Sheet 1 of 2

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - Oriska Rest Area Parking

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	81	2

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
I-94 EB Ramps (Chain: EB RA Ramps)			
Begin, PI	0+00.00	468,895.64	2,654,290.92
PC	1+56.87	468,865.72	2,654,444.92
PI	4+08.60	468,817.72	2,654,692.03
PCC	6+60.00	468,791.67	2,654,942.40
Combo PI	6+94.57	468,763.19	2,654,972.75
PI	7+62.52	468,781.05	2,655,044.37
PT	8+62.97	468,805.87	2,655,143.85
PC	10+63.01	468,854.29	2,655,337.94
PI	11+57.61	468,877.18	2,655,429.72
PT	12+51.51	468,880.50	2,655,524.26
PC	25+85.59	468,927.21	2,655,857.52
PI	27+06.36	468,931.44	2,656,978.22
PT	28+26.10	468,962.72	2,657,094.87
PC	31+22.10	469,039.36	2,657,380.78
PI	33+64.24	469,102.06	2,657,614.66
End, PCC	36+06.10	469,144.89	2,657,852.99

CURVE DATA

ARC DEFINITION

PCR01 (Chain: EB RA Ramps)		PCR05 (Chain: EB RA Ramps)	
PI Sta =	4+08.60	PI Sta =	33+64.24
Delta =	05° 03' 09" (LT)	Delta =	04° 49' 11" (RT)
Da =	01° 00' 15"	Da =	00° 59' 45"
R =	5705.65'	R =	5753.65'
T =	251.73'	T =	242.14'
L =	503.13'	L =	484.00'
PCR02 (Chain: EB RA Ramps)			
PI Sta =	7+62.52		
Delta =	19° 56' 51" (LT)		
Da =	09° 49' 40"		
R =	583.00'		
T =	102.52'		
L =	202.97'		
PCR03 (Chain: EB RA Ramps)			
PI Sta =	11+57.61		
Delta =	12° 00' 00" (RT)		
Da =	06° 21' 58"		
R =	900.00'		
T =	94.59'		
L =	188.50'		
PCR04 (Chain: EB RA Ramps)			
PI Sta =	27+06.36		
Delta =	13° 00' 00"		
Da =	05° 24' 19"		
R =	1060.00'		
T =	120.77'		
L =	240.51'		

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-140-N R-56-W			
SW Sec Cor 22	7-J	469,174.30	2,657,148.59

REFERENCE MARKERS

#	NORTHING	EASTING	STATION	OFFSET	ALIGN
304	469,131.75	2,653,416.50	118+63	70' Lt	SCL94
304	469,061.45	2,653,400.60	118+45	99' Rt	SCL94

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	ALIGNMENT	MONUMENT
PRIMARY CONTROL (SCL94)							
GPS 1	469,270.95	2,659,178.96	1,203.57'	176+27	1' Lt	SCL94	#4 Rebar w/ control cap
GPS 2	469,021.30	2,653,921.23	1,234.47'	123+64	59' Rt	SCL94	#4 Rebar w/ control cap
SECONDARY CONTROL (SCL94)							
RTK 100	469,014.98	2,655,363.99	1,223.15'	133+05	116' Rt	SCL94	#4 Rebar w/ control cap

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

INITIALIZING BENCH MARK
OPUS

- [x] NAVD-88
- [ ] _____
- [ ] GEOID12B
- [ ] _____
- [x] GEOID18

Date Survey Completed _/_/_

- [ ] Assumed Coordinates
- [x] All coordinates on this sheet are Barnes County ground coordinates. They are derived from the NAD83(2011) reference frame; North Dakota South Zone Combination Factor (cf) = 0.9998710

REGISTERED PROFESSIONAL ENGINEER
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PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

NOTES: Sheet 2 of 2

PRELIMINARY SURVEY COORDINATE AND CURVE DATA - Oriska Rest Area Parking

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	81	3

HORIZONTAL ALIGNMENT

PNT	STATION	NORTHING	EASTING
I-94 WB Ramps (Chain: WB RA Ramps)			
Begin, PI	0+00.00	469,071.08	2,653,258.97
PC	10+40.00	469,107.50	2,654,298.33
PI	11+27.51	469,110.56	2,654,385.79
PT	12+13.95	469,090.13	2,654,470.93
PC	14+63.13	469,032.00	2,654,713.19
PI	15+44.79	469,012.95	2,654,792.59
PT	16+25.45	469,015.81	2,654,874.20
PC	27+91.57	469,056.65	2,656,039.61
PI	28+86.17	469,059.96	2,656,134.14
PT	29+80.07	469,082.85	2,656,225.92
PC	32+51.88	469,0148.64	2,656,489.65
PI	34+23.20	469,190.11	2,656,655.88
PT	35+93.27	469,196.11	2,656,827.09
PI	38+30.08	469,204.40	2,657,063.78
End, PI	41+93.27	469,218.09	2,657,426.69

CURVE DATA

ARC DEFINITION	
PCR01 (Chain: WB RA Ramps)	
PI Sta =	11+27.51
Delta =	15° 30' 00" (RT)
Da =	8° 54' 39"
R =	643.00'
T =	87.51'
L =	173.65'
PCR02 (Chain: WB RA Ramps)	
PI Sta =	15+44.79
Delta =	15° 30' 00" (LT)
Da =	9° 32' 57"
R =	600.00'
T =	81.66'
L =	162.32'
PCR03 (Chain: WB RA Ramps)	
PI Sta =	28+86.17
Delta =	12° 00' 00" (LT)
Da =	06° 21' 58"
R =	900.00'
T =	94.59'
PCR04 (Chain: WB RA Ramps)	
PI Sta =	34+23.20
Delta =	12° 00' 00" (RT)
Da =	3° 30' 54"
R =	1630.00'
T =	171.32'
L =	341.39'

US PUBLIC LAND SURVEY DATA

CORNER	IRN	NORTHING	EASTING
T-140-N R-56-W			
SW Sec Cor 22	7-J	469,174.30	2,657,148.59

REFERENCE MARKERS

#	NORTHING	EASTING	STATION	OFFSET	ALIGN
304	469,131.75	2,653,416.50	118+63	70' Lt	SCL94
304	469,061.45	2,653,400.60	118+45	99' Rt	SCL94

SURVEY CONTROL POINTS

PNT	NORTHING	EASTING	ELEV	STATION	OFFSET	ALIGNMENT	MONUMENT
PRIMARY CONTROL (SCL94)							
GPS 1	469,270.95	2,659,178.96	1,203.57'	176+27	1' Lt	SCL94	#4 Rebar w/ control cap
GPS 2	469,021.30	2,653,921.23	1,234.47'	123+64	59' Rt	SCL94	#4 Rebar w/ control cap
SECONDARY CONTROL (SCL94)							
RTK 100	469,014.98	2,655,363.99	1,223.15'	133+05	116' Rt	SCL94	#4 Rebar w/ control cap

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INITIALIZING BENCH MARK
OPUS

☒ NAVD-88 ☐ _____

☐ GEOID12B ☐ _____

☒ GEOID18

Date Survey Completed _/_/_

☐ Assumed Coordinates

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REGISTERED PROFESSIONAL ENGINEER
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NOTES: Sheet 2 of 2

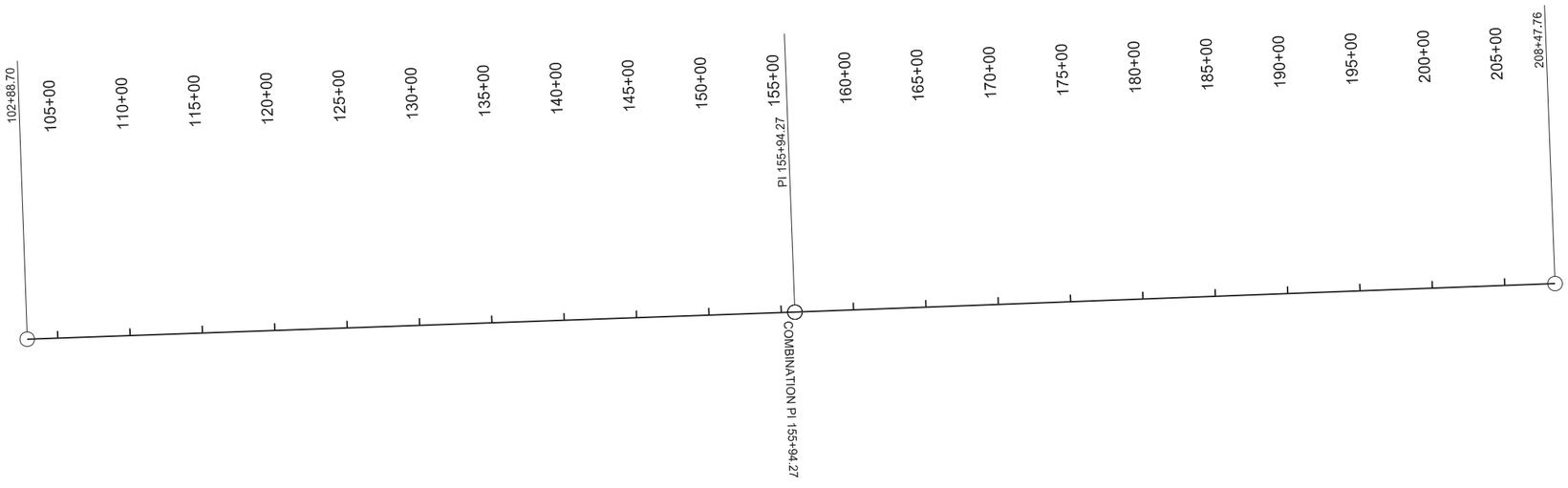
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	82	1

Survey Centerline I94

Alignment Name: SCL94
Alignment Description:
Alignment Style: Alignment\Horizontal\Survey Centerline\SCL 1L

		Station	Northing	Easting
Element: Linear				
START	( )	10288.700 R1	469006.54	2651845.61
COMBINATION PI	( )	15594.272 R1	469193.789	2657147.877
Tangential Direction:		N87.977°E		
Tangential Length:		5305.572		
Element: Linear				
COMBINATION PI	( )	15594.272 R1	469193.789	2657147.877
END	( )	20847.762 R1	469391.09	2662397.66
Tangential Direction:		N87.848°E		
Tangential Length:		5253.49		

N



Alignment Descriptions
SCL94
Oriska Rest Area

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

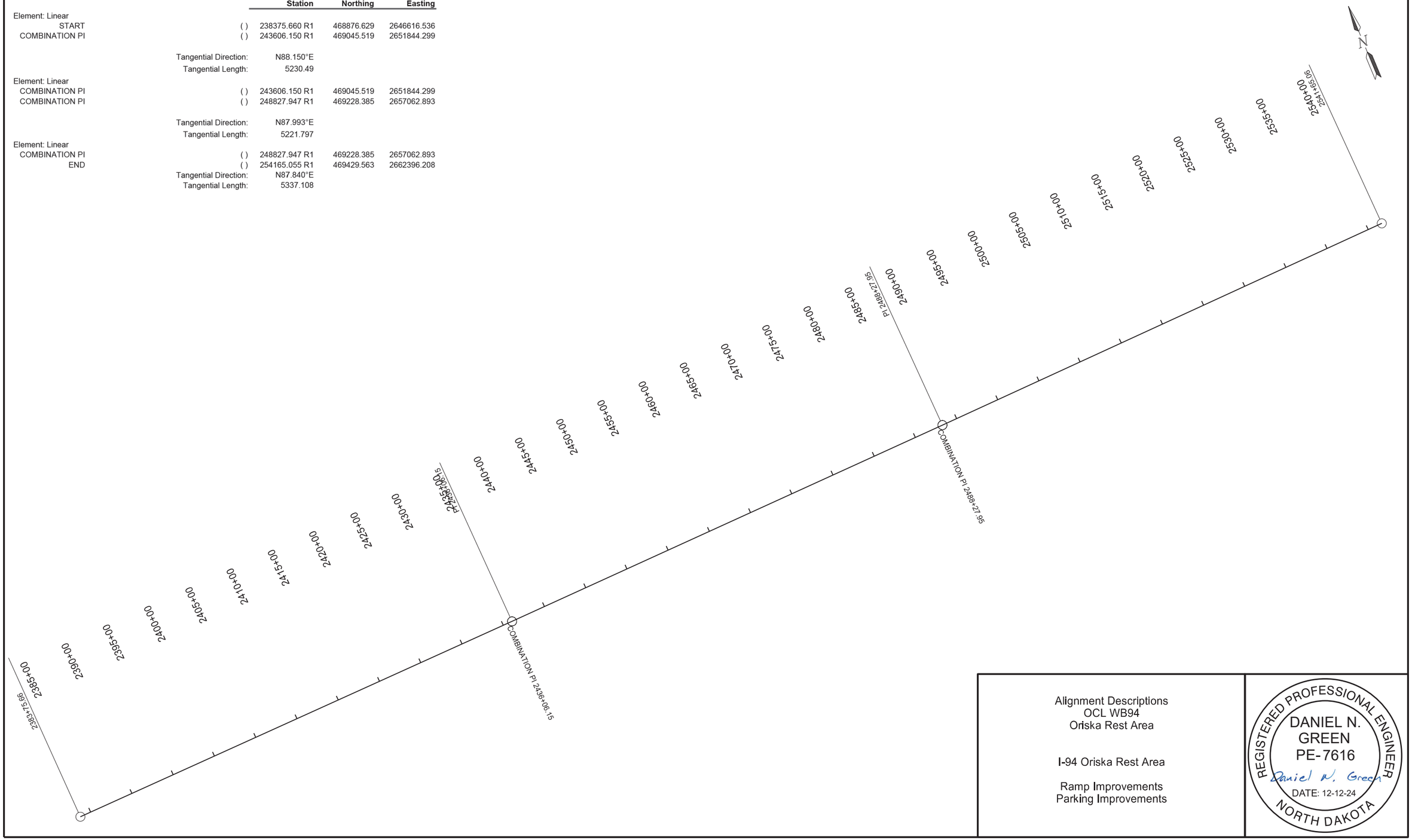
REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	82	2

Office Centerline Westbound I94

Alignment Name: OCL WB94
Alignment Description:
Alignment Style: Alignment\Horizontal\Large Scale\Alignment 7 L

		Station	Northing	Easting
Element: Linear				
START	( )	238375.660 R1	468876.629	2646616.536
COMBINATION PI	( )	243606.150 R1	469045.519	2651844.299
Tangential Direction:		N88.150°E		
Tangential Length:		5230.49		
Element: Linear				
COMBINATION PI	( )	243606.150 R1	469045.519	2651844.299
COMBINATION PI	( )	248827.947 R1	469228.385	2657062.893
Tangential Direction:		N87.993°E		
Tangential Length:		5221.797		
Element: Linear				
COMBINATION PI	( )	248827.947 R1	469228.385	2657062.893
END	( )	254165.055 R1	469429.563	2662396.208
Tangential Direction:		N87.840°E		
Tangential Length:		5337.108		



Alignment Descriptions
OCL WB94
Oriska Rest Area

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

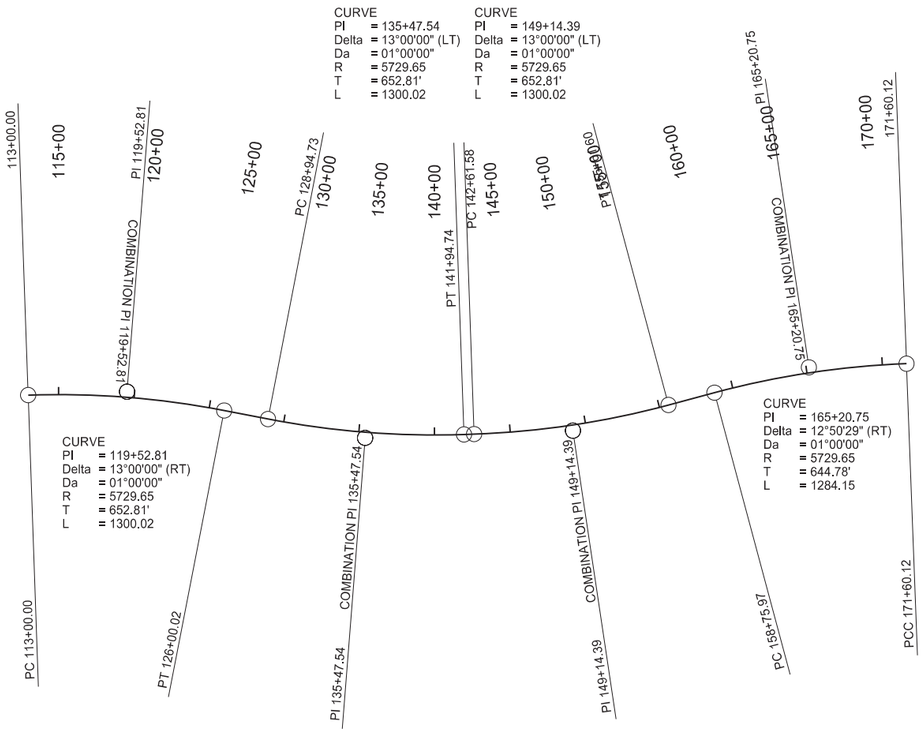
REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	82	3

Office Centerline Eastbound I94

Alignment Name: OCL EB94
Alignment Description:
Alignment Style: Alignment\Horizontal\Large Scale\Alignment 6 L

		Station	Northing	Easting
Element: Circular				
PC	( )	11300.000 R1	468999.983	2652857.798
COMBINATION PI	( )	11952.811 R1	469022.844	2653510.209
CC	( )		463273.847	2653058.451
PT	( )	12600.016 R1	468898.36	2654151.041
Radius:		5729.65		
Delta:		13.000° Right		
Degree of Curvature (Arc):		1.000°		
Length:		1300.016		
Tangent:		652.811		
Chord:		1297.23		
Middle Ordinate:		36.831		
External:		37.069		
Back Tangent Direction:		N87.993°E		
Back Radial Direction:		S2.007°E		
Chord Direction:		S85.507°E		
Ahead Radial Direction:		S10.993°W		
Ahead Tangent Direction:		S79.007°E		
Element: Linear				
PT	( )	12600.016 R1	468898.36	2654151.041
PC	( )	12894.725 R1	468842.161	2654440.342
Tangential Direction:		S79.007°E		
Tangential Length:		294.709		
Element: Circular				
PC	( )	12894.725 R1	468842.161	2654440.342
COMBINATION PI	( )	13547.536 R1	468717.677	2655081.174
CC	( )		474466.674	2655532.932
PT	( )	14194.742 R1	468740.538	2655733.585
Radius:		5729.65		
Delta:		13.000° Left		
Degree of Curvature (Arc):		1.000°		
Length:		1300.016		
Tangent:		652.811		
Chord:		1297.23		
Middle Ordinate:		36.831		
External:		37.069		
Back Tangent Direction:		S79.007°E		
Back Radial Direction:		S10.993°W		
Chord Direction:		S85.507°E		
Ahead Radial Direction:		S2.007°E		
Ahead Tangent Direction:		N87.993°E		
Element: Linear				
PT	( )	14194.742 R1	468740.538	2655733.585
PC	( )	14261.580 R1	468742.879	2655800.383
Tangential Direction:		N87.993°E		
Tangential Length:		66.839		
Element: Circular				
PC	( )	14261.580 R1	468742.879	2655800.383
COMBINATION PI	( )	14914.392 R1	468765.74	2656452.793
CC	( )		474469.014	2655599.73
PT	( )	15561.597 R1	468934.776	2657083.34
Radius:		5729.65		
Delta:		13.000° Left		
Degree of Curvature (Arc):		1.000°		
Length:		1300.016		
Tangent:		652.811		
Chord:		1297.23		
Middle Ordinate:		36.831		
External:		37.069		
Back Tangent Direction:		N87.993°E		
Back Radial Direction:		S2.007°E		
Chord Direction:		N81.493°E		
Ahead Radial Direction:		S15.007°E		
Ahead Tangent Direction:		N74.993°E		
Element: Linear				
PT	( )	15561.597 R1	468934.776	2657083.34
PC	( )	15875.970 R1	469016.179	2657386.991
Tangential Direction:		N74.993°E		
Tangential Length:		314.373		
Element: Circular				
PC	( )	15875.970 R1	469016.179	2657386.991
COMBINATION PI	( )	16520.746 R1	469183.134	2658009.777
CC	( )		463481.941	2658870.602
PT	( )	17160.119 R1	469207.499	2658654.093
Radius:		5729.65		
Delta:		12.841° Right		
Degree of Curvature (Arc):		1.000°		
Length:		1284.15		
Tangent:		644.776		
Chord:		1281.464		
Middle Ordinate:		35.938		
External:		36.165		
Back Tangent Direction:		N74.993°E		
Back Radial Direction:		S15.007°E		
Chord Direction:		N81.414°E		
Ahead Radial Direction:		S2.166°E		
Ahead Tangent Direction:		N87.834°E		



Alignment Descriptions
OCL EB94
Oriska Rest Area

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	82	4

Proposed Eastbound Rest Area Ramp Alignment

Alignment Name: EB RA Ramps
Alignment Description:
Alignment Style: Alignment\Horizontal\Large Scale\Alignment 2 L

		Station	Northing	Easting
Element: Linear				
START	( )	0.000 R1	468895.635	2654290.924
PC	( )	156.874 R1	468865.721	2654444.918
Tangential Direction:		S79.007°E		
Tangential Length:		156.874		
Element: Circular				
PC	( )	156.874 R1	468865.721	2654444.918
COMBINATION PI	( )	408.600 R1	468817.719	2654692.026
CC	( )		474466.674	2655532.932
PCC	( )	660.000 R1	468791.666	2654942.4
Radius:		5705.65		
Delta:		5.052° Left		
Degree of Curvature (Arc):		1.004°		
Length:		503.126		
Tangent:		251.726		
Chord:		502.963		
Middle Ordinate:		5.545		
External:		5.55		
Back Tangent Direction:		S79.007°E		
Back Radial Direction:		S10.993°W		
Chord Direction:		S81.533°E		
Ahead Radial Direction:		S5.941°W		
Ahead Tangent Direction:		S84.059°E		
Element: Circular				
PCC	( )	660.000 R1	468791.666	2654942.4
COMBINATION PI	( )	762.524 R1	468781.054	2655044.373
CC	( )		469371.535	2655002.74
PT	( )	862.972 R1	468805.869	2655143.849
Radius:		583		
Delta:		19.948° Left		
Degree of Curvature (Arc):		9.828°		
Length:		202.972		
Tangent:		102.524		
Chord:		201.949		
Middle Ordinate:		8.811		
External:		8.946		
Back Tangent Direction:		S84.059°E		
Back Radial Direction:		S5.941°W		
Chord Direction:		N85.967°E		
Ahead Radial Direction:		S14.007°E		
Ahead Tangent Direction:		N75.993°E		
Element: Linear				
PT	( )	862.972 R1	468805.869	2655143.849
PC	( )	1063.014 R1	468854.287	2655337.942
Tangential Direction:		N75.993°E		
Tangential Length:		200.041		
Element: Circular				
PC	( )	1063.014 R1	468854.287	2655337.942
COMBINATION PI	( )	1157.608 R1	468877.182	2655429.724
CC	( )		467981.047	2655555.777
PT	( )	1251.509 R1	468880.495	2655524.26
Radius:		900		
Delta:		12.000° Right		
Degree of Curvature (Arc):		6.366°		
Length:		188.496		
Tangent:		94.594		
Chord:		188.151		
Middle Ordinate:		4.93		
External:		4.957		
Back Tangent Direction:		N75.993°E		
Back Radial Direction:		S14.007°E		
Chord Direction:		N81.993°E		
Ahead Radial Direction:		S2.007°E		
Ahead Tangent Direction:		N87.993°E		
Element: Linear				
PT	( )	1251.509 R1	468880.495	2655524.26
PC	( )	2585.591 R1	468927.214	2656857.523
Tangential Direction:		N87.993°E		
Tangential Length:		1334.081		
Element: Circular				
PC	( )	2585.591 R1	468927.214	2656857.523
COMBINATION PI	( )	2706.363 R1	468931.443	2656978.221
CC	( )		469986.564	2656820.402
PT	( )	2826.098 R1	468962.716	2657094.874
Radius:		1060		
Delta:		13.000° Left		
Degree of Curvature (Arc):		5.405°		
Length:		240.507		
Tangent:		120.772		
Chord:		239.991		
Middle Ordinate:		6.814		
External:		6.858		
Back Tangent Direction:		N87.993°E		
Back Radial Direction:		S2.007°E		
Chord Direction:		N81.493°E		
Ahead Radial Direction:		S15.007°E		
Ahead Tangent Direction:		N74.993°E		
Element: Linear				
PT	( )	2826.098 R1	468962.716	2657094.874
PC	( )	3122.096 R1	469039.36	2657380.777
Tangential Direction:		N74.993°E		
Tangential Length:		295.998		
Element: Circular				
PC	( )	3122.096 R1	469039.36	2657380.777
COMBINATION PI	( )	3364.240 R1	469102.06	2657614.662
CC	( )		463481.941	2658870.602
PT	( )	3606.098 R1	469144.886	2657852.988
Radius:		5753.65		
Delta:		4.820° Right		
Degree of Curvature (Arc):		0.996°		
Length:		484.001		
Tangent:		242.144		
Chord:		483.859		
Middle Ordinate:		5.089		
External:		5.093		
Back Tangent Direction:		N74.993°E		
Back Radial Direction:		S15.007°E		
Chord Direction:		N77.403°E		
Ahead Radial Direction:		S10.187°E		
Ahead Tangent Direction:		N79.813°E		

CURVE
PI = 7+62.52
Delta = 19°56'51" (LT)
Da = 09°49'40"
R = 583.00
T = 102.52'
L = 202.97

CURVE
PI = 4+08.60
Delta = 05°03'09" (LT)
Da = 01°00'15"
R = 5705.65
T = 251.73'
L = 503.13

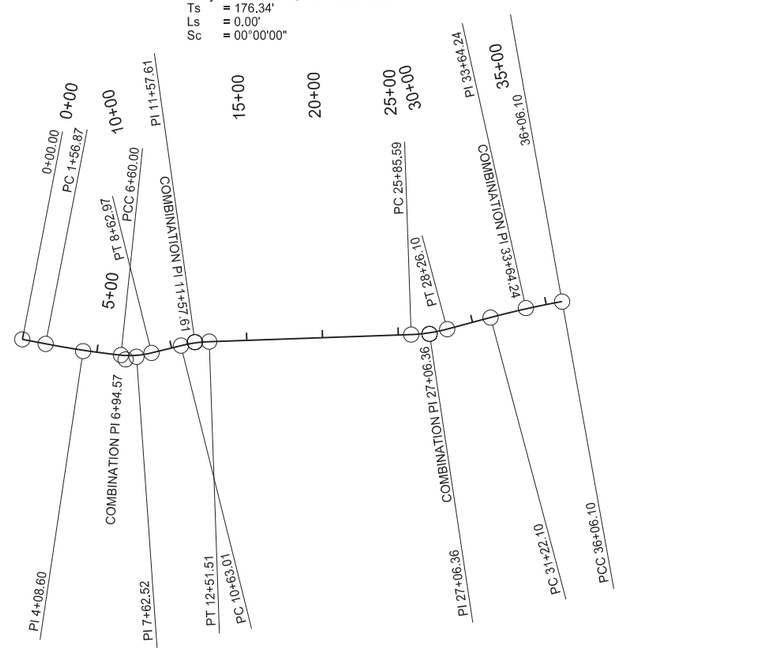
Curve Combination
PI = 6+94.57
Delta = 25°00'00" (LT)
Da = 01°00'15"
R = 5705.65'
Ts = 537.70'
L = 503.13'
Ls = 0.00'
Sc = 00°00'00"

CURVE
PI = 11+57.61
Delta = 12°00'00" (RT)
Da = 06°21'58"
R = 900.00
T = 94.59'
L = 188.50

CURVE
PI = 27+06.36
Delta = 13°00'00" (LT)
Da = 05°24'19"
R = 1060.00
T = 120.77'
L = 240.51

CURVE
PI = 33+64.24
Delta = 04°49'11" (RT)
Da = 00°59'45"
R = 5753.65
T = 242.14'
L = 484.00

Entry Values Above, Exit Values Below
Ts = 176.34'
Ls = 0.00'
Sc = 00°00'00"



Alignment Descriptions
EB RA Ramps
Oriska Rest Area

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

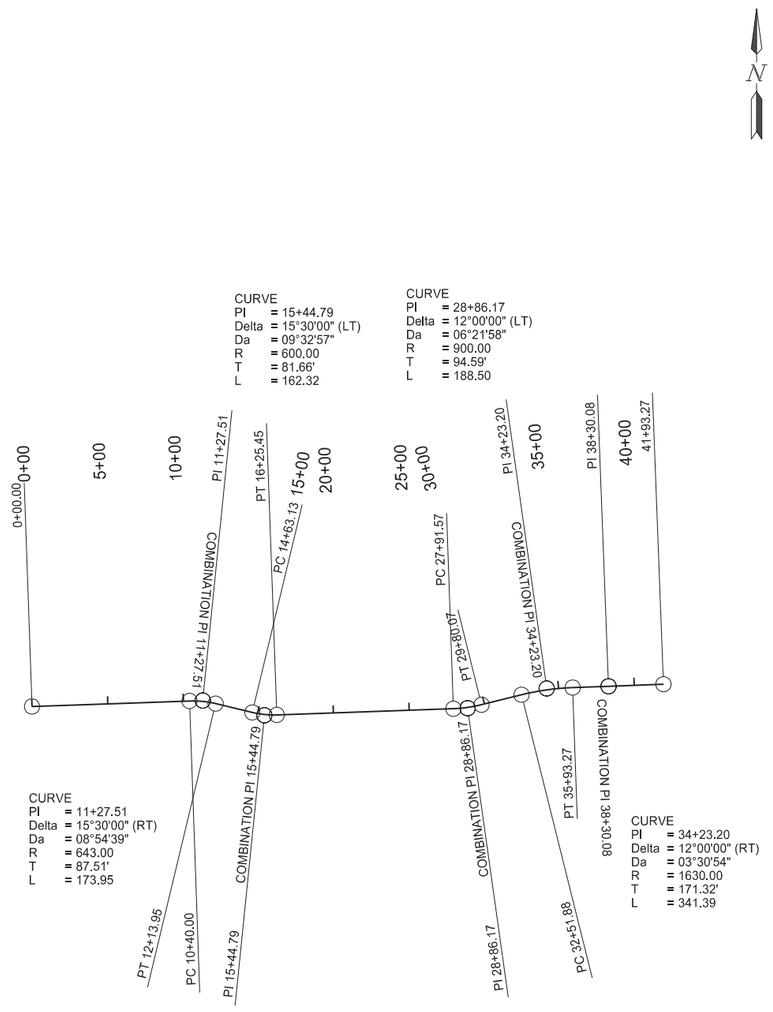
REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	82	5

Proposed Westbound Rest Area Ramp Alignment

Alignment Name: WB RA Ramps
Alignment Description:
Alignment Style: Alignment\Horizontal\Large Scale\Alignment 3 L

		Station	Northing	Easting
Element: Linear				
START	( )	0.000 R1	469071.076	2653258.97
PC	( )	1040.000 R1	469107.496	2654298.332
Tangential Direction:		N87.993°E		
Tangential Length:		1040		
Element: Circular				
PC	( )	1040.000 R1	469107.496	2654298.332
COMBINATION PI	( )	1127.508 R1	469110.561	2654385.787
CC	( )		468464.891	2654320.85
PT	( )	1213.948 R1	469090.143	2654470.88
Radius:		643		
Delta:		15.500° Right		
Degree of Curvature (Arc):		8.911°		
Length:		173.948		
Tangent:		87.508		
Chord:		173.418		
Middle Ordinate:		5.873		
External:		5.927		
Back Tangent Direction:		N87.993°E		
Back Radial Direction:		S2.007°E		
Chord Direction:		S84.257°E		
Ahead Radial Direction:		S13.493°W		
Ahead Tangent Direction:		S76.507°E		
Element: Linear				
PT	( )	1213.948 R1	469090.143	2654470.88
PC	( )	1463.133 R1	469032.001	2654713.187
Tangential Direction:		S76.507°E		
Tangential Length:		249.184		
Element: Circular				
PC	( )	1463.133 R1	469032.001	2654713.187
COMBINATION PI	( )	1544.789 R1	469012.948	2654792.589
CC	( )		469615.44	2654853.184
PT	( )	1625.448 R1	469015.808	2654874.195
Radius:		600		
Delta:		15.500° Left		
Degree of Curvature (Arc):		9.549°		
Length:		162.315		
Tangent:		81.656		
Chord:		161.821		
Middle Ordinate:		5.48		
External:		5.531		
Back Tangent Direction:		S76.507°E		
Back Radial Direction:		S13.493°W		
Chord Direction:		S84.257°E		
Ahead Radial Direction:		S2.007°E		
Ahead Tangent Direction:		N87.993°E		
Element: Linear				
PT	( )	1625.448 R1	469015.808	2654874.195
PC	( )	2791.573 R1	469056.645	2656039.606
Tangential Direction:		N87.993°E		
Tangential Length:		1166.125		
Element: Circular				
PC	( )	2791.573 R1	469056.645	2656039.606
COMBINATION PI	( )	2886.167 R1	469059.958	2656134.141
CC	( )		469956.093	2656008.088
PT	( )	2980.069 R1	469082.853	2656225.923
Radius:		900		
Delta:		12.000° Left		
Degree of Curvature (Arc):		6.366°		
Length:		188.496		
Tangent:		94.594		
Chord:		188.151		
Middle Ordinate:		4.93		
External:		4.957		
Back Tangent Direction:		N87.993°E		
Back Radial Direction:		S2.007°E		
Chord Direction:		N81.993°E		
Ahead Radial Direction:		S14.007°E		
Ahead Tangent Direction:		N75.993°E		
Element: Linear				
PT	( )	2980.069 R1	469082.853	2656225.923
PC	( )	3251.880 R1	469148.642	2656489.652
Tangential Direction:		N75.993°E		
Tangential Length:		271.811		
Element: Circular				
PC	( )	3251.880 R1	469148.642	2656489.652
COMBINATION PI	( )	3423.200 R1	469190.108	2656655.878
CC	( )		467567.107	2656884.175
PT	( )	3593.266 R1	469196.108	2656827.092
Radius:		1630		
Delta:		12.000° Right		
Degree of Curvature (Arc):		3.515°		
Length:		341.386		
Tangent:		171.32		
Chord:		340.763		
Middle Ordinate:		8.929		
External:		8.978		
Back Tangent Direction:		N75.993°E		
Back Radial Direction:		S14.007°E		
Chord Direction:		N81.993°E		
Ahead Radial Direction:		S2.007°E		
Ahead Tangent Direction:		N87.993°E		
Element: Linear				
PT	( )	3593.266 R1	469196.108	2656827.092
COMBINATION PI	( )	3830.085 R1	469204.401	2657063.765
Tangential Direction:		N87.993°E		
Tangential Length:		236.818		
Element: Linear				
COMBINATION PI	( )	3830.085 R1	469204.401	2657063.765
END	( )	4193.268 R1	469218.091	2657426.69
Tangential Direction:		N87.840°E		
Tangential Length:		363.183		

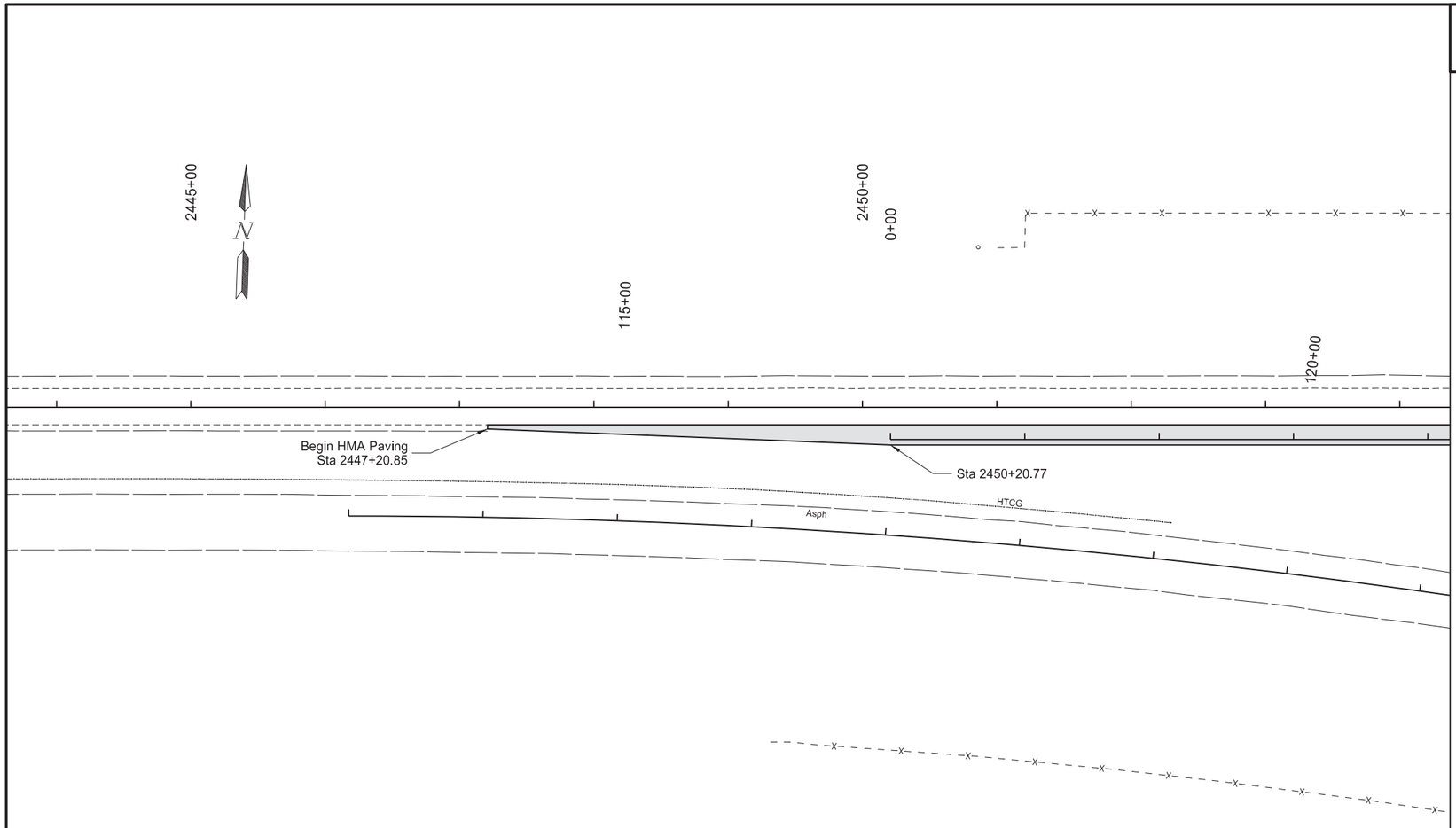


Alignment Descriptions
WB RA Ramps
Oriska Rest Area

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	90	1

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5 WB Sta 2447+20.85 to Sta 2454+00.00	1,460	TON
401	0050	TACK COAT WB Sta 2447+20.85 to Sta 2454+00.00	52	GAL
401	0060	PRIME COAT WB Sta 2447+20.85 to Sta 2454+00.00	410	GAL
430	0045	SUPERPAVE FAA 45 WB Sta 2447+20.85 to Sta 2454+00.00	321	TON
430	5818	PG 58H-34 ASPHALT CEMENT WB Sta 2447+20.85 to Sta 2454+00.00	19.3	TON

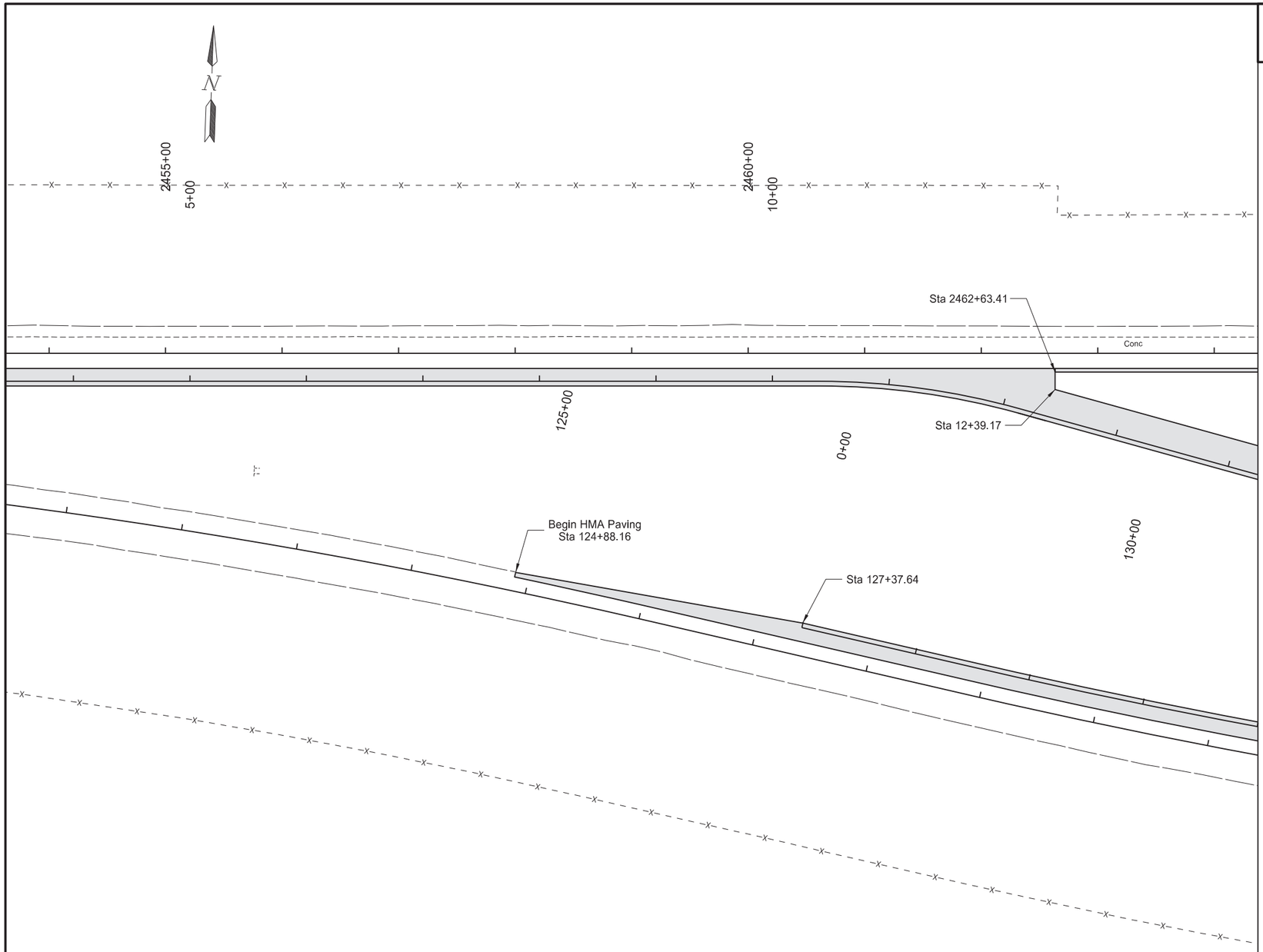
5.5" Superpave FAA 45
15" Aggr. Base Course Cl 5

Paving Laouts

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	90	2

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		WB Sta 2454+00 to Sta 2462+63.41	1,948	TON
		WB Sta 2462+63.41 to Sta 2464+00	161	TON
		WB Sta 12+39 to Sta 13+79.69	457	TON
		EB Sta 124+88.16 to Sta 131+00	1,220	TON
401	0050	TACK COAT		
		WB Sta 2454+00 to Sta 2462+63.41	90	GAL
		WB Sta 2462+63.41 to Sta 2464+00	4	GAL
		WB Sta 12+39 to Sta 13+79.69	24	GAL
		EB Sta 124+88.16 to Sta 131+00	50	GAL
401	0060	PRIME COAT		
		WB Sta 2454+00 to Sta 2462+63.41	709	GAL
		WB Sta 2462+63.41 to Sta 2464+00	35	GAL
		WB Sta 12+39 to Sta 13+79.69	179	GAL
		EB Sta 124+88.16 to Sta 131+00	396	GAL
430	0045	SUPERPAVE FAA 45		
		WB Sta 2454+00 to Sta 2462+63.41	556	TON
		WB Sta 2462+63.41 to Sta 2464+00	21	TON
		WB Sta 12+39 to Sta 13+79.69	143	TON
		EB Sta 124+88.16 to Sta 131+00	311	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		WB Sta 2454+00 to Sta 2462+63.41	33.4	TON
		WB Sta 2462+63.41 to Sta 2464+00	1.3	TON
		WB Sta 12+39 to Sta 13+79.69	8.6	TON
		EB Sta 124+88.16 to Sta 131+00	18.6	TON

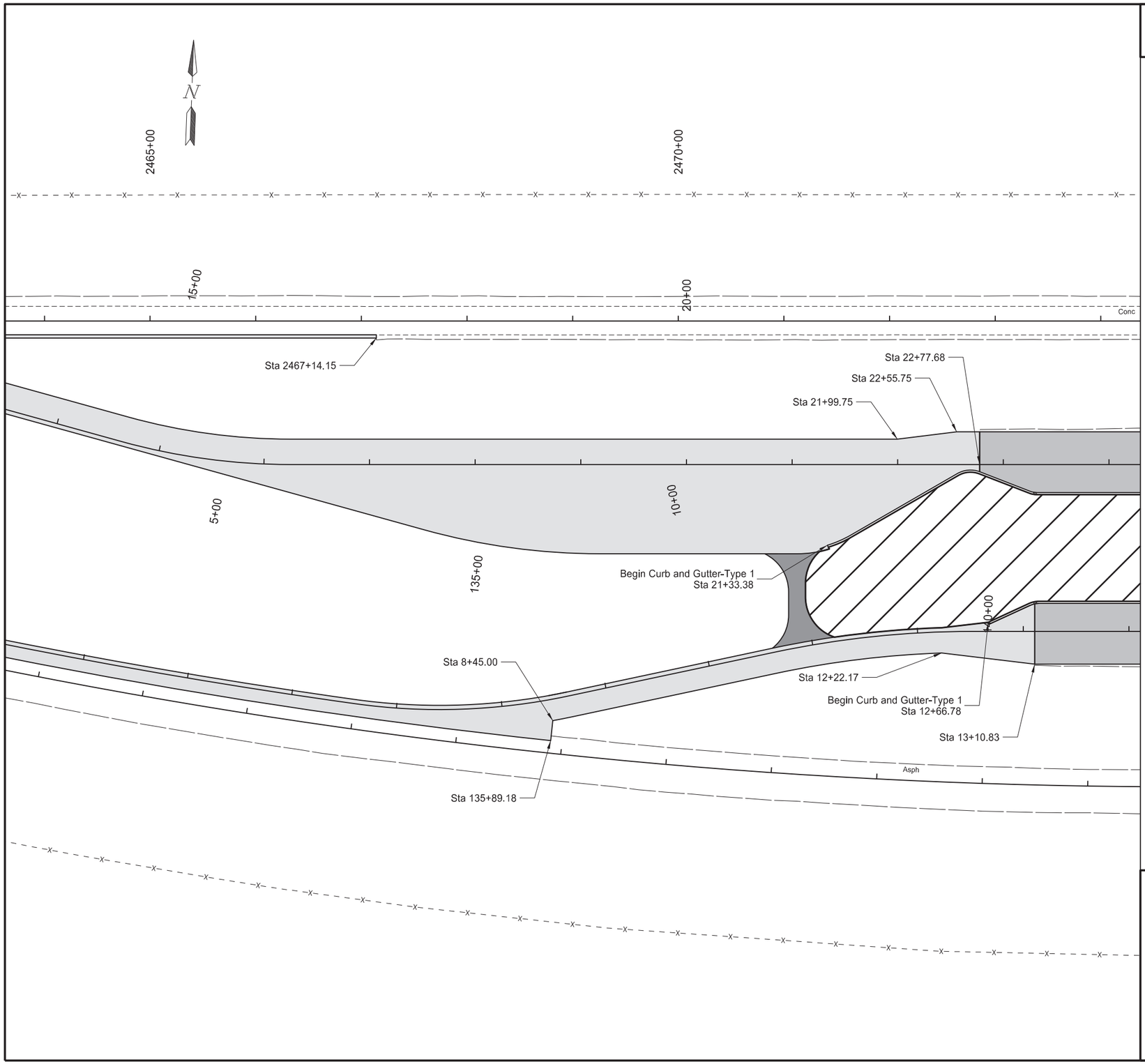
5.5" Superpave FAA 45
15" Aggr. Base Course Cl 5

Paving Layouts

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	90	3

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		WB Sta 2464+00.00 to Sta 2467+14.15	369	TON
		WB Sta 13+79.69 to Sta 22+77.68	6,424	TON
		West Access Road	55	TON
		EB Sta 131+00.00 to Sta 135+89.18	1,133	TON
		EB Sta 8+45.00 to Sta 13+10.83	1,431	TON
401	0050	TACK COAT		
		WB Sta 2464+00.00 to Sta 2467+14.15	8	GAL
		WB Sta 13+79.69 to Sta 22+77.68	381	GAL
		WB Sta 22+77.68 to Sta 24+00.00	72	GAL
		EB Sta 131+00.00 to Sta 135+89.18	56	GAL
		EB Sta 8+45.00 to Sta 13+10.83	75	GAL
		EB Sta 13+10.83 to Sta 13+72.90	40	GAL
401	0060	PRIME COAT		
		WB Sta 2464+00.00 to Sta 2467+14.15	87	GAL
		WB Sta 13+79.69 to Sta 22+77.68	2,791	GAL
		EB Sta 131+00.00 to Sta 135+89.18	437	GAL
		EB Sta 8+45.00 to Sta 13+10.83	581	GAL
430	0045	SUPERPAVE FAA 45		
		WB Sta 2464+00.00 to Sta 2467+14.15	49	TON
		WB Sta 13+79.69 to Sta 22+77.68	2,302	TON
		WB Sta 22+77.68 to Sta 24+00.00	81	TON
		EB Sta 131+00.00 to Sta 135+89.18	347	TON
		EB Sta 8+45.00 to Sta 13+10.83	447	TON
		EB Sta 13+10.83 to Sta 13+72.90	44	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		WB Sta 2464+00.00 to Sta 2467+14.15	2.9	TON
		WB Sta 13+79.69 to Sta 22+77.68	138.1	TON
		WB Sta 22+77.68 to Sta 24+00.00	4.8	TON
		EB Sta 131+00.00 to Sta 135+89.18	20.8	TON
		EB Sta 8+45.00 to Sta 13+10.83	26.8	TON
		EB Sta 13+10.83 to Sta 13+72.90	2.6	TON
748	0140	CURB & GUTTER-TYPE I		
		WB Sta 21+33.38 to Sta 24+00.00	288	LF
		EB Sta 12+66.78 to Sta 13+10.90	110	LF

5.5" Superpave FAA 45
15" Aggr. Base Course Cl 5

2" Superpave FAA 45

6" Aggr. Surface Course Cl 5

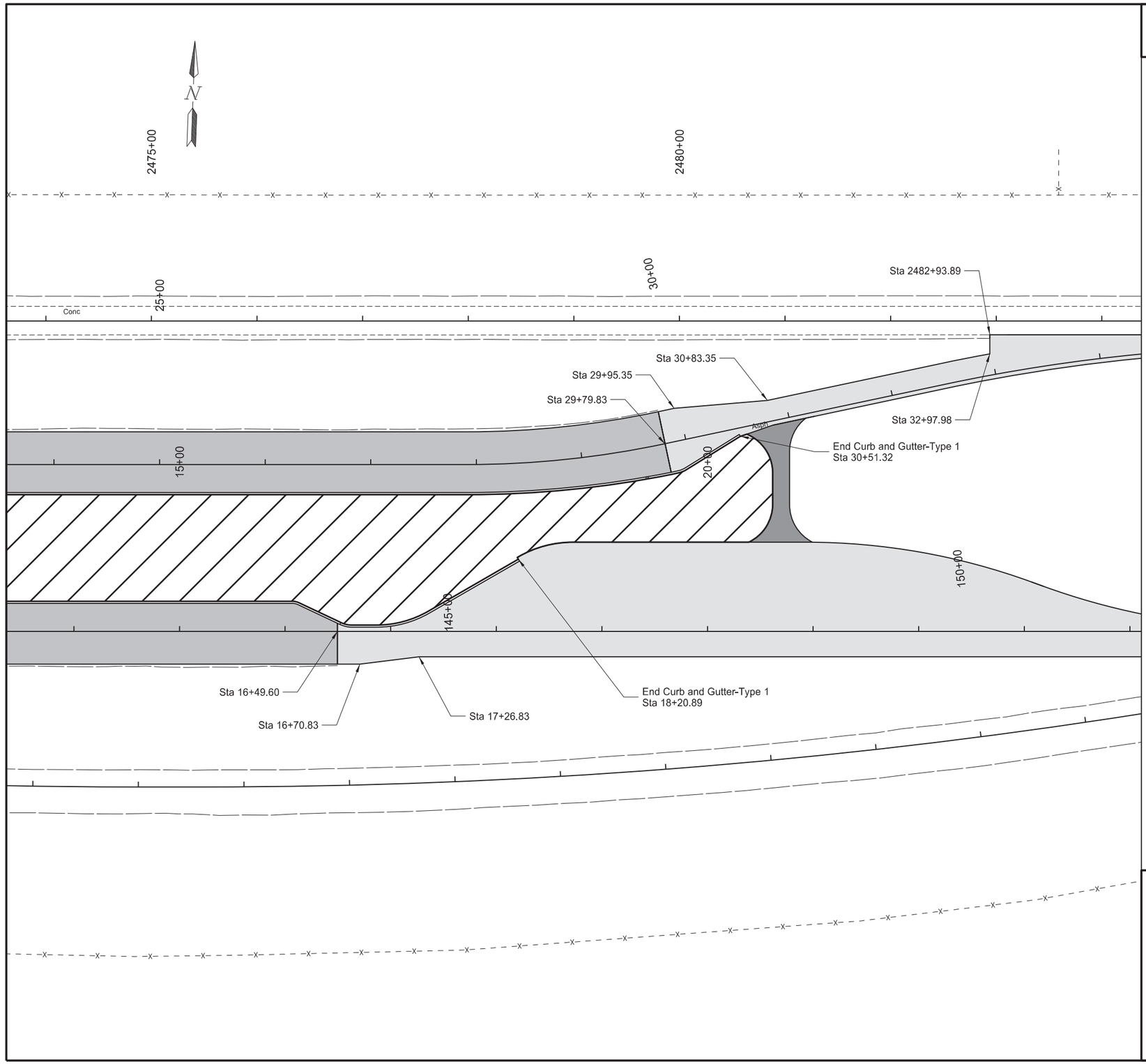
Rest Area Building Project
PCN 23501 - Constructed by Others

Paving Layouts

I-94 Oriska Rest Area

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	ND	IM-2-094(198)304	90	4

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		WB Sta 29+79.83 to Sta 32+97.98	1,179	TON
		WB Sta 2482+93.89 to Sta 2484+00.00	456	TON
		East Access Road	68	TON
		EB Sta 16+49.60 to Sta 23+67.19	5,982	TON
401	0050	TACK COAT		
		WB Sta 24+00.00 to Sta 29+79.83	372	GAL
		WB Sta 29+79.83 to Sta 32+97.98	57	GAL
		WB Sta 2482+93.89 to Sta 2484+00.00	20	GAL
		EB Sta 13+72.90 to Sta 16+49.60	172	GAL
		EB Sta 16+49.60 to Sta 23+67.19	356	GAL
401	0060	PRIME COAT		
		WB Sta 29+79.83 to Sta 32+97.98	434	GAL
		WB Sta 2482+93.89 to Sta 2484+00.00	155	GAL
		EB Sta 16+49.60 to Sta 23+67.19	2,582	GAL
430	0045	SUPERPAVE FAA 45		
		WB Sta 24+00.00 to Sta 29+79.83	412	TON
		WB Sta 29+79.83 to Sta 32+97.98	348	TON
		WB Sta 2482+93.89 to Sta 2484+00.00	123	TON
		EB Sta 13+72.90 to Sta 16+49.60	192	TON
		EB Sta 16+49.60 to Sta 23+67.19	2,156	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		WB Sta 24+00.00 to Sta 29+79.83	24.7	TON
		WB Sta 29+79.83 to Sta 32+97.98	20.9	TON
		WB Sta 2482+93.89 to Sta 2484+00.00	7.4	TON
		EB Sta 13+72.90 to Sta 16+49.60	11.5	TON
		EB Sta 16+49.60 to Sta 23+67.19	129.3	TON
748	0140	CURB & GUTTER-TYPE I		
		WB Sta 24+00.00 to Sta 30+51.32	661	LF
		EB Sta 13+72.90 to Sta 18+20.89	468	LF

5.5" Superpave FAA 45
15" Aggr. Base Course Cl 5

2" Superpave FAA 45

6" Aggr. Surface Course Cl 5

Rest Area Building Project
PCN 23501 - Constructed by Others

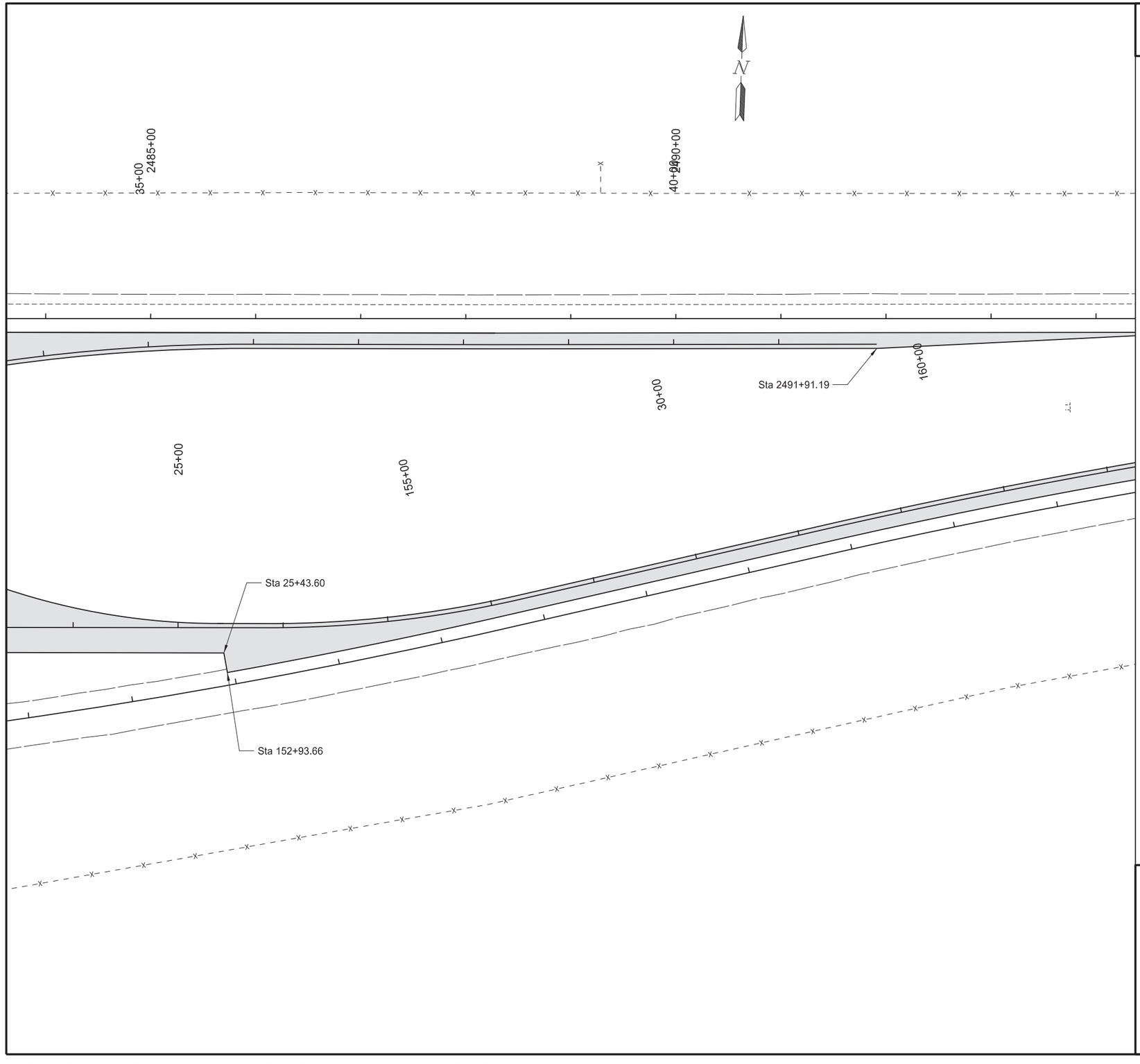
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	ND	IM-2-094(198)304	90	5



SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		WB Sta 2484+00.00 To Sta 2494+00.00	2,393	TON
		EB Sta 23+67.19 to Sta 25+43.60	656	TON
		EB Sta 152+93.66 to Sta 159+38	1,607	TON
		EB Sta 159+39 to Sta 161+49.71	944	TON
401	0050	TACK COAT		
		WB Sta 2484+00.00 To Sta 2494+00.00	91	GAL
		EB Sta 23+67.19 to Sta 25+43.60	36	GAL
		EB Sta 152+93.66 to Sta 161+49.71	100	GAL
401	0060	PRIME COAT		
		WB Sta 2484+00.00 To Sta 2494+00.00	704	GAL
		EB Sta 23+67.19 to Sta 25+43.60	284	GAL
		EB Sta 152+93.66 to Sta 161+49.71	694	GAL
430	0045	SUPERPAVE FAA 45		
		WB Sta 2484+00.00 To Sta 2494+00.00	560	TON
		EB Sta 23+67.19 to Sta 25+43.60	221	TON
		EB Sta 152+93.66 to Sta 161+49.71	613	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		WB Sta 2484+00.00 To Sta 2494+00.00	33.6	TON
		EB Sta 23+67.19 to Sta 25+43.60	13.3	TON
		EB Sta 152+93.66 to Sta 161+49.71	36.8	TON

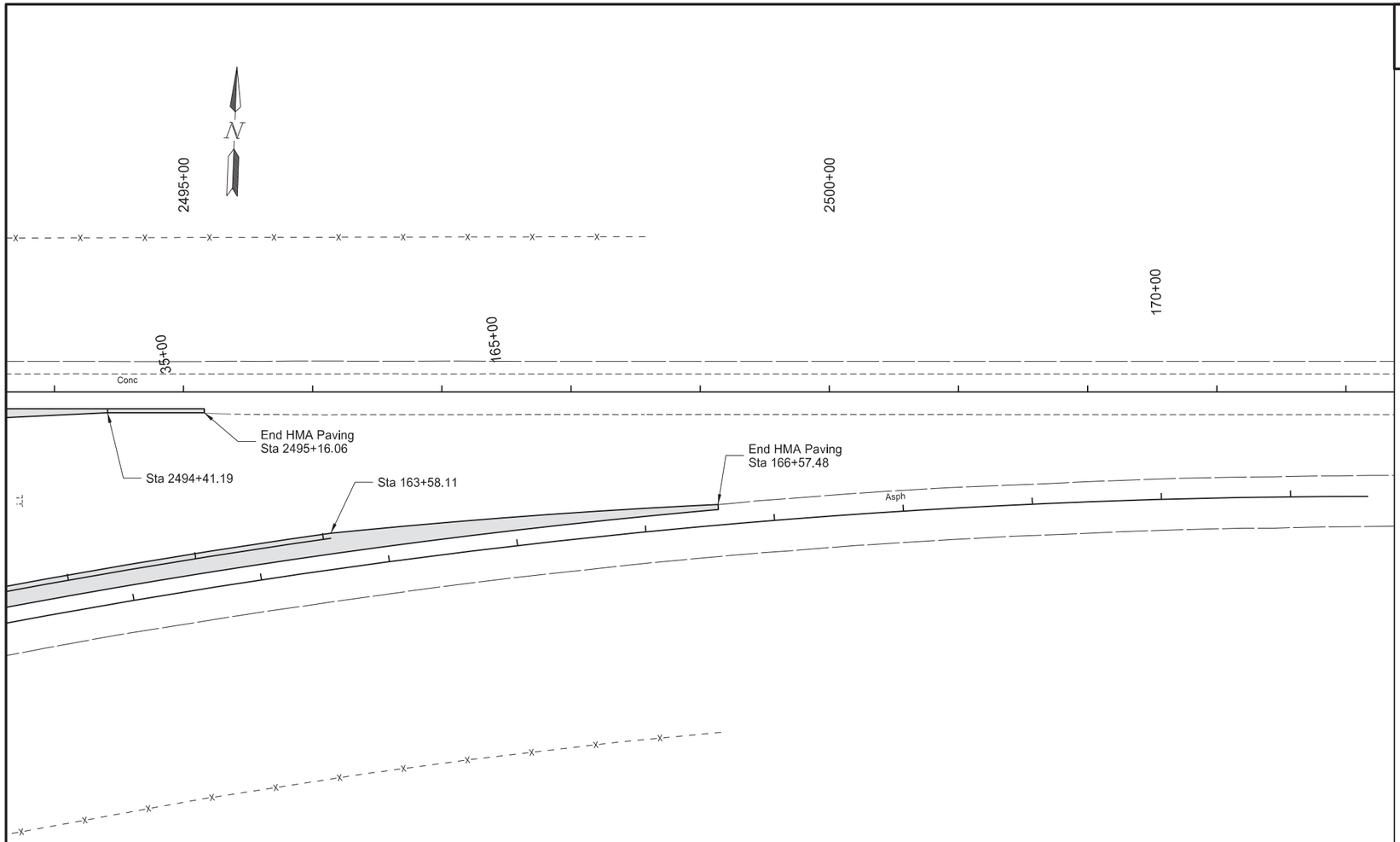
5.5" Superpave FAA 45
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	90	6

SPEC	CODE	BID ITEM	QTY	UNIT
302	0120	AGGREGATE BASE COURSE CL 5		
		WB Sta 2494+00 to Sta 2495+16.06	141	TON
		EB Sta 161+49.71 to Sta 166+57.48	1,993	TON
401	0050	TACK COAT		
		WB Sta 2494+00 to Sta 2495+16.06	3	GAL
		EB Sta 161+49.71 to Sta 166+57.48	39	GAL
401	0060	PRIME COAT		
		WB Sta 2494+00 to Sta 2495+16.06	33	GAL
		EB Sta 161+49.71 to Sta 166+57.48	296	GAL
430	0045	SUPERPAVE FAA 45		
		WB Sta 2494+00 to Sta 2495+16.06	19	TON
		EB Sta 161+49.71 to Sta 166+57.48	243	TON
430	5818	PG 58H-34 ASPHALT CEMENT		
		WB Sta 2494+00 to Sta 2495+16.06	1.2	TON
		EB Sta 161+49.71 to Sta 166+57.48	14.6	TON

5.5" Superpave FAA 45
15" Aggr. Base Course Cl 5

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	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		28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**4**	**26**	**104**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR		18	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		36	
G20-55-96	**96"x48"**	**SPEED LIMIT ENFORCED - MINIMUM FEE $80 WHEN WORKERS PRESENT**	**4**	**59**	**236**
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**4**	**30**	**120**
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**8**	**39**	**312**
R2-1aP-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**8**	**10**	**80**
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED (Mounted on barricade)		12	
R11-2-48	**48"x30"**	**RAMP CLOSED (Mounted on barricade)**	**4**	**12**	**48**
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		35	
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**4**	**35**	**140**
W4-2-48	**48"x48"**	**LANE ENDS RIGHT or LEFT**	**4**	**35**	**140**
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	**48"x48"**	**TRUCKS ENTERING HIGHWAY**	**2**	**35**	**70**
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or _ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		35	
W8-56-48	**48"x48"**	**TRUCKS EXITING HIGHWAY**	**2**	**35**	**70**
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
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**	**6**	**35**	**210**
W20-1-48	**48"x48"**	**RAMP CLOSED AHEAD**	**2**	**35**	**70**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT or _ MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE		35	
W20-3-48	**48"x48"**	**SHOULDER CLOSED**	**2**	**35**	**70**
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE		35	
W20-5-48	**48"x48"**	**RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE**	**4**	**35**	**140**
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)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		35	

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE		35	
W21-6-48	48"x48"	SURVEY CREW		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W21-52-48	48"x48"	PAVEMENT BREAKS		35	
W21-53-48	48"x48"	RUMBLE STRIPS AHEAD		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
W24-1-48	48"x48"	DOUBLE REVERSE CURVE		35	

SPECIAL SIGNS

SPEC & CODE

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	1890

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**500**
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**14**
704-1060	**DELINEATOR DRUMS**	**EACH**	**130**
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**	**50**
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**2**
704-1500	**OBLITERATION OF PVMT MK**	**SF**	**3492**
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	
762-0422	**SHORT TERM 6IN LINE - TYPE R**	**LF**	**13968**
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	

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

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Traffic Control Devices List

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	100	2

N

105+00 110+00 115+00 120+00

END ROAD WORK
G20-2-48 (2)

SPEED LIMIT 75
W2-1-48 (2)

SPEED LIMIT 45
MINIMUM FEE $80
R2-1-48 (2)
R2-1-1aP-24 (2)

WB I-94
Exst I-94 CL
EB I-94

ROAD WORK AHEAD
W20-1-46 (2)

SPEED LIMIT ENFORCED
MINIMUM FEE $80 WHEN WORKERS PRESENT
G20-55-96 (2)

LEFT LANE CLOSED AHEAD
W20-5-48 (2)

SPEED LIMIT 45
W3-5-48 (2)

SPEED LIMIT 45
MINIMUM FEE $80
R2-1-48 (2)
R2-1-1aP-24 (2)

W4-2R-48 (2)

704-1087
Sequencing Arrow Panel - Type C

Construction Sign Layouts

I-94 Oriska Rest Area

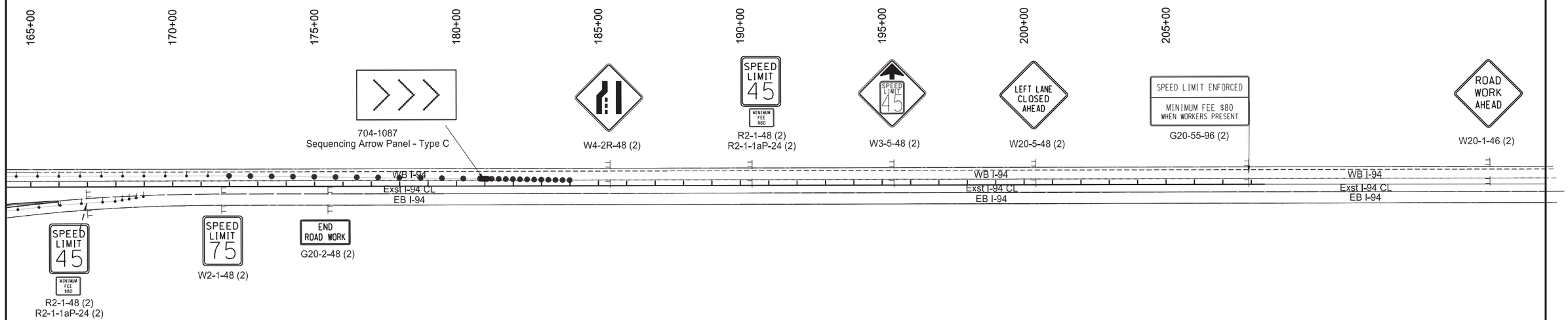
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10/29/2024 10:40:57 AM DNG01213 F:\Proj\14000\14946\14946.614\Project\200094304.198\Consultant\Design\Plan Sheets\100WZ_002-003_ConSign.dgn

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	ND	IM-2-094(198)304	100	3





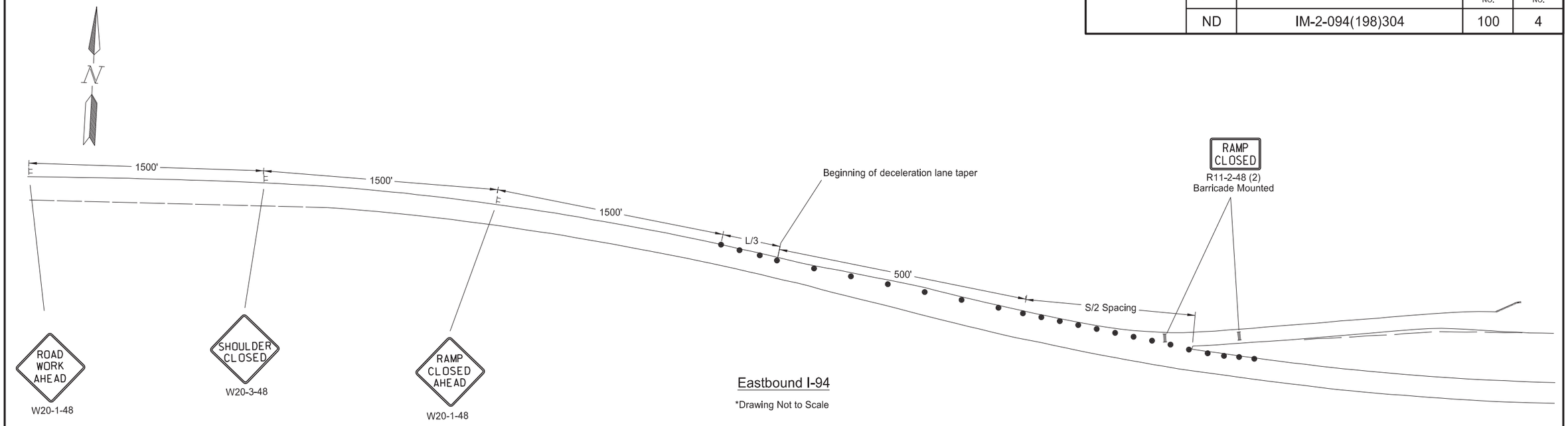
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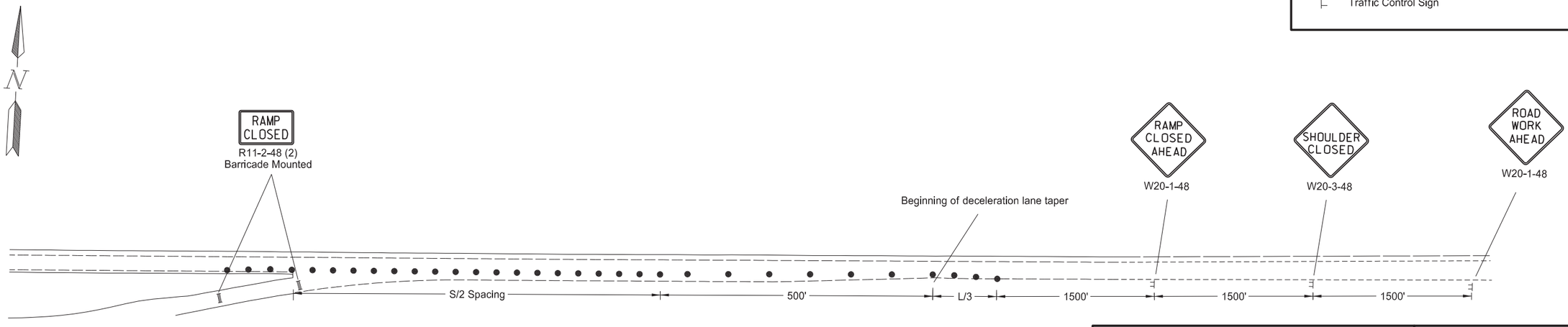
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	ND	IM-2-094(198)304	100	4



Eastbound I-94

*Drawing Not to Scale



Westbound I-94

*Drawing Not to Scale

LEGEND

- Type III Barricade
- Delineator drum
- Traffic Control Sign

Ramp Closure - No Work Adjacent to Roadway

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	IM-2-094(198)304	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
WB Ramps																							
15+00 Lt		9			11.9				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga	1			Seat Belt
21+33 Rt		32		5.0	9.3				5.0	2 x 2 12 ga	10.6						1	4	2.25 x 2.25 12 ga				Authorized Vehicles Only
30+70 Lt		9		5.0	11.3				5.0	2 x 2 12 ga	11.5						1	4	2.25 x 2.25 12 ga				Speed Limit 15
31+27 Rt		43		9.3	13.5				5.0	2.25 x 2.25 12 ga	15.6	3.9				2.5 x 2.5 12 ga	1	4	3 x 3 7 ga	1		1	Authorized Vehicles Only & Truck Parking Rt Arrow
31+32 Lt		15			11.6				5.0	2.5 x 2.5 12 ga	14.5						1	4	3 x 3 7 ga	1			No Overnight Camping
Sub Total			0.0	19.3		**Total**	57.6										**Total**	20.0		3	0	1	
EB Ramps																							
10+47 Rt		15			12.4				5.0	2.5 x 2.5 12 ga	14.5						1	4	3 x 3 7 ga	1			No Overnight Camping
10+55 Lt		43		9.3	12.0				5.0	2.5 x 2.5 10 ga	13.7						1	4	3 x 3 7 ga	1		1	Authorized Vehicles Only & Truck Parking Rt Arrow
12+20 Rt		9		5.0	11.8				5.0	2.25 x 2.25 12 ga	15.0						1	4	2.5 x 2.5 12 ga				Speed Limit 15
20+32 Lt		32		5.0	9.3				5.0	2 x 2 12 ga	10.6						1	4	2.25 x 2.25 12 ga				Authorized Vehicles Only
25+43 Lt		9			10.5				5.0	2 x 2 12 ga	14.6						1	4	2.25 x 2.25 12 ga	1			Seat Belt
Sub Total			0.0	19.3		**Total**	56.0										**Total**	20.0		3	0	1	
Grand Total			**0.0**	**38.6**		**Total**	**113.6**										**Total**	**40**	**0**	**6**	**0**	**2**	

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

Sign Summary
Perforated Tube

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	N.D.	IM-2-094(198)304	110	2

Station / RP	Sign / Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Panel For Signs IV SF	Panel For Signs XI SF	Overlay Panel IV SF	Overlay Panel XI SF	Vert Clear-ance FT	Galv Steel Sheet Standard Pipe 1st LF	Galv Steel Sheet Standard Pipe 2nd LF	Size	Galv Steel Post W-Shape Posts 1st LF	Galv Steel Post W-Shape Posts 2nd LF	Galv Steel Post W-Shape Posts 3rd LF	Max Post Len LF	Post Space FT	Revise Fuse Joint EA	Std Pipe Fdn Dia FT	Std Pipe Fdn Dep FT	Std Pipe Fdn Vol CY	W-Shape Pile LF	Remove Sign Fdns Conc Fdn EA	Remove Sign Fdns W-Shape Pile EA	Reset Sign Panel EA	Reset Sign Support EA	Stub Post EA	Multi Dir Base EA	Comments
WB Ramps																												
30+61 Rt	17							7.0	12.5		3.5				14.8			1.3	6.0	0.3		1		1			1	Do Not Enter
35+80 Rt	11		12.0					7.0	13.9		3.5				17.5			1.3	5.5	0.3		1						EXIT 25 MPH
Sub Total			12.0						**Total** 26.4			**Total** 0.0								0.6	0	2	0	1	0	0	1	
EB Ramps																												
6+65 Lt	11		12.0					7.0	14.1		3.5				17.5			1.3	5.5	0.3		1						EXIT 25 MPH
9+45 Rt								7.0	19.0	19.0	6.0				21.5	4.0		1.8	10.0	1.8		2		1				Rest Area Lt Arrow
10+42 Lt	17							5.0	10.1		3.5				14.8			1.3	5.5	0.3		1		1			1	Do Not Enter
122+53 Lt				55.0				7.0			W4x13	14.1	15.0		15.8	5.5					28	2						
Sub Total			12.0	55.0					**Total** 62.2			**Total** 29.1								2.4	28	6	0	2	0	0	1	
Grand Total			**24.0**	**55.0**					**Total** **88.6**			**Total** **29.1**								**3.0**	**28**	**8**	**0**	**3**	**0**	**0**	**2**	

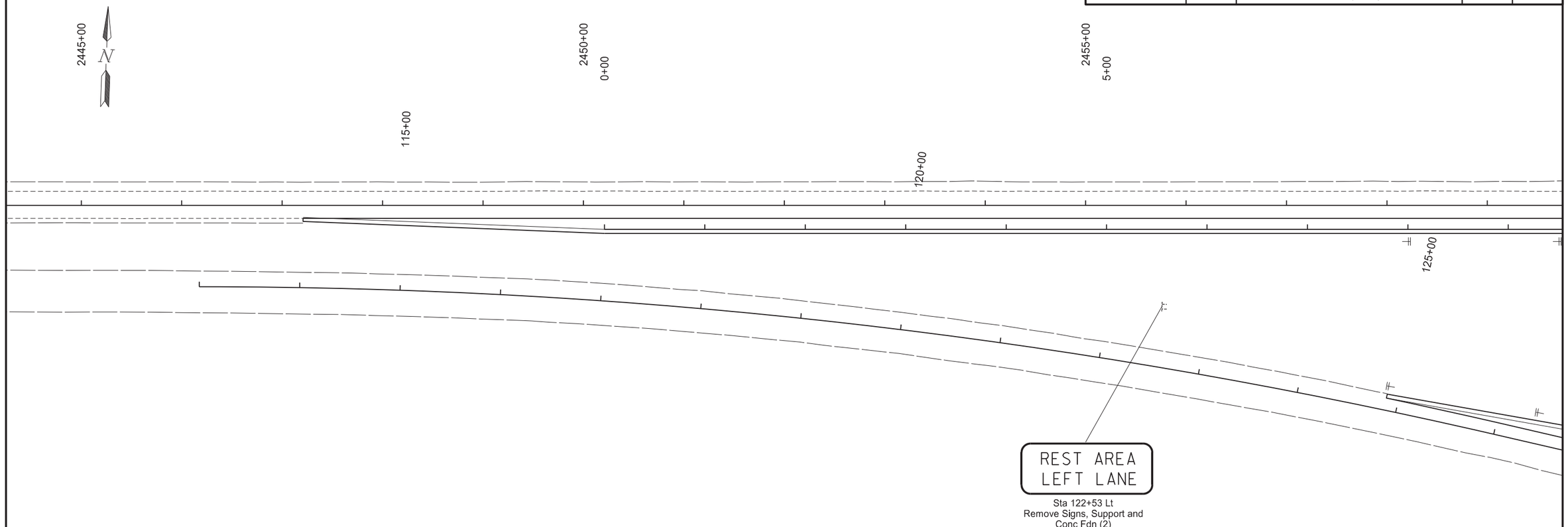


Sign Summary
Round Steel Pipe & W-Shape

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	110	3



SPEC	CODE	BID ITEM	QTY	UNIT
754	0160	DELINEATORS-TYPE B		
	Yellow	WB Sta 8+00 Rt	1	EA
	Yellow	EB Sta 124+88 Lt	1	EA

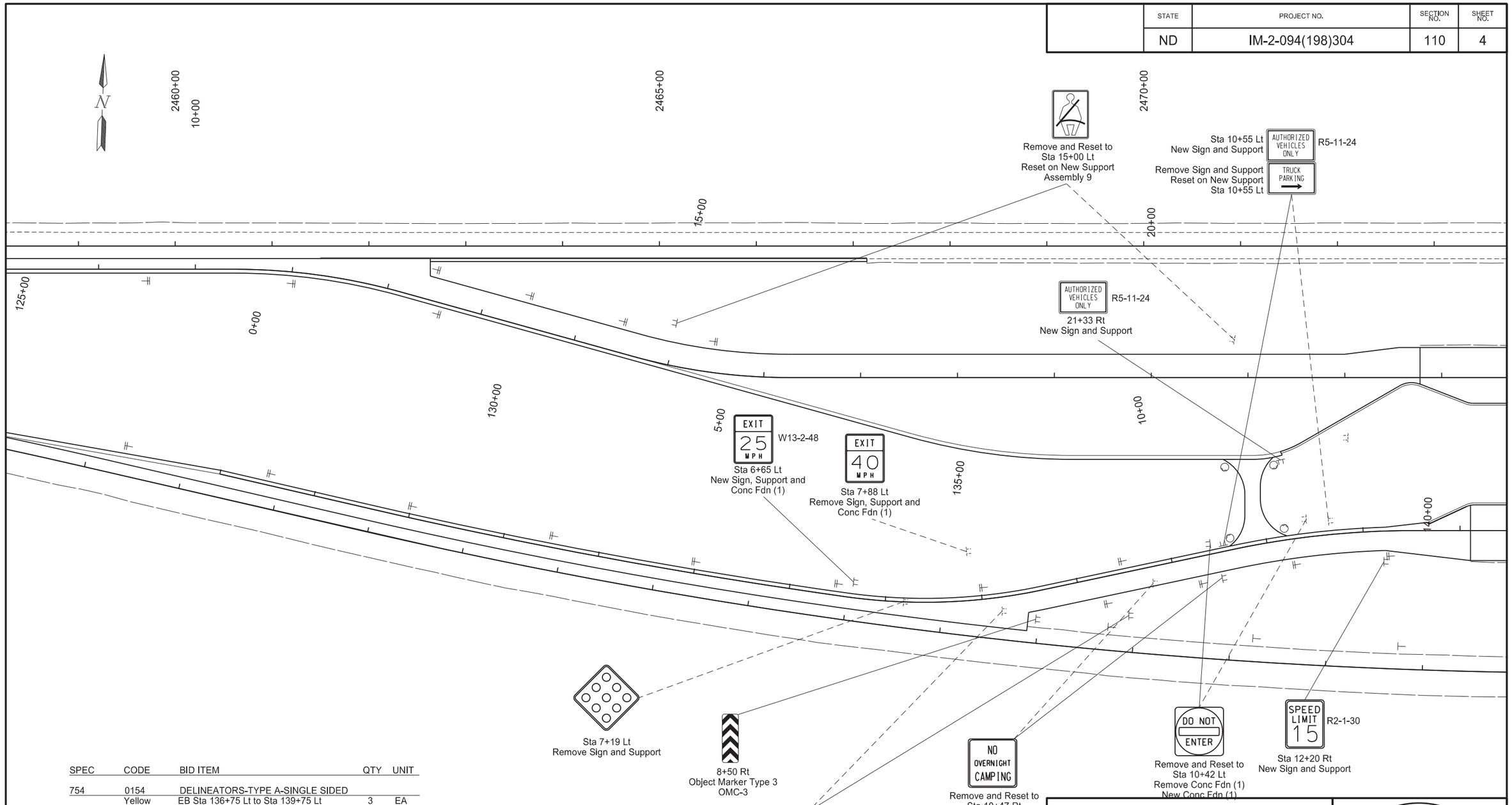
Sign Layouts

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	110	4



SPEC	CODE	BID ITEM	QTY	UNIT
754	0154	DELINEATORS-TYPE A-SINGLE SIDED		
	Yellow	EB Sta 136+75 Lt to Sta 139+75 Lt	3	EA
754	0160	DELINEATORS-TYPE B		
	Yellow	WB Sta 9+50 Rt to Sta 12+50 Rt	3	EA
	White	WB Sta 12+45 Lt to Sta 15+45 Lt	4	EA
	Yellow	EB Sta 126+38 Lt to Sta 133+88 Lt	6	EA
	Yellow	EB Sta 8+00 Lt to Sta 9+50 Lt	2	EA
	White	EB Sta 9+25 Rt to Sta 12+25 Rt	4	EA
754	0168	DELINEATORS-TYPE D		
		WB Sta 22+00 Rt	2	EA
		EB Sta 22+00 Lt	2	EA

Sign Layouts

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	110	5

N

2475+00

DO NOT ENTER
Remove and Reset to
Sta 30+61 Rt
Remove Conc Fdn (1)
New Conc Fdn (1)

SPEED LIMIT 15 R2-1-30
Sta 30+70 Lt
New Sign and Support

SPEED LIMIT 15
Sta 30+70 Lt
Remove Sign and Support

2480+00

NO OVERNIGHT CAMPING
Remove and Reset to
Sta 31+32 Lt

REST AREA
Sta 31+75 Lt
Remain in Place

Add
Object Marker Type 1
OM1-1(2)
See Std Drawing D-754-1

32+82 Lt
Object Marker Type 3
OMC-3

35+00
2485+00

Sta 32+82 Lt
Remove Sign and Support

25+00

30+00

15+00

20+00

AUTHORIZED VEHICLES ONLY R5-11-24
Sta 31+27 Rt
New Sign and Support

TRUCK PARKING
Remove Sign and Support
Reset on New Support
Sta 31+27 Rt

EXIT 40 MPH
Sta 33+20 Rt
Remove Sign, Support and
Conc Fdn (1)

25+00

EXIT 25 MPH W13-2-48
Sta 35+80 Rt
New Sign, Support and
Conc Fdn (1)

155+00

150+00

140+00

145+00

AUTHORIZED VEHICLES ONLY R5-11-24
20+32 Lt
New Sign and Support

PET EXERCISE AREA
Remove Sign and Support
Sta 20+86 Lt

Remove and Reset to
Sta 25+43 Lt

SPEC	CODE	BID ITEM	QTY	UNIT
754	0154	DELINEATORS-TYPE A-SINGLE SIDED		
	Yellow	WB Sta 2479+40 Rt to Sta 2482+40 Rt	3	EA
754	0160	DELINEATORS-TYPE B		
	White	WB Sta 29+15 Lt to Sta 32+15 Lt	7	EA
	Yellow	WB Sta 32+40 Rt to Sta 36+90 Rt	4	EA
	White	EB Sta 22+31 Rt to Sta 25+30 Rt	4	EA
	Yellow	EB Sta 25+30 Lt to Sta 26+80 Lt	2	EA
754	0168	DELINEATORS-TYPE D		
		WB Sta 31+00 Rt	2	EA
		EB Sta 20+50 Lt	2	EA

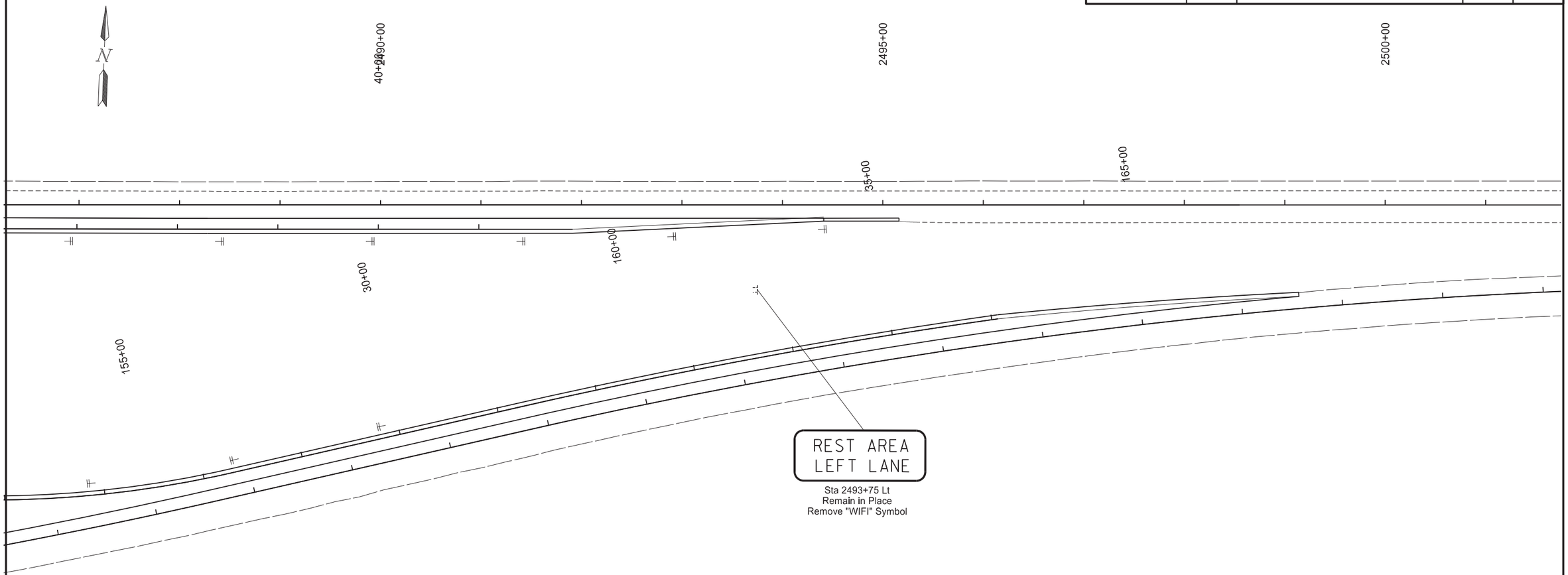
Sign Layouts

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	110	6



Sta 2493+75 Lt
Remain in Place
Remove "WIFI" Symbol

SPEC	CODE	BID ITEM	QTY	UNIT
754	0160	DELINEATORS-TYPE B		
	Yellow	WB Sta 38+40 Rt to Sta 41+40 Rt	3	EA
	Yellow	WB Sta 2492+92 Rt to Sta 2494+42 Rt	2	EA
	Yellow	EB Sta 27+30 Lt to Sta 29+80 Lt	2	EA

Sign Layouts

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

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DANIEL N. GREEN
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	110	7

EB Sta 122+53 Lt



9.00" Radius, 2.00" Border, White on Blue:
"REST", Clearview Hwy-5-W-R specified length; "AREA" Clearview Hwy-5-W-R specified lenght;
"LEFT", Clearview Hwy-5-W-R; "LANE", Clearview Hwy-5-W-R;

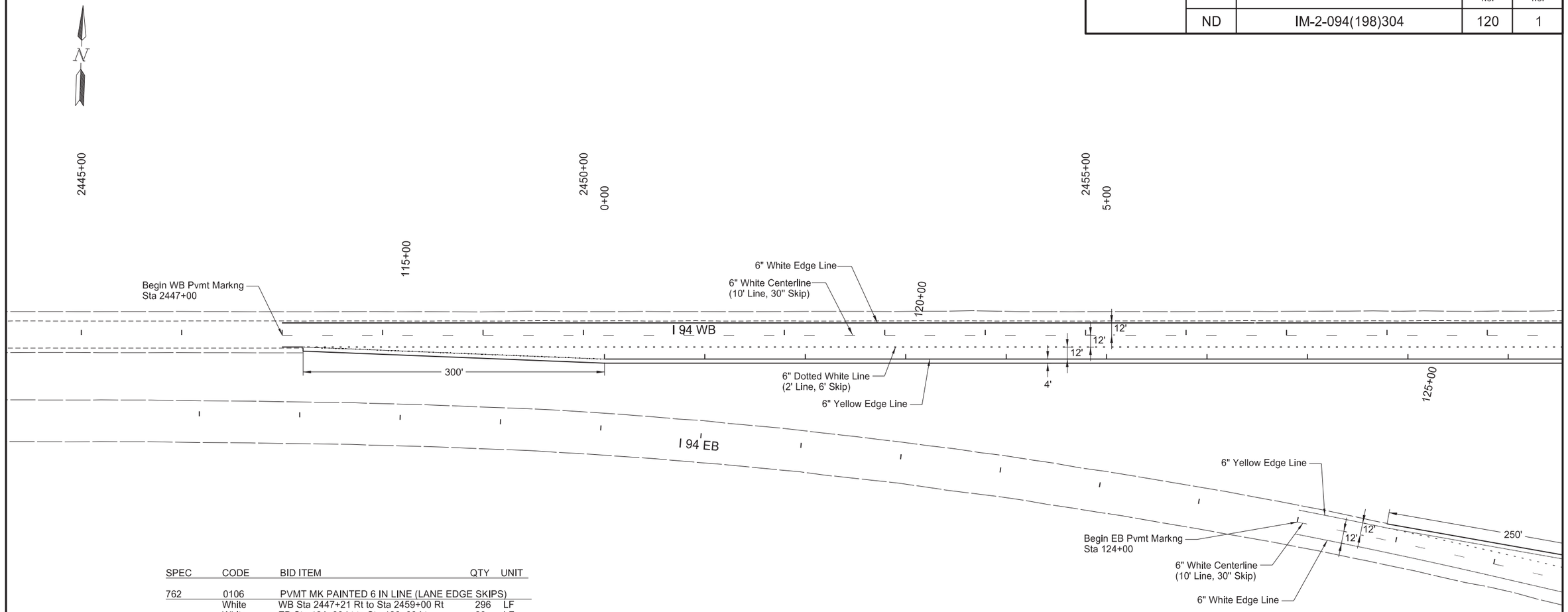
Sign Details

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	120	1



SPEC	CODE	BID ITEM	QTY	UNIT
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE SKIPS)		
	White	WB Sta 2447+21 Rt to Sta 2459+00 Rt	296	LF
	White	EB Sta 124+88 Lt to Sta 126+00 Lt	28	LF
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE LINE)		
	Yellow	WB Sta 2447+00 Rt to Sta 2459+00 Rt	1,200	LF
	White	WB Sta 2447+00 Lt to Sta 2459+00 Lt	1,200	LF
	Yellow	EB Sta 124+00 Lt to Sta 126+00 Lt	201	LF
	White	EB Sta 124+00 Rt to Sta 126+00 Rt	200	LF
762	1307	PREFORMED PATTERNED PVMT MK 6 IN LINE-GROOVED		
	White	WB Sta 2444+06 ℄ to Sta 2459+00 ℄	300	LF
	White	EB Sta 124+00 ℄ to Sta 126+00 ℄	50	LF

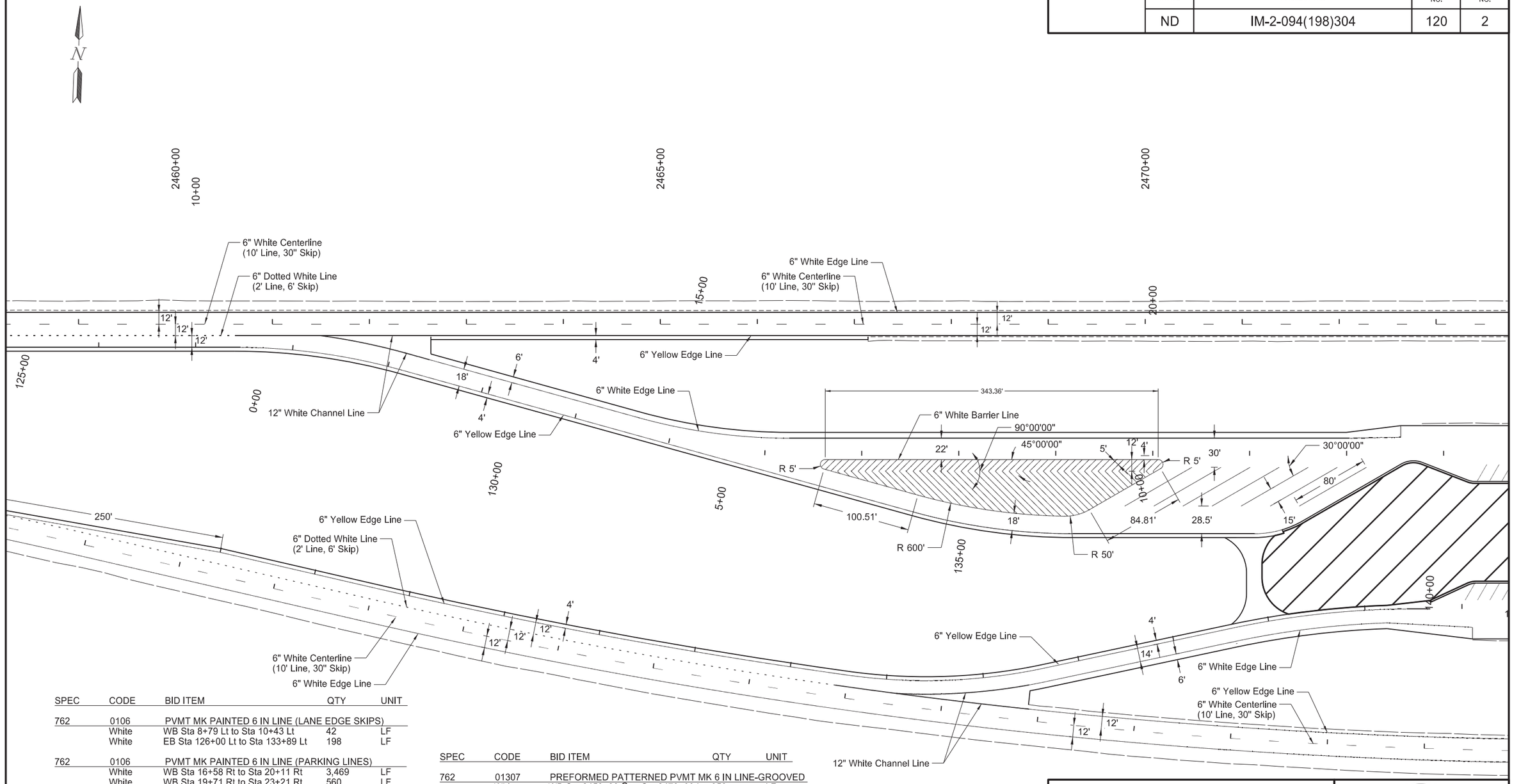
Pavement Marking

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	120	2



SPEC	CODE	BID ITEM	QTY	UNIT
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE SKIPS)		
	White	WB Sta 8+79 Lt to Sta 10+43 Lt	42	LF
	White	EB Sta 126+00 Lt to Sta 133+89 Lt	198	LF
762	0106	PVMT MK PAINTED 6 IN LINE (PARKING LINES)		
	White	WB Sta 16+58 Rt to Sta 20+11 Rt	3,469	LF
	White	WB Sta 19+71 Rt to Sta 23+21 Rt	560	LF
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE LINE)		
	White	WB Sta 2459+00 Lt to Sta 2473+00 Lt	1,300	LF
	Yellow	WB Sta 8+79 ℄ to Sta 23+00 Rt	2,104	LF
	Yellow	WB Sta 2462+63 Rt to Sta 2473+00 Rt	1,037	LF
	White	WB Sta 12+40 Lt to Sta 22+56 Lt	1,012	LF
	Yellow	EB Sta 126+00 Lt to Sta 127+38 Lt	138	LF
	Yellow	EB Sta 0+00 Lt to Sta 12+68 Lt	1,268	LF
	White	EB Sta 8+45 Rt to Sta 13+11 Rt	464	LF
	Yellow	EB Sta 135+89 Lt to Sta 140+00 Lt	411	LF
	White	EB Sta 126+00 Rt to Sta 140+00 Rt	1,400	LF
762	0112	PVMT MK PAINTED 12 IN LINE (CHANNEL EDGE)		
	White	WB Sta 10+43 Lt to Sta 12+40 Lt	315	LF
	White	EB Sta 6+49 Rt to Sta 8+45 Rt	338	LF

SPEC	CODE	BID ITEM	QTY	UNIT
762	01307	PREFORMED PATTERNED PVMT MK 6 IN LINE-GROOVED		
	White	WB Sta 2459+00 ℄ to Sta 2473+00 Lt	350	LF
	White	EB Sta 126+00 ℄ to Sta 140+00 ℄	350	LF

Rest Area Building Project
PCN 23501 - Constructed by Others

Pavement Marking

I-94 Oriska Rest Area

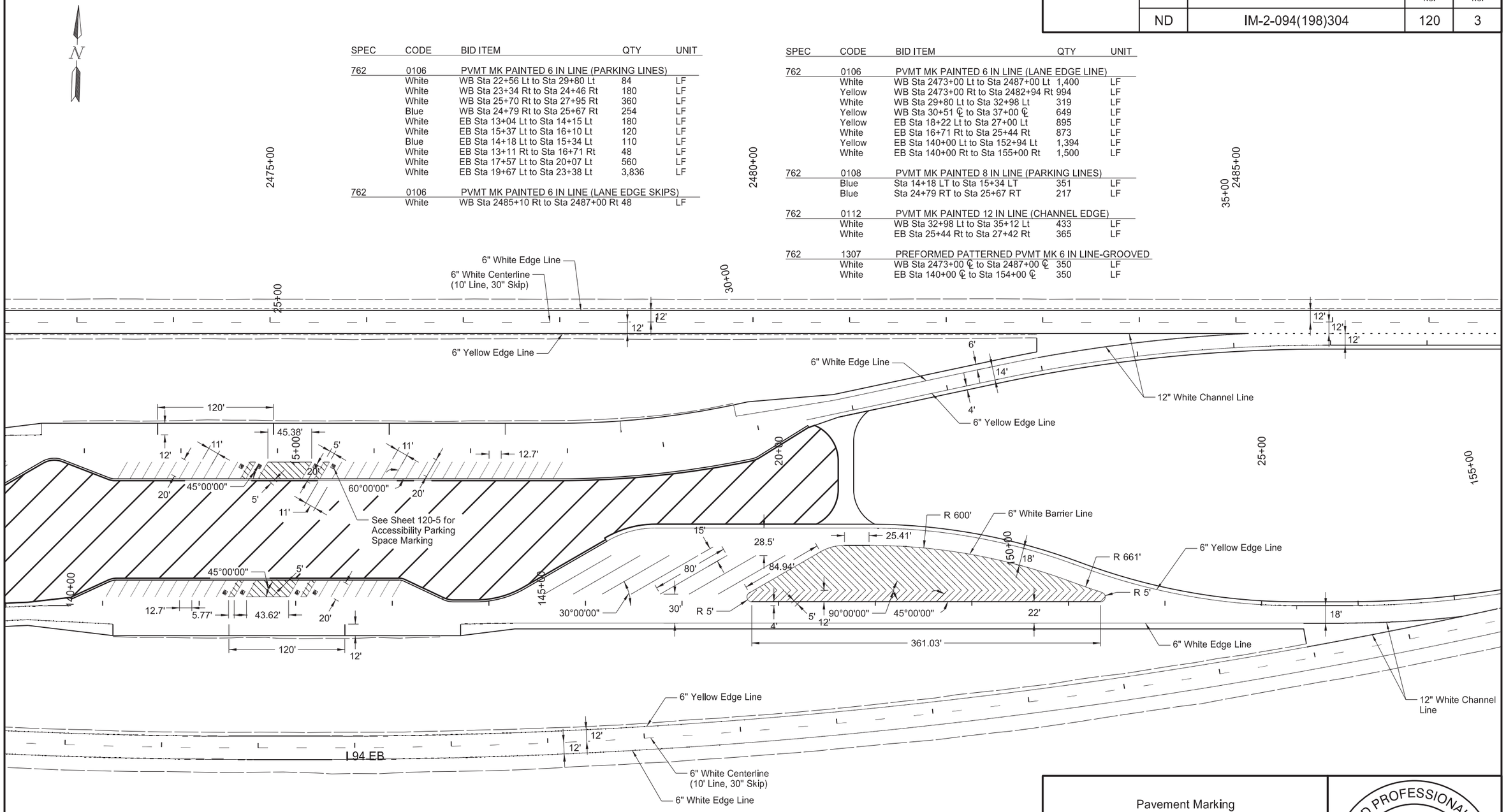
Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	120	3

SPEC	CODE	BID ITEM	QTY	UNIT
762	0106	PVMT MK PAINTED 6 IN LINE (PARKING LINES)		
	White	WB Sta 22+56 Lt to Sta 29+80 Lt	84	LF
	White	WB Sta 23+34 Rt to Sta 24+46 Rt	180	LF
	White	WB Sta 25+70 Rt to Sta 27+95 Rt	360	LF
	Blue	WB Sta 24+79 Rt to Sta 25+67 Rt	254	LF
	White	EB Sta 13+04 Lt to Sta 14+15 Lt	180	LF
	White	EB Sta 15+37 Lt to Sta 16+10 Lt	120	LF
	Blue	EB Sta 14+18 Lt to Sta 15+34 Lt	110	LF
	White	EB Sta 13+11 Rt to Sta 16+71 Rt	48	LF
	White	EB Sta 17+57 Lt to Sta 20+07 Lt	560	LF
	White	EB Sta 19+67 Lt to Sta 23+38 Lt	3,836	LF
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE SKIPS)		
	White	WB Sta 2485+10 Rt to Sta 2487+00 Rt	48	LF

SPEC	CODE	BID ITEM	QTY	UNIT
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE LINE)		
	White	WB Sta 2473+00 Lt to Sta 2487+00 Lt	1,400	LF
	Yellow	WB Sta 2473+00 Rt to Sta 2482+94 Rt	994	LF
	White	WB Sta 29+80 Lt to Sta 32+98 Lt	319	LF
	Yellow	WB Sta 30+51 ℄ to Sta 37+00 ℄	649	LF
	Yellow	EB Sta 18+22 Lt to Sta 27+00 Lt	895	LF
	White	EB Sta 16+71 Rt to Sta 25+44 Rt	873	LF
	Yellow	EB Sta 140+00 Lt to Sta 152+94 Lt	1,394	LF
	White	EB Sta 140+00 Rt to Sta 155+00 Rt	1,500	LF
762	0108	PVMT MK PAINTED 8 IN LINE (PARKING LINES)		
	Blue	Sta 14+18 LT to Sta 15+34 LT	351	LF
	Blue	Sta 24+79 RT to Sta 25+67 RT	217	LF
762	0112	PVMT MK PAINTED 12 IN LINE (CHANNEL EDGE)		
	White	WB Sta 32+98 Lt to Sta 35+12 Lt	433	LF
	White	EB Sta 25+44 Rt to Sta 27+42 Rt	365	LF
762	1307	PREFORMED PATTERNED PVMT MK 6 IN LINE-GROOVED		
	White	WB Sta 2473+00 ℄ to Sta 2487+00 ℄	350	LF
	White	EB Sta 140+00 ℄ to Sta 154+00 ℄	350	LF



Rest Area Building Project
PCN 23501 - Constructed by Others

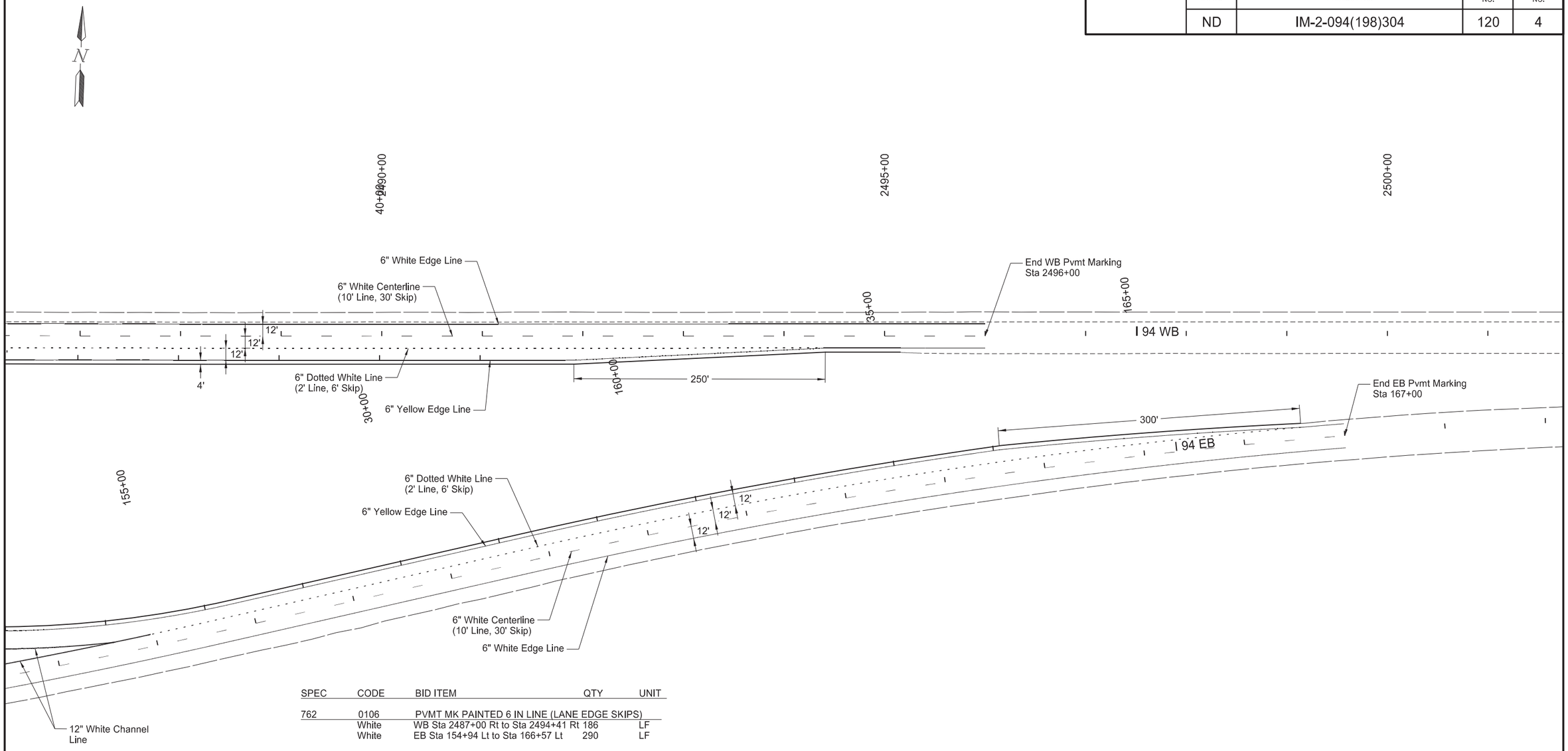
Pavement Marking

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	120	4



SPEC	CODE	BID ITEM	QTY	UNIT
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE SKIPS)		
	White	WB Sta 2487+00 Rt to Sta 2494+41 Rt	186	LF
	White	EB Sta 154+94 Lt to Sta 166+57 Lt	290	LF
762	0106	PVMT MK PAINTED 6 IN LINE (LANE EDGE LINE)		
	White	WB Sta 2487+00 Lt to Sta 2496+00 Lt	900	LF
	Yellow	WB Sta 2486+98 Rt to Sta 2496+00 Rt	902	LF
	Yellow	EB Sta 154+53 Lt to Sta 167+00 Lt	1,250	LF
	White	EB Sta 154+00 Rt to Sta 167+00 Rt	1,300	LF
762	1307	PREFORMED PATTERNED PVMT MK 6 IN LINE-GROOVED		
	White	WB Sta 2487+00 ℄ to Sta 2496+00 ℄	230	LF
	White	EB Sta 155+00 ℄ to Sta 167+00 ℄	400	LF

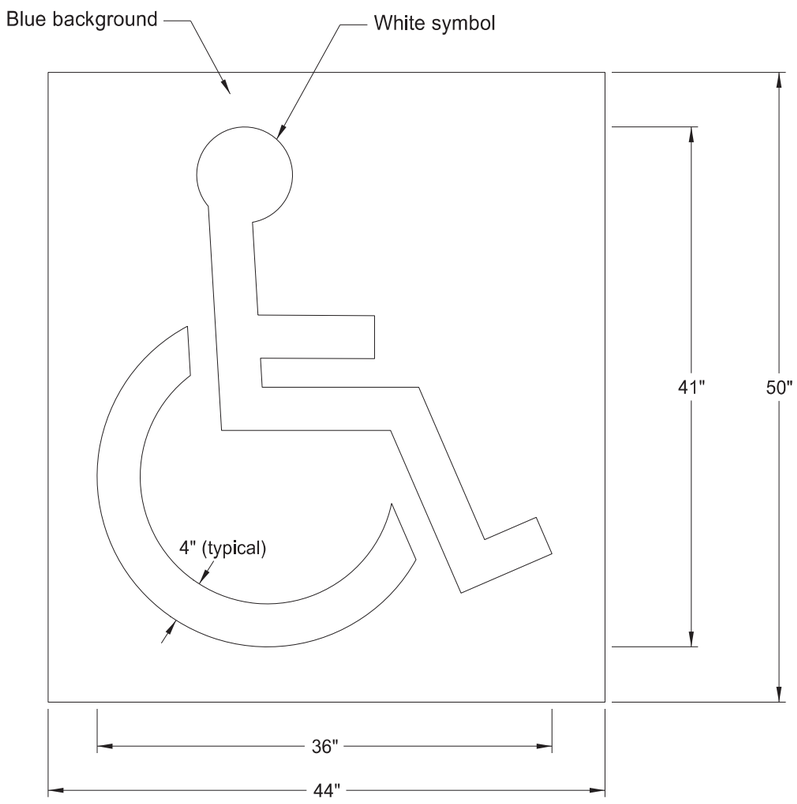
Pavement Marking

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
DANIEL N. GREEN
PE-7616
Daniel N. Green
DATE: 12-12-24
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	120	5



Total Area = 15 SF

Note: See the 2004 Standard Highway Signs Manual for symbol detail.

Pavement Marking Message Detail
Accessibility Parking Space Marking

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
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PE-7616
Daniel N. Green
DATE: 12-12-24
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	1

N

Sta 28+04.3, 36.9' Lt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 26+55.1, 37.1' Lt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 29+64.8, 36.5' Lt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 31+21.8, 29.0' Lt
Remove Existing Light Standard,
Luminaire, and Concrete Foundatio

Sta 25+04.5, 36.2' Lt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 23+55.6, 36.2' Lt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 12+90.3, 37.6' Rt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 15+99.8, 36.6' Rt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 17+59.3, 34.9' Rt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

Sta 14+50.0, 37.0' Rt
Remove Existing Light Standard,
Luminaire, and Concrete Foundation

I 94 EB

Rest Area Building Project
PCN 23501 - Constructed by Others

Lighting Removals

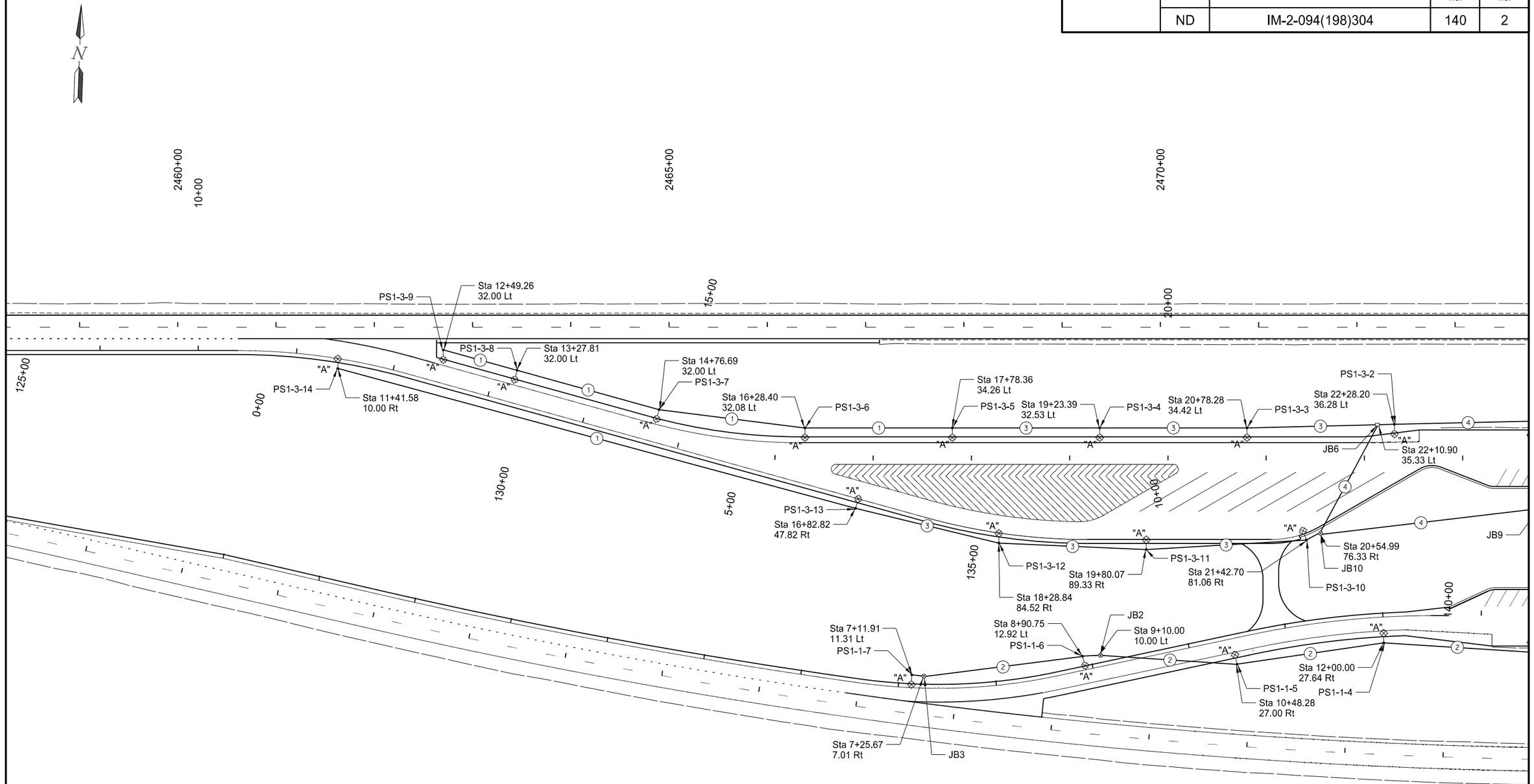
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 12/13/24
NORTH DAKOTA

11/1/2024 11:16:42 AM DNG01213 F:\Proj\14000\14946\14946.614\Project\200094304.198\Consultant\Design\Plan Sheets\140LT_001_Remove.dgn

Revised 3/18/25	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	2



FEEDER SCHEDULE:

(1) 2-8 & 1-8G IN 2"C

(2) 2-6 & 1-6G IN 2" C

(3) 2-3 & 1-3G IN 2"C

(4) 2-3, 2-8, 1-3G, & 1-8G IN 2"C

Lighting Plan

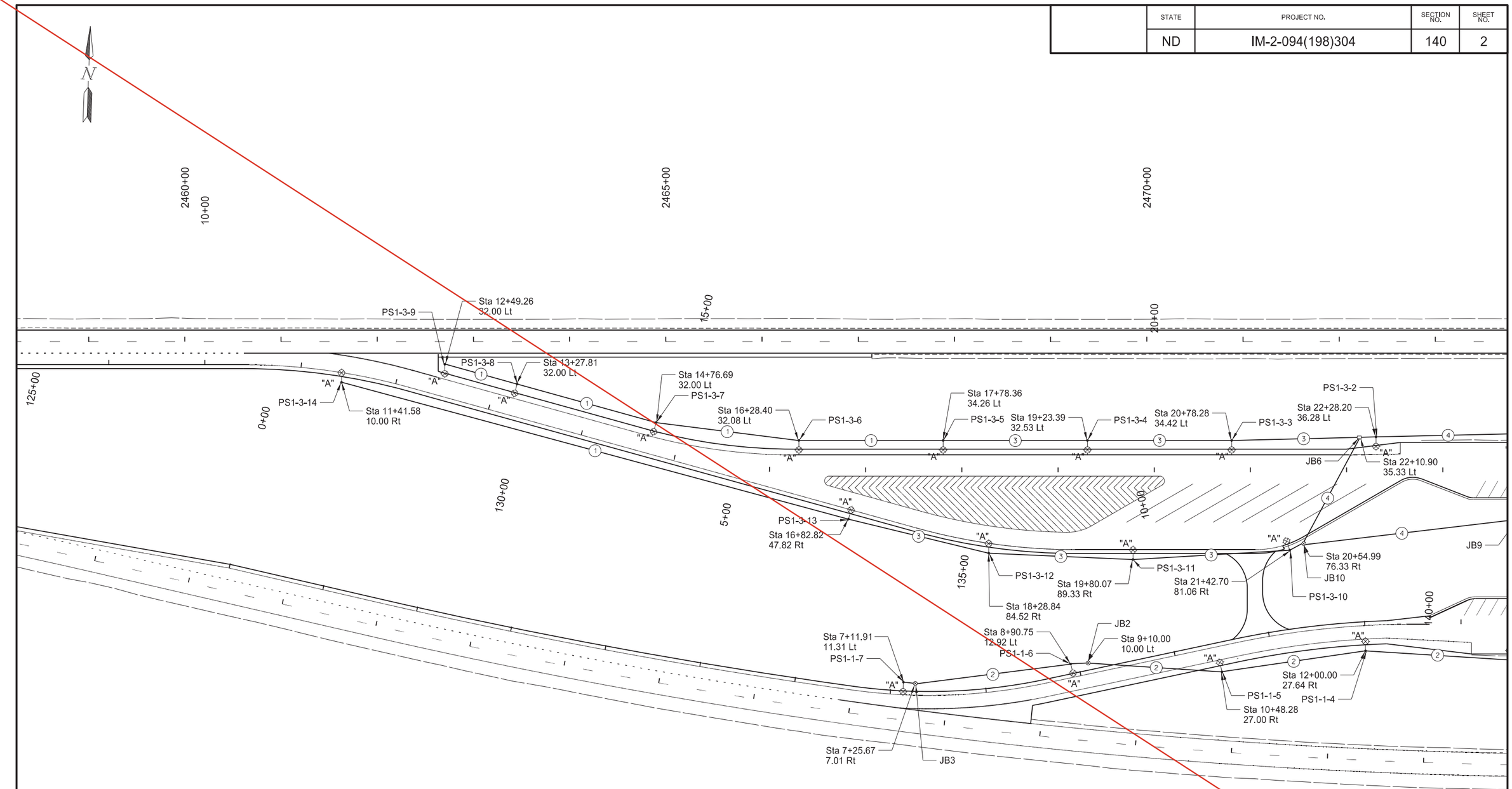
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 03/18/25
NORTH DAKOTA

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	2



FEEDER SCHEDULE:

(1) 2-8 & 1-8G IN 3/4"C

(2) 2-6 & 1-6G IN 3/4" C

(3) 2-3 & 1-3G IN 1-1/2 "C

(4) 2-3, 2-8, 1-3G, & 1-8G IN 2"C

Lighting Plan

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

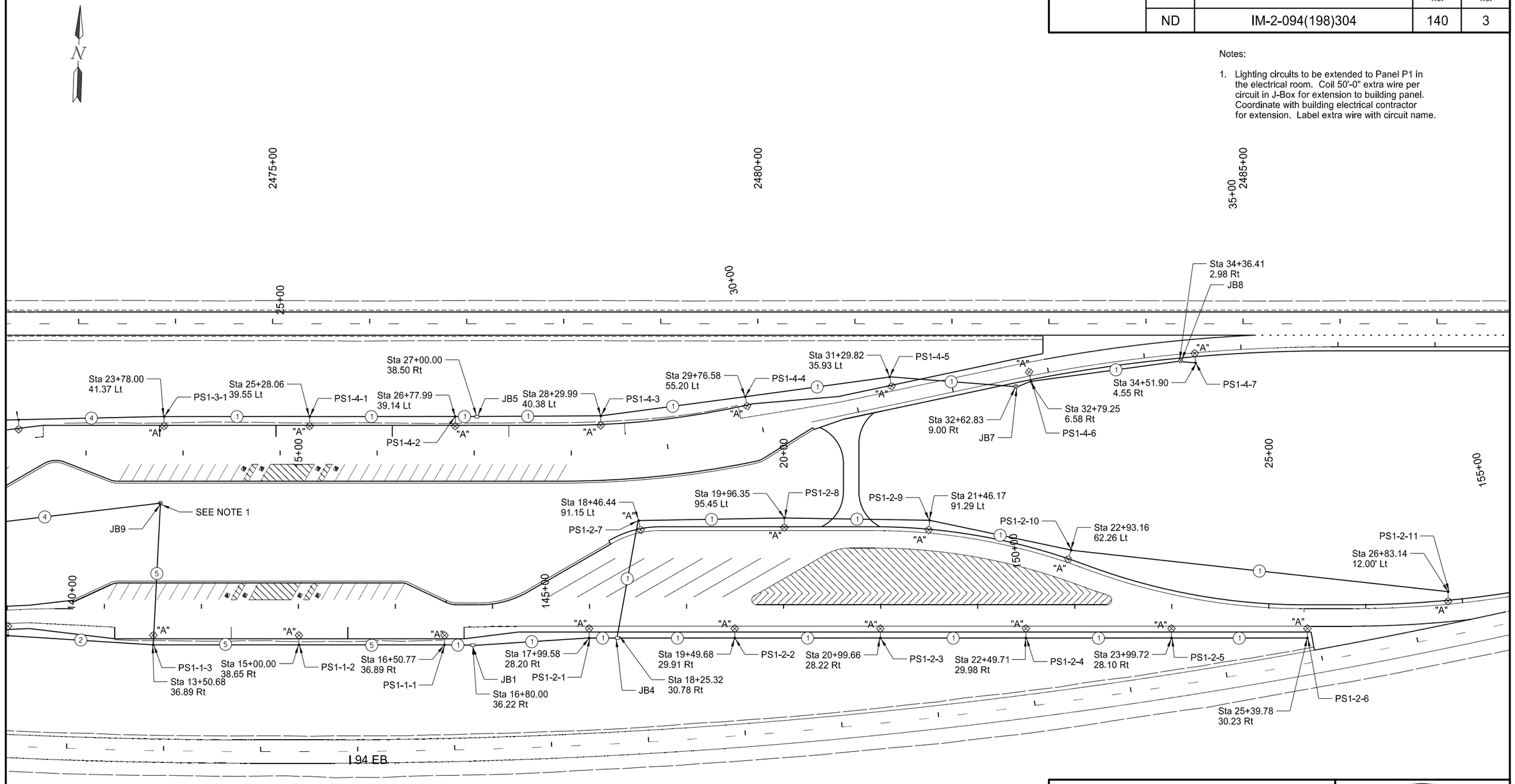
REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 12/13/24
NORTH DAKOTA

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Revised	3/18/25	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
		ND	IM-2-094(198)304	140	3

Notes:

1. Lighting circuits to be extended to Panel P1 in the electrical room. Coil 50'-0" extra wire per circuit in J-Box for extension to building panel. Coordinate with building electrical contractor for extension. Label extra wire with circuit name.



FEEDER SCHEDULE:

1. 2-8 & 1-8G IN 2"C
2. 2-6 & 1-6G IN 2" C
3. 2-3 & 1-3G IN 2"C
4. 2-3, 2-8, 1-3G, & 1-8G IN 2"C
5. 2-8, 2-6, 1-8G, 1-6G IN 2" C

Lighting Plan

I-94 Oriska Rest Area

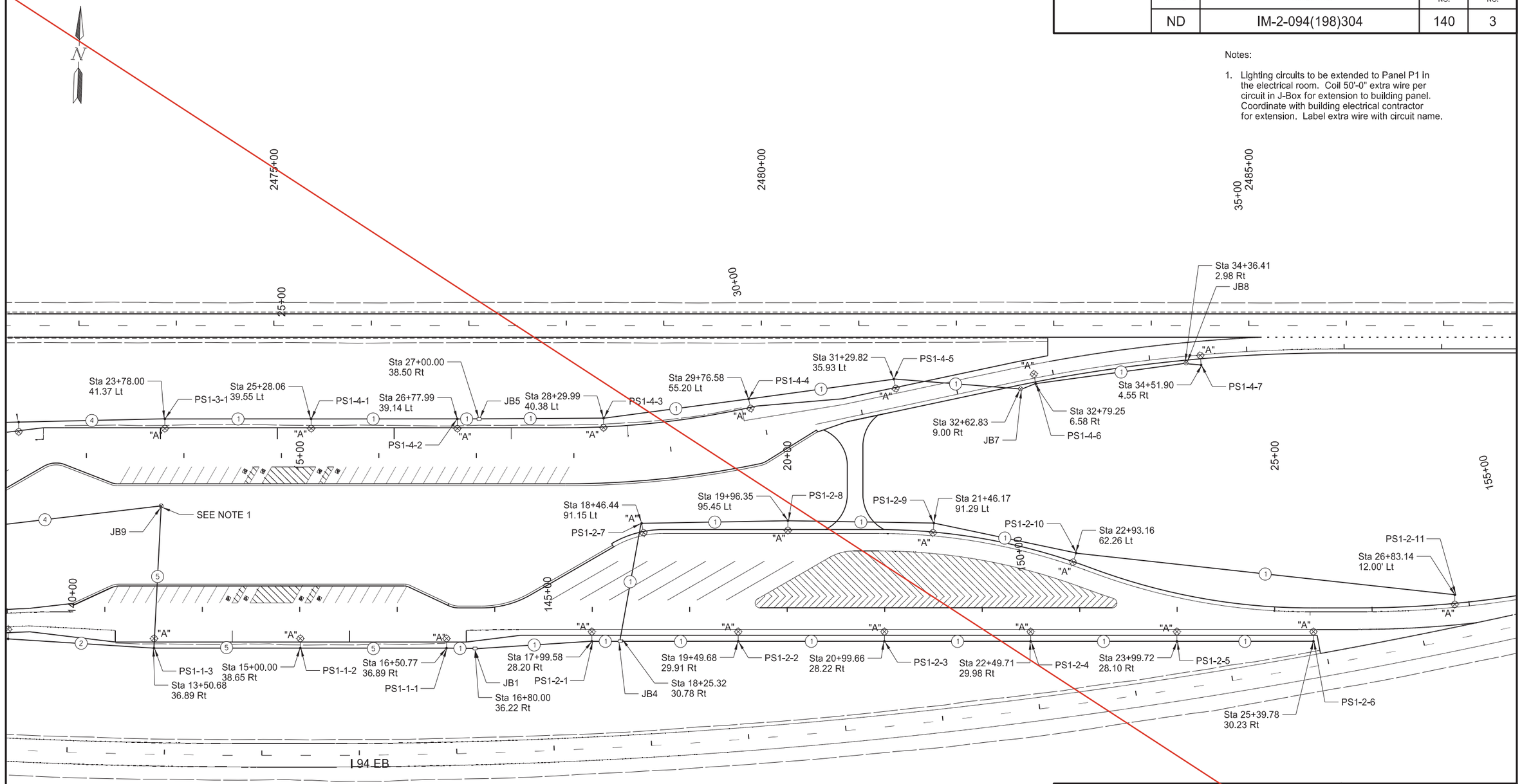
Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 03/18/25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	3

Notes:

1. Lighting circuits to be extended to Panel P1 in the electrical room. Coil 50'-0" extra wire per circuit in J-Box for extension to building panel. Coordinate with building electrical contractor for extension. Label extra wire with circuit name.



FEEDER SCHEDULE:

1. 2-8 & 1-8G IN 3/4"C
2. 2-6 & 1-6G IN 3/4" C
3. 2-3 & 1-3G IN 1-1/2 "C
4. 2-3, 2-8, 1-3G, & 1-8G IN 2"C
5. 2-8, 2-6, 1-8G, 1-6G IN 2" C

Lighting Plan

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 12/13/24
NORTH DAKOTA

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Revised 3/18/25	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	4

LIGHTING AND ELECTRICAL QUANTITIES SCHEDULE

CIRCUIT	FROM - TO	CENTER TO CENTER	CABLE 6 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	CABLE 8 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	CABLE 3 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	2" CONDUIT (LF)	TYPE 1 TRENCHING (LF)	CABLE 10 AWG 1 CONDUCTOR POWER (LF)	NOTES
1,2,3,4	P1 - JB9	100	105	105	105	100	100		
1,2,3,4	JB9 - JB10	215		220	220	215	215		
1	JB9 - PS1-1-3	135	140	140		135	135	120	
1	PS1-1-3 - PS1-1-4	150	155			150	150	120	
1	PS1-1-4 - PS1-1-5	150	155			150	150	120	
1	PS1-1-5 - JB2	150	155			150	150	120	
1	JB2 - PS1-1-6	150	155			150	150	120	
1	PS1-1-6 - JB3	160	165			160	160	120	
1	JB3 - PS1-1-7	10	15			10	10		
1	PS1-1-3 - PS1-1-2	150	155	155		150	150		
1	PS1-1-2 - PS1-1-1	150	155	155		150	150	120	
2	PS1-1-1 - JB1	30	35	35		30	30	120	
2	JB1 - PS1-2-1	120		125		120	120		
2	PS1-2-1 - JB4	25		30		25	25	120	
2	JB4 - PS1-2-2	120		125		120	120	120	
2	PS1-2-2 - PS1-2-3	150		155		150	150	120	
2	PS1-2-3 - PS1-2-4	150		155		150	150	120	
2	PS1-2-4 - PS1-2-5	150		155		150	150	120	
2	PS1-2-5 - PS1-2-6	150		155		150	150	120	
2	JB4 - PS1-2-7	120		125		120	120	120	
2	PS1-2-7 - PS1-2-8	150		155		150	150	120	
2	PS1-2-8 - PS1-2-9	150		155		150	150	120	
2	PS1-2-9 - PS1-2-10	150		155		150	150	120	
2	PS1-2-10 - PS1-2-11	390		395		390	390		
3	JB10 - JB6	120		125	125	120	120	120	
3	JB6 - PS1-3-2	150		155	155	150	150		
3	PS1-3-2 - PS1-3-1	150		155	155	150	150		
3	PS1-3-2 - PS1-3-3	150			155	150	150		
3	PS1-3-3 - PS1-3-4	150			155	150	150	120	
3	PS1-3-4 - PS1-3-5	150			155	150	150	120	
3	PS1-3-5 - PS1-3-6	150			155	150	150	120	
3	PS1-3-6 - PS1-3-7	150			155	150	150	120	
3	PS1-3-7 - PS1-3-8	150			155	150	150	120	
3	PS1-3-8 - PS1-3-9	80			85	80	80	120	
3	JB10 - PS1-3-10	20			25	20	20		
3	PS1-3-10 - PS1-3-11	150			155	150	150	120	
3	PS1-3-11 - PS1-3-12	150			155	150	150	120	
3	PS1-3-12 - PS1-3-13	150			155	150	150	120	
3	PS1-3-13 - PS1-3-14	150			155	150	150	120	
3	PS1-3-1 - PS1-4-1	150		155		150	150	120	
4	PS1-4-1 - PS1-4-2	150		155		150	150	120	
4	PS1-4-2 - JB5	25		30		25	25	120	
4	JB5 - PS1-4-3	125		130		125	125	120	
4	PS1-4-3 - PS1-4-4	150		155		150	150	120	
4	PS1-4-4 - PS1-4-5	150		155		150	150	120	
4	PS1-4-5 - JB7	150		155		150	150	120	
4	JB7 - PS1-4-6	20	25	25		20	20	120	
4	PS1-4-6 - JB8	150	155	155		150	150		
4	JB8 - PS1-4-7	15	20	20		15	15		
		TOTAL:	1590	4265	2420	3310	3310	4440	
		USE:	1600	4300	2600	3400	3400	4600	

NOTES:
1. COORDINATE WITH UTILTY FOR EXACT LOCATION AND LENGTH OF FEEDERS AND CONDUIT.
GENERAL NOTE: CONTRACTOR HAS OPTION TO USE SINGLE CONDUCTORS IN CONDUIT OT MULTIPLE UNDERGROUND CABLE WITHOUT CONDUIT.

Lighting Schedules

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 03/18/25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	4

LIGHTING AND ELECTRICAL QUANTITIES SCHEDULE

CIRCUIT	FROM - TO	CENTER TO CENTER	CABLE CONDUIT, 1", 6 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	CABLE CONDUIT, 2", 6 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	CABLE CONDUIT, 1", 8 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	CABLE CONDUIT, 2", 8 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	CABLE CONDUIT, 2", 3 AWG, 2 CONDUCTORS & 1 BARE NEUTRAL (LF)	TYPE 1 TRENCHING (LF)	CABLE 10 AWG 1 CONDUCTOR POWER (LF)	NOTES
1,2,3,4	P1 - JB9	100	105		105		105			
1,2,3,4	JB9 - JB10	215	220		220		220			
1	JB9 - PS1-1-3	135		140				135	120	
1	PS1-1-3 - PS1-1-4	150	155					150	120	
1	PS1-1-4 - PS1-1-5	150	155					150	120	
1	PS1-1-5 - JB2	150		155				150	120	
1	JB2 - PS1-1-6	150	155					150	120	
1	PS1-1-6 - JB3	160	165					160	120	
1	JB3 - PS1-1-7	10	15					10		
1	PS1-1-3 - PS1-1-2	150	155					150		
1	PS1-1-2 - PS1-1-1	150	155					150	120	
2	PS1-1-1 - JB1	30	35					30	120	
2	JB1 - PS1-2-1	120			125			120		
2	PS1-2-1 - JB4	25			30			25	120	
2	JB4 - PS1-2-2	120			125			120	120	
2	PS1-2-2 - PS1-2-3	150			155			150	120	
2	PS1-2-3 - PS1-2-4	150			155			150	120	
2	PS1-2-4 - PS1-2-5	150			155			150	120	
2	PS1-2-5 - PS1-2-6	150			155			150	120	
2	JB4 - PS1-2-7	120				125		120	120	
2	PS1-2-7 - PS1-2-8	150			155			150	120	
2	PS1-2-8 - PS1-2-9	150			155			150	120	
2	PS1-2-9 - PS1-2-10	150			155			150	120	
2	PS1-2-10 - PS1-2-11	390			395			390		
3	JB10 - JB6	120				125	125	120	120	
3	JB6 - PS1-3-2	150			155		155	150		
3	PS1-3-2 - PS1-3-1	150			155		155			
3	PS1-3-2 - PS1-3-3	150					155	150		
3	PS1-3-3 - PS1-3-4	150					155	150	120	
3	PS1-3-4 - PS1-3-5	150					155	150	120	
3	PS1-3-5 - PS1-3-6	150					155	150	120	
3	PS1-3-6 - PS1-3-7	150					155	150	120	
3	PS1-3-7 - PS1-3-8	150					155	150	120	
3	PS1-3-8 - PS1-3-9	80					85	80	120	
3	JB10 - PS1-3-10	20					25	20		
3	PS1-3-10 - PS1-3-11	150					155	150	120	
3	PS1-3-11 - PS1-3-12	150					155	150	120	
3	PS1-3-12 - PS1-3-13	150					155	150	120	
3	PS1-3-13 - PS1-3-14	150					155	150	120	
3	PS1-3-1 - PS1-4-1	150			155			150	120	
4	PS1-4-1 - PS1-4-2	150			155			150	120	
4	PS1-4-2 - JB5	25			30			25	120	
4	JB5 - PS1-4-3	125			130			125	120	
4	PS1-4-3 - PS1-4-4	150			155			150	120	
4	PS1-4-4 - PS1-4-5	150			155			150	120	
4	PS1-4-5 - JB7	150				155		150	120	
4	JB7 - PS1-4-6	20			25			20	120	
4	PS1-4-6 - JB8	150			155			150		
4	JB8 - PS1-4-7	15			20			15		
		TOTAL:	1315	295	3375	405	2420	2945	4440	
		USE:	1500	400	3500	500	2600	3200	4600	

NOTES:
1. COORDINATE WITH UTILTY FOR EXACT LOCATION AND LENGTH OF FEEDERS AND CONDUIT.
GENERAL NOTE: CONTRACTOR HAS OPTION TO USE SINGLE CONDUCTORS IN CONDUIT OT MULTIPLE UNDERGROUND CABLE WITHOUT CONDUIT.

Lighting Schedules

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 12/13/24
NORTH DAKOTA

Revised 3/18/25	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	140	5

LIGHT POLES AND APPURTENANCES

POLE NUMBER	CIRCUIT NUMBER	STATION	OFFSET	LED - A 150 WATT (EACH)	BRACKET ARM 8 FT. (EACH)	TYPE AT - 30 FT LIGHTING POLE (EACH)	BREAKAWAY POLE FOUNDATION 30 FT M.H. (EACH)
PS1-1-1	1	16+50.77	36.89 RT	1	1	1	1
PS1-1-2	1	15+0.00	38.65 RT	1	1	1	1
PS1-1-3	1	13+50.68	36.89 RT	1	1	1	1
PS1-1-4	1	12+0.00	27.64 RT	1	1	1	1
PS1-1-5	1	10+48.28	27.00 RT	1	1	1	1
PS1-1-6	1	8+90.75	12.92 LT	1	1	1	1
PS1-1-7	1	7+11.91	11.31 LT	1	1	1	1
PS1-2-1	2	17+99.58	28.20 RT	1	1	1	1
PS1-2-2	2	19+49.68	29.91 RT	1	1	1	1
PS1-2-3	2	20+99.66	28.22 RT	1	1	1	1
PS1-2-4	2	22+49.71	29.98 RT	1	1	1	1
PS1-2-5	2	23+99.72	28.1 LT	1	1	1	1
PS1-2-6	2	25+39.78	30.23 RT	1	1	1	1
PS1-2-7	2	18+46.44	91.15 LT	1	1	1	1
PS1-2-8	2	19+96.35	95.45 LT	1	1	1	1
PS1-2-9	2	21+46.17	91.29 LT	1	1	1	1
PS1-2-10	2	22+93.16	62.26 LT	1	1	1	1
PS1-2-11	2	26+83.14	12.00 LT	1	1	1	1
PS1-3-1	3	23+78.00	41.37 LT	1	1	1	1
PS1-3-2	3	22+28.20	36.28 LT	1	1	1	1
PS1-3-3	3	20+78.28	34.42 LT	1	1	1	1
PS1-3-4	3	19+23.39	32.53 LT	1	1	1	1
PS1-3-5	3	17+78.36	34.26 LT	1	1	1	1
PS1-3-6	3	16+28.40	32.08 LT	1	1	1	1
PS1-3-7	3	14+76.69	32.00 LT	1	1	1	1
PS1-3-8	3	13+27.81	32.00 LT	1	1	1	1
PS1-3-9	3	12+49.26	32.00 LT	1	1	1	1
PS1-3-10	3	21+42.70	81.06 RT	1	1	1	1
PS1-3-11	3	19+80.07	89.33 RT	1	1	1	1
PS1-3-12	3	18+28.84	84.52 RT	1	1	1	1
PS1-3-13	3	16+82.82	47.82 RT	1	1	1	1
PS1-3-14	3	11+41.58	10.00 RT	1	1	1	1
PS1-4-1	4	25+28.06	39.55 LT	1	1	1	1
PS1-4-2	4	26+77.99	39.14 LT	1	1	1	1
PS1-4-3	4	28+29.99	40.38 LT	1	1	1	1
PS1-4-4	4	29+76.58	55.20 LT	1	1	1	1
PS1-4-5	4	31+29.82	35.93 LT	1	1	1	1
PS1-4-6	4	32+79.25	6.58 RT	1	1	1	1
PS1-4-7	4	34+51.90	4.55 RT	1	1	1	1
				39	39	39	39

LIGHTING FIXTURE SCHEDULE

MARK	MANUFACTURER	CATALOG NUMBER	MOUNTING POLE	LAMP TYPE	WATTS	NOTES
A	ACUITY	ATB0-P302-MVOLT-R3-X	X	LED	83	1,2,3,4

NOTES:
1. E/C TO PROVIDE 30'-0" POLE PER NDDOT REQUIREMENTS.
2. E/C TO VERIFY FIXTURE AND POLE FINISH PER NDDOT REQUIREMENTS.
3. E/C TO PROVIDE 8'-0" BRACKET ARM.
4. EQUIVALENT MANUFACTURERS ARE CREE LIGHTING AND LEOTEK.

PULL BOX SCHEDULE W/ TYPE II DRAIN

PULL BOX NUMBER	STATION	OFFSET	TYPE I CONCRETE STANDARD PULL BOX EACH	TYPE II PREFORMED CLASS 2 PULL BOX EACH
JB1	16+0.00	36.22 RT		1
JB2	9+10.00	10.25 LT	1	
JB3	7+25.67	7.01 LT	1	
JB4	18+25.32	30.78 RT		1
JB5	27+00	38.50 LT		1
JB6	22+10.90	35.33 LT		1
JB7	32+62.83	9.00 RT	1	
JB8	34+36.41	2.98 RT	1	
JB9	FIELD VERIFY	FIELD VERIFY	1	
JB10	20+54.66	76.33 RT	1	
		TOTAL	6	4

ID NO	SUMMARY OF ELECTRIC LIGHTING SYSTEM QUANTITIES (HARDWARE)		
	Item	Unit	Quantity
1	Type 1 Junction Box	EA	6
2	Type 2 Junction Box	EA	4
3	Light Pole - 30 Ft.	EA	39
4	LED Fixture "A"	EA	39
5	Light Pole Bracket Arm - 8 Ft.	EA	39
6	Breakway Pole Base	EA	39
7	2" Rigid Conduit Trenched	LF	3,400
8	Cable 3 AWG 2 Conductor with Bare Neutral Power	LF	2,600
9	Cable 6 AWG 2 Conductor with Bare Neutral Power	LF	1,600
10	Cable 8 AWG 2 Conductor with Bare Neutral Power	LF	4,300
11	Pole Cable 10 AWG 1 Conductor	LF	4,600
12	10 Ft. Ground Rod	EA	39
13	30 Ft Pole Foundation	EA	39
14	Trenching/Backfill	LF	3,400

LIghting Schedules

I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 03/18/25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(198)304	140	5

LIGHT POLES AND APPURTENANCES

POLE NUMBER	CIRCUIT NUMBER	STATION	OFFSET	LED - A 150 WATT (EACH)	BRACKET ARM 8 FT. (EACH)	TYPE AT - 30 FT LIGHTING POLE (EACH)	BREAKAWAY POLE FOUNDATION 30 FT M.H. (EACH)
PS1-1-1	1	16+50.77	36.89 RT	1	1	1	1
PS1-1-2	1	15+0.00	38.65 RT	1	1	1	1
PS1-1-3	1	13+50.68	36.89 RT	1	1	1	1
PS1-1-4	1	12+0.00	27.64 RT	1	1	1	1
PS1-1-5	1	10+48.28	27.00 RT	1	1	1	1
PS1-1-6	1	8+90.75	12.92 LT	1	1	1	1
PS1-1-7	1	7+11.91	11.31 LT	1	1	1	1
PS1-2-1	2	17+99.58	28.20 RT	1	1	1	1
PS1-2-2	2	19+49.68	29.91 RT	1	1	1	1
PS1-2-3	2	20+99.66	28.22 RT	1	1	1	1
PS1-2-4	2	22+49.71	29.98 RT	1	1	1	1
PS1-2-5	2	23+99.72	28.1 LT	1	1	1	1
PS1-2-6	2	25+39.78	30.23 RT	1	1	1	1
PS1-2-7	2	18+46.44	91.15 LT	1	1	1	1
PS1-2-8	2	19+96.35	95.45 LT	1	1	1	1
PS1-2-9	2	21+46.17	91.29 LT	1	1	1	1
PS1-2-10	2	22+93.16	62.26 LT	1	1	1	1
PS1-2-11	2	26+83.14	12.00 LT	1	1	1	1
PS1-3-1	3	23+78.00	41.37 LT	1	1	1	1
PS1-3-2	3	22+28.20	36.28 LT	1	1	1	1
PS1-3-3	3	20+78.28	34.42 LT	1	1	1	1
PS1-3-4	3	19+23.39	32.53 LT	1	1	1	1
PS1-3-5	3	17+78.36	34.26 LT	1	1	1	1
PS1-3-6	3	16+28.40	32.08 LT	1	1	1	1
PS1-3-7	3	14+76.69	32.00 LT	1	1	1	1
PS1-3-8	3	13+27.81	32.00 LT	1	1	1	1
PS1-3-9	3	12+49.26	32.00 LT	1	1	1	1
PS1-3-10	3	21+42.70	81.06 RT	1	1	1	1
PS1-3-11	3	19+80.07	89.33 RT	1	1	1	1
PS1-3-12	3	18+28.84	84.52 RT	1	1	1	1
PS1-3-13	3	16+82.82	47.82 RT	1	1	1	1
PS1-3-14	3	11+41.58	10.00 RT	1	1	1	1
PS1-4-1	4	25+28.06	39.55 LT	1	1	1	1
PS1-4-2	4	26+77.99	39.14 LT	1	1	1	1
PS1-4-3	4	28+29.99	40.38 LT	1	1	1	1
PS1-4-4	4	29+76.58	55.20 LT	1	1	1	1
PS1-4-5	4	31+29.82	35.93 LT	1	1	1	1
PS1-4-6	4	32+79.25	6.58 RT	1	1	1	1
PS1-4-7	4	34+51.90	4.55 RT	1	1	1	1
				39	39	39	39

LIGHTING FIXTURE SCHEDULE

MARK	MANUFACTURER	CATALOG NUMBER	MOUNTING	LAMP		
			POLE	TYPE	WATTS	NOTES
A	ACUITY	ATB0-P302-MVOLT-R3-X	X	LED	83	1,2,3,4

NOTES:

1. E/C TO PROVIDE 30'-0" POLE PER NDDOT REQUIREMENTS.
2. E/C TO VERIFY FIXTURE AND POLE FINISH PER NDDOT REQUIREMENTS.
3. E/C TO PROVIDE 8'-0" BRACKET ARM.
4. EQUIVALENT MANUFACTURERS ARE CREE LIGHTING AND LEOTEK.

PULL BOX SCHEDULE W/ TYPE II DRAIN

PULL BOX NUMBER	STATION	OFFSET	TYPE I CONCRETE STANDARD PULL BOX EACH	TYPE II PREFORMED CLASS 2 PULL BOX EACH
JB1	16+0.00	36.22 RT		1
JB2	9+10.00	10.25 LT	1	
JB3	7+25.67	7.01 LT	1	
JB4	18+25.32	30.78 RT		1
JB5	27+00	38.50 LT		1
JB6	22+10.90	35.33 LT		1
JB7	32+62.83	9.00 RT	1	
JB8	34+36.41	2.98 RT	1	
JB9	FIELD VERIFY	FIELD VERIFY	1	
JB10	20+54.66	76.33 RT	1	
		TOTAL	6	4

ID NO	SUMMARY OF ELECTRIC LIGHTING SYSTEM QUANTITIES (HARDWARE)		
	Item	Unit	Quantity
1	Type 1 Junction Box	EA	6
2	Type 2 Junction Box	EA	4
3	Light Pole - 30 Ft.	EA	39
4	LED Fixture "A"	EA	39
5	Light Pole Bracket Arm - 8 Ft.	EA	39
6	Breakway Pole Base	EA	39
7	1" Rigid Conduit Trenched	LF	5,000
8	2" Rigid Conduit Trenched	LF	3,500
9	Cable 3 AWG 2 Conductor with Bare Neutral Power	LF	2,600
10	Cable 6 AWG 2 Conductor with Bare Neutral Power	LF	1,500
11	Cable 8 AWG 2 Conductor with Bare Neutral Power	LF	3,500
12	Pole Cable 10 AWG 1 Conductor	LF	4,600
13	10 Ft. Ground Rod	EA	39
14	30 Ft Pole Foundation	EA	39
15	Trenching/Backfill	LF	3,200

LIghting Schedules

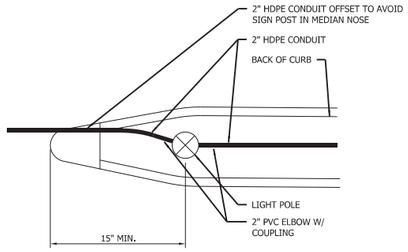
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

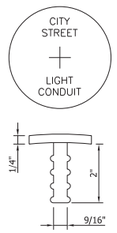
REGISTERED PROFESSIONAL ENGINEER
JENNIFER L. MCVEY
PE-7956
DATE 12/13/24
NORTH DAKOTA

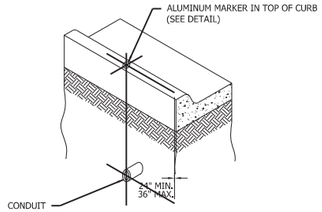
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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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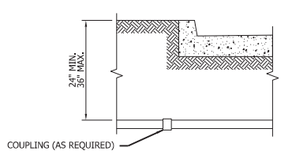
STREET LIGHT POLE IN MEDIAN



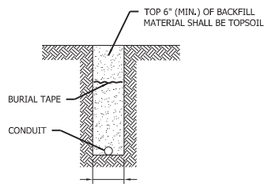


CONDUIT MARKING DETAIL

NOTES:
1. AN ALUMINUM MARKER SHALL BE PLACED IN THE TOP OF THE CURB DIRECTLY OVER THE CONDUIT.
2. MARKERS SHALL BE INSTALLED BY DRILLING THE CURB AND EPOXY THE MARKER IN PLACE. IF INSTALLED IN A SIDEWALK OR CURB RAMP, THE TOP OF THE MARKER SHALL BE FLUSH WITH THE CONCRETE SURFACE.
3. NO DIRECT PAYMENT SHALL BE MADE FOR CONDUIT MARKERS; THEY ARE SUBSIDIARY TO THE INSTALLATION OF CONDUIT.



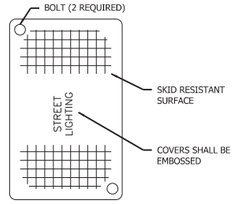
BORED CONDUIT



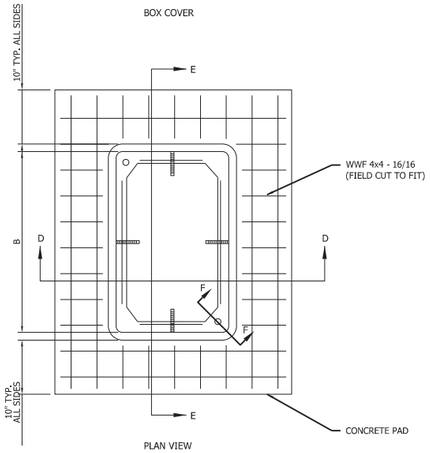
TRENCHED OR PLOWED CONDUIT

CONDUIT LOCATIONS

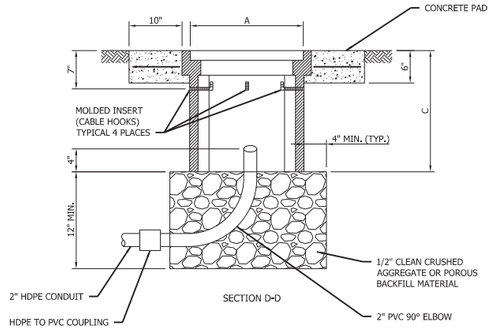
NOTES:
1. BACKFILL UNDER PAVED SURFACES SHALL BE FLOWABLE FILL.
2. THE CONDUIT SHALL NOT BE COVERED UNLESS INSPECTED AND APPROVED BY THE CITY ENGINEER, SO AS TO ENSURE PROPER DEPTH, CORRECT CONDUIT MATERIALS, AND PROPER CONDUIT END TREATMENT.



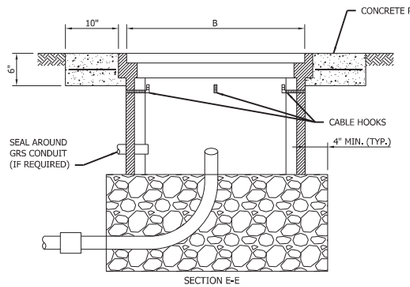
BOX COVER



PLAN VIEW

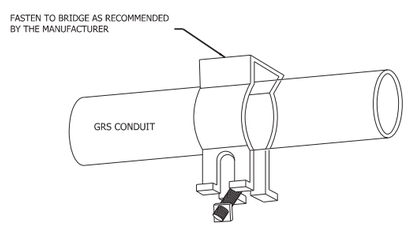


SECTION D-D

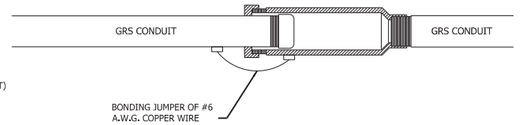


SECTION E-E

PULL OR JUNCTION BOX DETAILS



CONDUIT HANGER



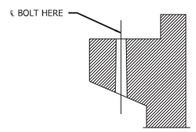
EXPANSION FITTING

GRS CONDUIT DETAILS

NOTES:
1. ALL CONDUITS INSTALLED ABOVE GROUND SHALL BE GRS.
2. CONDUIT ATTACHED TO BRIDGES SHALL HAVE EXPANSION FITTINGS INSTALLED AT EACH END OF THE BRIDGE AND AT EACH EXPANSION JOINT ON THE BRIDGE.
3. ALL GRS CONDUITS SHALL BE ELECTRICALLY BONDED BY A GROUNDING BUSHING AND GROUND WIRE AS DETAILED.
4. INSTALL THE CONDUIT AND CONNECTOR ASSEMBLY TO PERMIT A 1/2" MINIMUM LONGITUDINAL TRAVEL IN EITHER DIRECTION.

NUMBER OF ENTERING/EXITING CONDUITS	BOX TYPE	MINIMUM BOX DIMENSIONS		
		A	B	C
1 - 2	TYPE 1 JUNCTION BOX	12"	12"	12"
3 - 4	TYPE 2 JUNCTION BOX	12"	18"	12"
>4	CLASS 1 PULL BOX	17"	30"	22"

ALL DIMENSIONS SHOWN ARE NOMINAL



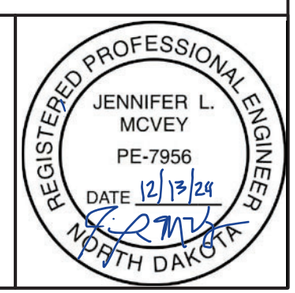
SECTION F-F

NOTES:
1. LIFT OPENING REQUIRED ON ALL COVERS.
2. PREFORMED BOX WALLS MAY BE EITHER FLARED OR VERTICAL. THE BOTTOM OF BOXES SHALL BE OPEN TO BELOW.
3. IF AN EXTENSION IS USED WITH A PREFORMED BOX, THE LIP OF THE EXTENSION MAY BE INTERIOR OR EXTERIOR . THE EXTENSION SHALL BE COMPATIBLE AND FROM THE SAME MANUFACTURER.
4. CABLE HOOKS ARE TO BE INCLUDED WITH CLASS 1 PULL BOXES ONLY.
5. A CLASS 1 PULL BOX SHALL BE INSTALLED ADJACENT TO EACH 4-CIRCUIT POWER SUPPLY.
6. ENCLOSURES, BOXES, AND COVERS ARE REQUIRED TO CONFORM TO ALL TEST PROVISIONS OF THE MOST CURRENT ANSI/SCTE 77 "SPECIFICATIONS FOR UNDERGROUND ENCLOSURES INTEGRITY" FOR TIER 15 APPLICATIONS. WHEN MULTIPLE "TIERS' ARE SPECIFIED THE BOXES MUST PHYSICALLY ACCOMMODATE AND STRUCTURALLY SUPPORT COMPATIBLE COVERS WHILE POSSESSING THE HIGHEST TIER RATING. ALL COVERS ARE REQUIRED TO HAVE THE TIER LEVEL RATING EMBOSSED ON THE SURFACE. IN NO ASSEMBLY CAN THE COVER DESIGN LOAD EXCEED THE DESIGN LOAD OF THE BOX. INDEPENDENT THIRD PARTY VERIFICATION OR TEST REPORTS STAMPED BY A REGISTERED PROFESSIONAL BEGINNER CERTIFYING THAT ALL TEST PROVISIONS OF THIS SPECIFICATIONS HAVE BEEN MET ARE REQUIRED WITH EACH SUBMITTAL.

Lighting Details

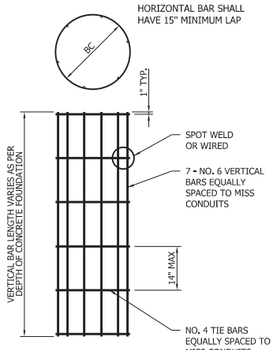
I-94 Oriska Rest Area

Ramp Improvements
Parking Improvements

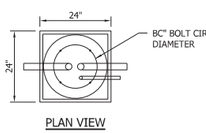


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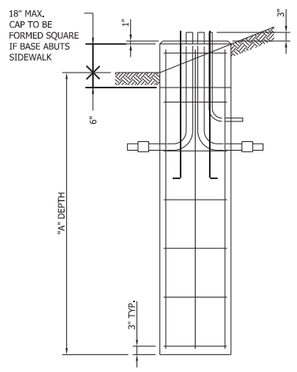
POLE TYPE	BRACKET ARM	DEPTH (A)	BOLT CIRCLE (BC)
P14	---	48"	9.5"
P30S OR P30D	SINGLE OR DUAL	72"	11.0"
P40S	SINGLE	94"	11.5"
P40D	DUAL	94"	14.5"



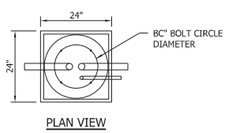
REBAR CAGE DETAIL



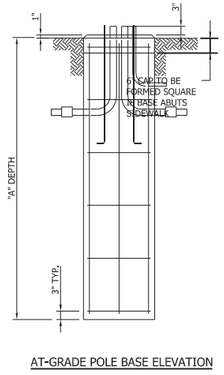
PLAN VIEW



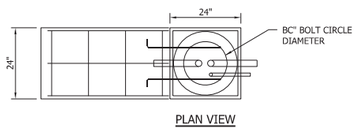
RAISED POLE BASE ELEVATION



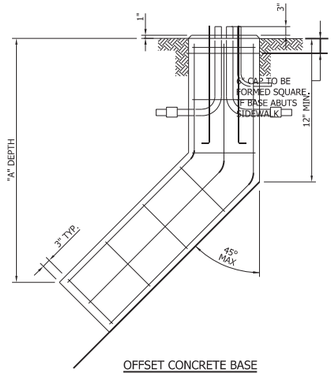
PLAN VIEW



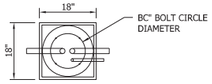
AT-GRADE POLE BASE ELEVATION



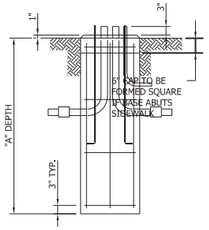
PLAN VIEW



OFFSET CONCRETE BASE



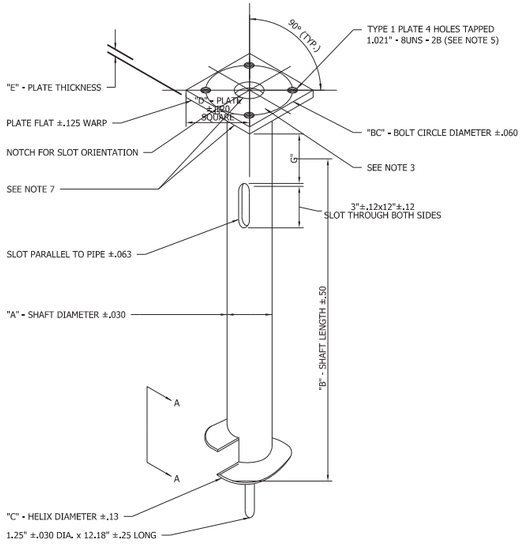
PLAN VIEW



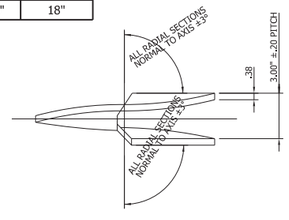
PEDESTAL POLE BASE

CONCRETE BASE DETAILS

BASE TYPE	POLE TYPE	MINIMUM TORQUE RATING (LBS. FT.)	MAXIMUM TORQUE RATING (LBS. FT.)	SHAFT DIA. (A)	SHAFT LENGTH (B)	HELIX DIA. (C)	PLATE SIZE (D)	PLATE THICKNESS (E)	BOLT CIRCLE (BC)	SLOT LOCATION (G)
B14	P14	2,000	15,000	6"	48"	12"	10"	0.75"	9.5"	12"
B30	P30S OR P30D	2,000	15,000	6"	60"	12"	12"	1.0"	11.0"	18"
B40S	P40S	2,000	20,000	6"	60"	14"	12"	1.0"	11.5"	18"
B40D	P40D	2,000	20,000	6"	60"	14"	15"	1.25"	14.5"	18"

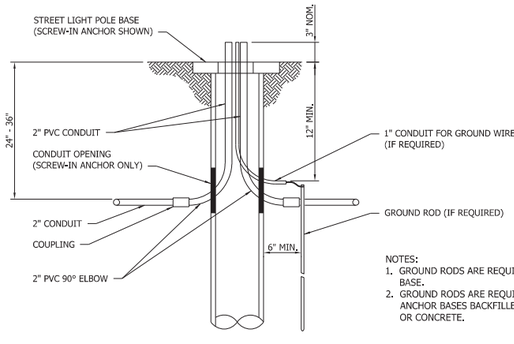


SCREW-IN ANCHOR BASE DETAILS



HELIX MUST BE FORMED BY MATCHING METAL DIE

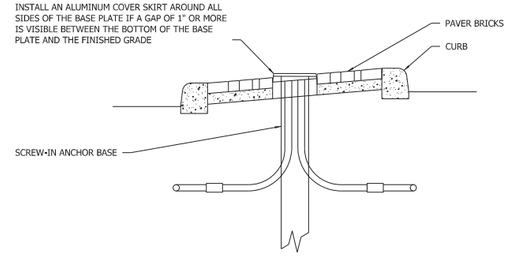
SECTION A-A



NOTES:
1. GROUND RODS ARE REQUIRED FOR ALL CONCRETE BASE.
2. GROUND RODS ARE REQUIRED FOR SCREW-IN ANCHOR BASES BACKFILLED WITH FLOWABLE FILL OR CONCRETE.

CONDUIT ENTRANCE AND GROUNDING

INSTALL AN ALUMINUM COVER SKIRT AROUND ALL SIDES OF THE BASE PLATE IF A GAP OF 1" OR MORE IS VISIBLE BETWEEN THE BOTTOM OF THE BASE PLATE AND THE FINISHED GRADE



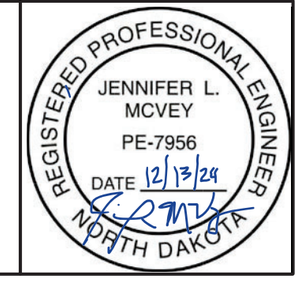
COVERSKIRT REQUIREMENTS

NOTES:
1. FINISH: HOT DIP GALVANIZE PER ASTM-1153 (LATEST REVISION).
2. BASEPLATE TO BE PERPENDICULAR TO SHAFT AXIS (±1°) AND HOLE AND CONCENTRIC (±.188 I.D. FIM) TO SHAFT AXIS.
3. ALL BASES SHALL BE IDENTIFIED BY THE MANUFACTURER'S INITIALS AND THE ANCHOR TYPE (1 OR 2) PERMANENTLY STAMPED INTO THE TOP PLATE WITH 1/2" LETTERS., THE JULIAN DATE OF MANUFACTURE SHALL BE PERMANENTLY STAMPED IN 1/4" NUMERALS.
4. PILOT POINT AND SHAFT AXIS TO BE CONCENTRIC (±.125 FIM) AND IN LINE (±2°).
5. TAP 1" HOLES ON THE SPECIFIED BOLT CIRCLE PERPENDICULAR TO THE BASEPLATE. CLEAN AND CHASE THE THREADS AFTER HOT-DIP GALVANIZING SO THAT A BOLT MAY BE INSTALLED.
6. PREHEAT (ROOM TEMPERATURE 70°F), TUMBLEBLAST, HANDGRIND, AND CLEAN BASEPLATE, HELIX, AND CORE ON ALL WELD AREAS.
7. FLAME CUT IRREGULARITIES PERMISSIBLE:
   (1) VALLEYS NOT TO EXCEED 3/32" IN. BELOW NOMINAL SURFACE LEVEL.
   (2) PEAKS OR POSITIVE IRREGULARITIES NOT TO EXCEED 1/32 IN. ABOVE NOMINAL SURFACE LEVEL OR INTERSECTIONS OF NOMINAL SURFACES.
8. MANUFACTURER TO HAVE IN EFFECT INDUSTRY RECOGNIZED WRITTEN QUALITY CONTROL FOR ALL MATERIALS AND MANUFACTURING PROCESSES.
9. ALL MATERIAL IS TO BE NEW, UNUSED AND MILL TRACEABLE MEETING THE FOLLOWING SPECIFICATIONS:
   - BASEPLATE: ASTM A36-(LATEST REVISION) HOT ROLLED STEEL PLATE (CONFORM TO AASHTO TECHNICAL BUL. #270).
   - SHAFT:A: STEEL PIPE PILES, SEAMLESS OR STRAIGHT WELDED, GRADE 2 PER ASTM A252. ALTERNATE MATERIAL: PIPE TYPE E OR S, GRADE B PER ASTM A53.
   - HELIX:B: ASTM A635-(LATEST REVISION) HOT ROLLED STEEL PLATE
   - PILOT POINT: ASTM A575-(LATEST REVISION) HOT ROLLED STEEL
   - BOLT:C: ASTM A326 OR GRADE 5 SAE J429 - 1" DIAMETER HOT DIP GALVANIZED HEX HEAD BOLT. BOLT SHALL INCLUDE ONE EACH LOCK AND FLAT WASHER.
10. THE DESIGN AND PERFORMANCE INTEGRITY OF THE FOUNDATION SHALL BE VERIFIED BY FULL-SCALE TESTS BY QUALIFIED ENGINEERS INDEPENDENT OF THE MANUFACTURER. CERTIFIED TEST REPORTS SHALL BE PROVIDED UPON REQUEST.
11. FLAME CUT NOTCH OR PROJECTION WILL BE ON THE BASE PLATE TO INDICATE SLOT ORIENTATION.

Lighting Details

I-94 Oriska Rest Area

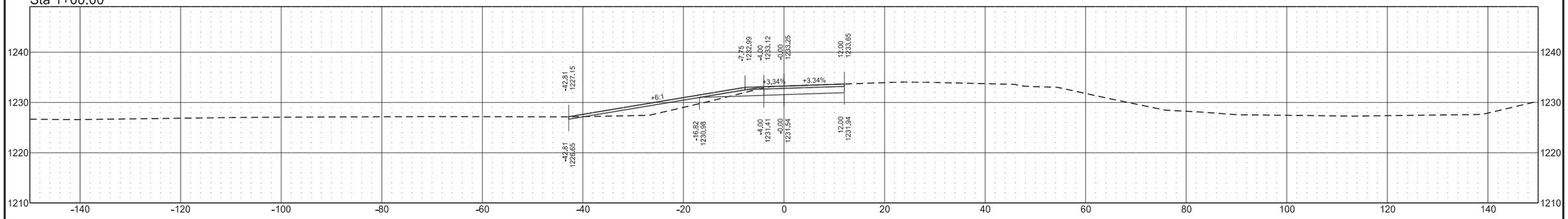
Ramp Improvements
Parking Improvements



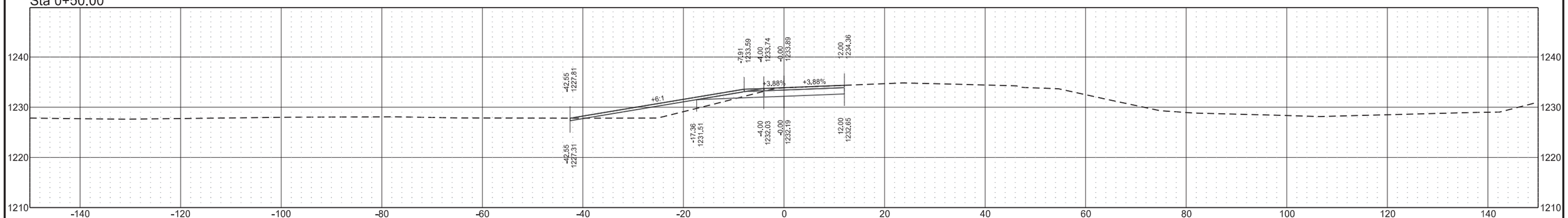
EB Ramps
Sta 0+00 to 1+00

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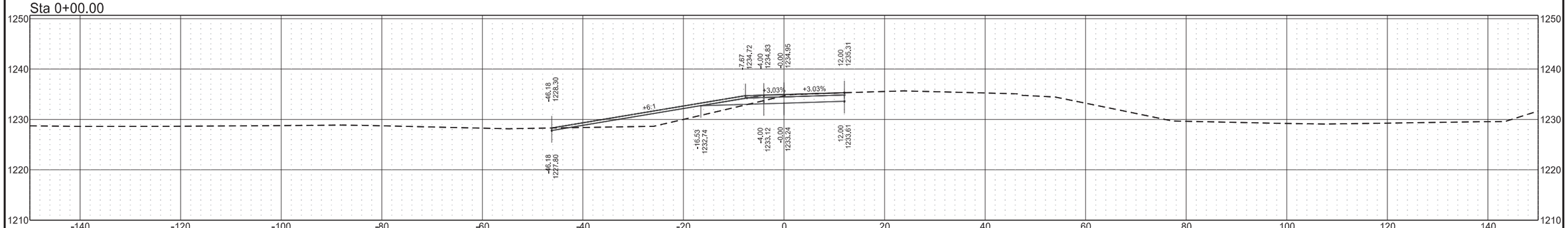
Sta 1+00.00



Sta 0+50.00



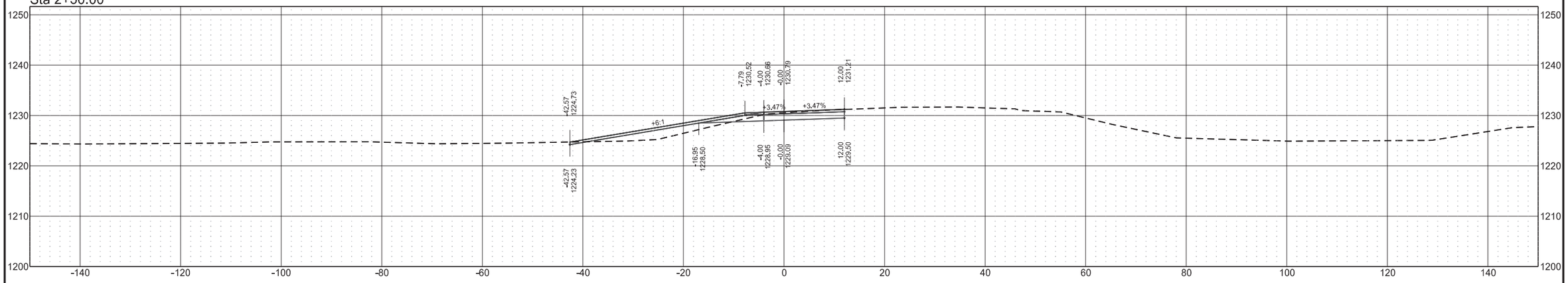
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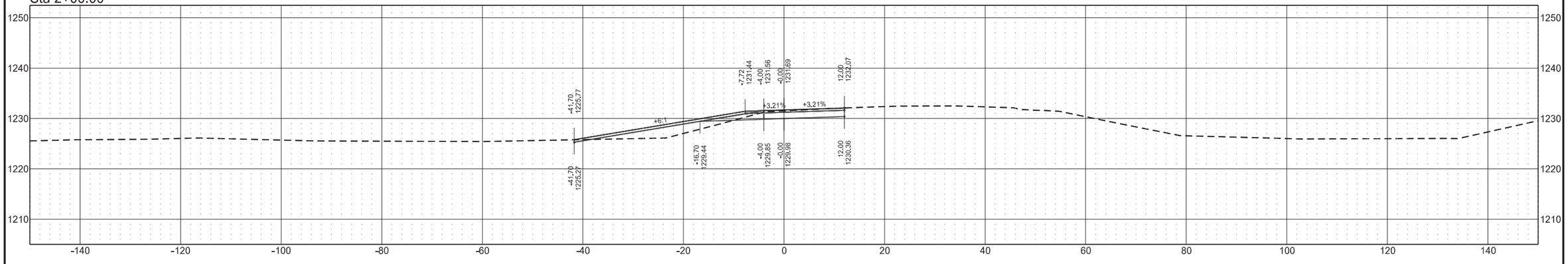
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	2

EB Ramps
Sta 1+56.87 to 2+50

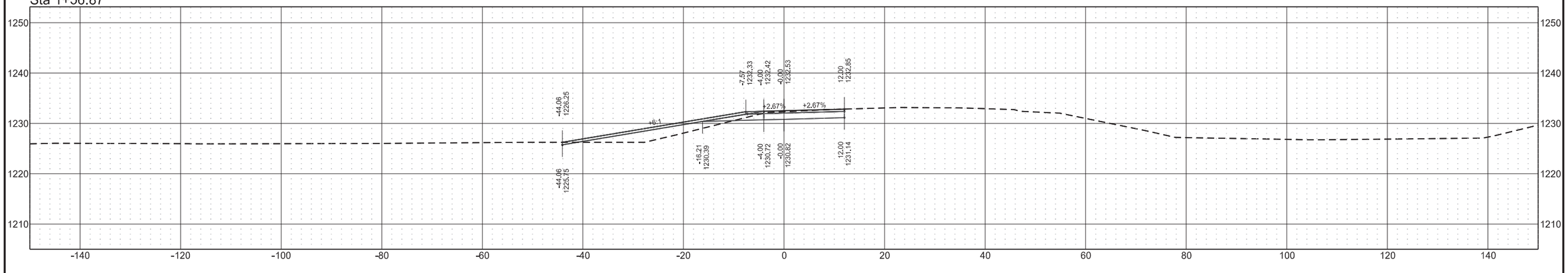
Sta 2+50.00



Sta 2+00.00



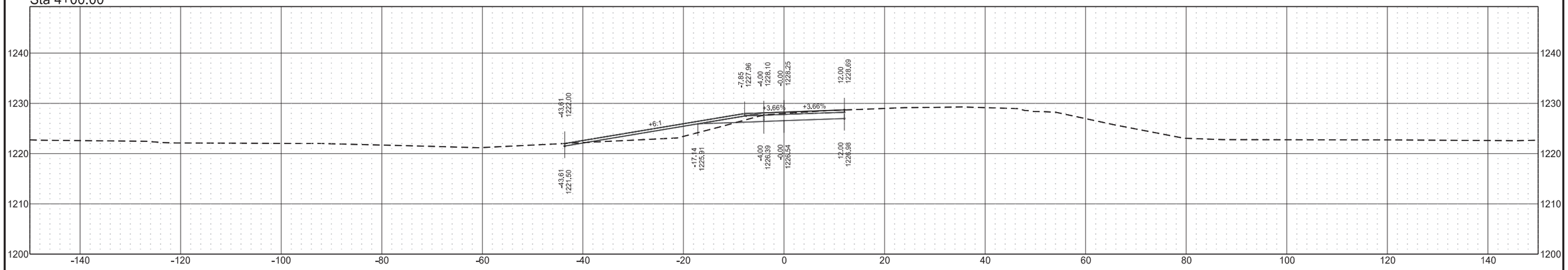
Sta 1+56.87



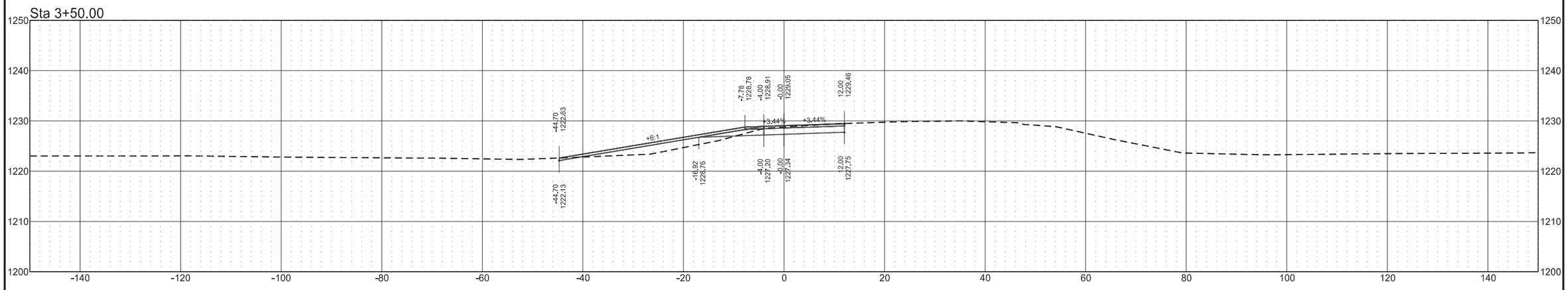
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	3

EB Ramps
Sta 3+00 to 4+00

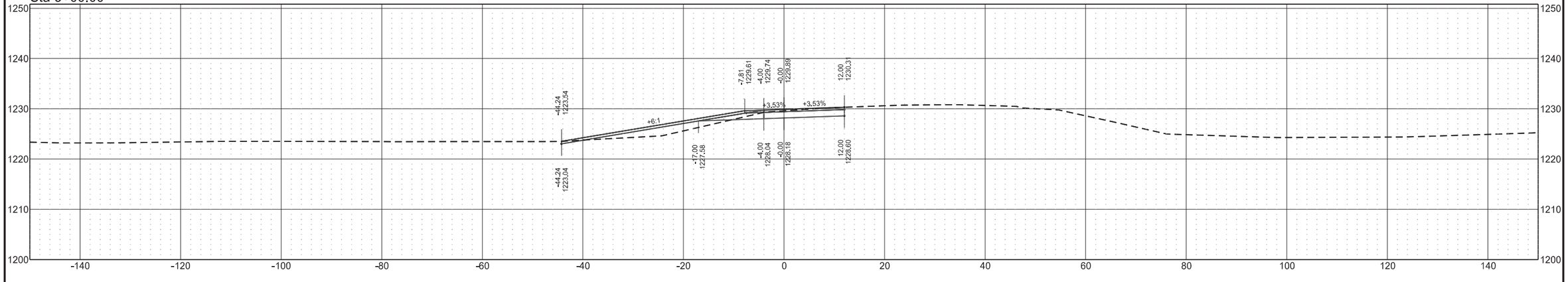
Sta 4+00.00



Sta 3+50.00



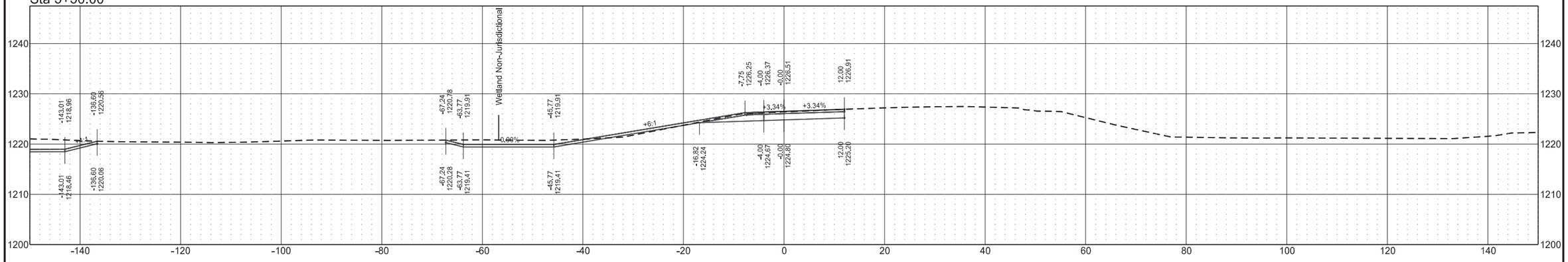
Sta 3+00.00



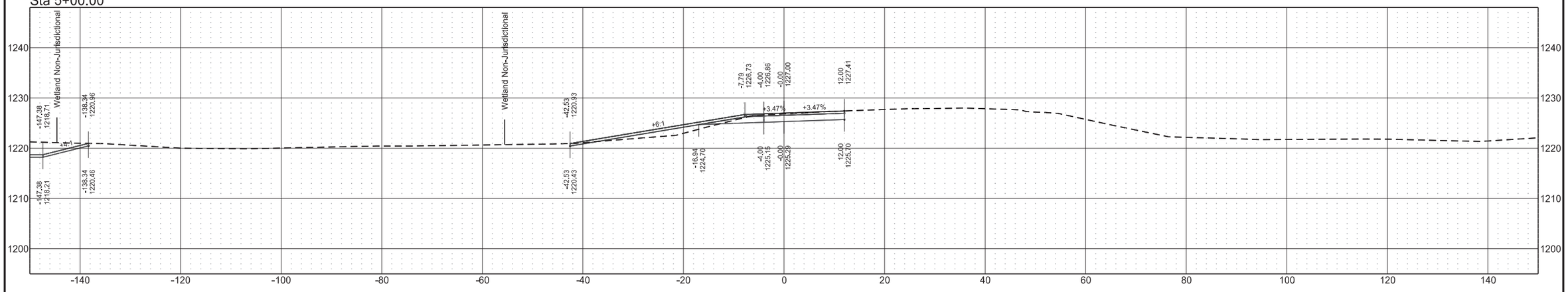
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	4

EB Ramps
Sta 4+50 to 5+00

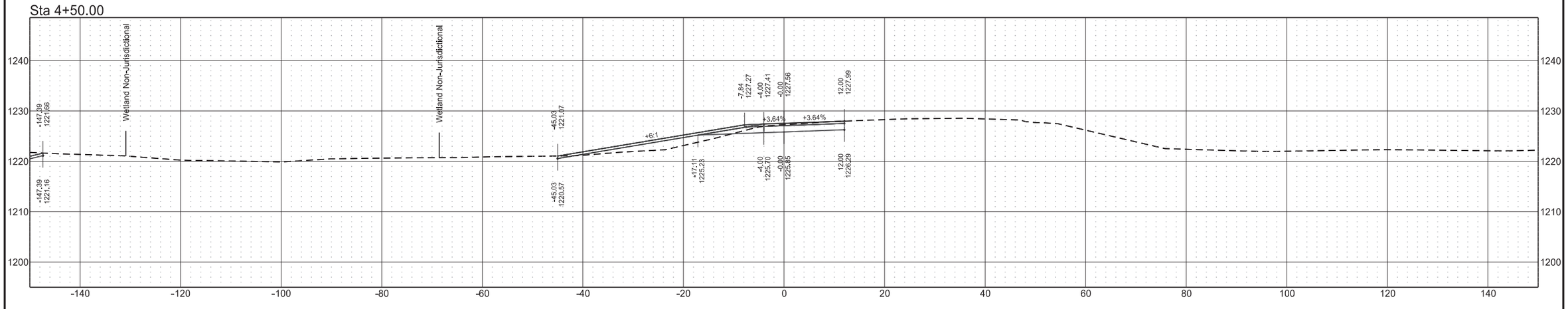
Sta 5+50.00



Sta 5+00.00



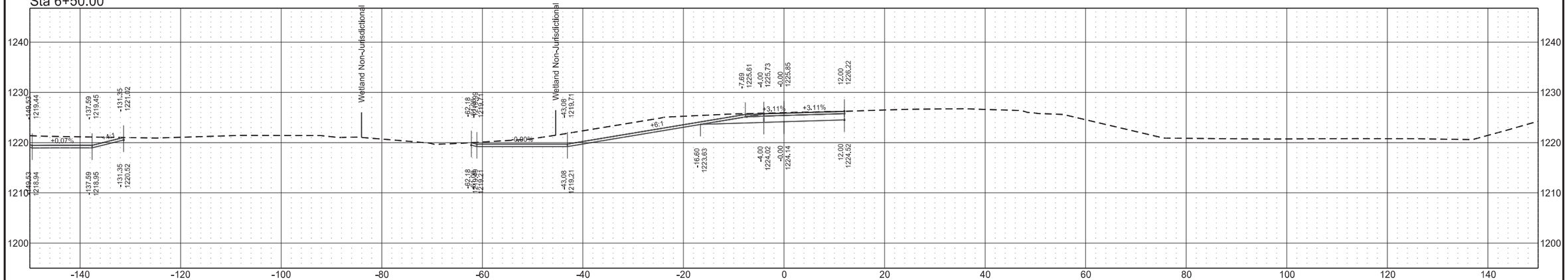
Sta 4+50.00



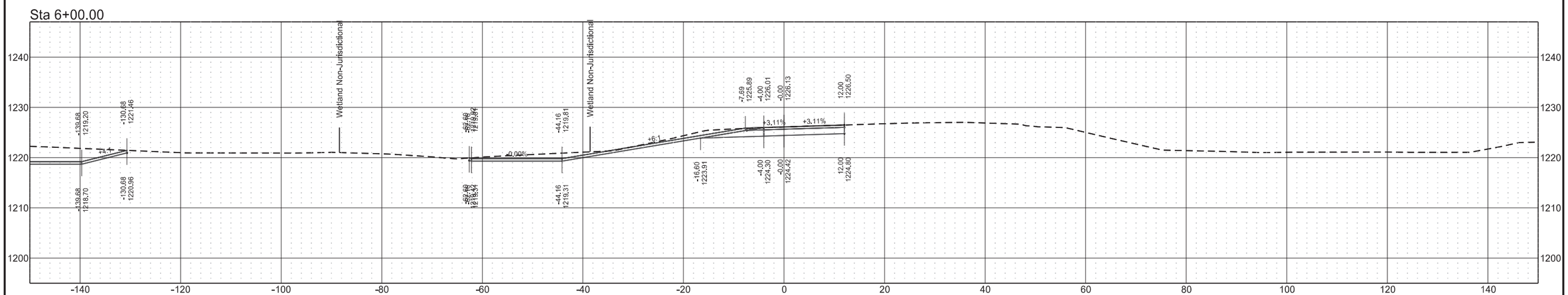
EB Ramps
Sta 6+00 to 6+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	5

Sta 6+50.00



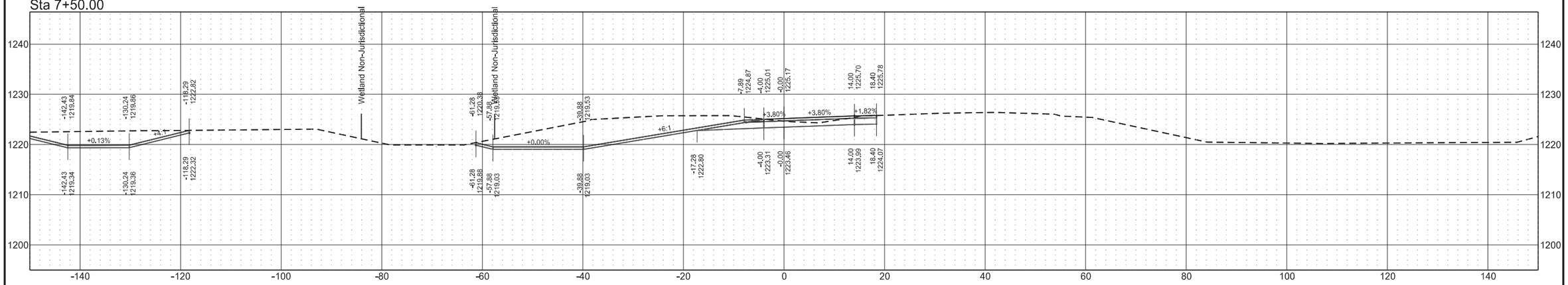
Sta 6+00.00



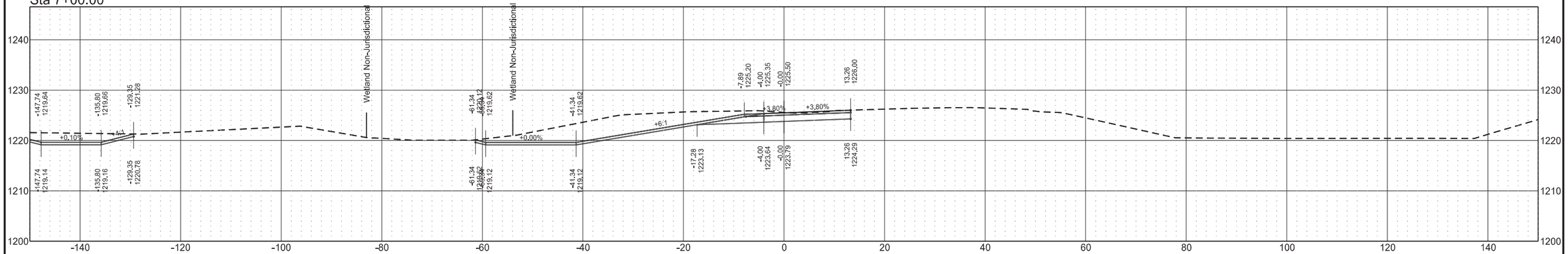
EB Ramps
Sta 6+60 to 7+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	6

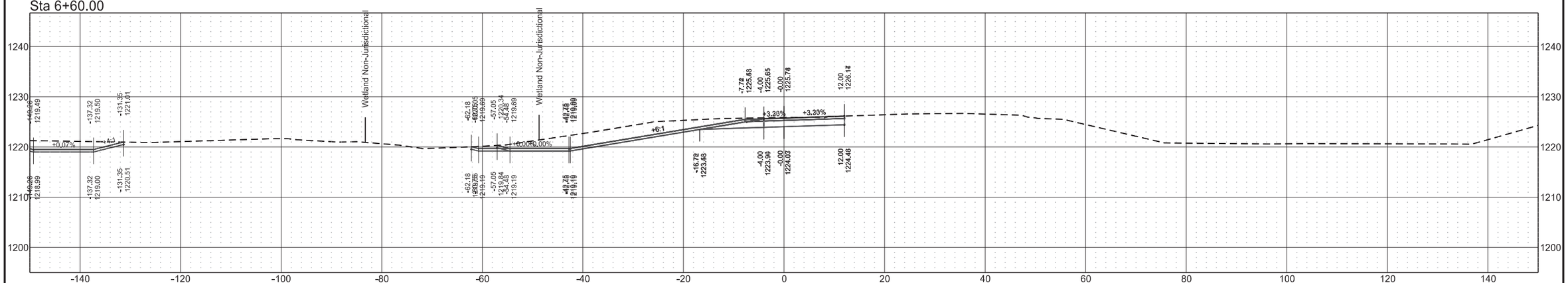
Sta 7+50.00



Sta 7+00.00



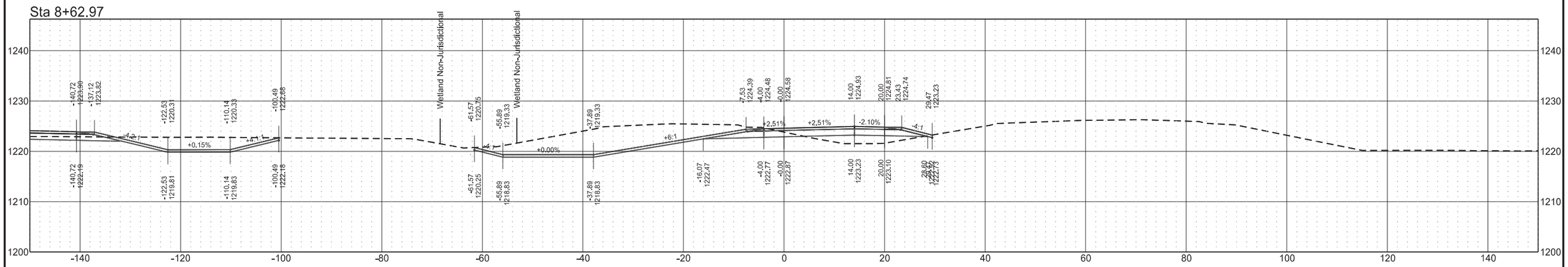
Sta 6+60.00



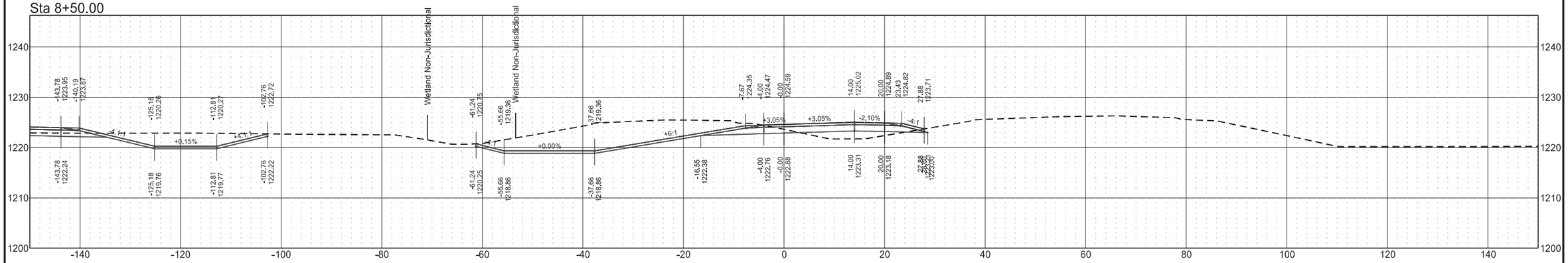
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	7

EB Ramps
Sta 8+00 to 8+62.97

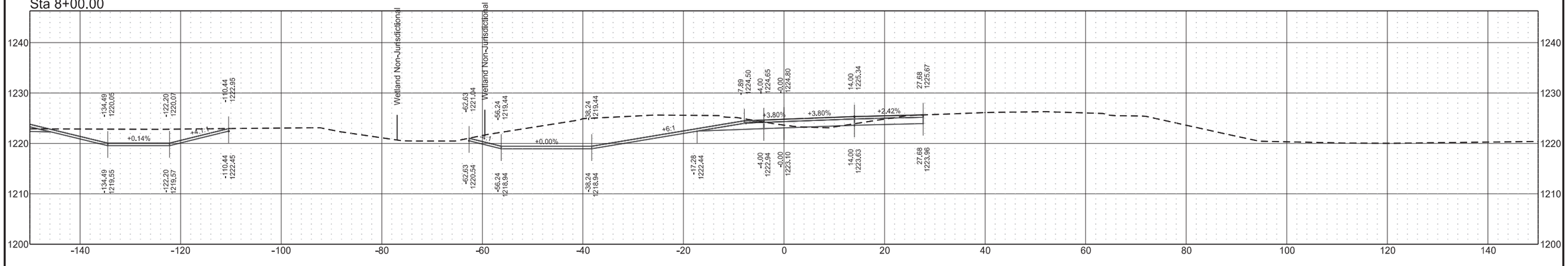
Sta 8+62.97



Sta 8+50.00



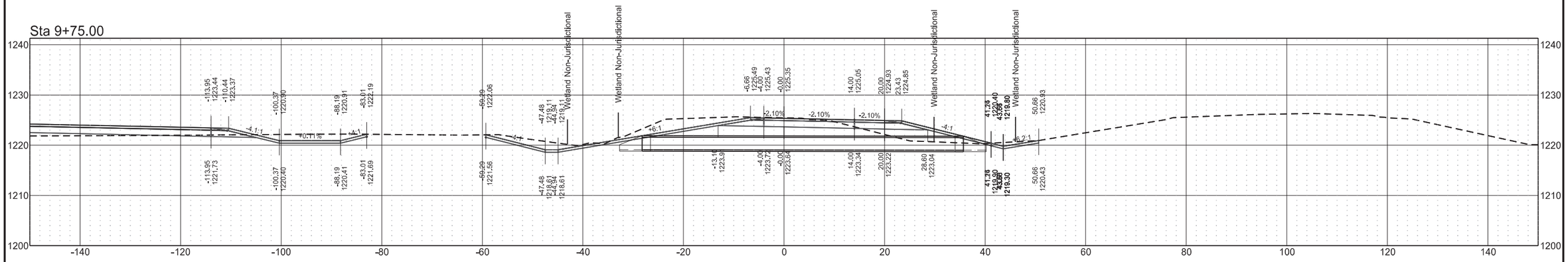
Sta 8+00.00



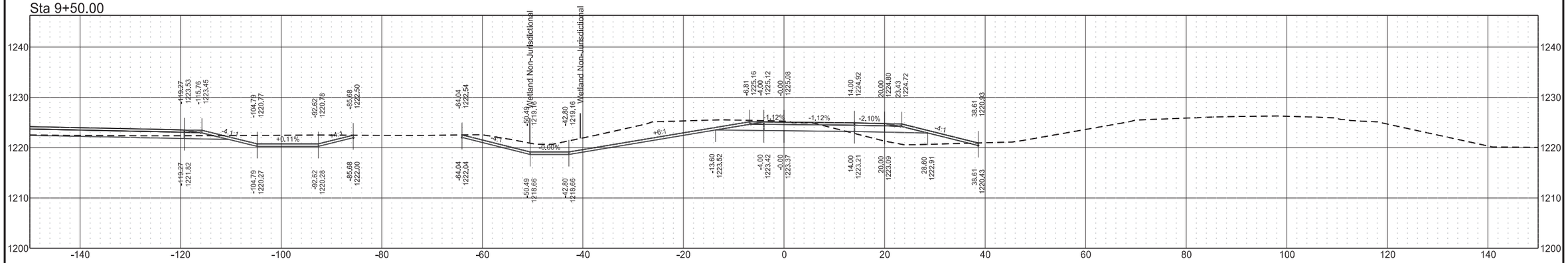
EB Ramps
Sta 9+00 to 9+75

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	8

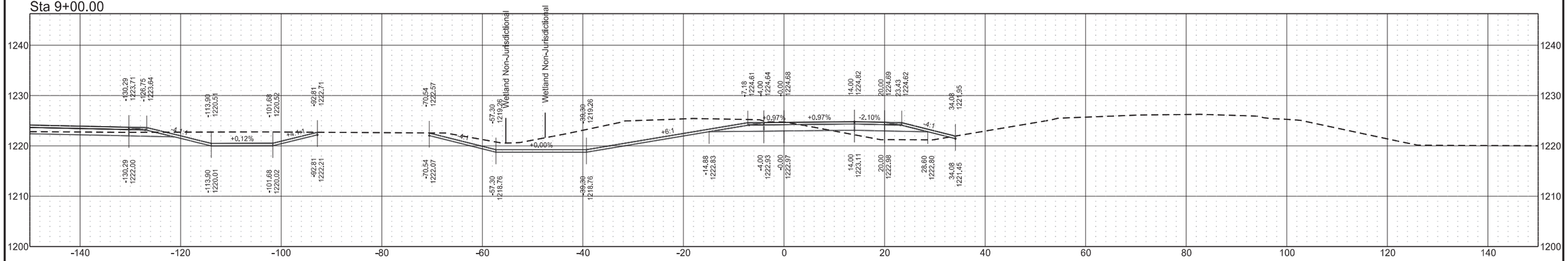
Sta 9+75.00



Sta 9+50.00



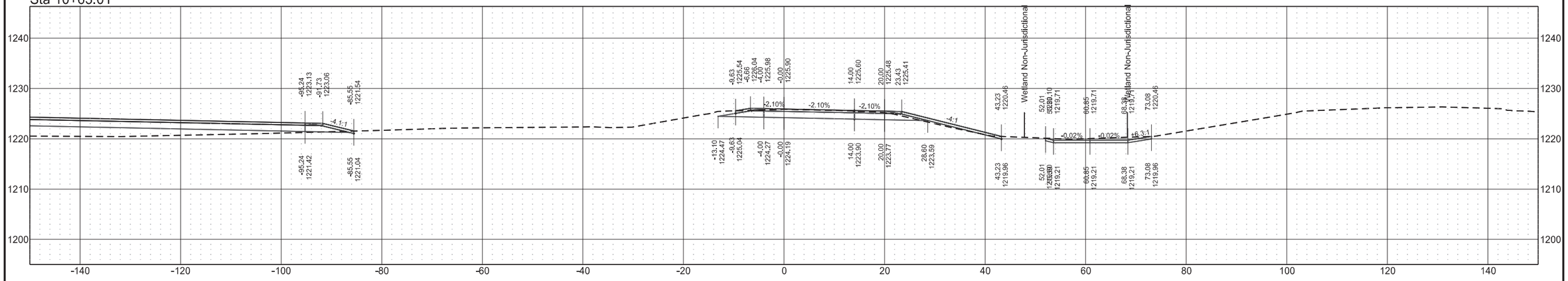
Sta 9+00.00



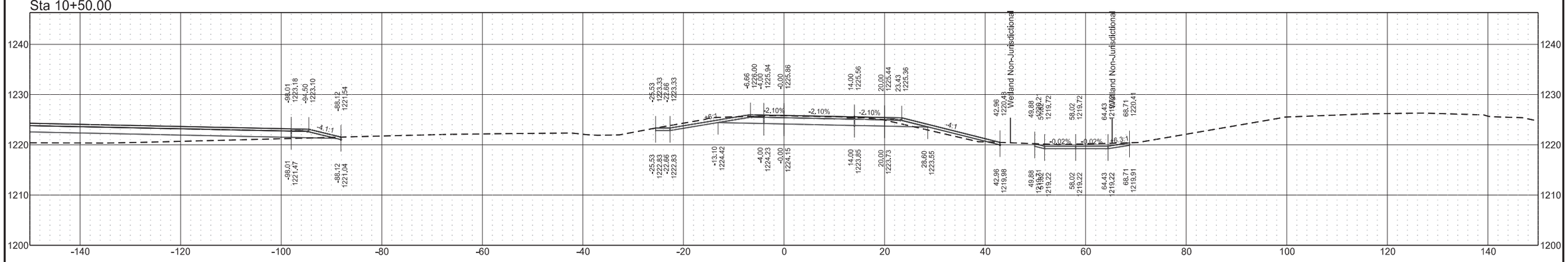
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	9

EB Ramps
Sta 10+00 to 10+63.01

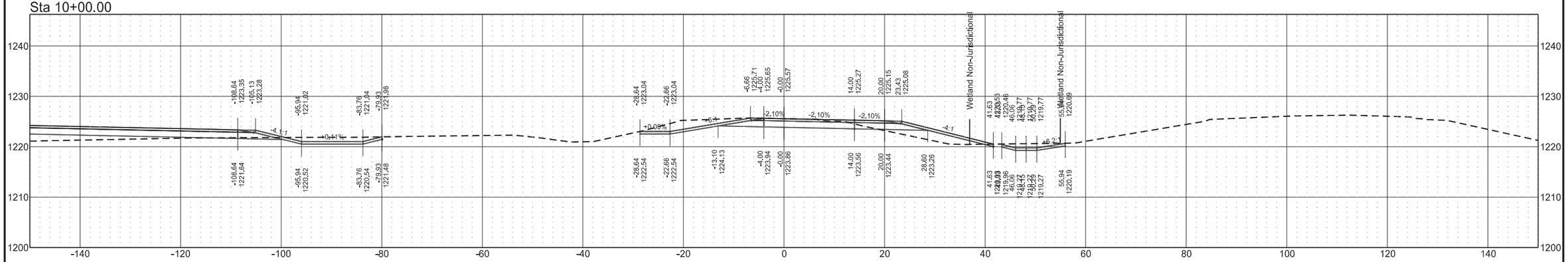
Sta 10+63.01



Sta 10+50.00



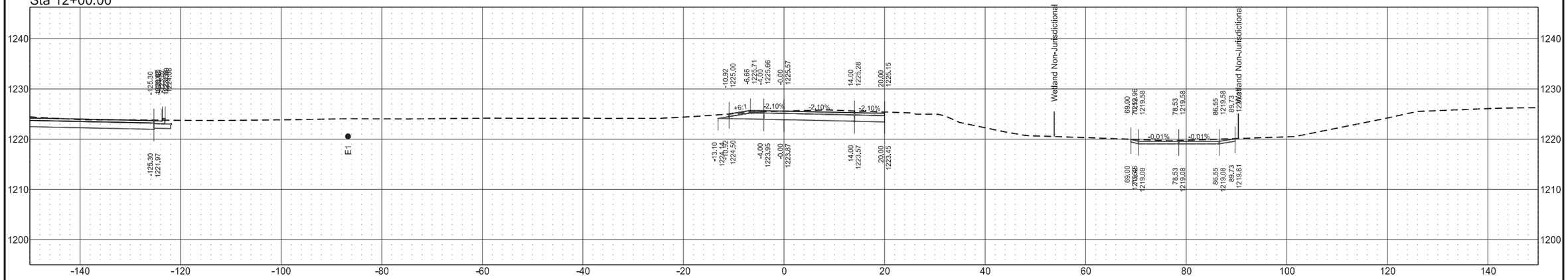
Sta 10+00.00



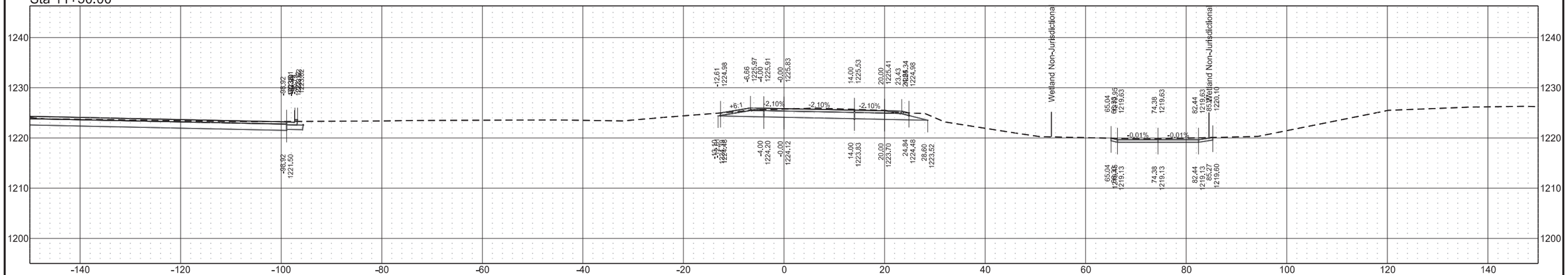
EB Ramps
Sta 11+00 to 11+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	10

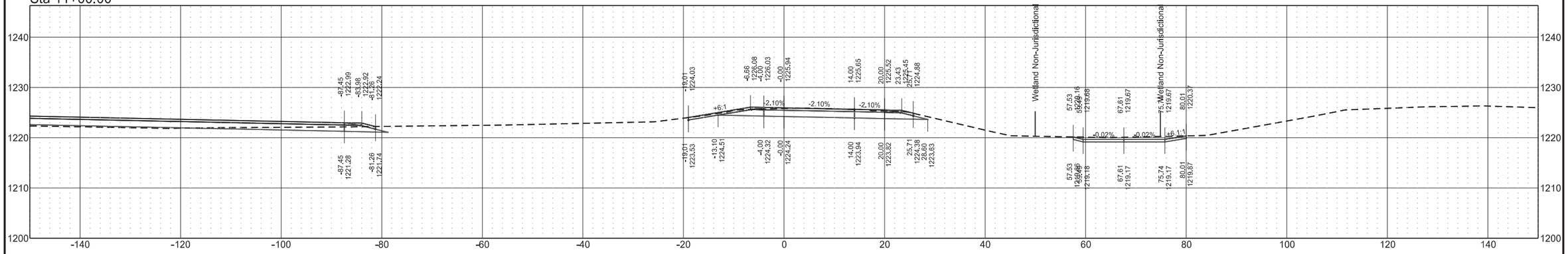
Sta 12+00.00



Sta 11+50.00



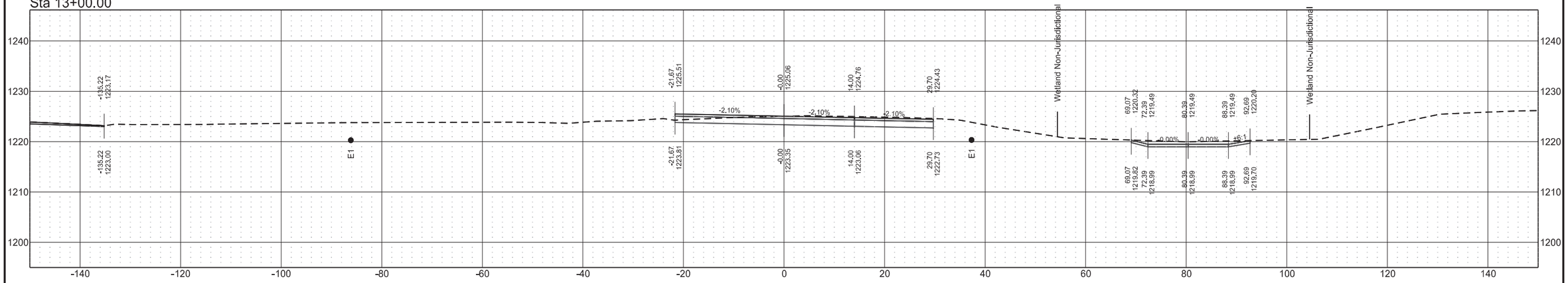
Sta 11+00.00



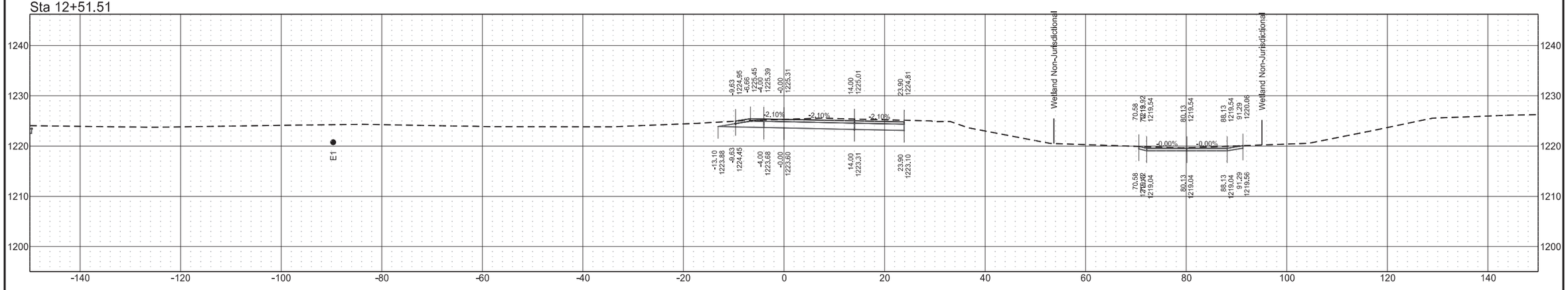
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	11

EB Ramps
Sta 12+50 to 13+00

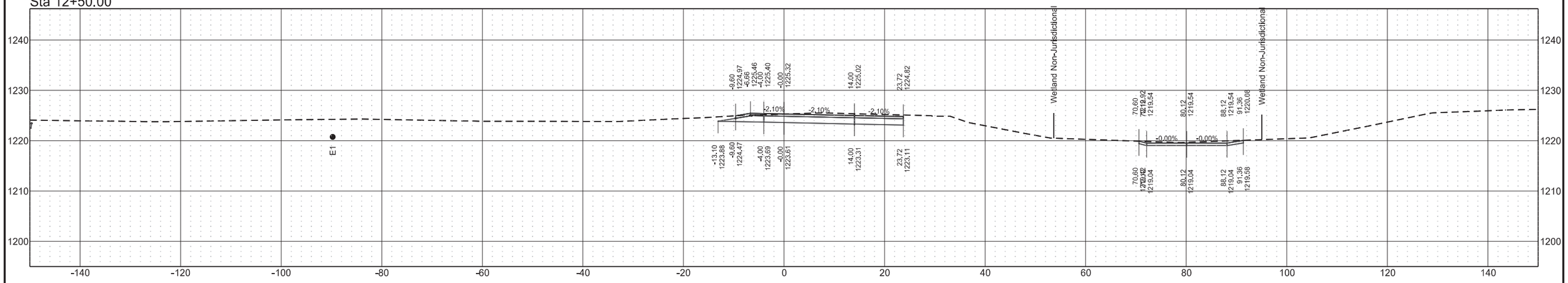
Sta 13+00.00



Sta 12+51.51



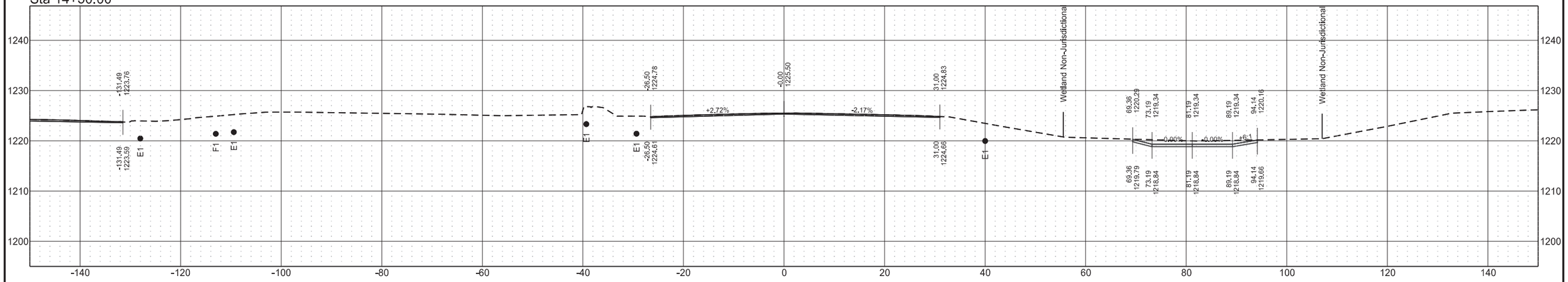
Sta 12+50.00



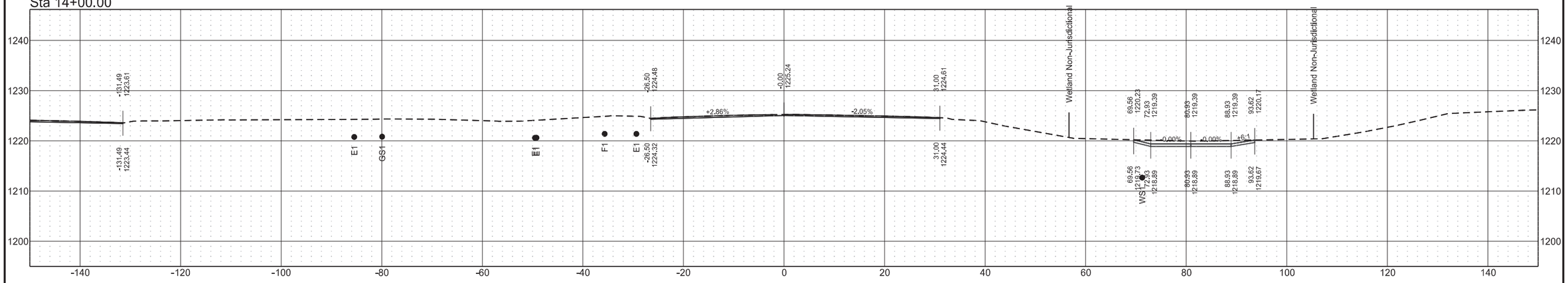
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	12

EB Ramps
Sta 13+50 to 14+50

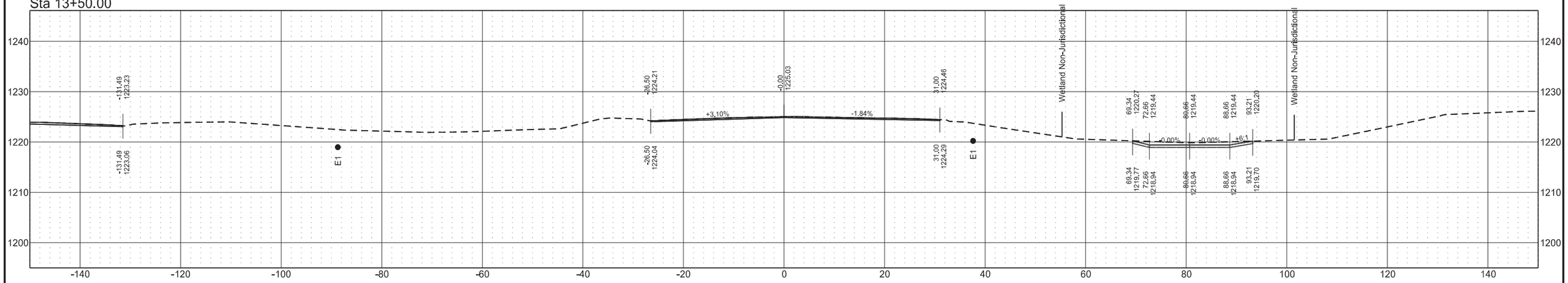
Sta 14+50.00



Sta 14+00.00



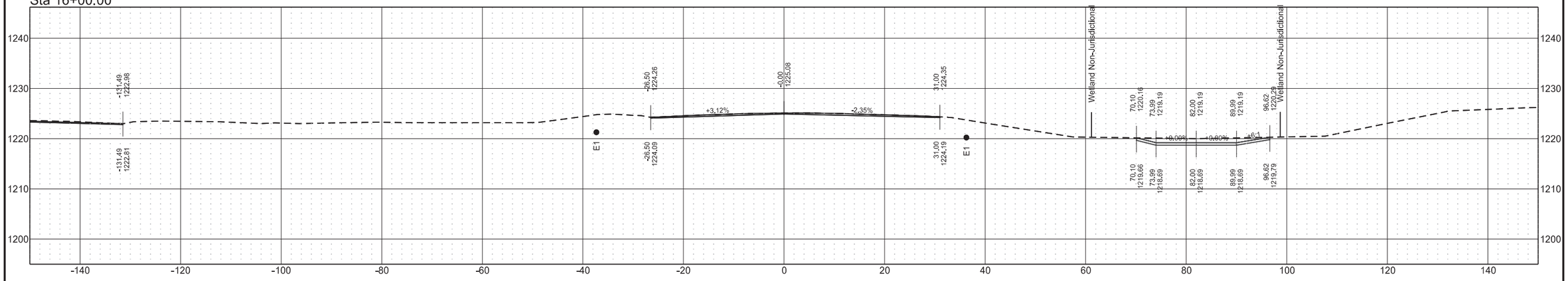
Sta 13+50.00



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	13

EB Ramps
Sta 15+00 to 16+00

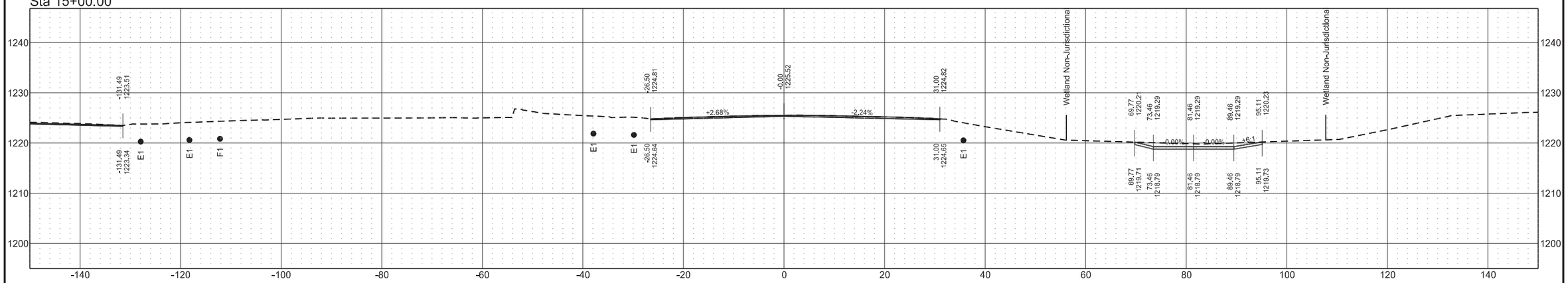
Sta 16+00.00



Sta 15+50.00



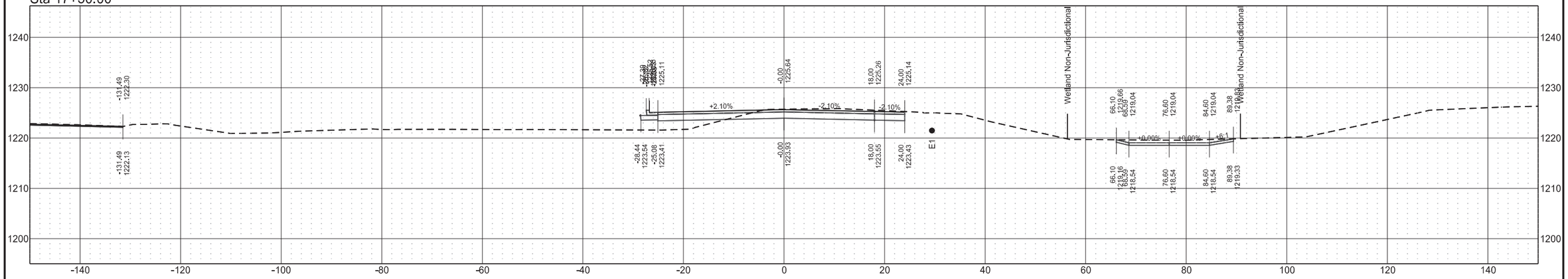
Sta 15+00.00



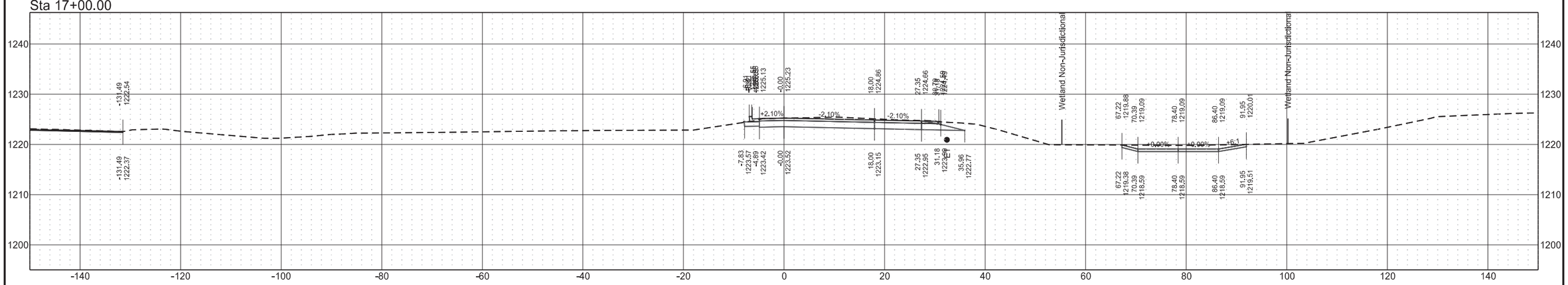
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	14

EB Ramps
Sta 16+50 to 17+50

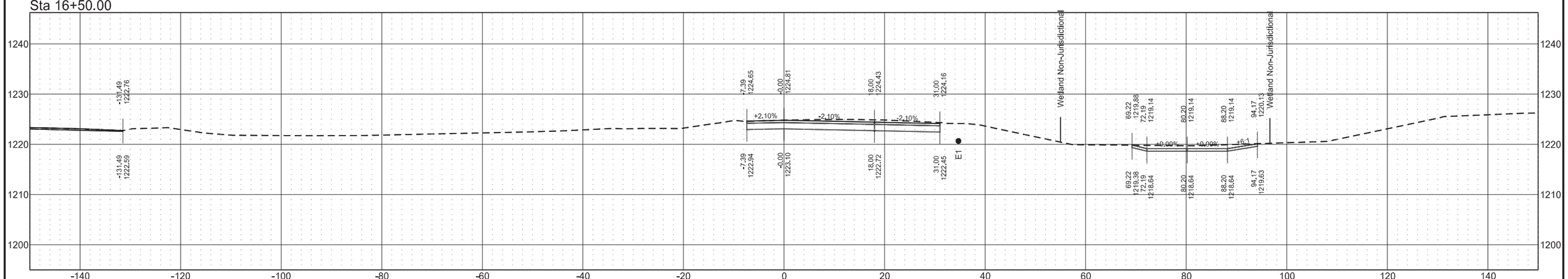
Sta 17+50.00



Sta 17+00.00



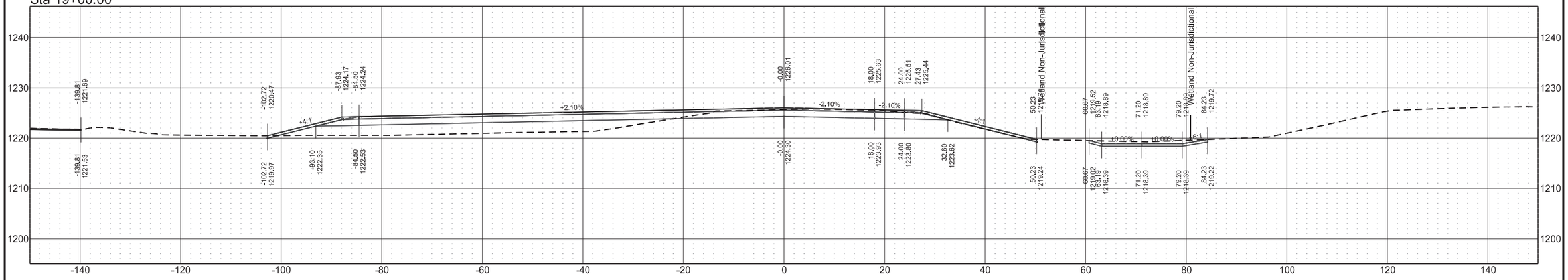
Sta 16+50.00



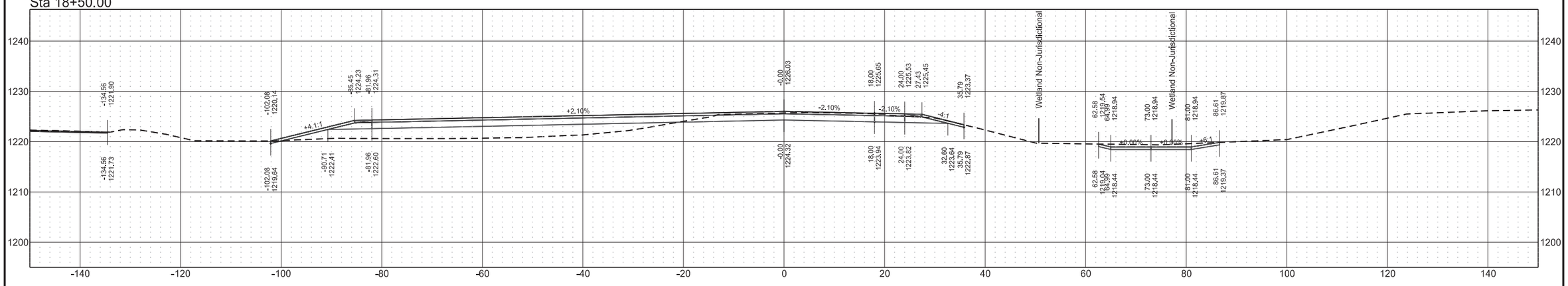
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	15

EB Ramps
Sta 18+00 to 19+00

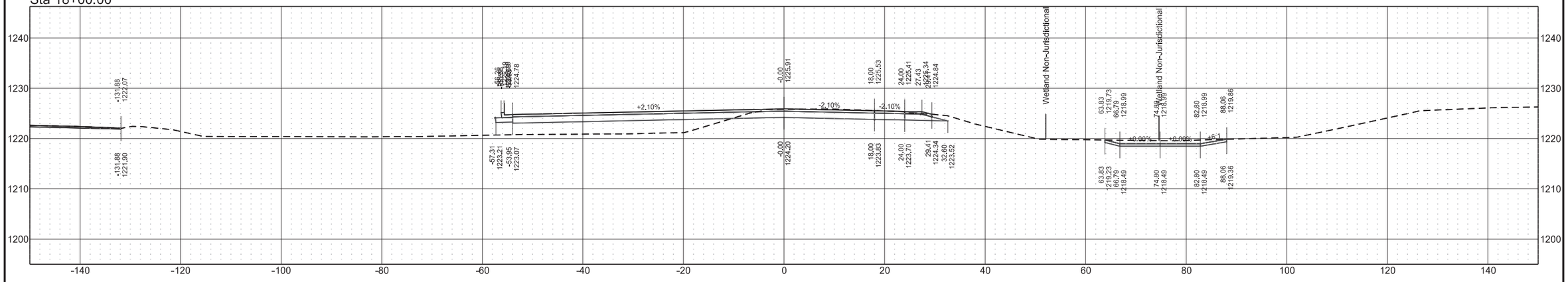
Sta 19+00.00



Sta 18+50.00



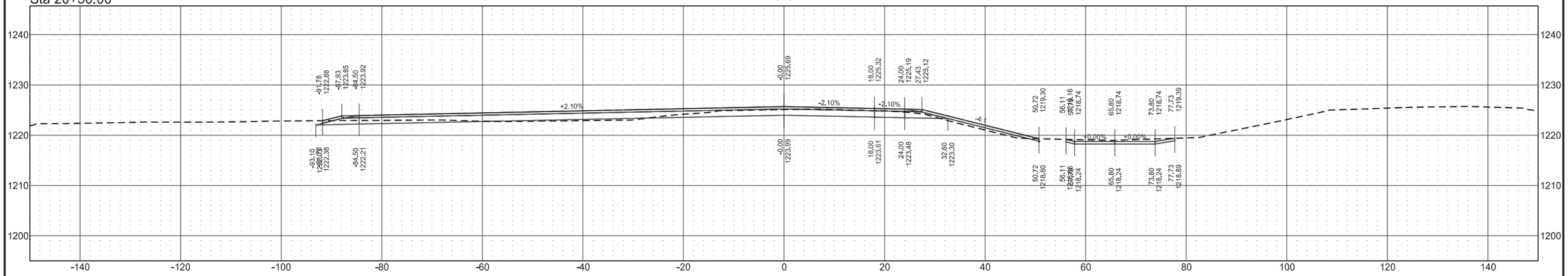
Sta 18+00.00



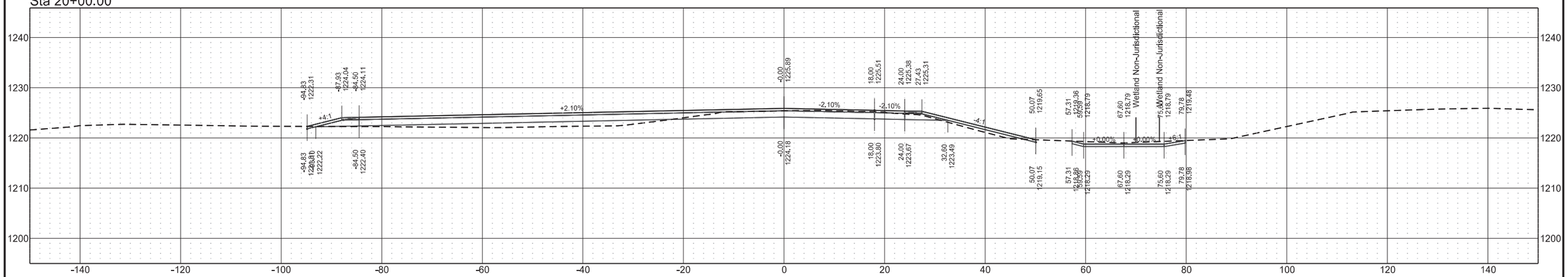
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	16

EB Ramps
Sta 19+50 to 20+50

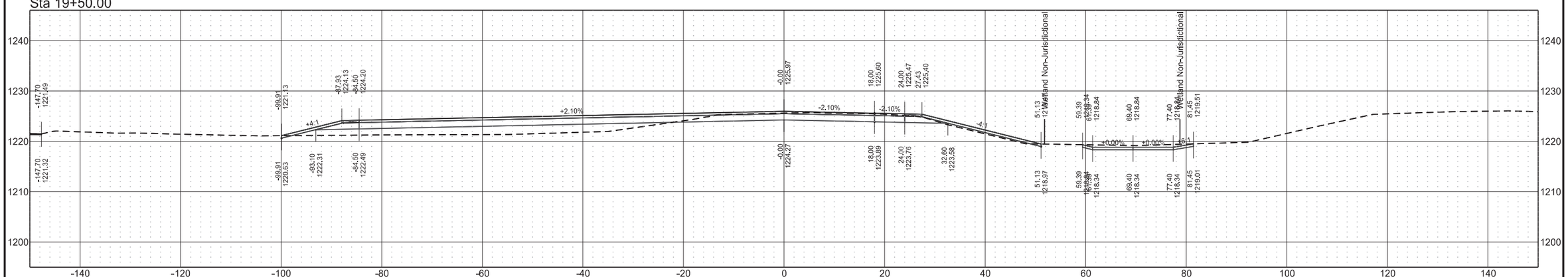
Sta 20+50.00



Sta 20+00.00



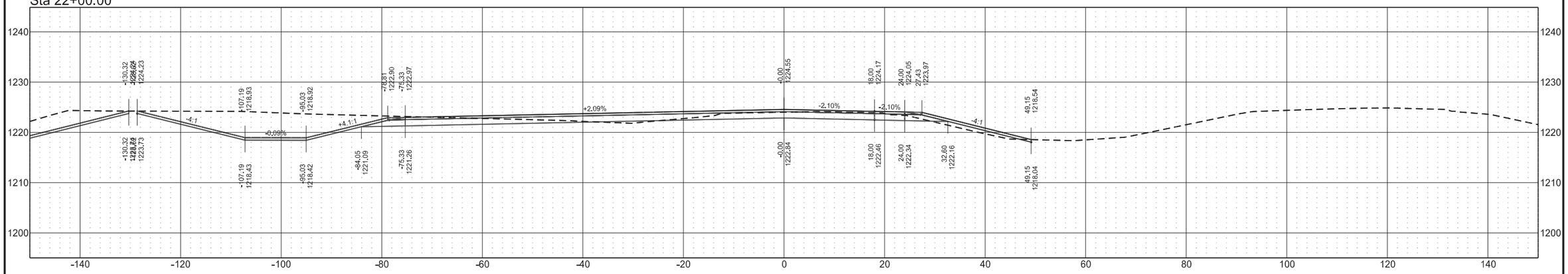
Sta 19+50.00



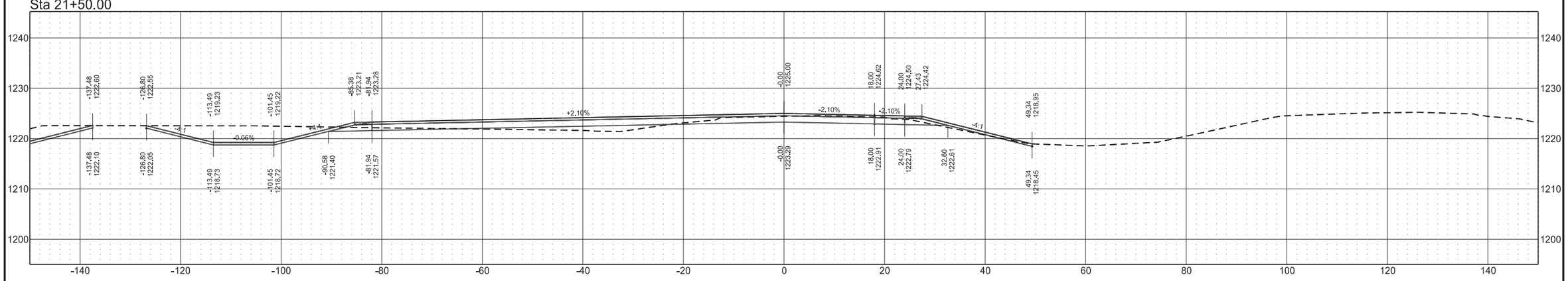
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	17

EB Ramps
Sta 21+00 to 22+00

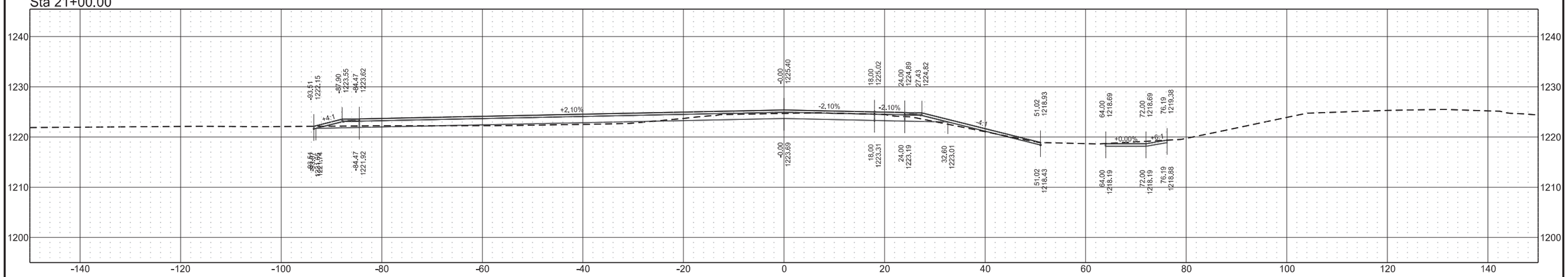
Sta 22+00.00



Sta 21+50.00



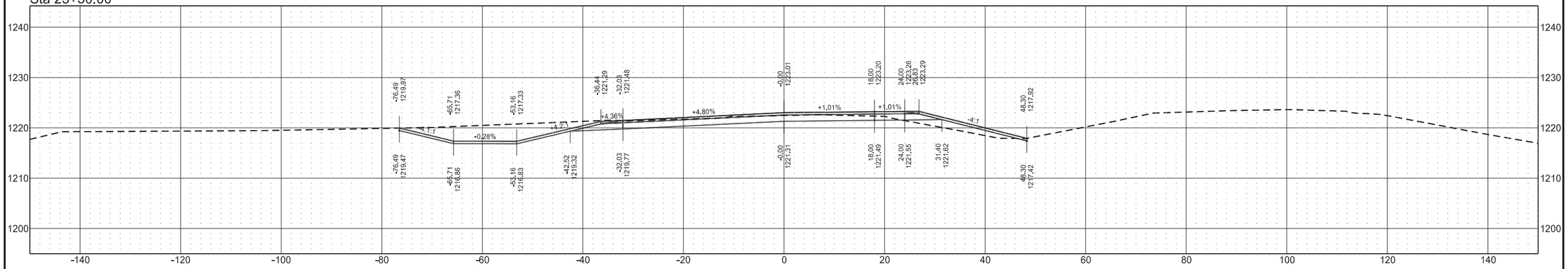
Sta 21+00.00



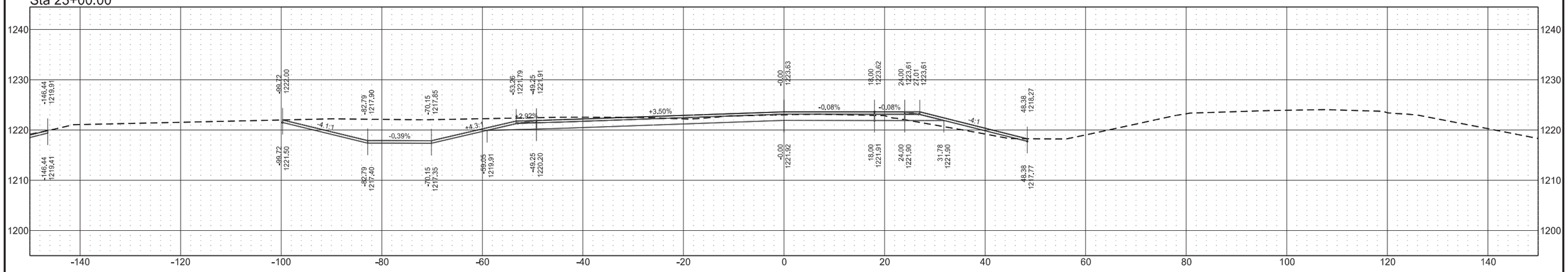
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	18

EB Ramps
Sta 22+50 to 23+50

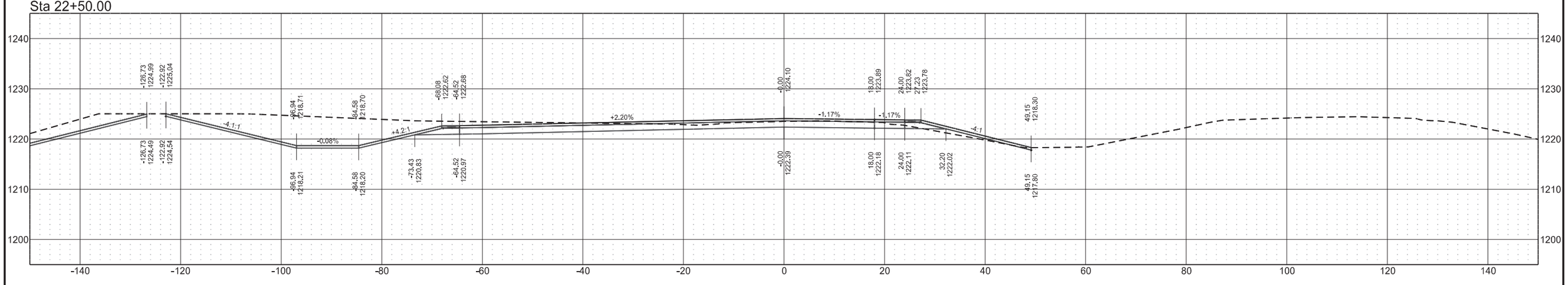
Sta 23+50.00



Sta 23+00.00



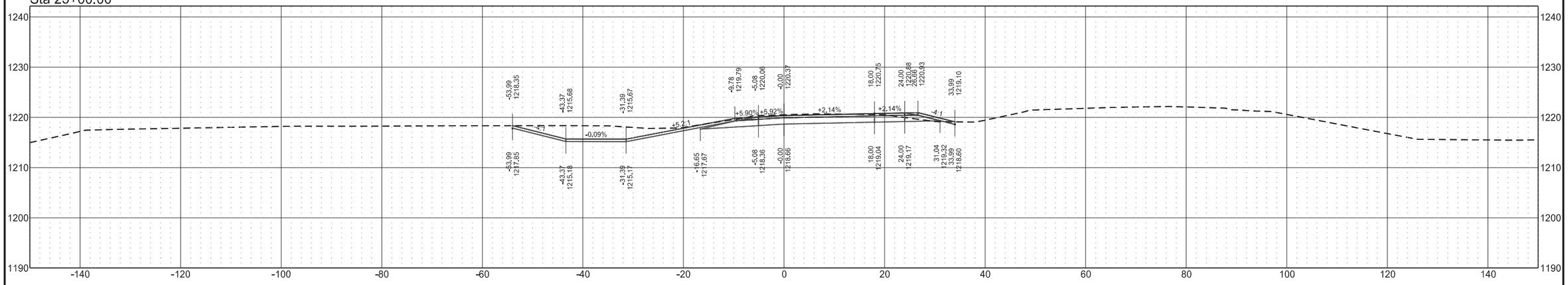
Sta 22+50.00



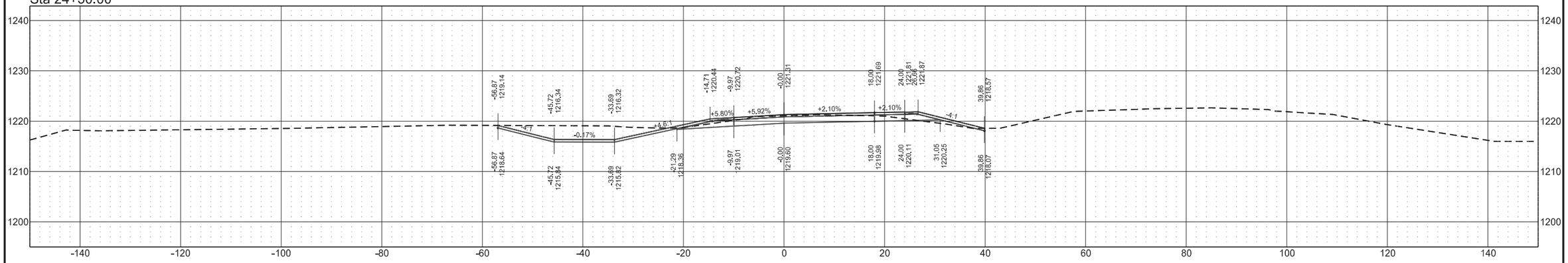
EB Ramps
Sta 24+00 to 25+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	19

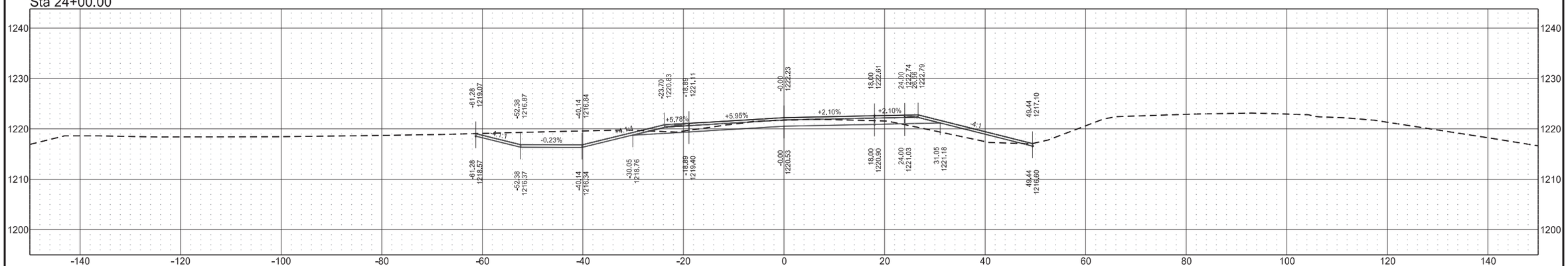
Sta 25+00.00



Sta 24+50.00



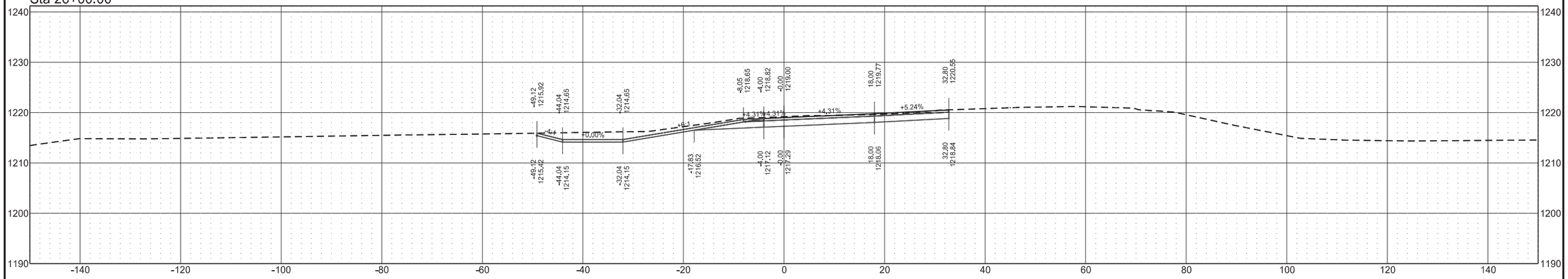
Sta 24+00.00



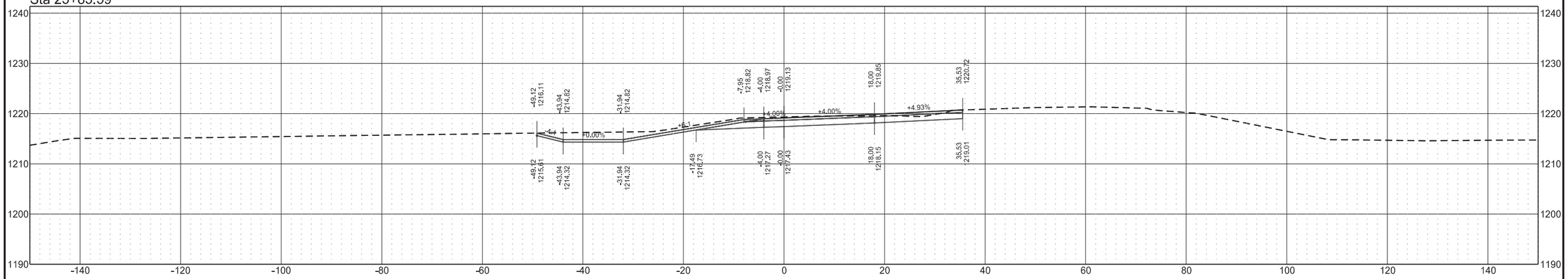
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	20

EB Ramps
Sta 25+50 to 26+00

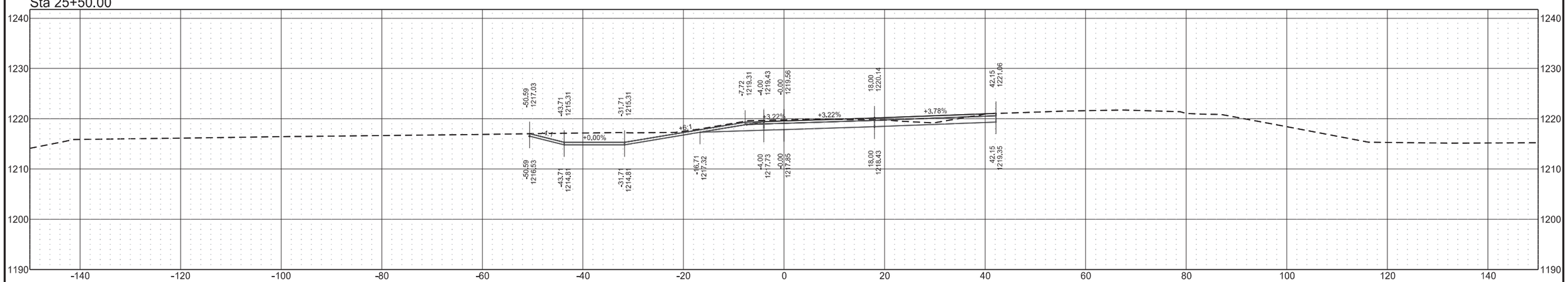
Sta 26+00.00



Sta 25+85.59



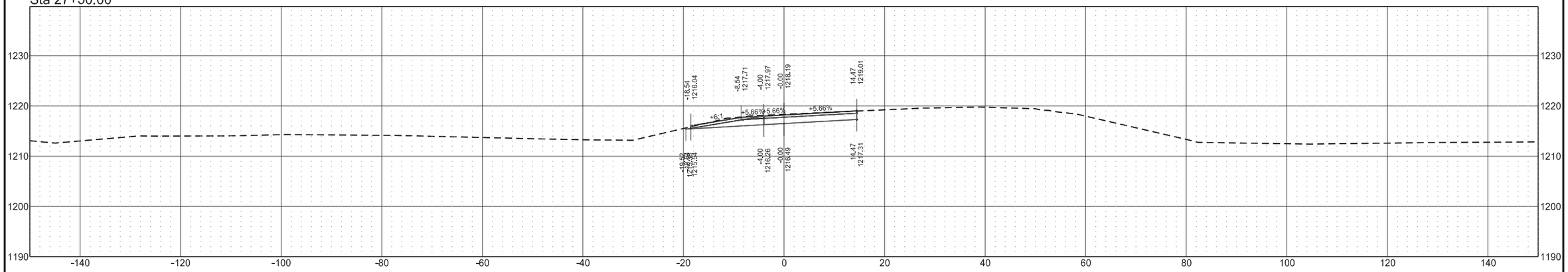
Sta 25+50.00



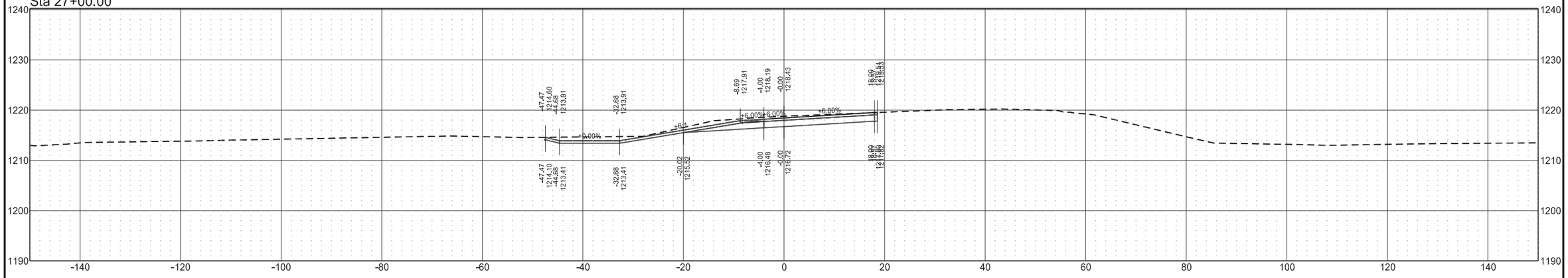
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	21

EB Ramps
Sta 26+50 to 27+50

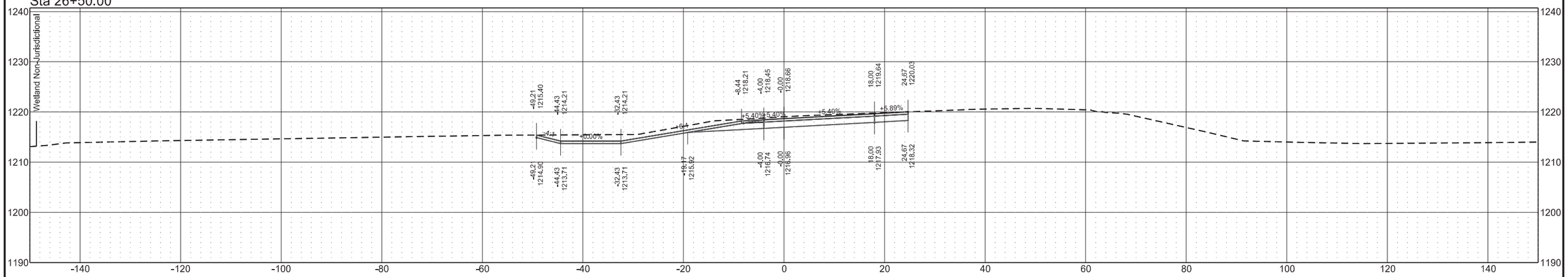
Sta 27+50.00



Sta 27+00.00



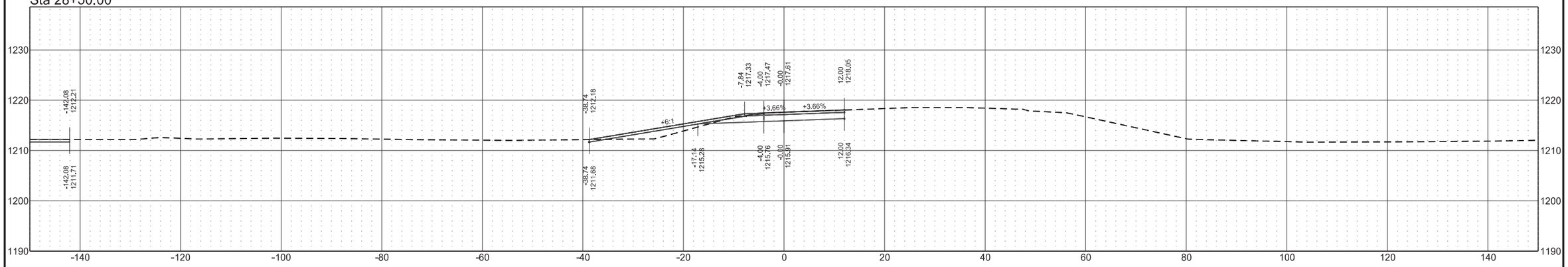
Sta 26+50.00



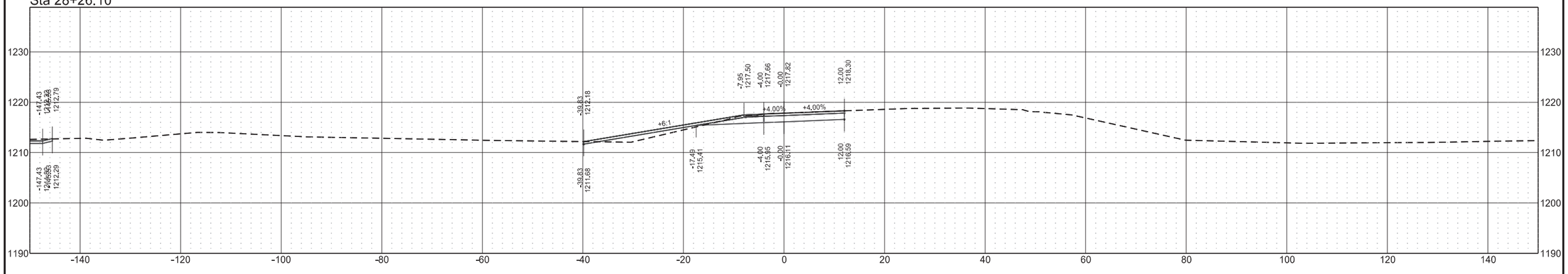
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	22

EB Ramps
Sta 28+00 to 28+50

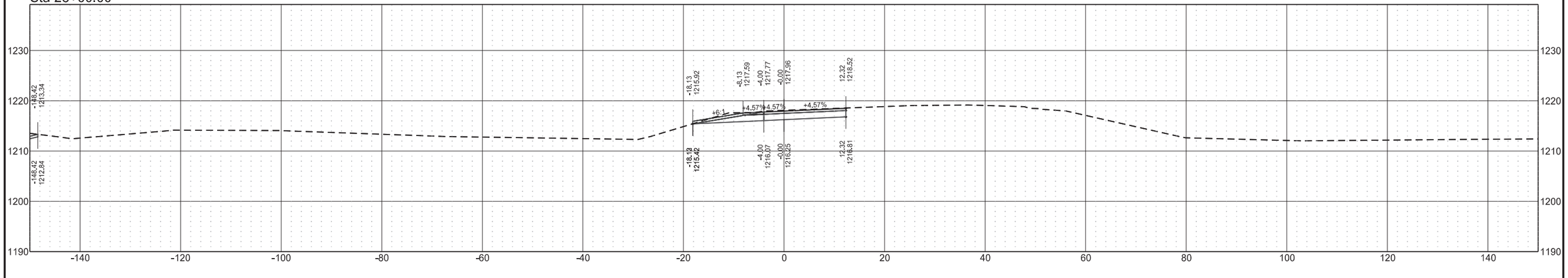
Sta 28+50.00



Sta 28+26.10



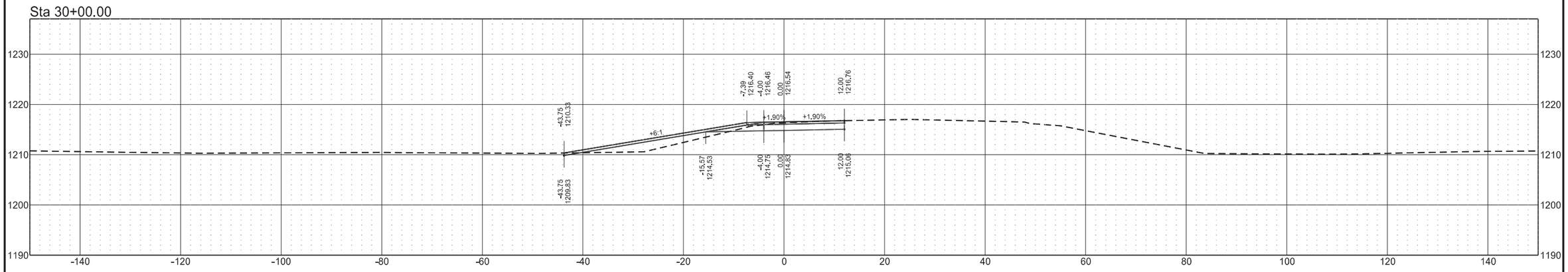
Sta 28+00.00



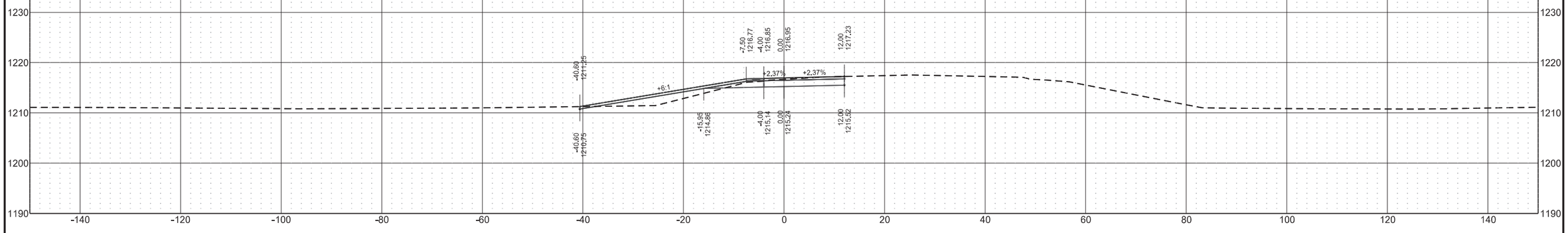
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	23

EB Ramps
Sta 29+00 to 30+00

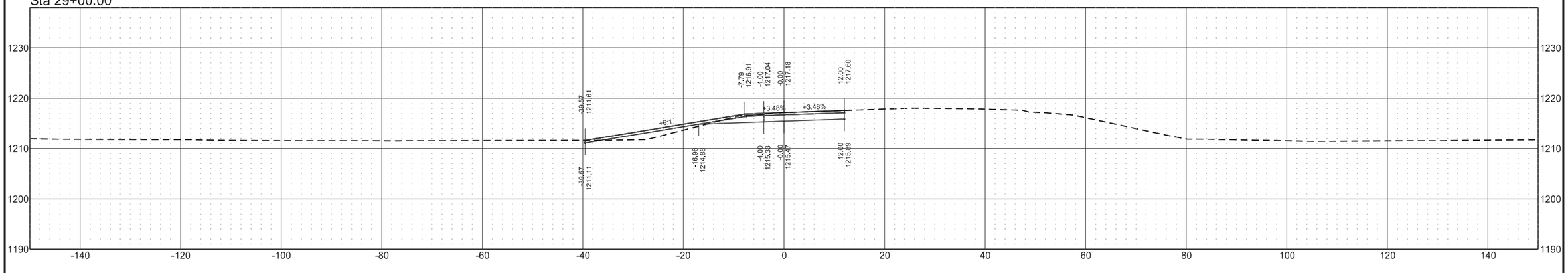
Sta 30+00.00



Sta 29+50.00



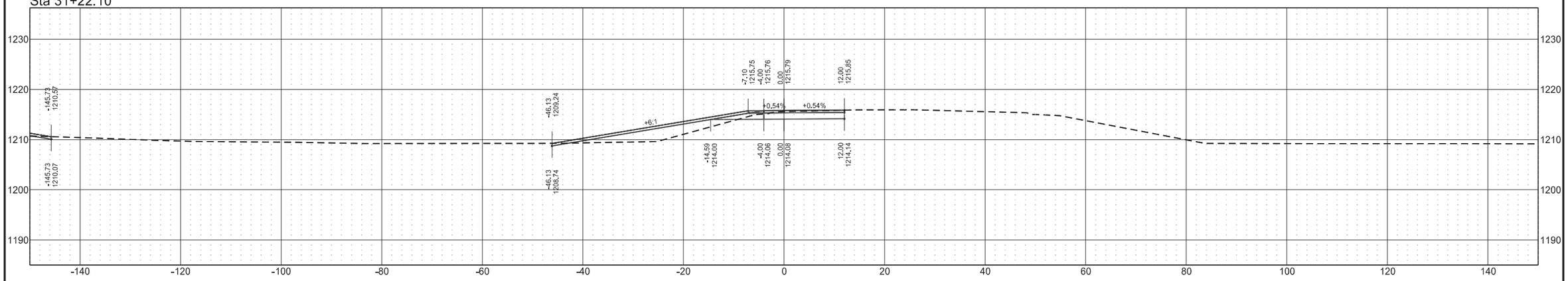
Sta 29+00.00



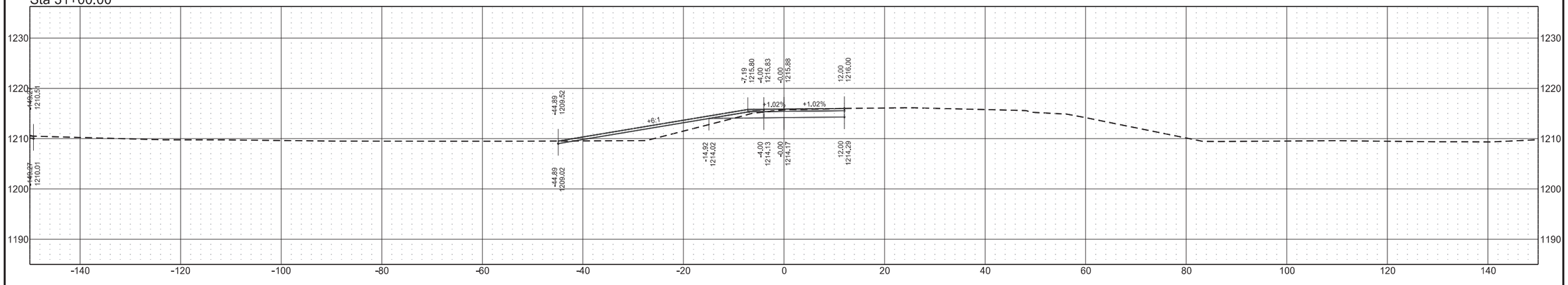
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	24

EB Ramps
Sta 30+50 to 31+22.10

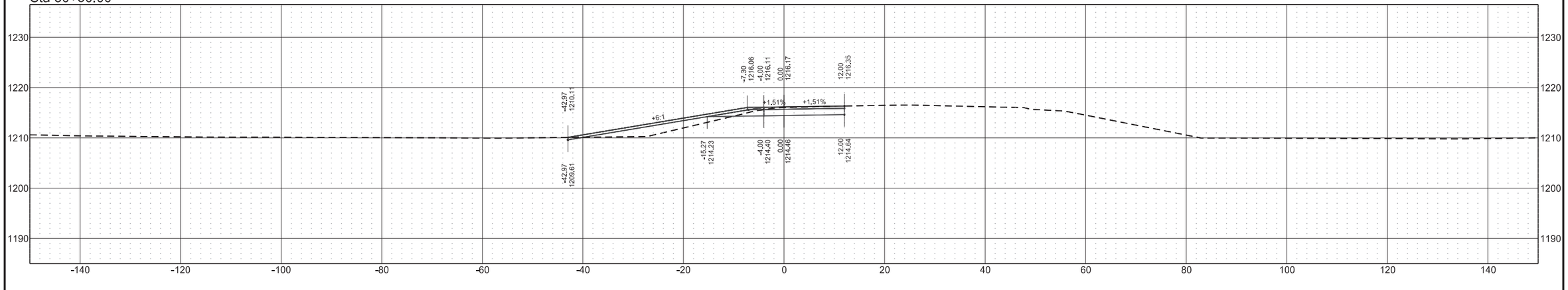
Sta 31+22.10



Sta 31+00.00



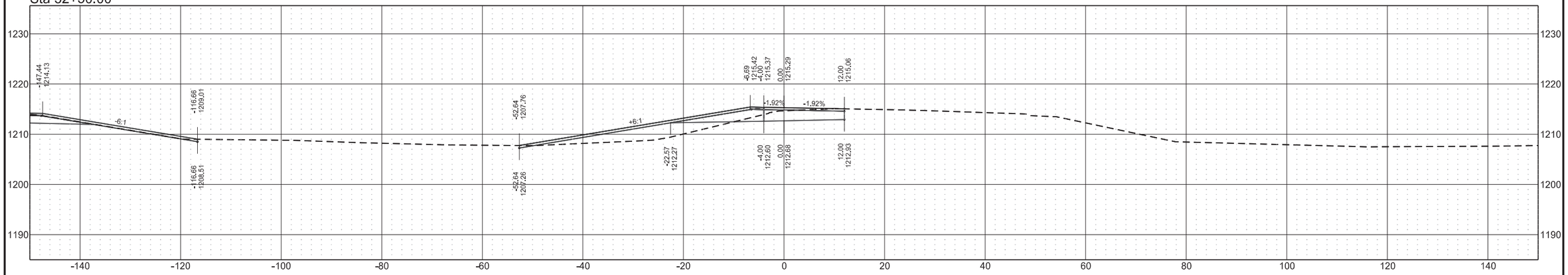
Sta 30+50.00



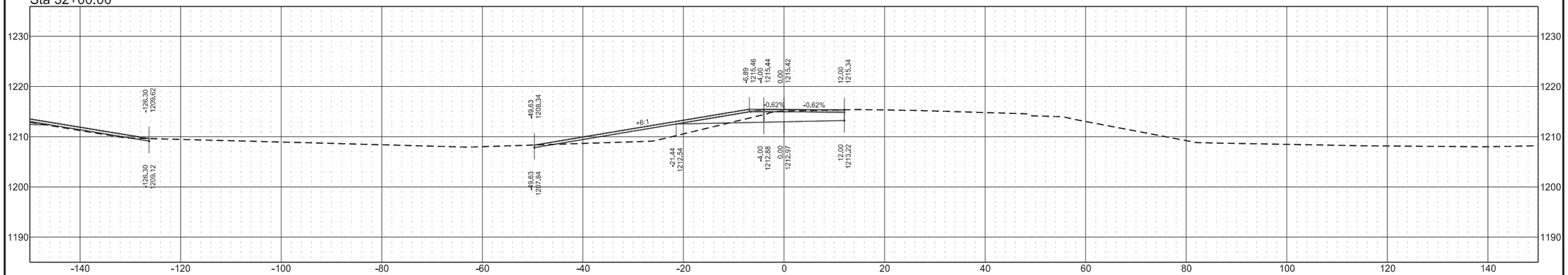
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	25

EB Ramps
Sta 31+50 to 32+50

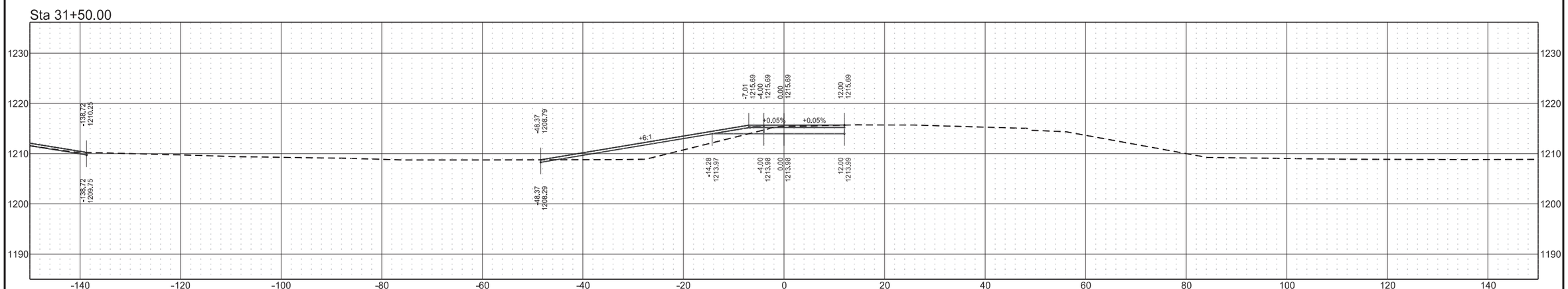
Sta 32+50.00



Sta 32+00.00



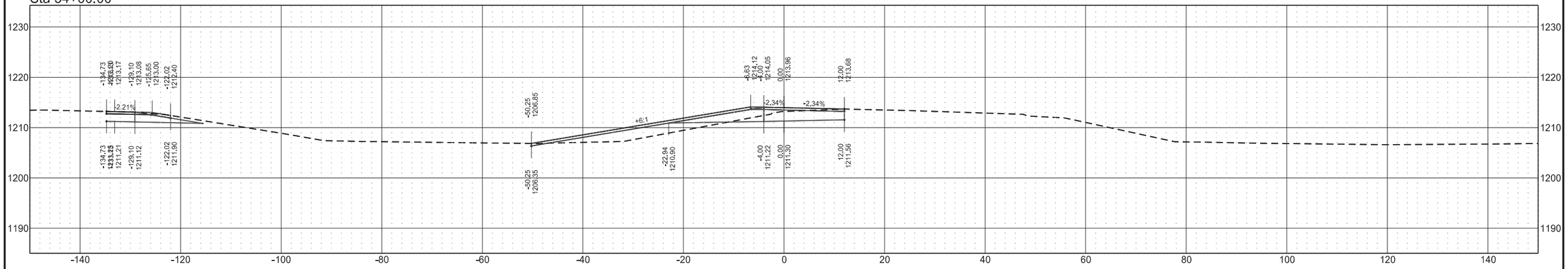
Sta 31+50.00



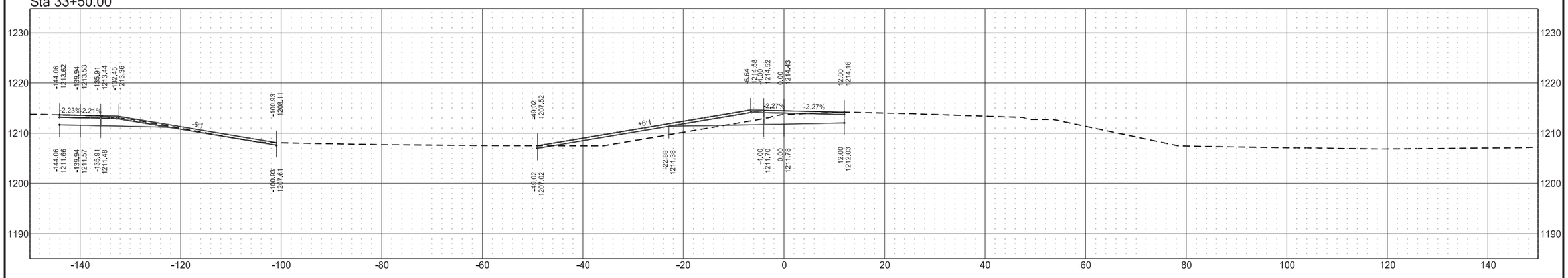
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	26

EB Ramps
Sta 33+00 to 34+00

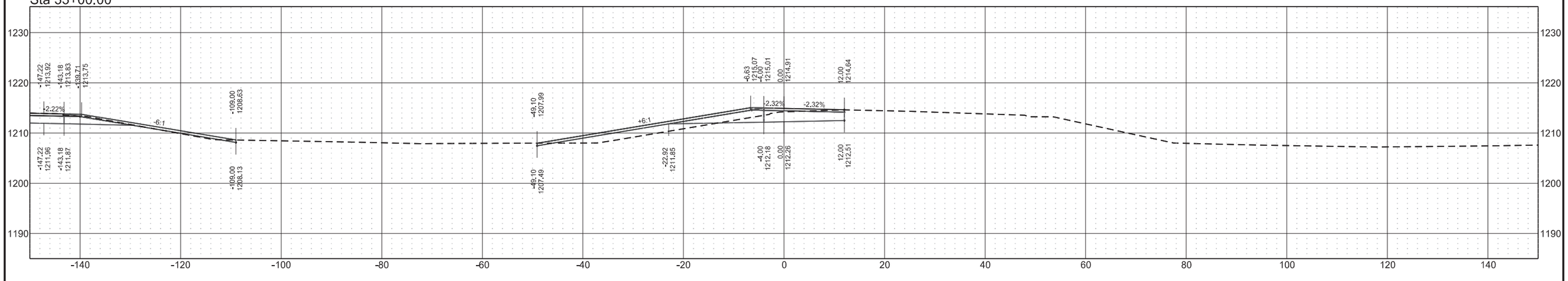
Sta 34+00.00



Sta 33+50.00



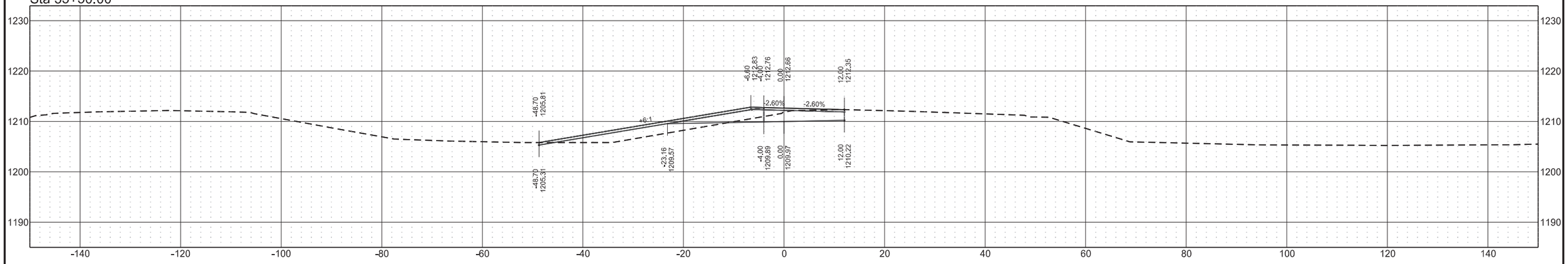
Sta 33+00.00



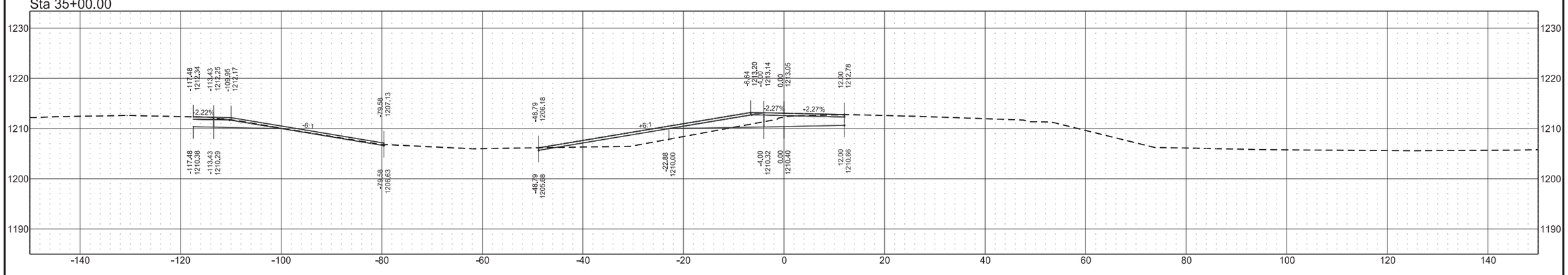
EB Ramps
Sta 34+50 to 35+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	27

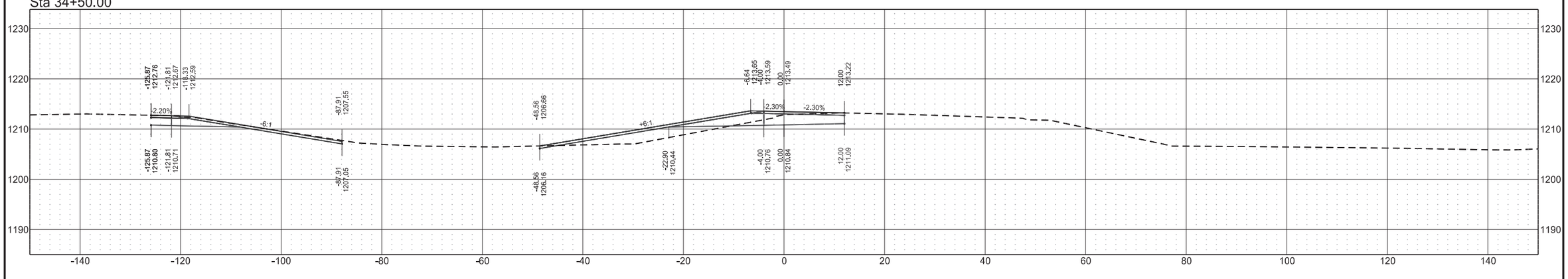
Sta 35+50.00



Sta 35+00.00



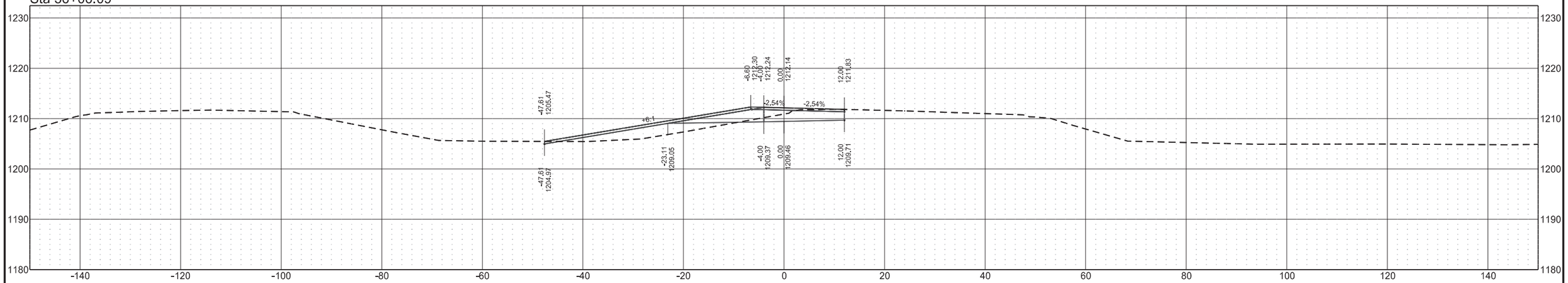
Sta 34+50.00



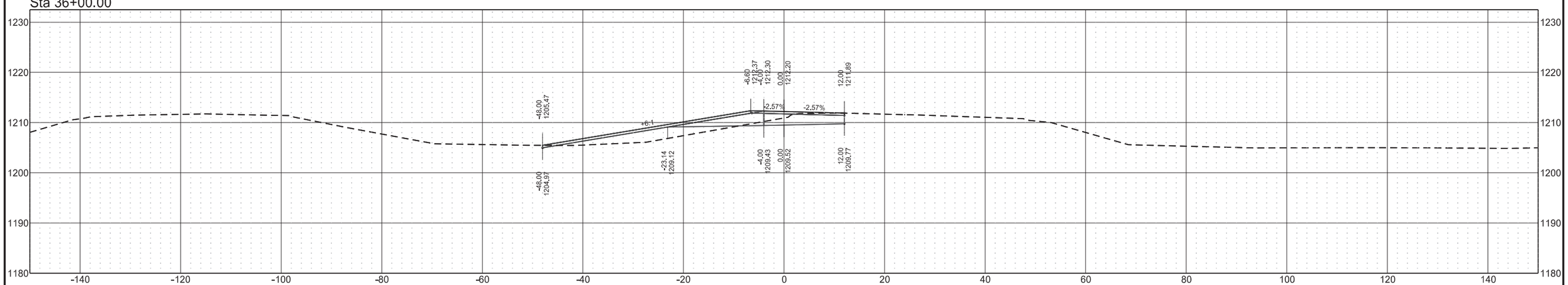
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	28

EB Ramps
Sta 36+00 to 36+06.09

Sta 36+06.09



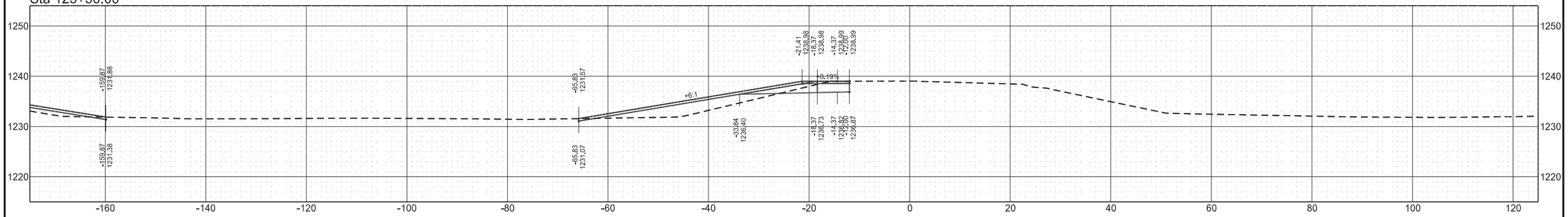
Sta 36+00.00



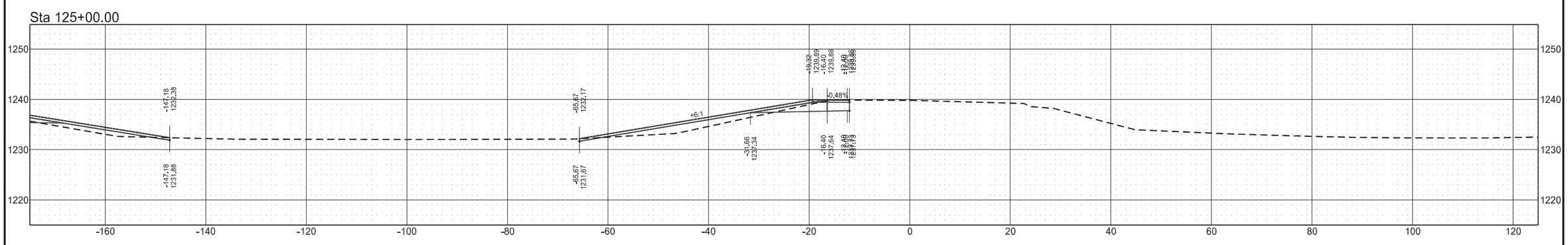
OCL EB94
Sta 124+88.08 to 125+50.00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	29

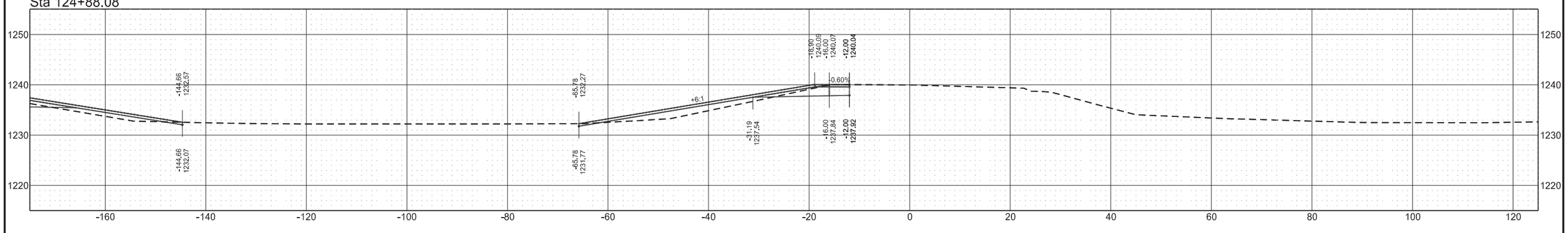
Sta 125+50.00



Sta 125+00.00



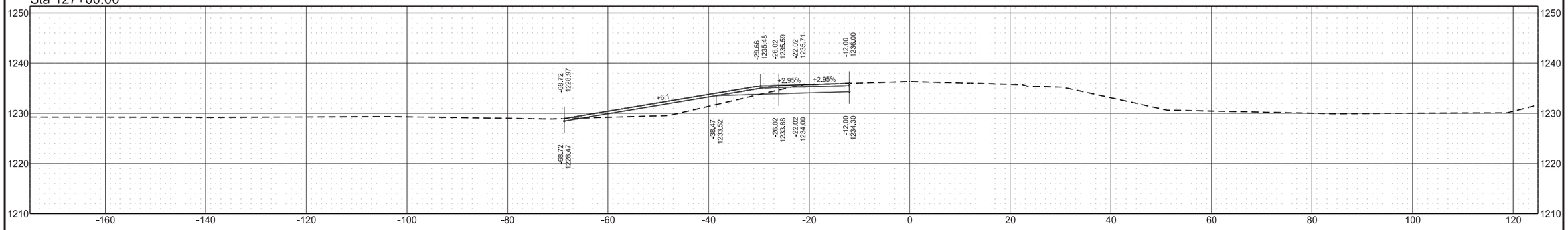
Sta 124+88.08



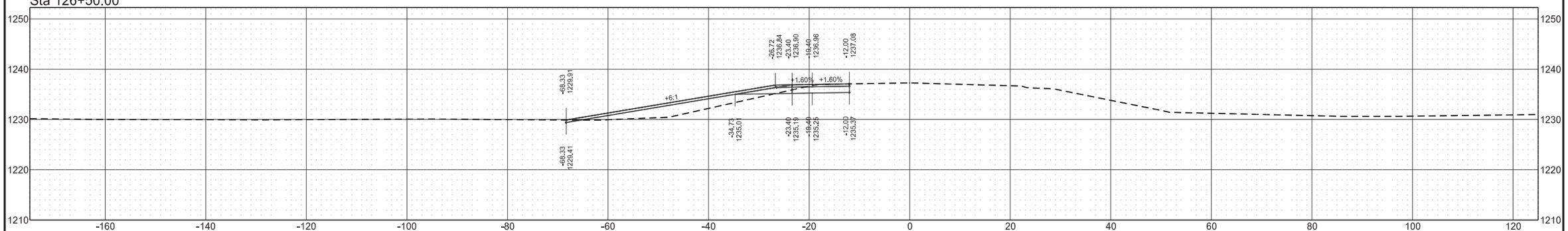
OCL EB94
Sta 126+00 to 127+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	30

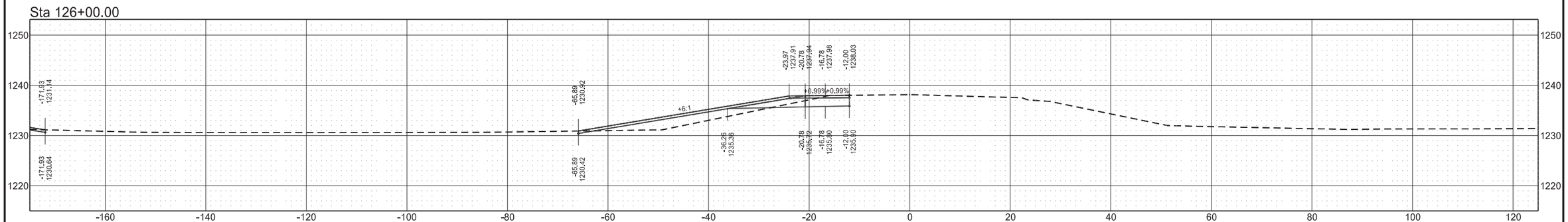
Sta 127+00.00



Sta 126+50.00

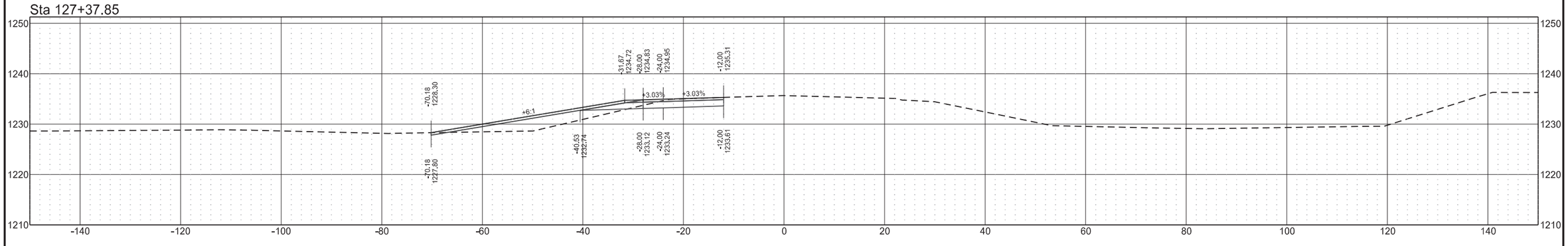


Sta 126+00.00



OCL EB94
Sta 127+37.85

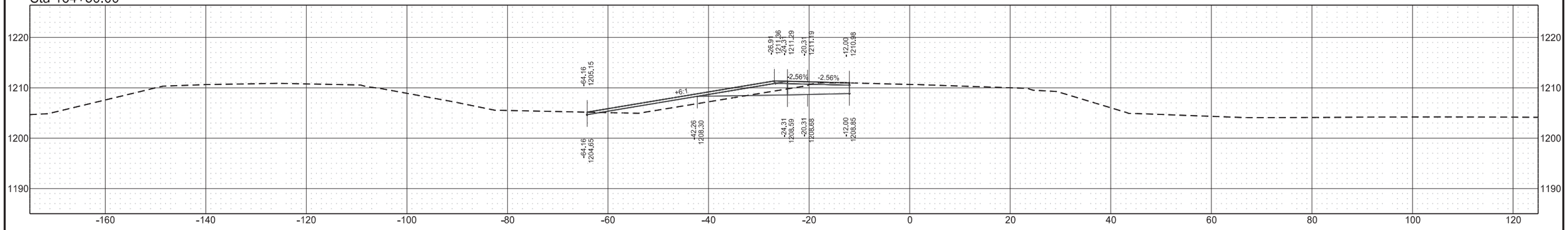
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	31



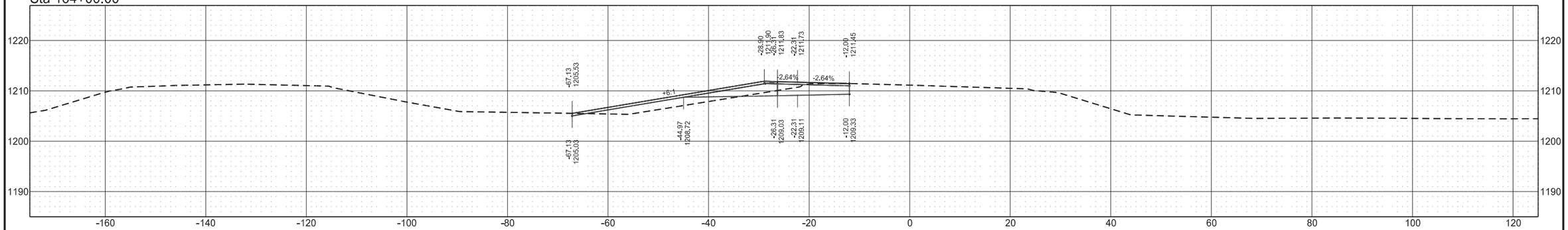
OCL EB94
Sta 163+57.95 to 164+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	32

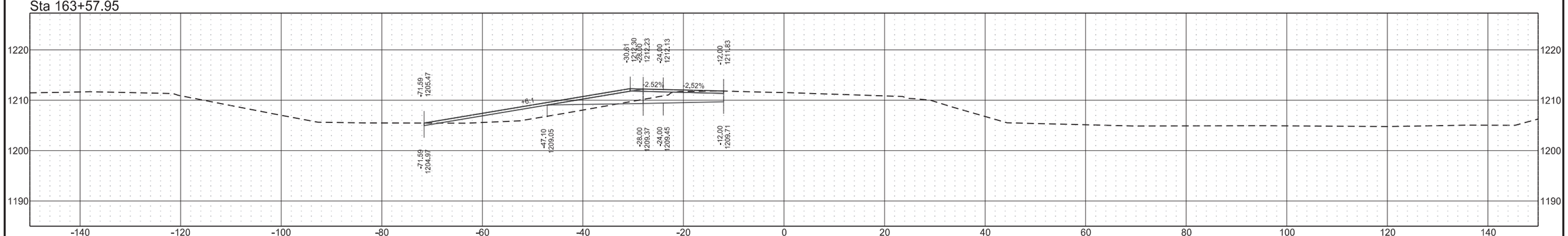
Sta 164+50.00



Sta 164+00.00



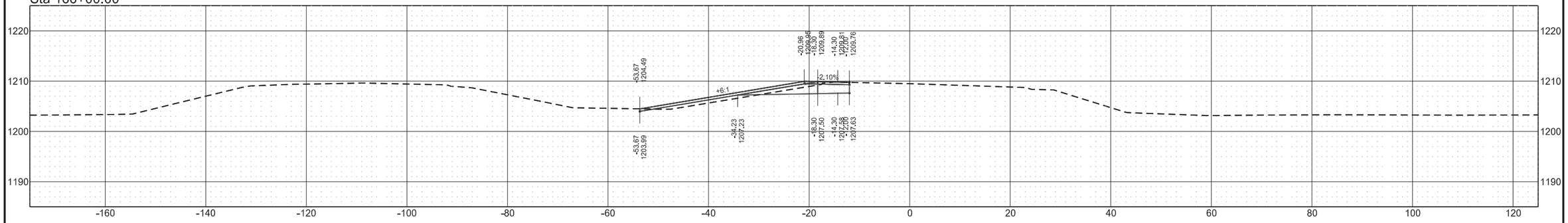
Sta 163+57.95



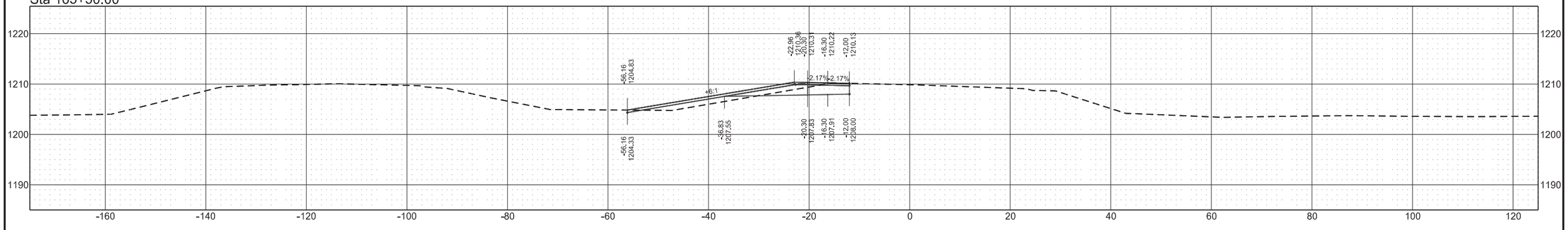
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	33

OCL EB94
Sta 165+00 to 166+00

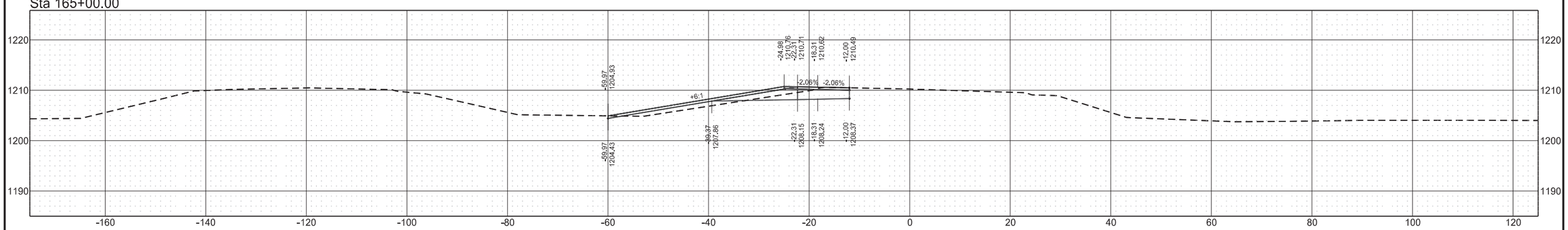
Sta 166+00.00



Sta 165+50.00



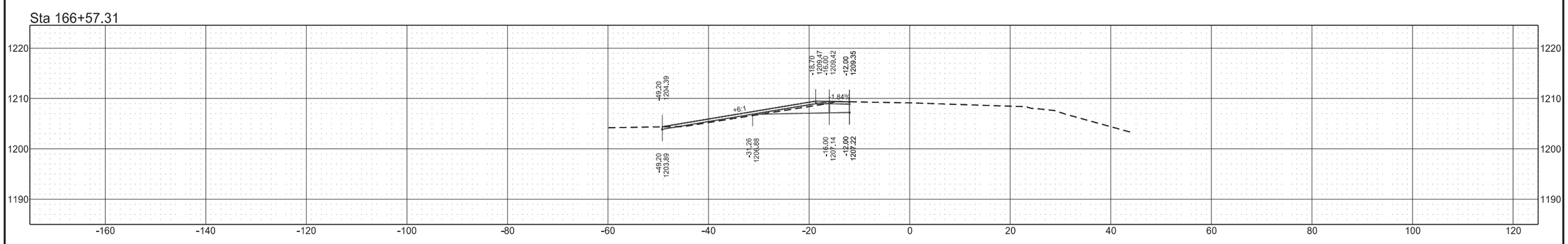
Sta 165+00.00



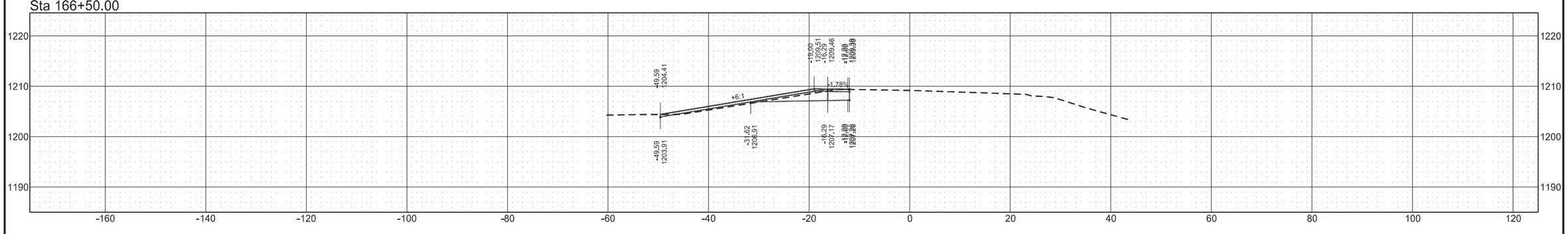
OCL EB94
Sta 166+50 to 166+57.31

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	34

Sta 166+57.31



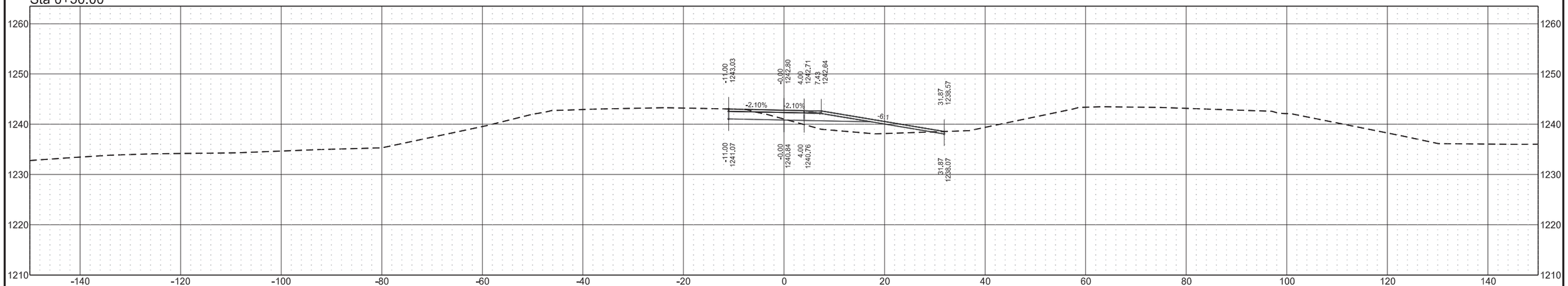
Sta 166+50.00



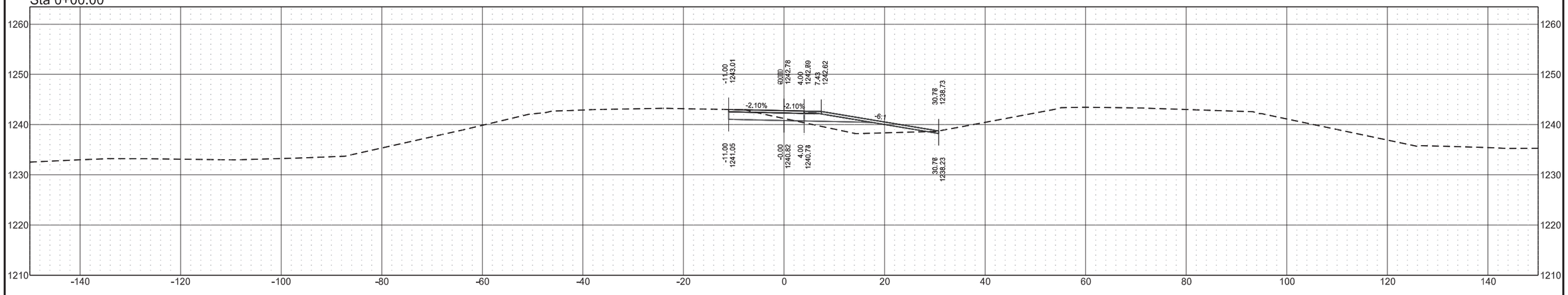
WB Ramps
Sta 0+00 to 0+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	35

Sta 0+50.00



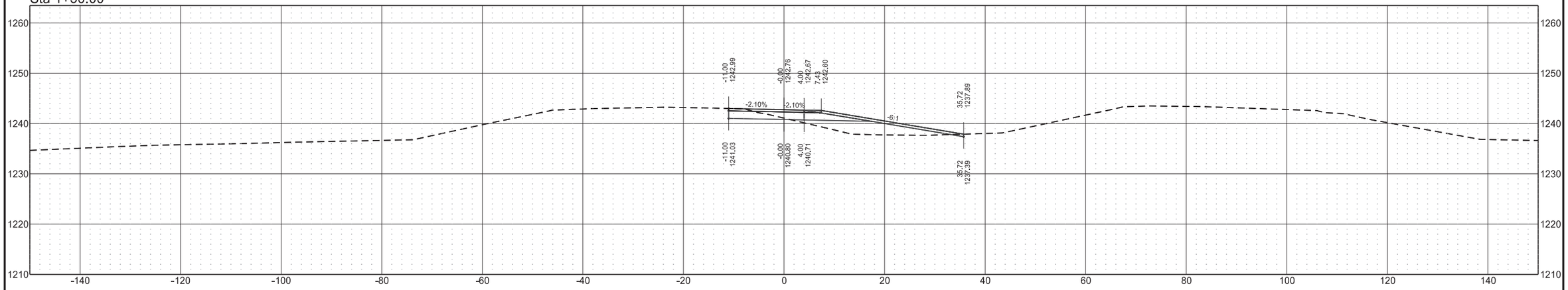
Sta 0+00.00



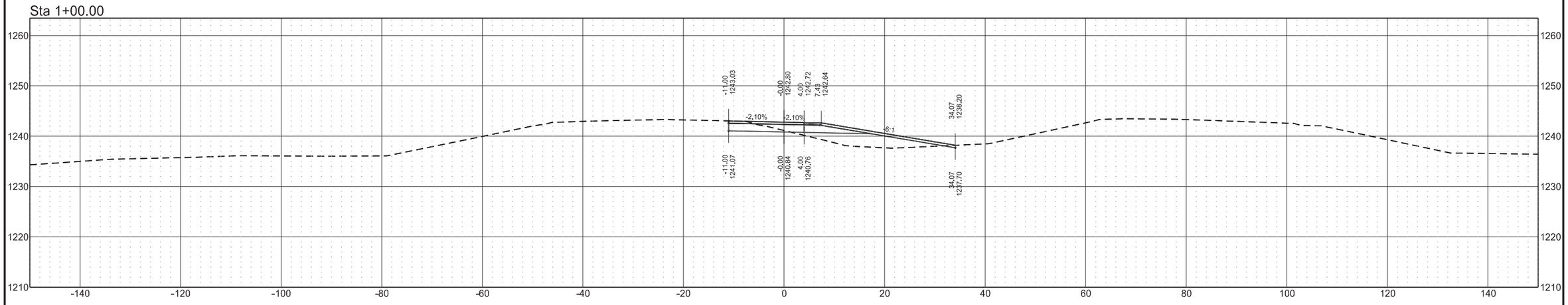
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	36

WB Ramps
Sta 1+00 to 1+50

Sta 1+50.00



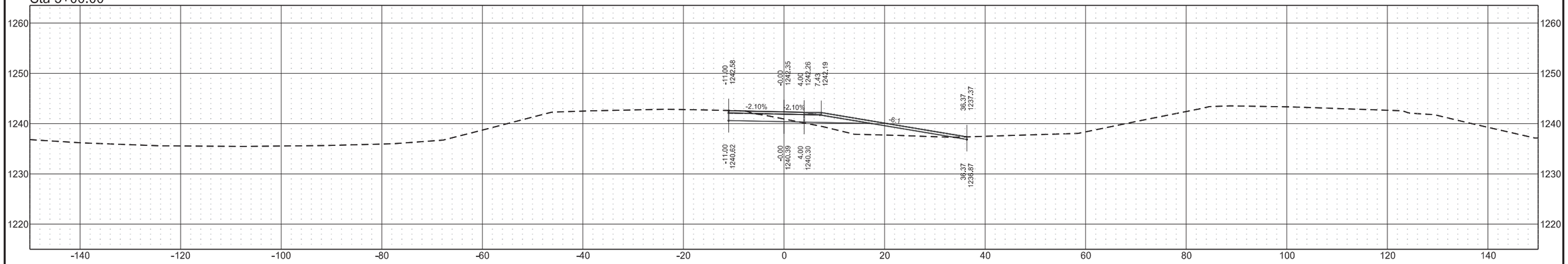
Sta 1+00.00



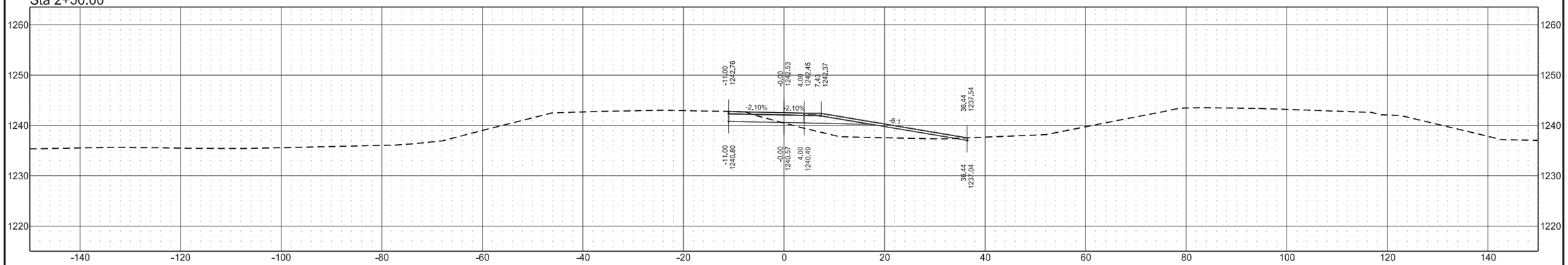
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	37

WB Ramps
Sta 2+00 to 3+00

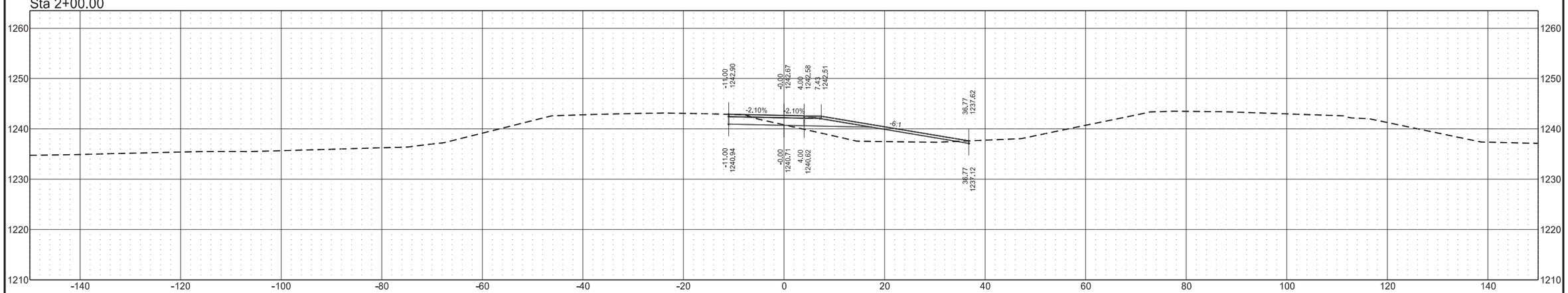
Sta 3+00.00



Sta 2+50.00



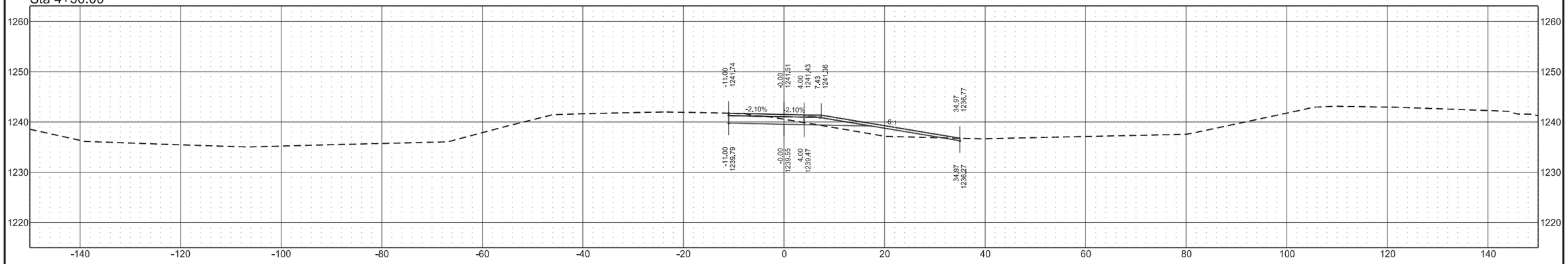
Sta 2+00.00



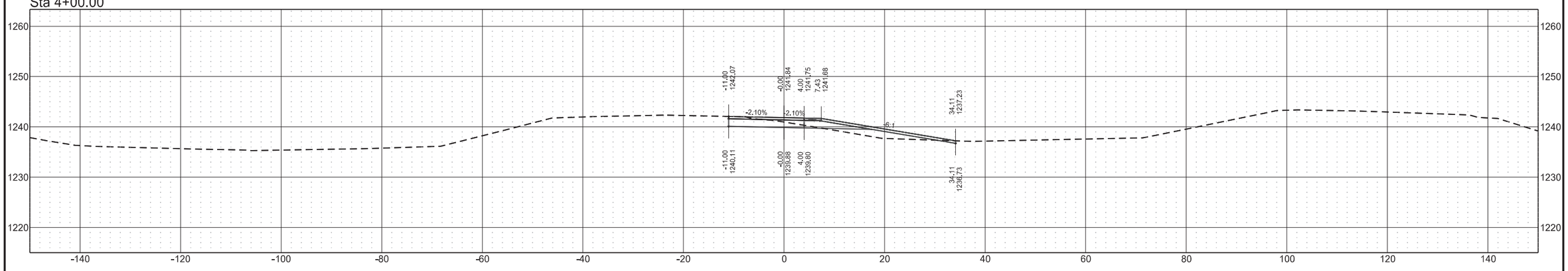
WB Ramps
Sta 3+50 to 4+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	28

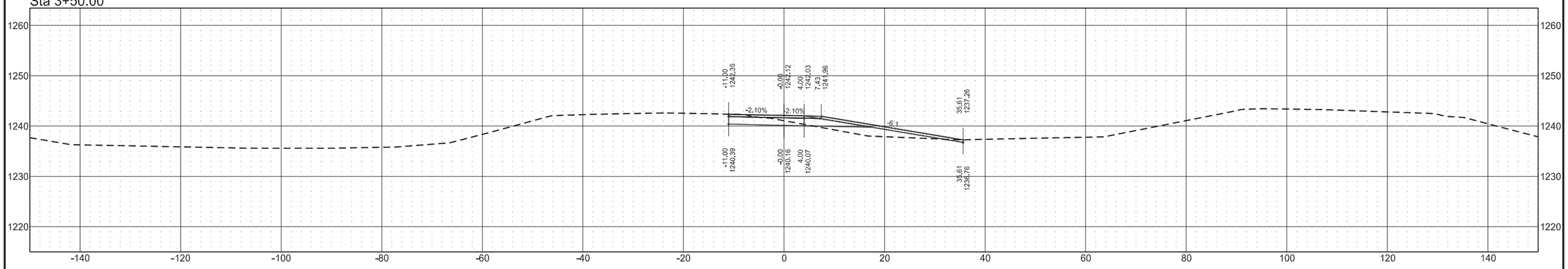
Sta 4+50.00



Sta 4+00.00



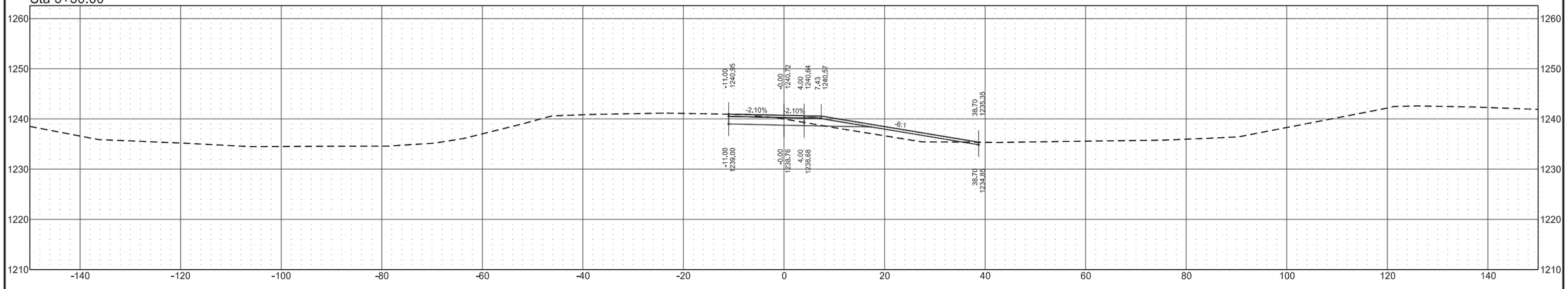
Sta 3+50.00



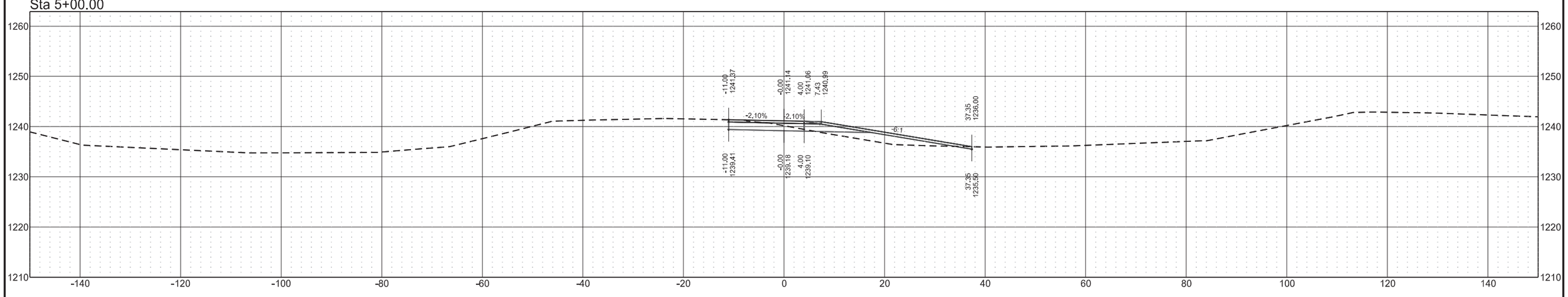
WB Ramps
Sta 5+00 to 5+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	39

Sta 5+50.00



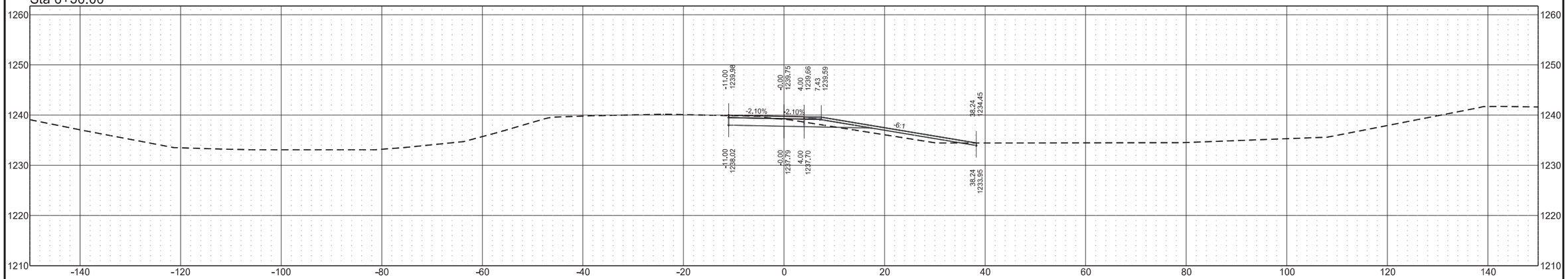
Sta 5+00.00



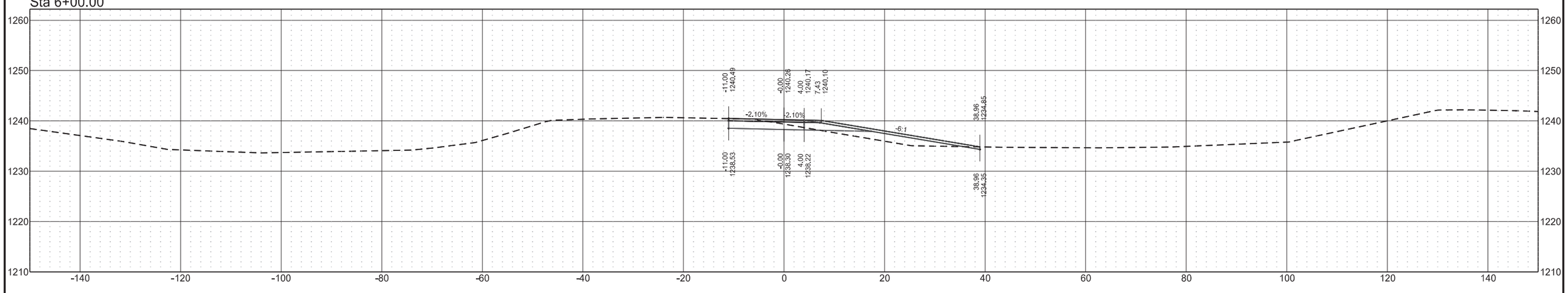
WB Ramps
Sta 6+00 to 6+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	40

Sta 6+50.00



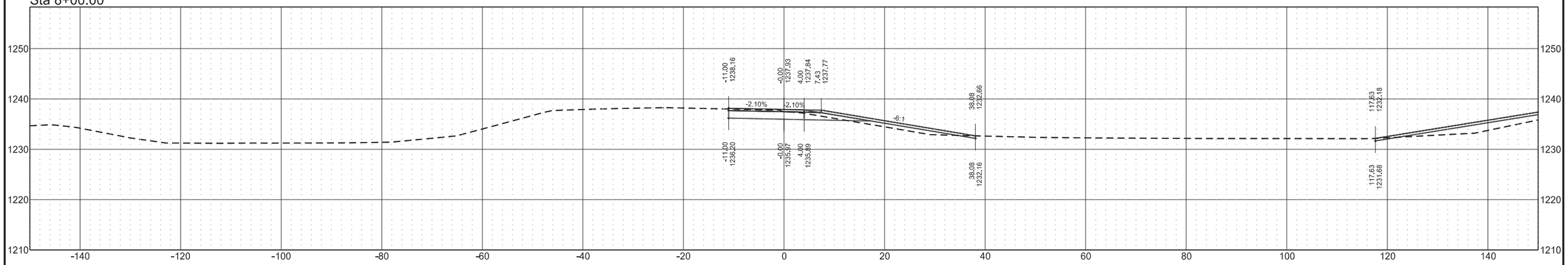
Sta 6+00.00



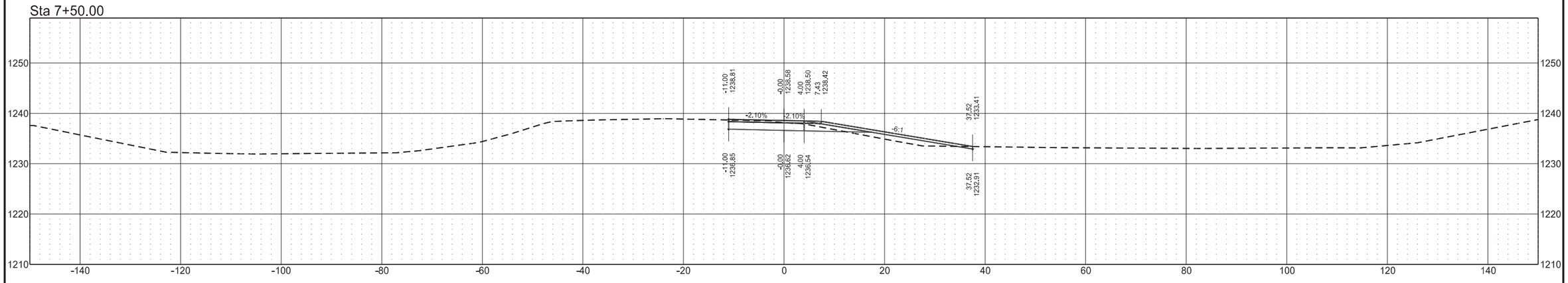
WB Ramps
Sta 7+00 to 8+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	41

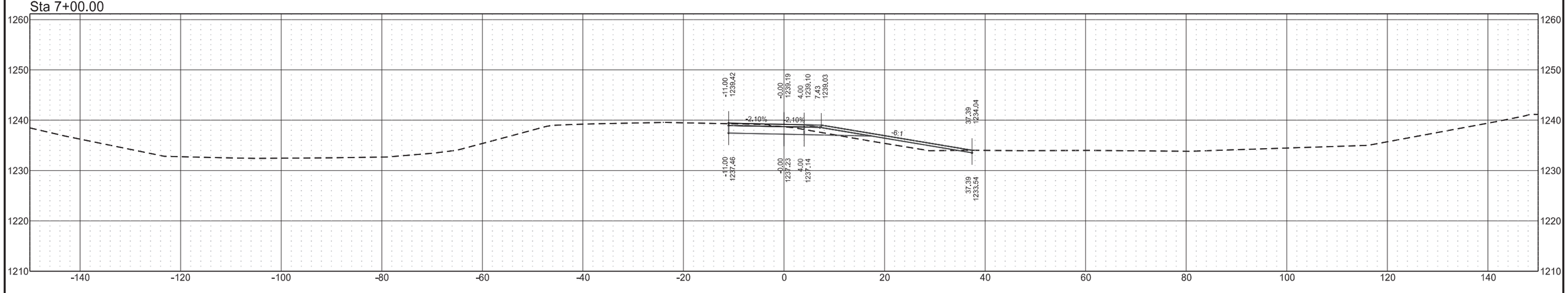
Sta 8+00.00



Sta 7+50.00



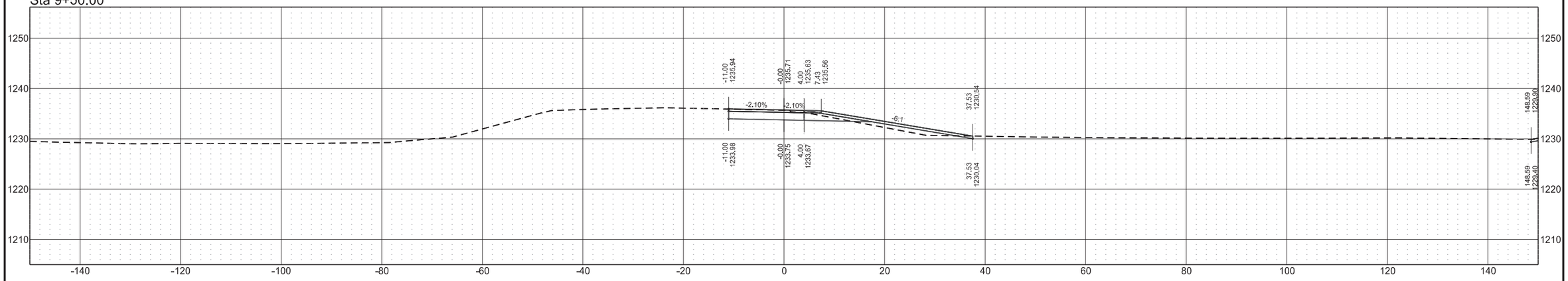
Sta 7+00.00



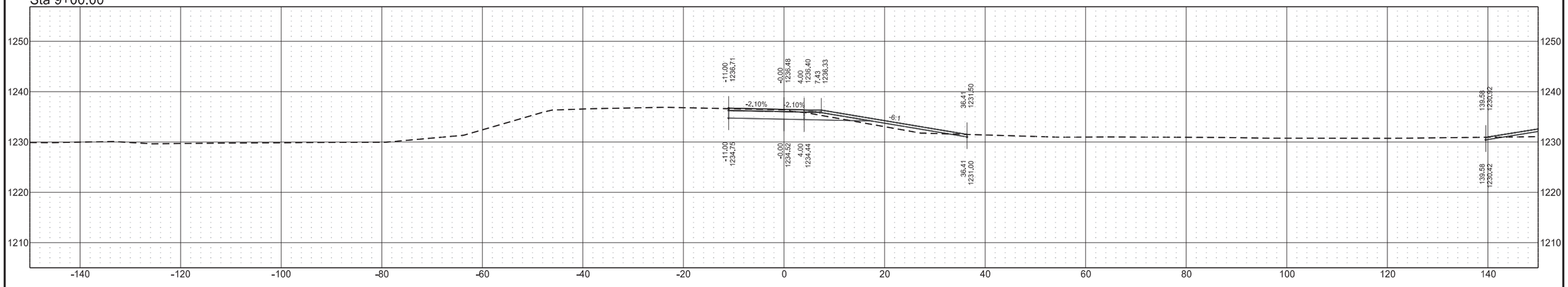
WB Ramps
Sta 8+50 to 9+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	42

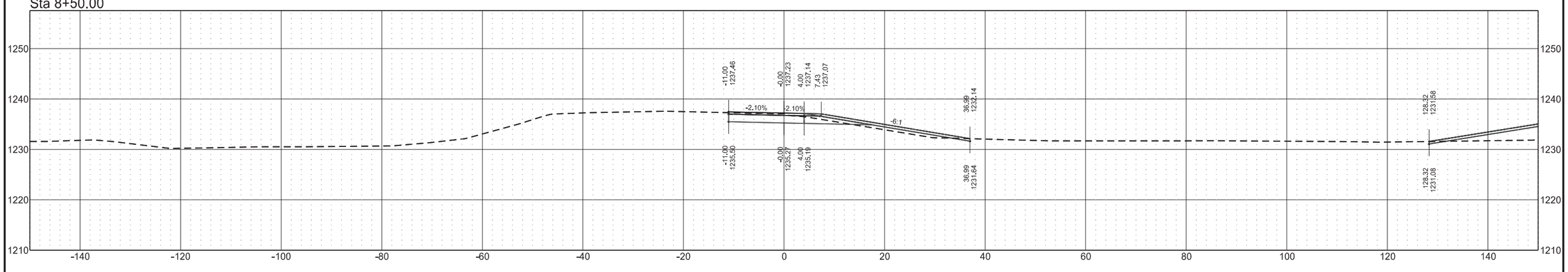
Sta 9+50.00



Sta 9+00.00



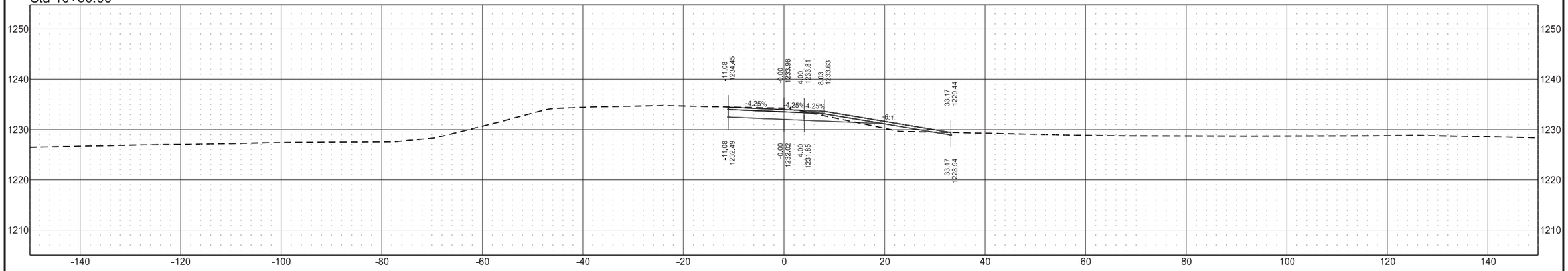
Sta 8+50.00



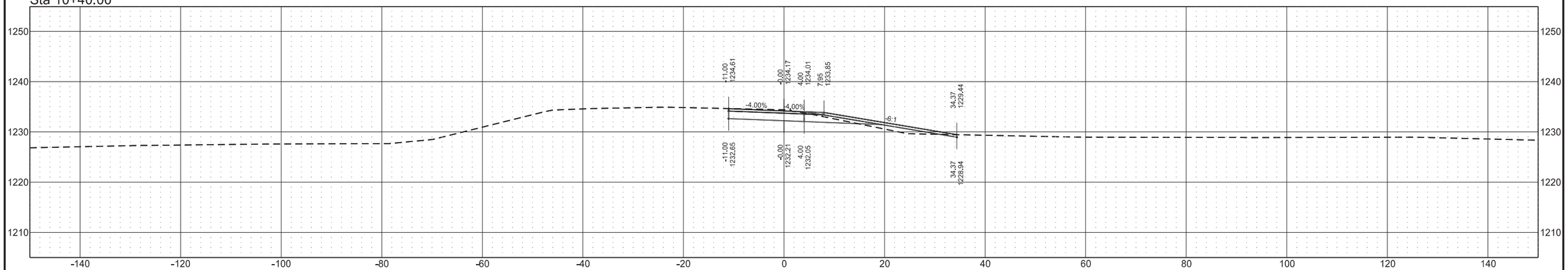
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	43

WB Ramps
Sta 10+00 to 10+50

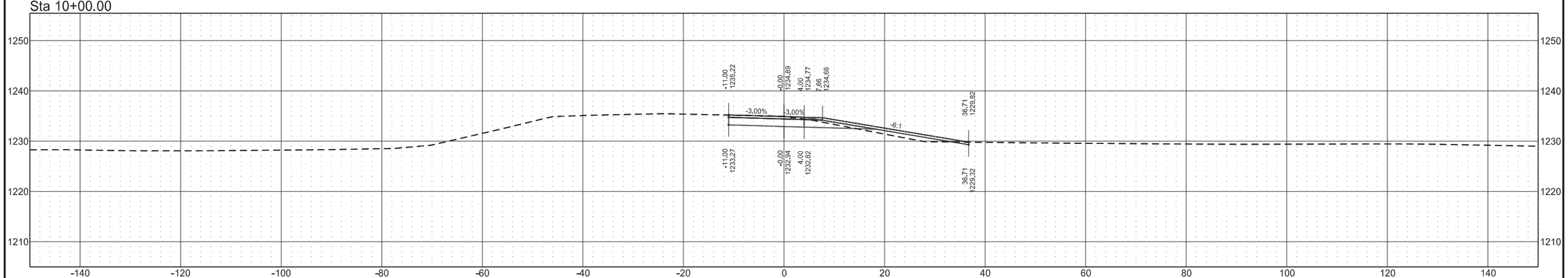
Sta 10+50.00



Sta 10+40.00



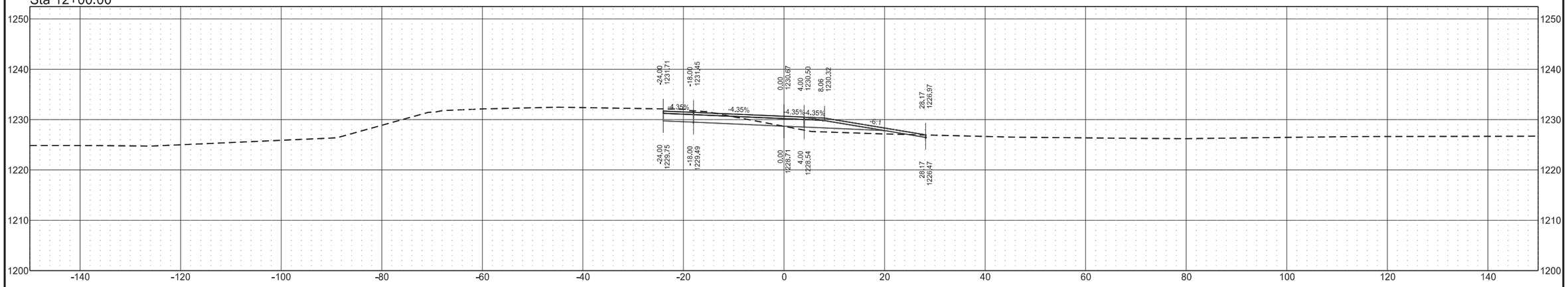
Sta 10+00.00



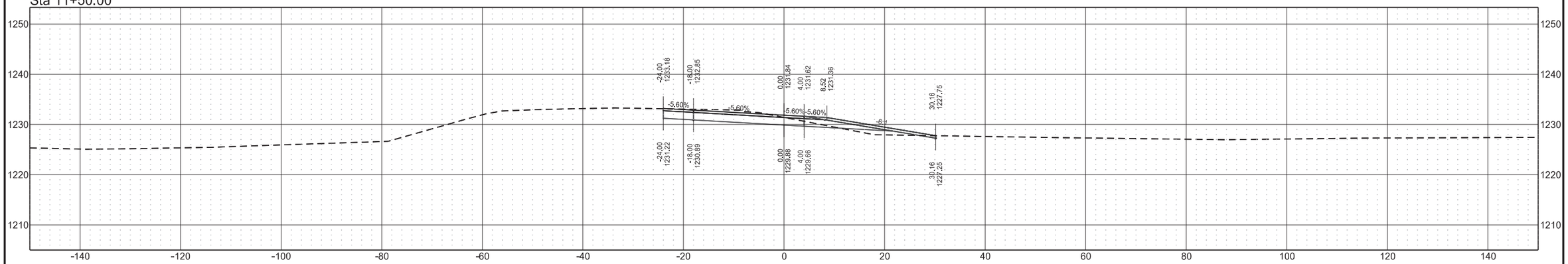
WB Ramps
Sta 11+00 to 12+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	44

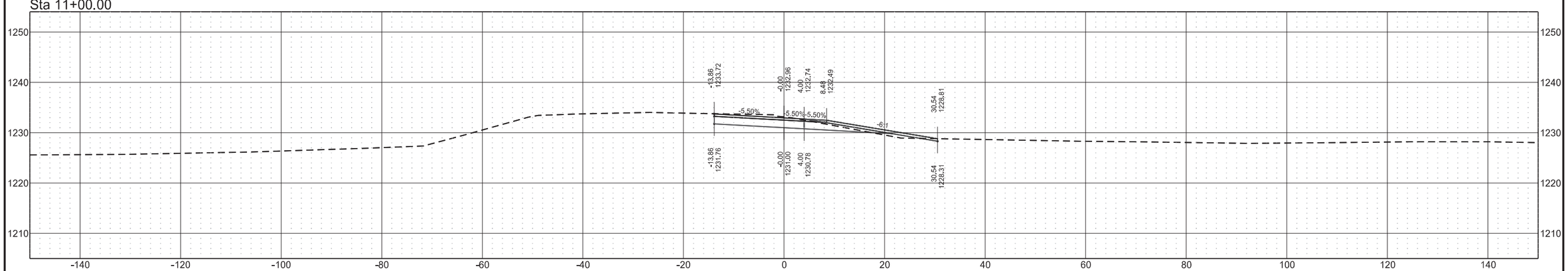
Sta 12+00.00



Sta 11+50.00



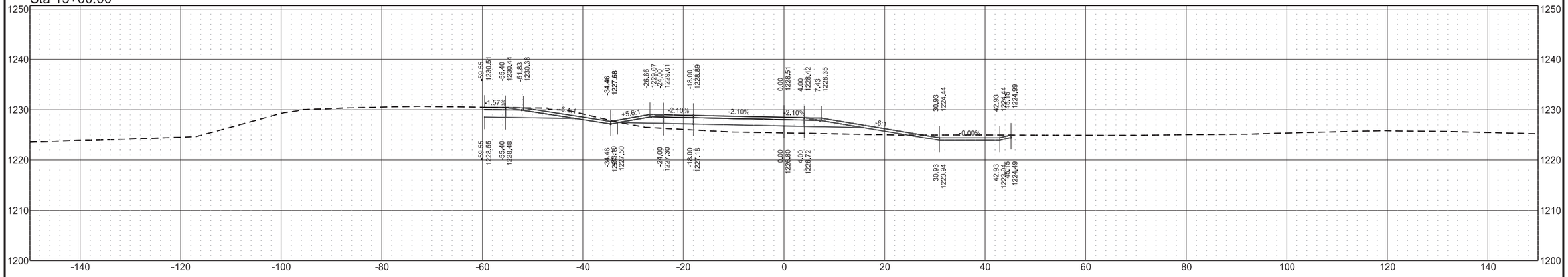
Sta 11+00.00



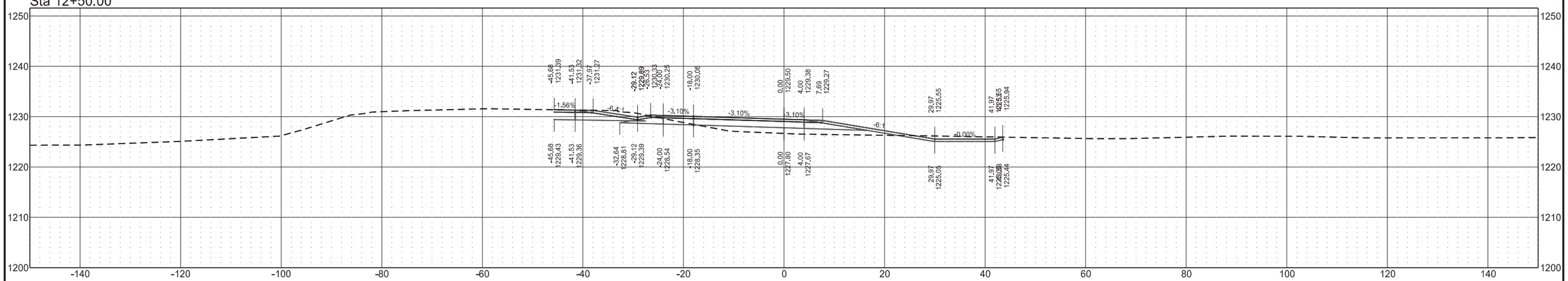
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	45

WB Ramps
Sta 12+13.95 to 13+00

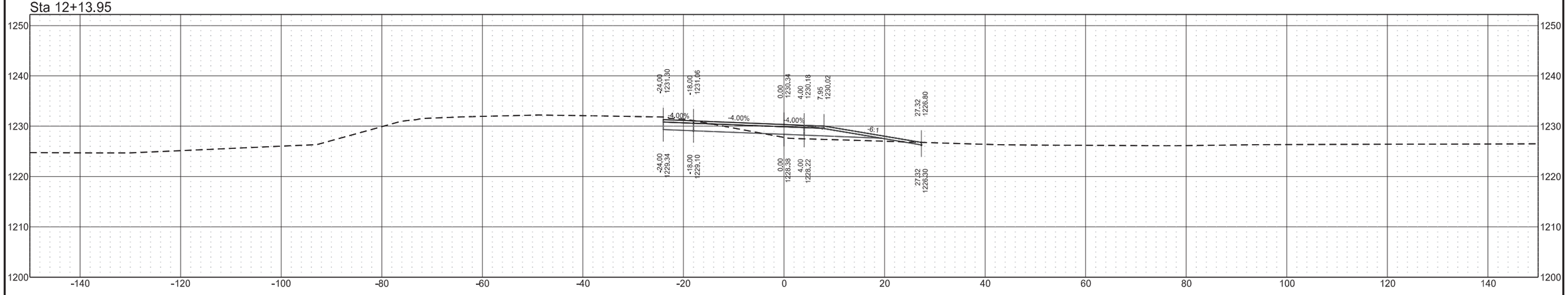
Sta 13+00.00



Sta 12+50.00



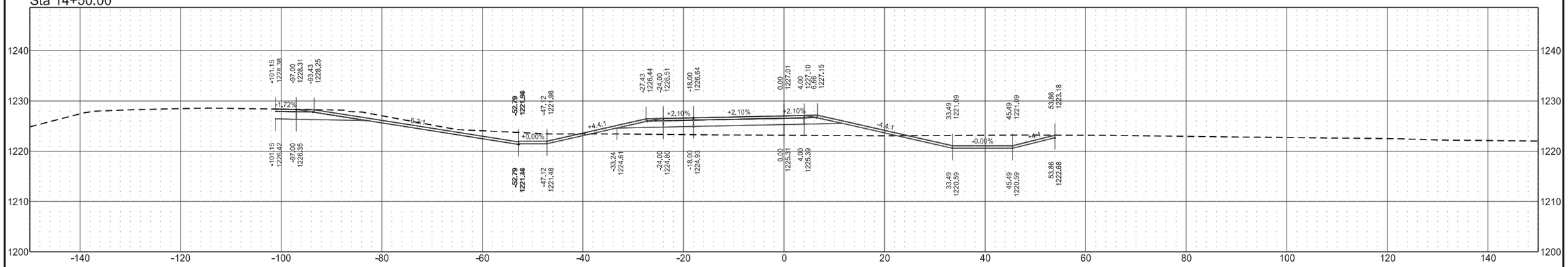
Sta 12+13.95



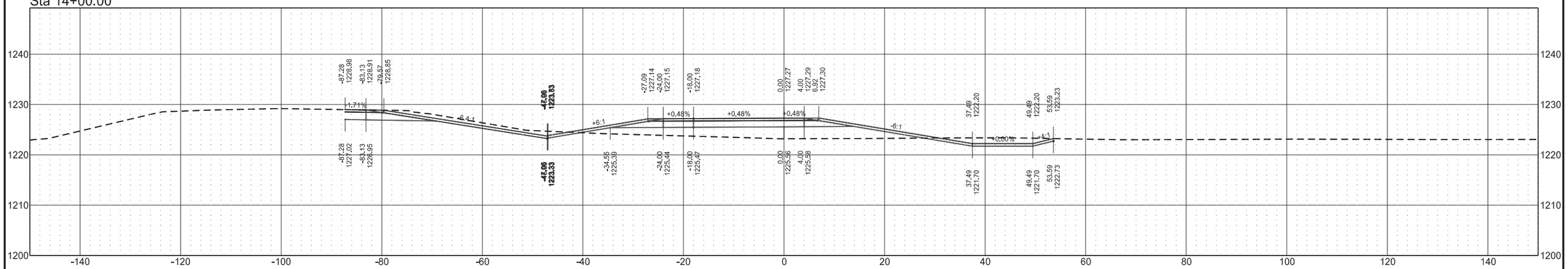
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	46

WB Ramps
Sta 13+50 to 14+50

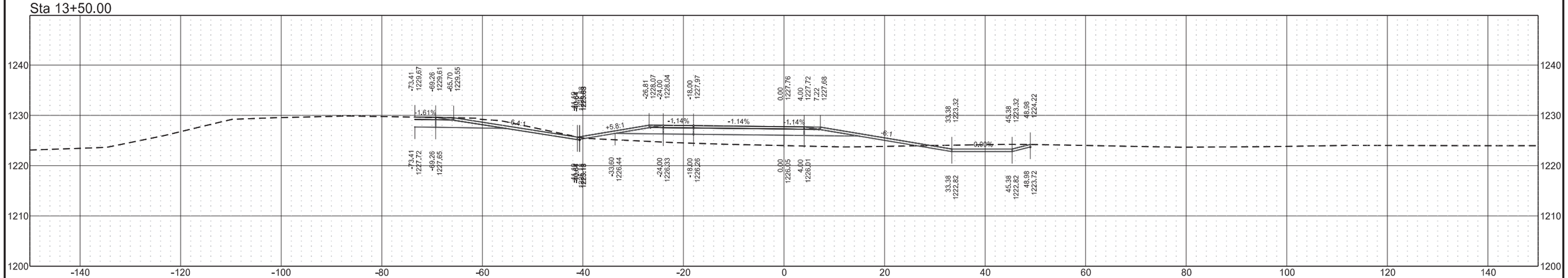
Sta 14+50.00



Sta 14+00.00



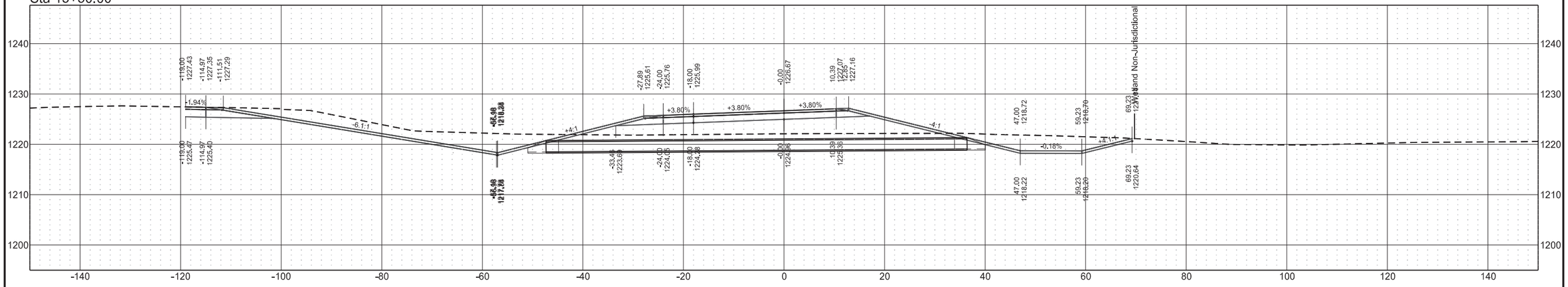
Sta 13+50.00



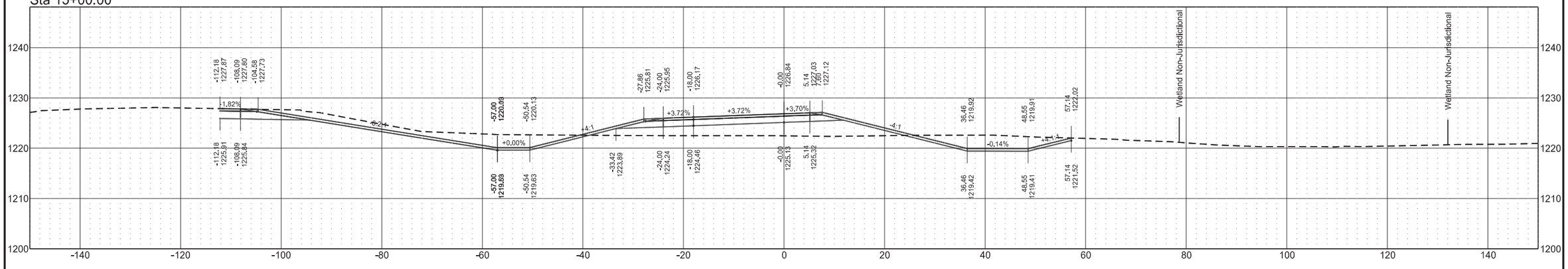
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	47

WB Ramps
Sta 14+63.13 to 15+50

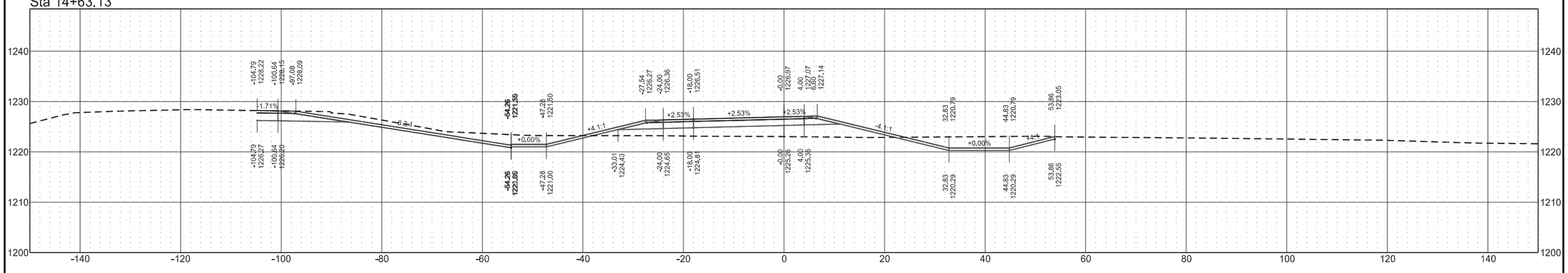
Sta 15+50.00



Sta 15+00.00



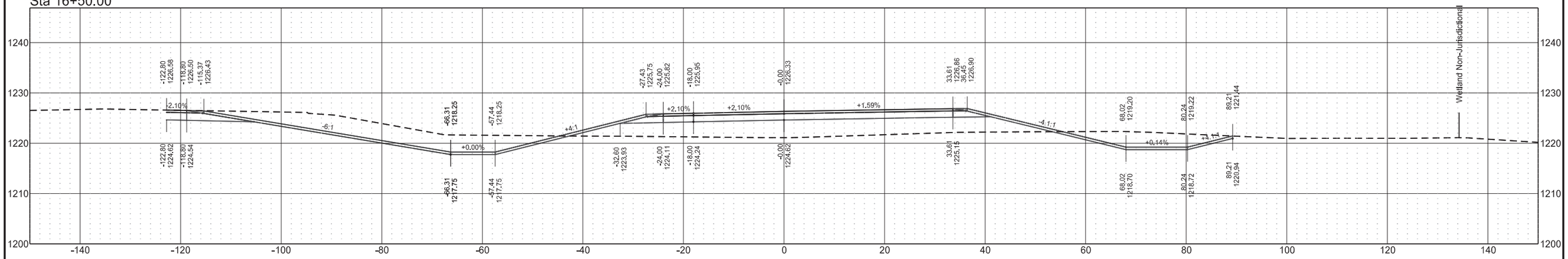
Sta 14+63.13



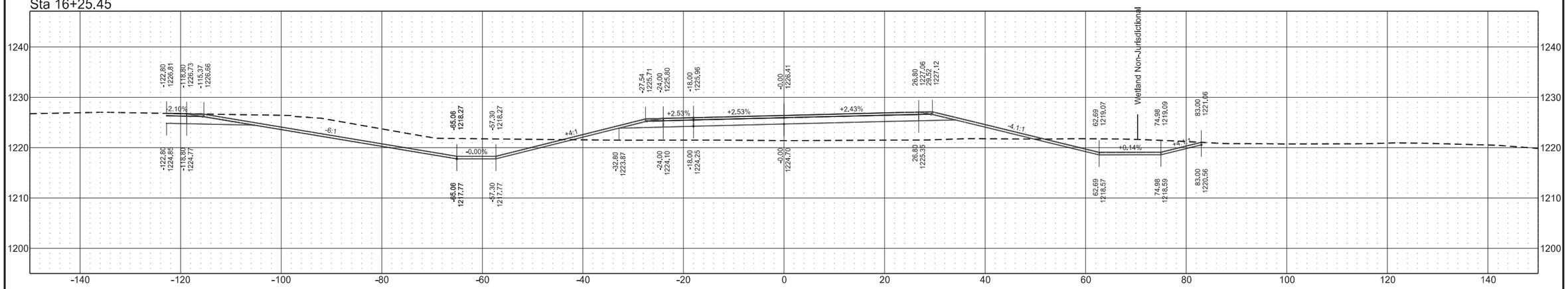
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	48

WB Ramps
Sta 16+00 to 16+50

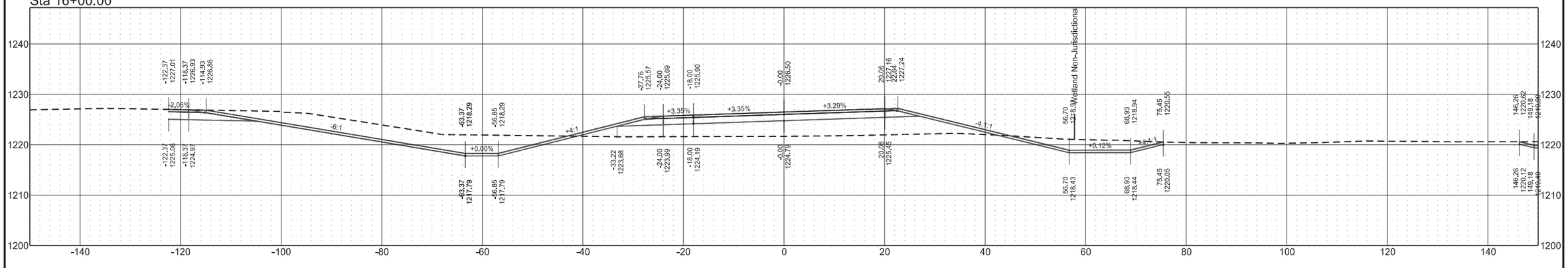
Sta 16+50.00



Sta 16+25.45



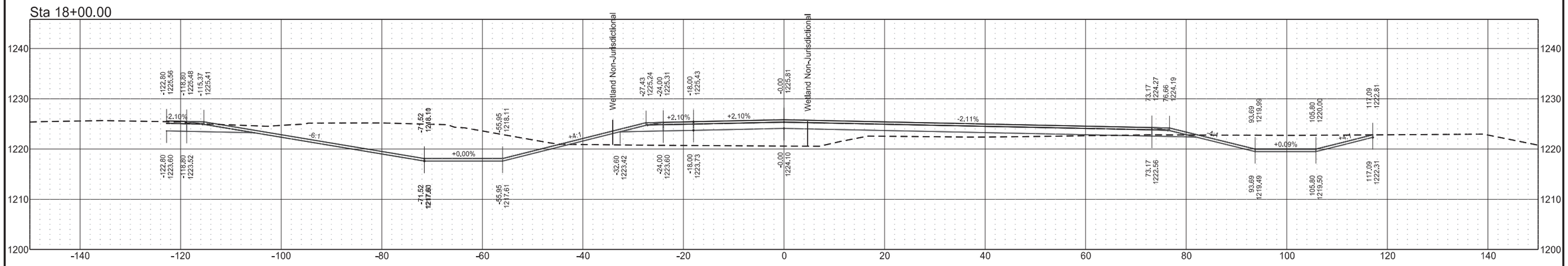
Sta 16+00.00



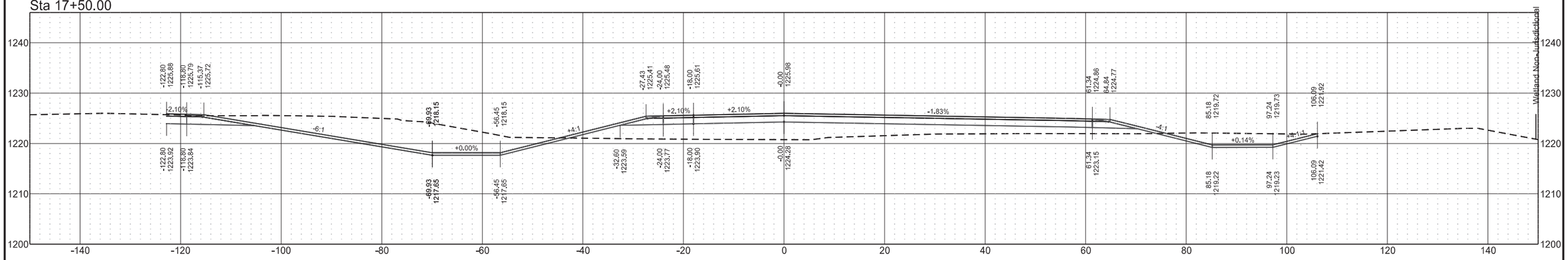
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	49

WB Ramps
Sta 17+00 to 18+00

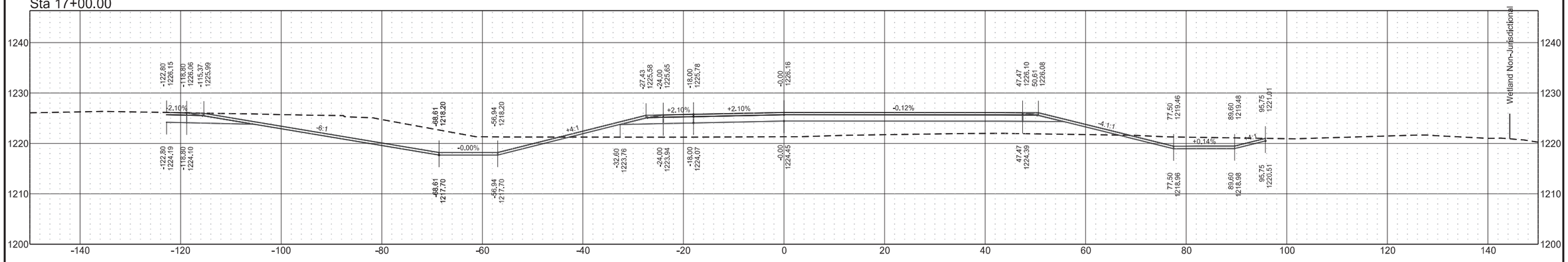
Sta 18+00.00



Sta 17+50.00



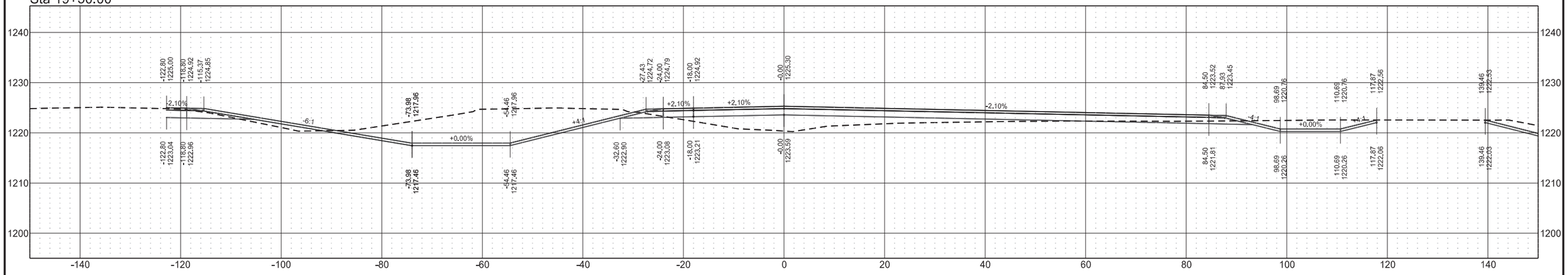
Sta 17+00.00



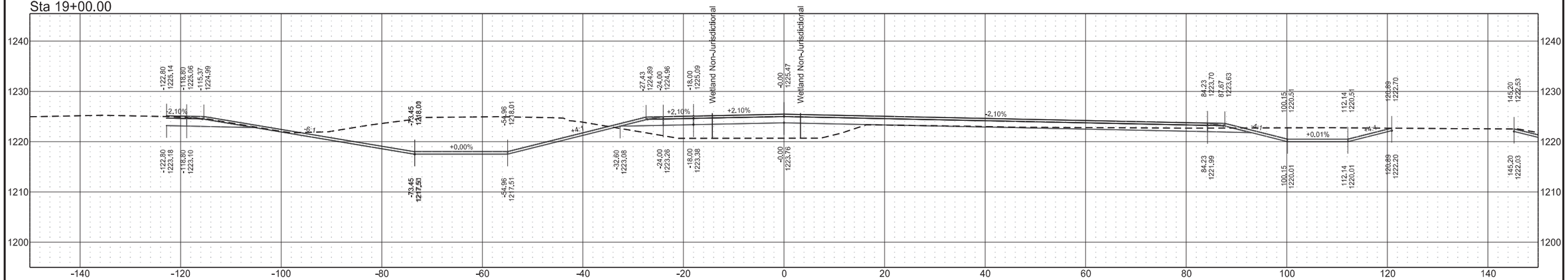
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	50

WB Ramps
Sta 18+50 to 19+50

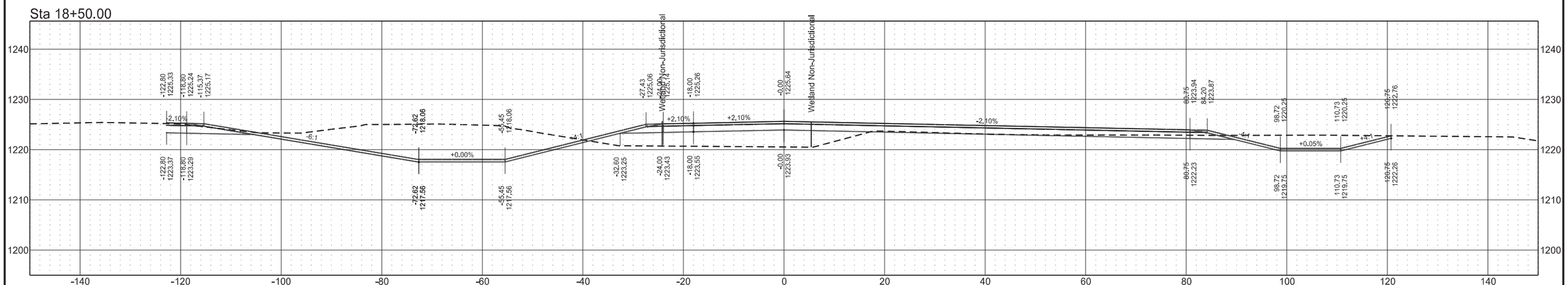
Sta 19+50.00



Sta 19+00.00



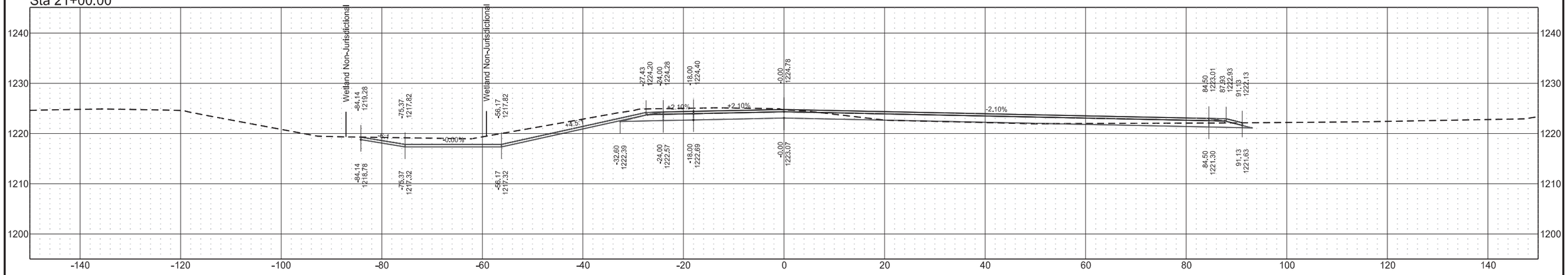
Sta 18+50.00



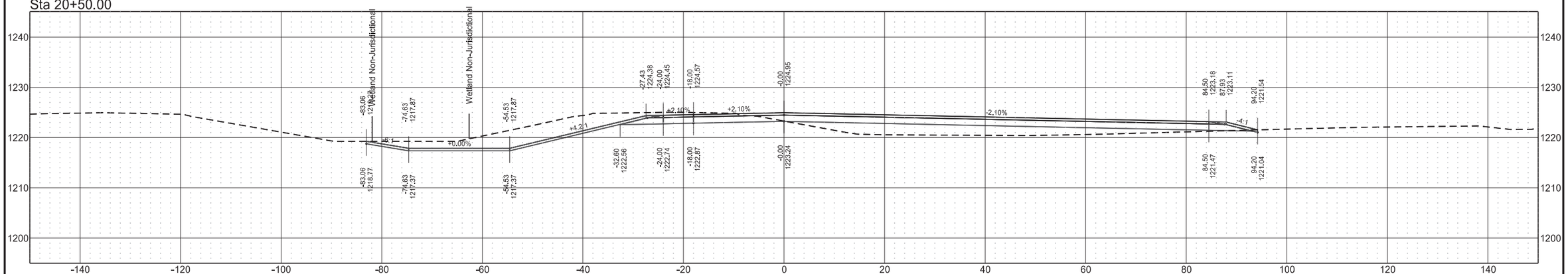
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	51

WB Ramps
Sta 20+00 to 21+00

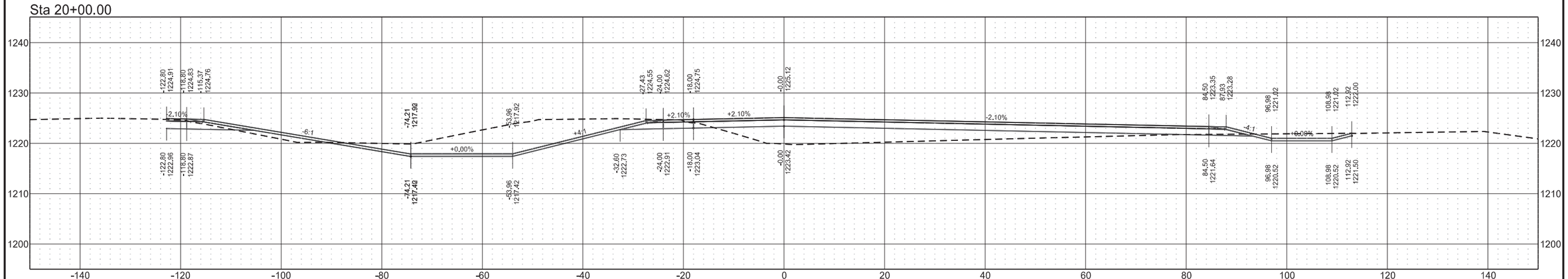
Sta 21+00.00



Sta 20+50.00



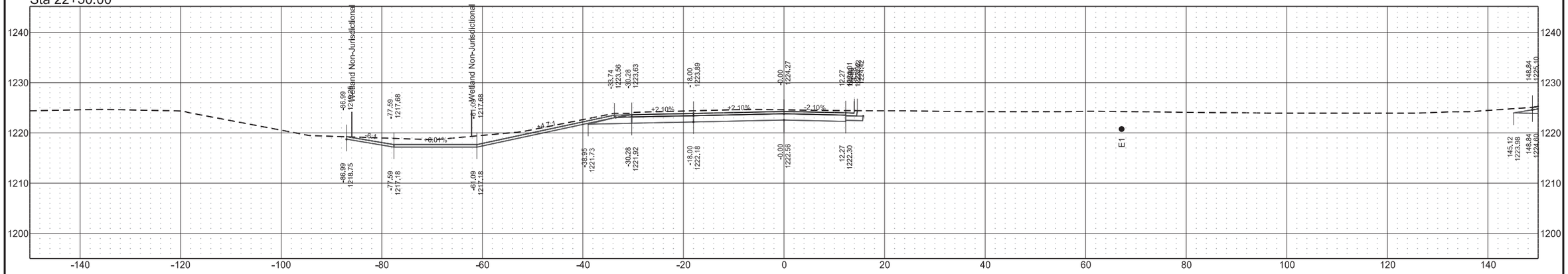
Sta 20+00.00



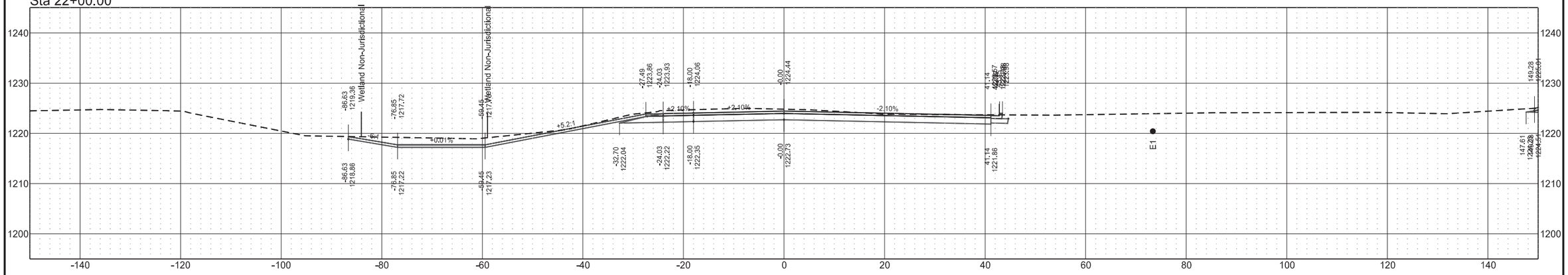
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	52

WB Ramps
Sta 21+50 to 22+50

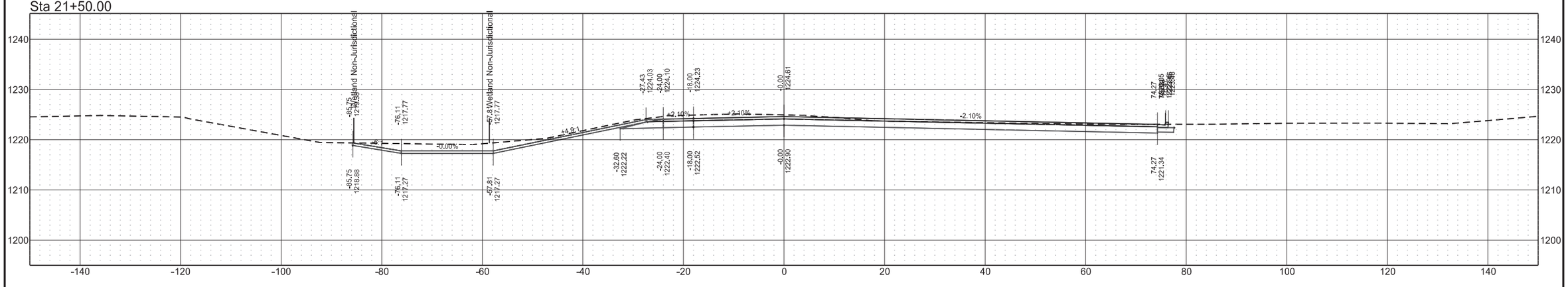
Sta 22+50.00



Sta 22+00.00



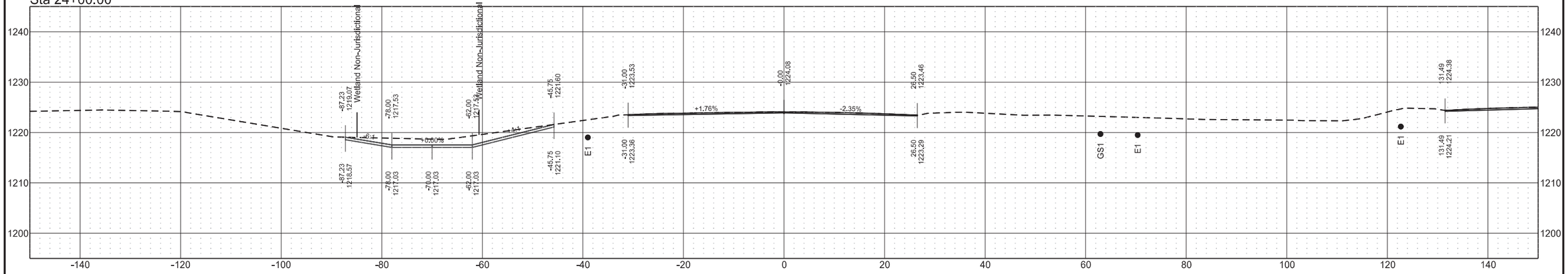
Sta 21+50.00



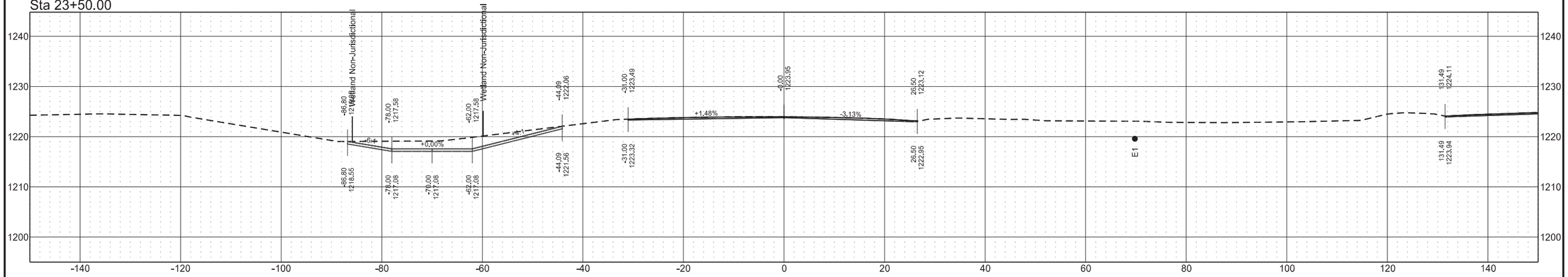
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	53

WB Ramps
Sta 23+00 to 24+00

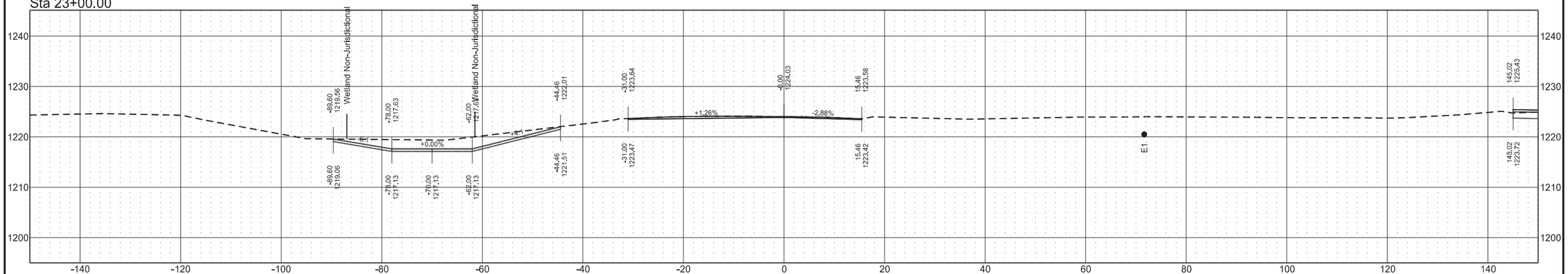
Sta 24+00.00



Sta 23+50.00



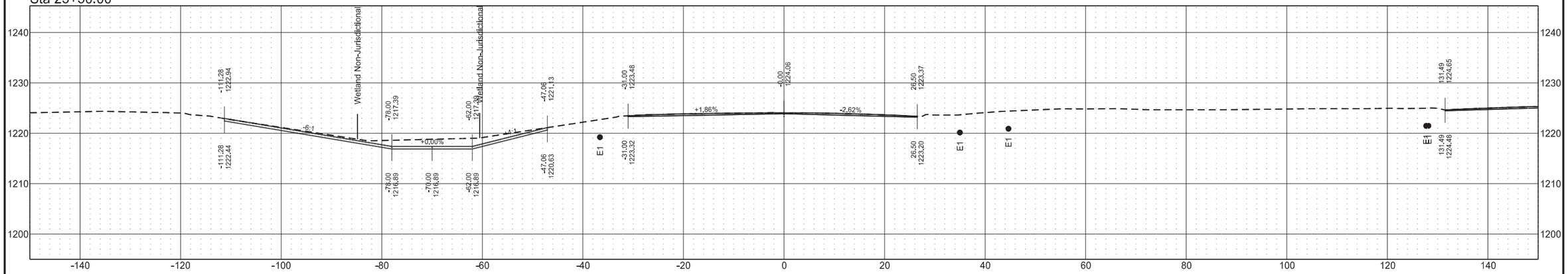
Sta 23+00.00



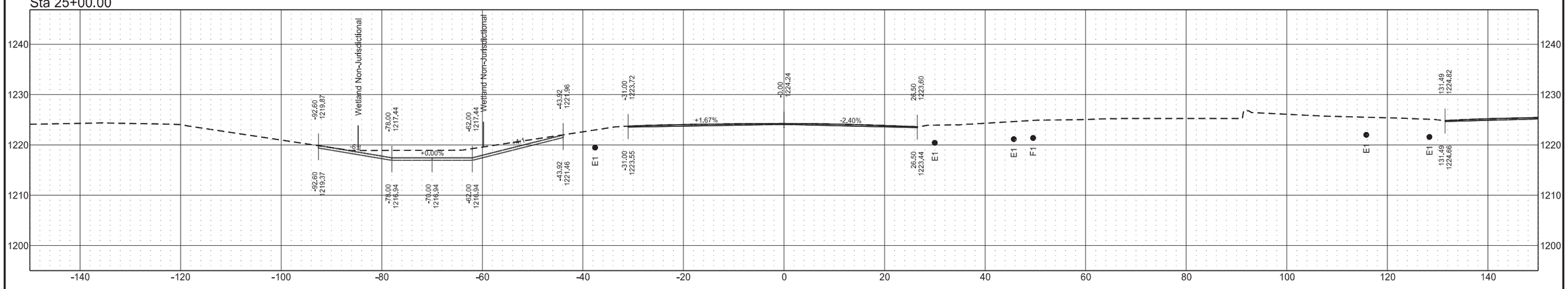
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	54

WB Ramps
Sta 24+50 to 25+50

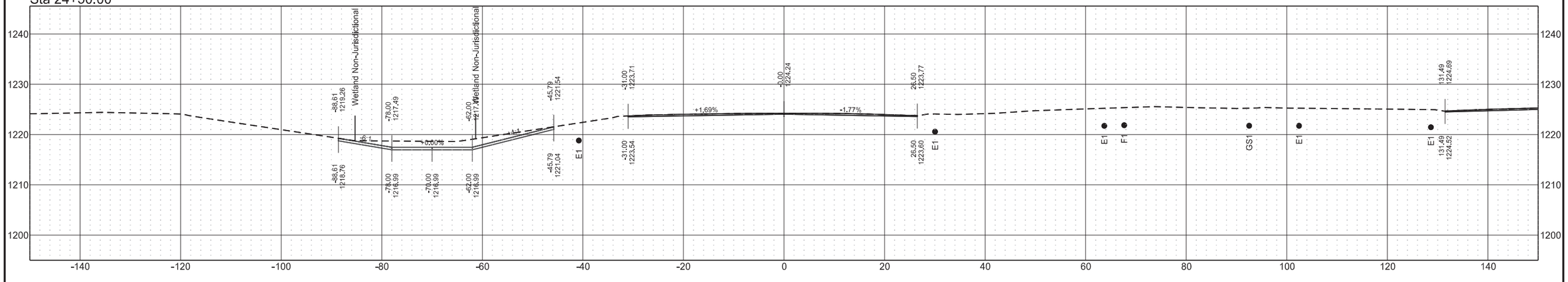
Sta 25+50.00



Sta 25+00.00



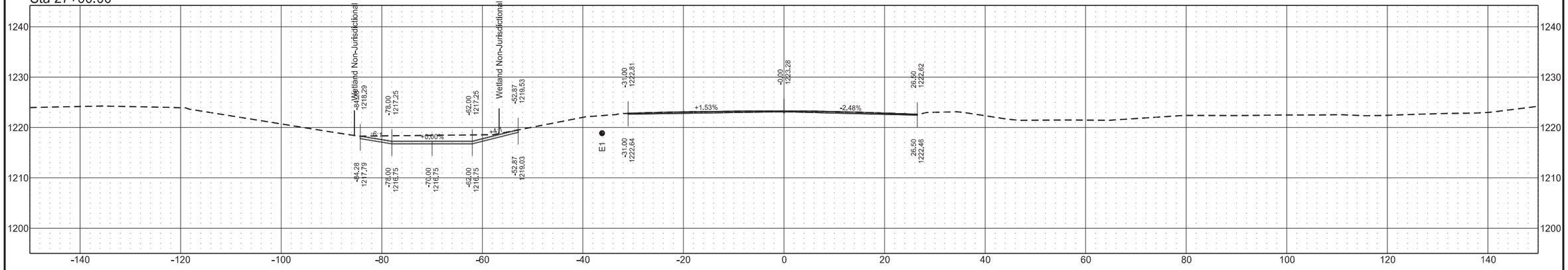
Sta 24+50.00



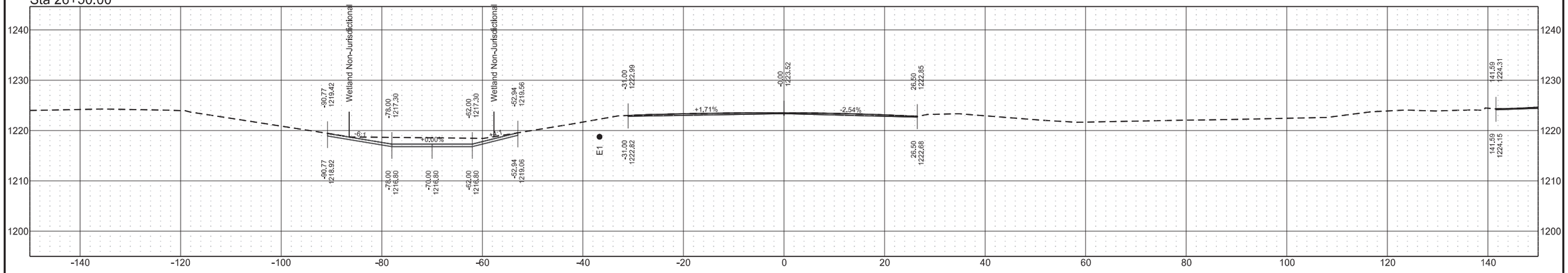
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	55

WB Ramps
Sta 26+00 to 27+00

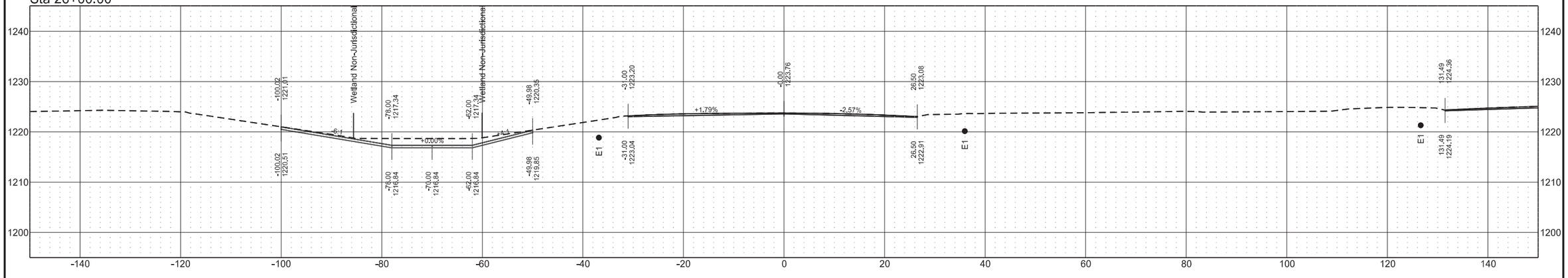
Sta 27+00.00



Sta 26+50.00



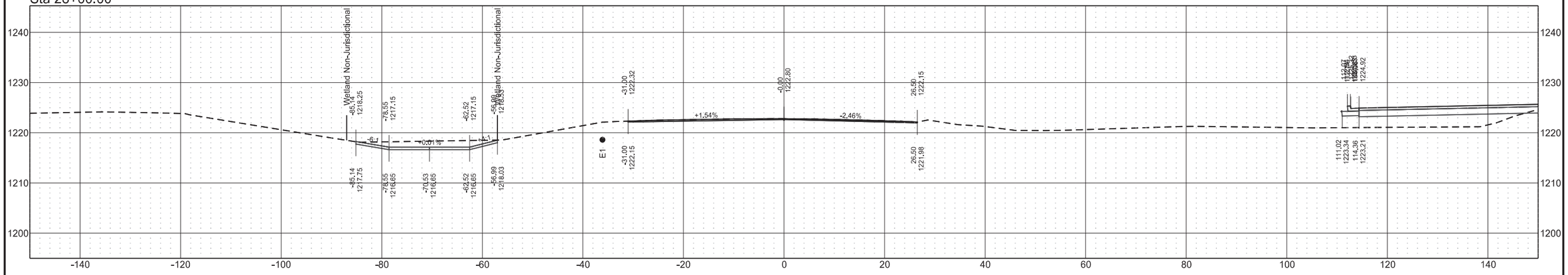
Sta 26+00.00



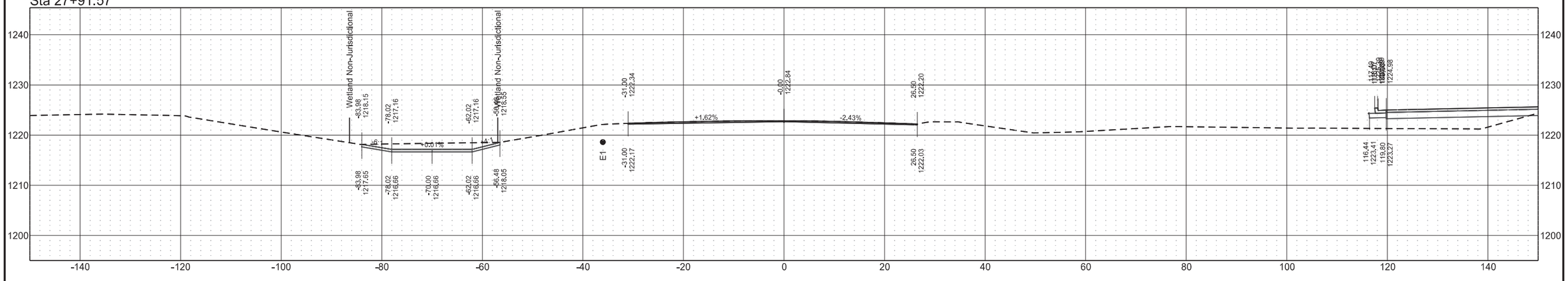
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	56

WB Ramps
Sta 27+50 to 28+00

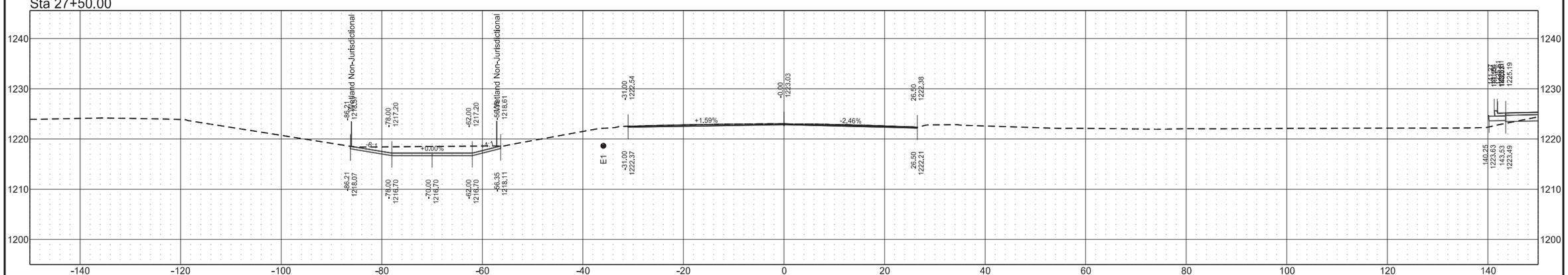
Sta 28+00.00



Sta 27+91.57



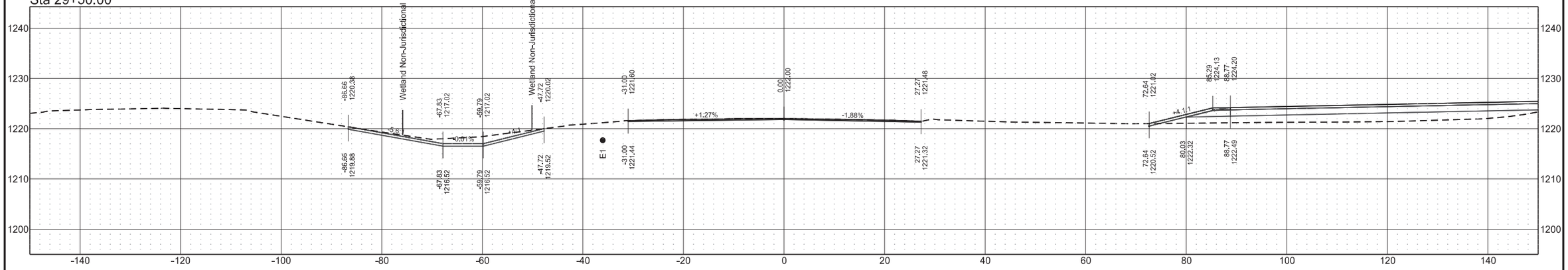
Sta 27+50.00



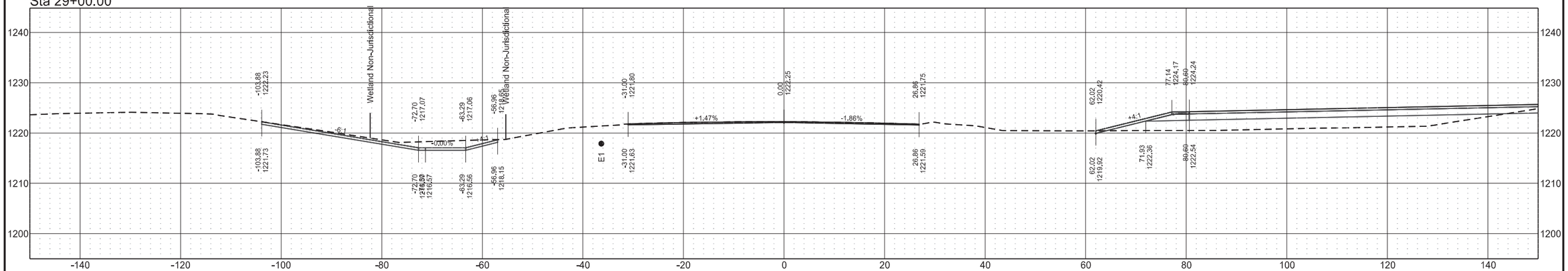
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	57

WB Ramps
Sta 28+50 to 29+50

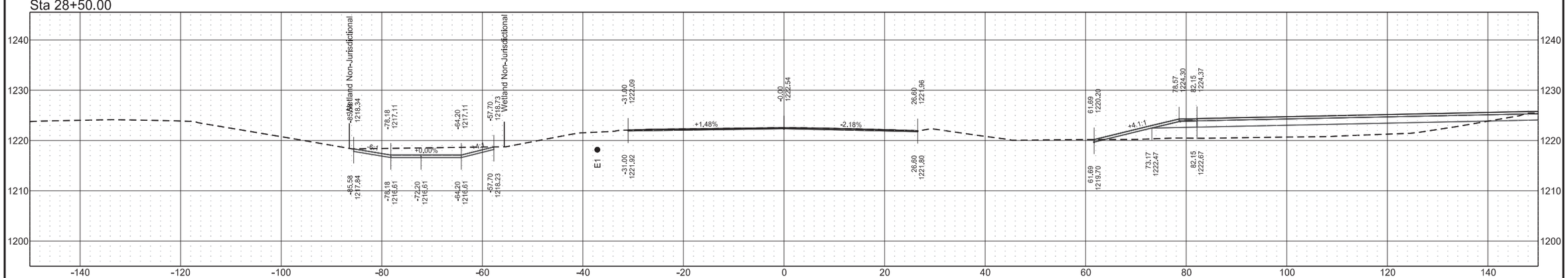
Sta 29+50.00



Sta 29+00.00



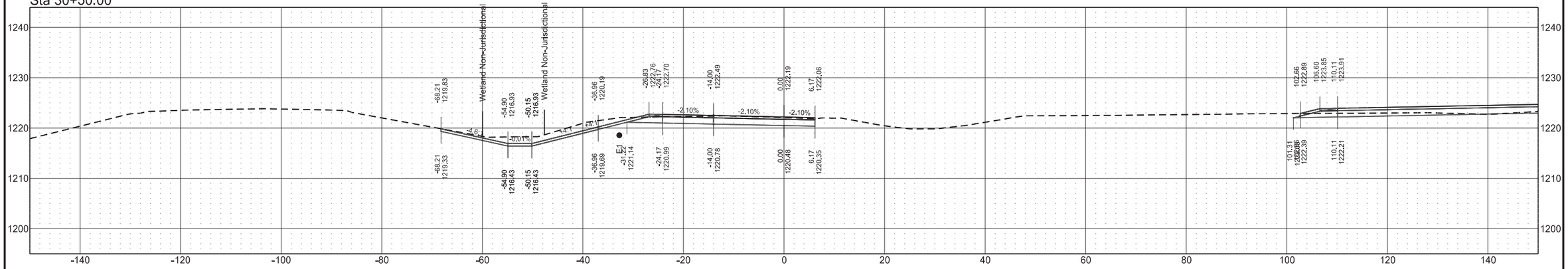
Sta 28+50.00



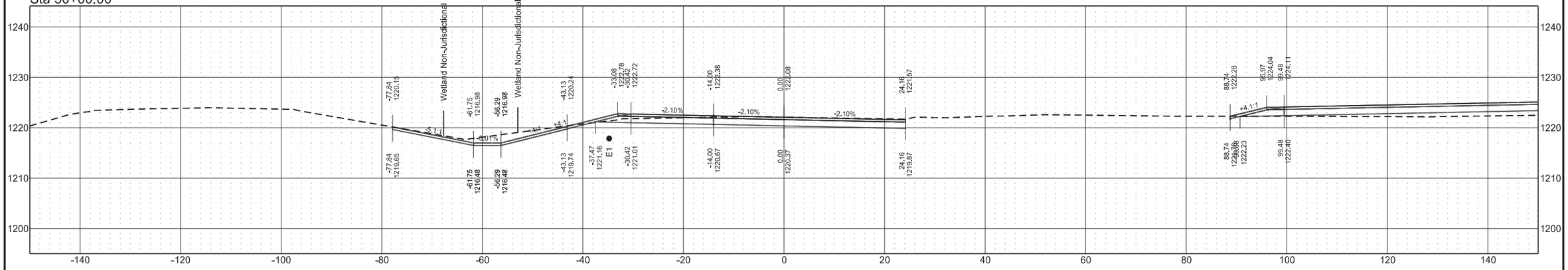
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	58

WB Ramps
Sta 29+80.07 to 30+50

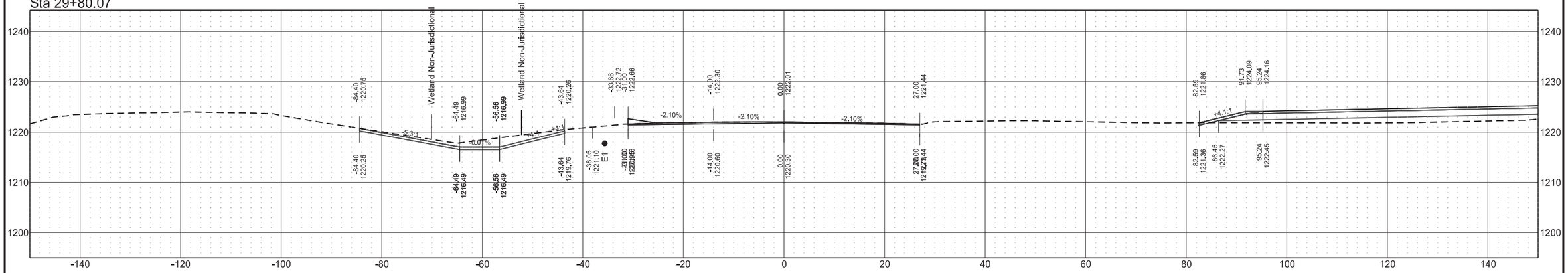
Sta 30+50.00



Sta 30+00.00



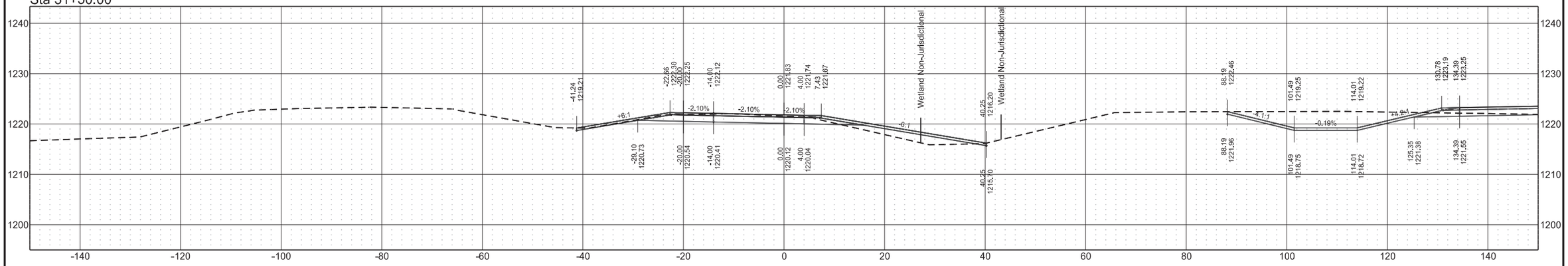
Sta 29+80.07



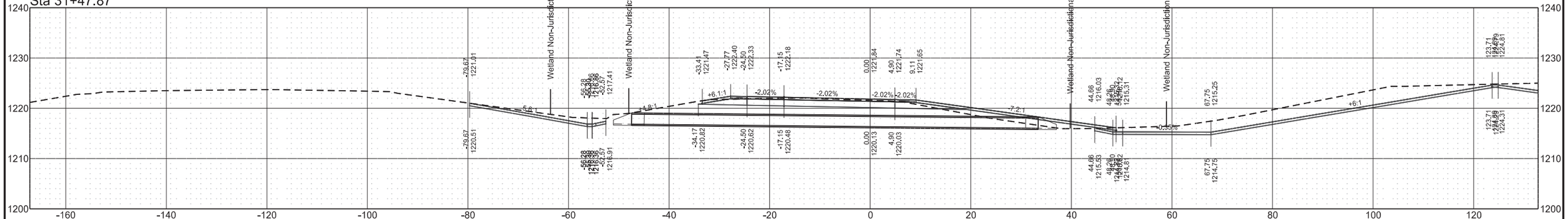
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	59

WB Ramps
Sta 31+00 to 31+50

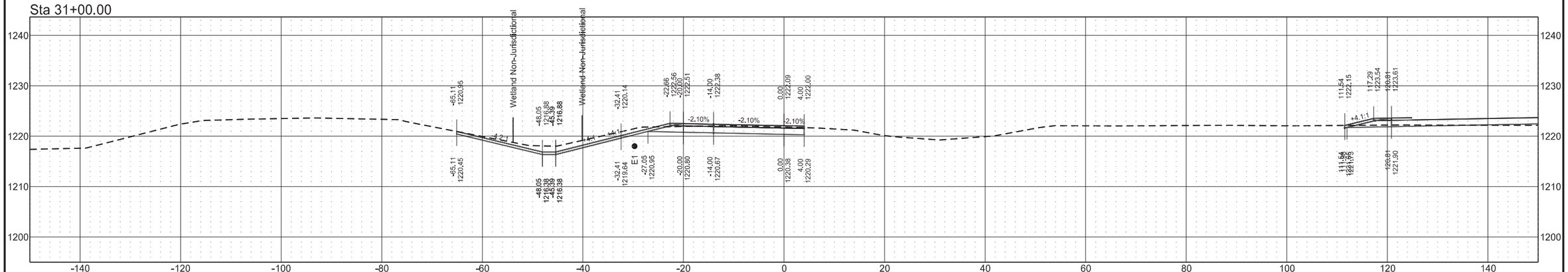
Sta 31+50.00



Sta 31+47.87



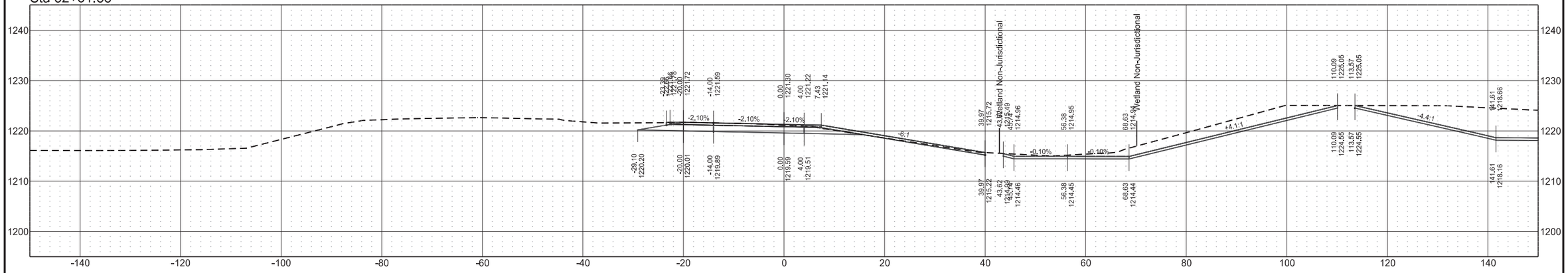
Sta 31+00.00



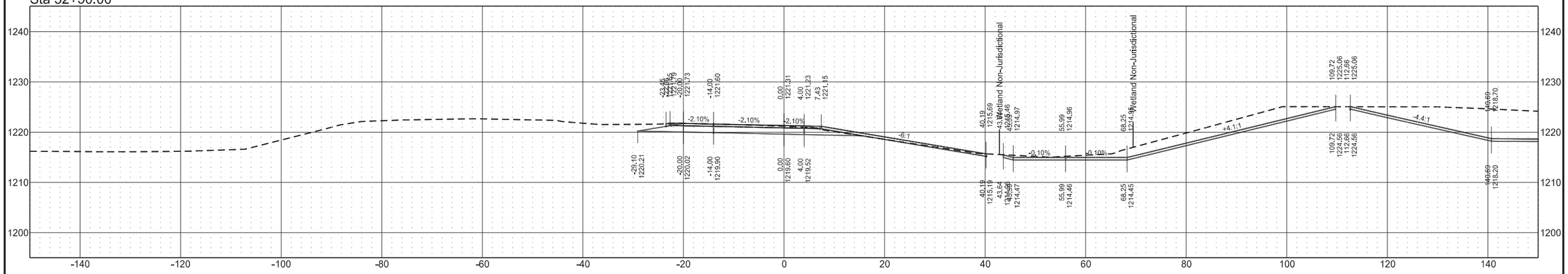
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	60

WB Ramps
Sta 32+00 to 32+51.88

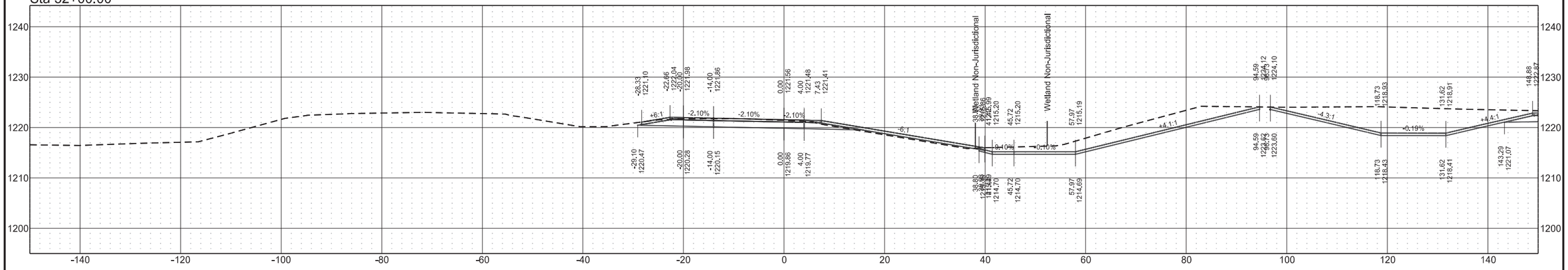
Sta 32+51.88



Sta 32+50.00



Sta 32+00.00

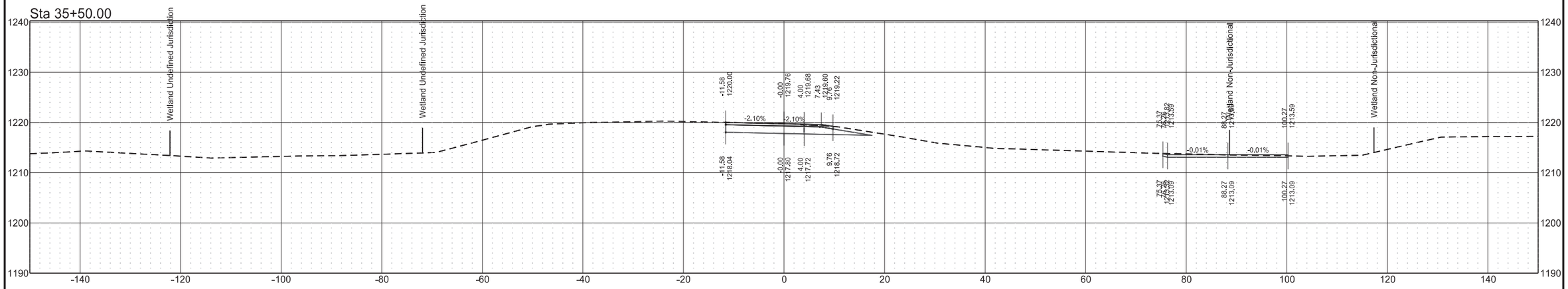


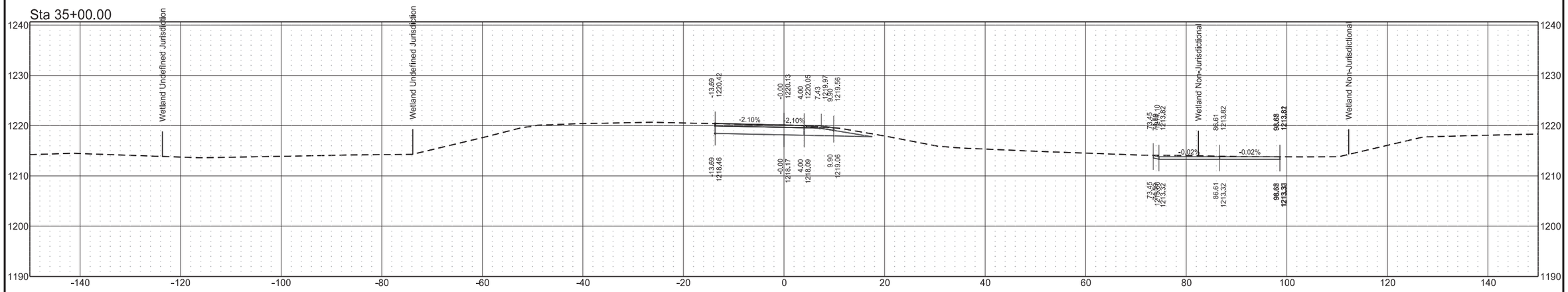
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	61

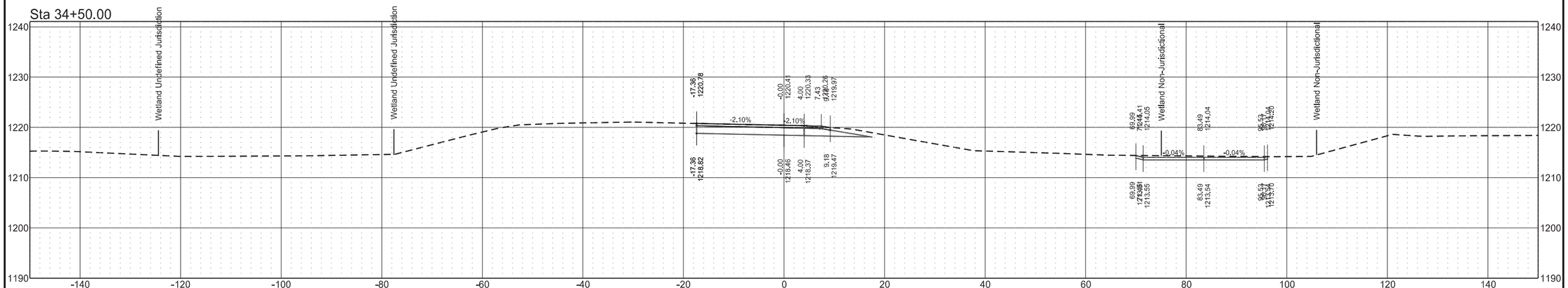
WB Ramps
Sta 33+00 to 34+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	62

WB Ramps
Sta 34+50 to 35+50

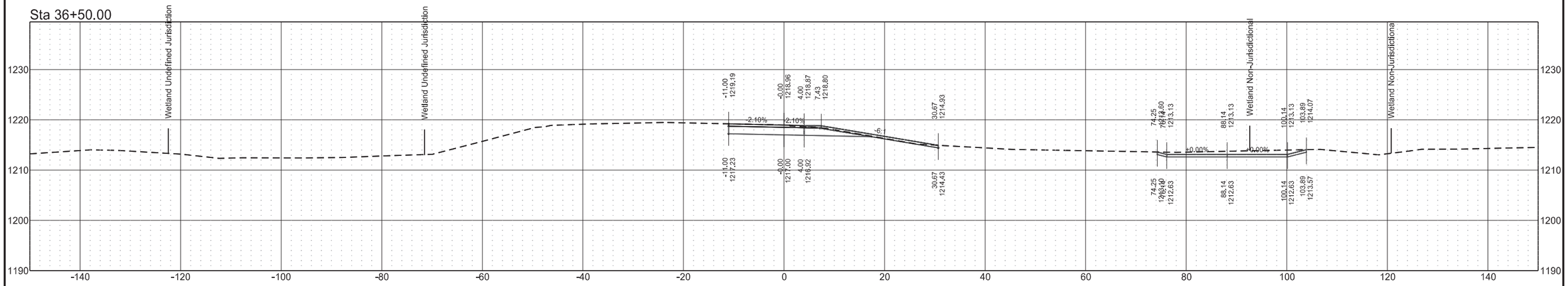


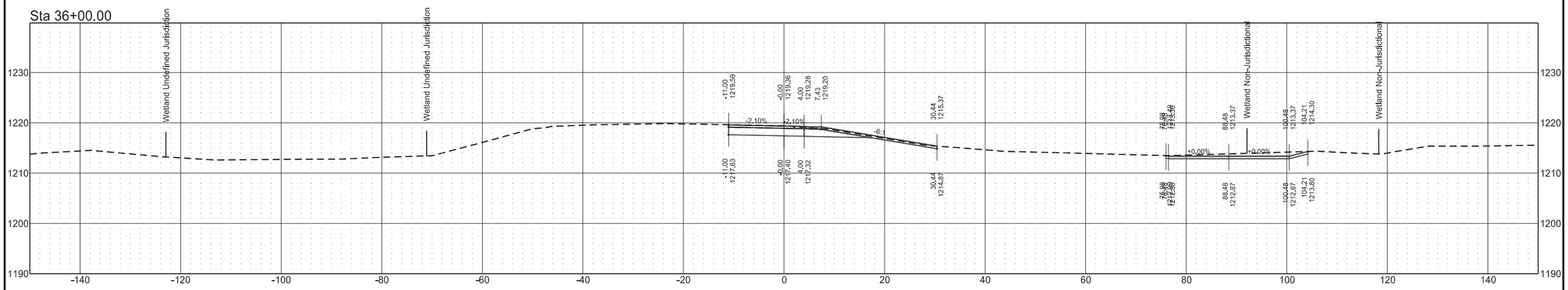


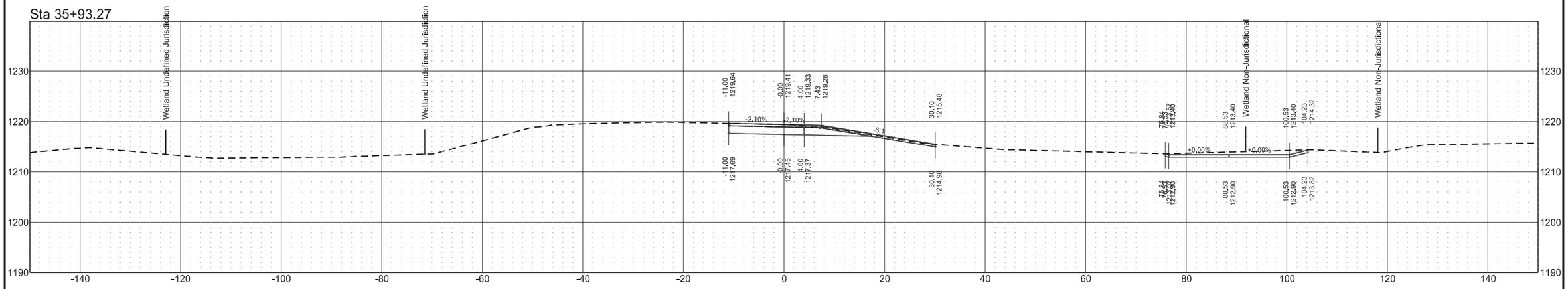


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	63

WB Ramps
Sta 35+93.27 to 36+50

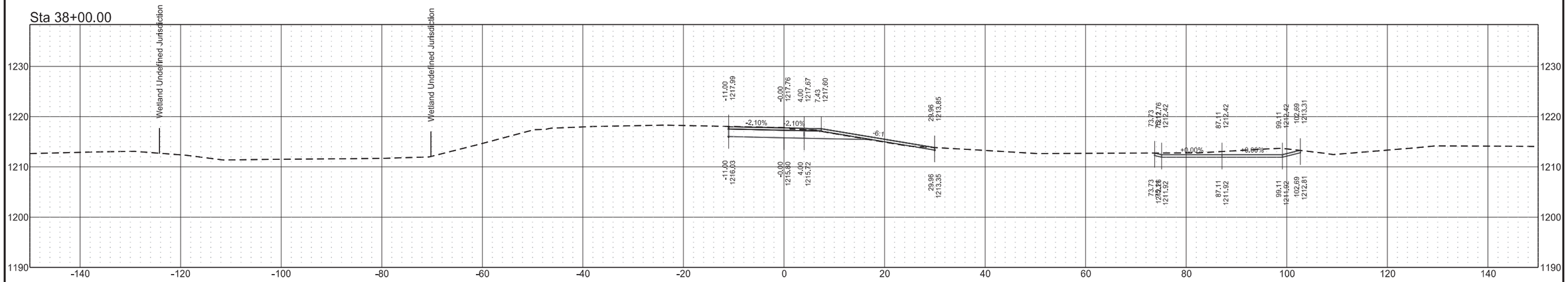


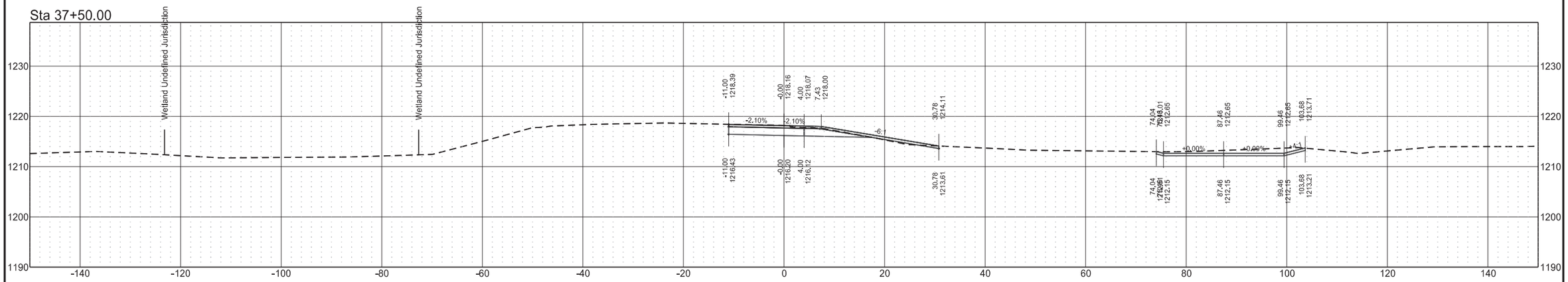


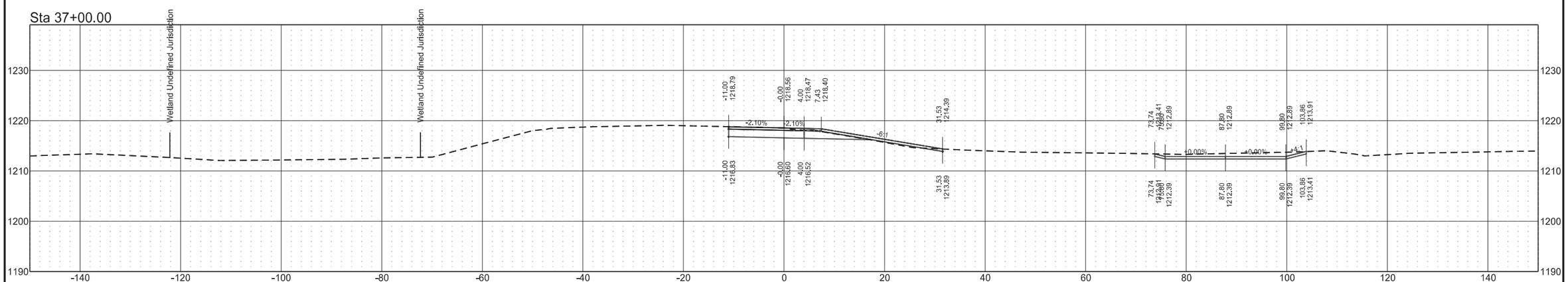


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	64

WB Ramps
Sta 37+00 to 38+00

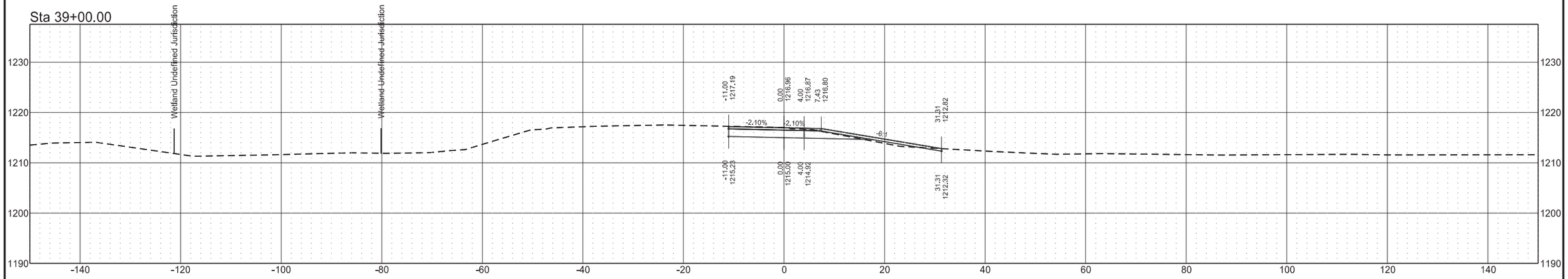


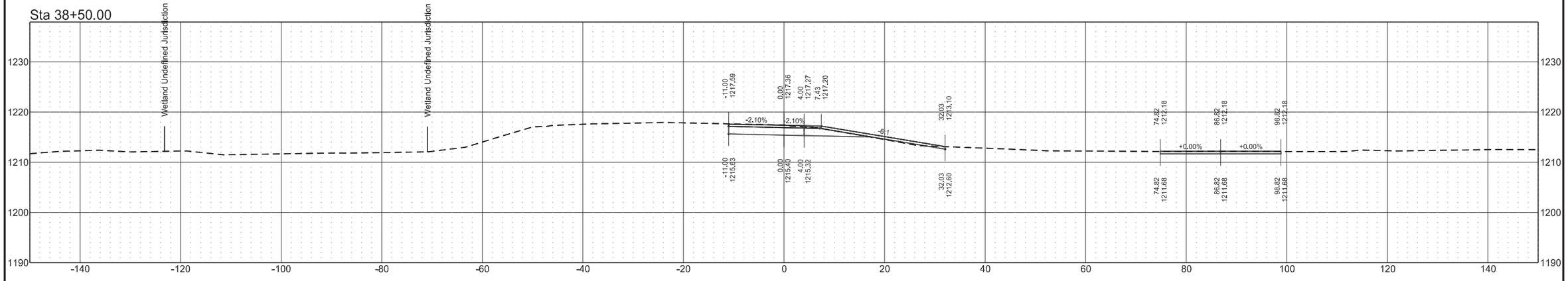


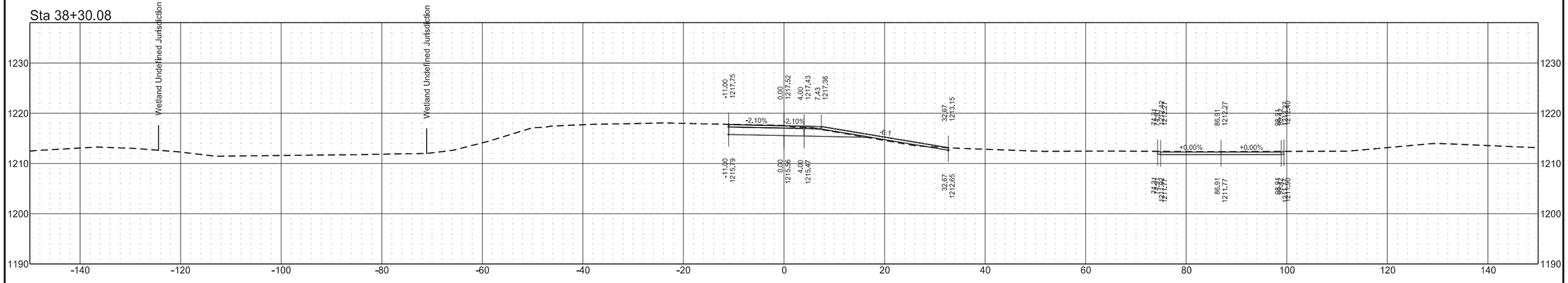


	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	65

WB Ramps
Sta 38+30.08 to 39+00



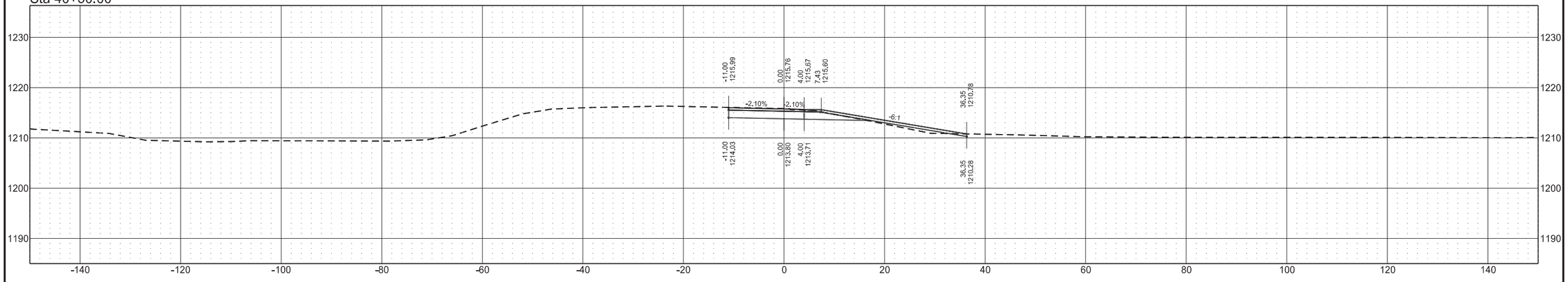




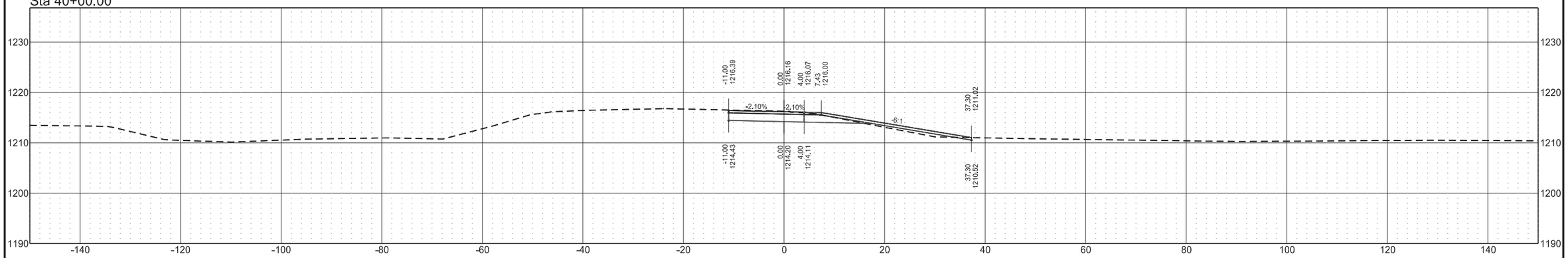
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	66

WB Ramps
Sta 40+50 to 39+50

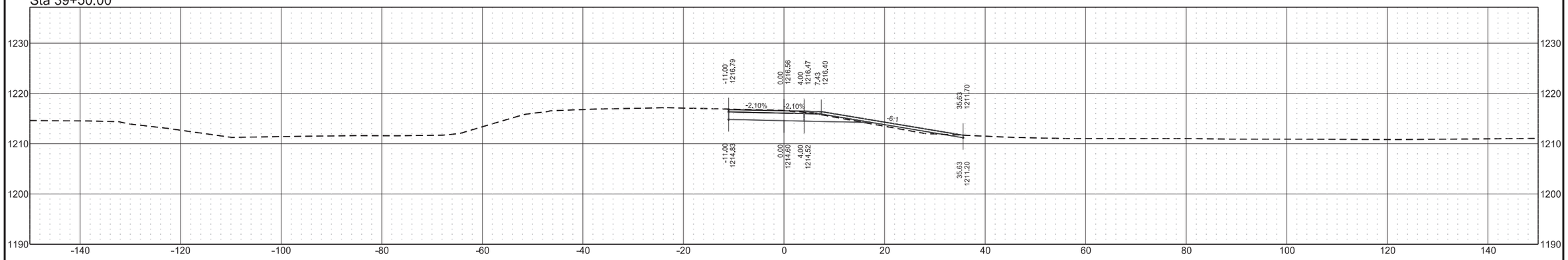
Sta 40+50.00



Sta 40+00.00



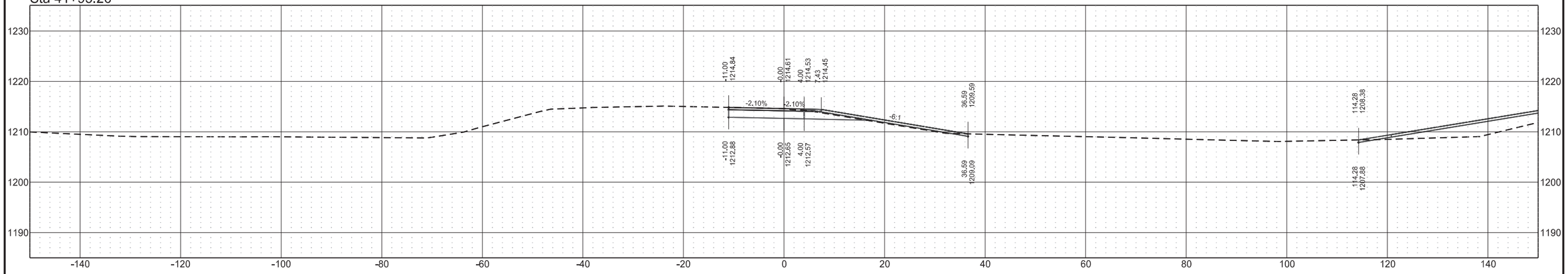
Sta 39+50.00



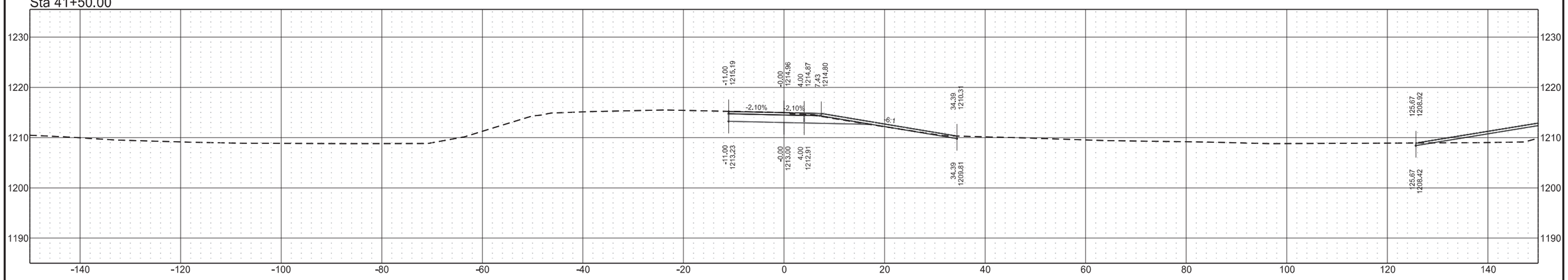
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	67

WB Ramps
Sta 41+00 to 41+93.26

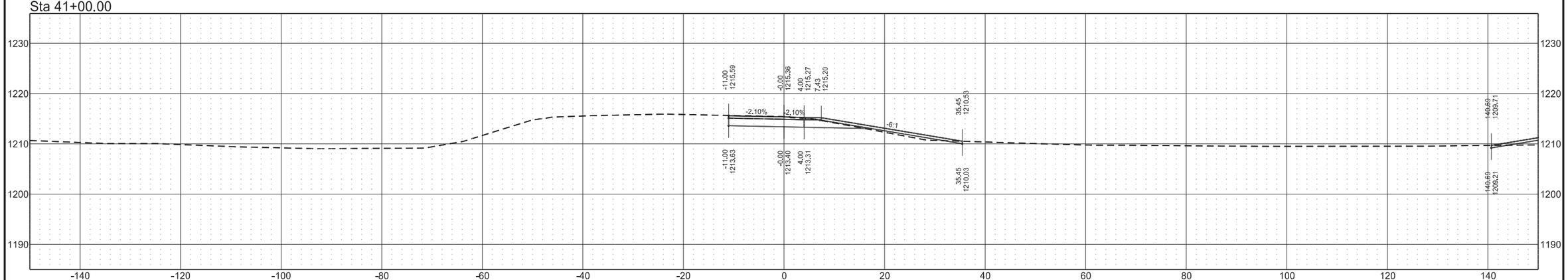
Sta 41+93.26



Sta 41+50.00



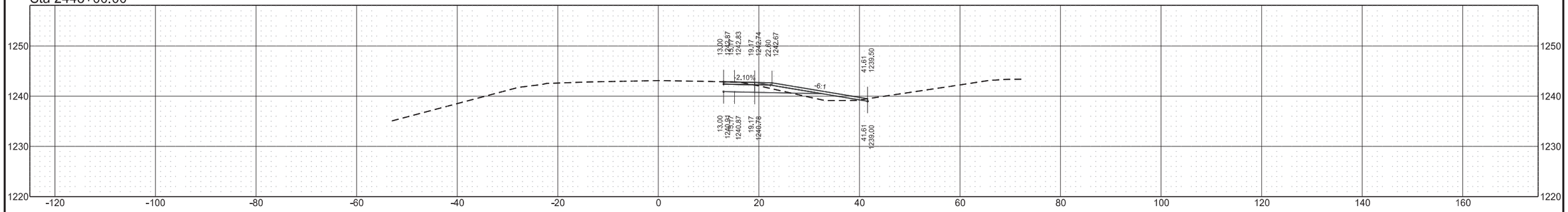
Sta 41+00.00



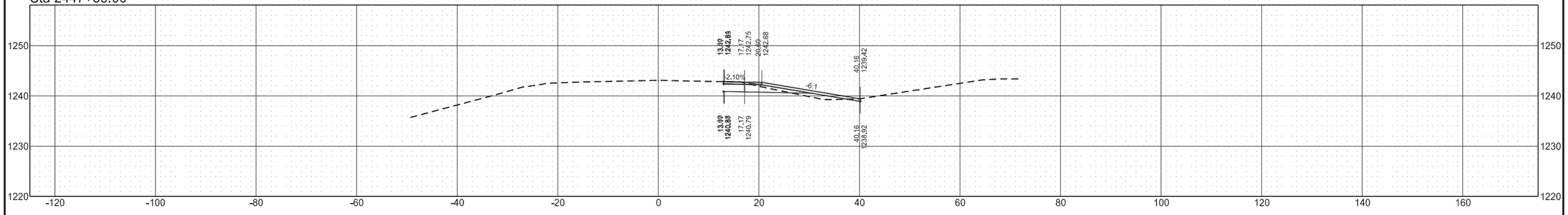
OCL WB94
Sta 2447+20.85 to 2448+00

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	68

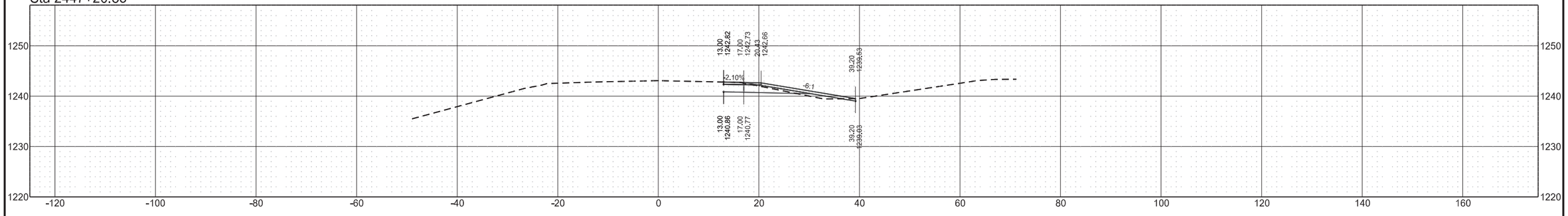
Sta 2448+00.00



Sta 2447+50.00



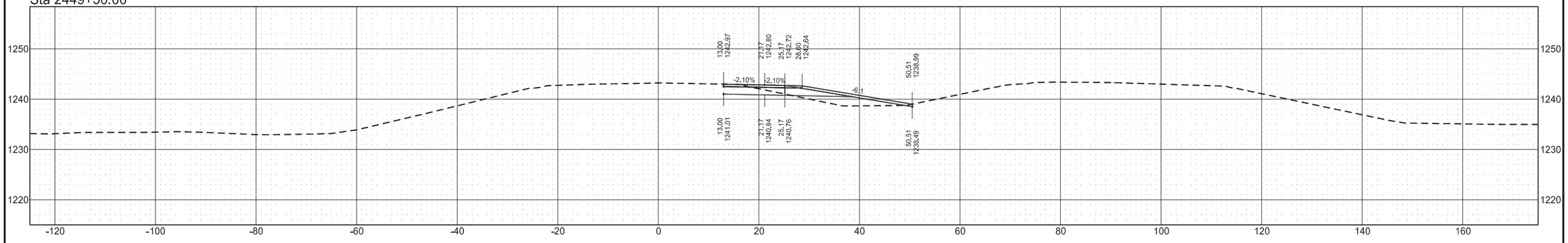
Sta 2447+20.85



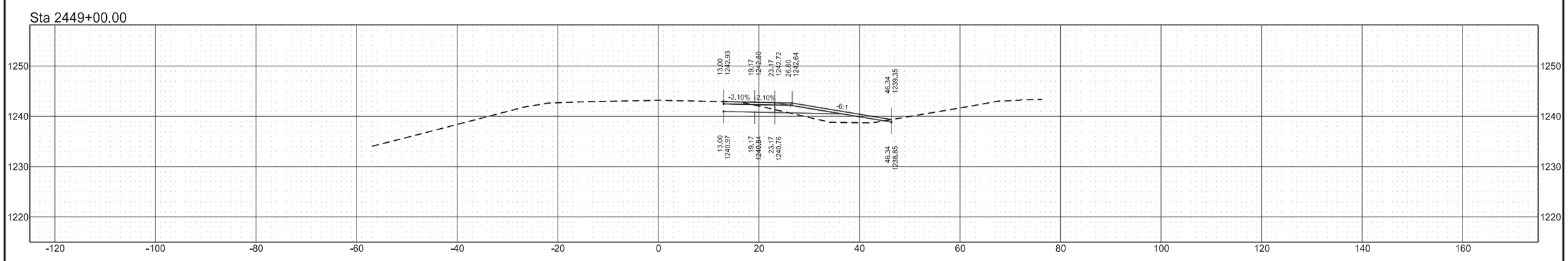
OCL WB94
Sta 2448+50 to 2449+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	69

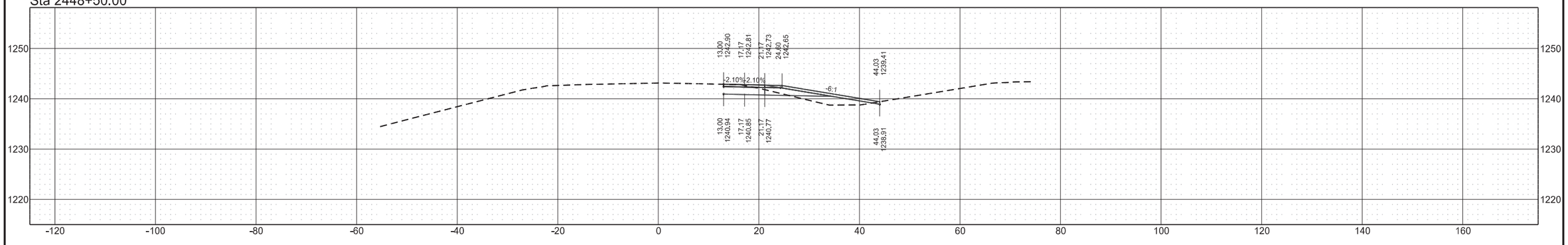
Sta 2449+50.00



Sta 2449+00.00



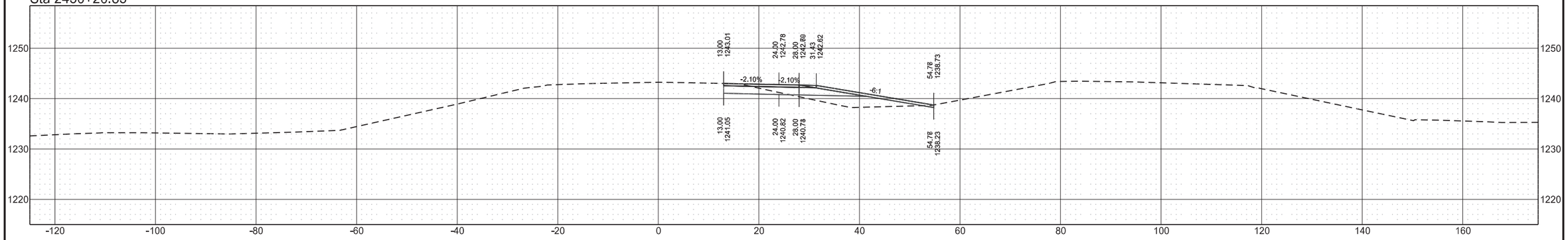
Sta 2448+50.00



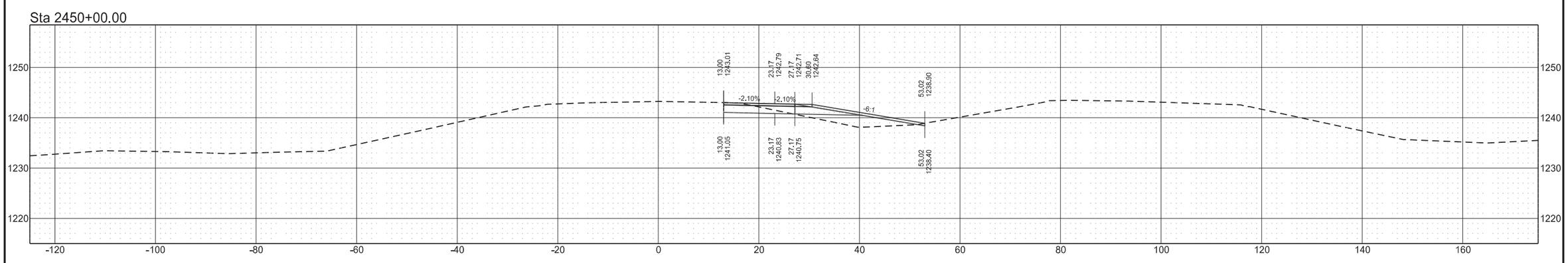
OCL WB94
Sta 2449+60 to 2450+85

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	70

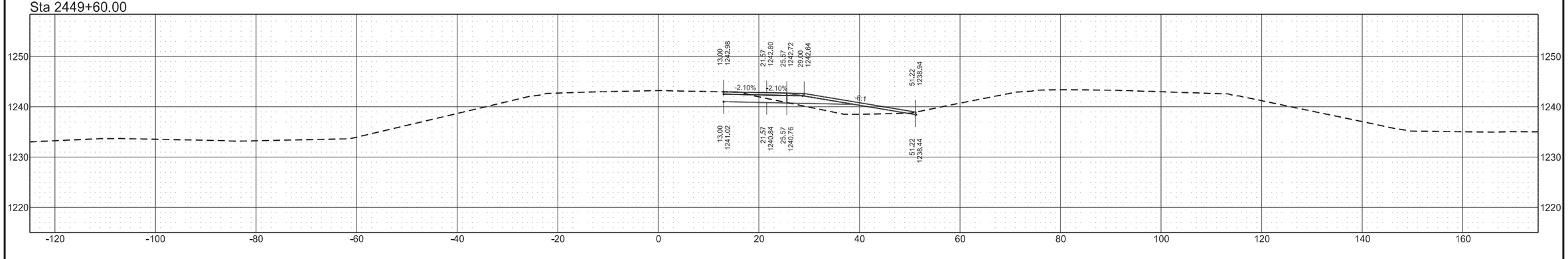
Sta 2450+20.85



Sta 2450+00.00



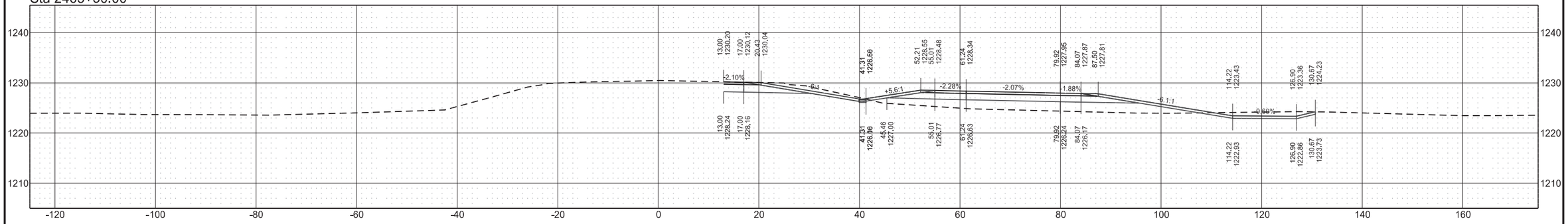
Sta 2449+60.00



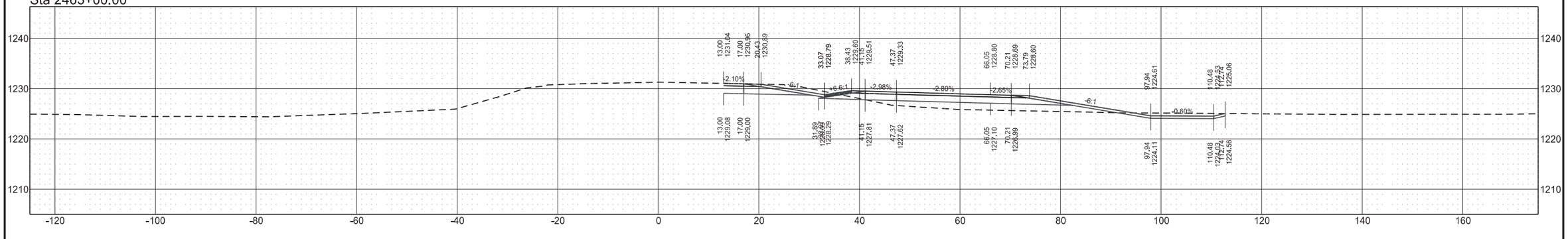
OCL WB94
Sta 2462+63.43 to 2463+50

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(198)304	200	71

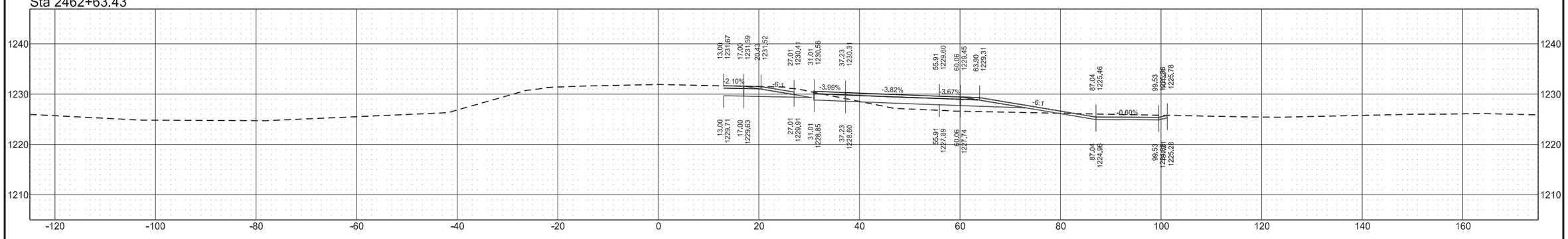
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Sta 2463+00.00



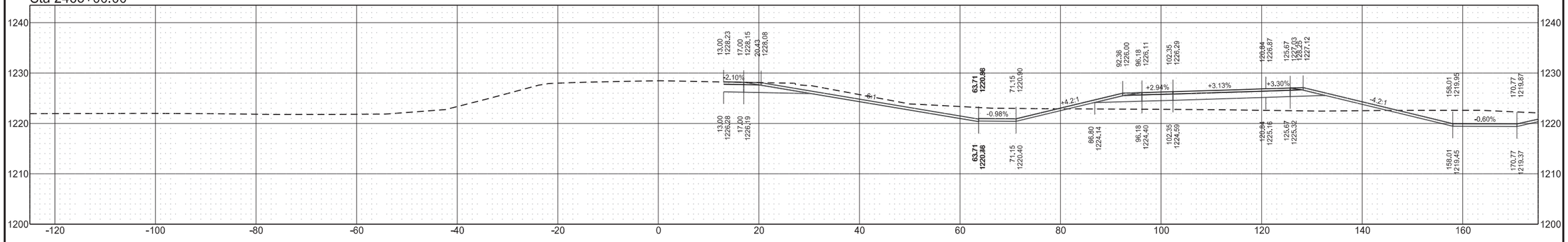
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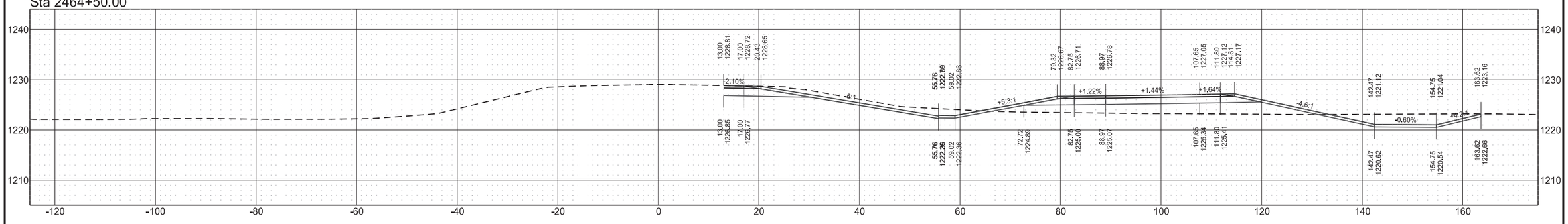
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OCL WB94
Sta 2464+00 to 2465+00

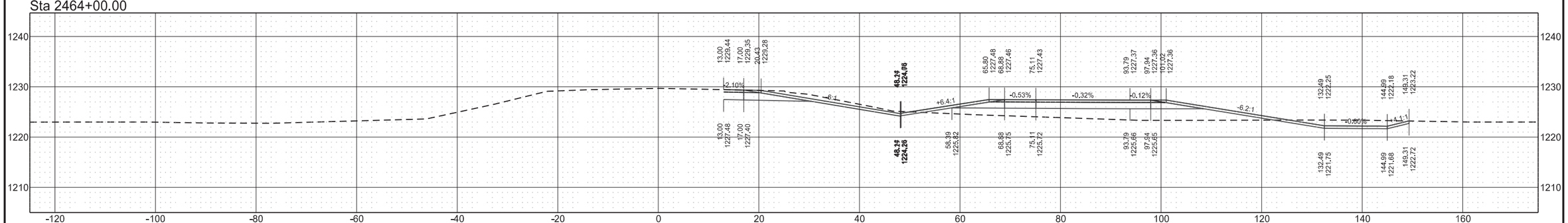
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Sta 2464+50.00



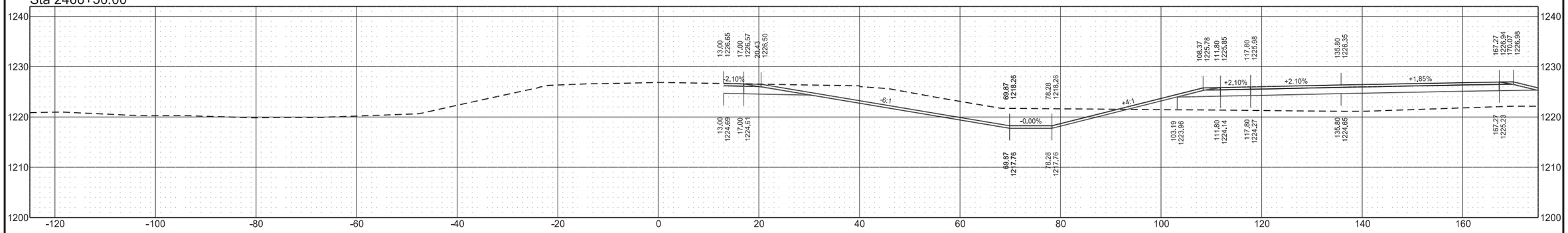
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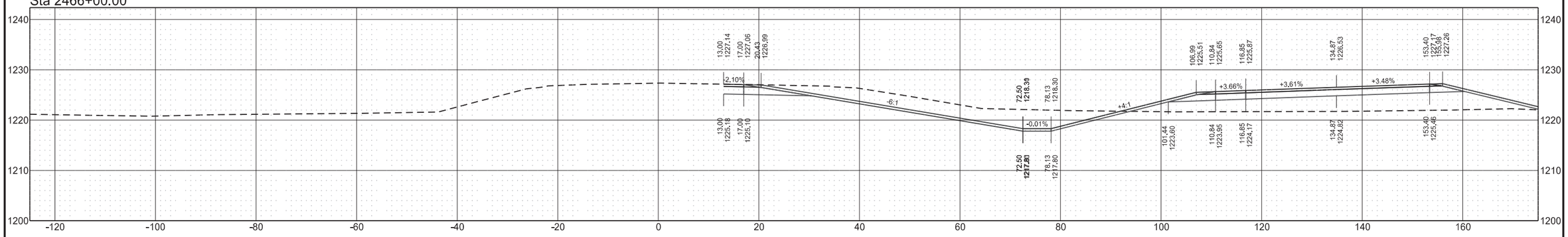
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Sta 2465+50 to 2466+50

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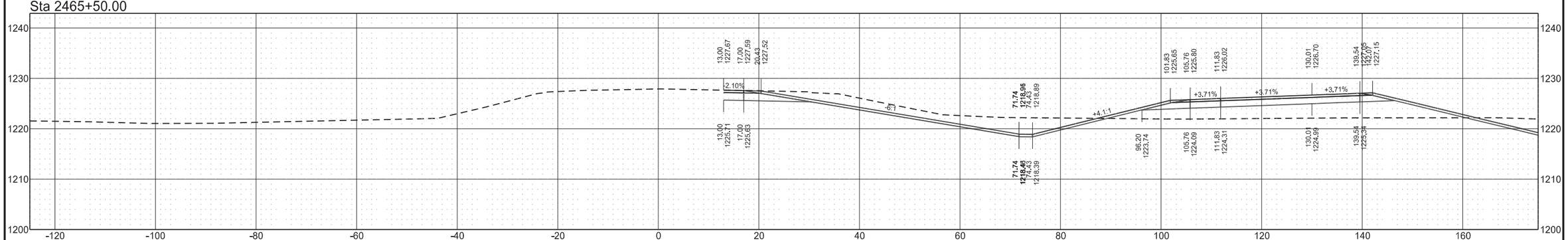
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Sta 2466+00.00



Sta 2465+50.00



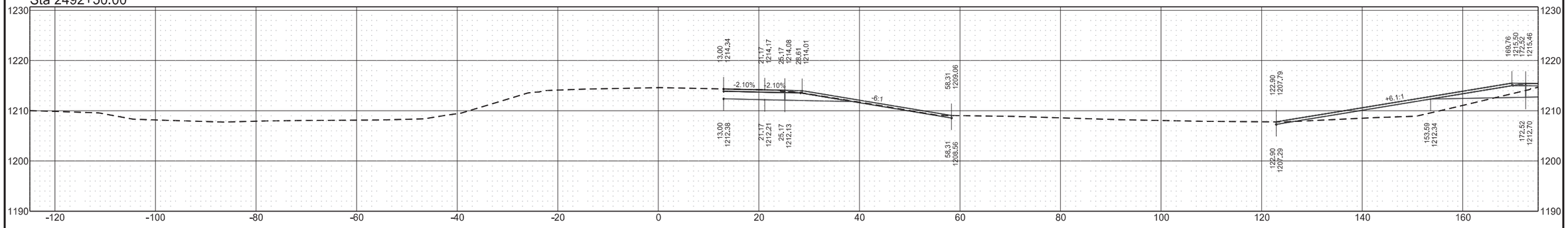
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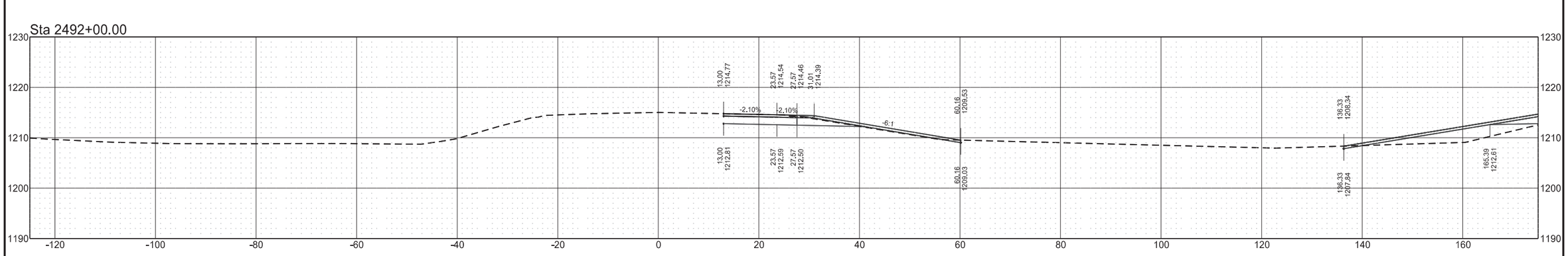
OCL WB94
Sta 2491+91.10 to 2492+50

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	ND	IM-2-094(198)304	200	75

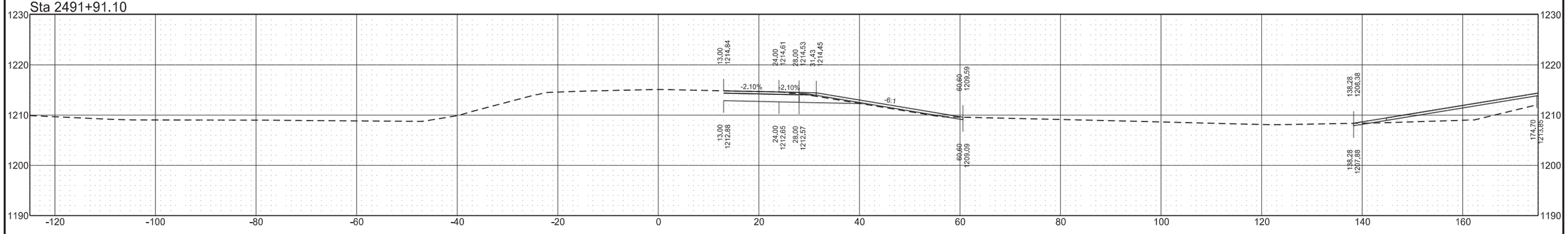
Sta 2492+50.00



Sta 2492+00.00



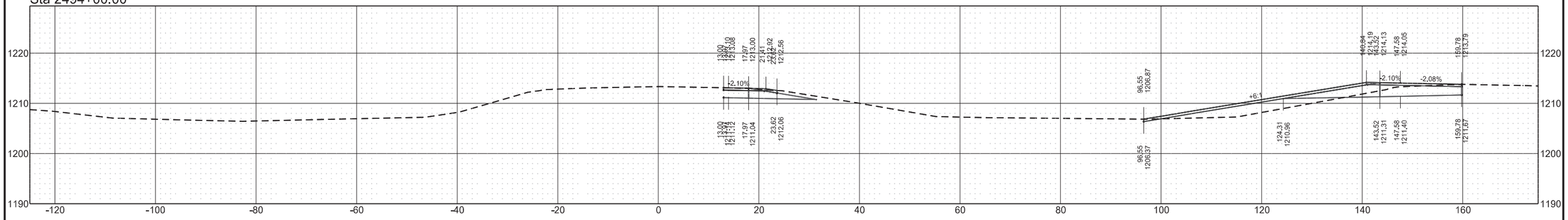
Sta 2491+91.10



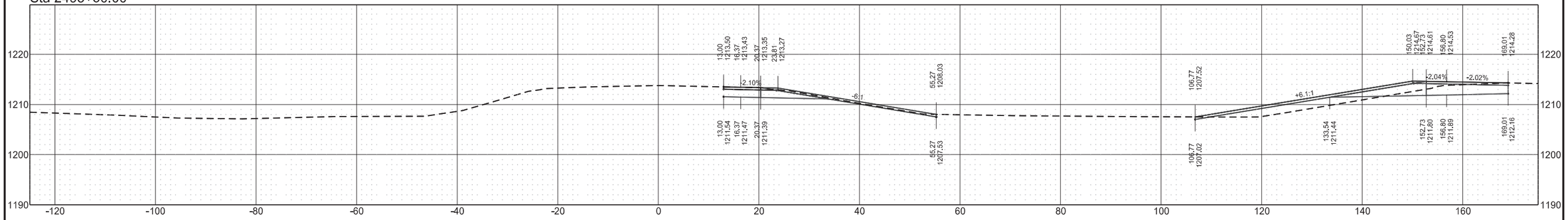
OCL WB94
Sta 2493+00 to 2494+00

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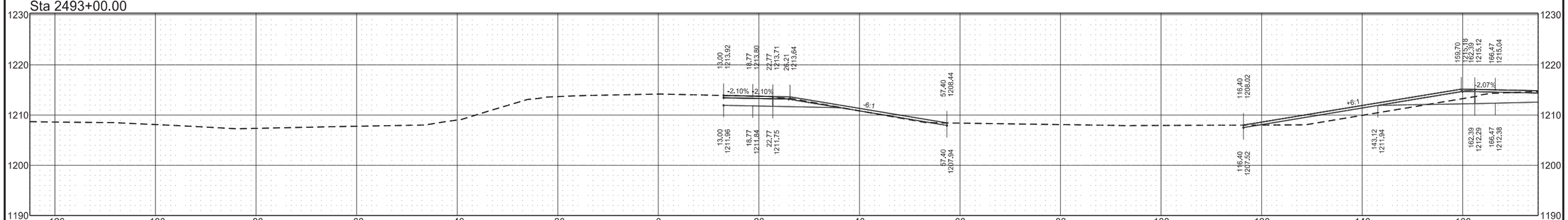
Sta 2494+00.00



Sta 2493+50.00



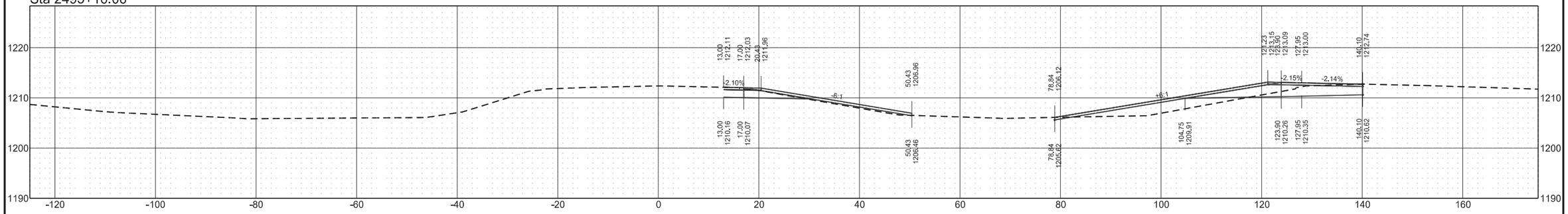
Sta 2493+00.00



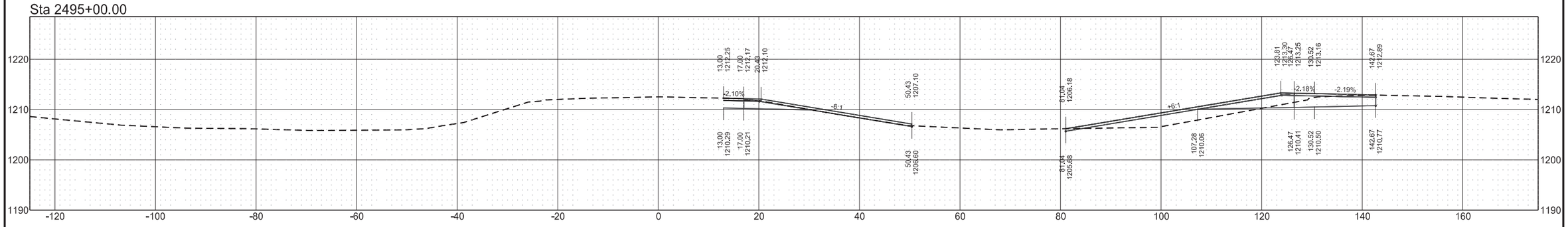
OCL WB94
Sta 2494+50 to 2495+16.06

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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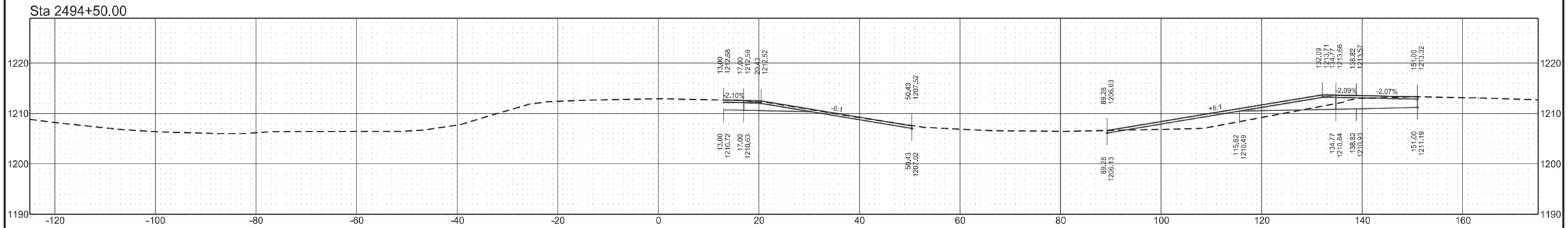
Sta 2495+16.06



Sta 2495+00.00



Sta 2494+50.00



NDDOT ABBREVIATIONS

D-101-1

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

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

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NDDOT ABBREVIATIONS

D-101-2

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

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

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

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08/16/22

NDDOT ABBREVIATIONS

MEASUREMENTS

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

SURVEY DESCRIPTIONS

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

SOIL TYPES

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

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NDDOT UTILITY COMPANY AND ORGANIZATION ABBREVIATIONS

D-101-10

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

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

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LINE STYLES

D-101-20

Existing Topography

- Existing Ground Void
- Existing Cemetary Boundary
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Existing Gravel Surface
- Existing Riprap
- Existing Dirt Surface
- Existing Asphalt Surface
- Existing Tie Point Line
- Existing Railroad Centerline
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Existing Fence
- Existing Railroad
- Existing Field Line
- Exst Flow
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter

- Existing 3-Cable w Posts
- Site Boundary
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Existing Tree Boundary
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Existing W-Beam Guardrail with Posts
- Existing Railroad Switch
- Gravel Pit - Borrow Area
- Existing Wet Area-Vegetation Break
- Existing High Tension Cable Guardrail
- Existing High Tension Cable Guardrail with Posts

Proposed Topography

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

Existing Utilities

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

Proposed Utilities

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

Traffic Utilities

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

Sign Structures

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

07-01-14

REVISIONS

DATE	CHANGE
09-23-16	Added and Revised Items, Organized by Functional Groups
12-18-20	General Revisions

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LINE STYLES

D-101-21

Right Of Way

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

Boundary Control

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

Cross Sections and Typicals

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

Geotechnical

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

Countours

- Depression Contours
- Supplemental Contour

Profile

- Subgrade, Subcut or Ditch Grade
- Topsoil Profile

Striping

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

Pavement Joints

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

Bridge Details

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

Erosion Control

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

Environmental

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

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

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SYMBOLS

D-101-30

North Arrow (Half Scale)

Alignment Data Point

Alignment Monument

Spot Elevation

Existing Miscellaneous Spot

Existing Access Control Arrow

Existing Benchmark

Reset USGS Marker

Iron Monument Found

Iron Pin R/W Monument

Property Corner

Iron Pin Reference Monument

Right of Way Marker (Exst, Ppsd, Reset)

Existing Federal Reference Corner

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

Existing Witness Corner

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

Existing Traverse PI Aerial Panel

Existing Reference Marker Point NGS

Existing EFB Misc

Existing Bush or Shrub

Existing Large Evergreen Tree

Existing Small Evergreen Tree

Existing Large Tree

Existing Small Tree

Existing Tree Trunk

Cairn or Stone Circle

Existing Artifact

Existing Satellite Dish

Existing Weather Station

Existing Windmill or Tower

Reinforced Pavement

CSB Continuous Split Barrel Sample

FA Flight Auger Sample

SB Split Barrel Sample

T Thinwall Tube Sample

N Standard Penetration Test

Incl Inclinometer Tube

Excavation Unit

Existing Ground Water Well Bore Hole

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
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12-18-20	General Revisions

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SYMBOLS

D-101-31

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

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

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

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SYMBOLS

D-101-32

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

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

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

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

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SYMBOLS

D-101-33

Existing Manhole (Electrical, Gas, Telephone)

Water Manhole (Exst, Exst with Valve)

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

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

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

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

Manhole (Ppsd, Ppsd 48 Inch, Exst Undefined)

Existing Water Appurtenance

Sprinkler Head (Exst, Ppsd)

Fire Hydrant (Exst, Ppsd)

Cleanout (Exst Sanitary, Underdrain)

Existing Catch Basin Inlet (Round, Square)

Existing Curb Inlet (Round, Square)

Existing Slotted Reinforced Concrete Pipe

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

Inlet Mountable Curb (Type A, Type B)

Inlet Saddle Base (Type 1, Type 2)

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

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

Median Drain

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

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

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

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

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

Pump
Sanitary, Storm Drain, Exst Water

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

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

Existing Utility Marker

Existing Meter

Existing Fuel Dispensers

Existing Fuel Filler Pipes

Existing Fuel Leak Sensors

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

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12 18 2020

Cross Section Legend

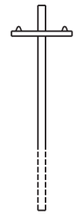
D-101-40

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

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

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

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



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



Anchor

High Tension Cable Guardrail

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



Connection to infer that probably will not be displayed

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

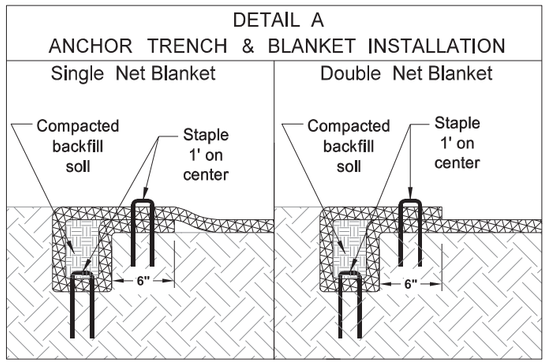


NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-20-18	
REVISIONS	
DATE	CHANGE
6/14/2023	CADD Standards Update

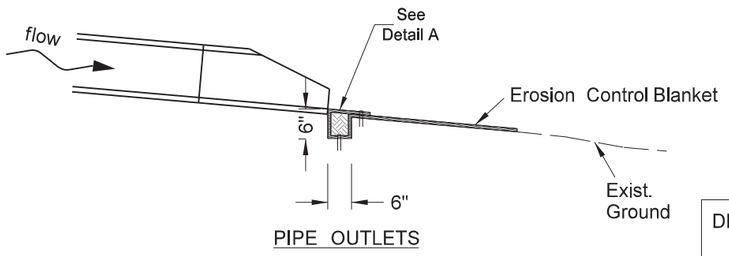
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06/14/23

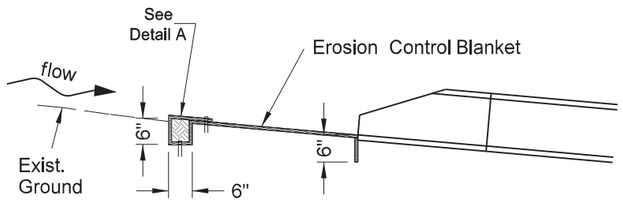
EROSION AND SILTATION CONTROL
EROSION CONTROL BLANKET INSTALLATION



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

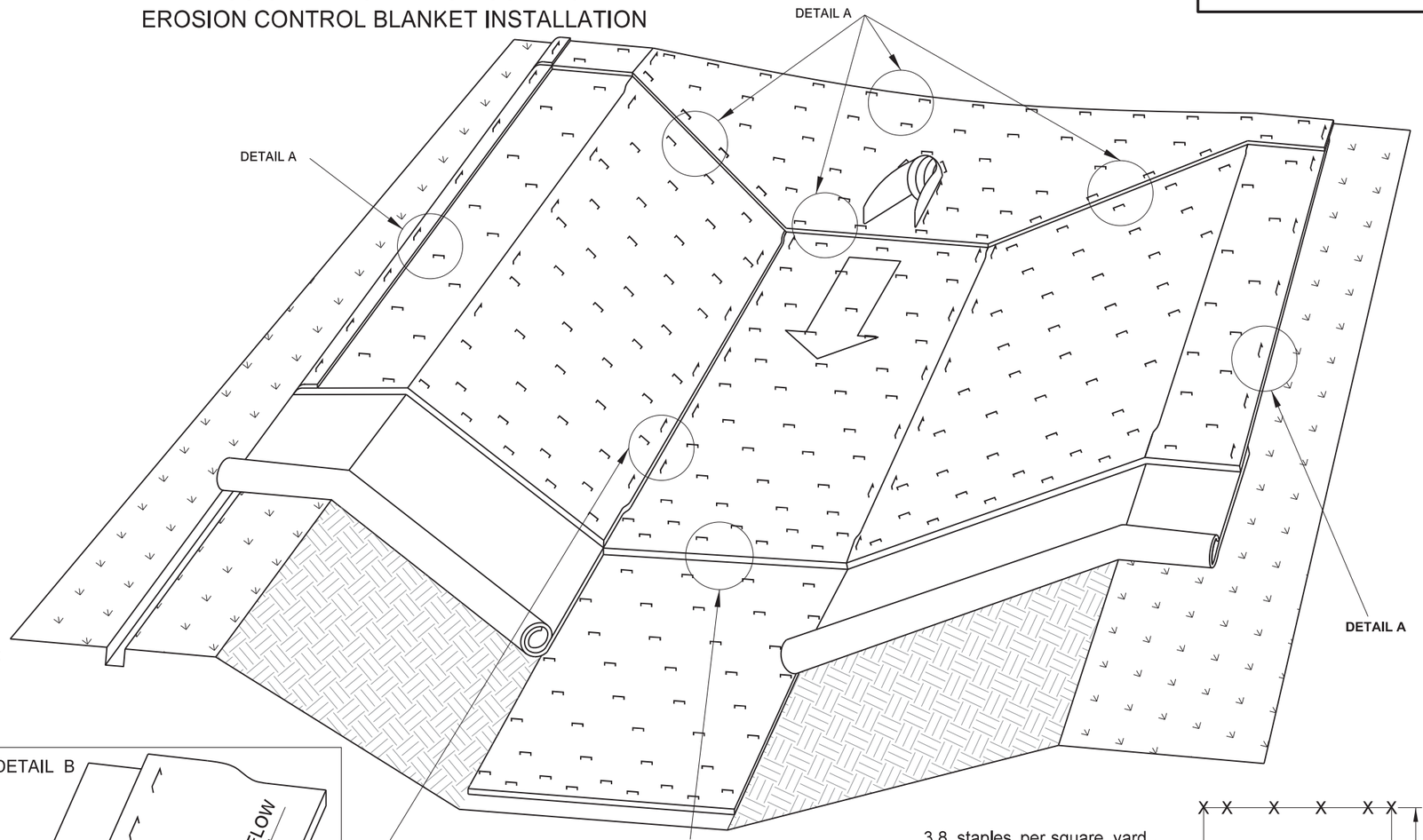


PIPE OUTLETS

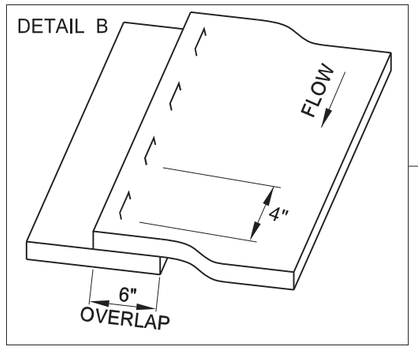


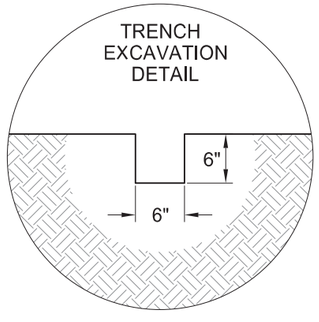
PIPE INLETS

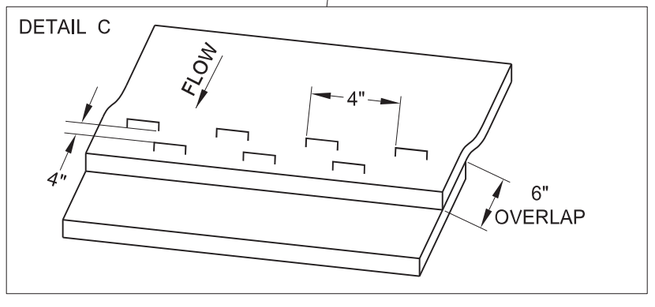
INSTALLATION AT PIPE ENDS



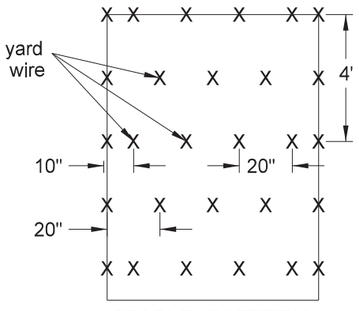
BLANKET LAYOUT
CHANNEL OR SLOPE INSTALLATION







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



STAPLE PATTERN

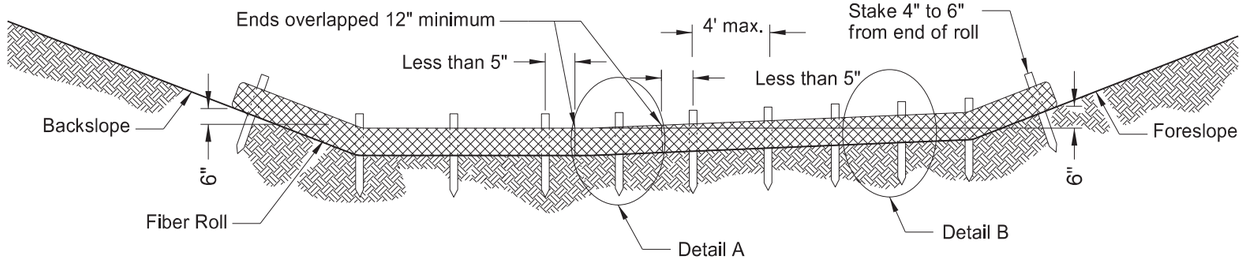
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Changed standard drawing number from D-708-5 to D-255-2.
07-27-15	Changed Installation details such as trench depth and overlap dimensions.
08-27-19	New Design Engineer PE Stamp.

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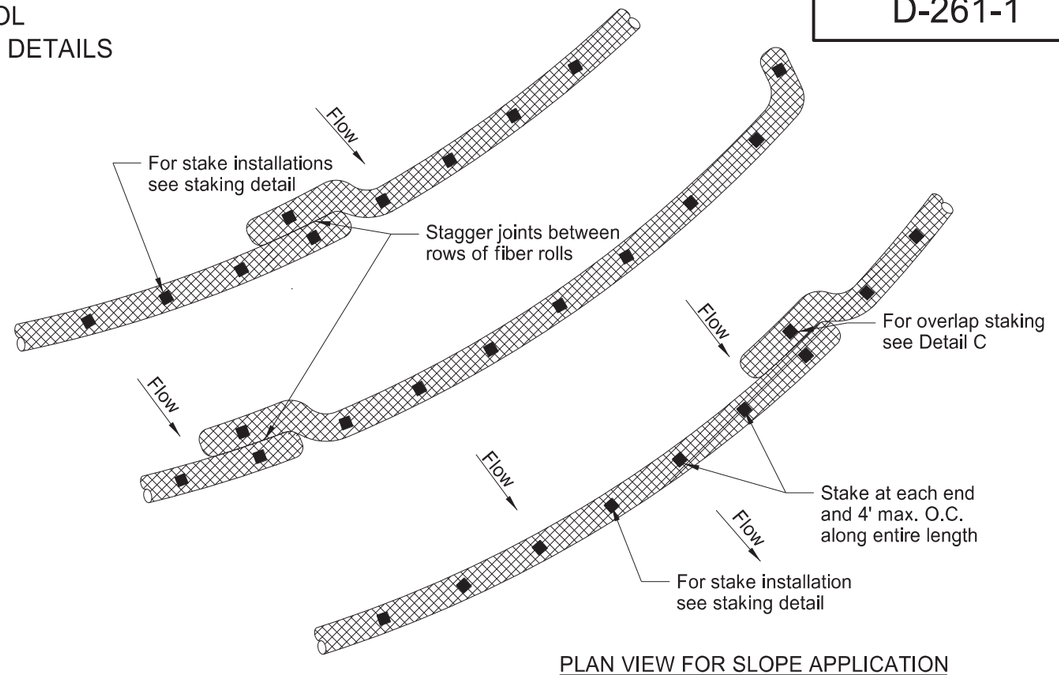
DocuSign Envelope ID: ACF8D5B6-E284-499F-ABF6-DD6AE0387A27

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

D-261-1

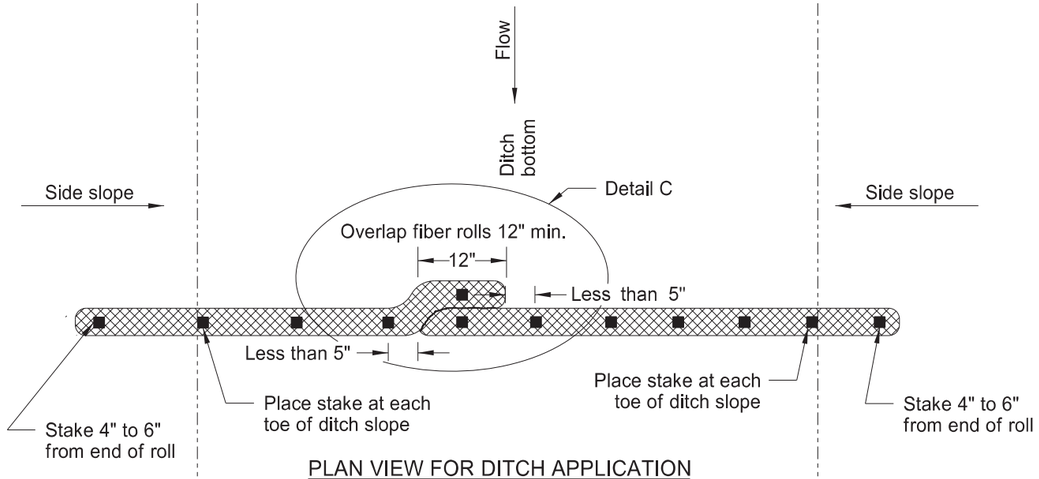


12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



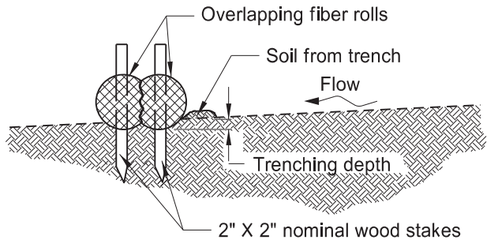
PLAN VIEW FOR SLOPE APPLICATION

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



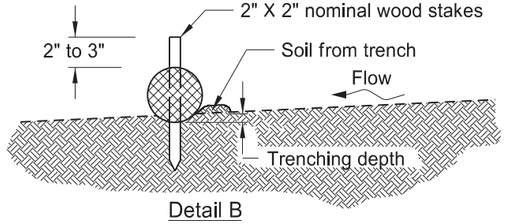
PLAN VIEW FOR DITCH APPLICATION

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"



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

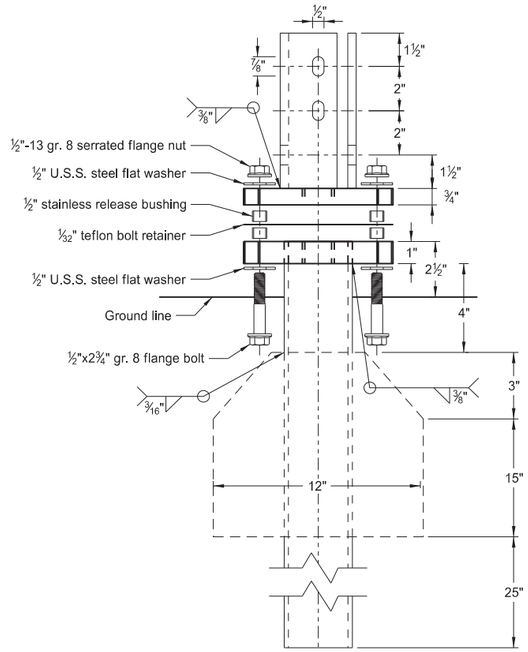
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1.
08-27-19	New Design Engineer PE Stamp
04-22-24	Slope Plan View-Overlap Change.

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

04/22/24

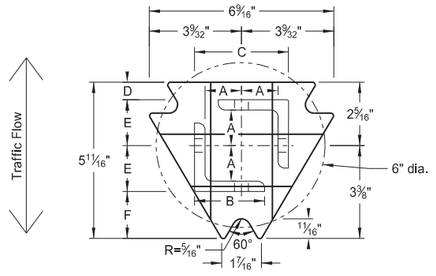
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

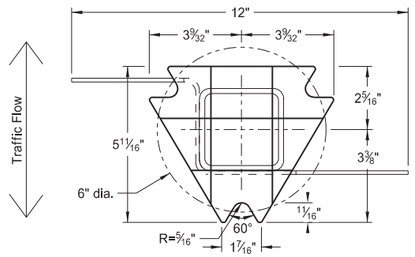


Multi-Directional
Slip Base Assembly

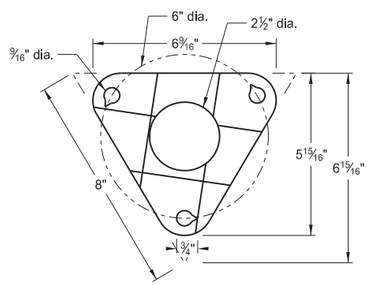
Perforated Tube



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.

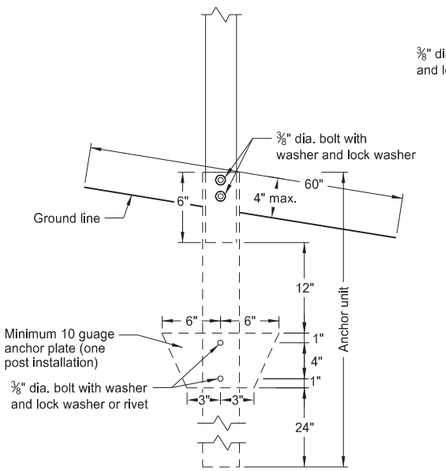
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½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

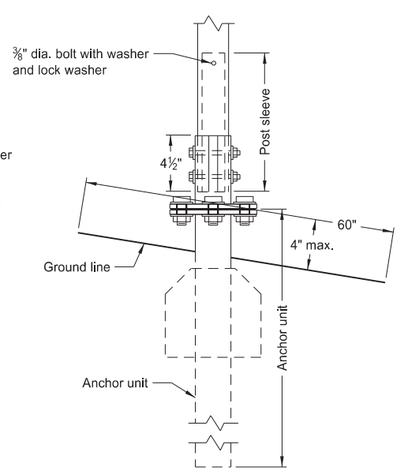
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄16"x10 ga.	1⁹⁄64"	2½"	3¹⁄32"	25⁄32"	1³³⁄64"	1⅞"
2½"x10 ga.	1⁹⁄32"	2½"	3⁵⁄16"	⅝"	1²¹⁄32"	1¾"

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

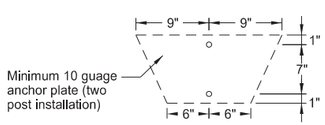
(B) For additional wind load, insert the 2³⁄16"x10 ga. into 2½"x10 ga.



Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly



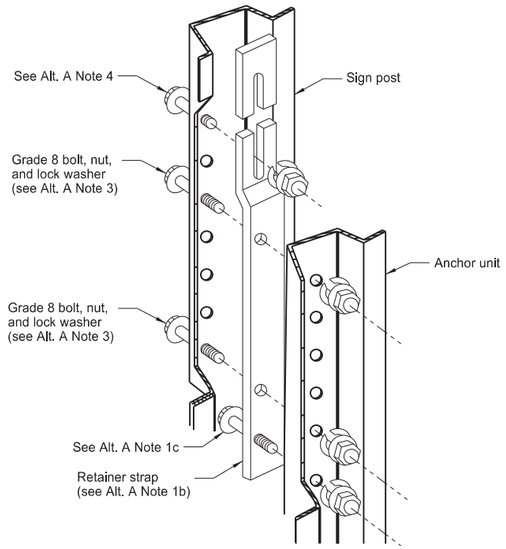
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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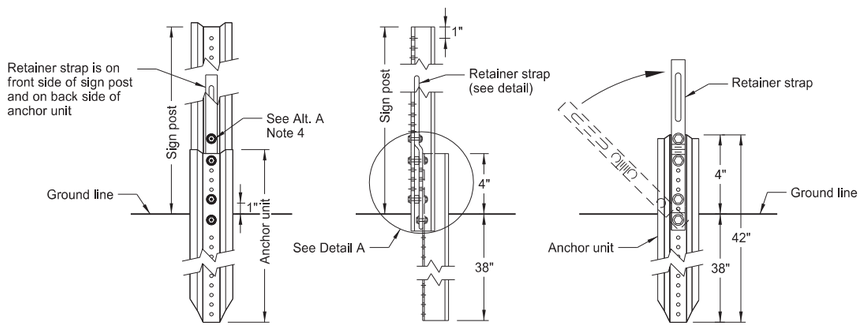
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



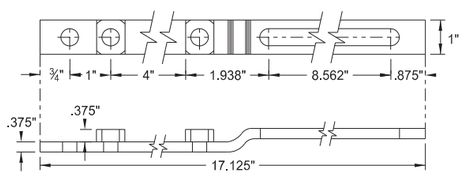
Detail A



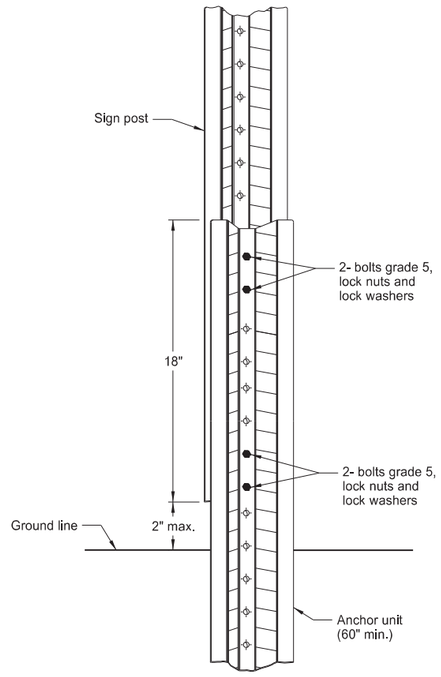
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

Install a maximum of 2 posts within 7'.

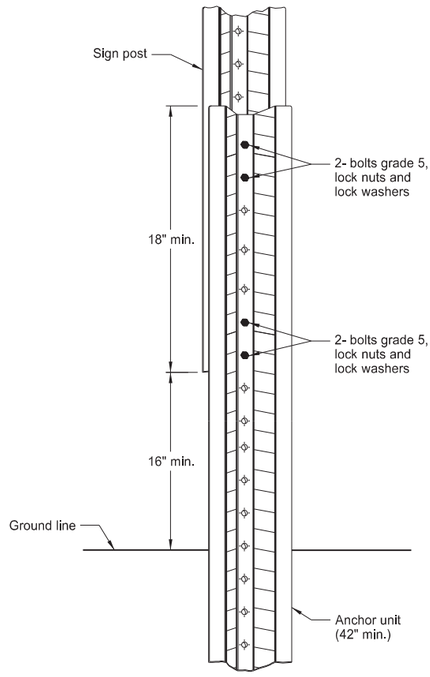


Retainer Strap Detail



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

Install a maximum of 3 posts within 7'.



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

Install a maximum of 3 posts within 7'.

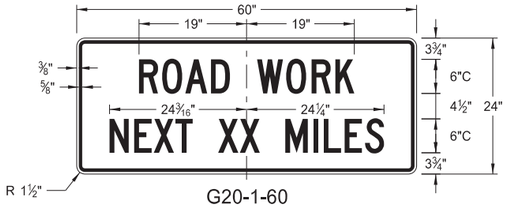
Alternate A Steps of Installation:

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

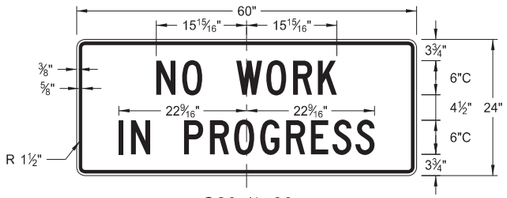
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-03-19	New Design Engr PE Stamp

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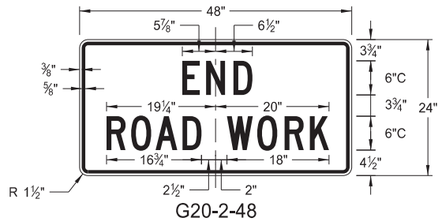
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



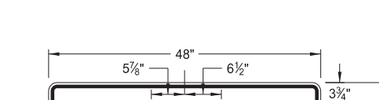
G20-1-60
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Background: orange



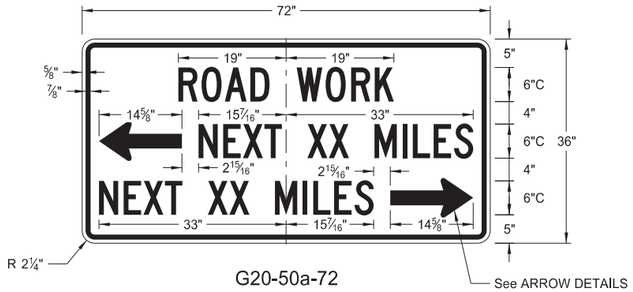
G20-1b-60
Legend: black (non-refl)
Background: orange



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

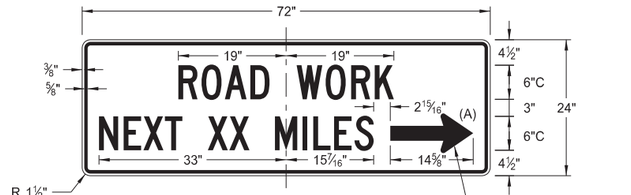


G20-4b-36
Legend: black (non-refl)
Background: orange



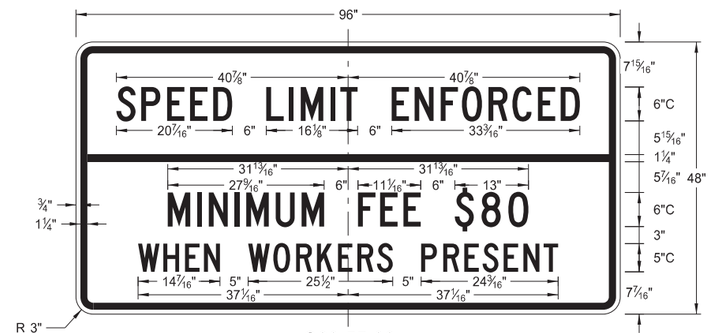
G20-50a-72
Legend: black (non-refl)
Background: orange

See ARROW DETAILS

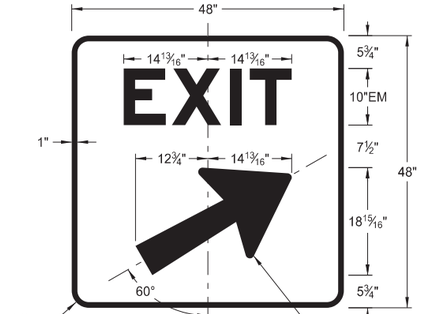


G20-52a-72
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See ARROW DETAILS

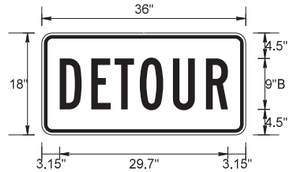


G20-55-96
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Background: orange

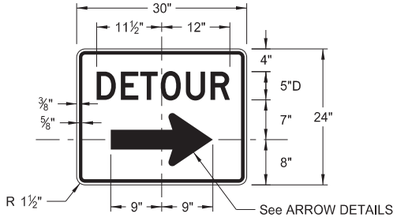


E5-1(L or R)-48
Legend: white
Background: green (orange optional)

See ARROW DETAILS

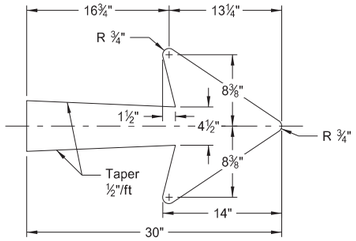


M4-8-36
Legend: black (non-refl)
Background: orange

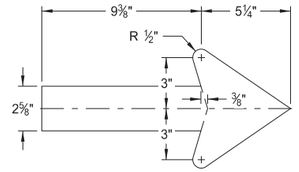


M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

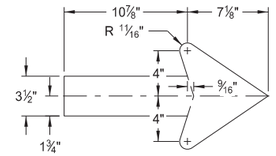
See ARROW DETAILS



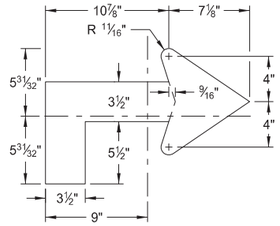
E5-1-48



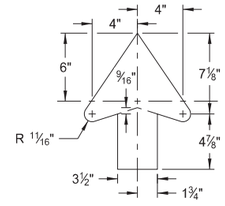
G20-50a-72
G20-52a-72



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



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



M4-9-30
Straight

ARROW DETAILS

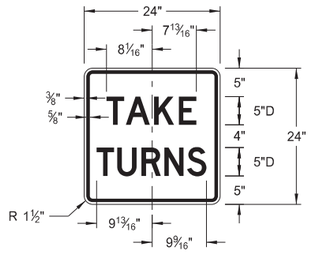
NOTES:

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

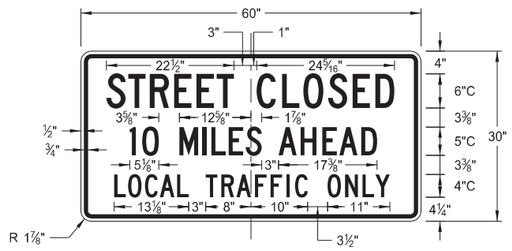
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17 10-03-19	Added sign & background color New Design Engineer PE Stamp

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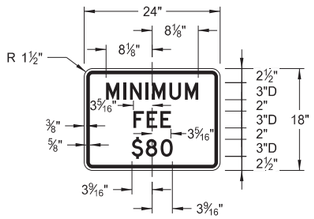
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



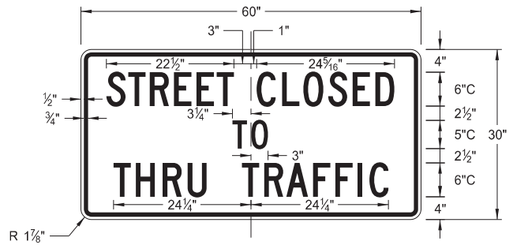
R1-50P-24
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Background: white



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



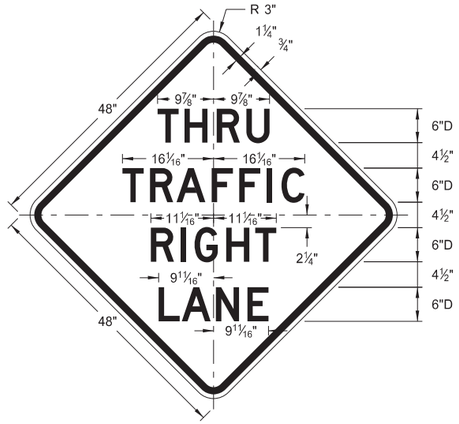
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NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Revised sign number
10-03-19	New Design Engineer PE Stamp

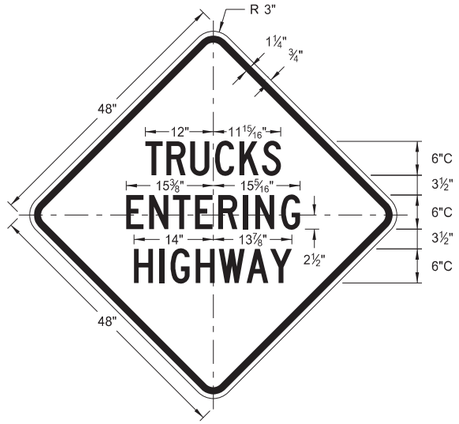
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CONSTRUCTION SIGN DETAILS
WARNING SIGNS

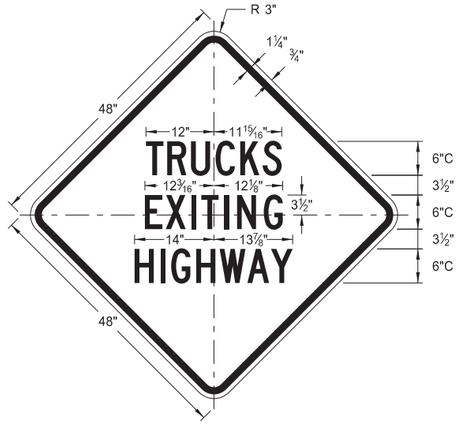
D-704-11



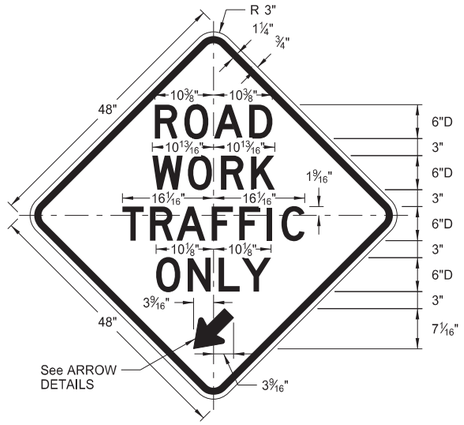
W5-8-48
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Background: orange



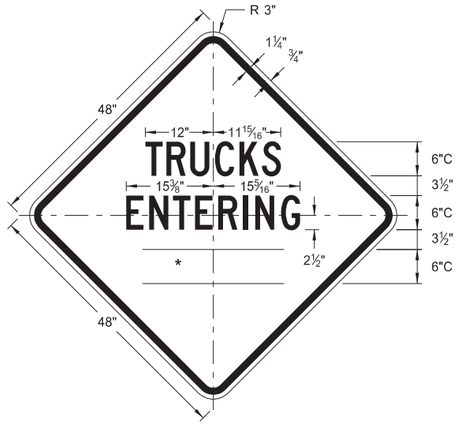
W8-53-48
Legend: black (non-refl)
Background: orange



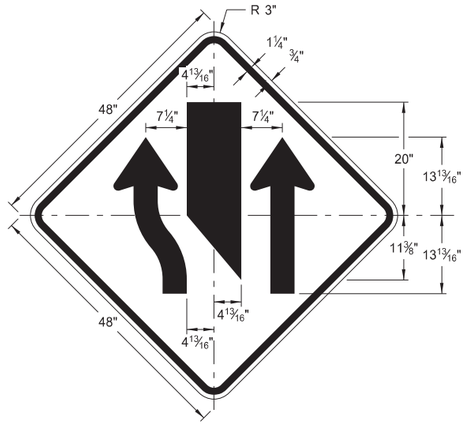
W8-56-48
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Background: orange



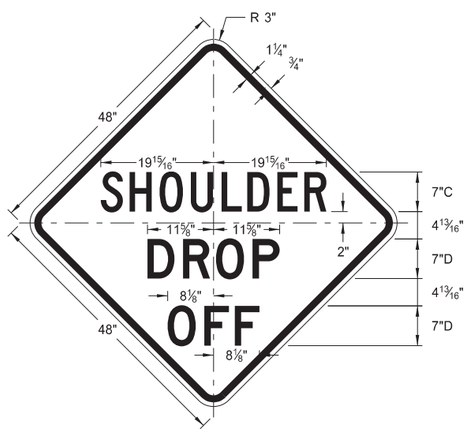
W5-9-48
Legend: black (non-refl)
Background: orange



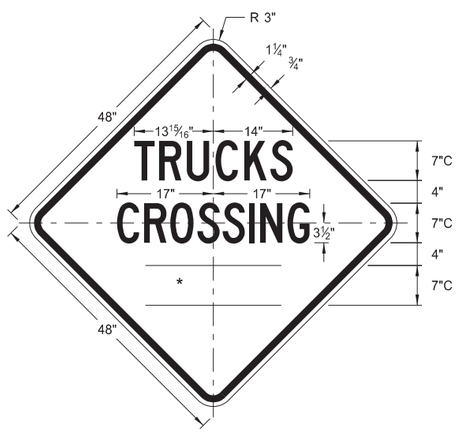
W8-54-48
Legend: black (non-refl)
Background: orange



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



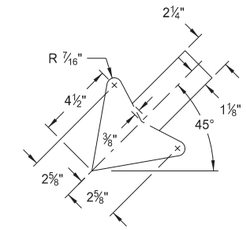
W8-9a-48
Legend: black (non-refl)
Background: orange



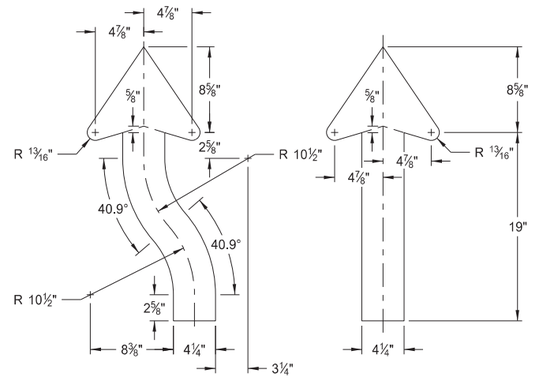
W8-55-48
Legend: black (non-refl)
Background: orange

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

* DISTANCE MESSAGES



W5-9-48



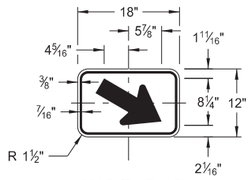
W9-3a-48

ARROW DETAILS

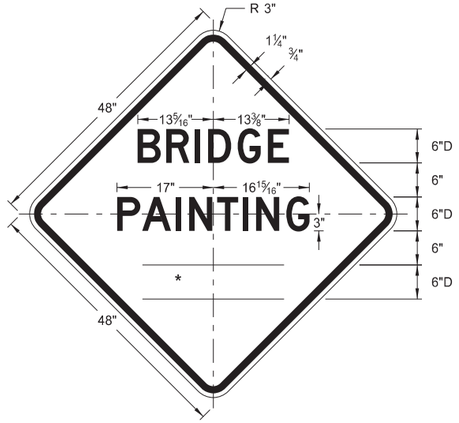
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE
8-17-17	Updated sign number
5-31-18	Revised sign and arrow details
10-03-19	New Design Engineer PE Stamp

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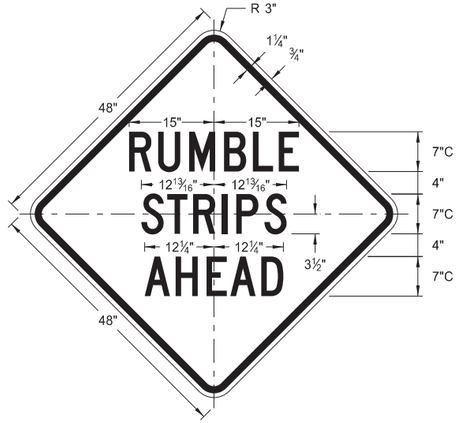
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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



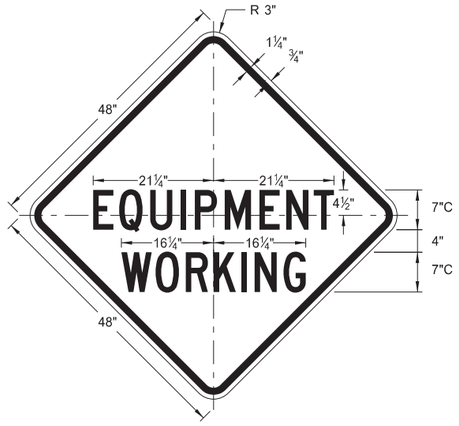
W21-50-48
Legend: black (non-refl)
Background: orange



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

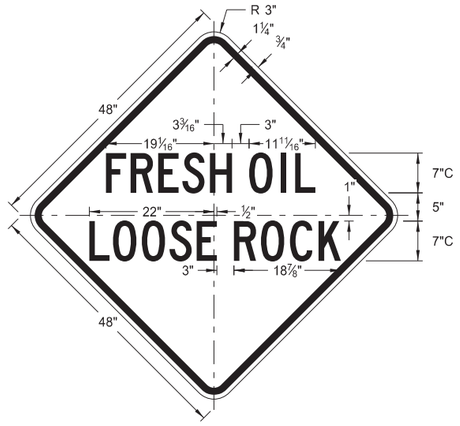
WORD	LETTER SPACING
AHEAD	Standard
200 FT	Standard
350 FT	Standard
500 FT	Standard
1000 FT	Reduce 40%
1500 FT	Reduce 40%
½ MILE	Reduce 50%
1 MILE	Standard

* DISTANCE MESSAGES

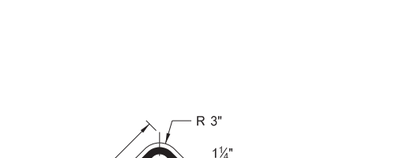


W20-51-48
Legend: black (non-refl)
Background: orange

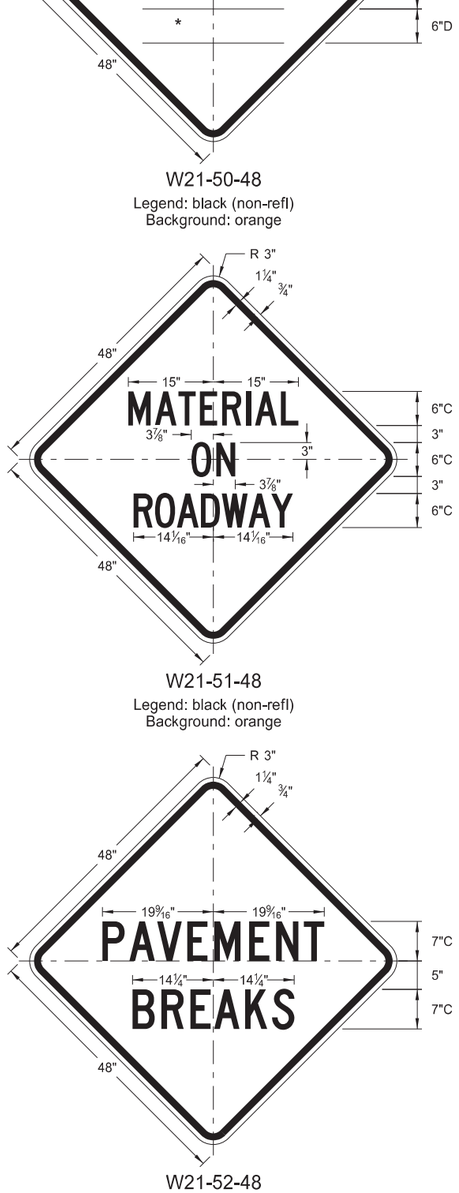
W21-51-48
Legend: black (non-refl)
Background: orange



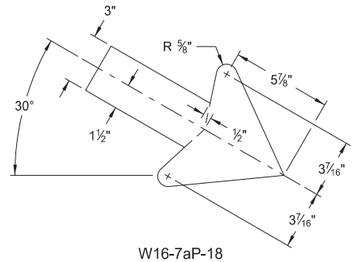
W22-8-48
Legend: black (non-refl)
Background: orange



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



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



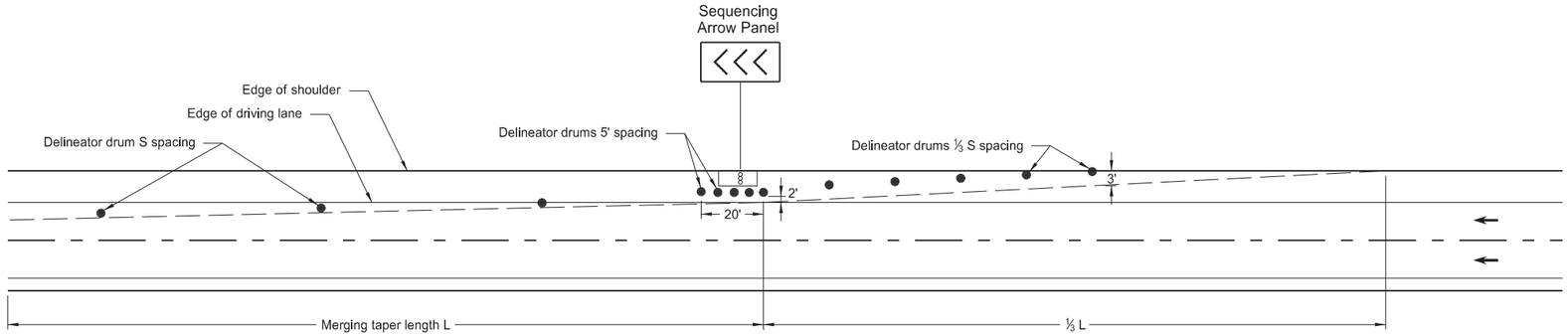
W16-7aP-18

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

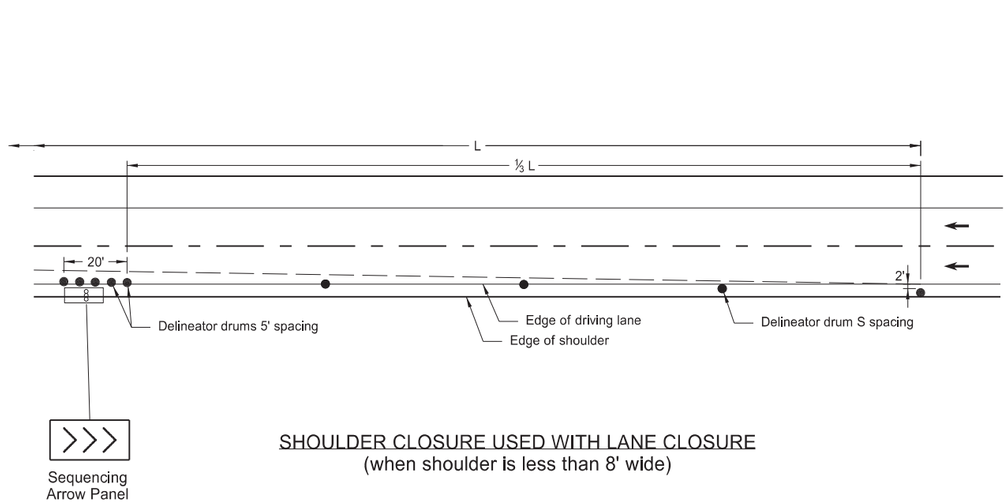
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SHOULDER CLOSURE TAPERS

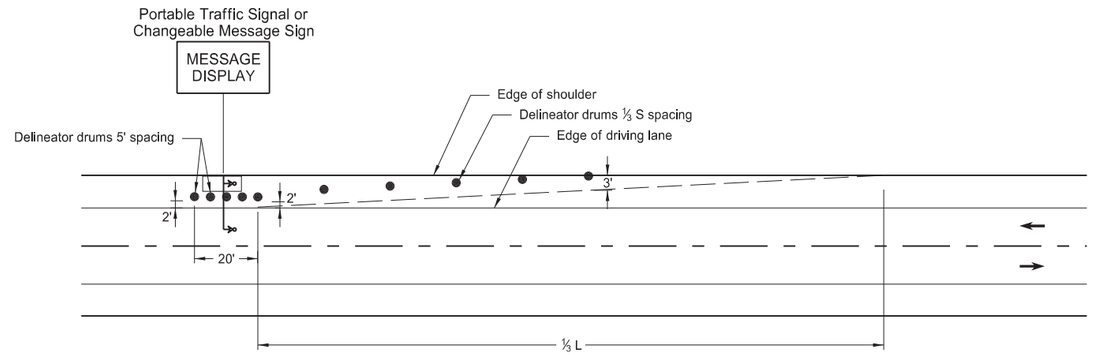
D-704-12



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



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



PORTABLE TRAFFIC SIGNAL OR CHANGEABLE MESSAGE SIGN ON SHOULDER

KEY

● Delineator Drum	∞ Sequencing Arrow Panel
° Message Display	Portable Traffic Signal

Notes:

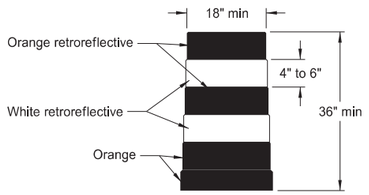
1. S = Posted Speed Limit in mph
   W = Width of offset in feet
   L = Taper length in feet
   L = $WS^2/60$ (40mph or less)
   L = WS (45mph or more)
2. If a shoulder taper is used, use a length of approximately ⅓L. If a shoulder is used as a travel lane, use a normal merging or shifting taper.
3. When paved shoulders of 8 foot width or more are closed, use channelizing devices to close shoulder in advance, to delineate beginning of work space, and to direct vehicular traffic to remain within the traveled way.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17	Updated to active voice
10-25-19	Added L dimension to detail

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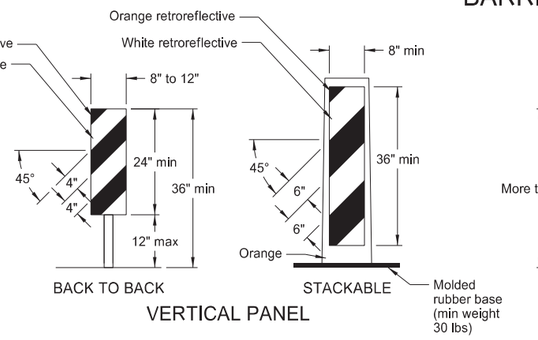
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



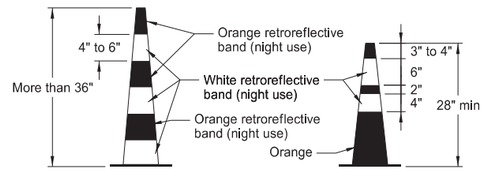
DELINEATOR DRUM

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.



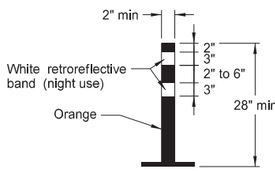
VERTICAL PANEL

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.



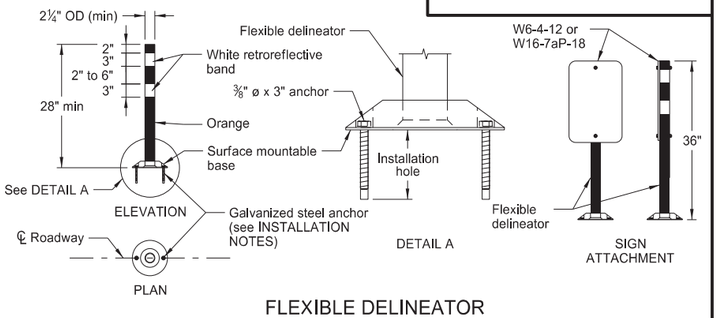
TRAFFIC CONE

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

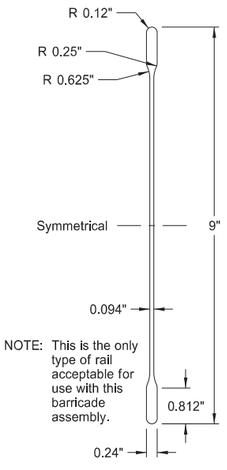
Provide retroreflectorization of tubular markers more than 42" in height by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



FLEXIBLE DELINEATOR

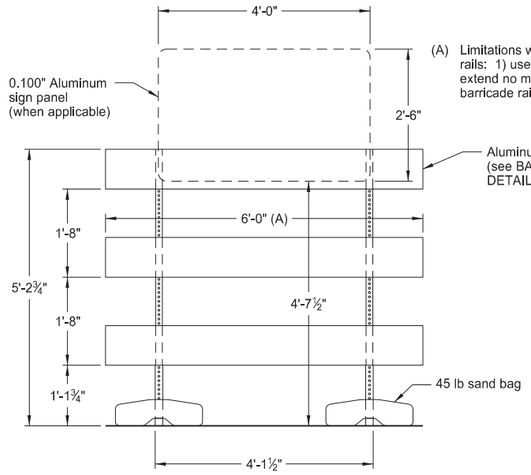
INSTALLATION NOTES:

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.



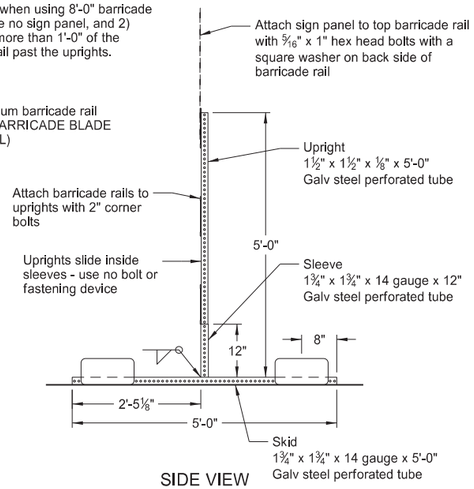
NOTE: This is the only type of rail acceptable for use with this barricade assembly.

BARRICADE BLADE DETAIL



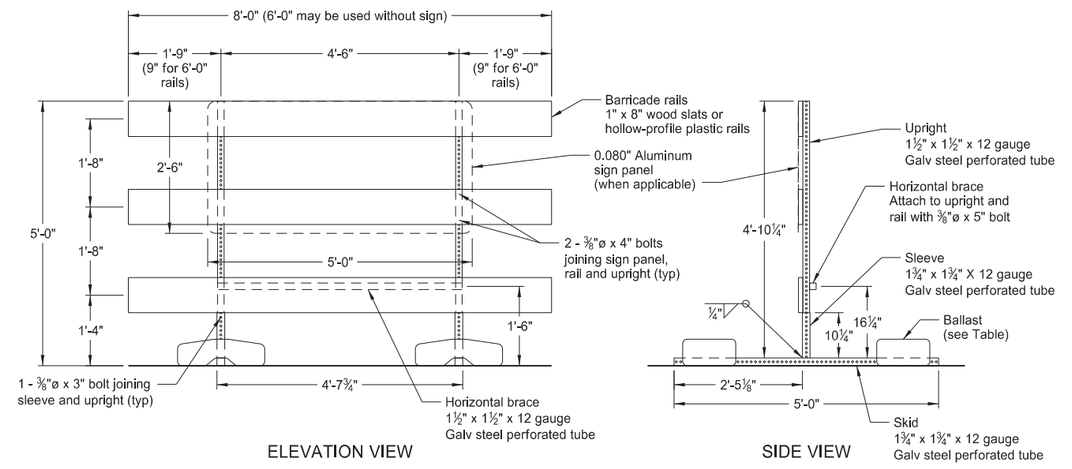
(A) Limitations when using 8'-0" barricade rails: 1) use no sign panel, and 2) extend no more than 1'-0" of the barricade rail past the uprights.

ELEVATION VIEW



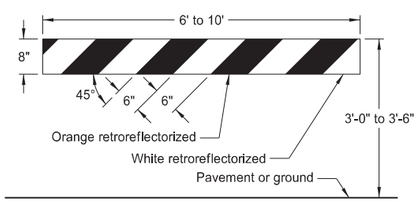
SIDE VIEW

BARRICADE ASSEMBLY DETAIL (Aluminum Barricade Rails)

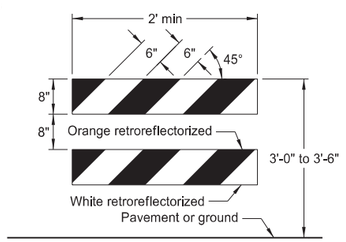


BARRICADE ASSEMBLY DETAIL (Wood or Plastic Rails)

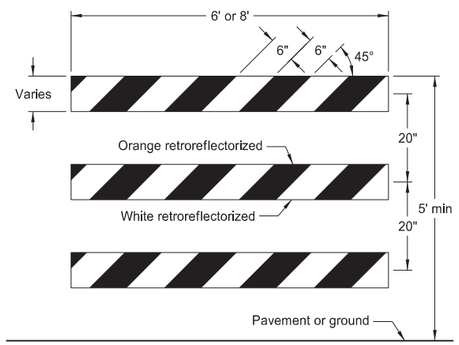
NOTE: For barricade markings use alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Place retroreflective sheeting on both sides of the rails with a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the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



TYPE I BARRICADE

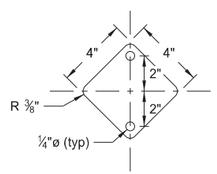


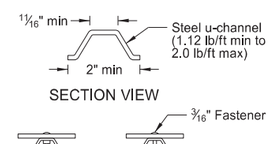
TYPE II BARRICADE

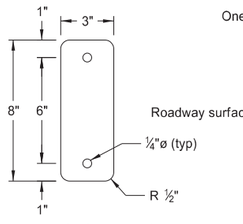


TYPE III BARRICADE

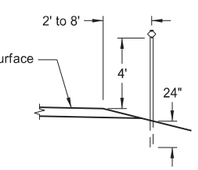
BARRICADE RAIL DETAILS







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.

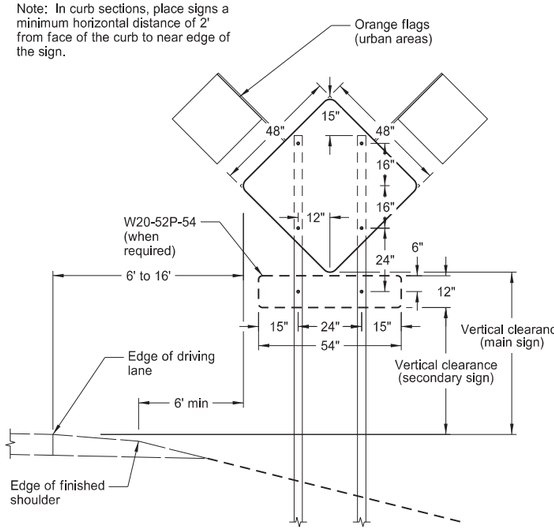
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE
9-27-17 11-01-19	Updated to active voice Revised details for Flexible Delineator

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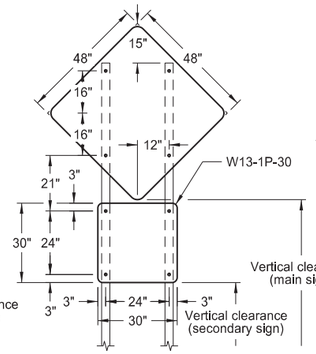
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

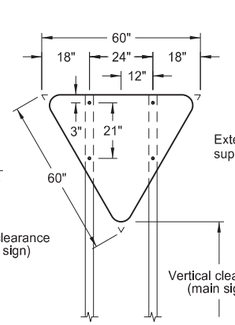
Note: In curb sections, place signs a minimum horizontal distance of 2' from face of the curb to near edge of the sign.



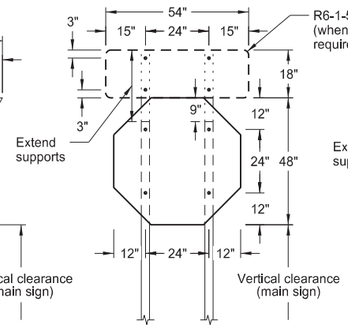
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



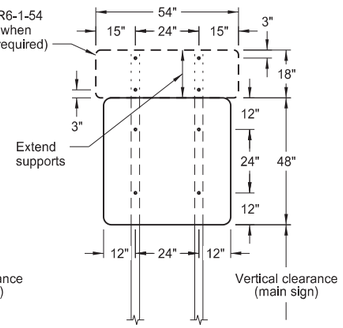
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



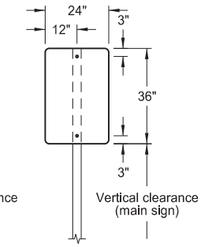
R1-2-60 - YIELD SIGN



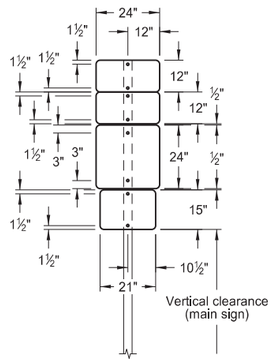
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



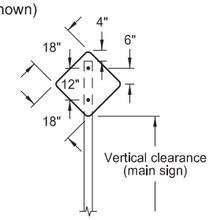
48" x 48" SIGN
(with R6-1-54 sign as required)



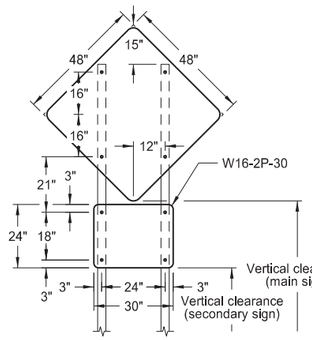
24" x 36" SIGN



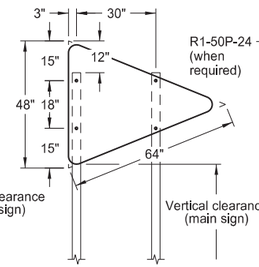
24" x 24"
ROUTE MARKER
ASSEMBLY



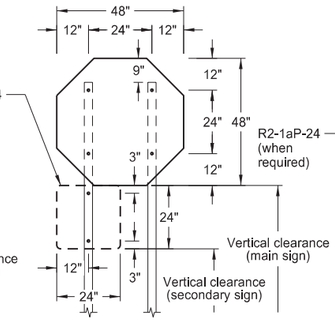
18" x 18"
DIAMOND SIGN



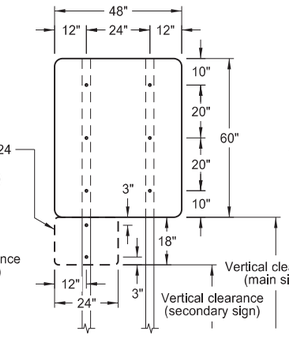
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



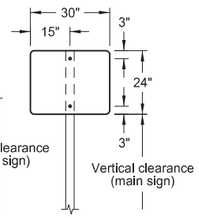
W14-3-64 - PENNANT SIGN



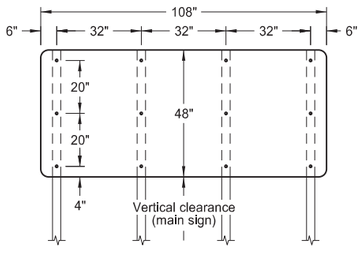
R1-1-48 - STOP SIGN
(with R1-50P-24 sign as required)



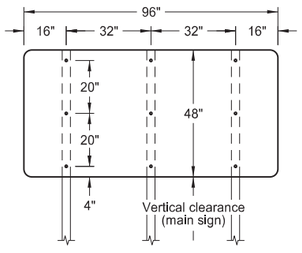
48" x 48" SIGN
(with R2-1aP-24 sign as required)



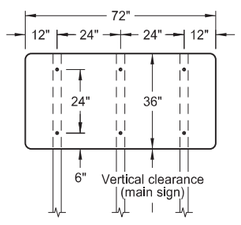
30" x 24" SIGN



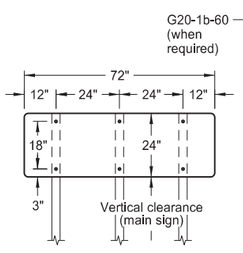
108" x 48" SIGN



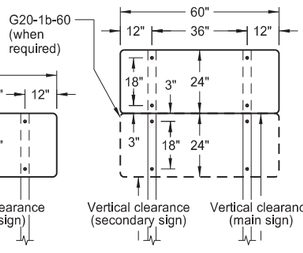
96" x 48" SIGN



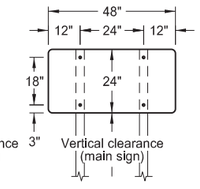
72" x 36" SIGN



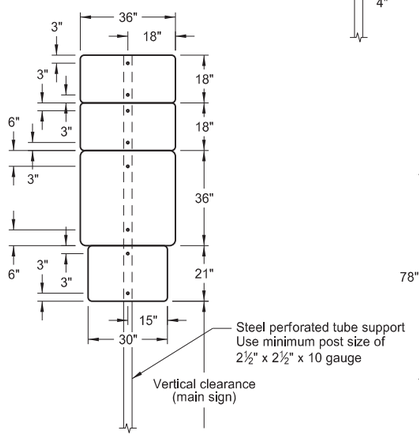
72" x 24" SIGN



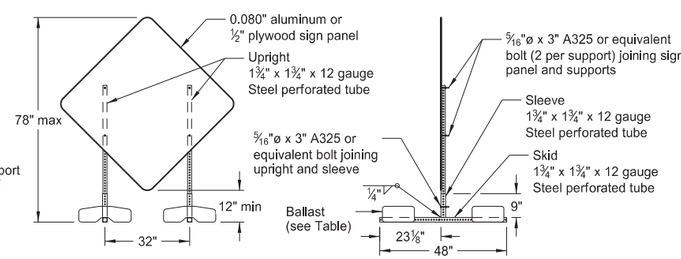
60" x 24" SIGN



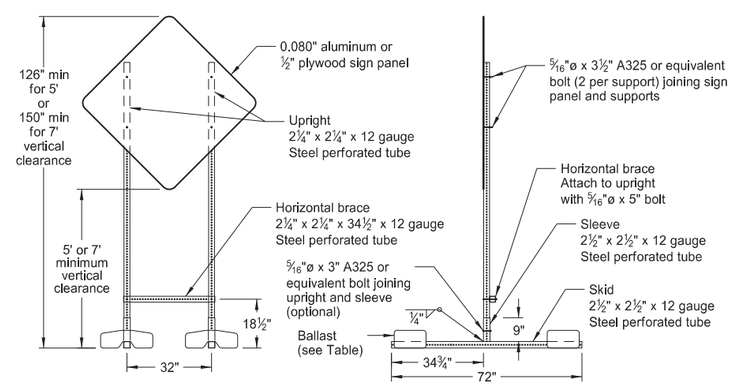
48" x 24" SIGN



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

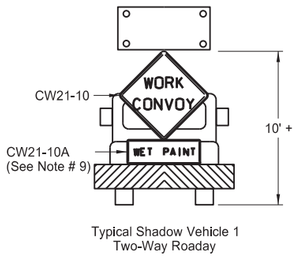
REVISIONS

DATE	CHANGE
11-14-13	Revised Note 6
9-27-17	Updated to active voice
11-01-19	Revised 60"x24" sign detail

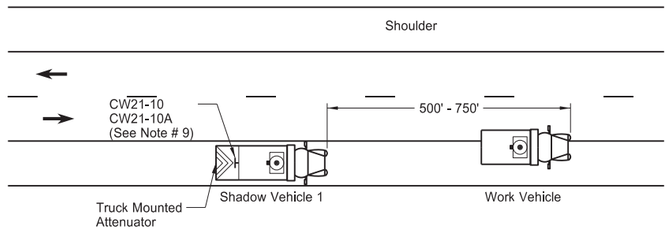
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MOBILE OPERATION
(PAVEMENT MARKING)

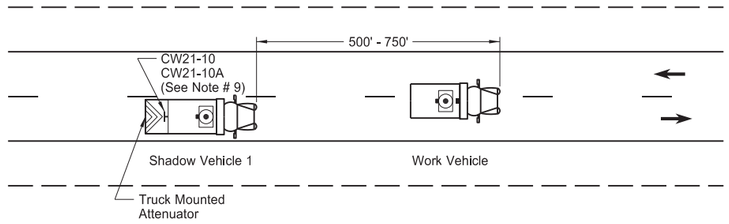
D-704-27



Typical Shadow Vehicle 1
Two-Way Roaday

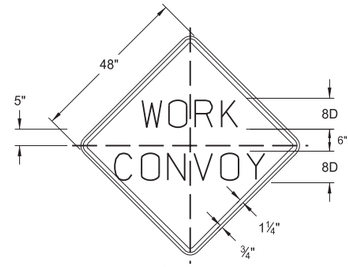


Two-Way Roadway with Paved Shoulders

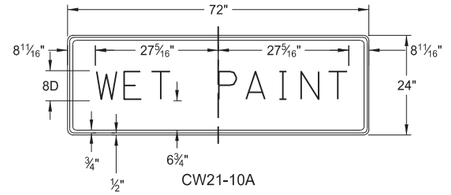


Two-Way Roadway without Paved Shoulders

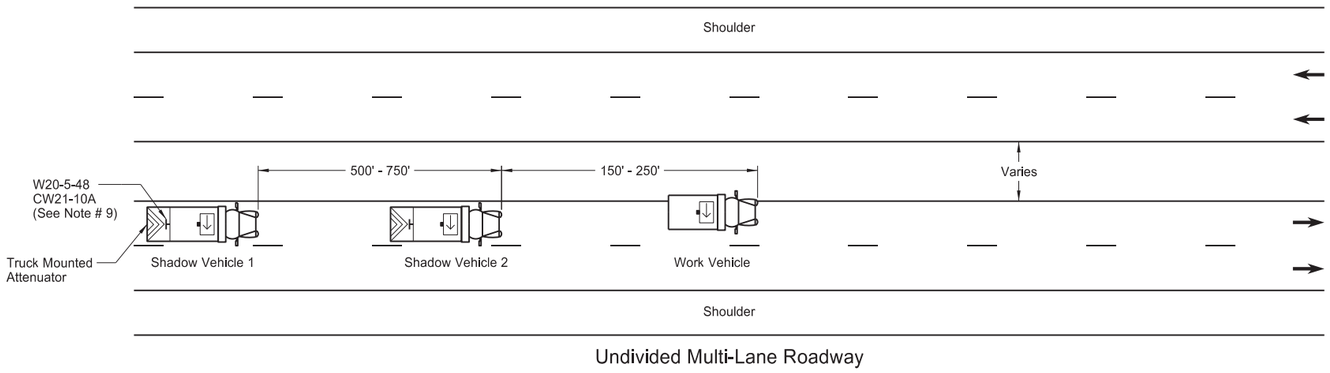
Sign Details



CW21-10

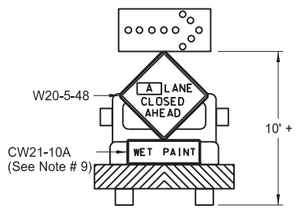


CW21-10A



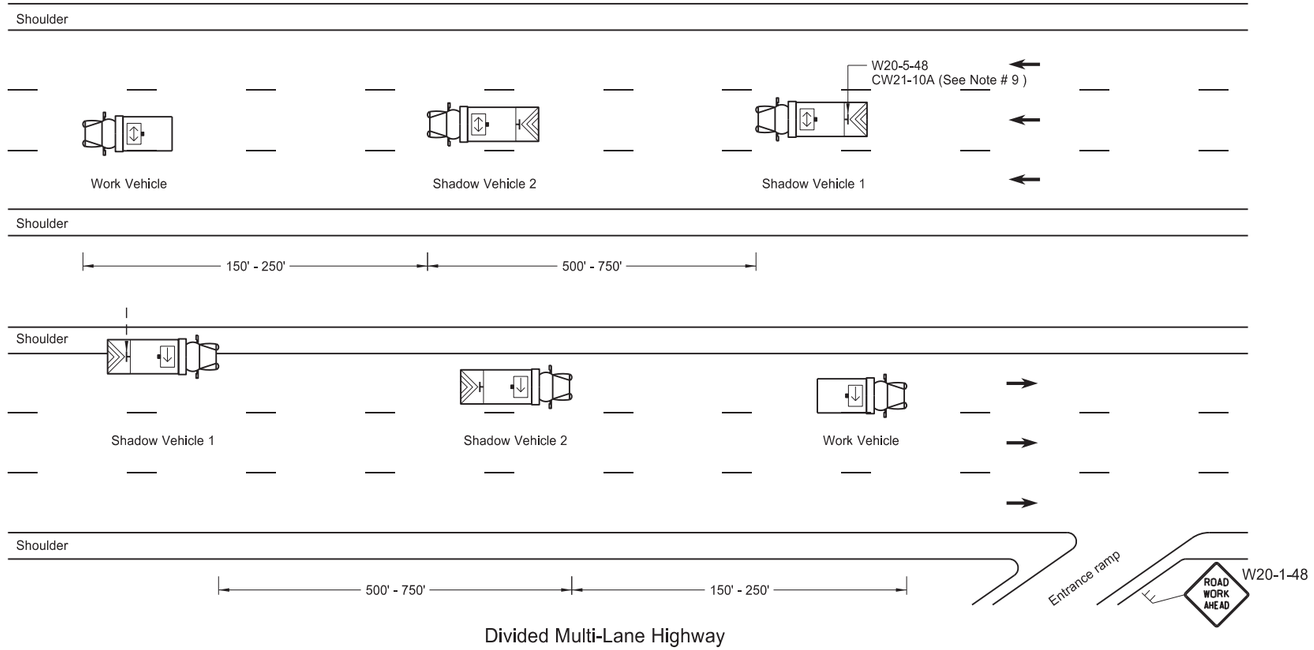
Undivided Multi-Lane Roadway

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



Typical Shadow Vehicle 1 & 2
Multi-Lane Highways

A = Left Right Center



Divided Multi-Lane Highway

KEY

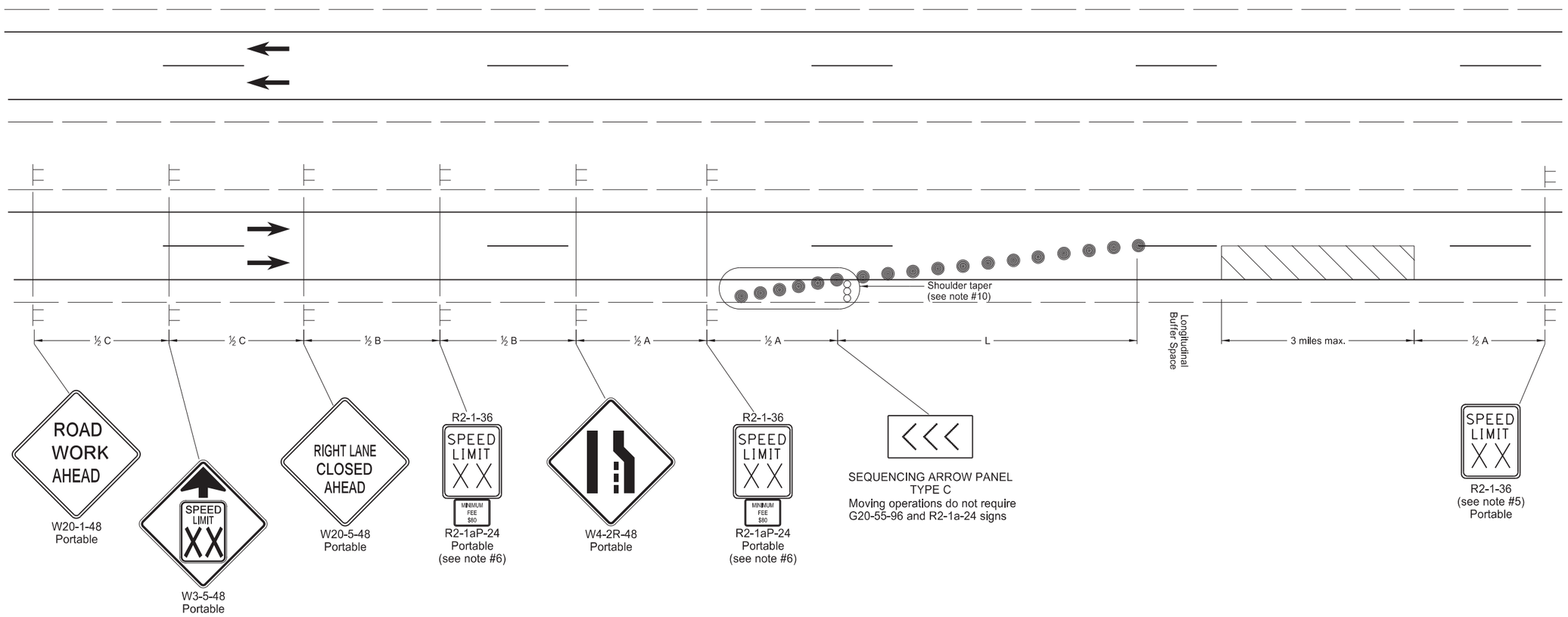
- Sign
- Truck mounted attenuator
- Flashing arrow panels:
  - Right directional
  - Left directional
  - Double arrow directional
  - Caution Mode

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways
9-27-17	Updated to active voice
11-08-19	Changed Standard Heading

This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 11/08/19 and the original document is stored at the North Dakota Department of Transportation

SIGN LAYOUT FOR ONE LANE CLOSURE DIVIDED HIGHWAY MOVING OPERATION

D-704-32



Notes
1. Provide an additional sequencing arrow panel in the closed lane, near the work area, if the moving operation is not visible to the motorist from the end of the taper.
2. Variables
   S = Numerical value of speed limit or 85th percentile.
   W = The width of the taper.
   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.
3. Space delineator drums for tapering traffic at dimension "S".
4. Sequencing Arrow Panels
   Panels should normally be placed at the beginning of the taper. Where shoulder width does not provide sufficient room, the panel should be moved closer to the work area so that it can be placed on the roadway surface.
   Type A shall be used on roadways with slow moving traffic speeds and low volume (25 mph & 750 ADT or less).
   Type B shall be used on roadways with moderate traffic speeds and volumes (40 mph and 5000 ADT or less).
   Type C shall be used on roadways with high traffic speeds and volumes (over 40 mph and 5000 ADT).
5. Re-establish speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
6. Determine the reduced speed limit 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 NDDOT Standard Drawing D-704-14.
10. Provide shoulder taper when shoulder is 8' or wider.
11. Recommend using 40 mph speed limit in vicinity of workers, unless location and conditions dictate otherwise.

KEY

Sign		Work area	
Delineator Drums		Sequencing arrow panel	

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 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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-27-13

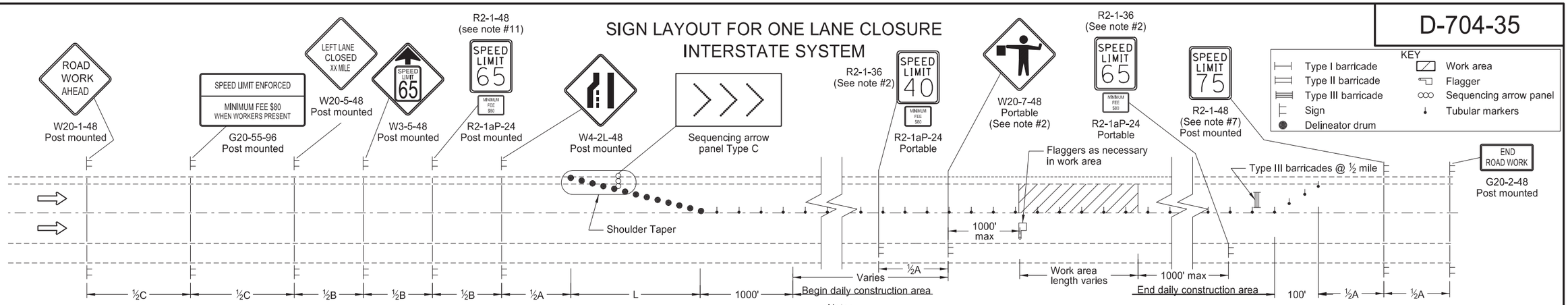
REVISIONS

DATE	CHANGE
6-24-14	Revised Note 9
8-17-17	Updated notes & sign numbers
11-01-19	Added sign, revised note & sign #

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

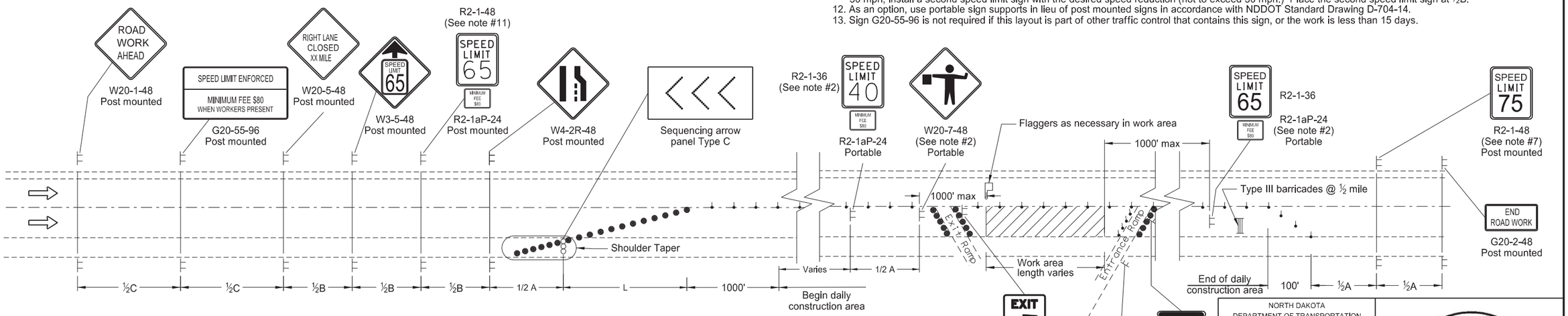
D-704-35

SIGN LAYOUT FOR ONE LANE CLOSURE INTERSTATE SYSTEM



LEFT LANE CLOSED
WORKERS IN WORK AREA

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



RIGHT LANE CLOSED
WORKERS IN WORK AREA

Notes:
1. Install advance signs for flagging when flaggers are flagging.
2. Move the advanced flagger sign and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Space the 40 mph speed limit sign at ½A in advance of the flagger sign and move the 65 mph speed limit sign. Cover or remove the 40 mph speed limit and Minimum Fee $80 signs and the 65 mph speed limit sign upon completion of the work day or when workers are not present.
3. RAMPS: When the work area encompasses an entrance ramp, install a 40 mph speed limit sign on the ramp and cover any existing yield sign. Install new yield sign as necessary. Remove the ramp speed limit sign when the main line 40 mph speed zone is moved past the ramp.
4. Variables:
   S=Numerical value of speed limit or 85th percentile
   W=The width of taper.
   L=Minimum length of taper, or SxW for freeways, expressways, and all other roads with speeds of 45 mph or greater, or
   WxSxS/60 for urban, residential, and other streets with speeds of 40 mph or less.
5. Space delineator drums for tapering traffic at the dimension "S". Space tubular markers used for tangents at 2 times dimension "S".
6. Place sequencing arrow panels at the beginning of the taper when possible. Where shoulder width does not provide sufficient room, move the panel closer to the work area and place on the roadway surface.
   Use Type C on roadways with high traffic speeds and volumes (over 40 mph or 5000 ADT or greater).
7. Re-establish the speed limit. Determine the exact speed limit in the field, dependent on location and conditions.
8. Cover existing speed limit signs within a reduced speed zone.
9. Upon approval, the Engineer will measure obliterated or covered pavement marking as Obliteration of Pavement Marking.
10. Install flags on warning signs in urban areas when signs are not portable. Mount 24 inch square flags perpendicular to the edges of the diamond sign, and at such a distance above the edge that the flag does not touch the sign when limp.
11. Determine the reduced speed limit dependent on the in place speed limit before construction. When speed limits are to be reduced more than 30 mph, install a second speed limit sign with the desired speed reduction (not to exceed 30 mph.) Place the second speed limit sign at ½B.
12. As an option, use portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Drawing D-704-14.
13. Sign G20-55-96 is not required if this layout is part of other traffic control that contains this sign, or the work is less than 15 days.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-7-2012

REVISIONS

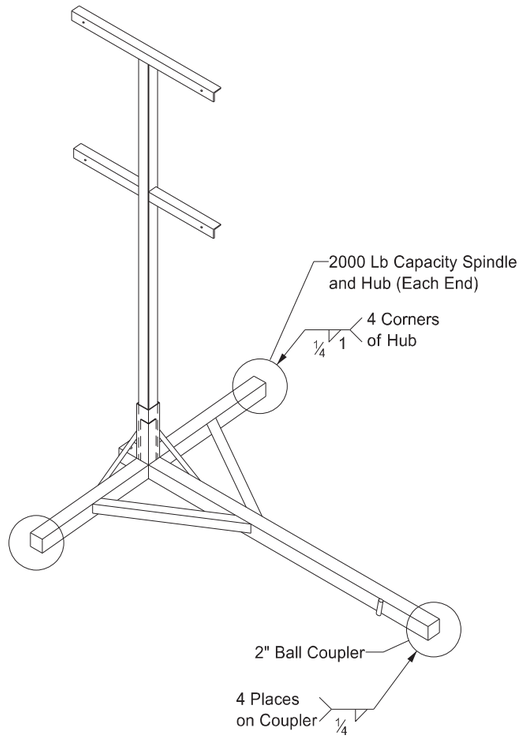
DATE	CHANGE
06-23-14	Revised Note 12
03-15-16	Removed Do Not Pass signs & updated notes
08-17-17	Moved speed signs & added note
10-17-17	Corrected spelling of "shoulder"
11-01-19	Revised tubular Mrkrs symbols
12-08-21	Switched order of Road Work Ahead and Spd Limit Enforced, added Dollars At Work, &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

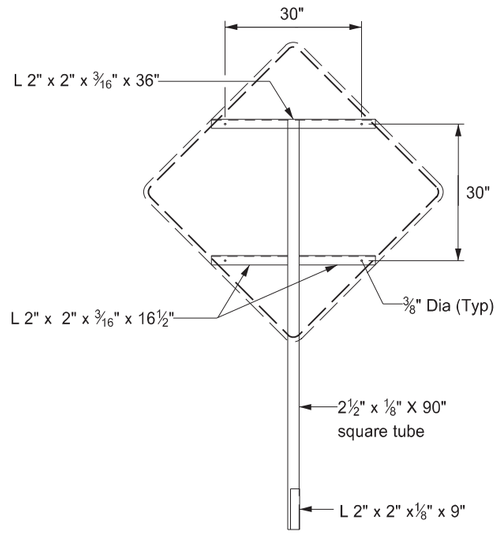
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

11/29/22

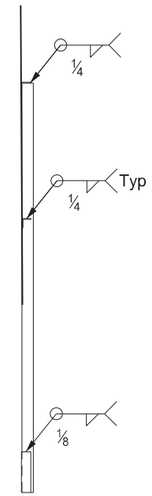
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50





FRONT

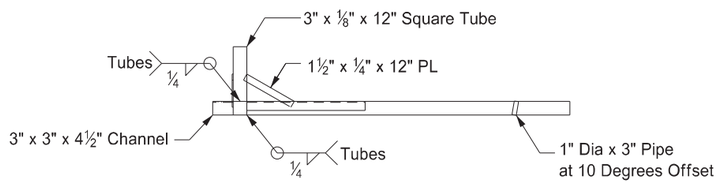


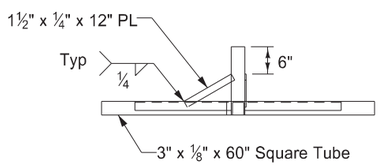
RIGHT

SIGN SUPPORT

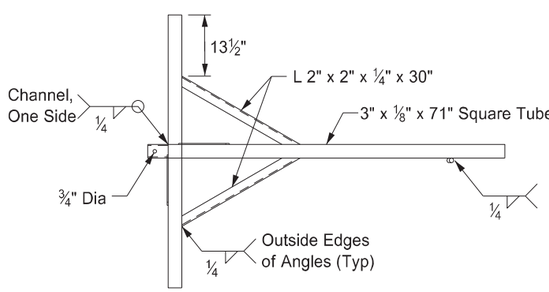
Notes:

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





RIGHT



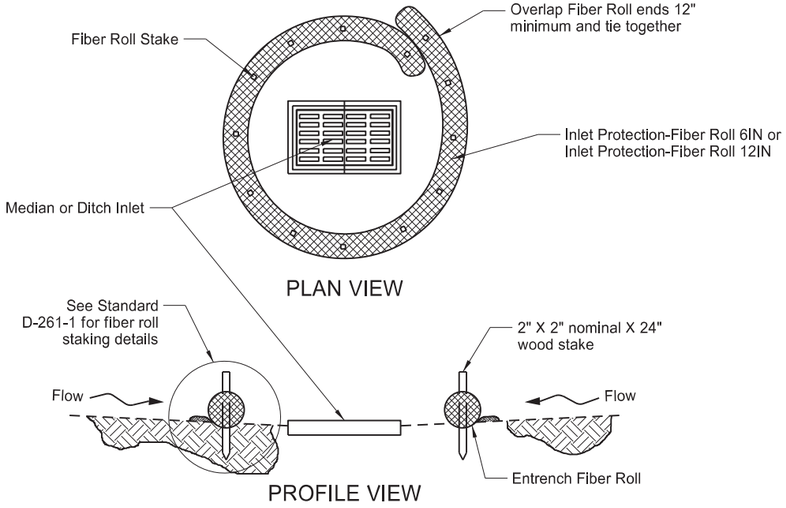
TOP

TRAILER

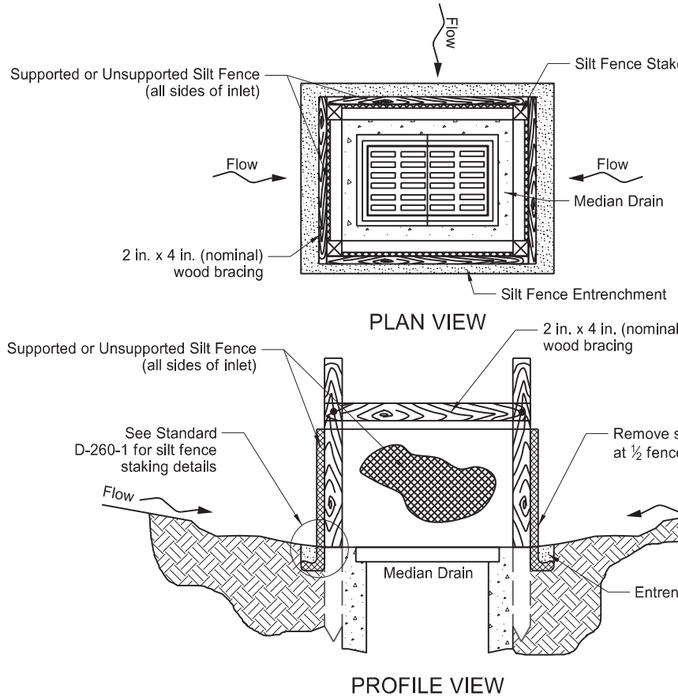
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE
12/02/2020	Updated Note to active voice.

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

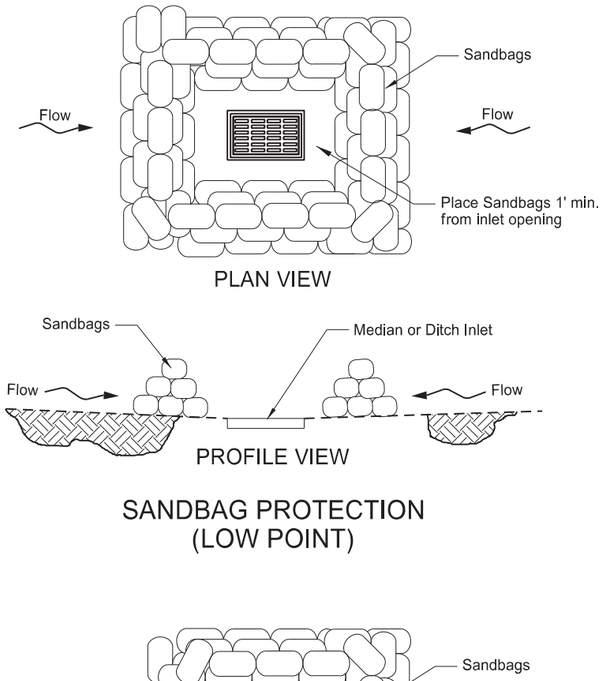
EROSION AND SILTATION CONTROLS
MEDIAN OR DITCH INLET PROTECTION



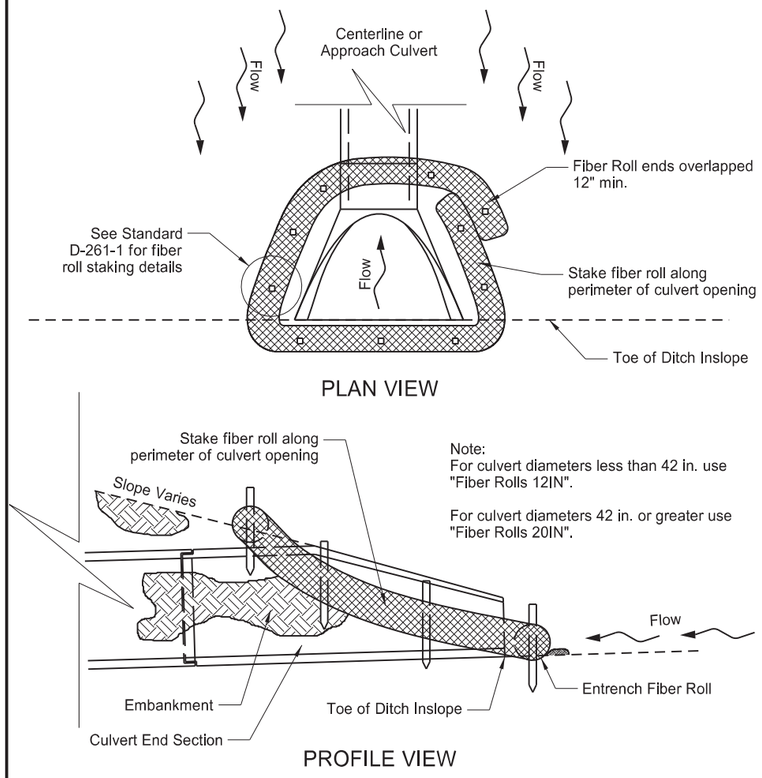
FIBER ROLL PROTECTION (MEDIAN OR DITCH INLET)



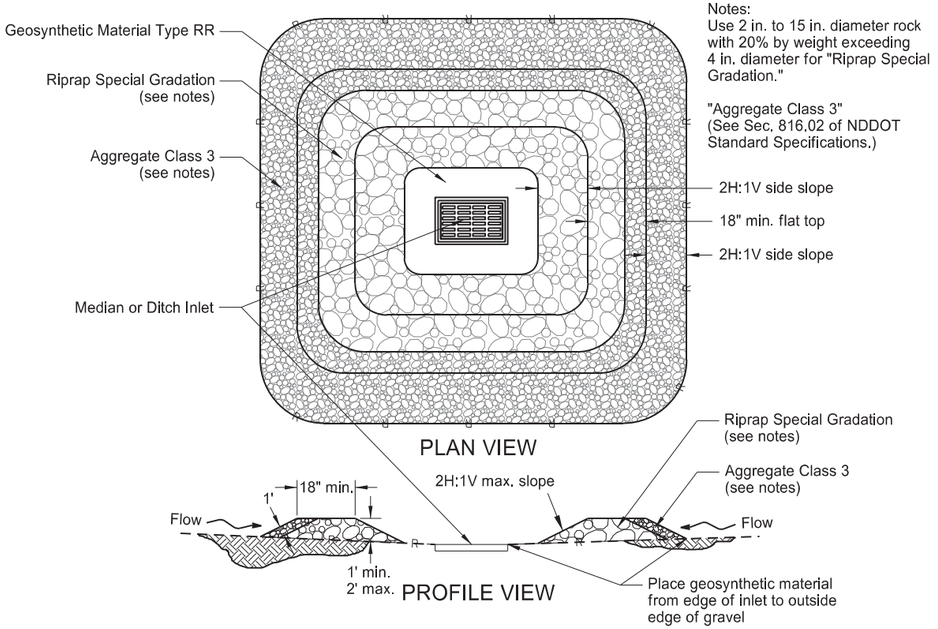
SILT FENCE PROTECTION (MEDIAN OR DITCH INLET)



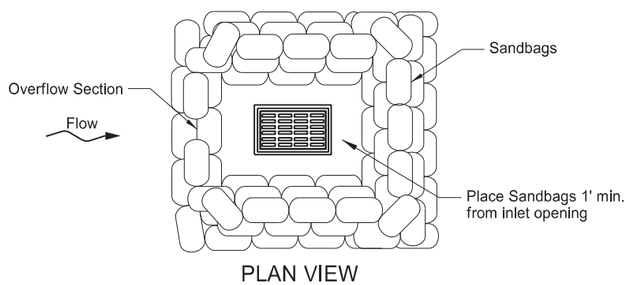
SANDBAG PROTECTION (LOW POINT)



FIBER ROLL PROTECTION (INLET OF CULVERT)



GRAVEL INLET PROTECTION (MEDIAN OR DITCH INLET)



SANDBAG PROTECTION (ON SLOPE)

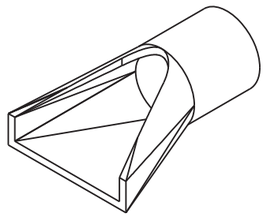
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Updated reference to standard drawing number for fiber roll staking details.
10-01-14	Updated reference to standard drawing number for silt fence.
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.

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

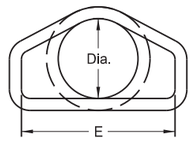
REINFORCED CONCRETE PIPE CULVERTS AND END SECTIONS
(Round Pipe)

D-714-1

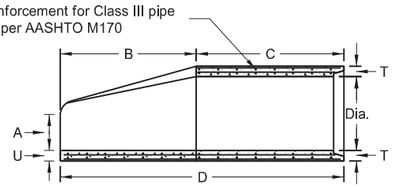
FLARED END SECTION						
TERMINAL DIMENSIONS						
DIA	A	B	C	D	E	U
12	0'-4"	2'-0"	4'-0⅞"	6'-0⅞"	2'-0"	2"
15	0'-6"	2'-3"	3'-10"	6'-1"	2'-6"	2¼"
18	0'-9"	2'-3"	3'-10"	6'-1"	3'-0"	2½"
21	0'-9"	3'-0"	3'-1"	6'-1"	3'-6"	2¾"
24	0'-9½"	3'-7½"	2'-6"	6'-1½"	4'-0"	3"
27	0'-10½"	4'-0"	2'-1½"	6'-1½"	4'-6"	3¼"
30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



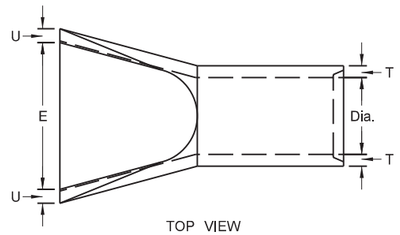
PERSPECTIVE



END VIEW



SIDE VIEW



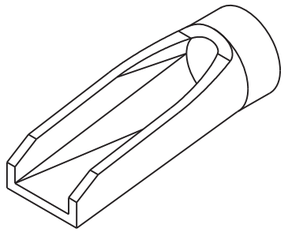
TOP VIEW

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

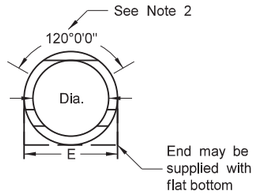
NOTES:

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

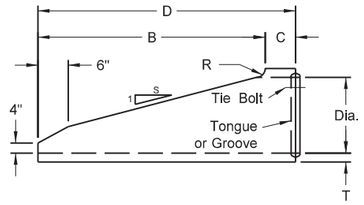
TRAVERSABLE END SECTION						
DIA	B	C	D	E	R	S
15"	4'	9"	4'-9"	1'-7½"	3"	6
18"	5'-9"	9"	6'-6"	1'-11"	3"	6
24"	6'	1'	7'	2'-6"	3"	4
30"	7'-6"	1'	8'-6"	3'-1"	3½"	4
36"	7'-3"	15"	8'-6"	3'-8"	3"	4



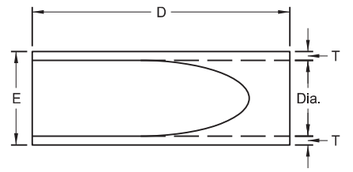
PERSPECTIVE



END VIEW



SIDE VIEW



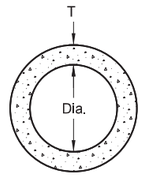
TOP VIEW

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

NOTES (Traversable End Section):

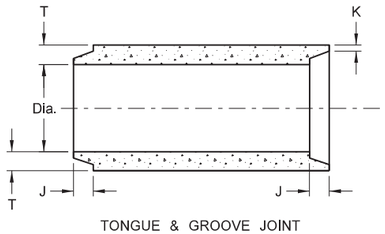
1. Manufactured in accordance with applicable portions of ASTM C76/AASHTO M170.
2. Reinforcement per Class III RCP with double reinforcement in the upper 120° of the full barrel portion.

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

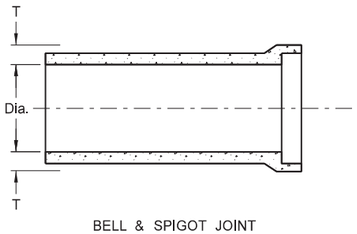


END VIEW

CIRCULAR PIPE

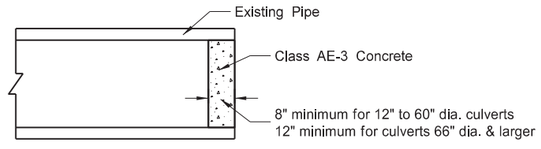


TONGUE & GROOVE JOINT



BELL & SPIGOT JOINT

JOINTS FOR REINFORCED CONCRETE PIPE



CONCRETE PIPE PLUG

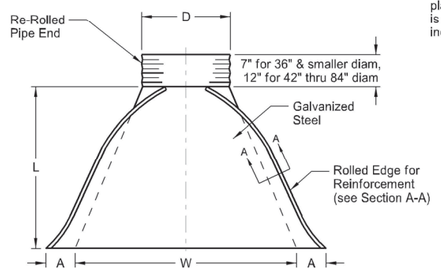
SEE STANDARD DRAWING D-714-22 FOR DETAILS OF CONCRETE PIPE TIES (TIE BOLTS).

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

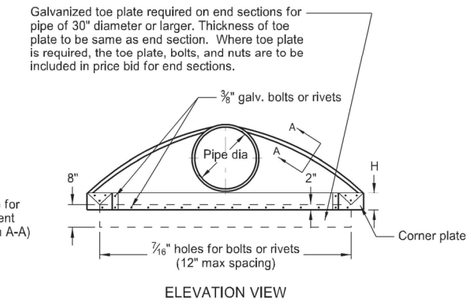
This document was originally issued and sealed by Jon Ketterling Registration Number PE-4684, on 9/18/19 and the original document is stored at the North Dakota Department of Transportation

ROUND CORRUGATED STEEL PIPE CULVERTS AND END SECTIONS

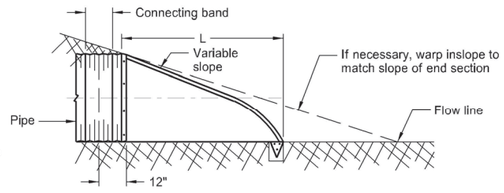
D-714-4



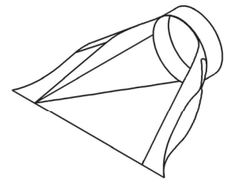
PLAN VIEW



ELEVATION VIEW



TYPICAL CROSS SECTION
(showing connector section)



PERSPECTIVE VIEW

* * PIPE DIA.	GALVANIZED THICKNESS	END SECTION DIMENSIONS A	B	H	L	W	APPROX. SLOPE	BODY
IN	IN	IN	IN	IN	IN	IN	RATE	PIECE
15	0.064 - 0.079	7	8	6	26	30	2½:1	1
18	0.064 - 0.109	8	10	6	31	36	2½:1	1
24	0.064 - 0.109	10	13	6	41	48	2½:1	1
30	0.064 - 0.109	12	16	8	51	60	2½:1	1 or 2
36	0.064 - 0.109	14	19	9	60	72	2½:1	2
42	0.064 - 0.138	16	22	11	69	84	2½:1	2
48	0.064 - 0.168	18	27	12	78	90	2¼:1	2
54	0.064 - 0.168	18	30	12	84	102	2:1	2
* 60	0.064 - 0.168	18	33	12	87	114	1¾:1	3
* 66	0.064 - 0.168	18	36	12	87	120	1½:1	3
* 72	0.064 - 0.168	18	39	12	87	126	1½:1	3
* 78	0.064 - 0.168	18	42	12	87	132	1¼:1	3
* 84	0.064 - 0.168	18	45	12	87	138	1⅛:1	3

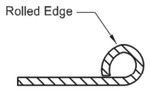
* These sizes have 0.109" sides and 0.138" center panels.

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

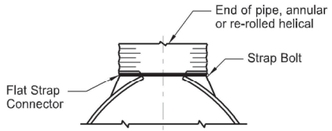
Manufacturers tolerances of above dimensions will be allowed.

Splices to be the lap riveted type.

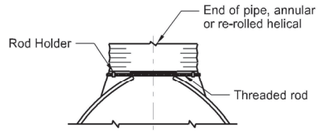
Multiple panel bodies shall have lap seams which are to be tightly joined with ⅜" dia. galv. bolts or rivets. Nuts to be torqued to 25 foot-lbs ±.



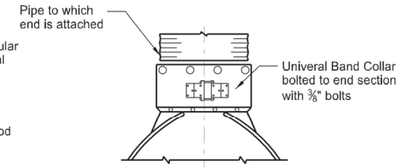
SECTION A-A



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



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

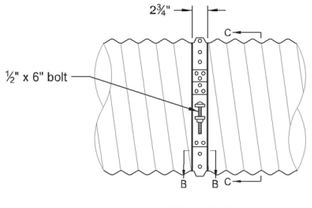


TYPE #3
For all pipe sizes

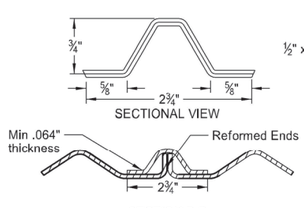
COUPLING BAND DIMENSIONS				
COUPLING TYPE	CORRUGATION PITCH x DEPTH	PIPE SIZE	COUPLING BAND LENGTH	MIN. BAND THICKNESS
Hat Band	2⅔" x ½"	12" - 48"	2¾"	.064"
Annular Band	2⅔" x ½"	12" - 72"	12"	.052"
		78" - 84"	12"	.079"
	3" x 1"	48" - 120"	14"	.052"
Hugger Band	2⅔" x ½" Rerolled End	12" - 72"	10½"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

NOTES:

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

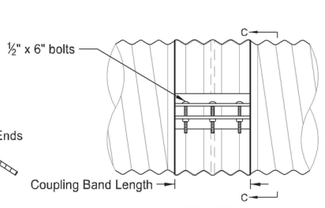


SIDE VIEW

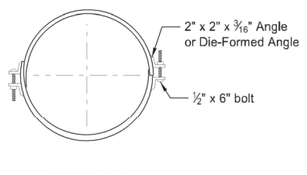


SECTION B-B

HAT BAND FOR FLANGED END PIPE

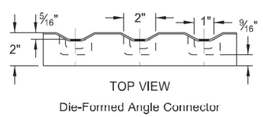


SIDE VIEW

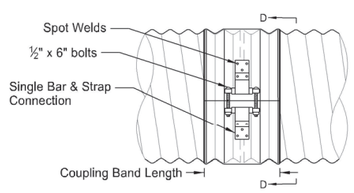


SECTION C-C
Angle Connection

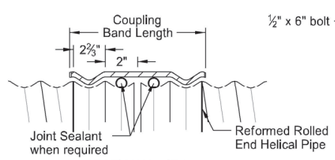
ANNULAR BAND



TOP VIEW
Die-Formed Angle Connector

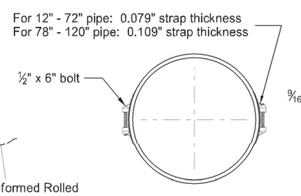


SIDE VIEW

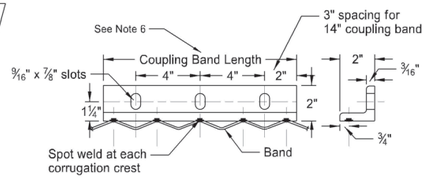


SECTIONAL VIEW

HUGGER COUPLING BAND



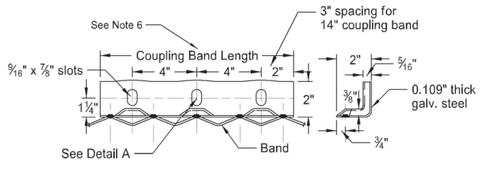
SECTION D-D
Bar & Strap Connection



SIDE VIEW

END VIEW

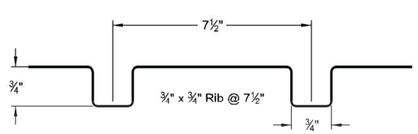
2" x 2" x 3/16" Angle Connector

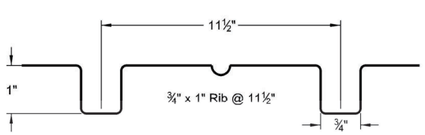


SIDE VIEW

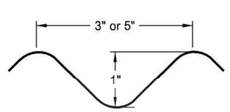
END VIEW

Die-Formed Angle Connector

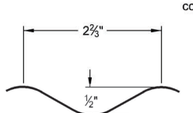




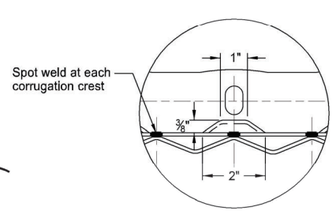
SPIRAL RIB CORRUGATIONS



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



2⅔" x ½" CORRUGATIONS



Detail A

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

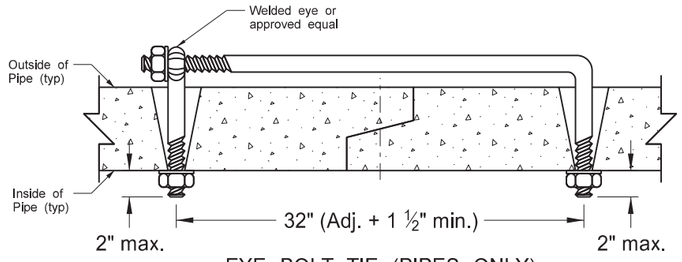
JONATHAN D KETTERLING
REGISTERED
PROFESSIONAL
PE-4684
ENGINEER
NORTH DAKOTA

09/23/22

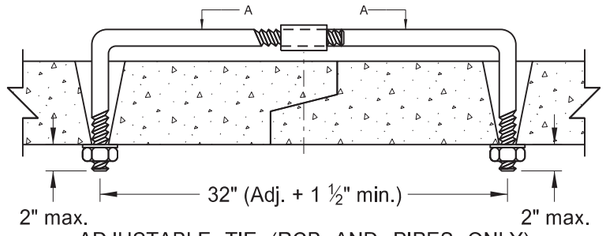
DocuSign

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

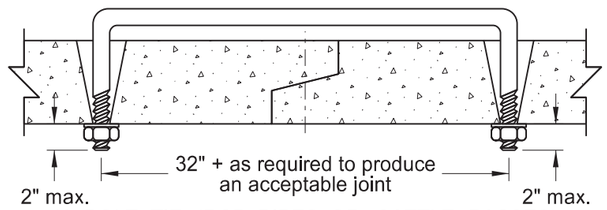
D-714-22



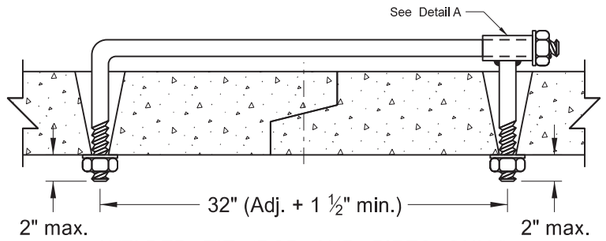
EYE BOLT TIE (PIPES ONLY)



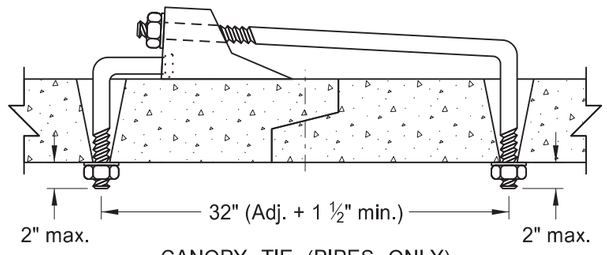
ADJUSTABLE TIE (RCB AND PIPES ONLY)



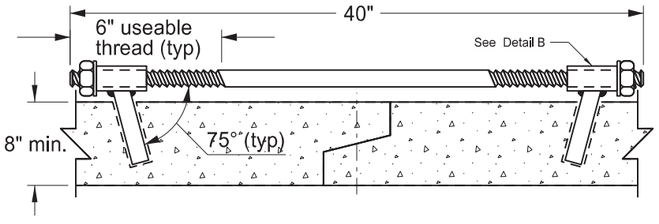
U BOLT TIE (RCB, PIPES, OR CATTLE PASSES)



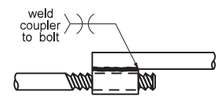
WELDED TIE (RCB AND PIPES ONLY)



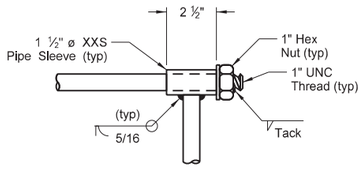
CANOPY TIE (PIPES ONLY)



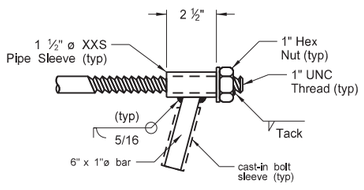
HIDDEN TIE (RCB ONLY)



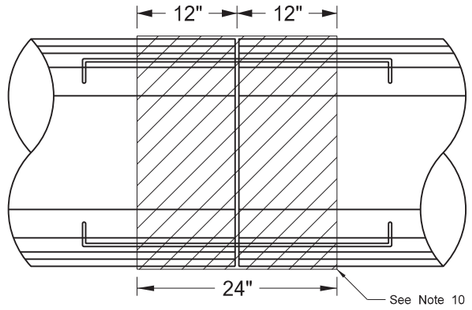
SECTION A-A



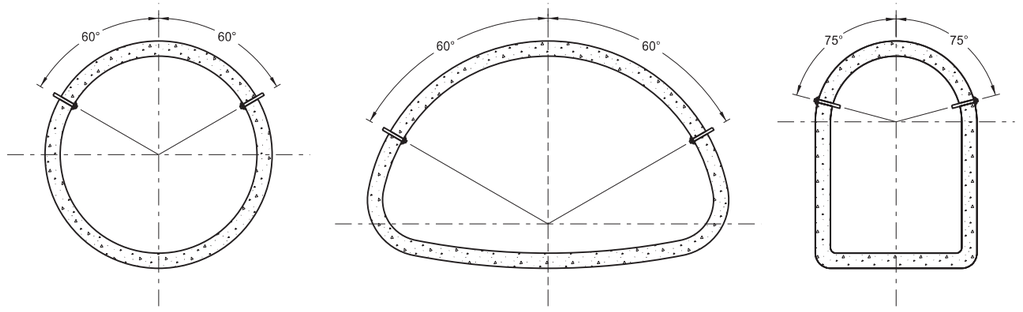
DETAIL A



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.

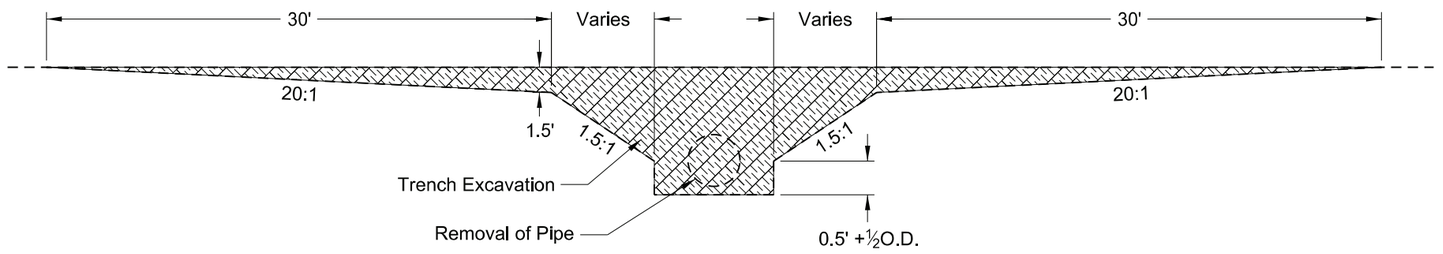
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8
6-6-17	Notes 2-11, Table, Title, Lables
8-11-21	Notes 2-12, Table, Lable

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08/11/21

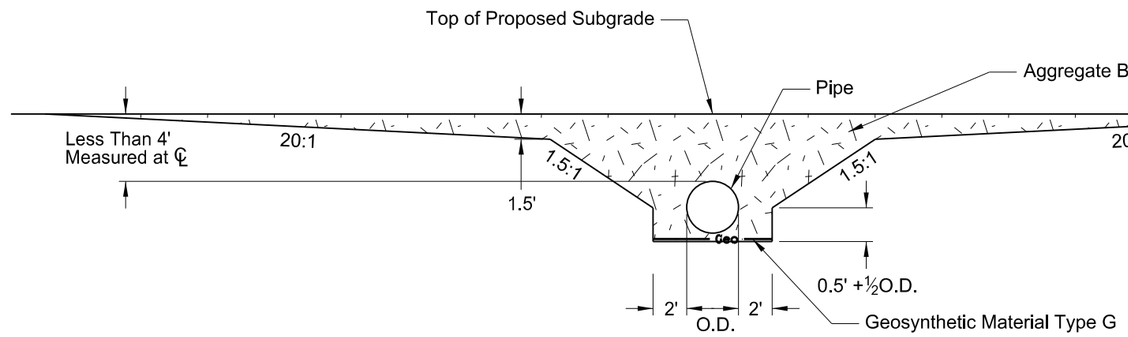
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TRANSVERSE MAINLINE PIPE INSTALLATION DETAIL
PIPES 4 FEET OR LESS BELOW TOP OF SUBGRADE

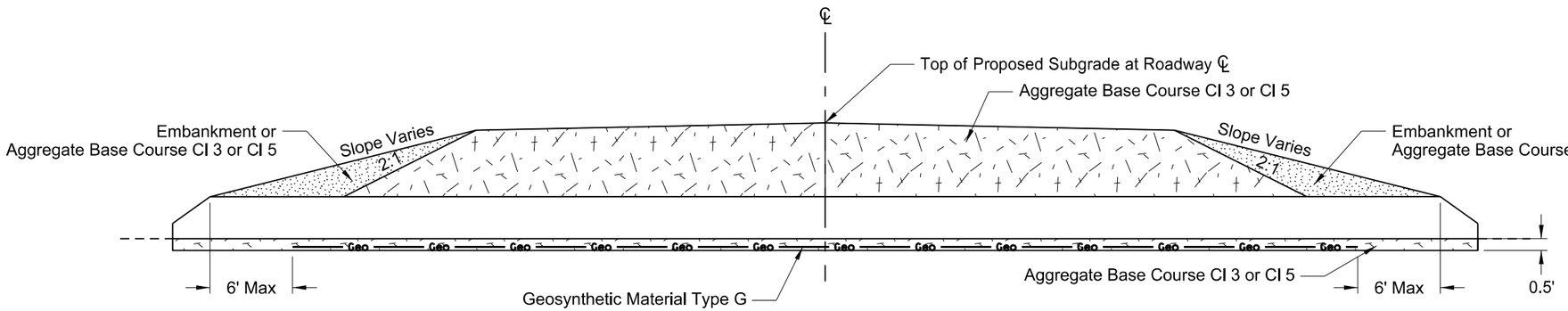
D-714-26



EXCAVATION DETAIL



INSTALLATION DETAIL



CROSS SECTION

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

*Included in Pipe Pay Item
1) Pipe
2) Trench Excavation
3) Aggregate Base Course Cl 3 or Cl 5
4) Embankment

NOTES:

1) This drawing applies to new/replaced mainline and paved intersection roadway pipes only (including ramps). It does not include pipes in approaches.

2) Embankment may be either borrow Excavation or Common Excavation - Type A

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

7-26-13

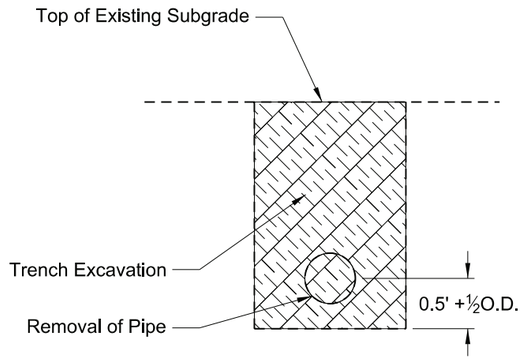
REVISIONS

DATE	CHANGE
10-15-13	Label Formatting
1-21-15	Nomenclature
9-18-15	Title Rewording
5-27-20	Replaced R1 Fabric with Geogrid Changed bedding depth

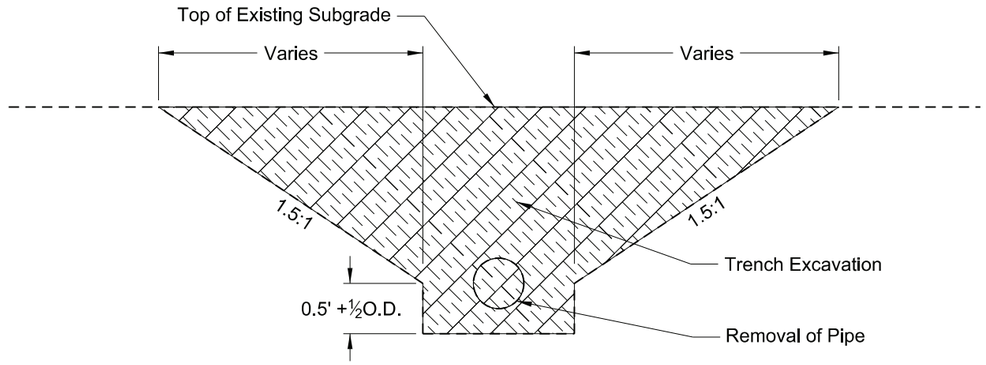
REGISTERED PROFESSIONAL ENGINEER
MATTHEW C KURLE
PE-8777
DATE
05/27/20
NORTH DAKOTA
DocuSign

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

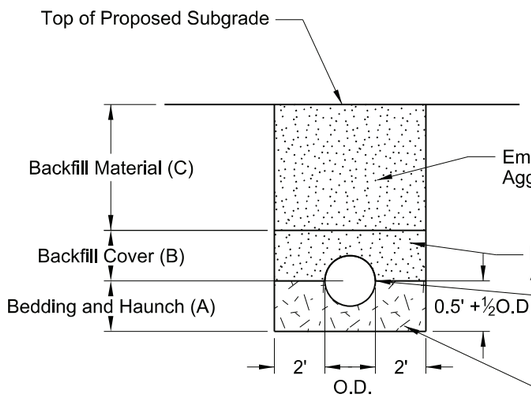
D-714-27



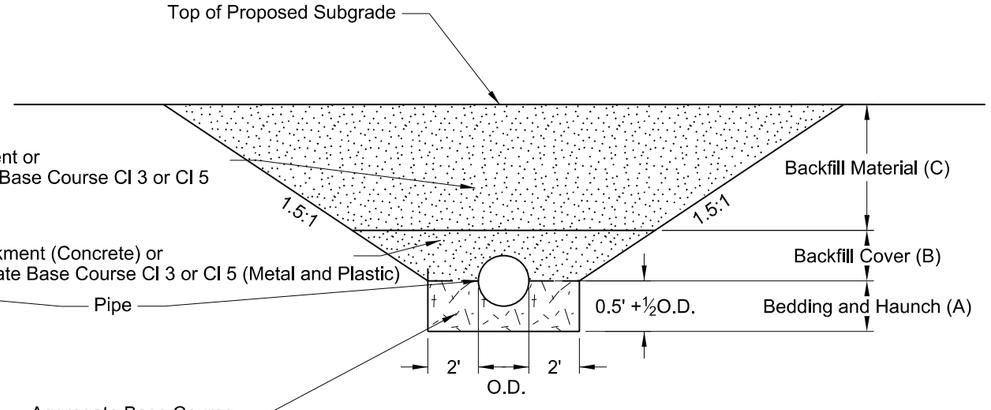
EXCAVATION DETAIL A



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 Cl 3 or Cl 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 Cl3 or Cl 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

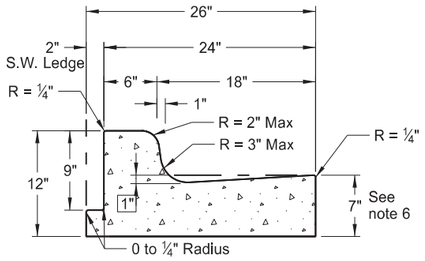
REVISIONS

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

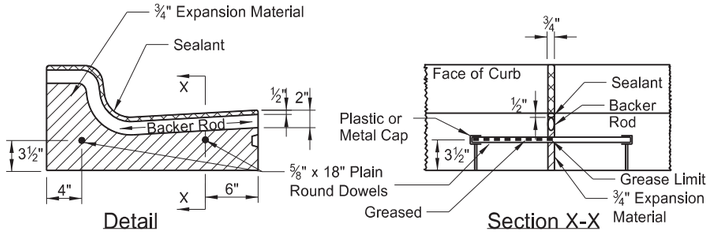
REGISTERED PROFESSIONAL ENGINEER
MATTHEW C KURLE
PE-8777
DATE
05/27/20
NORTH DAKOTA
DocuSign

Curb & Gutter and Valley Gutter

D-748-1

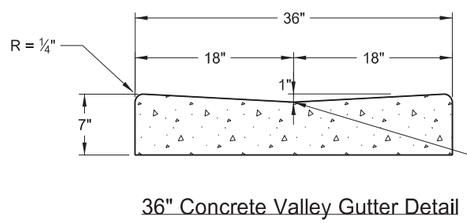


Curb & Gutter Type 1 (Sec. A & B)
Adjacent to Concrete Sidewalk, Median, or Parking Lot.
(Sec. A shown. See Sec B for additional details.)

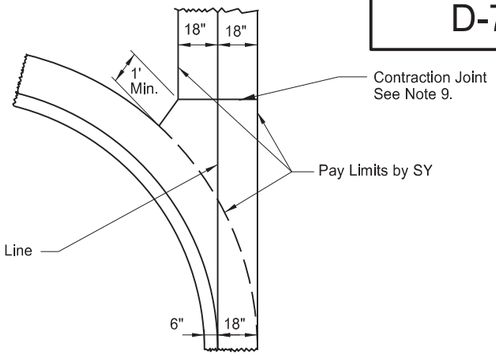


Detail — Section X-X

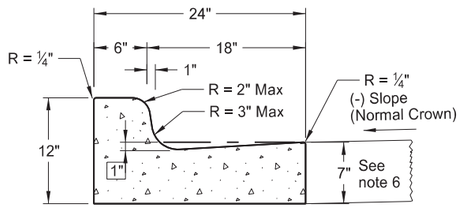
Isolation Joint



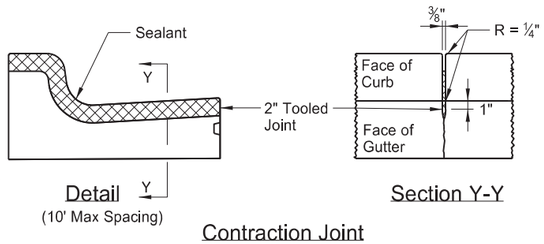
36" Concrete Valley Gutter Detail



36" Concrete Valley Gutter Plan

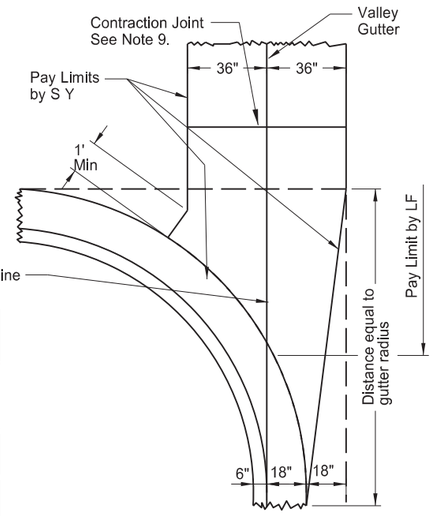


Curb & Gutter Type 1 (Sec. A)

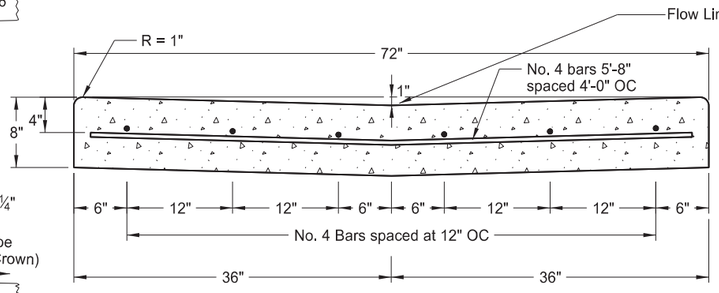


Detail (10' Max Spacing) — Section Y-Y

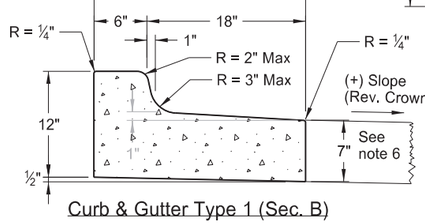
Contraction Joint



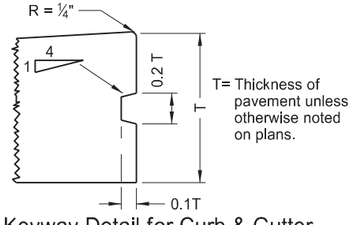
72" Concrete Valley Gutter Plan



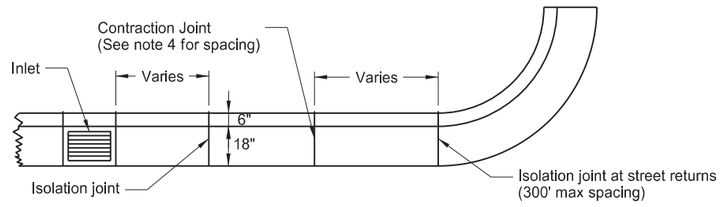
72" Concrete Valley Gutter Detail



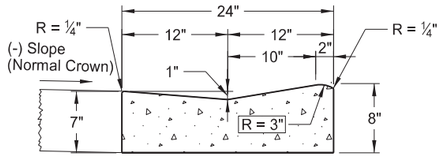
Curb & Gutter Type 1 (Sec. B)



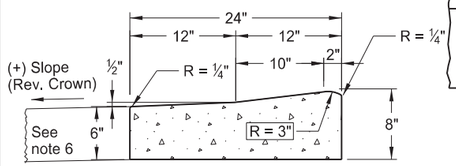
Keyway Detail for Curb & Gutter
(To be used with PCC Pavement and Drives)



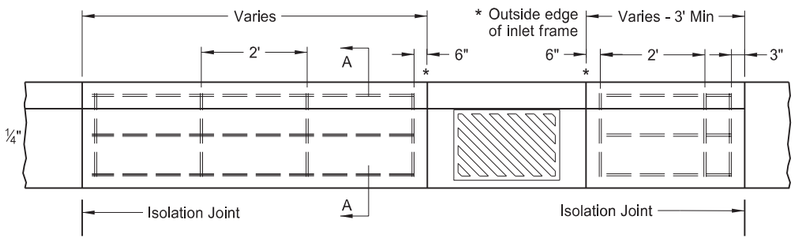
Joint Location Detail



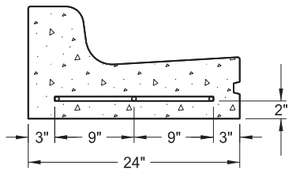
Mountable Curb & Gutter Type 1 (Sec. A)



Mountable Curb & Gutter Type 1 (Sec. B)



Curb & Gutter Reinforcing at Inlets



Section A-A

NOTE: Use #4 deformed reinforcing bars without splices. Include all costs for reinforcing bars at inlet locations (even inlets located on radii) in the price bid for "Curb and Gutter - Type 1." Extend reinforcement to the second joint (rebar placed through the first joint) in cases where the 3' min. panel length cannot be obtained.

NOTES:

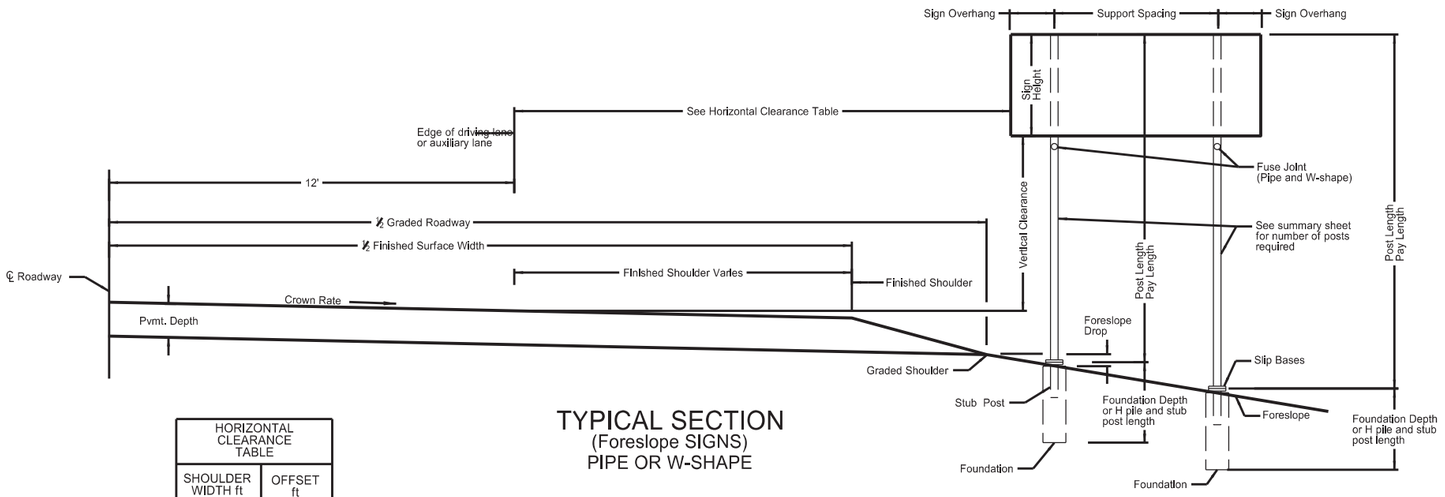
1. Use Curb and Gutter Type 1 (Sec. A & B). Use section "A" with (-) pavement slopes and section "B" with (+) pavement slopes.
2. Contraction Joints: Tool the Curb & Gutter 2" as shown on the contraction joint details.
3. Isolation Joints: Use ¾" expansion joint filler for isolation joint material. Form the backer rod and joint sealant opening with a pre-cut piece of wood or other material approved by the engineer. Dowel supports are not required on the second pour at a cold joint. Install plastic or metal caps and greased dowels in the cold joint for the second pour.
4. Joint Spacing: For hot bituminous pavements use a 10' max joint spacing for the curb and gutter with panels on each side of the inlets. For concrete pavements match the joint spacing for the curb and gutter to the pavement joint on PCC Pavements (approximately 15' spacing.)
5. Joint sealing: Seal contraction and isolation joints as shown in the details. Use joint sealant for contraction joints that conforms to section 826.02B. Use sealant for expansion joints specified in note 3 above. Tool and install sealant in accordance with the manufacturer's recommendations.
6. Face of Gutter Depth: For hot bituminous pavement use 7" gutter depth as shown. For PCC pavements, match the gutter depth to the depth of adjacent PCC pavement or to construct a 7" depth as shown.
7. Tie curb and gutter to abutting PCC pavement with No. 3 bars, 1'-6" in length, spaced at 4' centers.
8. On street returns and other locations where new curb and gutter ends and does not abut existing curb and gutter, taper the last two (2) feet of the curb from 6" in height to 0". Install a 1/2" premolded full depth isolation joint, the same shape as the curb and gutter just ahead of the taper. Install an 18" tie bar across the joint.
9. Valley Gutter Joints: Form, saw, or score ⅛" min. to ⅜" max. width contraction joints (a minimum 2" depth) at approx 10' intervals. Seal the joints with hot poured elastic type joint sealer (Section 826.02A.2 of the Standard Specifications.) Include all costs for the joint and sealant in the price bid for Valley Gutter.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-7-2013	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engr PE Stamp.

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

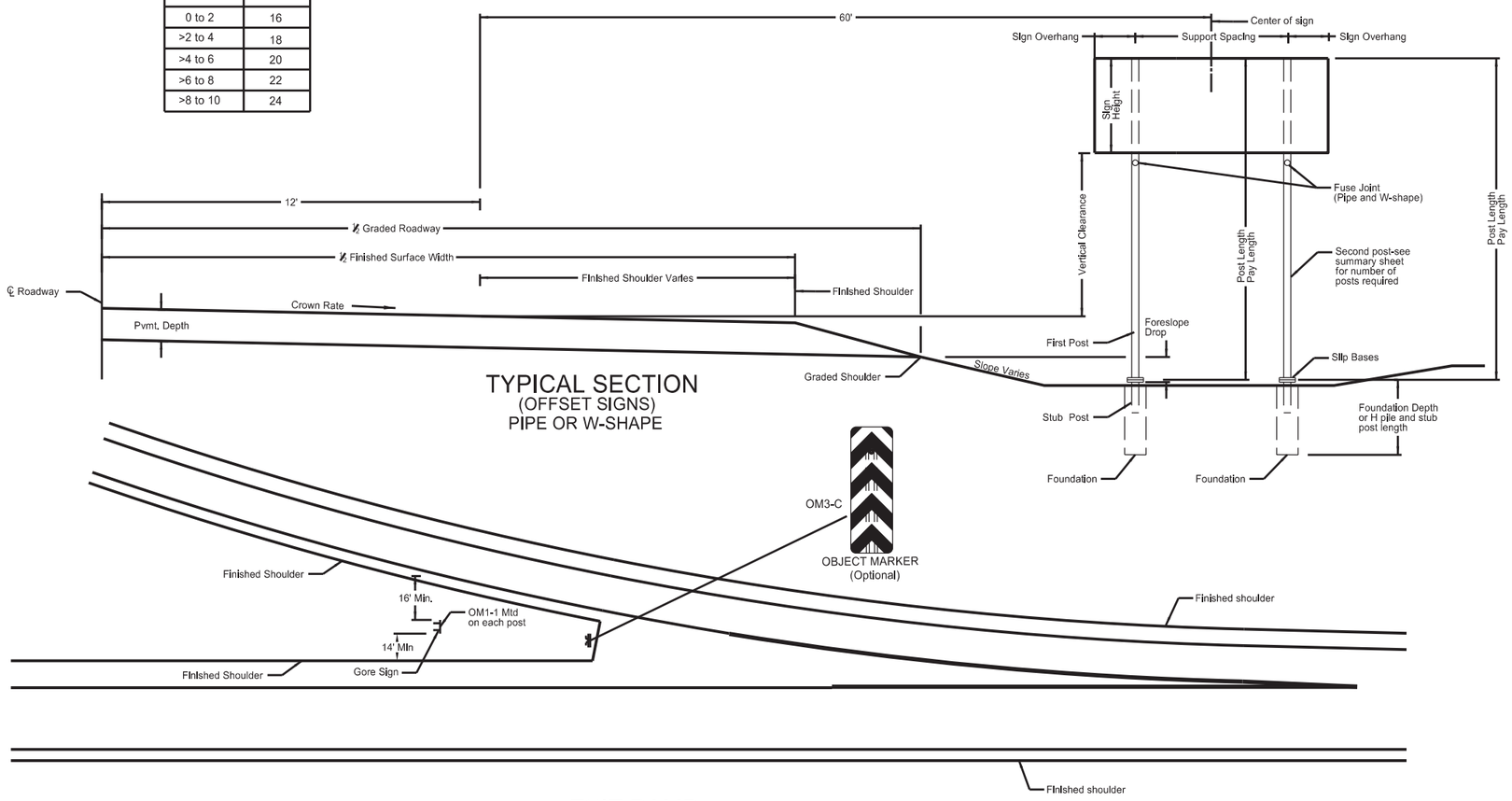
PIPE OR W-SHAPE ASSEMBLY DETAILS

D-754-1



TYPICAL SECTION
(Foreslope SIGNS)
PIPE OR W-SHAPE

HORIZONTAL CLEARANCE TABLE	
SHOULDER WIDTH ft	OFFSET ft
0 to 2	16
>2 to 4	18
>4 to 6	20
>6 to 8	22
>8 to 10	24



TYPICAL SECTION
(OFFSET SIGNS)
PIPE OR W-SHAPE

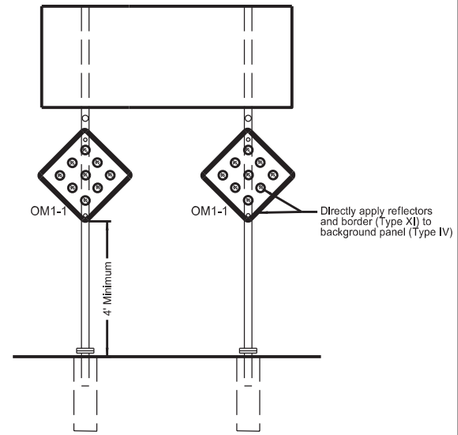
EXIT RAMP
GORE SIGN PLACEMENT

NOTES:

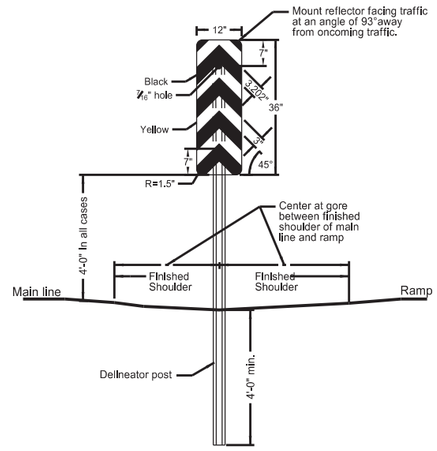
MINIMUM VERTICAL CLEARANCE:
Install signs with a minimum 5 foot vertical clearance from bottom of sign to top edge of the driving lane or auxiliary lane in rural locations. Provide a minimum 7 foot vertical clearance where parking or pedestrian movements occur. Install signs with a minimum 7 foot vertical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

A vertical clearance of 5 feet is acceptable where signs are placed a minimum of 30 feet from the edge of the traveled way.

Place signs a maximum of 6" above the vertical clearance specified above.



GORE SIGN OBJECT MARKER INSTALLATION



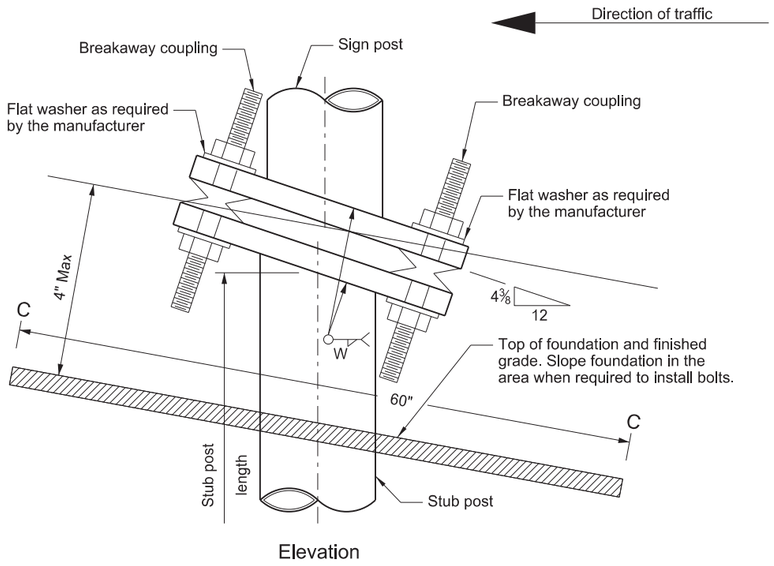
OBJECT MARKER INSTALLATION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
7-18-14	Modify notes and update reflective sheeting for object marker. Add correct section number for object marker post.
8-30-18	Updated notes to active voice.
11-26-21	Revised Object Marker signs.

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

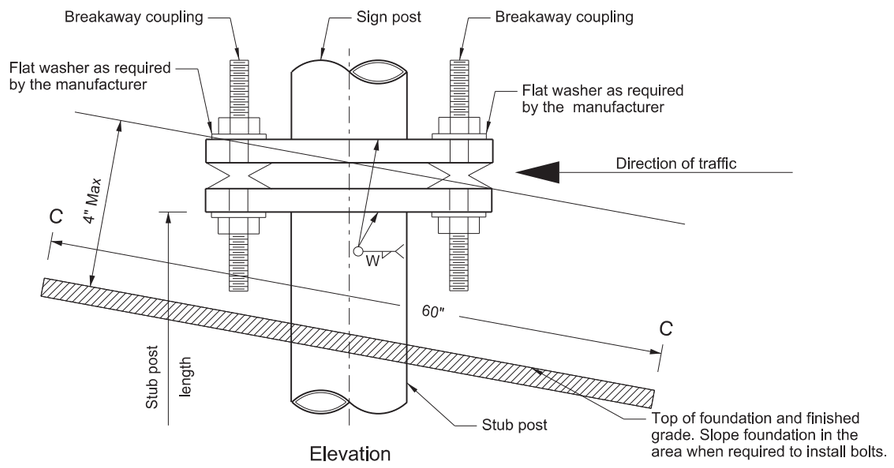
11/26/21

Breakaway Coupler System for Standard Pipe Stub Post



Elevation

Single Post Sign and Stub Post
Type A

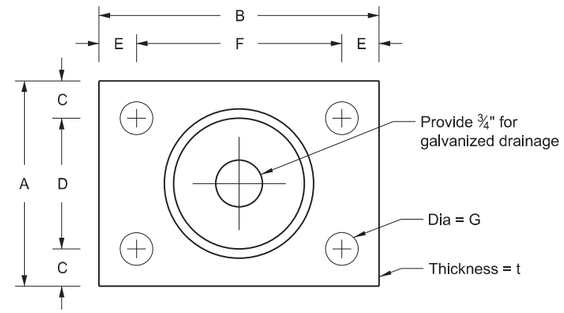


Elevation

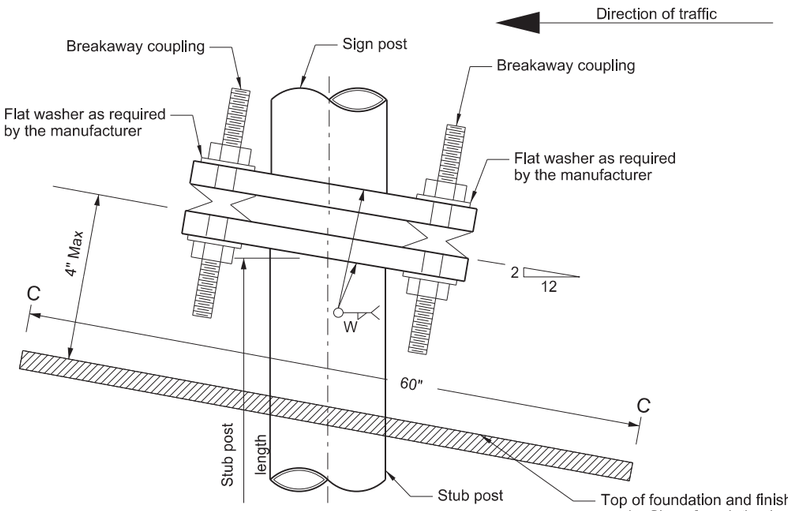
Two or More Post Sign and Stub Post
For two post signs with 8' or more post spacing and all three or more post signs
Type C

Notes:

1. In lieu of the breakaway base system on standards D-754-3 and D-754-4, use a breakaway coupler system. Manufacture the breakaway coupler system from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.
2. Fuse Joint Cuts - For steel posts cut after galvanizing, either galvanize cut after fabrication, or treat cut surface in accordance with ASTM A780. Aluminum posts need no treatment.
3. Shim as required to plumb post.
4. Tighten all bolts the maximum possible with 12" to 15" wrench.

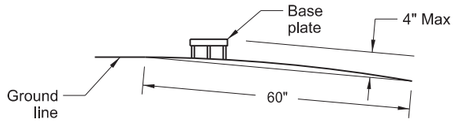


Plan Base Plate



Elevation

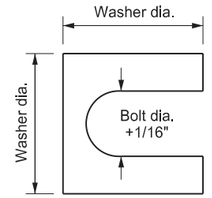
Two Post Sign and Stub Post
For signs with less than 8' post spacing
Type B



Section C - C

Max. protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.

Dimension / Nom. Pipe Size	Breakaway Coupling	A	B	C	D	E	F	G	t	W	Stub Post Length
Steel											
3½"	½" x 4½"	5½"	8⅜"	13/16"	3⅞"	13/16"	6¾"	9/16"	¾"	⅜"	1'-6"
4"	⅝" x 4½"	5½"	8¾"	1"	3½"	1"	6¾"	11/16"	¾"	⅜"	1'-6"
5"	¾" x 5¼"	6½"	10"	1⅛"	4¼"	1⅛"	7¾"	13/16"	1"	7/16"	2'-0"
6"	1" x 5¼"	7½"	11¾"	1⅜"	4¾"	1⅜"	9"	1 1/16"	1¼"	7/16"	2'-0"
8"	1" x 5¼"	9½"	13¼"	1⅜"	6¾"	1⅜"	10½"	1 1/16"	1¼"	7/16"	2'-6"
10"	1" x 5¼"	11¾"	15¼"	1⅜"	9"	1⅜"	12½"	1 1/16"	1¼"	½"	3'-0"
12"	1" x 7"	13¾"	18"	1⅝"	10 ½"	1⅝"	14¾"	1 1/16"	1½"	½"	3'-0"
Aluminum											
3½"	½" x 4½"	5½"	8⅜"	13/16"	3⅞"	13/16"	6¾"	9/16"	¾"	⅜"	1'-6"
4"	⅝" x 4½"	5½"	8¾"	1"	3½"	1"	6¾"	11/16"	1"	7/16"	1'-6"
5"	¾" x 5¼"	6½"	10"	1⅛"	4¼"	1⅛"	7¾"	13/16"	1"	½"	2'-0"
6"	1" x 5¼"	7½"	11¾"	1⅜"	4¾"	1⅜"	9"	1 1/16"	1¼"	½"	2'-0"
8"	1" x 5¼"	9½"	13¼"	1⅜"	6¾"	1⅜"	10½"	1 1/16"	1¼"	½"	2'-6"
10"	1" x 5¼"	11¾"	15¼"	1⅜"	9"	1⅜"	12½"	1 1/16"	1½"	7/16"	3'-0"
12"	1" x 7"	13¾"	18"	1⅝"	10¼"	1⅝"	14¾"	1 1/16"	1¾"	11/16"	3'-0"



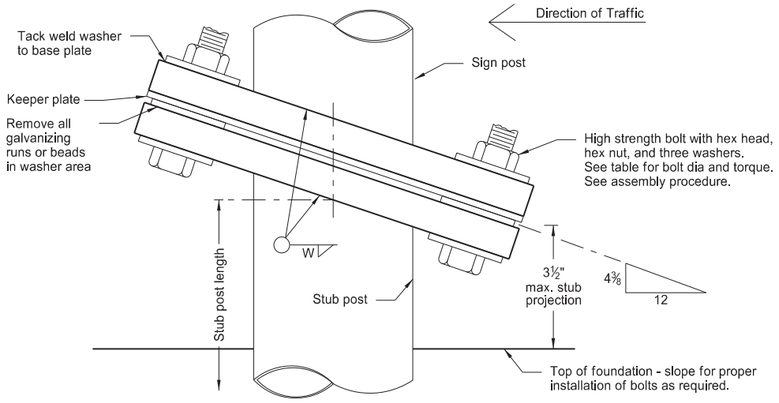
Shim Detail

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

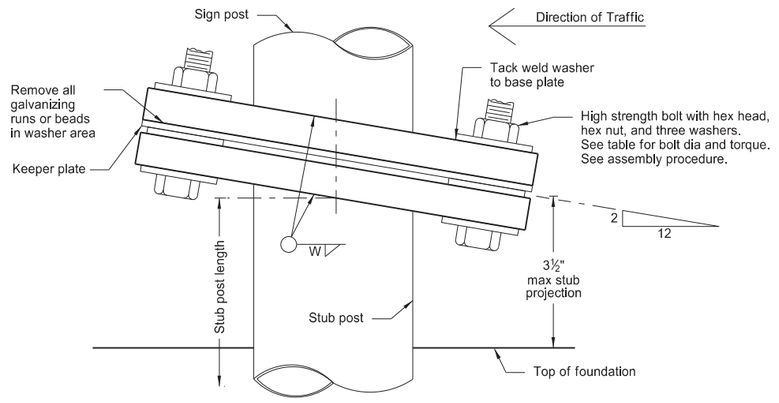
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-2018 8-29-2019	Updated notes to active voice. New Design Engineer PE Stamp.

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

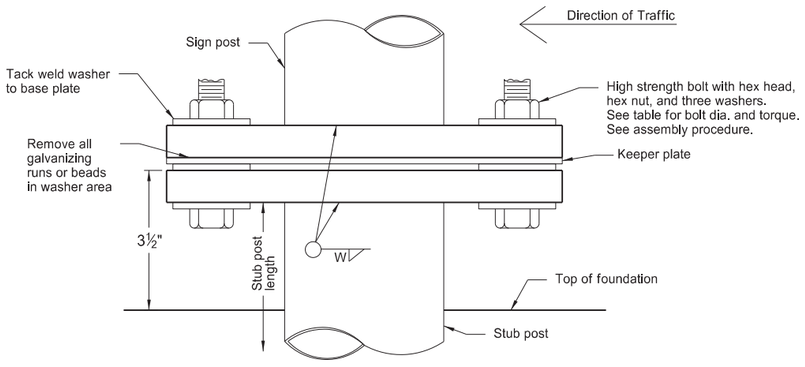
Breakaway System for Standard Pipe Stub Post



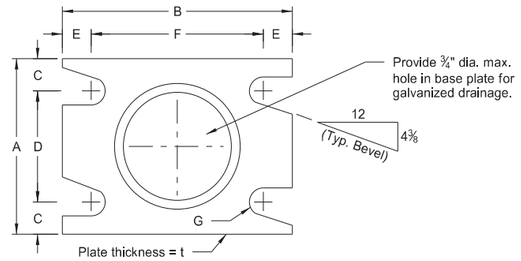
Stub Post Connection - Type A
Elevation View
(Single Post)



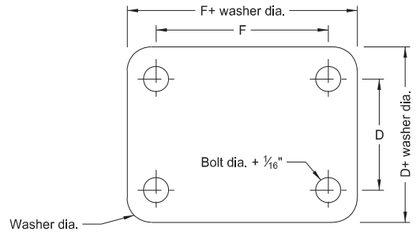
Stub Post Connection - Type B
Elevation View
(Two Posts)



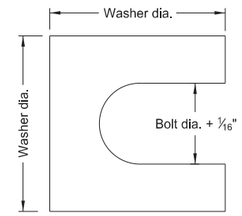
Stub Post Connection - Type C
Elevation View
(Two Posts)



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



Keeper Plate Detail
Place keeper plate above center washer between top and bottom slip bases. Fabricate keeper plate from 28 gauge material and galvanize after fabrication in conformance with ASTM A653 G60 coating.



Shim Detail
Furnish 2 each ±.012" thick and 2 each ±.032" thick shims per post. Fabricate shims from brass shim stock or strip in conformance with ASTM B36.

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

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

Assembly Procedure:
1. Assemble post to stub with bolts and one flat washer between base plate and keeper plate.
2. Shim as required.
3. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and shims and to clean bolt threads, then loosen.
4. Retighten bolts in a systematic order to prescribed torque. (see table)
5. Loosen each bolt and fill the gaps between the thread and mating surface with thread locking liquid resin, conforming to ASTM D5363-03 (2008), forming solid, one part assemblies secure from vibration, pressure, and corrosion.
6. Retighten each bolt to prescribed torque in the same order as initial retightening.

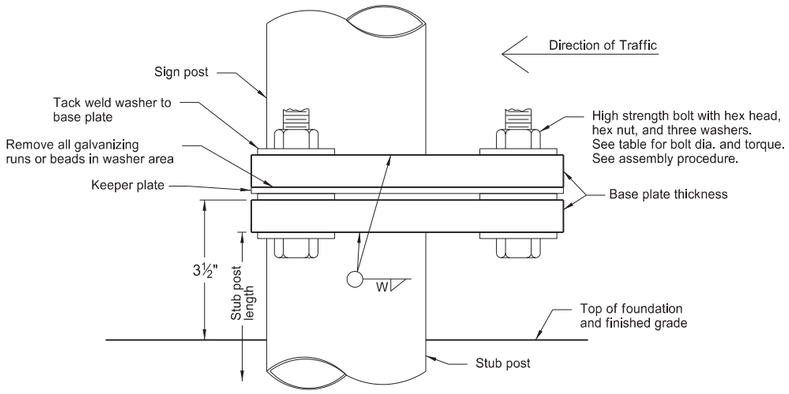
Base Data Table

Nominal Post Size dia.	Bolt Size (dia. x length)	Base Bolt Torque ft. lb.	A	B	C	D	E	F	G	t	W	Stub Post Length
Steel												
3½"	½"x2½"	12	5½"	8⅜"	13/16"	3⅞"	13/16"	6¾"	9/32"	¾"	⅜"	1'-6"
4"	⅝"x2¾"	29	5½"	8¾"	1"	3½"	1"	6¾"	11/32"	¾"	⅜"	1'-6"
5"	¾"x3½"	46	6½"	10"	1⅛"	4¼"	1⅛"	7¾"	13/32"	1"	7/16"	2'-0"
6"	1"x4¼"	61	7½"	11¾"	1⅜"	4¾"	1⅜"	9"	17/32"	1¼"	7/16"	2'-0"
Aluminum												
3½"	½"x2½"	12	5½"	8⅜"	13/16"	3⅞"	13/16"	6¾"	9/32"	¾"	⅜"	1'-6"
4"	⅝"x2¾"	29	5½"	8¾"	1"	3½"	1"	6¾"	11/32"	1"	7/16"	1'-6"
5"	¾"x3½"	46	6½"	10"	1⅛"	4¼"	1⅛"	7¾"	13/32"	1"	½"	2'-0"
6"	1"x4¼"	61	7½"	11¾"	1⅜"	4¾"	1⅜"	9"	17/32"	1¼"	½"	2'-0"

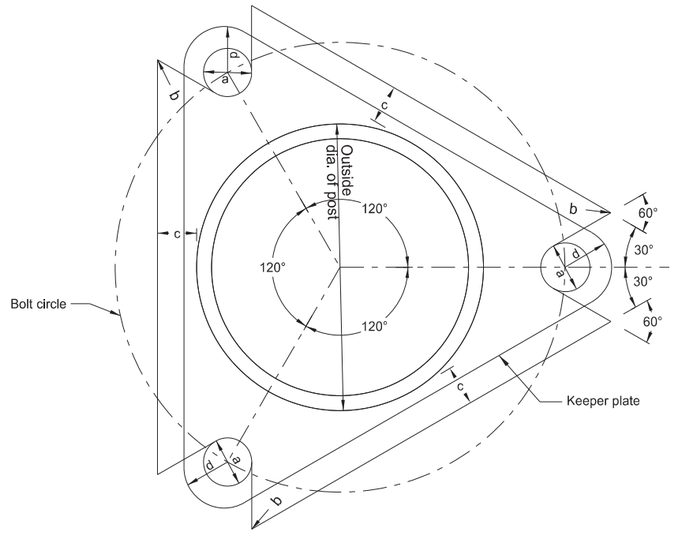
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-21-11	
REVISIONS	
DATE	CHANGE
2-28-14	Removed lower post and foundation details.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

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Multi-Directional Breakaway System for Standard Pipe Stub Post



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

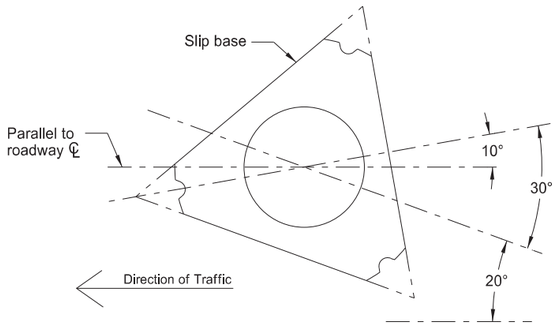


Stub Post Detail
Top View

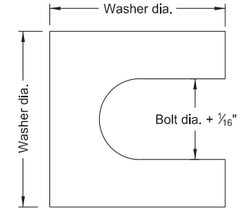
Notes:
Tack weld aluminum base plate washers to the base, when the base plate is fabricated from aluminum.

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

Assembly Procedure:
1. Assemble post to stub with bolts and one flat washer between base plates and keeper plate.
2. Shim as required.
3. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and shims to clean bolt threads, then loosen.
4. Retighten bolts in a systematic order to prescribed torque. (see table)
5. Loosen each bolt and apply thread locking liquid resin conforming to ASTM D5363-03 (2008). Fill gaps between thread and mating surface with thread locker to form solid, one part assemblies secure from vibration, pressure, and corrosion.
6. Retighten each bolt to prescribed torque in the same order as initial retightening.



Slip Base Orientation
Top View



Shim Detail

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

Base Data Table

Nominal Post Size dia.	Outside Post dia.	Bolt Circle	a rad.	b rad.	c rad.	Bolt Size (dia. x length)	Base Plate Thickness	W	Base Bolt Torque ft. lb.	d rad.	Stub Post Length
Steel											
3½"	4"	7"	1 1/16"	⅛"	1⅛"	1"x4"	1¼"	5/16"	55	1⅛"	1'-6"
4"	4.5"	7½"	1 1/16"	⅛"	1⅛"	1"x4½"	1½"	⅜"	98	1⅛"	1'-6"
5"	5.563"	9½"	1 5/16"	⅛"	1⅛"	1¼"x5"	1½"	⅜"	167	1⅜"	2'-0"
Aluminum											
3½"	4"	7"	13/16"	⅛"	⅞"	¾"x3½"	1"	5/16"	43	⅞"	1'-6"
4"	4.5"	7½"	13/16"	⅛"	¾"	¾"x4"	1¼"	5/16"	76	⅞"	1'-6"
5"	5.563"	9½"	1 1/16"	⅛"	1⅛"	1"x4"	1¼"	5/16"	98	1⅛"	2'-0"
6"	6.625"	10¼"	1 1/16"	⅛"	¾"	1"x4½"	1½"	⅜"	134	1⅛"	2'-0"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

2-28-14

REVISIONS

DATE	CHANGE
8-30-18 8-29-19	Updated notes to active voice. New Design Engineer PE Stamp.

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FOUNDATION DATA FOR STEEL SUPPORTS

D-754-5

Foundation Diameter	Foundation			Vertical Reinforcing Steel				Horizontal Tie Bars		
	Depth	Conc. Vol. for 1 Post (CU YDS)	Conc. Vol. for 2 Posts (CU YDS)	Length of Each Bar	Size	No. Bars for 1 Post	No. Bars for 2 Posts	Size	No. Bars for 1 Post	No. Bars for 2 Posts
1' - 4"	4' - 6"	0.23	0.47	4' - 2"	5	6	12	3	6	12
1' - 4"	5' - 0"	0.26	0.52	4' - 8"	5	6	12	3	7	14
1' - 4"	5' - 6"	0.28	0.57	5' - 2"	5	6	12	3	8	16
1' - 4"	6' - 0"	0.31	0.62	5' - 8"	5	6	12	3	8	16
1' - 4"	6' - 6"	0.34	0.67	6' - 2"	5	6	12	3	9	18
1' - 4"	7' - 0"	0.36	0.72	6' - 8"	5	6	12	3	9	18
1' - 4"	7' - 6"	0.39	0.78	7' - 2"	5	6	12	3	10	20
1' - 4"	8' - 0"	0.41	0.83	7' - 8"	5	6	12	3	11	22
1' - 4"	8' - 6"	0.44	0.88	8' - 2"	5	6	12	3	11	22
1' - 4"	9' - 0"	0.47	0.93	8' - 8"	5	6	12	3	12	24
1' - 4"	9' - 6"	0.49	0.98	9' - 2"	5	6	12	3	12	24
1' - 4"	10' - 0"	0.52	1.03	9' - 8"	5	6	12	3	13	26
1' - 4"	10' - 6"	0.54	1.09	10' - 2"	5	6	12	3	14	28
1' - 4"	11' - 0"	0.57	1.14	10' - 8"	5	6	12	3	14	28
1' - 4"	11' - 6"	0.59	1.19	11' - 2"	5	6	12	3	15	30
1' - 4"	12' - 0"	0.62	1.24	11' - 8"	5	6	12	3	15	30

Foundation Diameter	Foundation			Vertical Reinforcing Steel				Horizontal Tie Bars		
	Depth	Conc. Vol. for 1 Post (CU YDS)	Conc. Vol. for 2 Posts (CU YDS)	Length of Each Bar	Size	No. Bars for 1 Post	No. Bars for 2 Posts	Size	No. Bars for 1 Post	No. Bars for 2 Posts
1' - 9"	4' - 6"	0.40	0.80	4' - 2"	5	10	20	3	6	12
1' - 9"	5' - 0"	0.45	0.89	4' - 8"	5	10	20	3	7	14
1' - 9"	5' - 6"	0.49	0.98	5' - 2"	5	10	20	3	8	16
1' - 9"	6' - 0"	0.53	1.07	5' - 8"	5	10	20	3	8	16
1' - 9"	6' - 6"	0.58	1.16	6' - 2"	5	10	20	3	9	18
1' - 9"	7' - 0"	0.62	1.25	6' - 8"	5	10	20	3	9	18
1' - 9"	7' - 6"	0.67	1.34	7' - 2"	5	10	20	3	10	20
1' - 9"	8' - 0"	0.71	1.43	7' - 8"	5	10	20	3	11	22
1' - 9"	8' - 6"	0.76	1.51	8' - 2"	5	10	20	3	11	22
1' - 9"	9' - 0"	0.80	1.60	8' - 8"	5	10	20	3	12	24
1' - 9"	9' - 6"	0.85	1.69	9' - 2"	5	10	20	3	12	24
1' - 9"	10' - 0"	0.89	1.78	9' - 8"	5	10	20	3	13	26
1' - 9"	10' - 6"	0.94	1.87	10' - 2"	5	10	20	3	14	28
1' - 9"	11' - 0"	0.98	1.96	10' - 8"	5	10	20	3	14	28
1' - 9"	11' - 6"	1.02	2.05	11' - 2"	5	10	20	3	15	30
1' - 9"	12' - 0"	1.07	2.14	11' - 8"	5	10	20	3	15	30

Foundation Diameter	Foundation			Vertical Reinforcing Steel				Horizontal Tie Bars		
	Depth	Conc. Vol. for 1 Post (CU YDS)	Conc. Vol. for 2 Posts (CU YDS)	Length of Each Bar	Size	No. Bars for 1 Post	No. Bars for 2 Posts	Size	No. Bars for 1 Post	No. Bars for 2 Posts
2' - 0"	4' - 6"	0.52	1.05	4' - 2"	6	10	20	3	6	12
2' - 0"	5' - 0"	0.58	1.16	4' - 8"	6	10	20	3	7	14
2' - 0"	5' - 6"	0.64	1.28	5' - 2"	6	10	20	3	8	16
2' - 0"	6' - 0"	0.70	1.40	5' - 8"	6	10	20	3	8	16
2' - 0"	6' - 6"	0.76	1.51	6' - 2"	6	10	20	3	9	18
2' - 0"	7' - 0"	0.81	1.63	6' - 8"	6	10	20	3	9	18
2' - 0"	7' - 6"	0.87	1.75	7' - 2"	6	10	20	3	10	20
2' - 0"	8' - 0"	0.93	1.86	7' - 8"	6	10	20	3	11	22
2' - 0"	8' - 6"	0.99	1.98	8' - 2"	6	10	20	3	11	22
2' - 0"	9' - 0"	1.05	2.09	8' - 8"	6	10	20	3	12	24
2' - 0"	9' - 6"	1.11	2.21	9' - 2"	6	10	20	3	12	24
2' - 0"	10' - 0"	1.16	2.33	9' - 8"	6	10	20	3	13	26
2' - 0"	10' - 6"	1.22	2.44	10' - 2"	6	10	20	3	14	28
2' - 0"	11' - 0"	1.28	2.56	10' - 8"	6	10	20	3	14	28
2' - 0"	11' - 6"	1.34	2.68	11' - 2"	6	10	20	3	15	30
2' - 0"	12' - 0"	1.40	2.79	11' - 8"	6	10	20	3	15	30
2' - 0"	12' - 6"	1.45	2.91	12' - 2"	6	10	20	3	16	32
2' - 0"	13' - 0"	1.51	3.03	12' - 8"	6	10	20	3	17	34
2' - 0"	13' - 6"	1.57	3.14	13' - 2"	6	10	20	3	17	34
2' - 0"	14' - 0"	1.63	3.26	13' - 8"	6	10	20	3	18	36
2' - 0"	14' - 6"	1.69	3.37	14' - 2"	6	10	20	3	18	36
2' - 0"	15' - 0"	1.75	3.49	14' - 8"	6	10	20	3	19	38

Foundation Diameter	Foundation			Vertical Reinforcing Steel				Horizontal Tie Bars		
	Depth	Conc. Vol. for 1 Post (CU YDS)	Conc. Vol. for 2 Posts (CU YDS)	Length of Each Bar	Size	No. Bars for 1 Post	No. Bars for 2 Posts	Size	No. Bars for 1 Post	No. Bars for 2 Posts
2' - 4"	4' - 6"	0.71	1.43	4' - 2"	6	14	28	3	6	12
2' - 4"	5' - 0"	0.79	1.58	4' - 8"	6	14	28	3	7	14
2' - 4"	5' - 6"	0.87	1.74	5' - 2"	6	14	28	3	8	16
2' - 4"	6' - 0"	0.95	1.90	5' - 8"	6	14	28	3	8	16
2' - 4"	6' - 6"	1.03	2.06	6' - 2"	6	14	28	3	9	18
2' - 4"	7' - 0"	1.11	2.22	6' - 8"	6	14	28	3	9	18
2' - 4"	7' - 6"	1.19	2.38	7' - 2"	6	14	28	3	10	20
2' - 4"	8' - 0"	1.27	2.53	7' - 8"	6	14	28	3	11	22
2' - 4"	8' - 6"	1.35	2.69	8' - 2"	6	14	28	3	11	22
2' - 4"	9' - 0"	1.43	2.85	8' - 8"	6	14	28	3	12	24
2' - 4"	9' - 6"	1.50	3.01	9' - 2"	6	14	28	3	12	24
2' - 4"	10' - 0"	1.58	3.17	9' - 8"	6	14	28	3	13	26
2' - 4"	10' - 6"	1.66	3.33	10' - 2"	6	14	28	3	14	28
2' - 4"	11' - 0"	1.74	3.48	10' - 8"	6	14	28	3	14	28
2' - 4"	11' - 6"	1.82	3.64	11' - 2"	6	14	28	3	15	30
2' - 4"	12' - 0"	1.90	3.80	11' - 8"	6	14	28	3	15	30
2' - 4"	12' - 6"	1.98	3.96	12' - 2"	6	14	28	3	16	32
2' - 4"	13' - 0"	2.06	4.12	12' - 8"	6	14	28	3	17	34
2' - 4"	13' - 6"	2.14	4.28	13' - 2"	6	14	28	3	17	34
2' - 4"	14' - 0"	2.22	4.43	13' - 8"	6	14	28	3	18	36
2' - 4"	14' - 6"	2.30	4.59	14' - 2"	6	14	28	3	18	36
2' - 4"	15' - 0"	2.38	4.75	14' - 8"	6	14	28	3	19	38
2' - 4"	15' - 6"	2.45	4.91	15' - 2"	6	14	28	3	20	40
2' - 4"	16' - 0"	2.53	5.07	15' - 8"	6	14	28	3	20	40
2' - 4"	16' - 6"	2.61	5.23	16' - 2"	6	14	28	3	21	42
2' - 4"	17' - 0"	2.69	5.38	16' - 8"	6	14	28	3	21	42
2' - 4"	17' - 6"	2.77	5.54	17' - 2"	6	14	28	3	22	44
2' - 4"	18' - 0"	2.85	5.70	17' - 8"	6	14	28	3	23	46

Foundation Diameter	Foundation			Vertical Reinforcing Steel				Horizontal Tie Bars		
	Depth	Conc. Vol. for 1 Post (CU YDS)	Conc. Vol. for 2 Posts (CU YDS)	Length of Each Bar	Size	No. Bars for 1 Post	No. Bars for 2 Posts	Size	No. Bars for 1 Post	No. Bars for 2 Posts
2' - 6"	4' - 6"	0.82	1.64	4' - 2"	6	16	32	3	6	12
2' - 6"	5' - 0"	0.91	1.82	4' - 8"	6	16	32	3	7	14
2' - 6"	5' - 6"	1.00	2.00	5' - 2"	6	16	32	3	8	16
2' - 6"	6' - 0"	1.09	2.18	5' - 8"	6	16	32	3	8	16
2' - 6"	6' - 6"	1.18	2.36	6' - 2"	6	16	32	3	9	18
2' - 6"	7' - 0"	1.27	2.55	6' - 8"	6	16	32	3	9	18
2' - 6"	7' - 6"	1.36	2.73	7' - 2"	6	16	32	3	10	20
2' - 6"	8' - 0"	1.45	2.91	7' - 8"	6	16	32	3	11	22
2' - 6"	8' - 6"	1.55	3.09	8' - 2"	6	16	32	3	11	22
2' - 6"	9' - 0"	1.64	3.27	8' - 8"	6	16	32	3	12	24
2' - 6"	9' - 6"	1.73	3.45	9' - 2"	6	16	32	3	12	24
2' - 6"	10' - 0"	1.82	3.64	9' - 8"	6	16	32	3	13	26
2' - 6"	10' - 6"	1.91	3.82	10' - 2"	6	16	32	3	14	28
2' - 6"	11' - 0"	2.00	4.00	10' - 8"	6	16	32	3	14	28
2' - 6"	11' - 6"	2.09	4.18	11' - 2"	6	16	32	3	15	30
2' - 6"	12' - 0"	2.18	4.36	11' - 8"	6	16	32	3	15	30
2' - 6"	12' - 6"	2.27	4.55	12' - 2"	6	16	32	3	16	32
2' - 6"	13' - 0"	2.36	4.73	12' - 8"	6	16	32	3	17	34
2' - 6"	13' - 6"	2.45	4.91	13' - 2"	6	16	32	3	17	34
2' - 6"	14' - 0"	2.55	5.09	13' - 8"	6	16	32	3	18	36
2' - 6"	14' - 6"	2.64	5.27	14' - 2"	6	16	32	3	18	36
2' - 6"	15' - 0"	2.73	5.45	14' - 8"	6	16	32	3	19	38
2' - 6"	15' - 6"	2.82	5.64	15' - 2"	6	16	32	3	20	40
2' - 6"	16' - 0"	2.91	5.82	15' - 8"	6	16	32	3	20	40
2' - 6"	16' - 6"	3.00	6.00	16' - 2"	6	16	32	3	21	42
2' - 6"	17' - 0"	3.09	6.18	16' - 8"	6	16	32	3	21	42
2' - 6"	17' - 6"	3.18	6.36	17' - 2"	6	16	32	3	22	44
2' - 6"	18' - 0"	3.27	6.54	17' - 8"	6	16	32	3	23	46
2' - 6"	18' - 6"	3.36	6.73	18' - 2"	6	16	32	3	23	46
2' - 6"	19' - 0"	3.45	6.91	18' - 8"	6	16	32	3	24	48
2' - 6"	19' - 6"	3.55	7.09	19' - 2"	6	16	32	3	24	48
2' - 6"	20' - 0"	3.64	7.27	19' - 8"	6	16	32	3	25	50

NOTES:

1. Use Grade 60 reinforcing steel.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

10-3-13

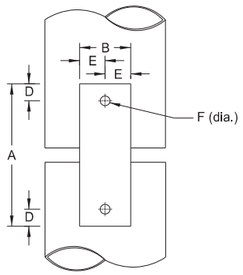
REVISIONS

DATE	CHANGE
8-30-18 8-29-19	Updated notes to active voice. New Design Engineer PE Stamp.

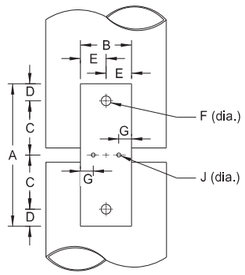
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Hinge Plate, Fuse Plate and Foundation Details for Standard Pipe

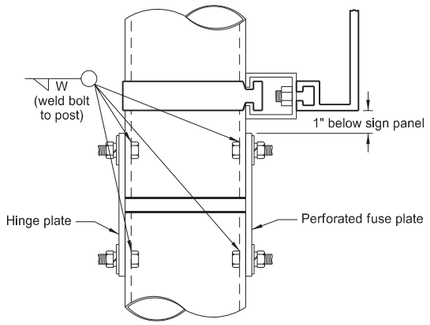
D-754-6



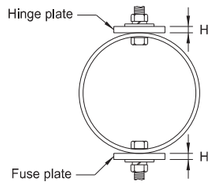
Hinge Plate



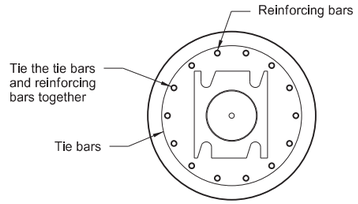
Perforated Fuse Plate



Side View



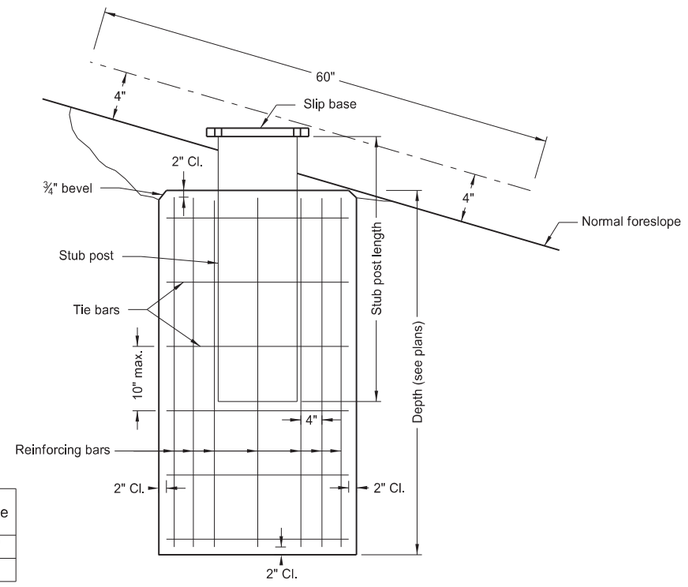
Top View



Top View

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

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



Foundation

Front View

Foundation detail for breakaway base with stub post connection.

Notes:
Fuse Joint Cuts - For steel posts cut after galvanizing, either galvanize cut after fabrication, or treat cut surface in accordance with ASTM A780. Aluminum posts need no treatment.

Use standard drawings D-754-2, D-754-3 and D-754-4 for information on breakaway base details.

Maintain the 4" vertical height and 60" diameter horizontal clearance of the break-away base at each post location.

Assembly Procedure:
1. Assemble hinge plate to post with bolts and one flat washer and lock washer under nut.

2. Tighten all bolts the maximum possible with 12" to 15" wrench.

Round Metal Posts							
Dimensions				Properties			
Nominal dia. in.	Outside dia. in.	Inside dia. in.	Wall Thickness in.	Weight per Foot Pound	Moment of Inertia $in.^4$	Cross Sec. Area $in.^2$	Section Diameter $in.^2$
Steel							
3½	4.000	3.548	.226	9.11	4.788	2.680	2.394
4	4.500	4.026	.237	10.79	7.233	3.174	3.215
5	5.563	5.047	.258	14.62	15.16	4.300	5.449
6	6.625	6.065	.280	18.97	28.14	5.581	8.495
Aluminum							
3½	4.000	3.548	.226	3.151	4.788	2.680	2.394
4	4.500	4.026	.237	3.733	7.232	3.174	3.214
5	5.563	5.047	.258	5.057	15.16	4.300	5.451
6	6.625	6.065	.280	6.564	28.14	5.581	8.496

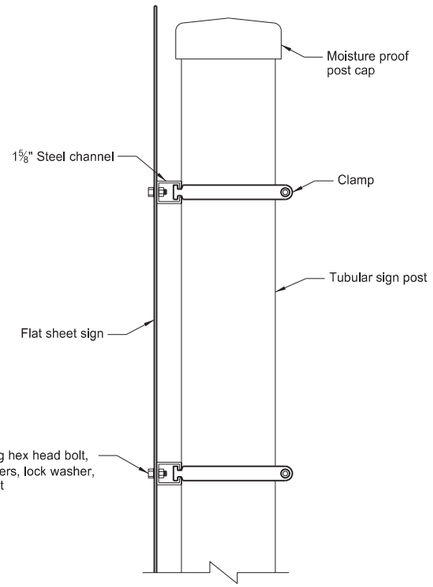
Nominal Pipe Size dia.	Fuse and Hinge Plate Data										
	Bolt Size	A	B	C	D	E	F	G	H	I	J
3½"	½"ø x 1½"	5"	1¾"	1 1¹⁄₁₆"	¹³⁄₁₆"	⅞"	⁹⁄₁₆"	¹⁵⁄₃₂"	¼"	¹³⁄₃₂"	⁷⁄₁₆"
4"	⅝"ø x 1½"	5¾"	2"	1⅞"	1"	1"	1¹⁄₁₆"	¹⁷⁄₃₂"	⅜"	¹⁵⁄₃₂"	⁹⁄₁₆"
5"	⅝"ø x 1¾"	5¾"	2"	1⅞"	1"	1"	1¹⁄₁₆"	⁹⁄₁₆"	½"	⁷⁄₁₆"	⅝"
6"	¾"ø x 2¼"	6¼"	2¼"	2"	1⅛"	1⅛"	¹³⁄₁₆"	⅝"	½"	½"	⅝"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
8-30-18 8-29-19	Updated notes to active voice. New Design Engineer PE Stamp.

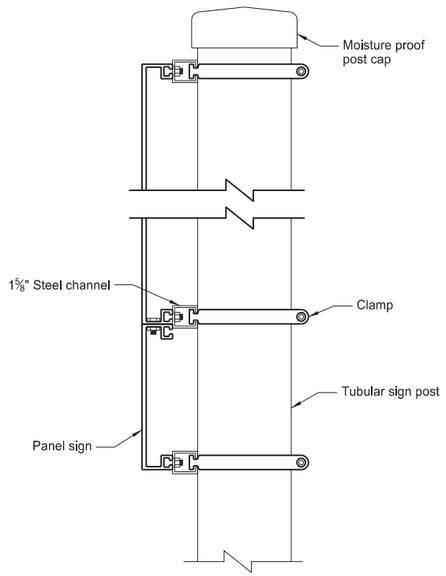
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PIPE SUPPORT AND SIGN MOUNTING DETAILS

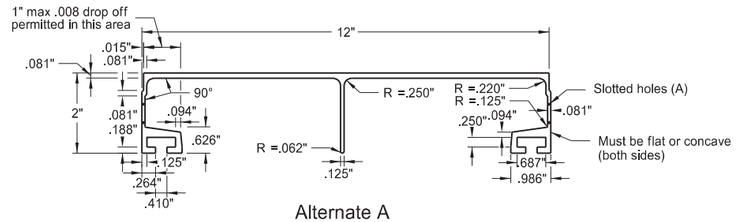
D-754-7



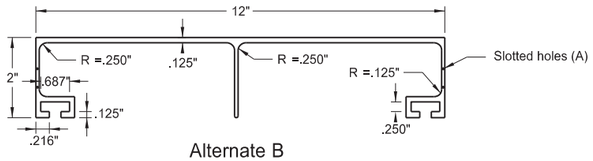
Side View



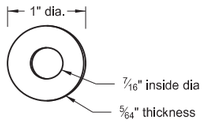
Side View



Alternate A
12" Extruded Panel



Alternate B
12" Extruded Panel



Flat Washer Detail

Slotted Hole Detail

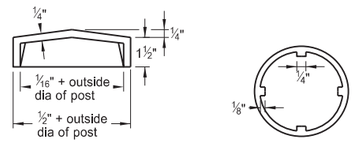
6" Extruded Panel

Aluminum Panel Details

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

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

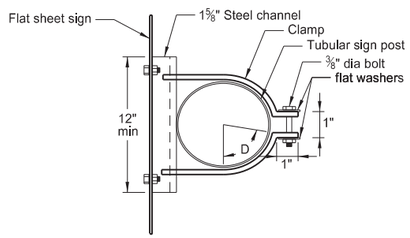
Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



Side View Top View

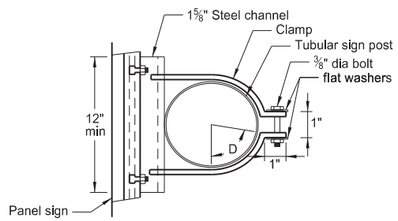
Post Cap Detail

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



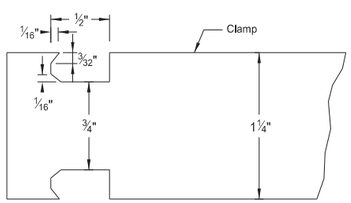
Top View

Flat Sheet Sign Clamp Mounting Details

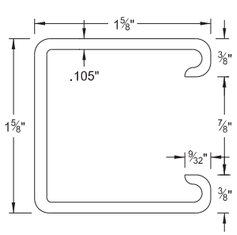


Top View

Panel Sign Clamp Mounting Details



Clamp Detail



Steel Channel Detail

Post Size dia	Clamp Gauge min
3½" to 5"	11
6" to 12"	10

Post Size dia (in)	D (in)
3½	3
4	3 3/16
5	5⅛
6	7 7/16
8	13 1/16
10	20¾
12	29⅝

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

2-21-14

REVISIONS

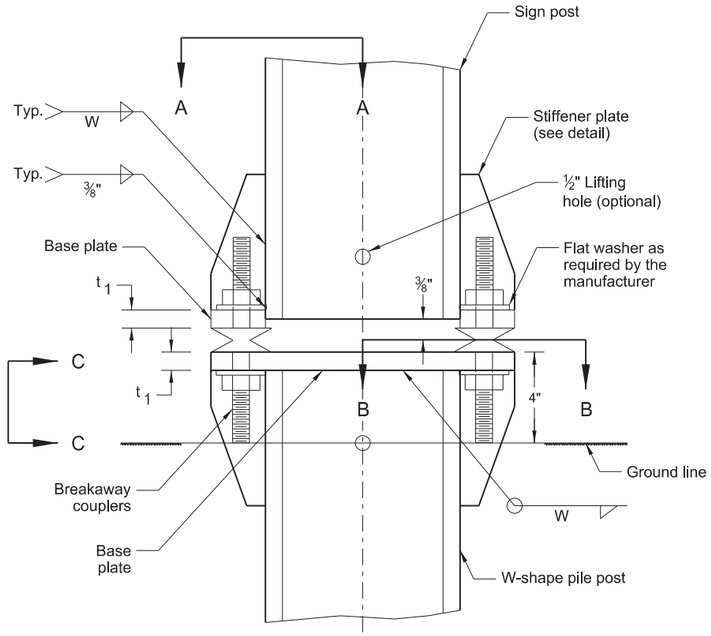
DATE	CHANGE
08-30-18	Updated to active voice, defined bolt & washer for fastening sign.
08-29-19	New Design Engineer PE Stamp.
10-19-22	Added washers to clamp.

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

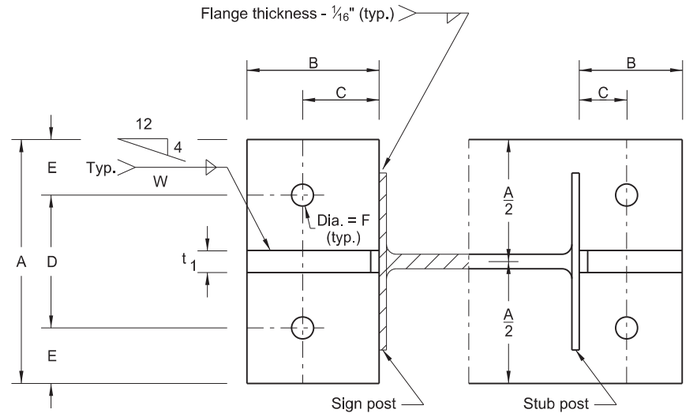
10/20/22

Breakaway Coupler System
Structural Details
for W-Shape Supports

D-754-12



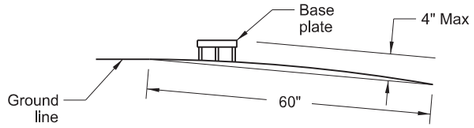
Sign Post and Stub Post
Elevation



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

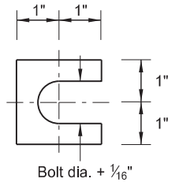
Notes:

1. Use either the breakaway base system shown on standard D-754-13 or a breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements as specified by DENT BREAKAWAY IND., INC. which meets the requirements of NCHRP Report 350.
2. Use structural steel conforming to Sec. 894.03 B.6 and high strength bolts conforming to ASTM - A325. Refer to "Sign Summary" sheet for specific data on each individual sign installation.
3. Use manufacturer's recommendations for assembly procedures.

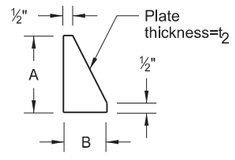


Section C - C

Max. protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



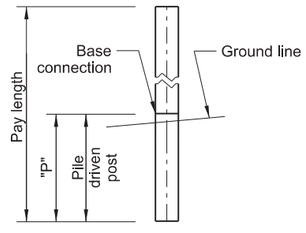
Shim Detail



Stiffener Plate Detail
(See Table for Dimensions)

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

Sections shown are for installations on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.



W-Shape - Pile Footing

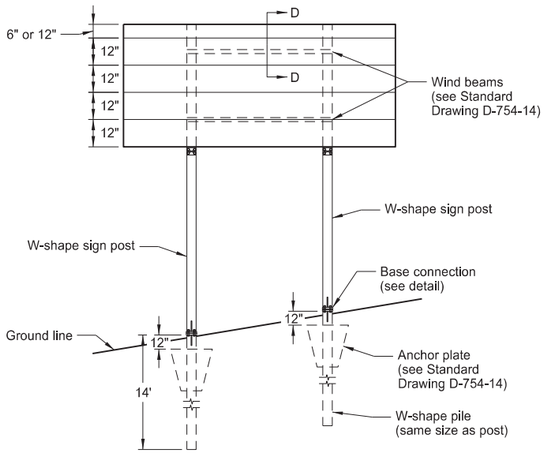
W-Shape Post & Pile Size	Base Connection Data										Footing Data
	Bolt Size	A	B	C	D	E	t_1	t_2	W	F	W-Shape Pile Post "P"
W4X13	¾" x 5¼"	6"	2½"	1½"	3½"	1¼"	1"	½"	¼"	13/16"	14'
W5X16											14'
W6X20	⅞" x 5¼"	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	15/16"	14'
W8X24											14'
W8X28	1" x 5¼"	8"	3"	2"	4"	2"	1½"	¾"	5/16"	1 1/16"	14'

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-2013	
REVISIONS	
DATE	CHANGE
7-8-14	Revised notes 2 and 3.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

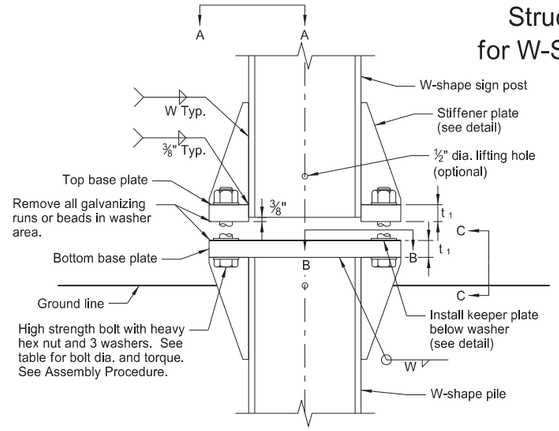
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

Breakaway System Structural Details for W-Shape Supports

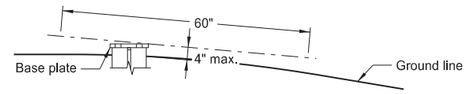
D-754-13



Typical Panel Mounting on W-shape Sign Posts



Base Connection Detail



Section C-C
Stub Height Requirements

Maximum projection of base plate limits are defined as a line 4" parallel to any chord, which is perpendicular to, or aligned radially to, the center line of the highway and has the chord's end points on the ground surface on opposite sides of the stub post.

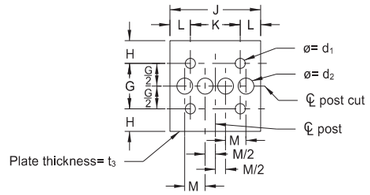
Notes:

Use structural steel conforming to Section 894.03 B.6 of the Standard Specifications and high strength bolts conforming to ASTM A325.

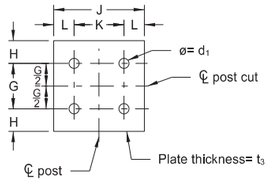
Refer to Sign Summary sheet for specific data on individual sign installation.

Install perforated fuse plate on side of post facing traffic.

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



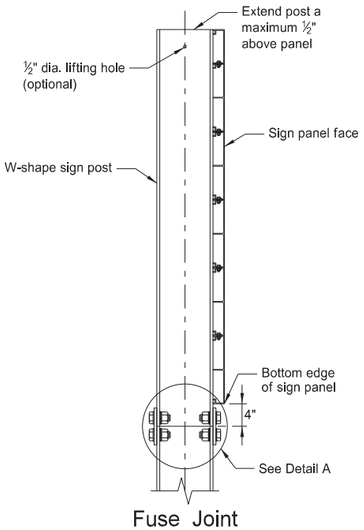
Perforated Fuse Plate



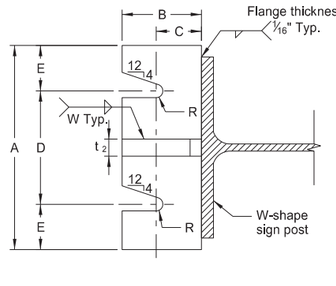
Hinge Plate

Assembly Procedure:

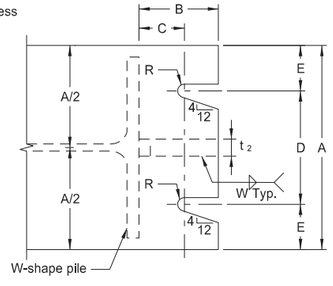
1. Assemble base plates with bolts and one flat washer between top base plate and keeper plate.
2. Shim as required to plumb post.
3. Tighten all base connection bolts the maximum possible with 12" to 15" wrench to bed washers and shims and clean bolt threads.
4. Loosen each bolt in turn and retighten in systematic order to the prescribed torque (see table).
5. Assemble perforated fuse and hinge plates to post with bolts and one flat washer and lock washer under nut.



Fuse Joint
(Side View)

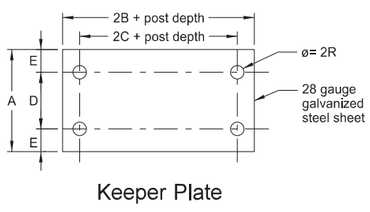


Section A-A

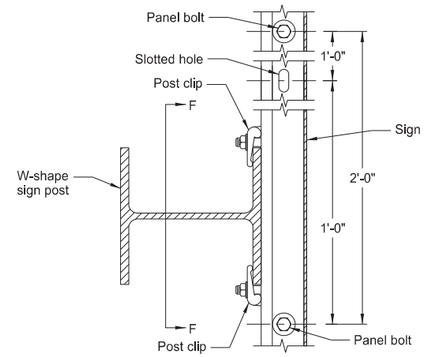


Section B-B

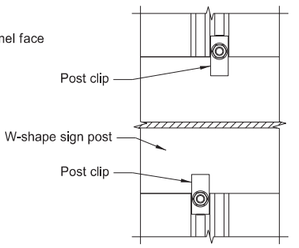
Sections shown for installations on right shoulder. Reverse plate slot bevels for installations on left shoulder.



Keeper Plate

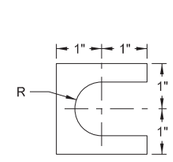


Section E-E



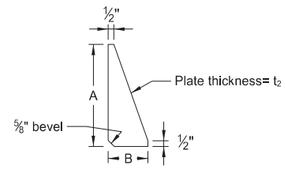
Section F-F

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

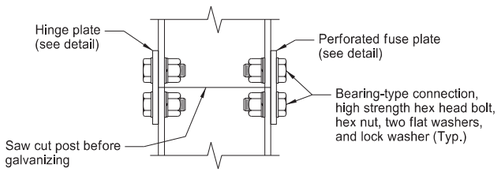


Shim Detail

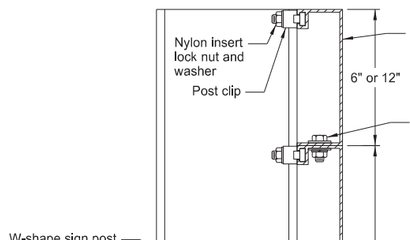
Furnish 2 each .012"± thick and 2 each .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



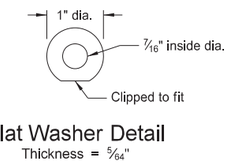
Stiffener Plate



Detail A



Section D-D



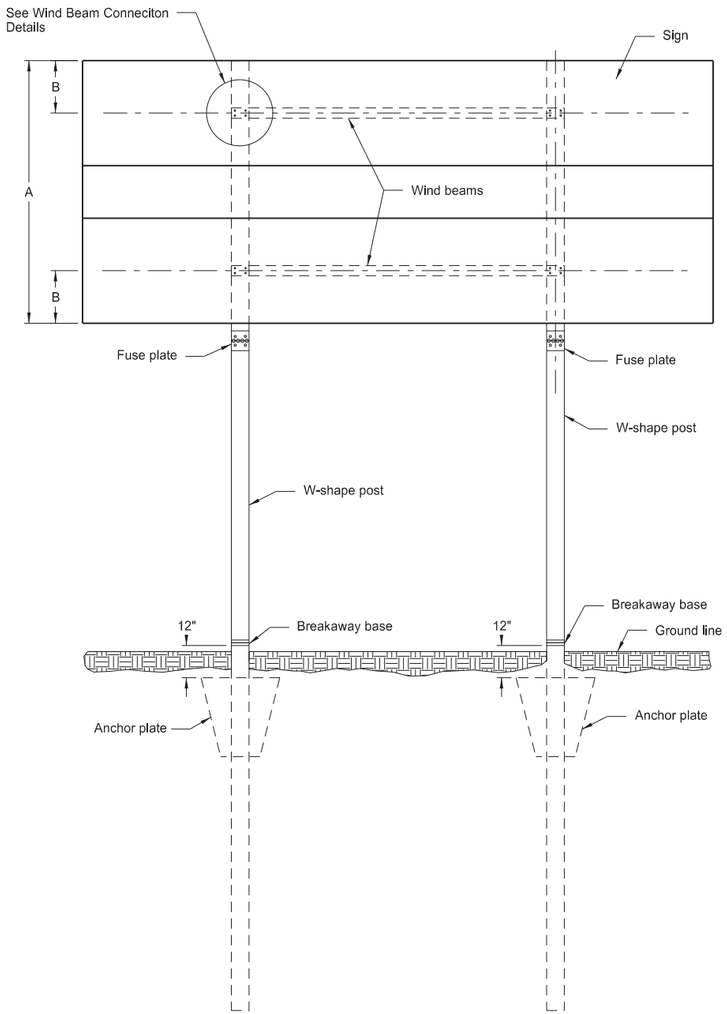
Flat Washer Detail
Thickness = 5/64"

W-Shape Post and Pile Size	Base Connection Dimensions										Fuse and Hinge Plate Dimensions									
	Bolt Size and Torque	A	B	C	D	E	t_1	t_2	W	R	G	H	J	K	L	M	d_1	d_2	t_3	Bolt dia.
W4x13	¾" ø x 3½" Torque = 600 in-lb	6"	2½"	1½"	3½"	1¼"	1"	½"	¼"	13/32"	2"	1¼"	4"	2¼"	⅞"	1"	11/16"	¾"	⅜"	⅝"
W5x16	¾" ø x 3½" Torque = 600 in-lb	6"	2½"	1½"	3½"	1¼"	1"	½"	¼"	13/32"	2½"	1¼"	5"	2¾"	1⅛"	1⅛"	13/16"	⅞"	⅜"	¾"
W6x20	⅞" ø x 4¼" Torque = 800 in-lb	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	15/32"	2½"	1¼"	6"	3½"	1¼"	1⅜"	13/16"	1⅛"	⅜"	¾"
W8x24	⅞" ø x 4¼" Torque = 800 in-lb	8"	3"	1¾"	4"	2"	1¼"	½"	¼"	15/32"	2½"	1½"	6½"	3½"	1½"	1½"	15/16"	1¼"	½"	⅞"
W8x28	1" ø x 5" Torque = 1000 in-lb	8"	3"	2"	4"	2"	1½"	¾"	5/16"	17/32"	2½"	1½"	6½"	3½"	1½"	1⅝"	1⅛"	1⅛"	½"	1"
W8x31	1⅛" ø x 5" Torque = 1200 in-lb	9"	3½"	2"	5"	2"	1½"	¾"	5/16"	19/32"	3"	1¾"	8"	5½"	1¼"	2"	1⅛"	1½"	½"	1"
W10x39	1⅛" ø x 5" Torque = 1200 in-lb	9"	3½"	2"	5"	2"	1½"	¾"	5/16"	19/32"	3"	1¾"	8"	5½"	1¼"	1⅞"	1⅜"	1⅜"	½"	1⅛"

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE
7-18-14	Revised first note.
8-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.

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

WIND BEAMS AND ANCHOR PLATES FOR W-SHAPE SUPPORTS



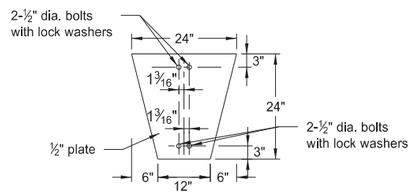
ASSEMBLY DETAIL FOR WIND BEAMS AND ANCHOR PLATES

Notes:

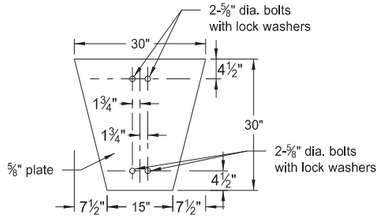
Calculate the B distance using the formula, B=A/4.

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

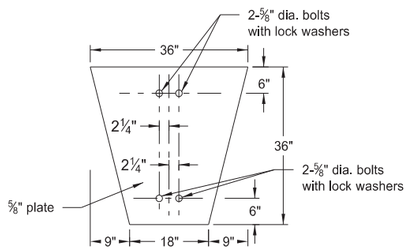
Use bolts conforming to ASTM A307 and galvanized according to ASTM A153.



W4-13 & W5-16

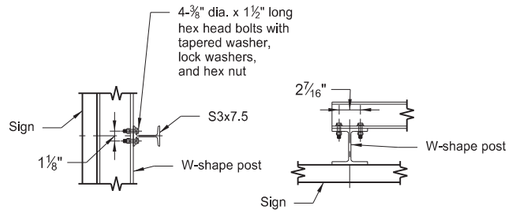


W6-20, W8-24 & W8-28



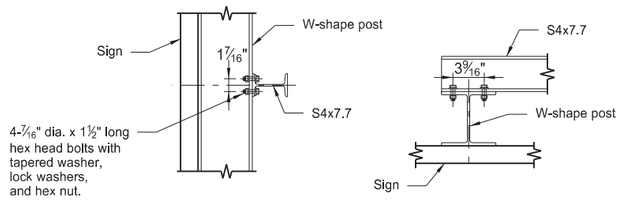
W8-31 & W10-39

ANCHOR PLATE DETAILS



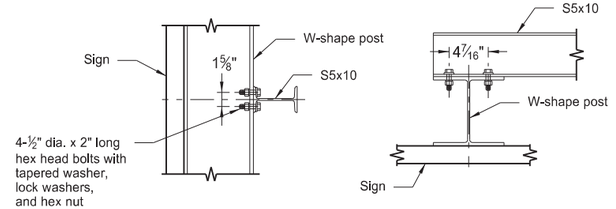
End View Top View

W4-13 & W5-16



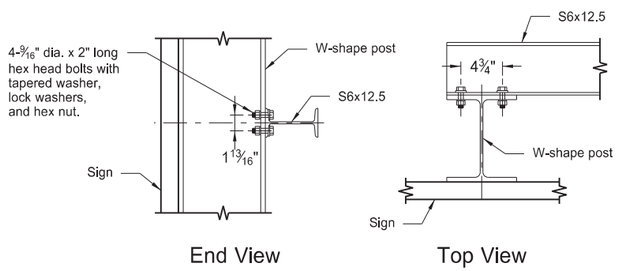
End View Top View

W6-20, W8-24 and W8-28



End View Top View

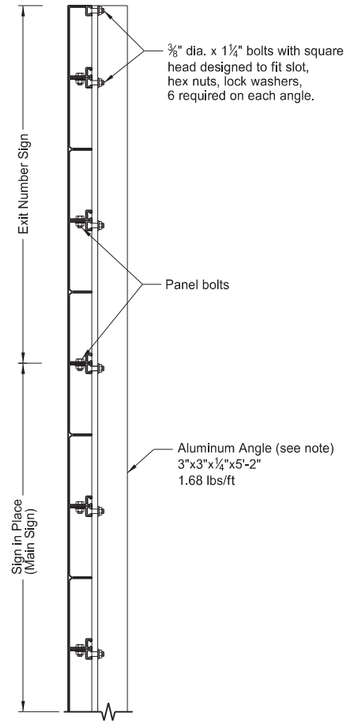
W8-31



End View Top View

W10-39

WIND BEAM CONNECTION DETAILS



ASSEMBLY DETAIL FOR EXIT NUMBER SIGNS

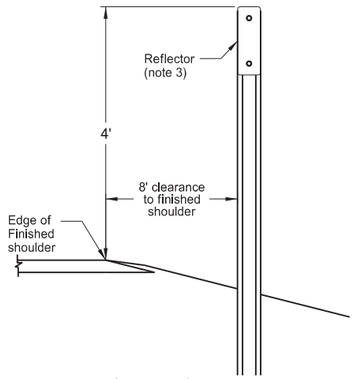
Note: Use two aluminum angles on each sign. Vary distance between angles dependent on post spacing of sign in place. Place angles as near as possible to posts. The Engineer will determine exact location.

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

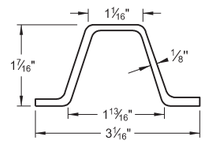
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/29/19 and the original document is stored at the North Dakota Department of Transportation

REFLECTORIZED DELINEATORS - DIVIDED HIGHWAY

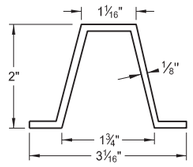
D-754-21



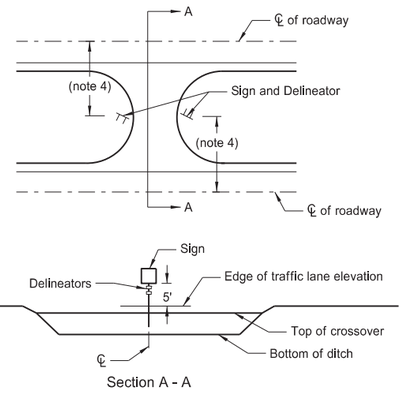
Installation
(Type A, B, and C)



Steel Post Detail
Approx. 2.0 lbs/ft

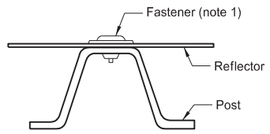


Aluminum Post Detail
Approx. 0.88 lbs/ft



Section A - A

Median Crossovers
Signing and Delineation system



Type A, Type B, and Type C
Delineator Attachment Detail

Delineator Details

Type A, B, and C

Installation: Install posts along the right shoulder line, in the direction of travel, unless shown otherwise on the plans.

Reflectors: Use reflector of the same color as the adjacent pavement marking with a 0.080 inch minimum thickness sign backing material.

Type E

Alternate: As an alternate, use one unit band consisting of two yellow stripes separated by a 2" black stripe in place of two 3" yellow bands.

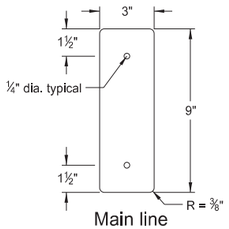
(1) Use fasteners that are a minimum ¼" diameter. Use double headed rivet or other non-rust vandal resistant fastener.

(2) Drill only those holes required to attach the number of reflectors on that post, or drill all the posts the same so that any number of reflectors may be added.

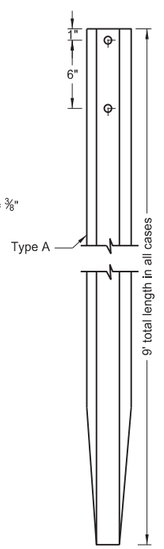
(3) Mount reflector facing traffic at an angle of 90° away from oncoming traffic.

(4) Median width may vary. Place sign and delineator assembly in the median crossover an equal distance from each roadway.

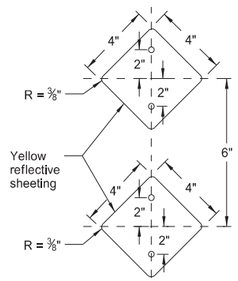
(5) Include all costs for materials, labor, and equipment to install single sided type A delineators in the unit price bid for "Delineators-Type A-Single Sided." Include all costs for materials, labor, and equipment to install single sided type B, type C, type D, and type E delineators in the unit price bid for "Delineators-Type B", "Delineators-Type C", "Delineators-Type D", and "Delineators-Type E."



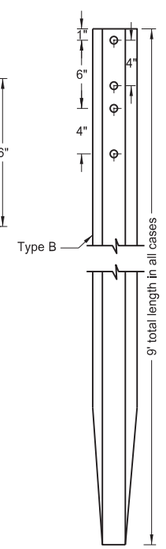
Main line
Single Sided Reflector
(Type A delineator)



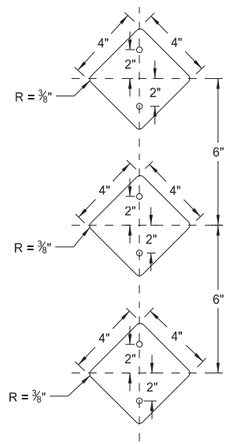
U-type Post
(Delineator-Type A-Single Sided)



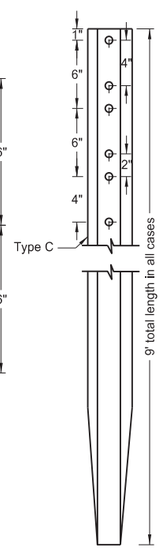
Ramps
Two reflectors
(Type B delineator)



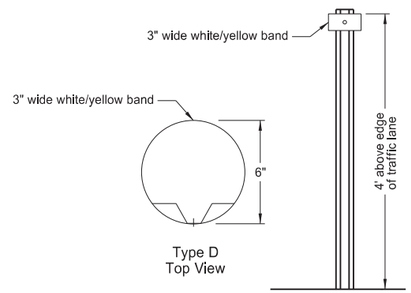
U-type Post
(Delineators-Type B)



Narrow Bridges
Three reflectors
(Type C delineator)

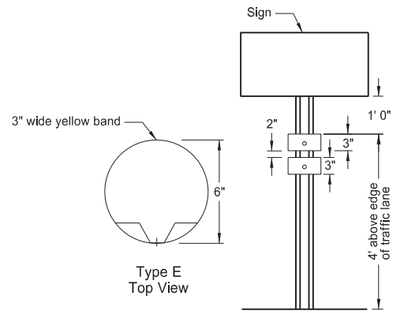


U-type Post
(Delineators-Type C)



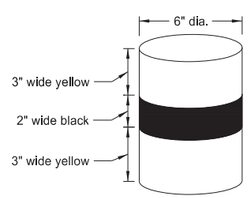
Type D
Top View

Median
One reflector
(Delineators-Type D)



Type E
Top View

Median
Two reflectors
(Delineators-Type E)



Alternate Type E delineator

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12/16/22	
REVISIONS	
DATE	CHANGE

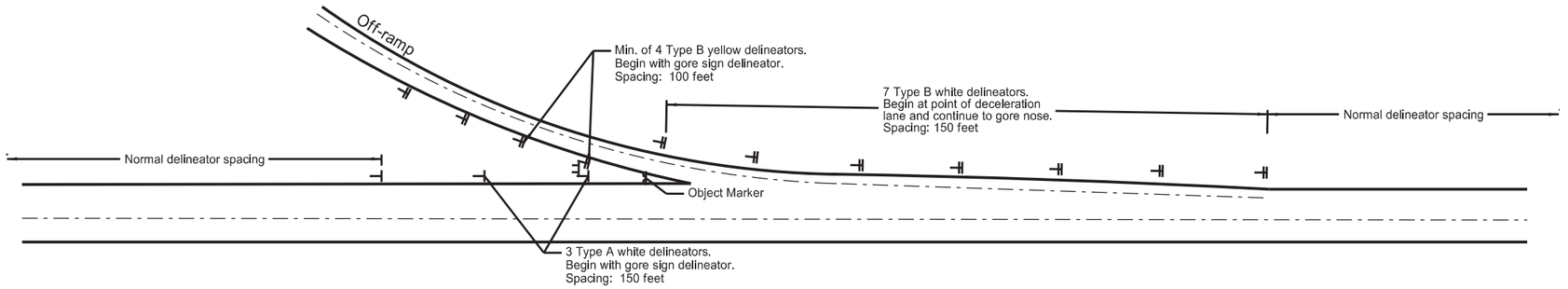
KIRK J. HOFF
REGISTERED
PROFESSIONAL
PE-4683
ENGINEER
NORTH DAKOTA

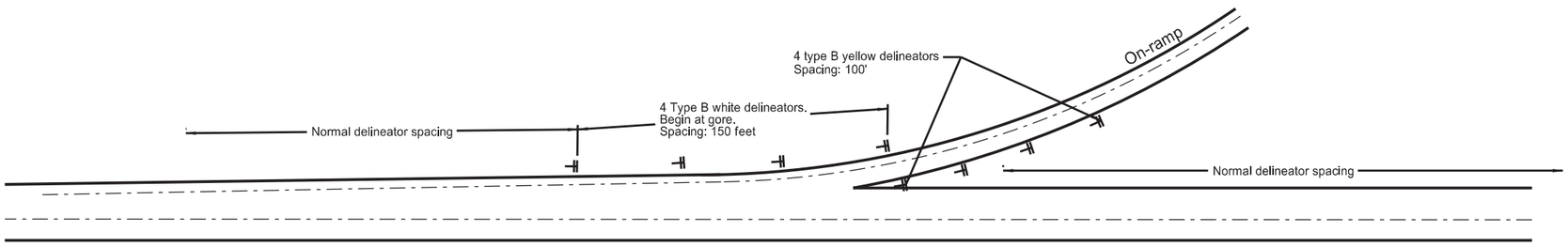
12/16/22

TYPICAL REST AREA DELINEATION

D-754-22B

Interstate mainline delineator spacing:
528' on tangent and curves less than 0°30'
264' on curves 0°30' and greater.





NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
9-30-18	Updated notes to active voice.
8-29-19	New Design Engineer PE Stamp.
11-26-21	Revised Object Marker designation.

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

11/26/21

PERFORATED TUBE ASSEMBLY DETAILS

D-754-23

Notes:

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

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

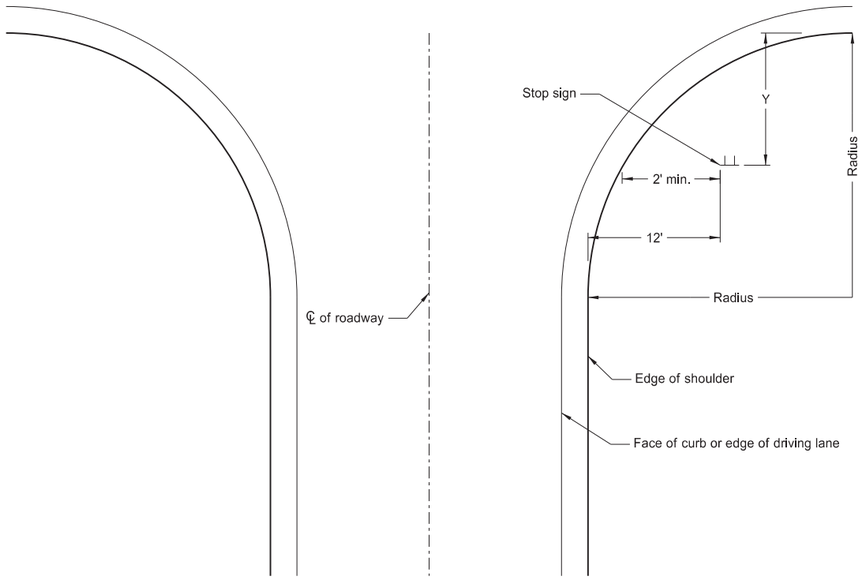
   Install signs on expressways a minimum height of 7'.

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

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

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

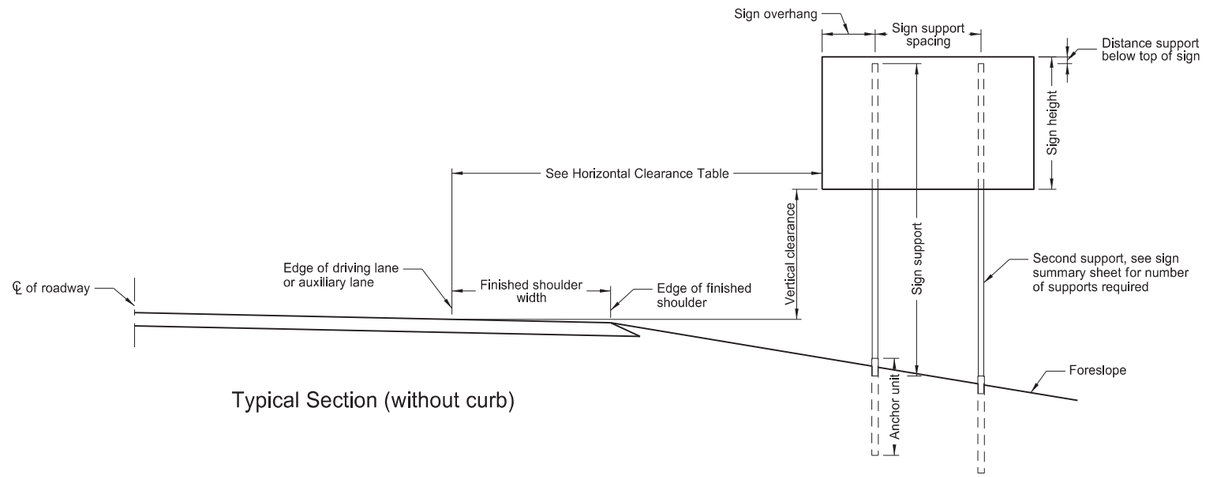
4. Provide a horizontal clearance from edge of shared use path to edge of sign of 3', except where width is limited. Provide a minimum clearance of 2'.



Stop Sign Location
Wide Throat Intersection

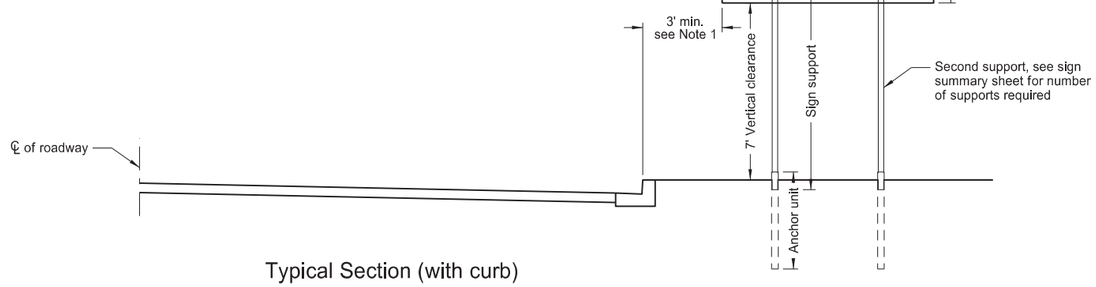
Use layout for the placement of "Stop" signs.

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



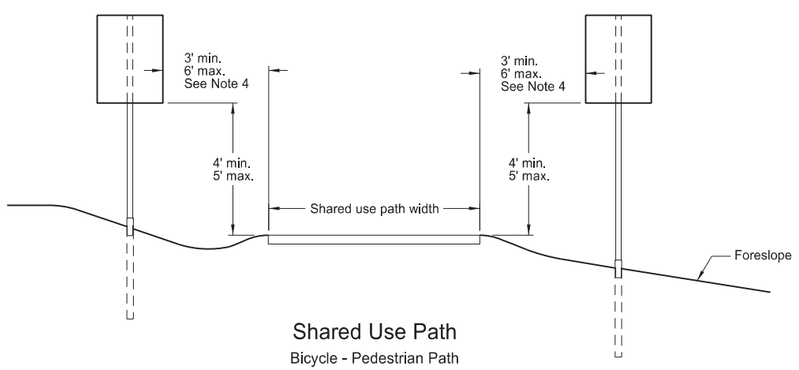
Typical Section (without curb)

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



Typical Section (with curb)

Residential or Business District



Shared Use Path

Bicycle - Pedestrian Path

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

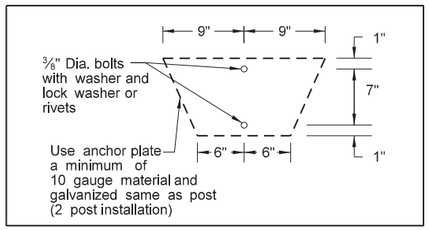
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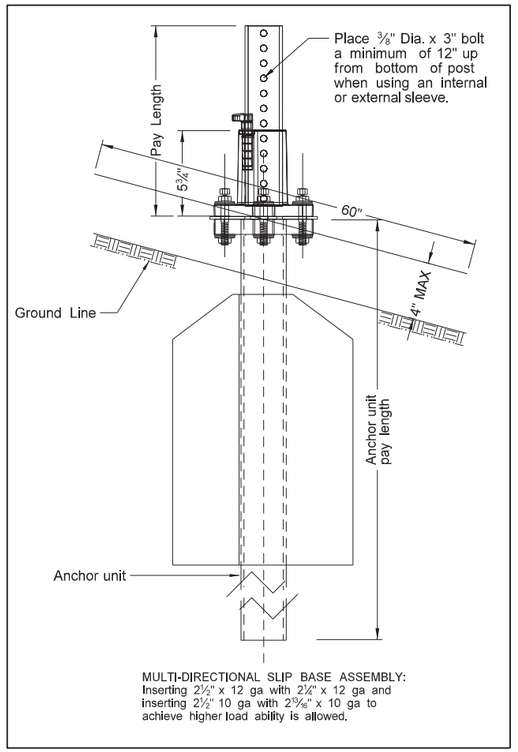
Mounting Details Perforated Tube

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.

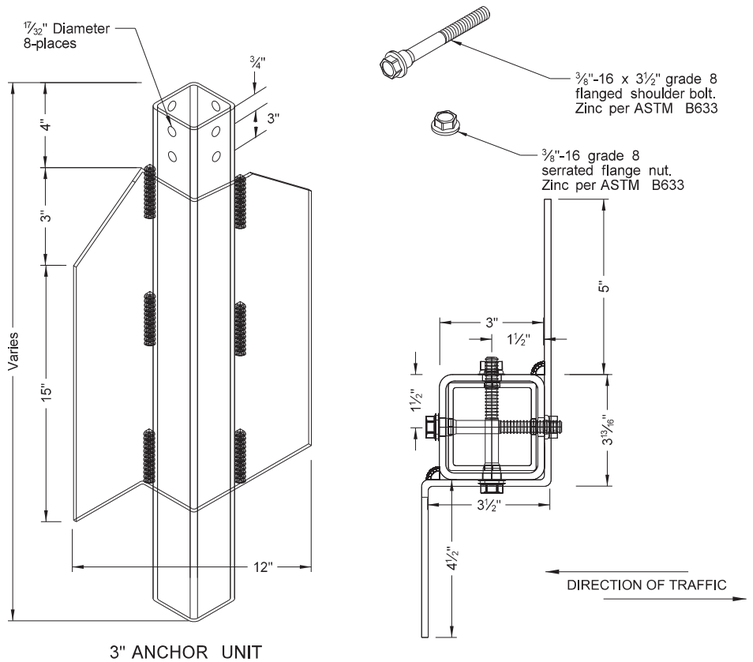




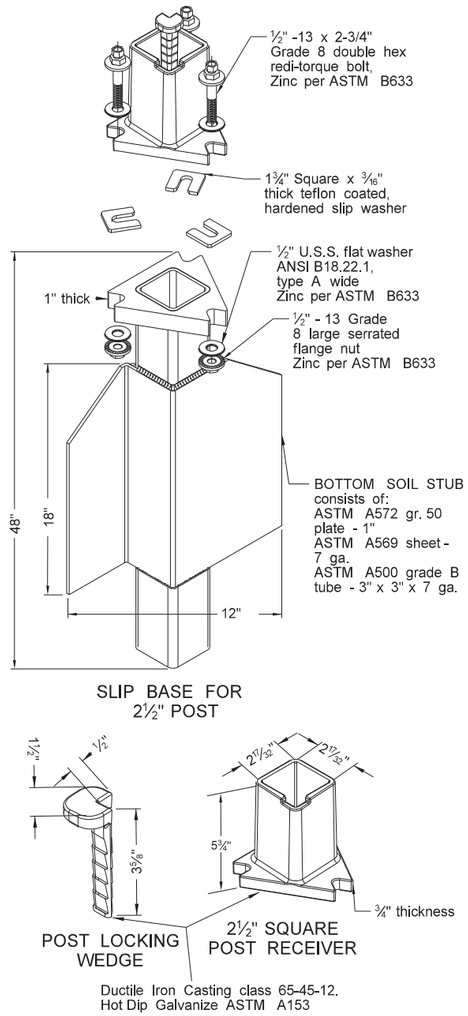
MULTI-DIRECTIONAL SLIP BASE ASSEMBLY:
Inserting 2½" x 12 ga with 2¼" x 12 ga and inserting 2½" 10 ga with 2⅜16" x 10 ga to achieve higher load ability is allowed.

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



SLIP BASE FOR 2½" POST

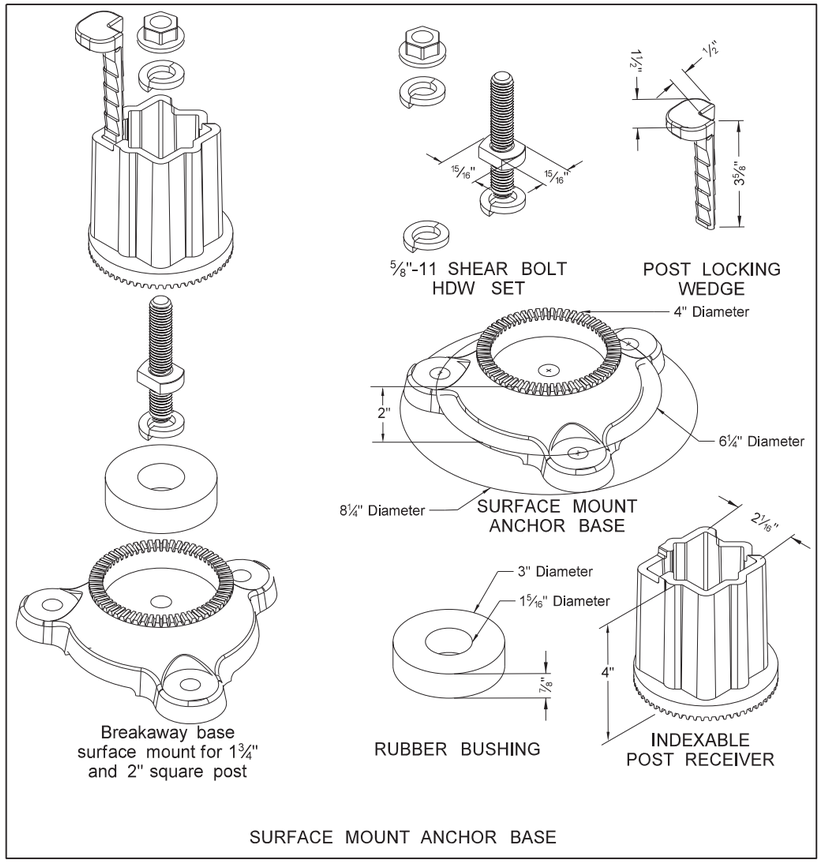
SLIP BASE DETAIL

Properties of Telescoping Perforated Tubes						
Tube Size In.	Wall Thickness in.	U.S. Standard Gauge	Weight Per Foot Lbs.	Moment of Inertia In.⁴	Cross Sect. Area In.²	Section 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
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.



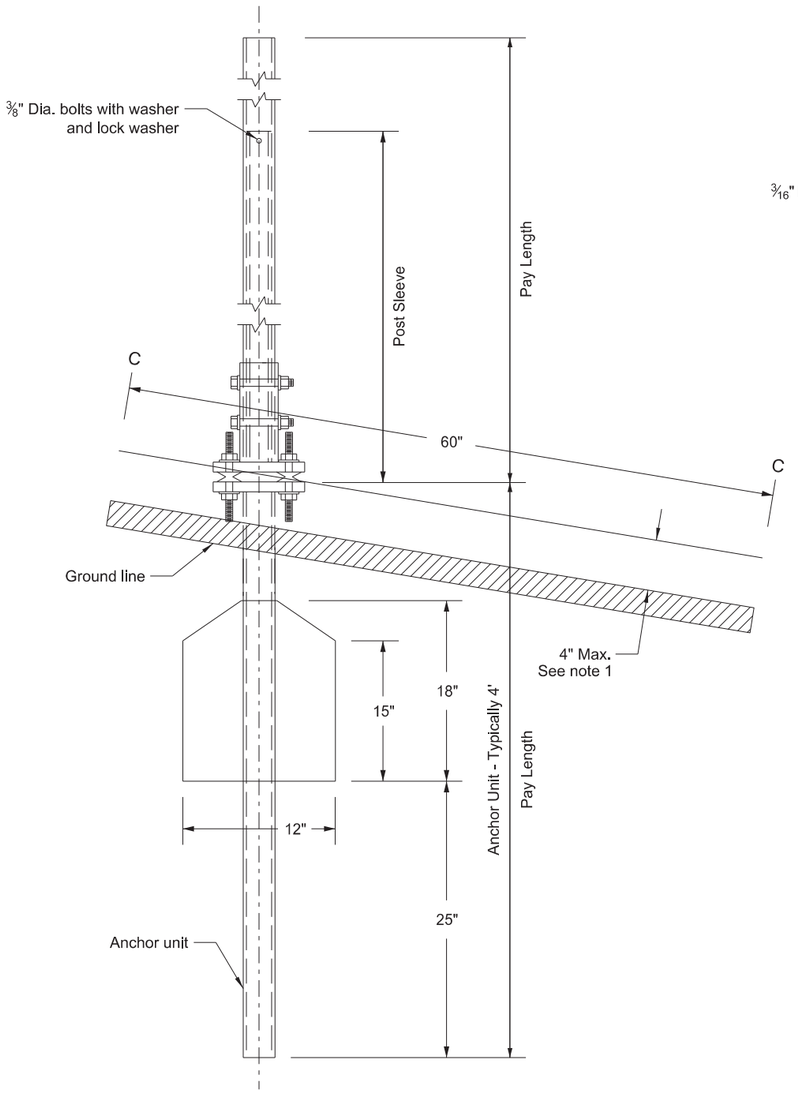
SURFACE MOUNT ANCHOR BASE

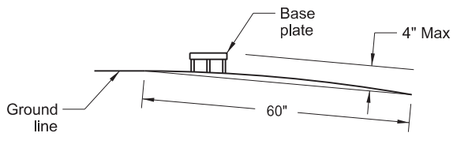
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-6-09	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice & corrected max height of base.
8-29-19	New Design Engineer PE Stamp.

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

D-754-24A

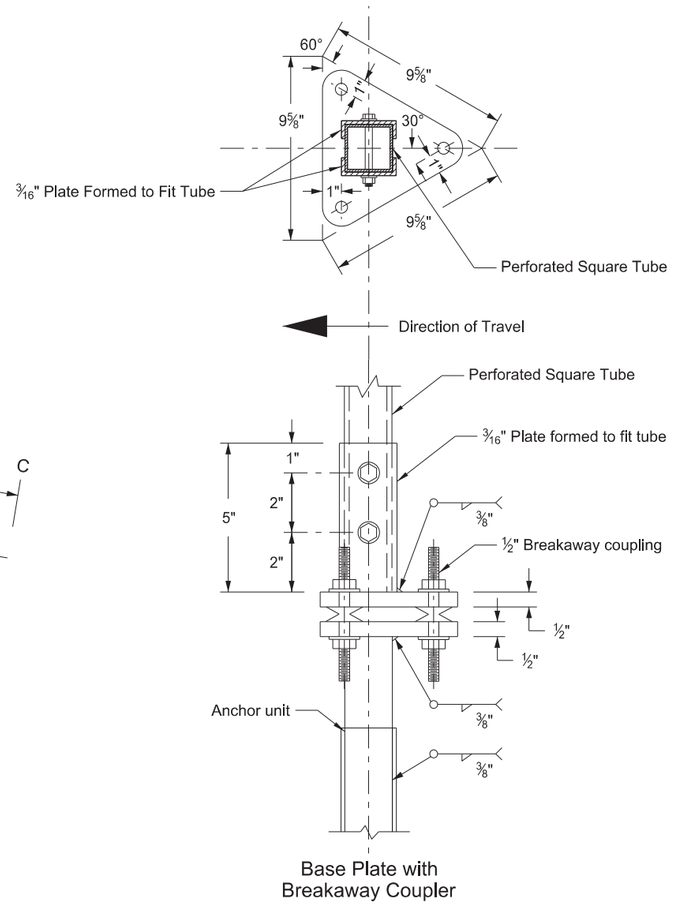
Breakaway Coupler System for Perforated Tubes





Section C-C

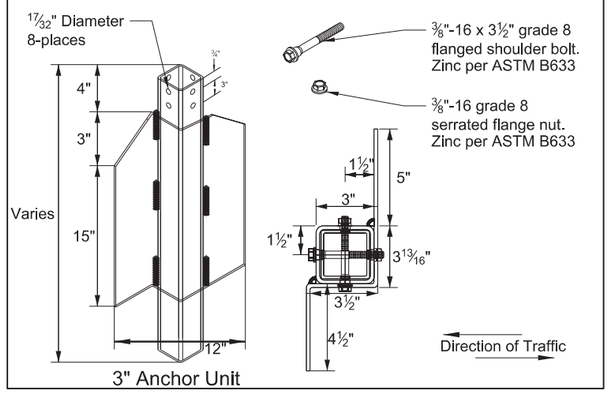
Max protection of the stub post is 4" above a 60" chord aligned radially to the center line of the highway and connecting any point, within the length of the chord, on the ground surface on one side of the support to a point in the ground surface on the other side.



Base Plate with Breakaway Coupler

Shoulder Bolt

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



3" Anchor Unit

Notes:

1. 4" Vertical clearance of anchor or breakaway base. The 4" x 60" measurement is above and below post location and also back and ahead of post.
2. Use anchor unit of the same size and specification as the post.
3. Provide a minimum 8' distance between the first and fourth post on four post signs.
4. Use the breakaway base system on standard D-754-24 or the breakaway coupling system manufactured from material meeting the requirements of ASTM A325 fasteners with the special requirements specified by DENT BREAKAWAY IND., INC. which meets the test requirements of NCHRP Report 350.

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

(B) - 2½" 12 gauge posts do not need breakaway bases unless support is placed in boggy, wet, or loose soil areas.

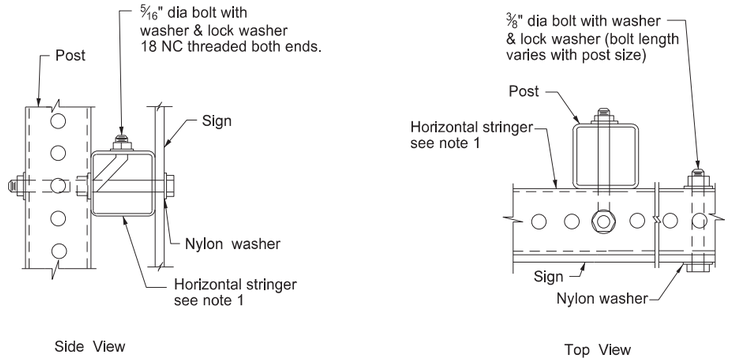
(C) - 3" anchor unit

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engr PE Stamp.

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

Mounting Details Perforated Tube

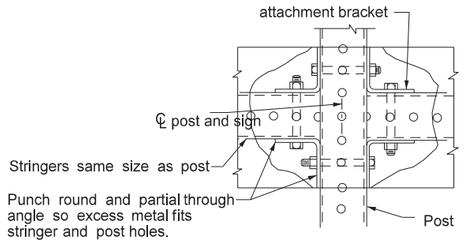
D-754-25



Side View

Top View

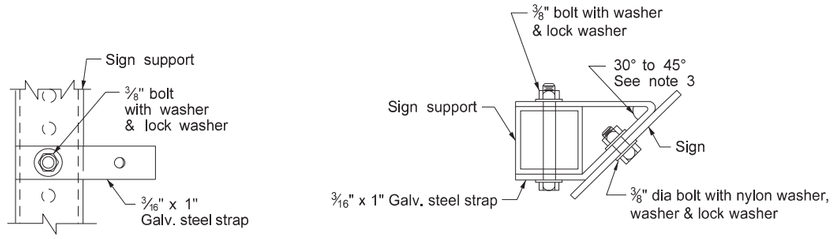
STRINGER MOUNTING
(WITH STRINGER IN FRONT OF POST)



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

Note:

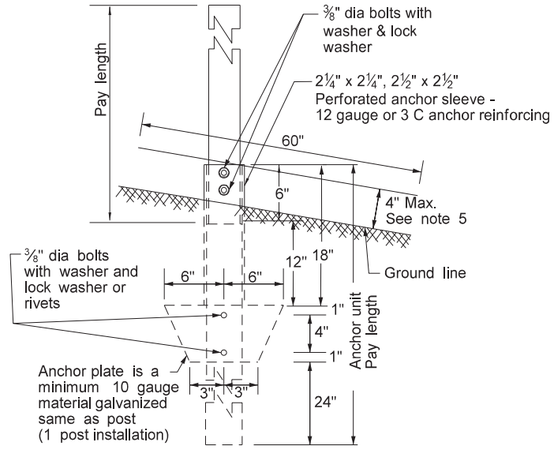
1. Horizontal stringers - Use perforated tubes or 1¾" x 3/16" thick, 1.08 lbs./ft aluminum or 3.16 lbs./ft steel z bar stringers.
2. Use minimum outside diameter 15/16" ±1/16" and 10 gauge thick metal washers on sign face.
3. Place No Parking signs with directional arrows at a 30 to 45 degree angle with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



Side View

Top View

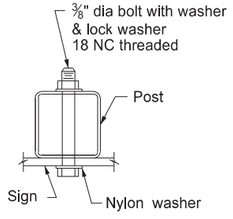
STRAP DETAIL



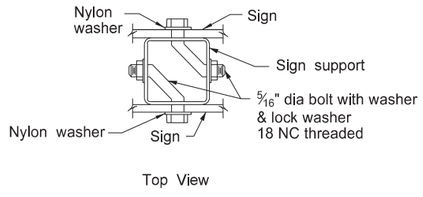
ANCHOR UNIT AND POST ASSEMBLY

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

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

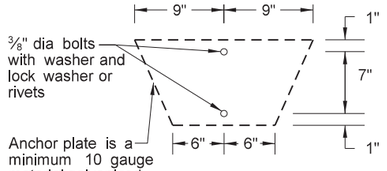


BOLT MOUNTING



Top View

BACK TO BACK MOUNTING



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

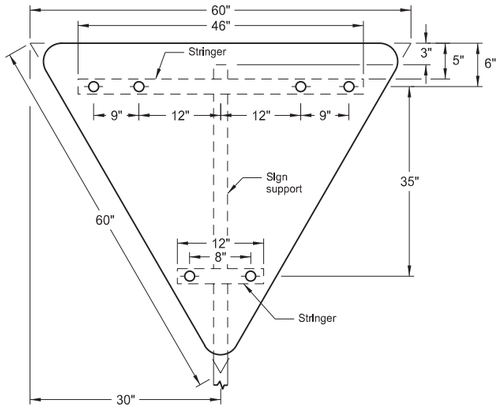
The 2 3/16" size 10 gauge is shown as 2.19" size on the plans.
The 2½" size is shown as 2.51" size on the plans.

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

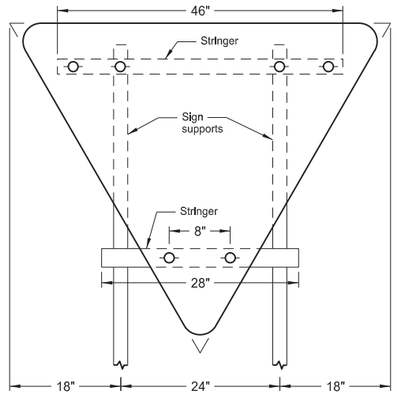
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE- 4683 , on 8/30/19 and the original document is stored at the North Dakota Department of Transportation

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

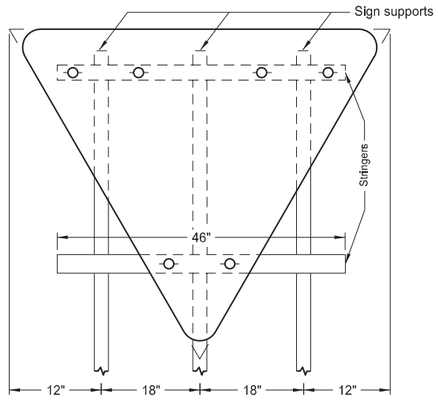
D-754-27



1 Post



2 Posts

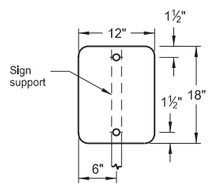


3 Posts

Assembly No. 6

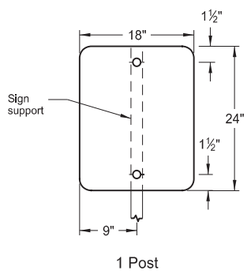
Notes:

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



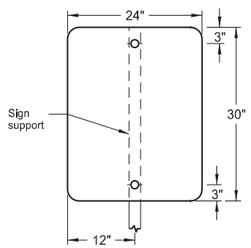
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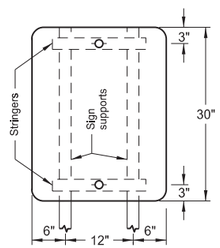


1 Post

Assembly No. 8

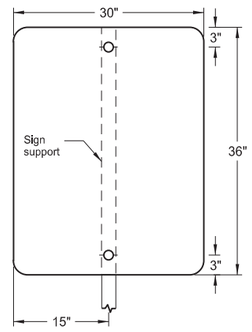


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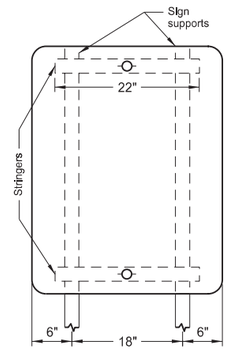


2 Posts

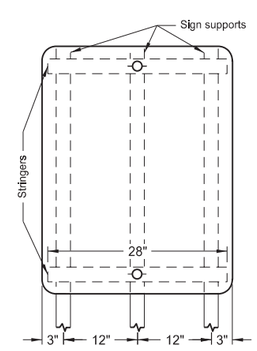
Assembly No. 9



1 Post

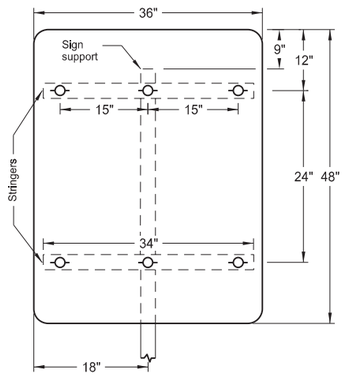


2 Posts

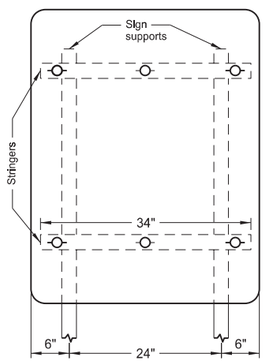


3 Posts

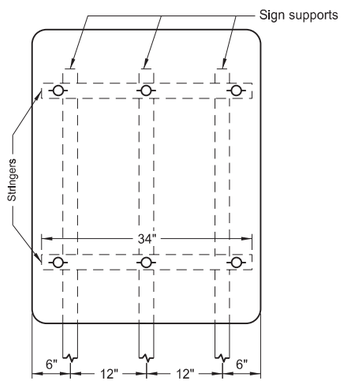
Assembly No. 10



1 Post



2 Posts



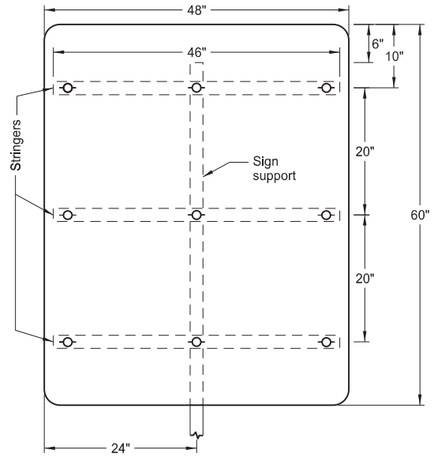
3 Posts

Assembly No. 11

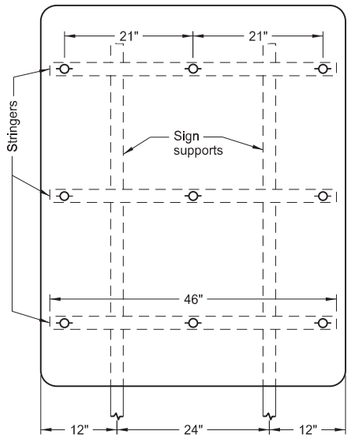
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18 8-30-19	Updated notes to active voice. New Design Engineer PE Stamp.

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

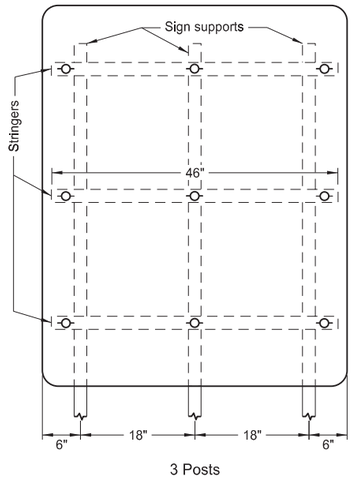
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION
DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post

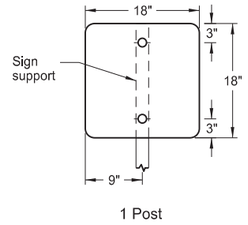


2 Posts



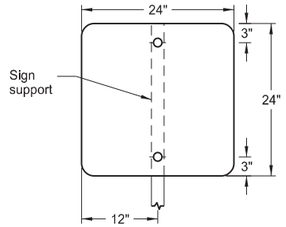
3 Posts

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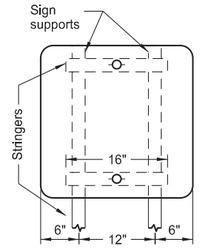


1 Post

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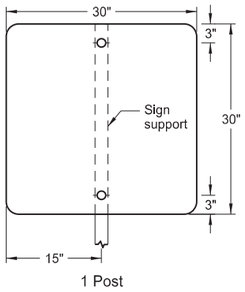


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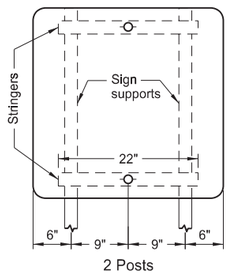


2 Posts

Assembly No. 14

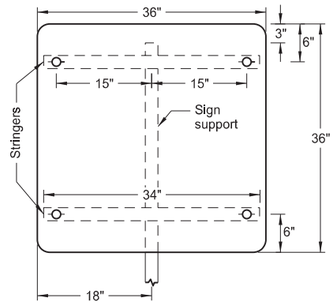


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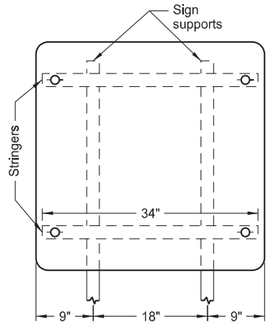


2 Posts

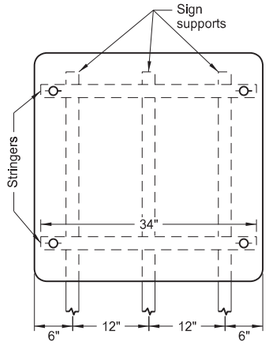
Assembly No. 15



1 Post

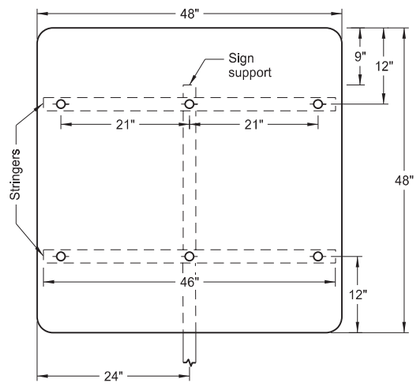


2 Posts

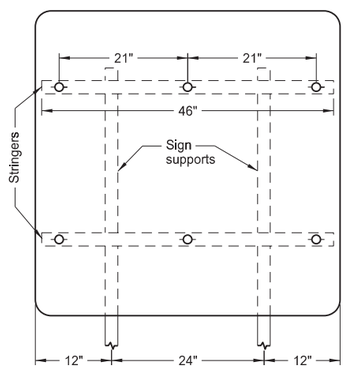


3 Posts

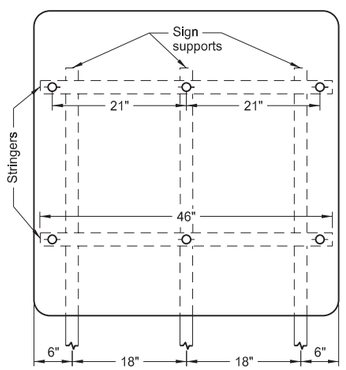
Assembly No. 16



1 Post



2 Posts



3 Posts

Assembly No. 17

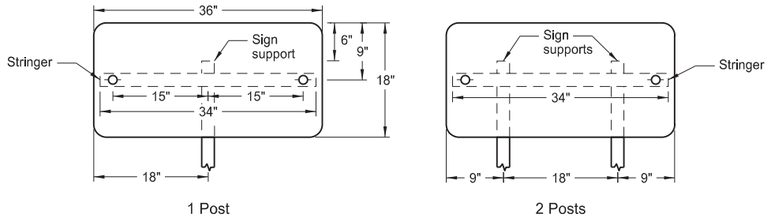
Notes:

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.

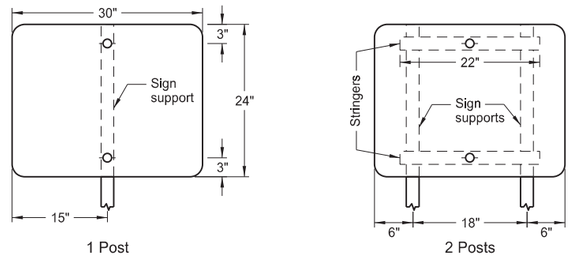
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SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post 2 Posts

Assembly No. 31

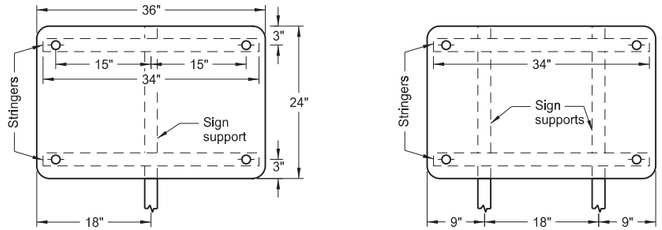


1 Post 2 Posts

Assembly No. 32

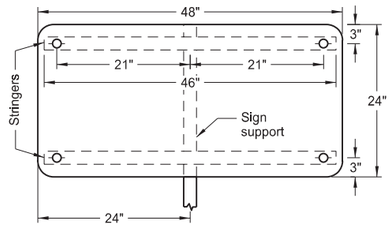
Notes:

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.

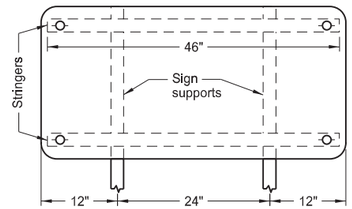


1 Post 2 Posts

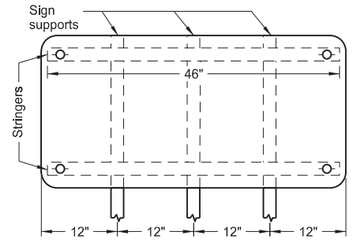
Assembly No. 33



1 Post

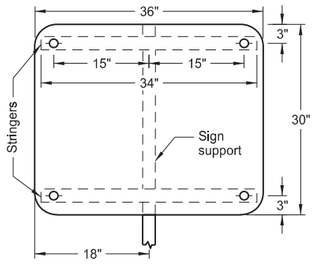


2 Posts

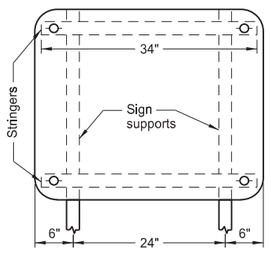


3 Posts

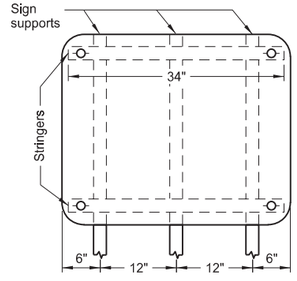
Assembly No. 34



1 Post

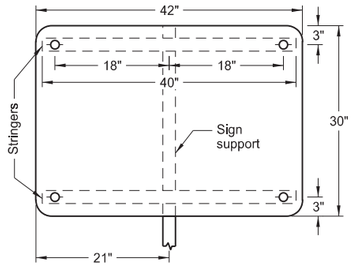


2 Posts

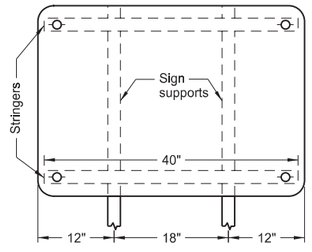


3 Posts

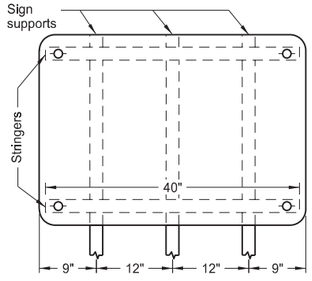
Assembly No. 35



1 Post

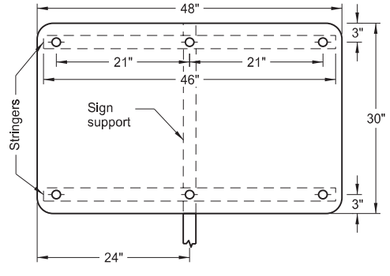


2 Posts

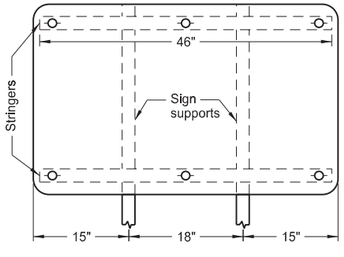


3 Posts

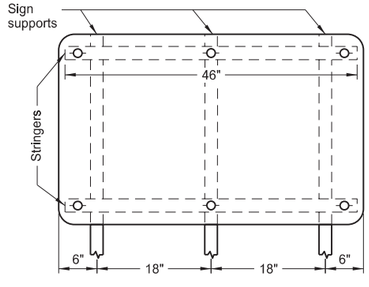
Assembly No. 36



1 Post



2 Posts



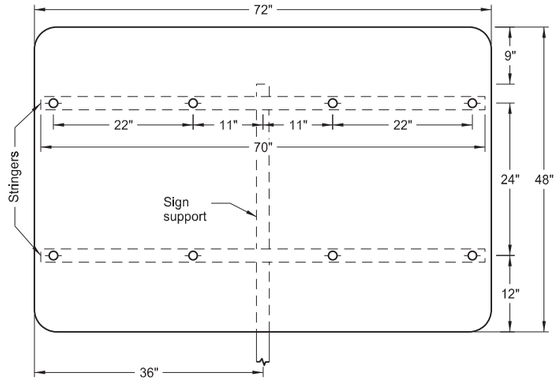
3 Posts

Assembly No. 37

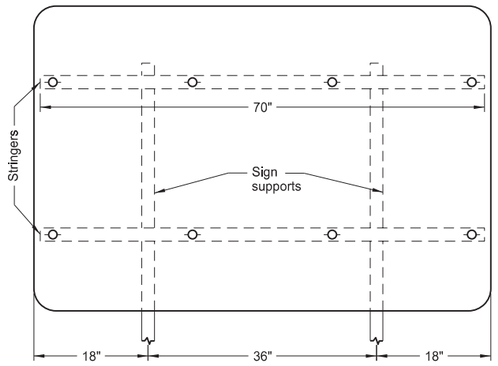
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
8-30-18	Updated notes to active voice.
8-30-19	New Design Engineer PE Stamp.

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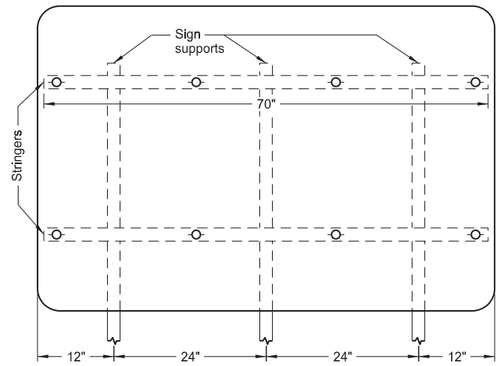
SIGN PUNCHING, STRINGER AND SUPPORT LOCATION DETAILS REGULATORY, WARNING AND GUIDE SIGNS



1 Post



2 Posts

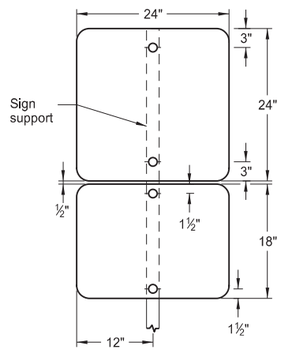


3 Posts

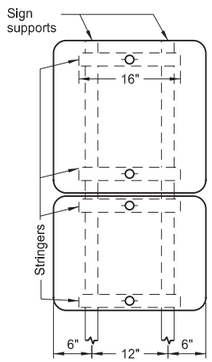
Assembly No. 41

Notes:

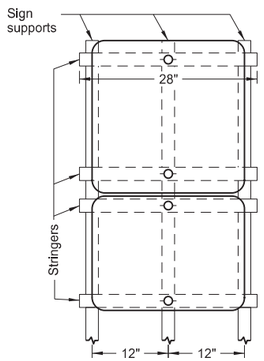
1. Use 0.100 inch minimum thickness sign backing material.
2. Use 1½" x 1½" perforated square tube stringers.
3. Punch holes round for ⅜" bolt.



1 Post

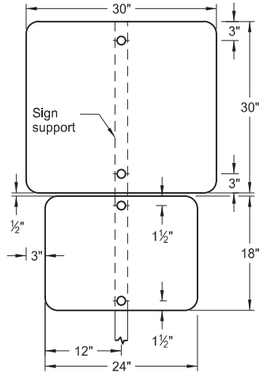


2 Posts

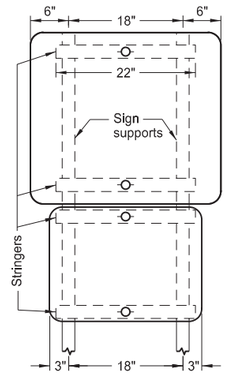


3 Posts

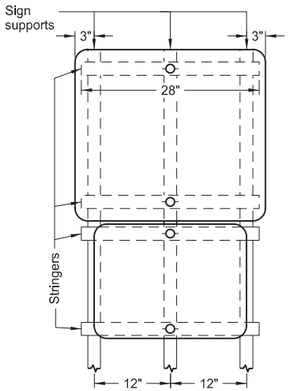
Assembly No. 42



1 Post



2 Posts



3 Posts

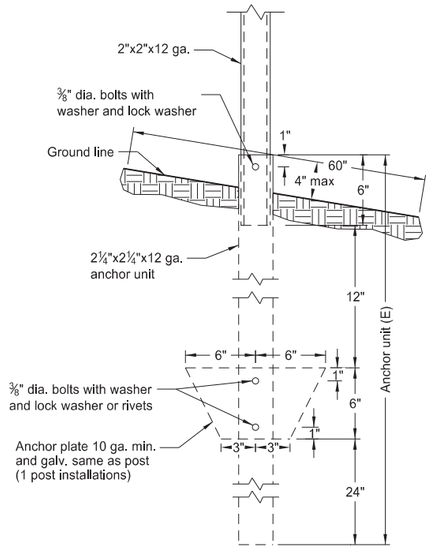
Assembly No. 43

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.

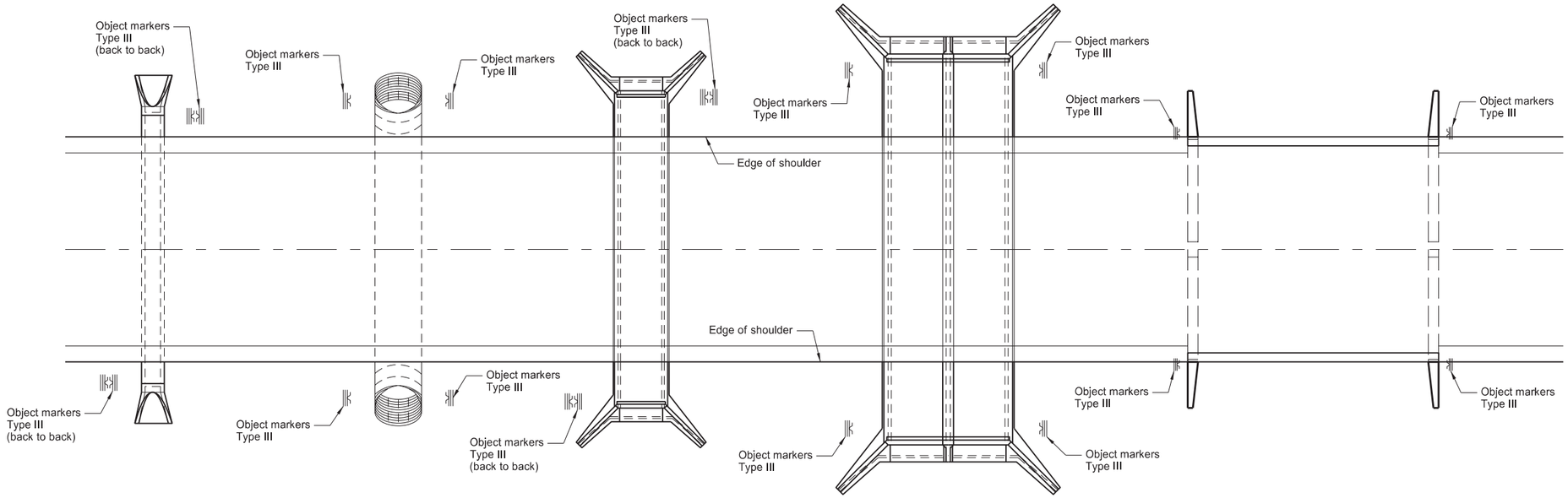
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OBJECT MARKERS

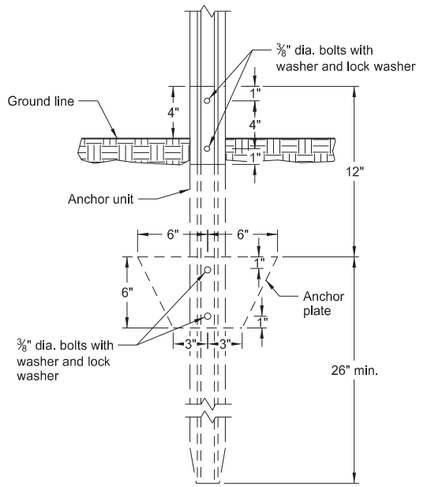
D-754-82



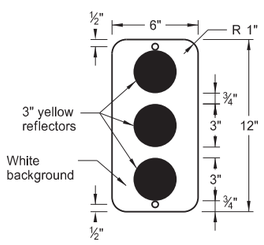
Perforated Tube Anchor Unit Assembly



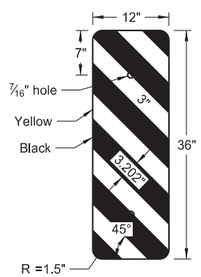
Pipe Culverts 10' max | Pipe Culverts greater than 10' | Box Culverts 10' max | Box Culverts greater than 10' | Bridges (B)



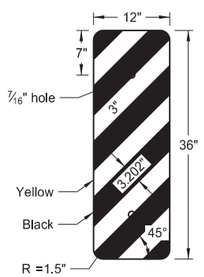
U-Channel Anchor Unit Assembly



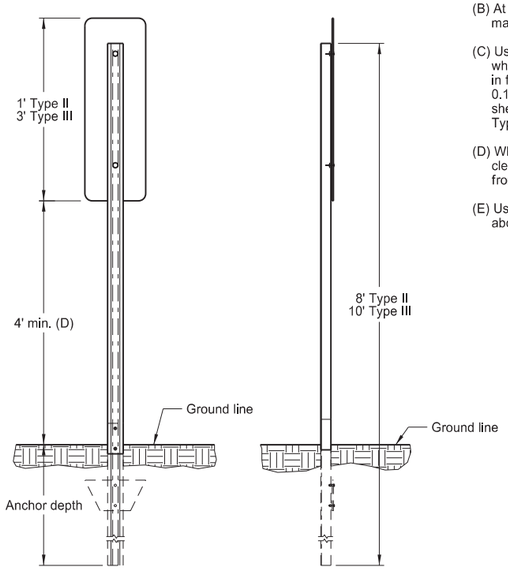
Object Marker
OM2-1V (C)
Type II



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



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



Object Marker
Installation Detail

Notes:

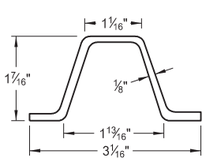
(A) Use ⅜" dia. tension pin type or other non-rust vandal resistant fastener with min. outside dia. $1\frac{3}{16}$" flat washer.

(B) At locations of approach guardrail with reflectors and end terminal with impact head object markers, do not install object markers.

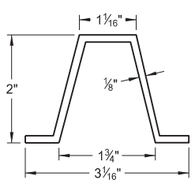
(C) Use two object markers for back to back mountings. On bridges where the distance between wheel guards is less than the approach width, mount object markers vertically on steel posts in front of the bridge railing on each side of highway to mark the horizontal clearance. Use 0.100" minimum thickness sheet aluminum for sign backing material. Use ASTM Type XI sheeting for Type III object markers and ASTM Type IV background sheeting with ASTM Type XI reflectors for Type II object markers.

(D) When object marker is located 8' or less from shoulder or curb, provide 4' minimum vertical clearance from near edge of traveled way to bottom of sign. When located more than 8' from shoulder or curb provide 4' minimum vertical clearance from ground to bottom of sign.

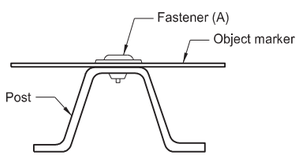
(E) Use 4" vertical clearance for anchor or breakaway base. Provide 4"x60" measurement above and below post location and back and ahead of post.



Steel Post Detail
Approx. 2 lb/ft



Aluminum Post Detail
Approx. 0.88 lb/ft



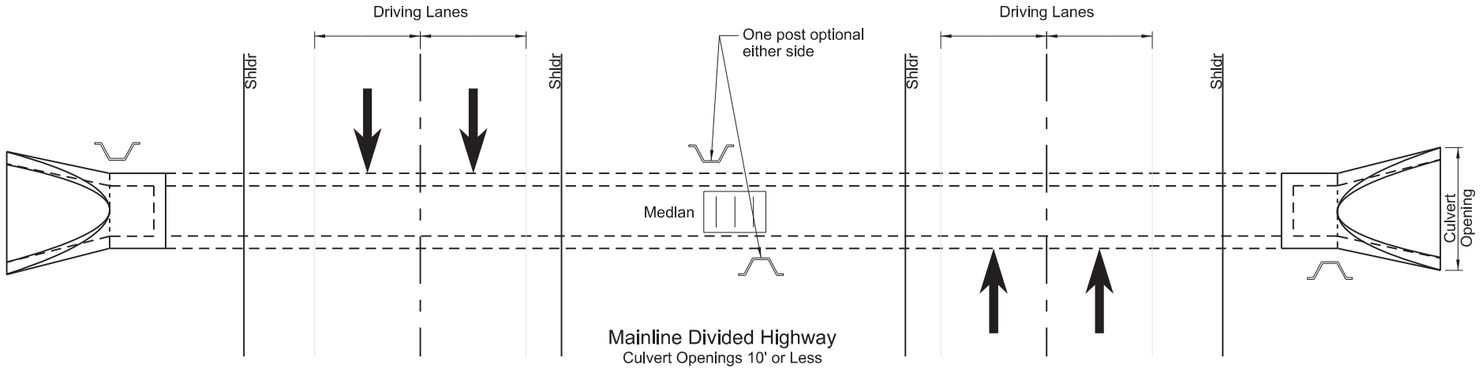
Fastener Detail

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

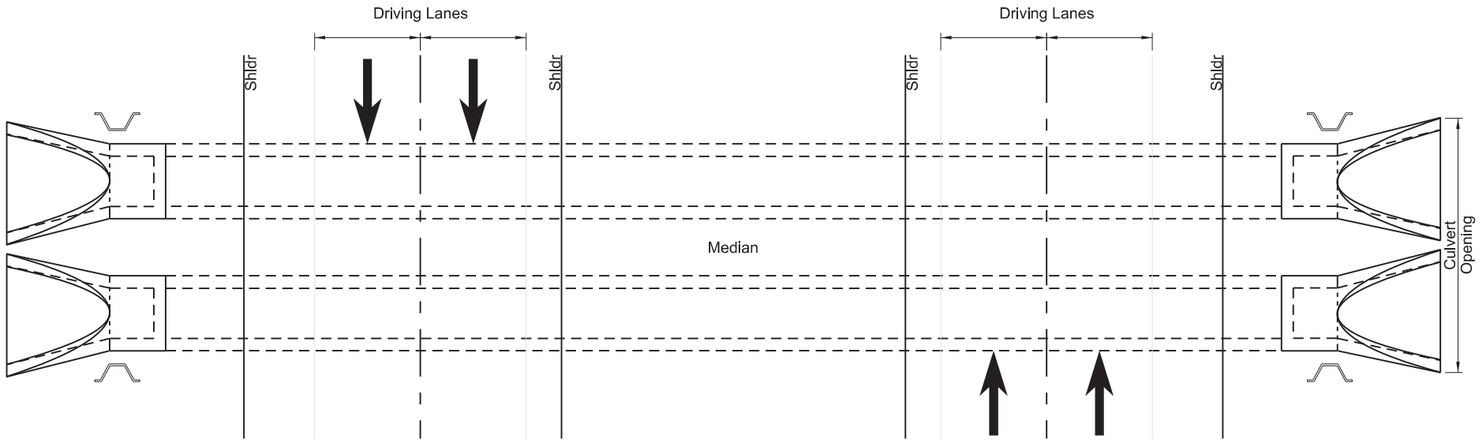
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OBJECT MARKERS - CULVERTS

D-754-83

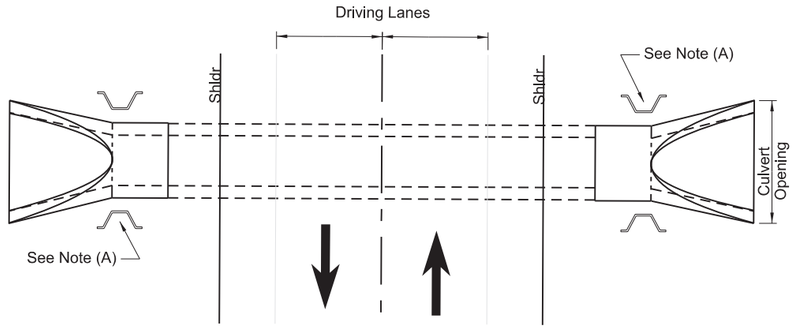


Mainline Divided Highway
Culvert Openings 10' or Less



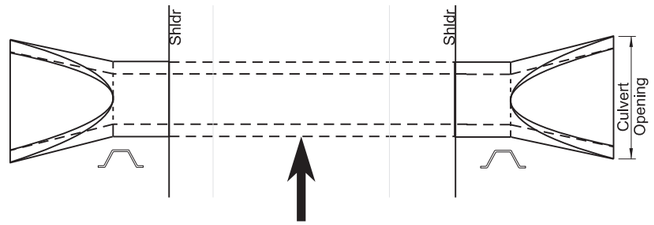
Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations

Post Location

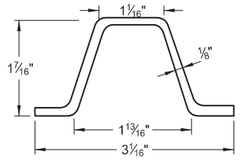


Two-Lane Highway

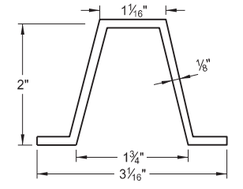
(A) Install additional marker where multiple pipe installations have a width of greater than 10'.



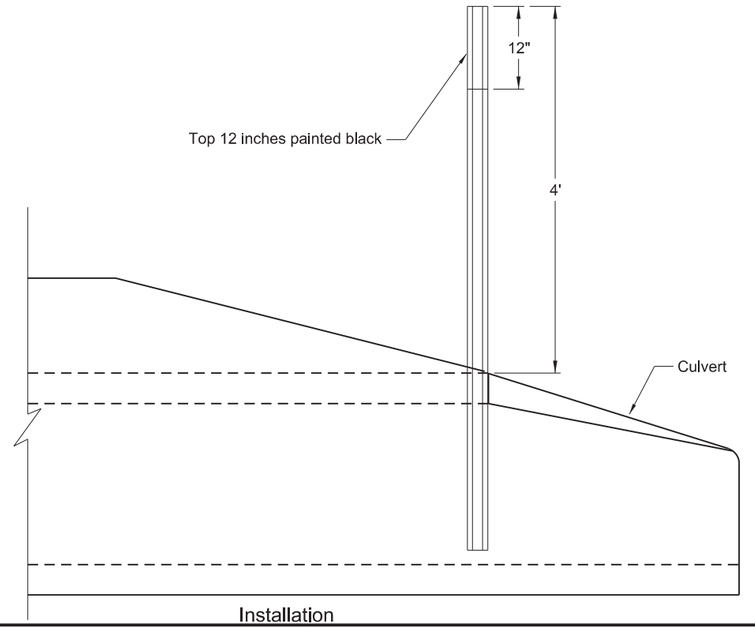
Ramp



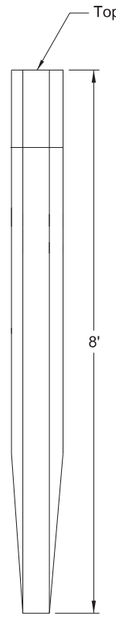
Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft



Installation



U-Type Post

Notes:

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

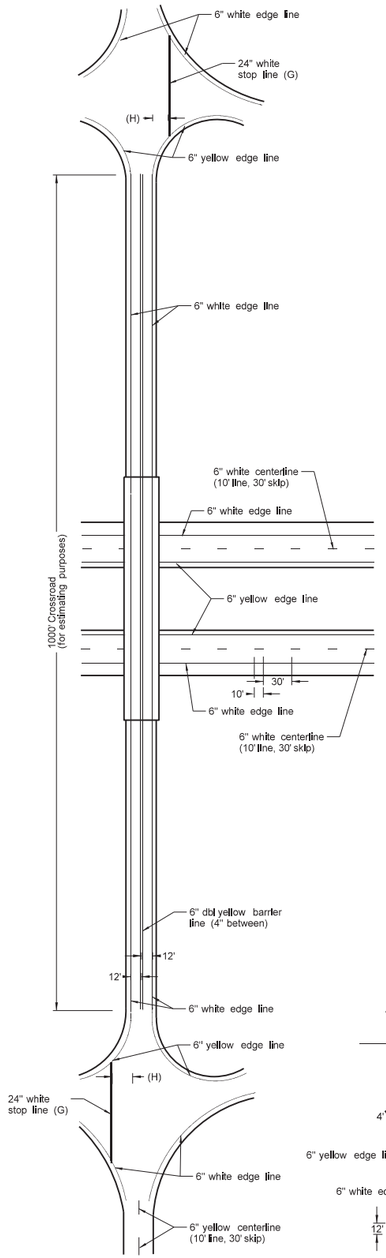
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes
8-30-18	Updated notes to active voice.
9-05-19	New Design Engineer PE Stamp.

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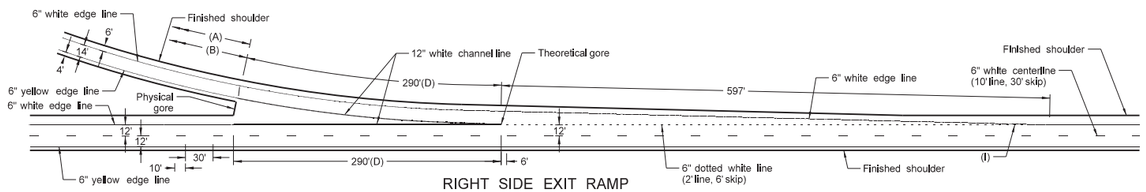
INTERSTATE PAVEMENT MARKING
4 LANE DIVIDED HIGHWAY

D-762-2

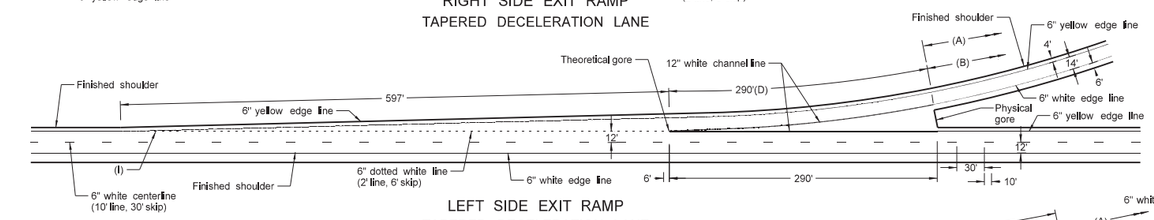


CROSS-ROAD & STRUCTURE

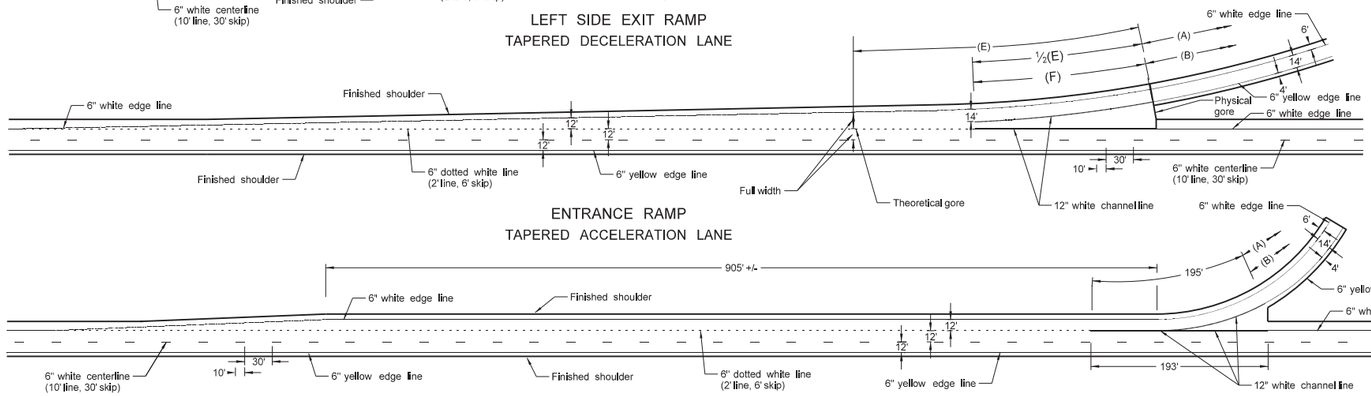
Engineer will determine length striped.



RIGHT SIDE EXIT RAMP
TAPERED DECELERATION LANE

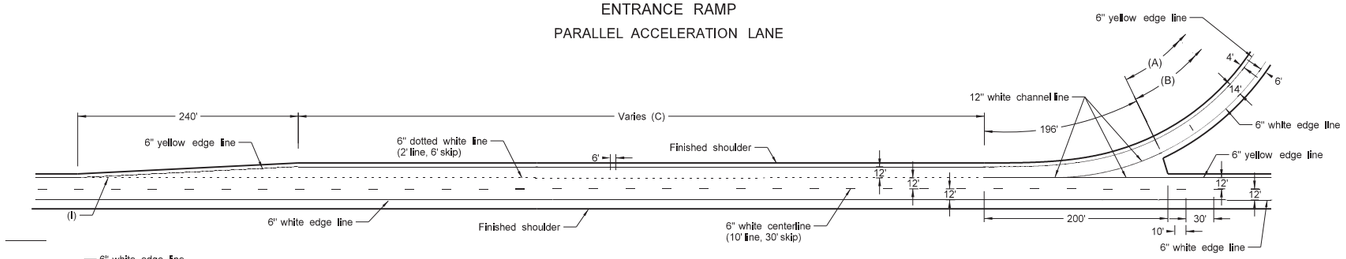


LEFT SIDE EXIT RAMP
TAPERED DECELERATION LANE

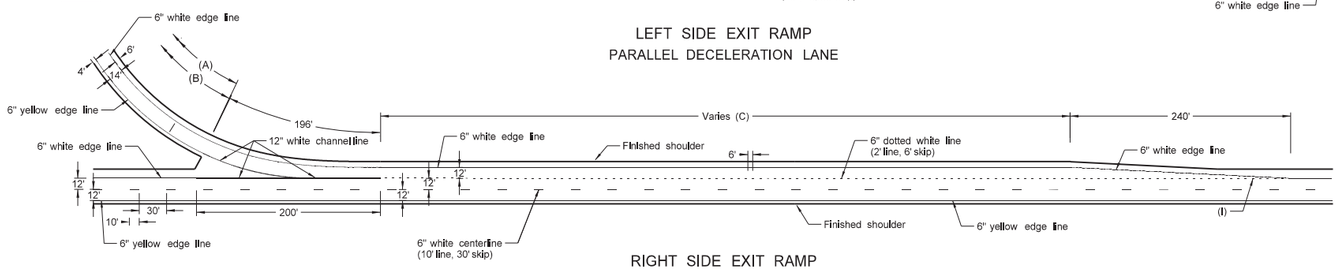


ENTRANCE RAMP
TAPERED ACCELERATION LANE

ENTRANCE RAMP
PARALLEL ACCELERATION LANE



LEFT SIDE EXIT RAMP
PARALLEL DECELERATION LANE



RIGHT SIDE EXIT RAMP
PARALLEL DECELERATION LANE

NOTE:

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

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

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

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

(C) Assume "varies" equals 790' for purpose of estimate. Place pavement marking from beginning of taper to the 12" line.
(D) Beginning of physical gore to theoretical gore.
(E) If the distace is less than 350' extend the 12" channel line to the theoretical gore, otherwise use 195'.
(F) Use 195' for estimating purposes.
(G) Not required for gravel surface crossroad approaches.
(H) 4' minimum, 15' maximum from nearest edge of intersection traveled way.
(I) Extend dotted line until it touches the edgeline.

BASIS OF ESTIMATE		
LOCATION	ITEM	
Right or Left Side Exit Ramp TAPERED	12" White channel line	580 LF
	24" White stop line	60 LF
	6" White dotted line	148 LF
	6" White edge line	1115 LF
	6" Yellow edge line	1075 LF
Entrance Ramp TAPERED	12" White channel line	390 LF
	6" White dotted line	258 LF
	6" White edge line	1270 LF
	6" Yellow edge line	1075 LF
Right or Left Side Exit Ramp PARALLEL	12" White channel line	396 LF
	24" White stop line	60 LF
	6" White dotted line (C)	258 LF
	6" White edge line	1115 LF
	6" Yellow edge line	1075 LF
Entrance Ramp PARALLEL	12" White channel line	388 LF
	6" White dotted line	283 LF
	6" White edge line	1275 LF
	6" Yellow edge line	1075 LF
Main Line (Both Roadways)	6" White lane line, 10' line, 30' skip	2640 LF/MI
	6" White edge line	10,560 LF/MI
	6" Yellow edge line	10,560 LF/MI
Cross Road	6" White edge line	2000 LF
	6" Dbl yellow barrier line (4" between)	2000 LF

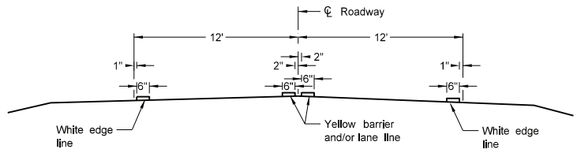
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-3-11	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice
10-25-19	Replaced 2' Max dim with Note (I)
11-05-21	Revised labels
11-22-23	Revised pvmt marking widths
1-17-24	Revised wide pvmt marking width

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

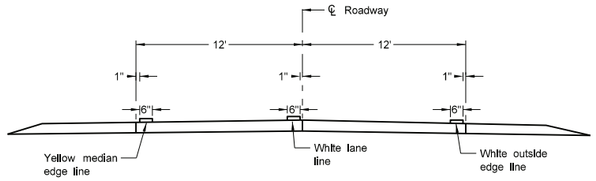
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PAVEMENT MARKING

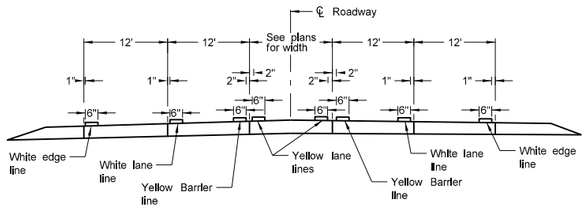
D-762-4



Two Lane Two Way
RURAL ROADWAY



Two Lane Roadway
INTERSTATE HIGHWAY
Concrete Section



RURAL FIVE LANE ROADWAY
Concrete Section

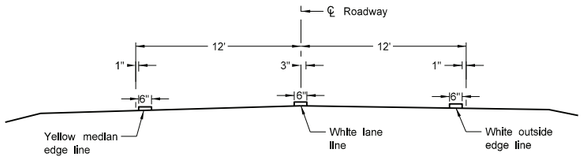
NOTES:

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

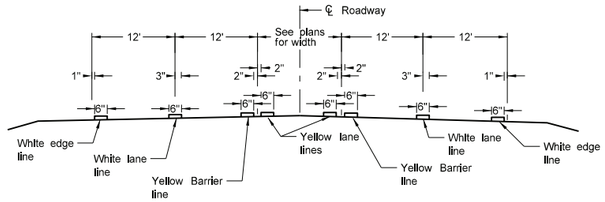
   For section lines, county roads, and street approaches, stripe the radii and edge lines of the paved surface within the right of way except where curb and gutter is present.

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

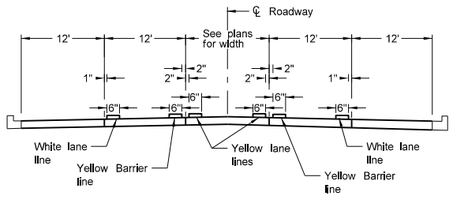
3. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits < 40 mph.



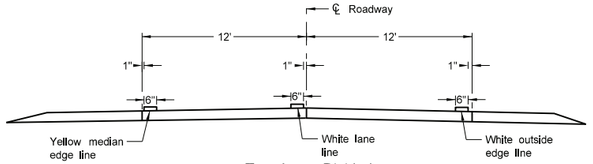
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Asphalt Section



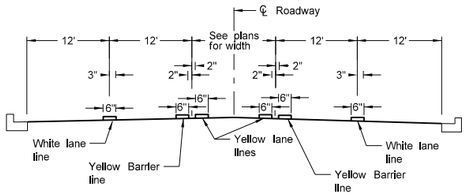
RURAL FIVE LANE ROADWAY
Asphalt Section



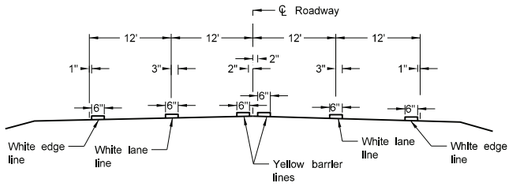
URBAN FIVE LANE SECTION
Concrete Section



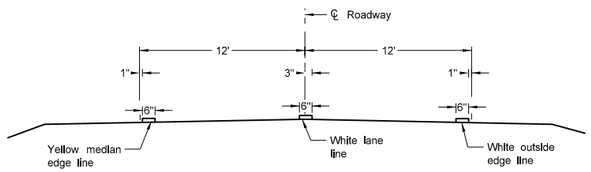
Two Lane Divided
Rural Roadway
PRIMARY HIGHWAY
Concrete Section



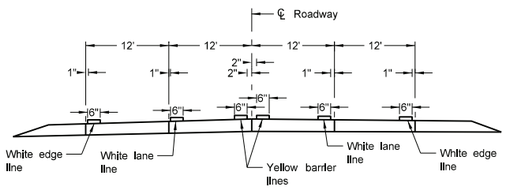
URBAN FIVE LANE SECTION
Asphalt Section



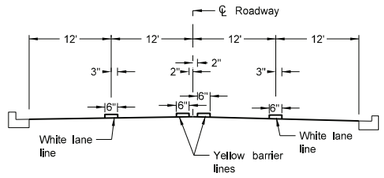
RURAL FOUR LANE ROADWAY
Asphalt Section



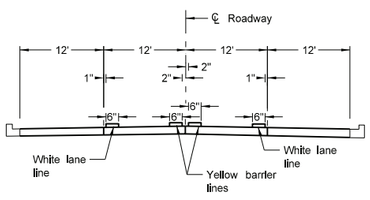
Two Lane Roadway
INTERSTATE HIGHWAY
Asphalt Section



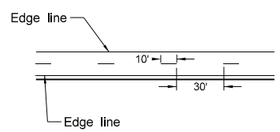
RURAL FOUR LANE ROADWAY
Concrete Section



URBAN FOUR LANE SECTION
Asphalt Section



URBAN FOUR LANE SECTION
Concrete Section



CENTERLINE PAVEMENT MARKING SKIP SPACING DETAIL

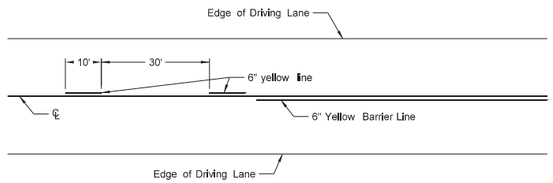
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
12-1-10	
REVISIONS	
DATE	CHANGE
10-17-17	Updated to active voice.
08-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
07-09-24	Modified Note 1.

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

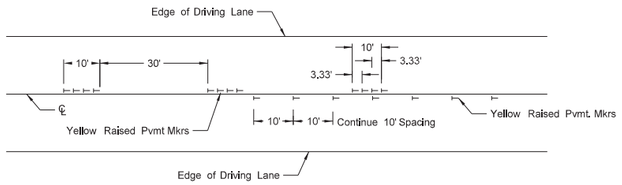
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SHORT-TERM PAVEMENT MARKING

D-762-11

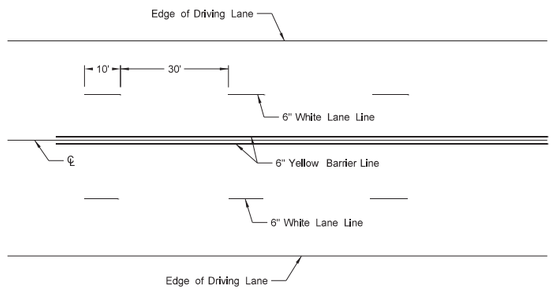


Painted or Tape Lines

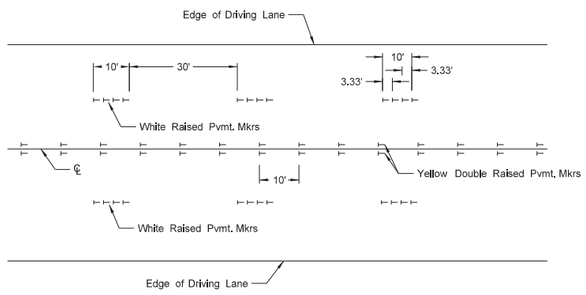


Raised Pavement Markers

TWO-LANE TWO-WAY ROADWAY

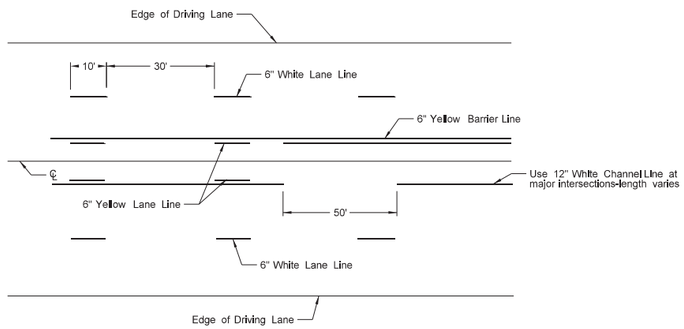


Painted or Tape Lines

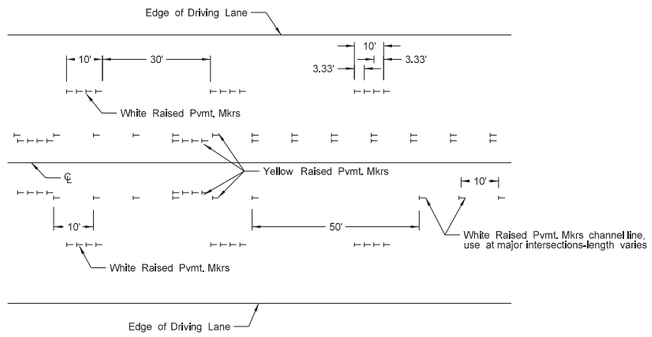


Raised Pavement Markers

FOUR LANE ROADWAY

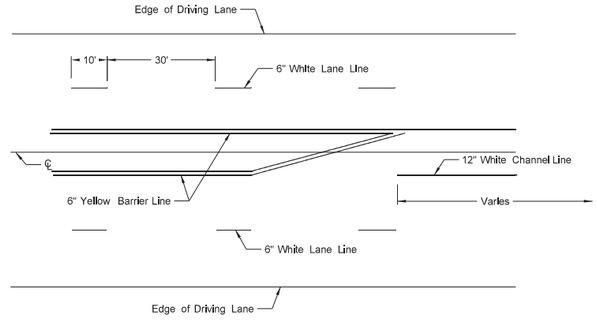


Painted or Tape Lines

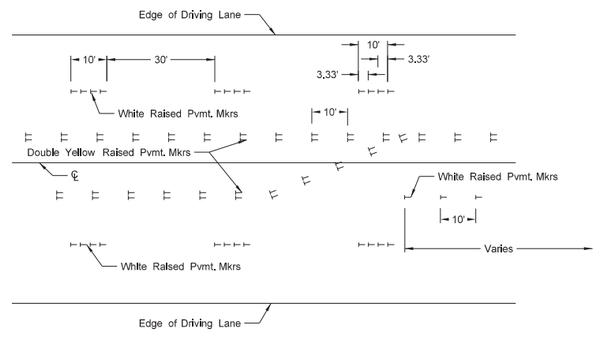


Raised Pavement Markers

FIVE LANE ROADWAY TWO WAY LEFT TURN



Painted or Tape Lines



Raised Pavement Markers

FIVE LANE ROADWAY WITH MARKED ISLANDS

NOTES:

1. Place no passing zones on two-lane two-way roadways as shown. In lieu of short term no passing zone pavement markings, place no passing zone signs. Replace no passing zone signs with short term no passing zone pavement marking within three days.
2. Place short term center line stripe (paint) on top lift to match exact placement of permanent stripe.
3. Remove raised markers and tape markings after permanent pavement marking is installed.
4. Normal width line - 6 inches wide for freeways, expressways, and ramps; 6 inches for all other roadways with speed limits > 40 mph.
5. Use 4 or 6 inch wide pavement marking for all other roadways with speed limits ≤ 40 mph.
6. Wide lines - 8 inches wide if 4 inch normal width lines are used and 12 inches wide if 6 inch normal width lines are used.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

12-1-10

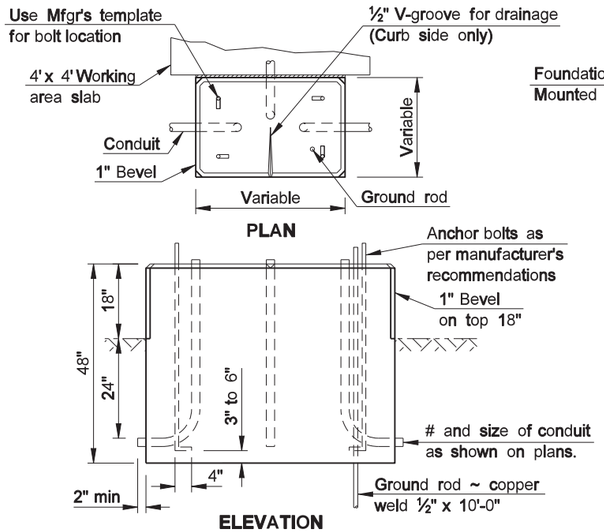
REVISIONS

DATE	CHANGE
3-29-16	Re-numbered to be D-762-11 (previously was D-762-6)
10-17-17	Updated to active voice.
8-27-19	New Design Engineer PE Stamp.
11-22-23	Revised pavement marking widths.
1-17-24	Revised wide pvmt marking width.

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

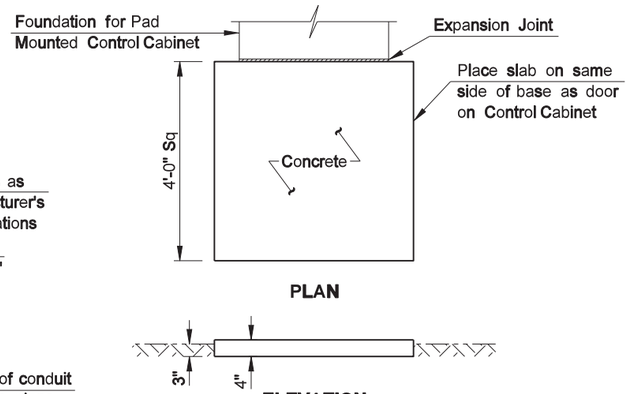
CONCRETE FOUNDATIONS
(TRAFFIC SIGNALS & HIGHWAY LIGHTING)

D-770-1



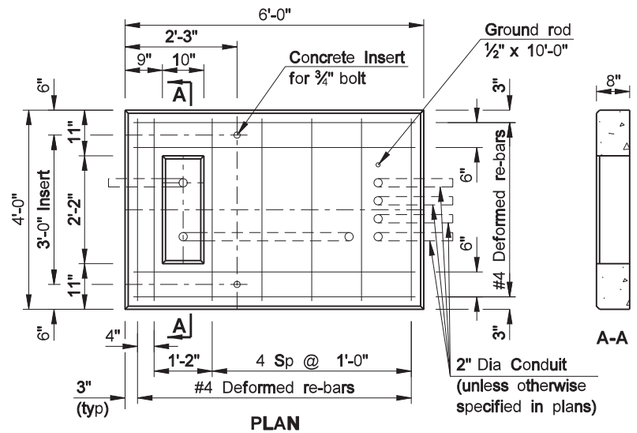
CONTROLLER CABINET FOUNDATION PAD MOUNT

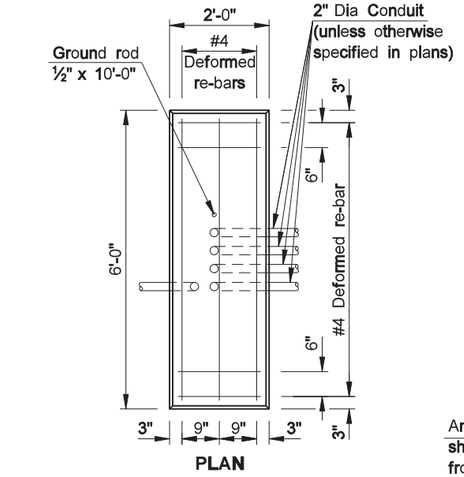
The Controller Cabinet Foundation shall be bid as Concrete Foundation - Traffic Signals.

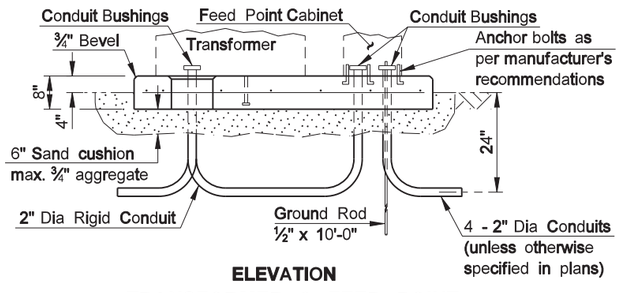


WORKING AREA SLAB

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.

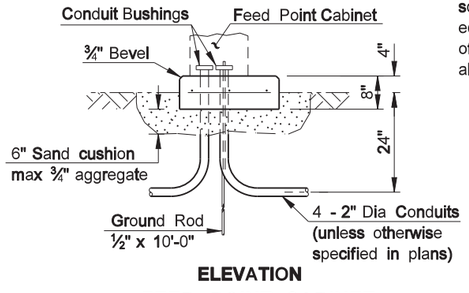






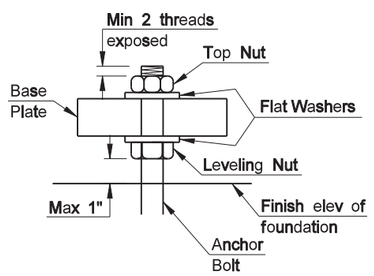
TRANSFORMER & FEED POINT CABINET FOUNDATION PAD MOUNT

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

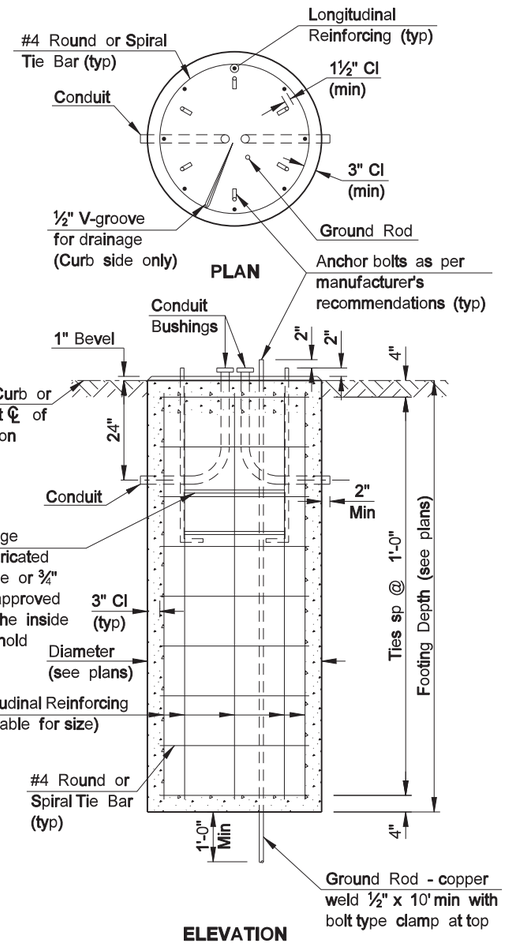


FEED POINT CABINET FOUNDATION PAD MOUNT

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



ANCHOR BOLT DETAIL



LIGHT & SIGNAL STANDARD FOUNDATION

NOTES:

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

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

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

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

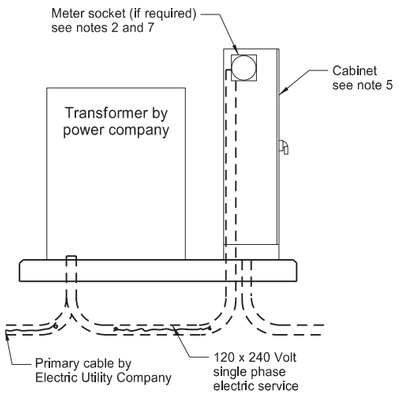
FEED POINT CABINET FOUNDATION PAD MOUNTED: The foundation shall have a wood float finish. All conduits shown shall be installed. Conduit that is not used at this time shall be plugged with an expandable plug.

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

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

This document was originally issued and sealed by Terrence R. Udland Registration Number PE- 2674 , on 6/15/10 and the original document is stored at the North Dakota Department of Transportation

FEED POINTS
(ROADWAY LIGHTING)



Elevation

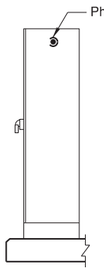
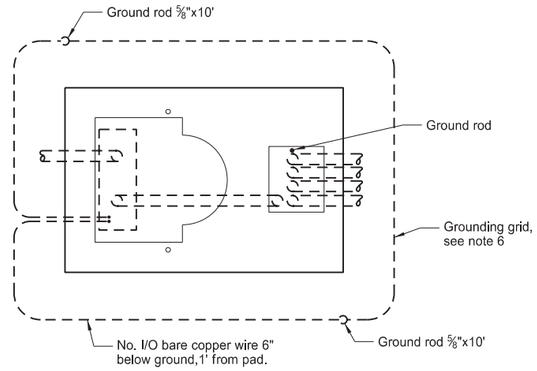
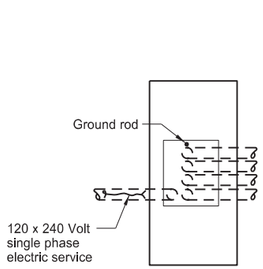


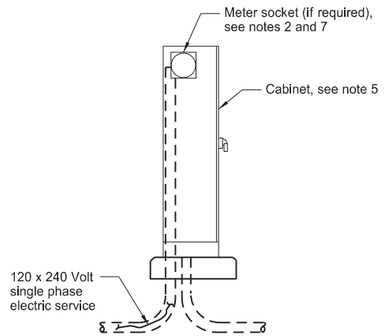
Photo Cell
Mounting Detail



Plan

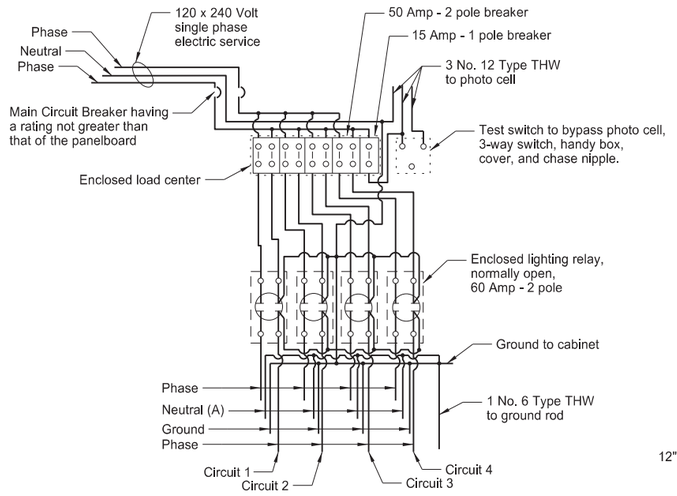
Transformer and Feed Point Cabinet Pad Mounted





Plan Elevation

Feed Point Cabinet Pad Mounted



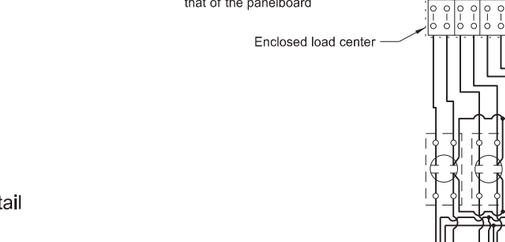
Feed Point Type IV

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

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

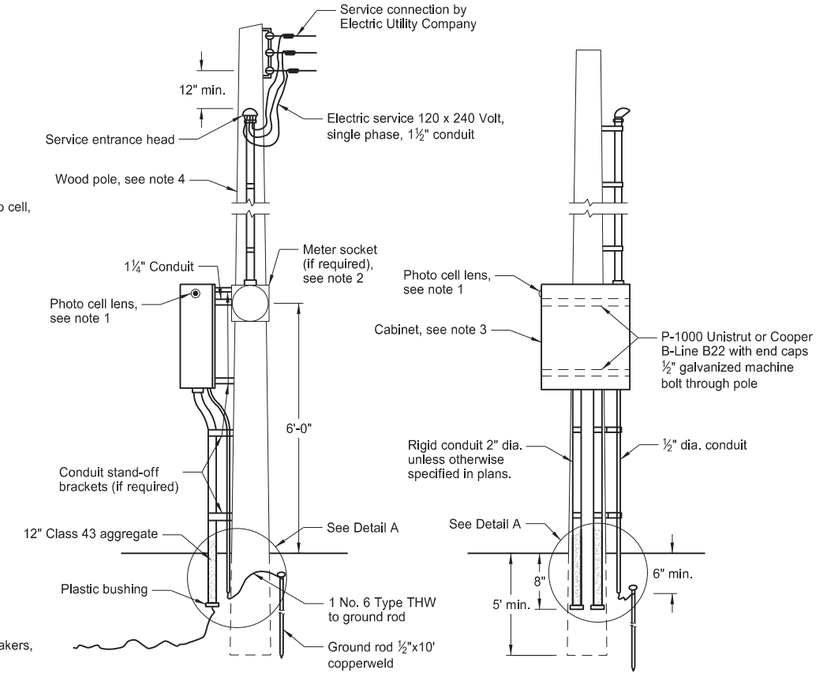
Provide Type III feed point similar to Type IV, except with three electrical circuits, three 50 Amp - 2 pole breakers, and three lighting relays, normally open.

(A) Install when festoon circuit is required.

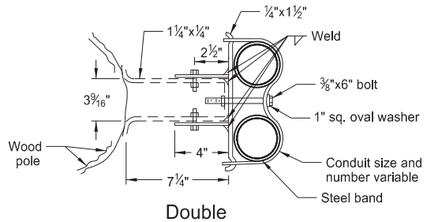


Detail A

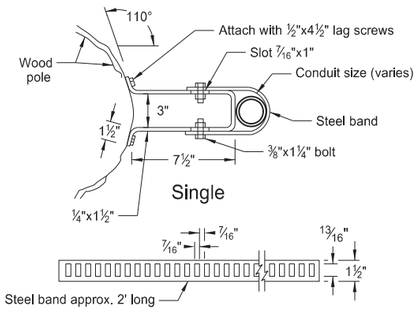
Use this detail for a continuous run of conduit from the feed point to the first light standard.



Feed Point Pole Mounted



Double



Single

Conduit Standoff Bracket

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

Notes:

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

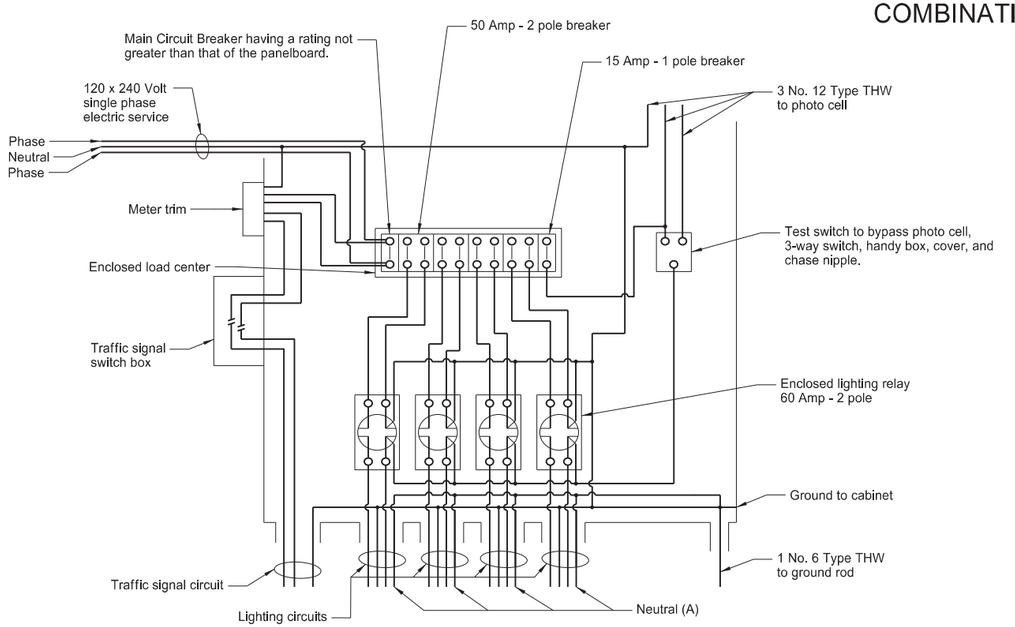
   Provide 30" high x 24" wide x 8" deep Type I and II feed points. Provide 30" high x 42" wide x 10" deep or 36" high x 36" wide x 10" deep Type III and IV feed points.
4. Wood Pole: Provide minimum 20' Class VII full length penta pressure treated wood pole. (if required, see layout sheets)
5. Pad Mounted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

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 voice. New Design Engineer PE Stamp.

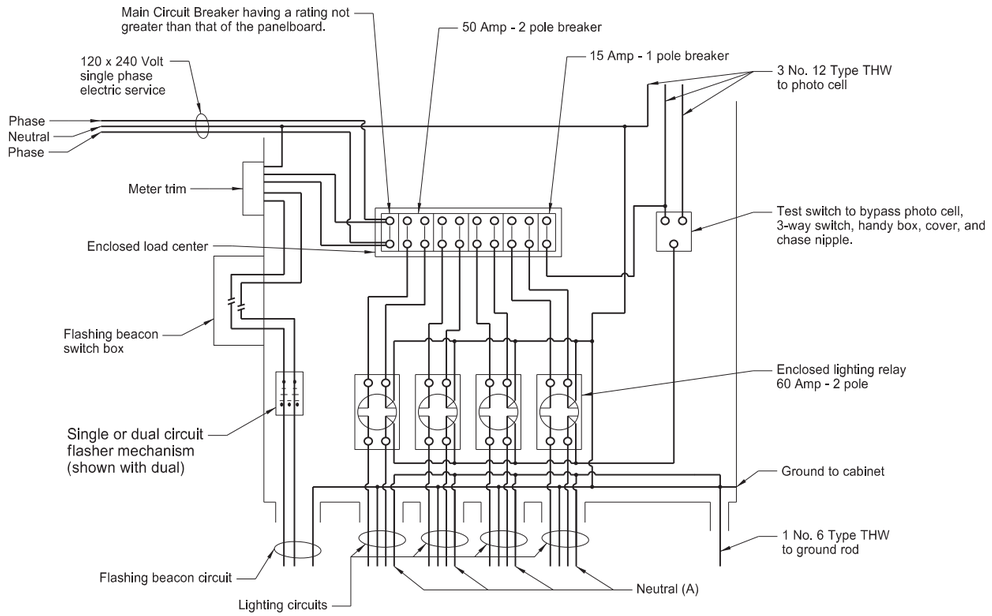
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/28/19 and the original document is stored at the North Dakota Department of Transportation

COMBINATION FEED POINT DETAILS

D-770-2A



Combination Lighting and Signal
Feed Point Type IV



Combination Lighting and Flashing Beacon
Feed Point Type IV

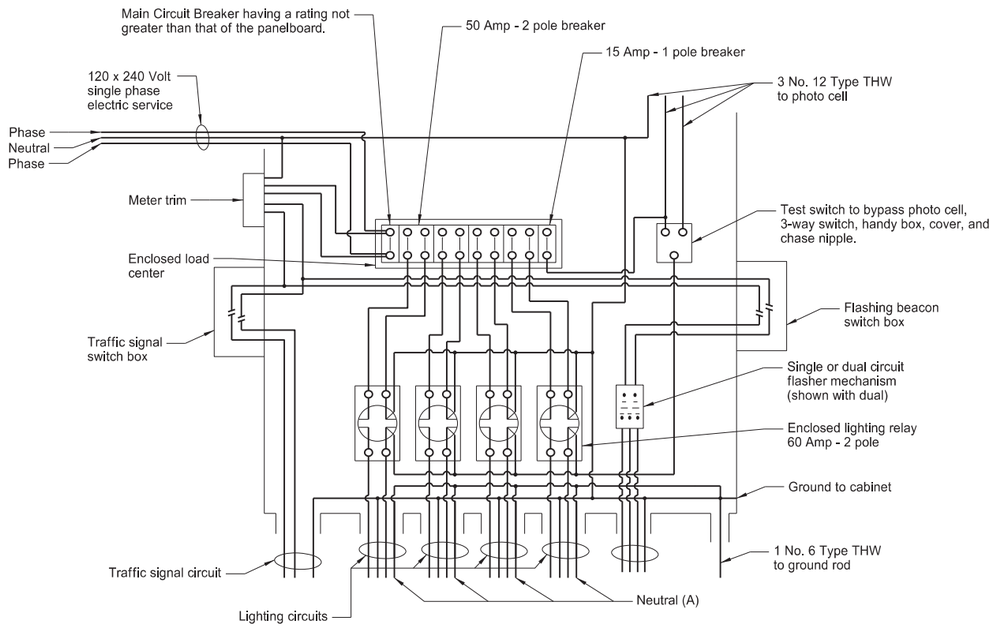
Notes:

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

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

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

(A) Install when festoon circuits are required



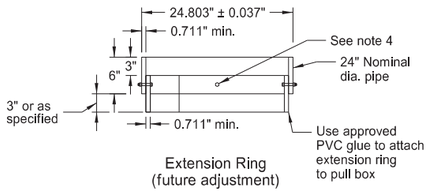
Combination Lighting, Signal, and Flashing Beacon
Feed Point Type IV

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.

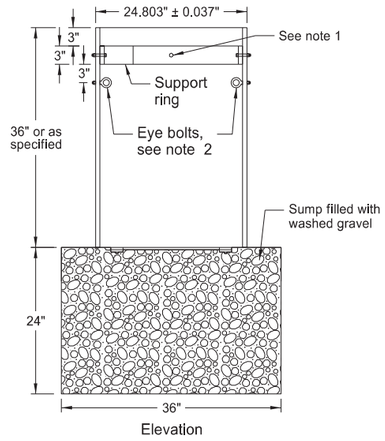
This document was originally issued and sealed by Kirk J Hoff, Registration Number PE-4683, on 8/28/19 and the original document is stored at the North Dakota Department of Transportation

PULL BOX DETAILS

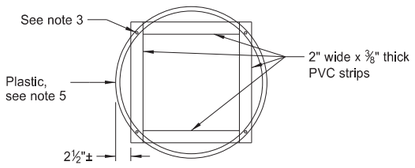
D-770-3



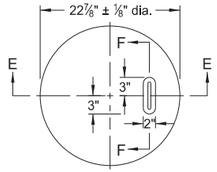
Extension Ring
(future adjustment)



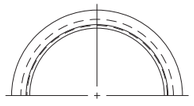
Elevation



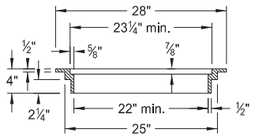
Bottom View



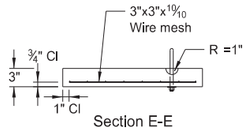
Concrete Cover



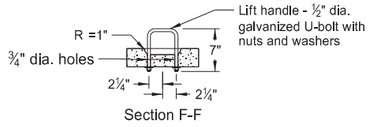
Half Top View



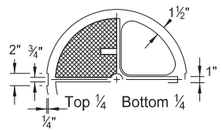
Section Frame

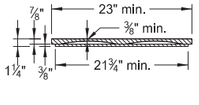


Section E-E



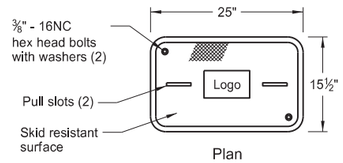
Section F-F



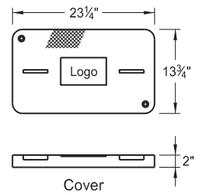


Section Cover

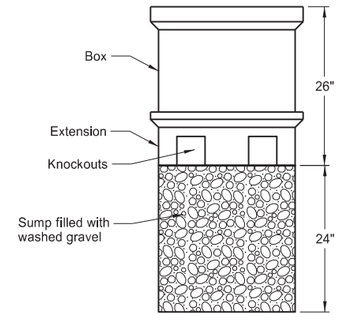
Cast Iron Frame and Cover



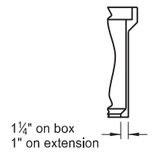
Plan



Cover



Elevation



Polymer Concrete Pull Box

Note: Polymer concrete reinforced by a heavy weave fiberglass

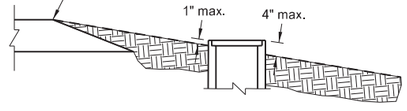
Polymer Concrete Pull Box Notes:

1. Place top of pull box flush with surfaced area and approximately one inch above earth or sodded areas on level surfaces.
2. Provide at least one knockout per side in pull box.
3. Provide Polymer Concrete pull box meeting Tier 22 as per ANSI / SCTE 77.

PVC Pull Box

PVC Pull Box Notes:

1. Attach split 24" nominal diameter PVC cover support ring with four ⅜" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
2. Two type 2 shoulder eye bolts, ⅜" dia. x 1¼" shank length with hex nuts 180 degrees apart (for lifting pull box and supporting electric cable).
3. Four ¼" x 1¼" long galvanized lag screws. Screw assembly together.
4. Attach split 24" nominal diameter PVC cover support extension ring with four ⅜" dia. x 2" long stainless steel hex head bolts with nuts at 90 degrees apart.
5. Bolt assembly together.
6. Size conduit holes in barrel section a maximum of 1" larger than size of conduit being used.
7. After pull box and conduit installation, make inside walls and cover water tight to the satisfaction of the Engineer.
8. PVC pipe to meet requirements of ASTM F679T-1 or equal.
9. Use austenitic stainless steel hex head bolts and nuts. Galvanize other fasteners as per AASHTO M-232.
10. Coat concrete cover on top and sides with an approved epoxy coating. Apply light gray, clear, or neutral color epoxy protective coating as recommended by the manufacturer. Clean the surfaces of concrete receiving the epoxy protective coating by wire brush and dry before application.
11. Cast Iron Cover castings shall be gray iron as per AASHTO M 105, Class 35B.



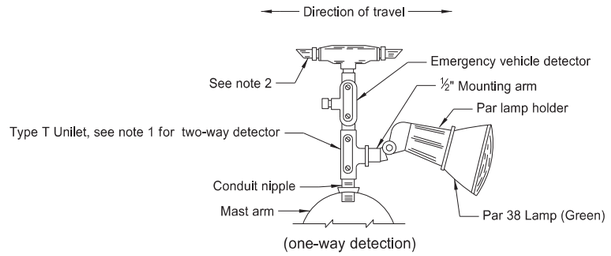
Typical Pull Box in Rural Section

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

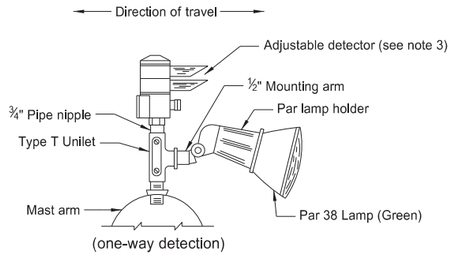
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LIGHTING AND SIGNAL DETAILS

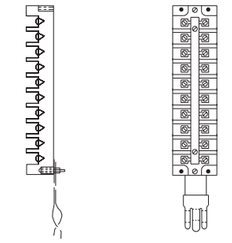
D-770-4



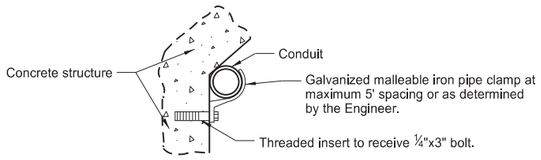
Emergency Vehicle Detector Detail



Alternate Emergency Vehicle Detector Detail (adjustable)

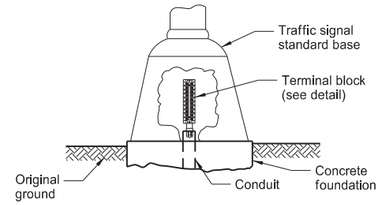


Terminal Block Detail

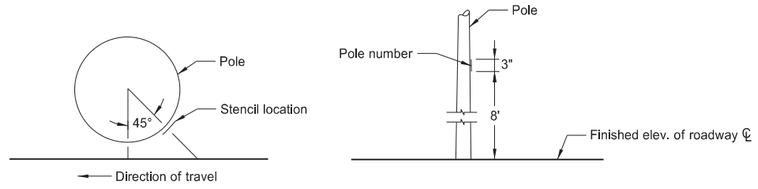


Bridge Mounted Conduit Hanger

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.

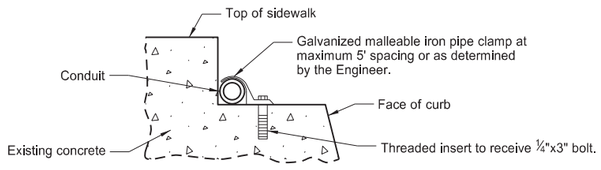


Terminal Block
(rigid mounted)

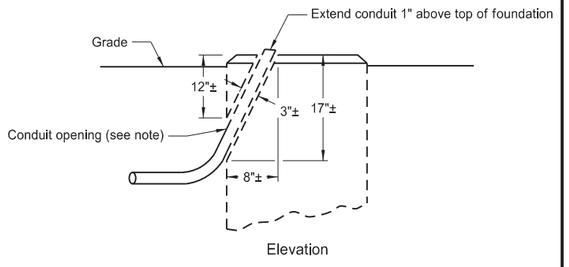


Light Standard Numbering

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.

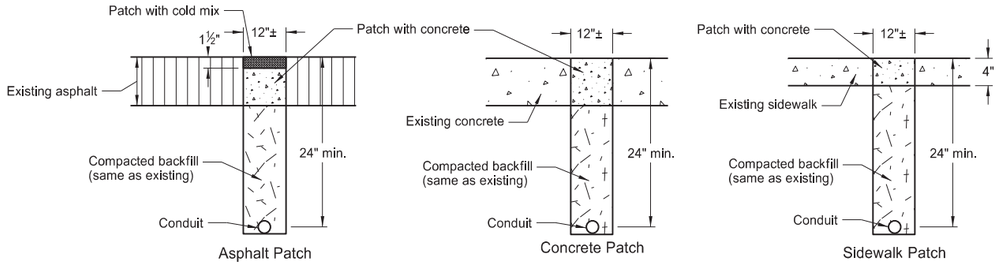


Bridge Curb Mounted Conduit



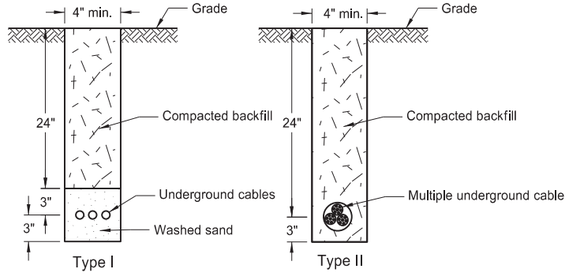
Revise Concrete Foundation

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

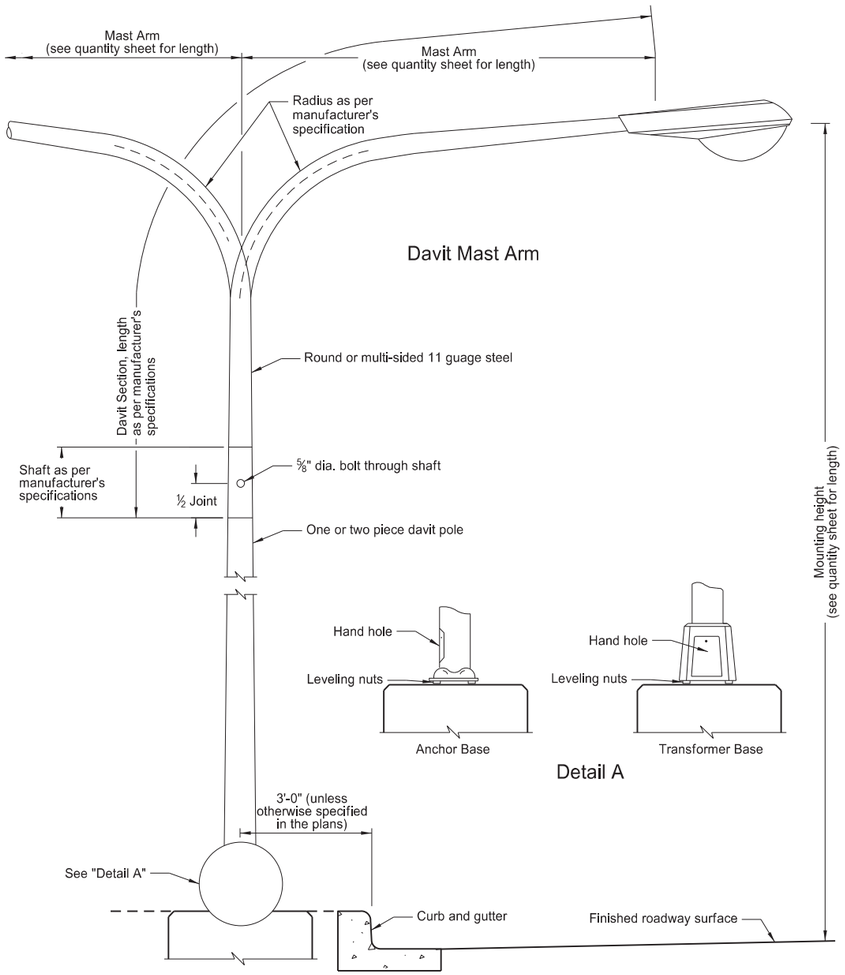
Note: Sod entire area disturbed by trenching, unless directed otherwise by the Engineer.

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

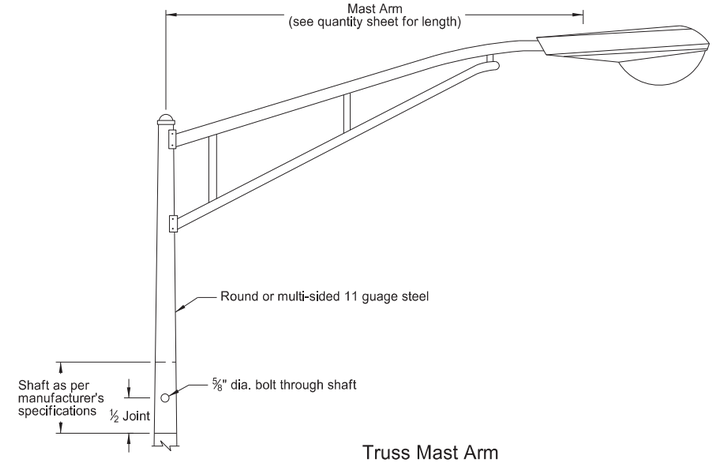
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LIGHT STANDARD DETAILS

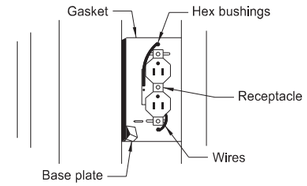
D-770-5



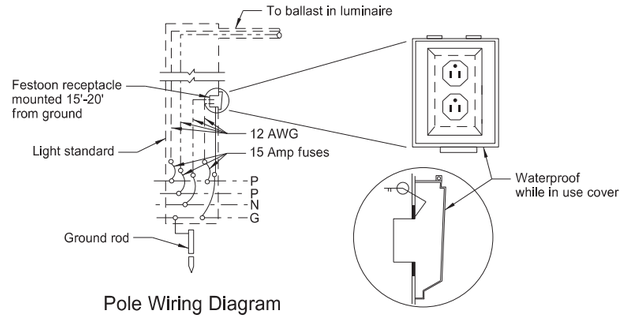
Light Standard Details



Truss Mast Arm



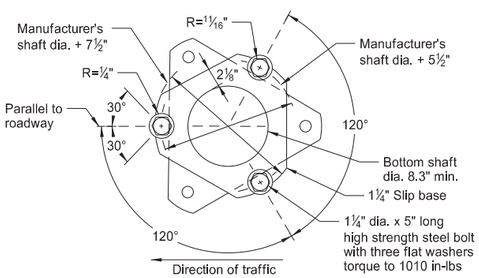
Optional: Festoon receptacle
mounted on multi-sided pole.



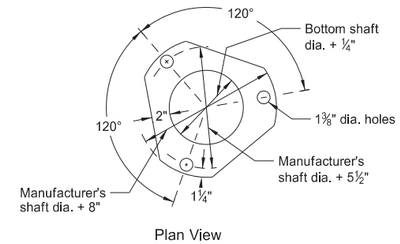
Pole Wiring Diagram

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:

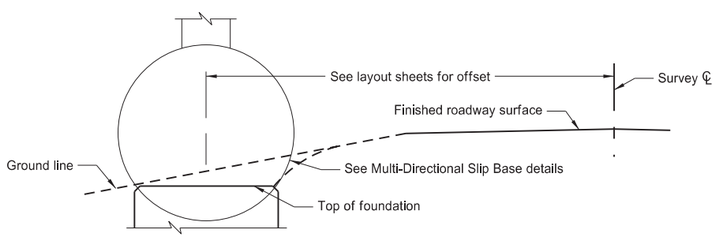
Light Standard Locations: The minimum offset distance from the curb face is 3 feet. Offset light standards at least 3 feet in urban areas and where speeds are less than 30 mph. Where speeds are 30 mph or more, place light standards at least 16 feet from the driving lane.

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

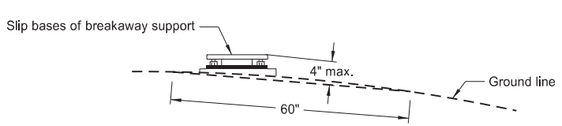
Luminaire: Use internal ballast-constant wattage 120x240 voltage. See layout sheets for type of luminaire, wattage, I.E.S. distribution, and operating system.

Fusing: Fusing in base, see specifications.

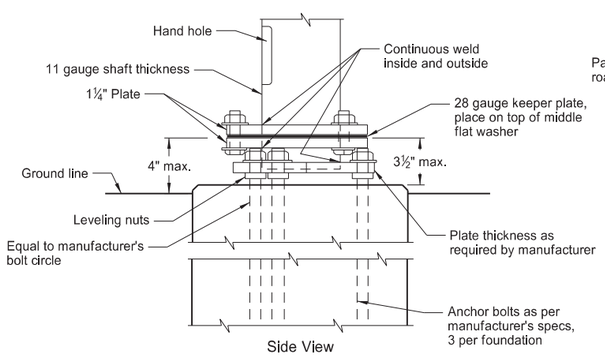
Slip Base Bolt Torque Procedure:
1. Tighten all bolts the maximum possible with 12" to 15" wrench to bed washers and to clean bolt threads, then loosen.
2. Retighten bolts with a systematic order to prescribed torque.
3. Loosen each bolt and retighten to prescribed torque in the same order as initial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



Concrete Foundation Location

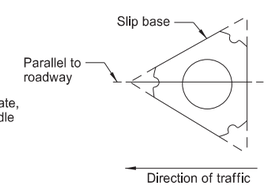


Breakaway Support Stub Clearance Diagram

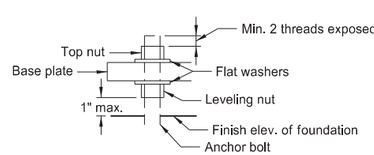


Side View

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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