DESIGN DATA				
Traffic	Average Daily			
Current 2015	Pass: 2875	Trucks: 1115	Total: 3990	
Forecast 2035	Pass: 4285	Trucks: 1830	Total: 6115	
Clear Zone Dist. N/A		Design Speed: 75		
Minimum Sight Dist. for Stopping:		Bridges: N/A		
Full Control of Access, No Point of Access Other Than at Interchange Ramps				
Pavement Design Life N/A (years)				
Design Accumulated One-way N/A ESALs: N/A				

	STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	21302	1	1

JOB # 6
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

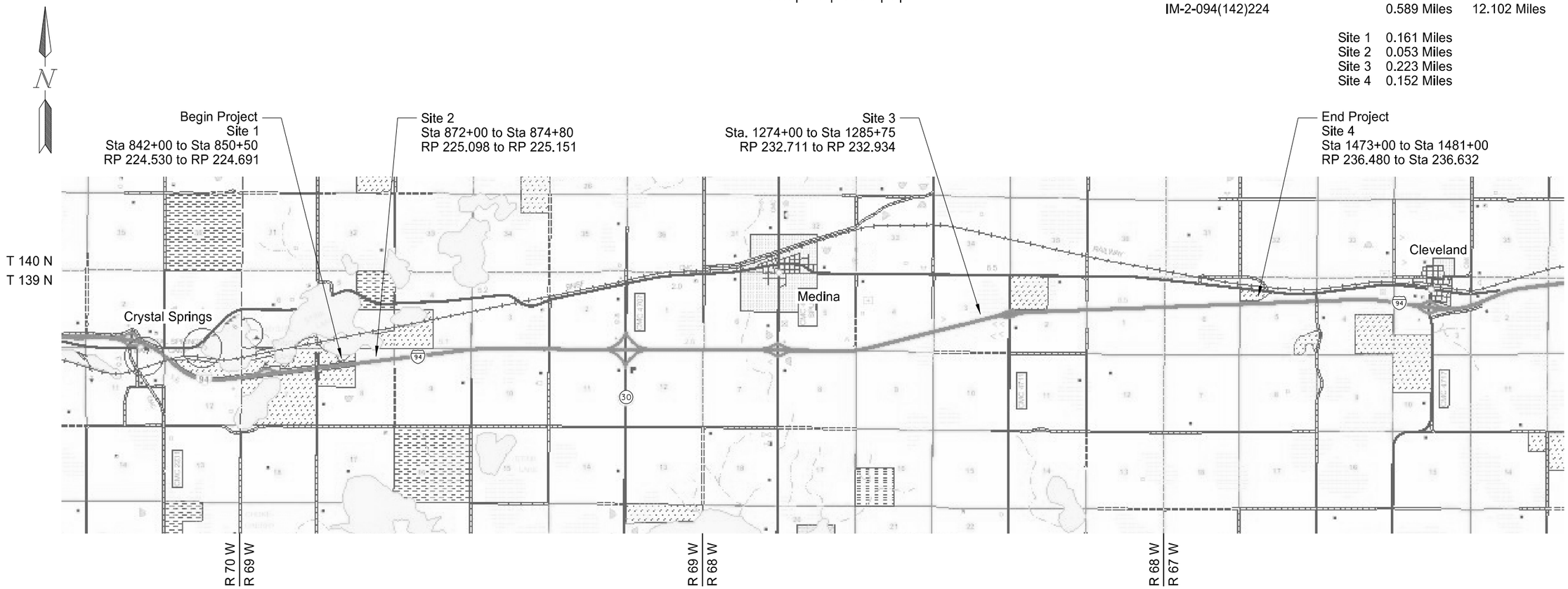
IM-2-094(142)224

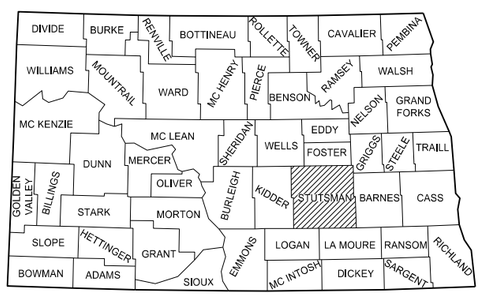
Stutsman County
Westbound I-94 near Crystal Springs, Medina, and Cleveland
Inslope Repair & Riprap

GOVERNING SPECIFICATIONS:
2014 Standard Specifications adopted by the North Dakota Department of Transportation and the Supplemental Specifications effective on the date the project is advertised.

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
IM-2-094(142)224	0.589 Miles	12.102 Miles

Site 1 0.161 Miles
Site 2 0.053 Miles
Site 3 0.223 Miles
Site 4 0.152 Miles





STATE COUNTY MAP

DESIGNERS

Adam McMahon /s/

DISTRICT REVIEW

Jay Praska /s/
NDDOT - Valley City Assistant Distirct Engineer

APPROVED DATE 4/12/16

Roger Weigel /s/
OFFICE OF PROJECT DEVELOPMENT
ND DEPARTMENT OF TRANSPORTATION

I hereby certify that the attached plans were prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the state of ND.

APPROVED DATE 04/07/2016

Daniel R. Viau /s/
NDDOT - Valley City District

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	2	1

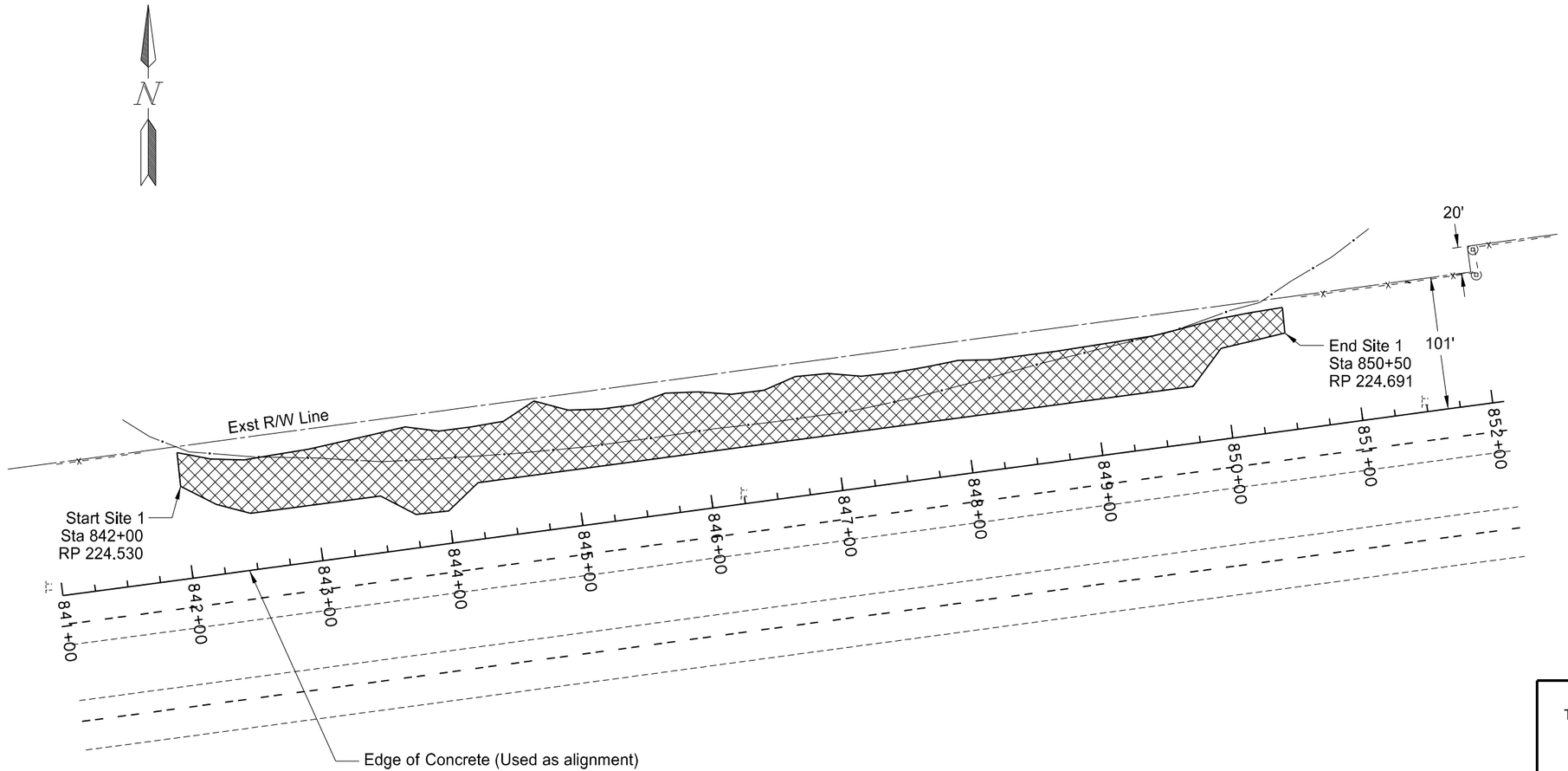
TABLE OF CONTENTS

PLAN SECTIONS

SPECIAL PROVISIONS

LIST OF STANDARD DRAWINGS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	4	1



Legend

Inslope Repair & Riprap

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Scope of Work

Site 1
0.75 Miles East of Crystal Springs Rest Area
Westbound I-94

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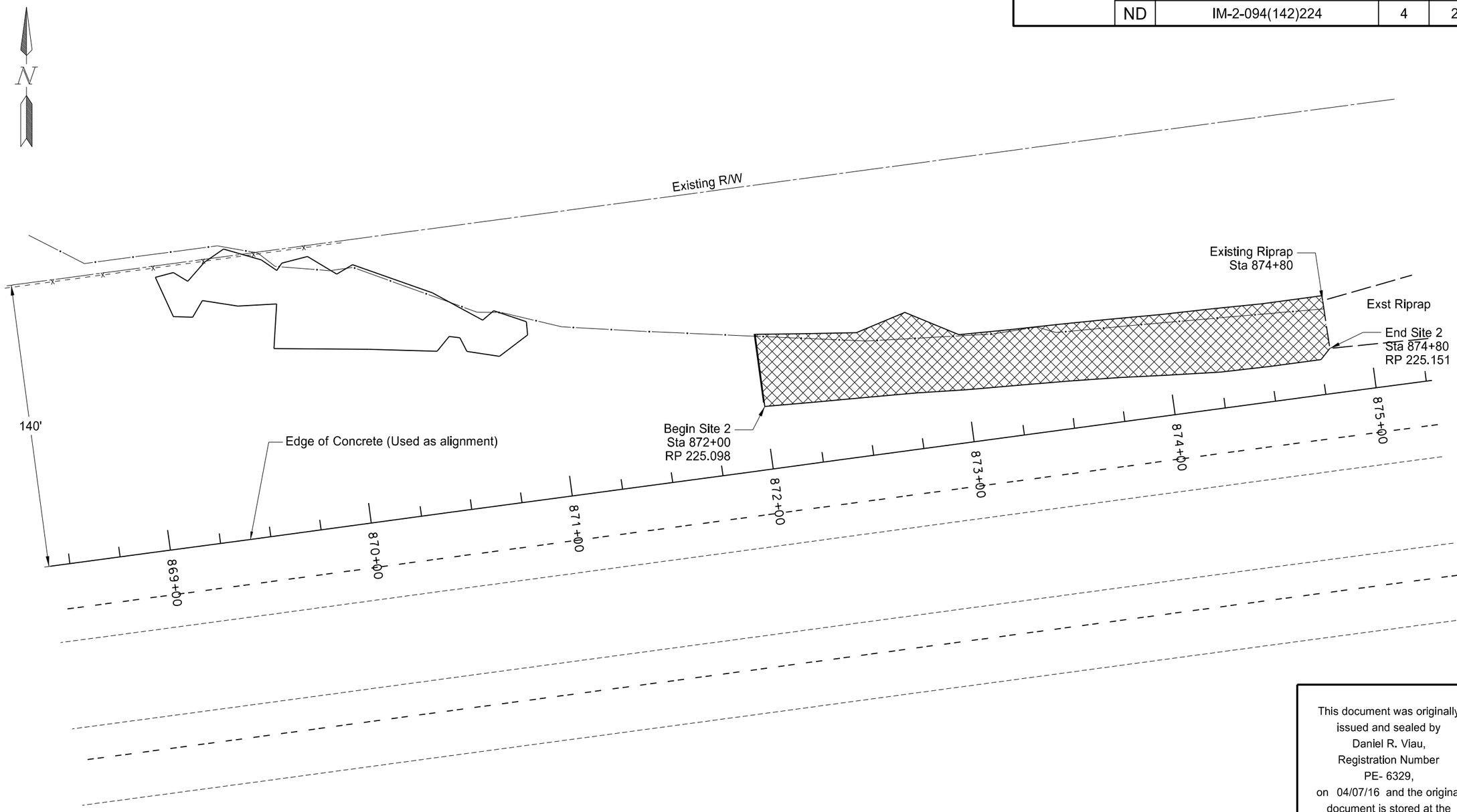
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	4	2



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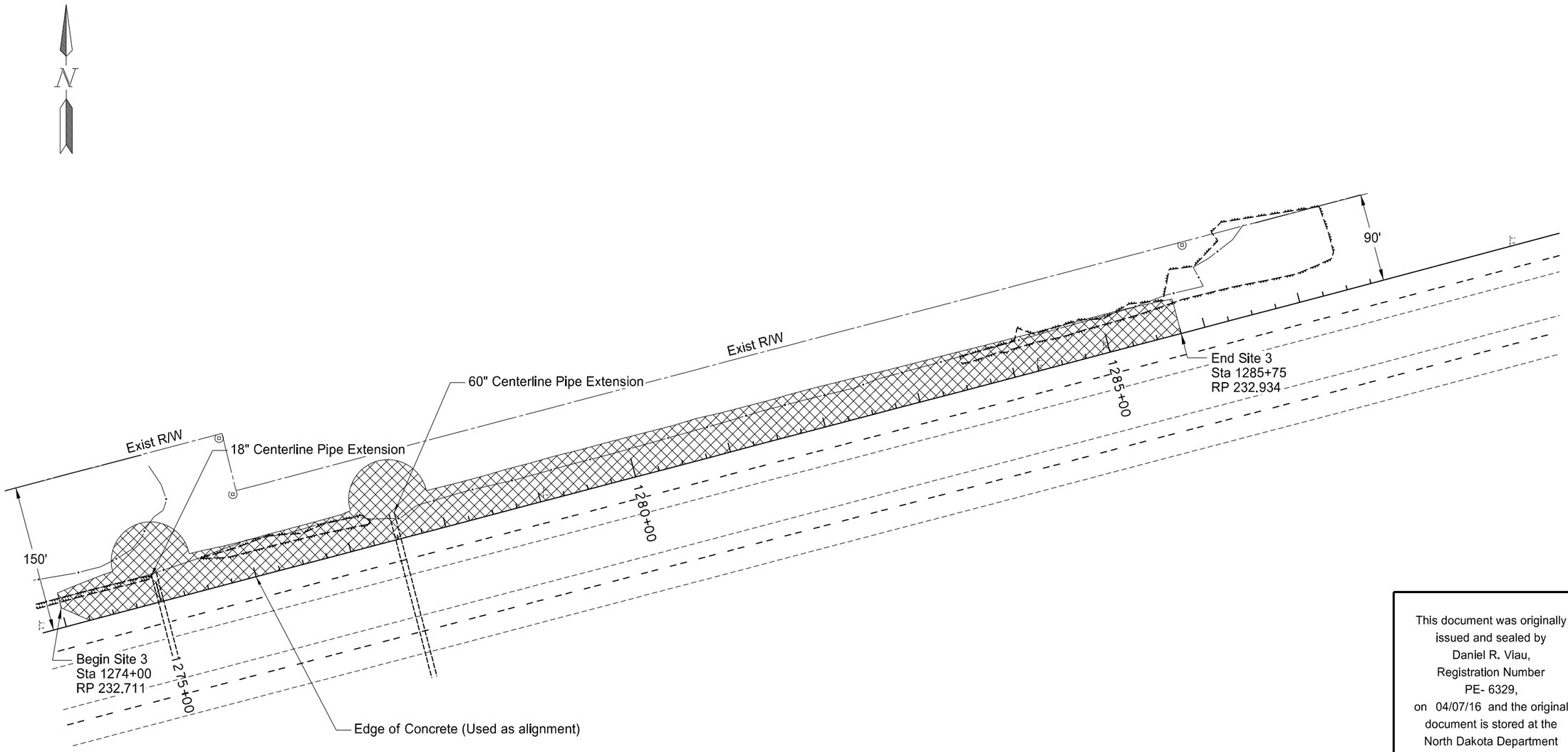
Legend

Inslope Repair & Riprap

Scope of Work

Site 2
1.3 Miles East of Crystal Springs Rest Area
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	4	3



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Legend

Erosion Repair & Riprap

Scope of Work

Site 3
2.24 Miles East of Medina Interchange
Westbound I-94

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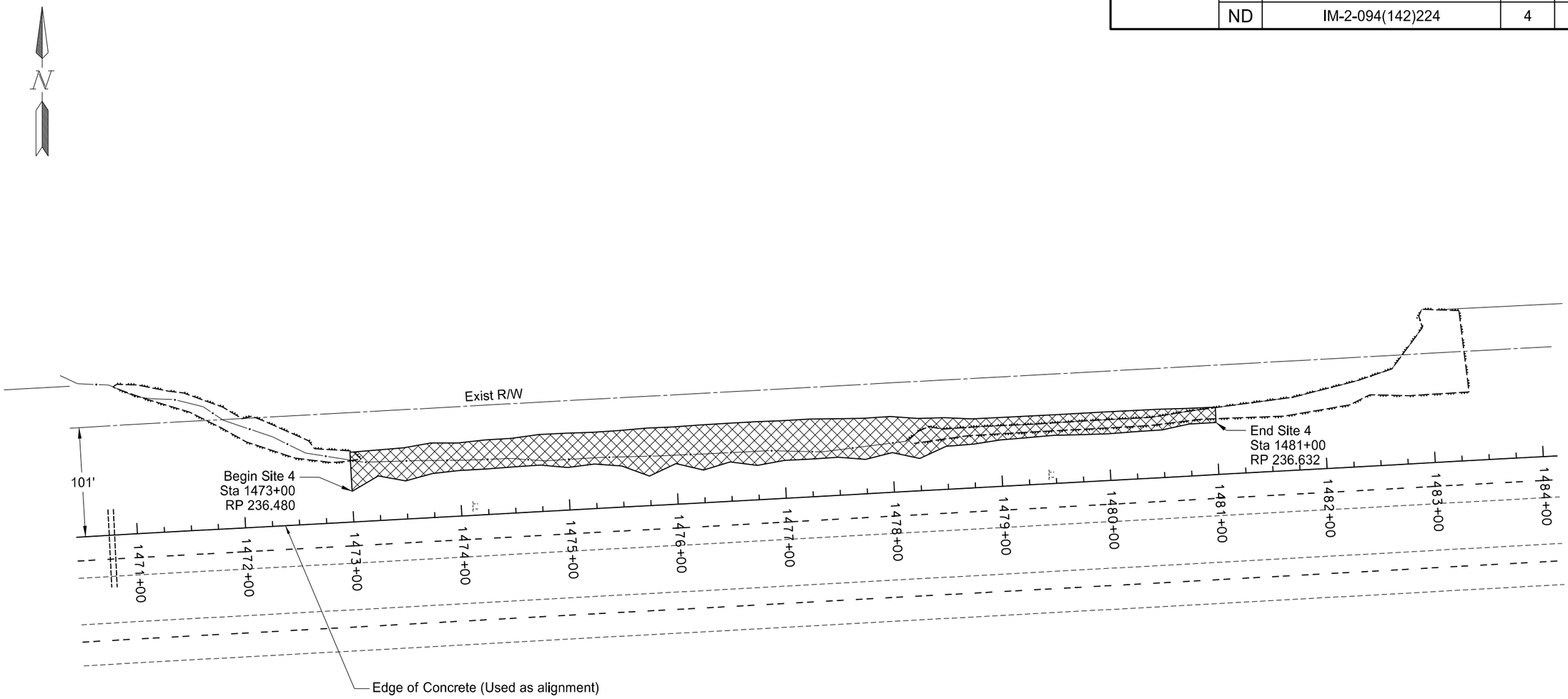
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	4	4



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Legend

Erosion Repair & Riprap

Scope of Work

Site 4
2 Miles West of Cleveland Interchange
Westbound I-94

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STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(142)224	6	1

NOTES

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; and
- •An environmental impact analysis.

If the Engineer determines that the information is adequate, the Engineer will submit the information to FHWA for approval and environmental clearance.

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

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

107-700 HAUL ROADS: The Engineer will not designate paved roads off the state system as haul roads.

107-710 HAUL ROADS: Before submitting a proposal, contact the appropriate State, County, Township, or City officials to determine if there are any roads that will be designated as “no haul routes”.

107-P01 CONSTRUCTION TRAFFIC ACCESS: All construction traffic will be limited to access at interchanges only. Construction traffic will not be permitted to operate in the median nor will access from one roadway through the median to the other roadway be permitted.

203-010 SHRINKAGE: 25 percent additional volume of borrow material is included for shrinkage in earth embankment above the water. 50 percent additional volume of material is included for shrinkage/loss under the water.

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

203-P01 TOPSOIL: Site 4 will require approximately 40 Cubic Yards of topsoil to be transported from the Site 3 excess topsoil. Include the cost to haul and place this topsoil in the contract unit price for “Topsoil”.

203-P02 EMBANKMENT CONSTRUCTION: For embankment material, use Standard 203.04 E.3 for Compaction Control, Type B.

262-P01 FLOTATION SILT CURTAIN: Quantities for Flotation Silt Curtain have been provided for use at 2 sites at a time. Include the installation, removal, cleaning and transportation of the flotation silt curtain in the contract unit price for “Flotation Silt Curtain”.

704-P01 TRAFFIC CONTROL: Provide traffic control consisting of a temporary lane closure and flagging.

Traffic control device quantities are based on two 1 mile limitations and the list below. Provide additional devices at no additional cost to the Department.

1. Standard D-704-22, Layout K & L; for trucks hauling materail
2. Standard D-704-35

714-P01 COFFERDAM / PIPE EXTENSION: A cofferdam may be required for pipe extensions at site 3.

If an earthen cofferdam is constructed, use borrow material from a different location in the borrow area that is not to be measured.

After the pipes are completed, remove the cofferdams completely under observation of the Engineer and haul the material back to the borrow area that is not to be measured.

Include all costs associated with the construction and removal of the cofferdams in the contract unit price for “Pipe Concrete Reinforced 18 In Class III” and “Pipe Concrete Reinforced 60 In Class III”.

990-P01 PIPE CLEANOUT: At Site 3, clean out the sediment in the 2 culverts to be extended all the way through the pipe. Also, clean and flatten a 20 foot radius around the end section of the extended pipes. Include all costs of cleaning of the pipe, removing material around the end of the pipe and disposing the waste material, according to 107.17 of the Standard Specifications, in the contract unit price for “Pipe Cleanout”.

ESTIMATE OF QUANTITIES

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(142)224	8	1

SPEC	CODE	ITEM DESCRIPTION	UNIT	MAINLINE	SITE 1	SITE 2	SITE 3	SITE 4	TOTAL
103	0100	CONTRACT BOND	L SUM	1					1
203	0102	COMMON EXCAVATION-TYPE B	CY		473	47	114	122	756
203	0109	TOPSOIL	CY		262	148	646	110	1,166
203	0140	BORROW-EXCAVATION	CY		1,760	42	1,043	503	3,348
216	0100	WATER	M GAL	100	18	1	10	5	134
251	0200	SEEDING CLASS II	ACRE		1.29	0.25	0.68	1.01	3.23
253	0101	STRAW MULCH	ACRE		2.58	0.5	1.36	2.02	6.46
256	0201	RIPRAP GRADE II	TON		2,677	1,050	1,590	1,247	6,564
260	0200	SILT FENCE SUPPORTED	LF		43	45	50	50	188
260	0201	REMOVE SILT FENCE SUPPORTED	LF		43	45	50	50	188
261	0112	FIBER ROLLS 12IN	LF		902	332	1,195	852	3,281
262	0100	FLOTATION SILT CURTAIN	LF	2,228					2,228
702	0100	MOBILIZATION	L SUM	1					1
704	0100	FLAGGING	MHR	350					350
704	1000	TRAFFIC CONTROL SIGNS	UNIT	1,728					1,728
704	1052	TYPE III BARRICADE	EA	2					2
704	1060	DELINEATOR DRUMS	EA	44					44
704	1067	TUBULAR MARKERS	EA	70					70
704	1087	SEQUENCING ARROW PANEL-TYPE C	EA	2					2
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY		3,150	1,247	2,556	1,882	8,835
714	0310	PIPE CONC REINF 18IN CL III	LF				10		10
714	1310	PIPE CONC REINF 60IN CL III	LF				16		16
714	9660	REMOVE & RELAY END SECTION-ALL TYPE & SIZES	EA				2		2
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF				12.1		12.1
754	0162	REMOVE & RESET DELINEATORS	EA		1	1	2	2	6
754	0210	GALV STEEL POST-STANDARD PIPE	LF				15.4		15.4
754	0805	OBJECT MARKERS - CULVERTS	EA				2		2
754	1100	CLASS AE CONCRETE-SIGN FOUNDATIONS	CY				0.3		0.3
754	1104	REMOVE SIGN FOUNDATION	EA				1		1
990	0400	PIPE CLEANOUT	EA				2		2

ESTIMATE NUMBER: 16553 RUN DATE: 04/07/2016 TIME: 11:32:04

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(142)224	10	1

BASIS OF ESTIMATE

Water

25 MGal/Mile for Dust Palliative (Estimated for 1 mile of roadway per site) = 100 MGal
10 Gal/CY for Borrow Embankment

Site 1: 1,758 CY x 10 Gal/CY = 18
Site 2: 42 CY x 10 Gal/CY = 1
Site 3: 1,042 CY x 10 Gal/CY = 10
Site 4: 504 CY x 10 Gal/CY = 5
Subtotal = 34 MGal

Riprap Grade II

Riprap is estimated at 1.75 Tons per Cubic Yard

Earthwork Summary

Location	Quantity Required Above Water (CY)	Quantity Required Below Water (CY)	Common Excavation – Type B (CY) Pay Item	Borrow Excavation (CY) Pay Item
	A_1	A_2	B	$C = (A_1 \times 1.25) + (A_2 \times 1.50) - B$
Site 1	1,595	159	473	1,760
Site 2	71	0.00	47	42
Site 3	911	12	114	1,043
Site 4	359	119	122	503
Subtotal	2,936	290	756	
Shrinkage/ Loss	25%	50%	0%	Total
Totals	3,670	435	756	3,349

Topsoil Summary

Based on 6 Inches depth in place, to be stripped, stockpiled onsite and replaced evenly across all disturbed areas.

Location	Quantity Removed (CY)	Quantity Replaced (CY)
Site 1	262	262
Site 2	148	148
Site 3	646	606
Site 4	110	150
	Total	1,166

Signs

Location	Remove & Reset Delineators	Object Markers – Culverts
Site 1	(Ea)	(Ea)
Sta 846+23 Lt	1	
Site 2		
Sta 872+00 Lt	1	
Site 3		
Sta 1275+00		1
Sta 1277+50		1
Sta 1279+05	1	
Sta 1284+26	1	
Site 4		
Sta 1474+10	1	
Sta 1479+43	1	
Total	6	2

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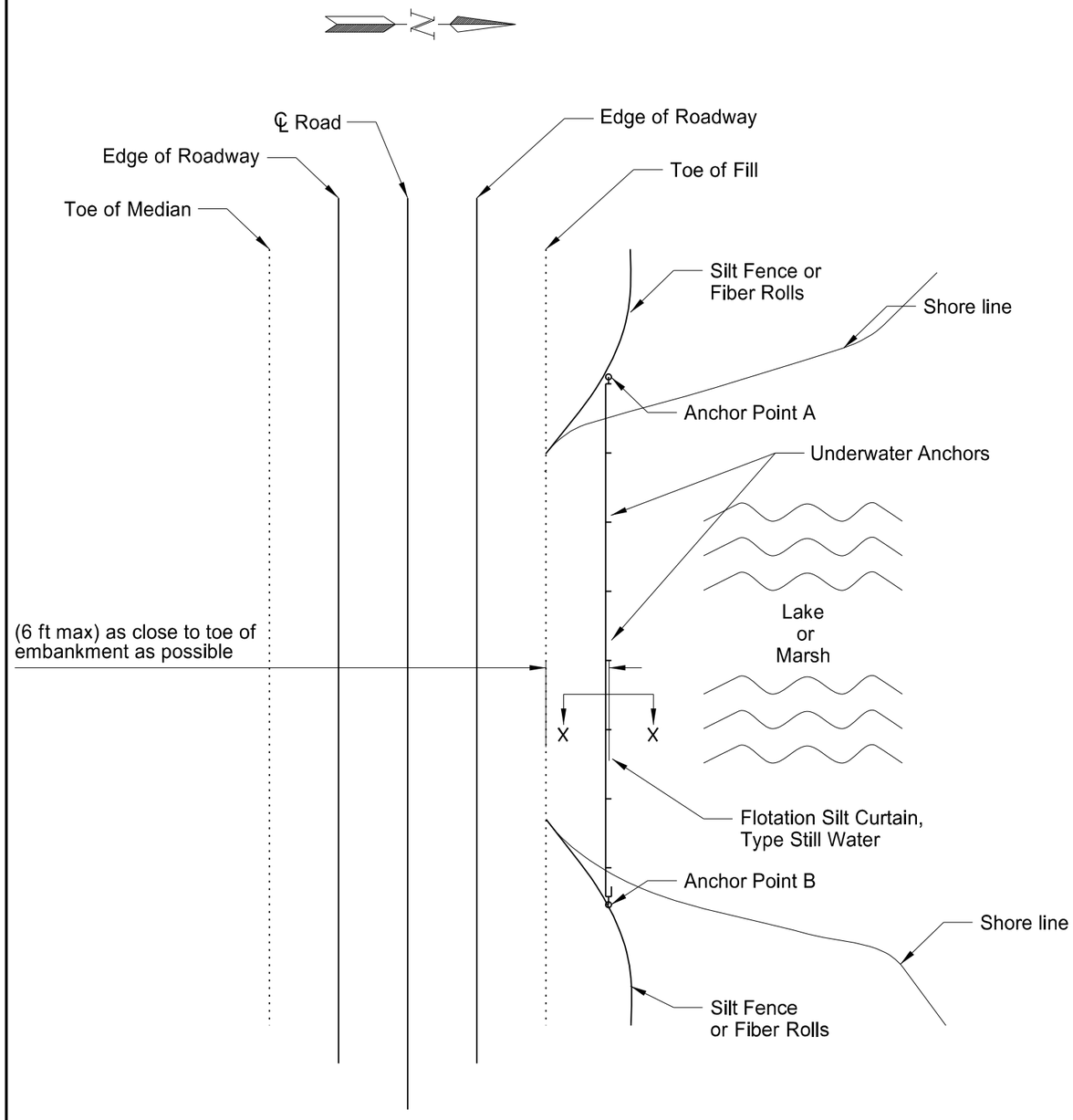
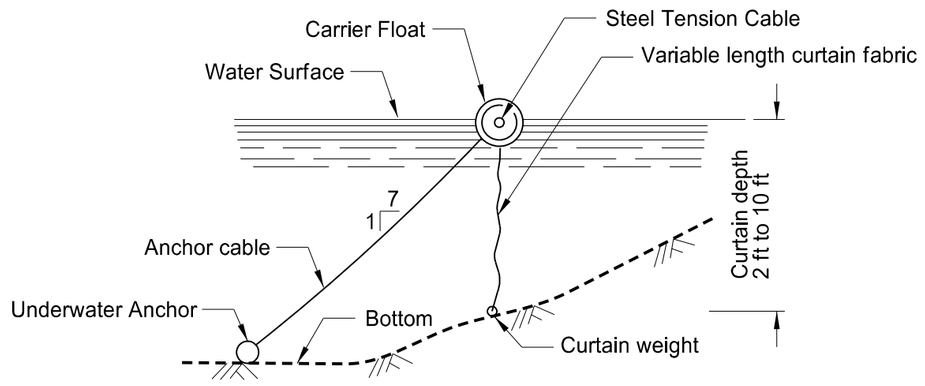
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	20	1



PLAN VIEW

FLOTATION SILT CURTAIN - TYPE STILL WATER

The silt curtain shall extend onto shore and shall also be anchored there.



SECTION X-X

FLOTATION SILT CURTAINS

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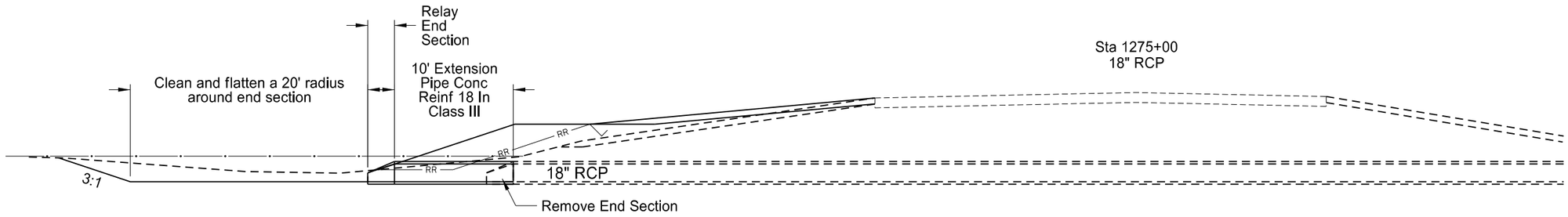
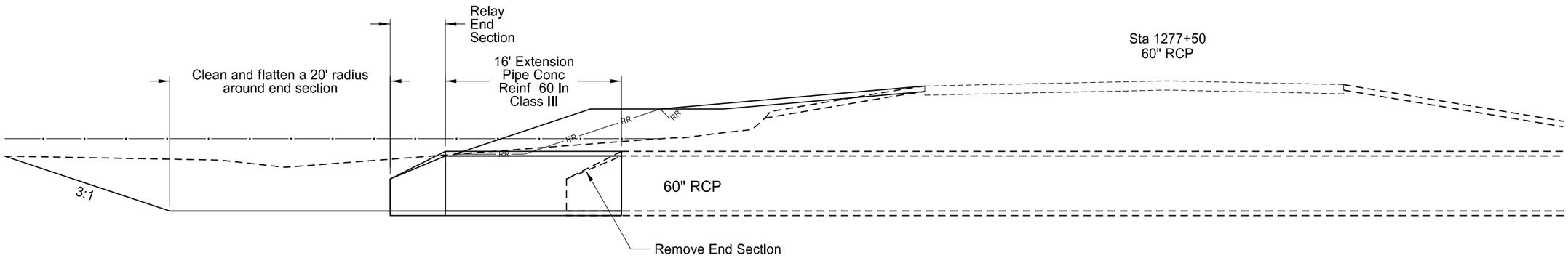
Temporary Erosion Control - Floatation Silt Curtain

Sites 1 - 4

Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	20	2





Item	Description	Quantity	Unit
714-0310	Pipe Conc Reinf 18In Class III		
	Sta 1275+00	10	LF
714-1310	Pipe Conc Reinf 60In Class III		
	Sta 1277+50	16	LF
714-9660	Remove and Relay End Section - All Types & Sizes		
	Sta 1275+00	1	Ea
	Sta 1277+50	1	Ea
990-0400	Pipe Cleanout		
	Sta 1275+00	1	Ea
	Sta 1277+50	1	Ea

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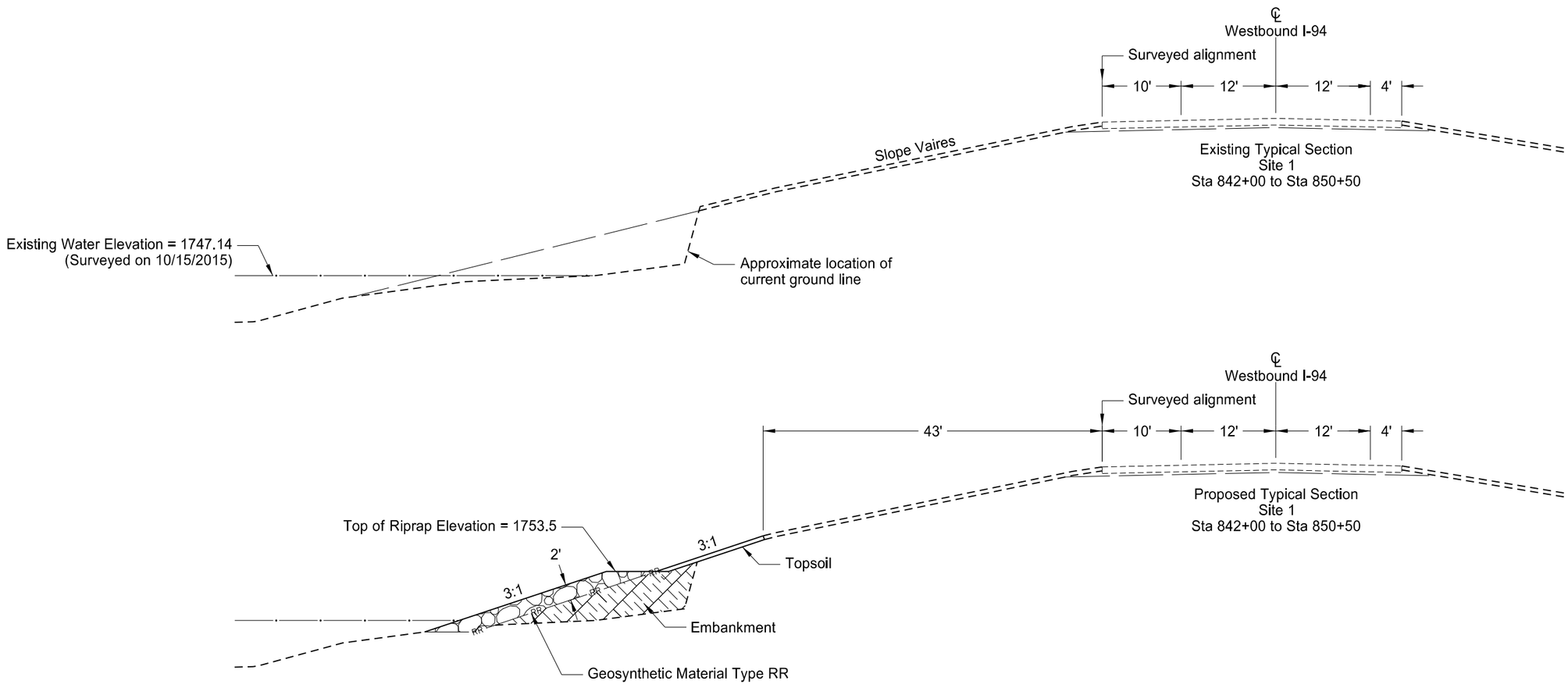
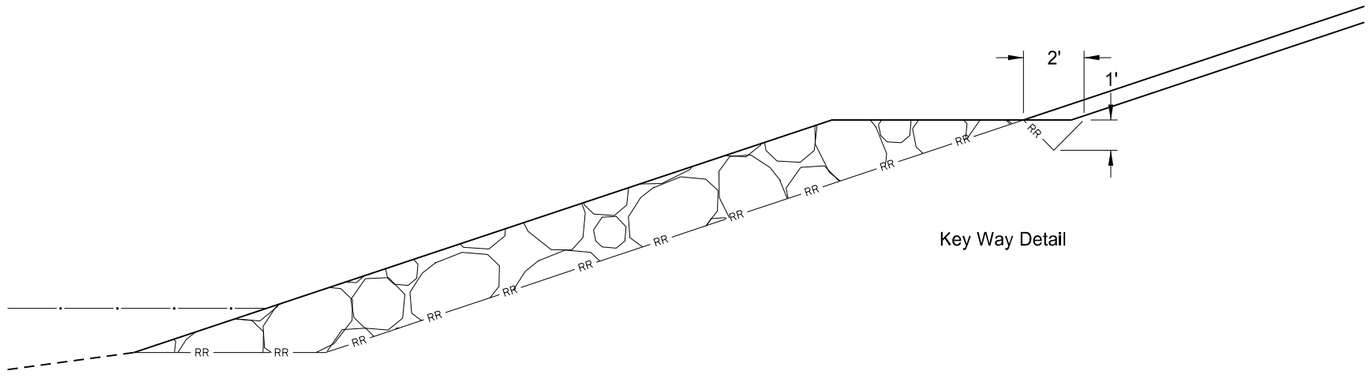
Pipe Extension Details

Site 3
2.24 Miles East of Medina Interchange
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(124)224	30	1





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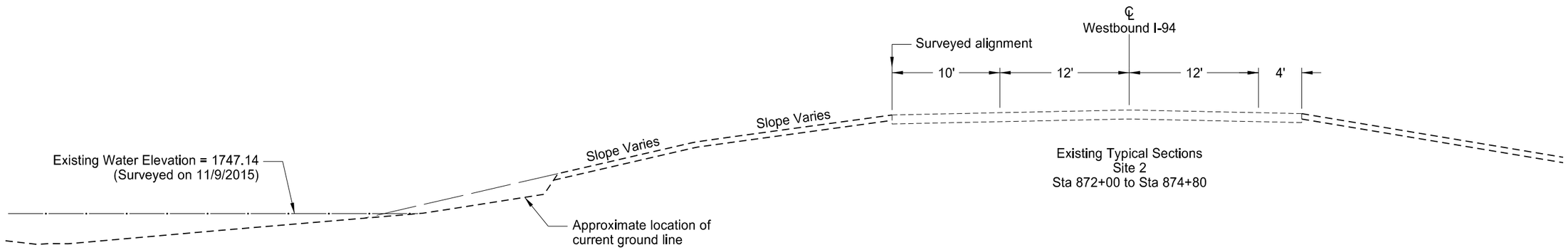
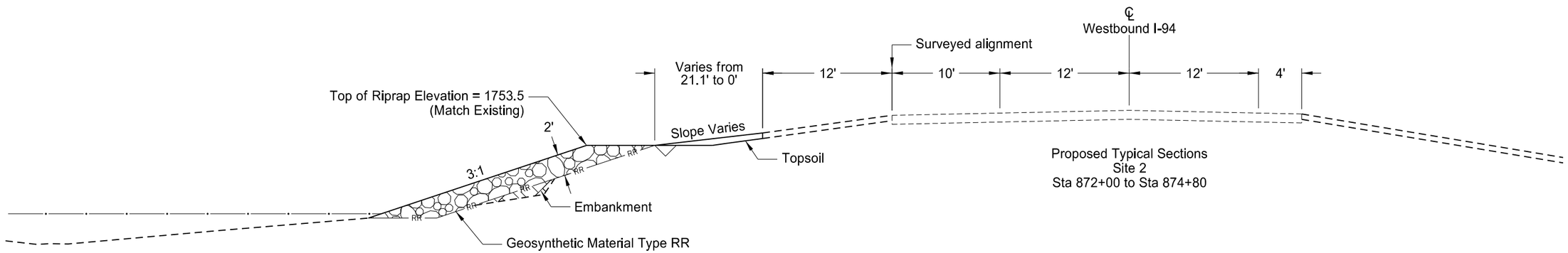
Typical Sections

Site 1
0.75 Miles East of Crystal Springs Rest Area
Westbound I-94

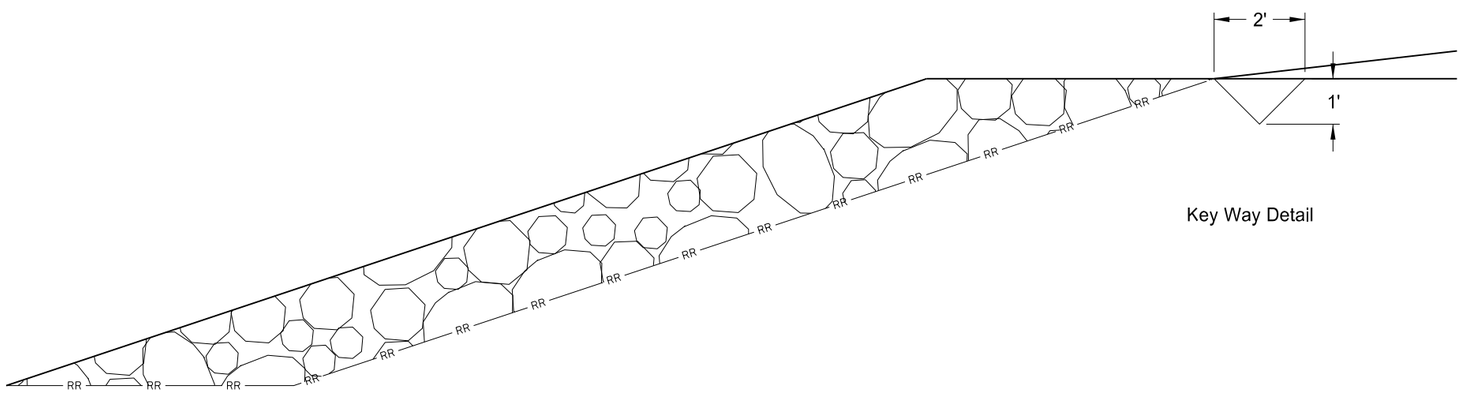
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	30	2



Existing Typical Sections
Site 2
Sta 872+00 to Sta 874+80



Proposed Typical Sections
Site 2
Sta 872+00 to Sta 874+80



Key Way Detail

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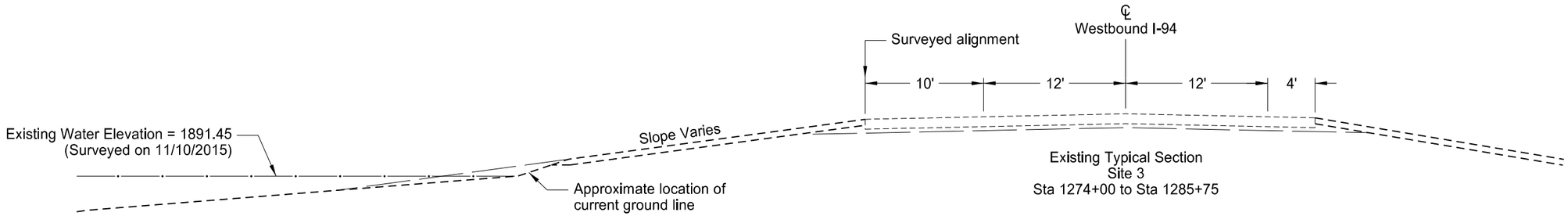
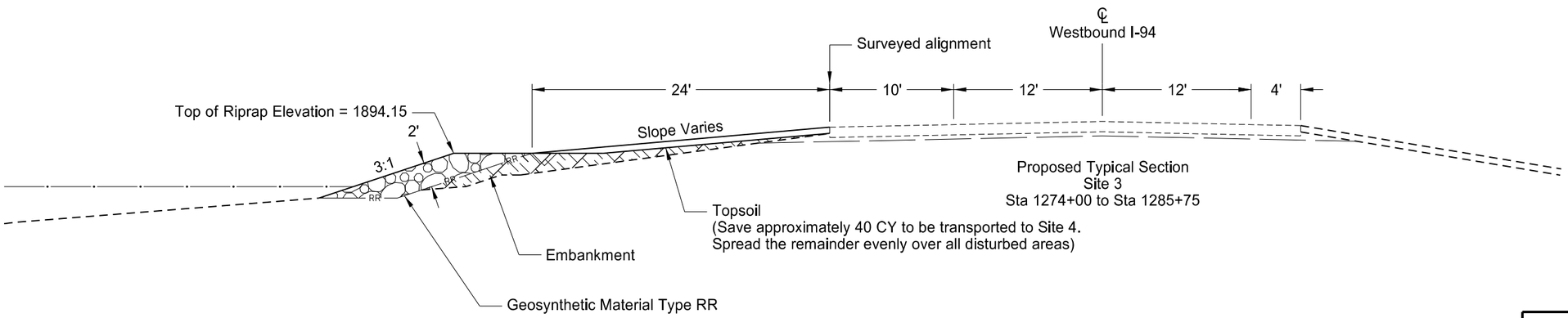
Typical Sections

Site 2
1.3 Miles East of Crystal Springs Rest Area
Westbound I-94

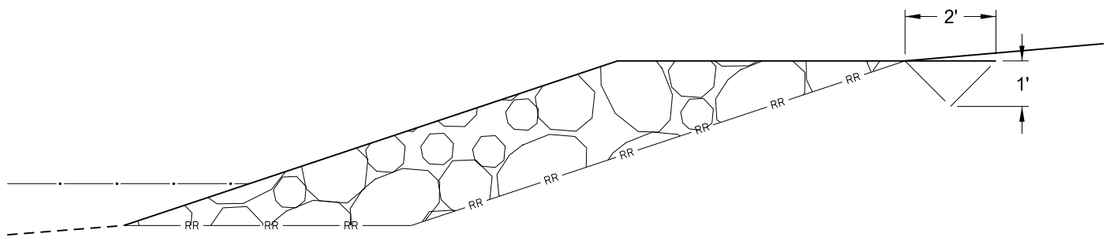
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	30	3



Existing Typical Section
Site 3
Sta 1274+00 to Sta 1285+75



Proposed Typical Section
Site 3
Sta 1274+00 to Sta 1285+75



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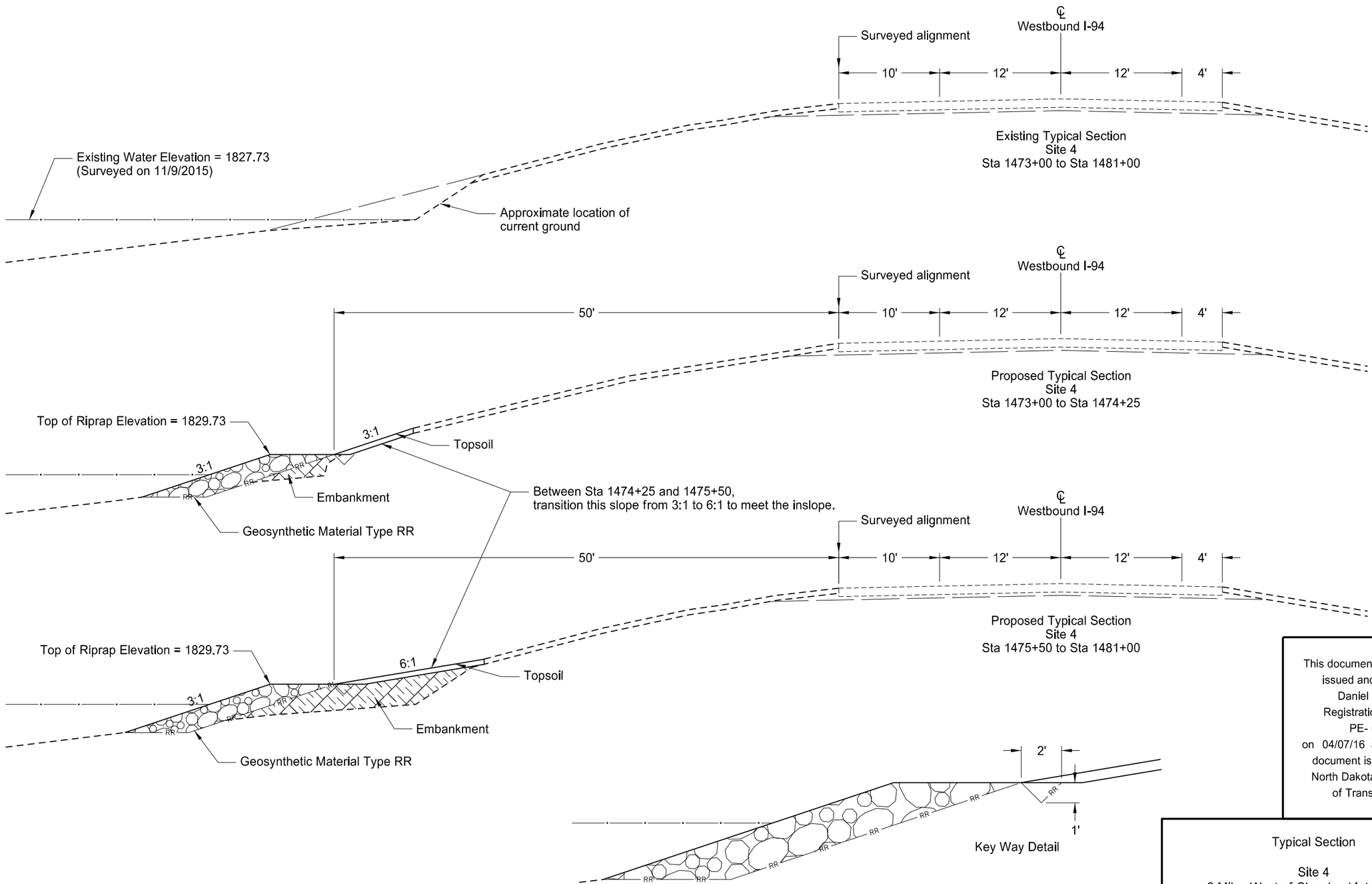
Typical Section

Site 3
2.24 Miles East of Medina Interchange
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	30	4



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Typical Section

Site 4
2 Miles West of Cleveland Interchange
Westbound I-94

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	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	End Sections	Applicable Backfill
									End	
				In	Bid Item	LF		In	EA	
Site 3										
1275+00	30.45 Lt	1275+00	40.45 Lt	18	Pipe Conc. Reinf. CL III (Extension)	10	Reinforced Concrete Pipe - Class III **(barrel length = 10 LF)**	18	Remove & Relay	D714-27
1277+50	27.50 Lt	1277+50	43.50 Lt	60	Pipe Conc. Reinf. CL III (Extension)	16	Reinforced Concrete Pipe - Class III **(barrel length = 16 LF)**	60	Remove & Relay	D714-27

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Allowable Pipe List

Site 3
2.24 Miles East of Medina Interchange
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	75	1

Wetland Impact Table

Wetland Number	Location	Cowardin Class.	Wetland Type	Wetland Size (acres)	Wetland Feature	USACE Jurisdictional Wetlands[1]	Wetland Impacts (acres)		USFWS Easement Impacts (acres)		Wetland Mitigation								
											Mitigation Required			Bank		Onsite			
							Temp	Perm	Temp	Perm	EO 11990	USACE	USFWS	Location	acres	Mitigation Location; Ratio	acres	Constructed Site #	Constructed size (acres)
1b	Sec. 8, T139N, R69W	PEMA/C	Fringe	0.3	Natural	No	0	0	0	0	Y	N	N	N	O		0		0
2	Sec. 3, T139N, R 68W	PEMC/F	Basin	4.8	Natural	No	0.20	0.08	0	0	Y	N	N	Vollrath 16/17	0.08		0		0
3a	Sec. 5, T139N, R67W	PEMC/F	Fringe	0.54	Natural	No	<0.01	<0.01	0	0	Y	N	N	Vollrath 16/17	<0.01		0		0
3b	Sec. 5, T139N, R67W	PEMF	Fringe	1.28	Natural	No	0	0.04	0	0	Y	N	N	Vollrath 16/17	0.04		0		0
			Totals	**6.92**			**0.21**	**0.13**	**0**	**0**					**0.13**		**0**		0

Other Waters Impact Table

Other Waters											Other Water Mitigation				
			Size				Impacts to Other Waters				Mitigation Required				
							Acres		Linear Feet						
Number	Location	Type	Acres	Linear Feet	Feature	USACE Jurisdictional[1]	Temp	Perm	Temp	Perm	EO 11990	USACE	USFWS	Mitigation Location; ratio	Method
OW1A	Sec. 8, T139N, R69W	Stink Lake	1.58	92	Lake	No	0.08	<0.01	11.9	1.5	N	N	N	NA	NA
OW1c	Sec. 8, T139N, R69W	Stink Lake	2.08	153	Lake	No	0.01	0.01	11.2	3.0	N	N	N	NA	NA
OW3c	Sec. 5, T139N, R67W	NA	2.13	146	Lake	No	0.01	0.06	16.6	6.4	N	N	N	NA	NA
		Totals	**5.79**	**391**			**0.10**	**0.08**	**39.7**	**10.9**					

[1] All artificial/non-jurisdictional, deep water (impacts greater than 6.6 feet), Other Waters less than 300 linear feet (determined by the USACE on a case by case), and temporary impacts do not require mitigation.

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Wetland Tables

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	75	2

Summary Impact Table			
Total Permanent Impact Summary		**Temporary Impacts and additional information**	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	0.00	**Temporary JD**	0.00 Acre
Natural/Non-JD	0.13	**Non-JD Temporary**	0.21 Acre
Artificial/JD	0.00	**Permanent JD > 0.10**	0.00 Acre
Artificial /Non-JD	0.00	**Permanent OW**	10.9 Lf
Total	**0.13**	**Temporary OW**	39.7 Lf

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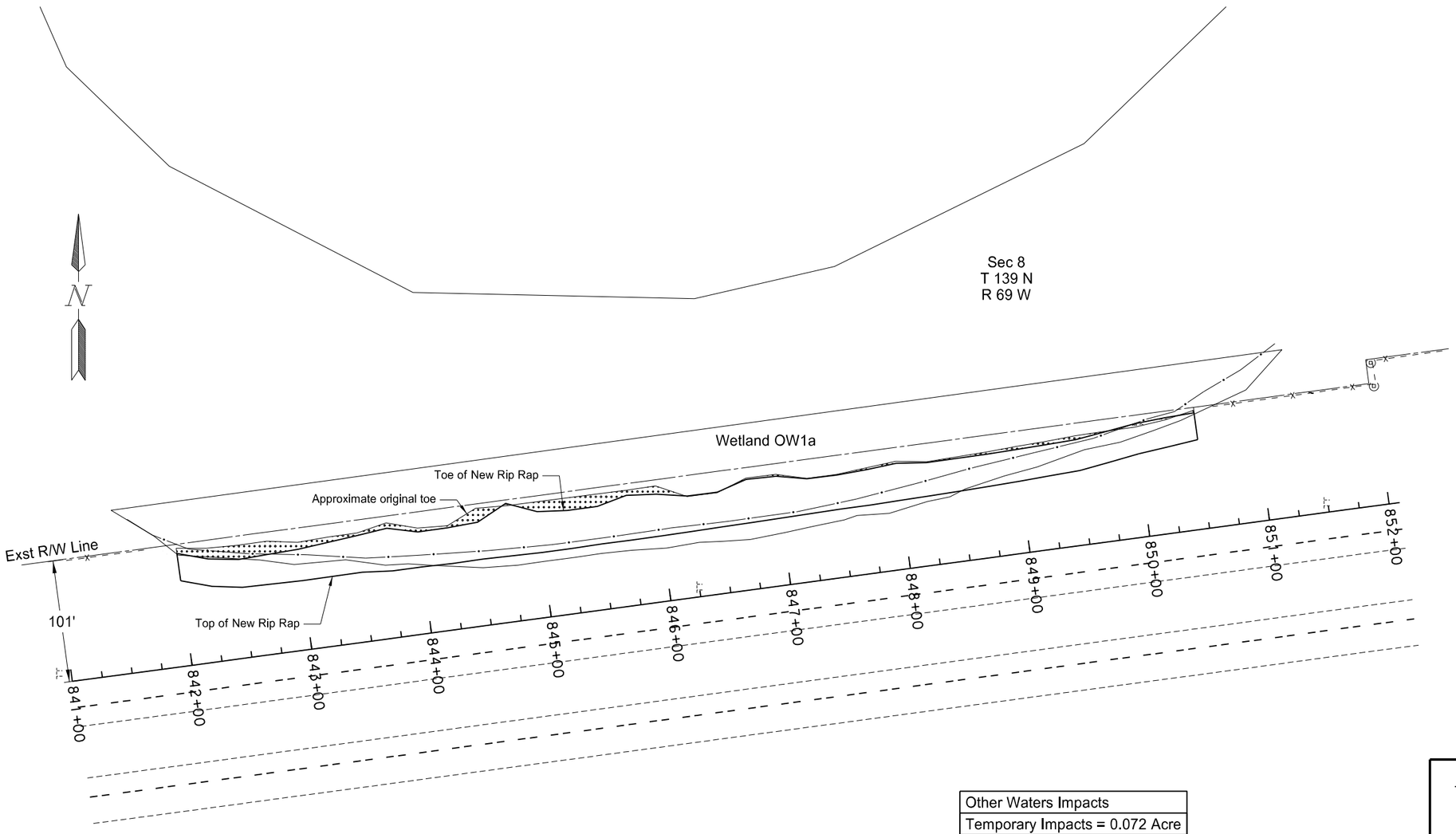
Wetland Impacts Summary

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	75	3



Other Waters Impacts
Temporary Impacts = 0.072 Acre
Permanent Impacts = 0.002 Acre

Legend

Temporary Other Waters Impact

Permanent Other Waters Impact

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Wetland Impacts
Site 1
Other Waters 1A
0.75 Miles East of Crystal Springs Rest Area
Westbound I-94

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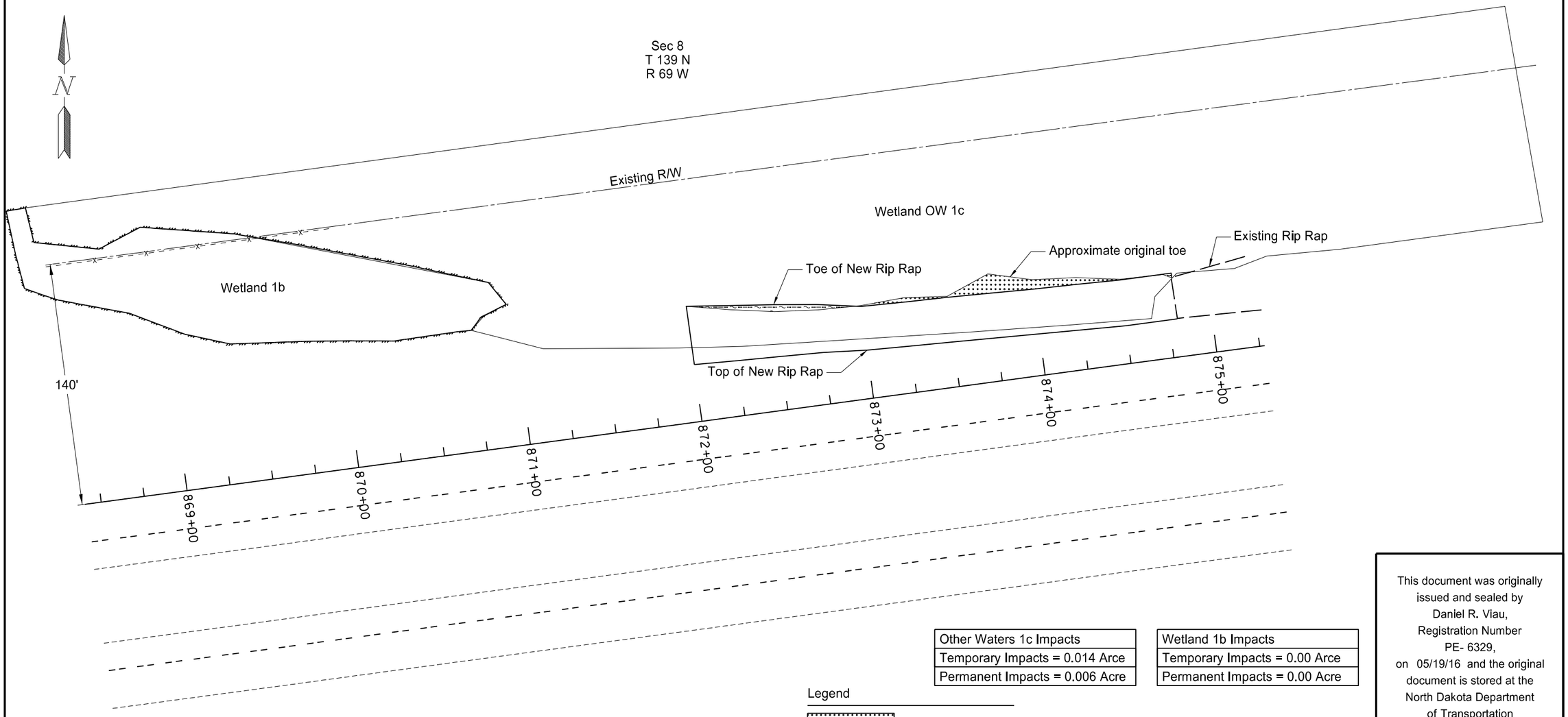
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	75	4



Other Waters 1c Impacts
Temporary Impacts = 0.014 Arce
Permanent Impacts = 0.006 Acre

Wetland 1b Impacts
Temporary Impacts = 0.00 Arce
Permanent Impacts = 0.00 Acre

Legend

Temporary Other Waters Impacts

Permanent Other Waters Impacts

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Wetland Impacts
Site 2
Other Waters 1C & Wetland 1b
1.3 Miles East of Crystal Springs Rest Area
Westbound I-94

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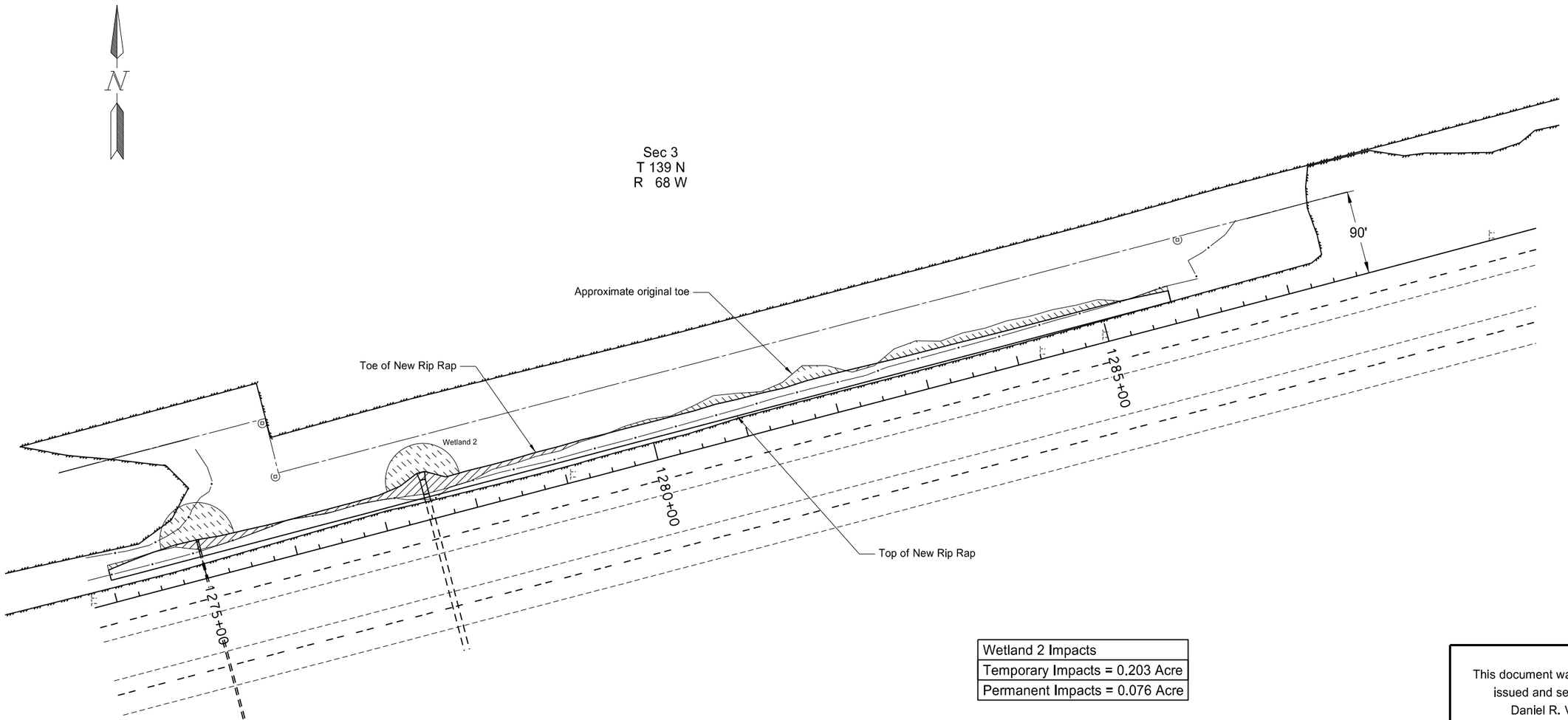
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	75	5



Wetland 2 Impacts
Temporary Impacts = 0.203 Acre
Permanent Impacts = 0.076 Acre

Legend

Temporary Wetland Impacts

Permanent Wetland Impacts

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Wetland Impacts
Site 3
Wetland 2
2.24 Miles East of Medina Interchange
Westbound I-94

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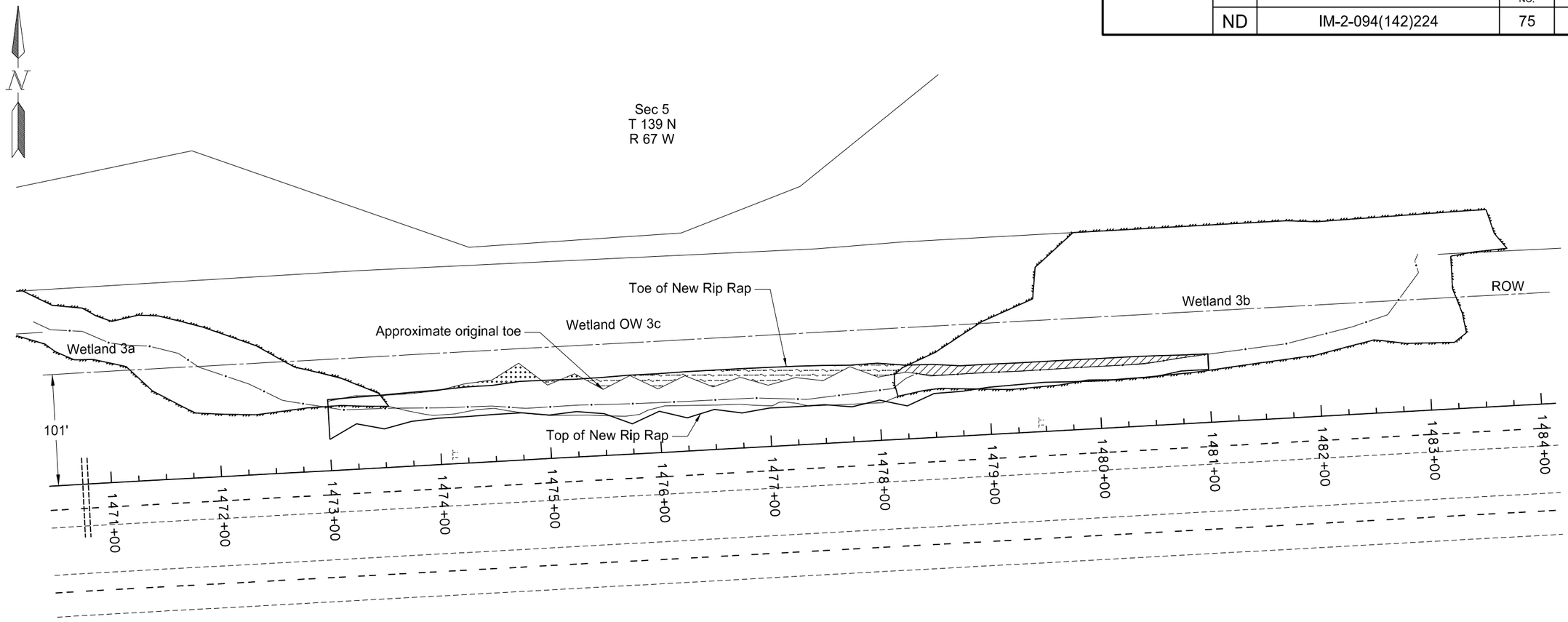
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	75	6



Wetland 3a Impacts
Temporary Impacts = 0.0005 Acre
Permanent Impacts = 0.0002 Acre

Other Water 3c Impacts
Temporary Impacts = 0.014 Acre
Permanent Impacts = 0.063 Acre

Wetland 3b Impacts
Temporary Impacts = 0.000 Acre
Permanent Impacts = 0.043 Acre

Legend

- Temporary Other Water Impact
- Permanent Other Water Impact
- Temporary Wetland Impact
- Permanent Wetland Impact

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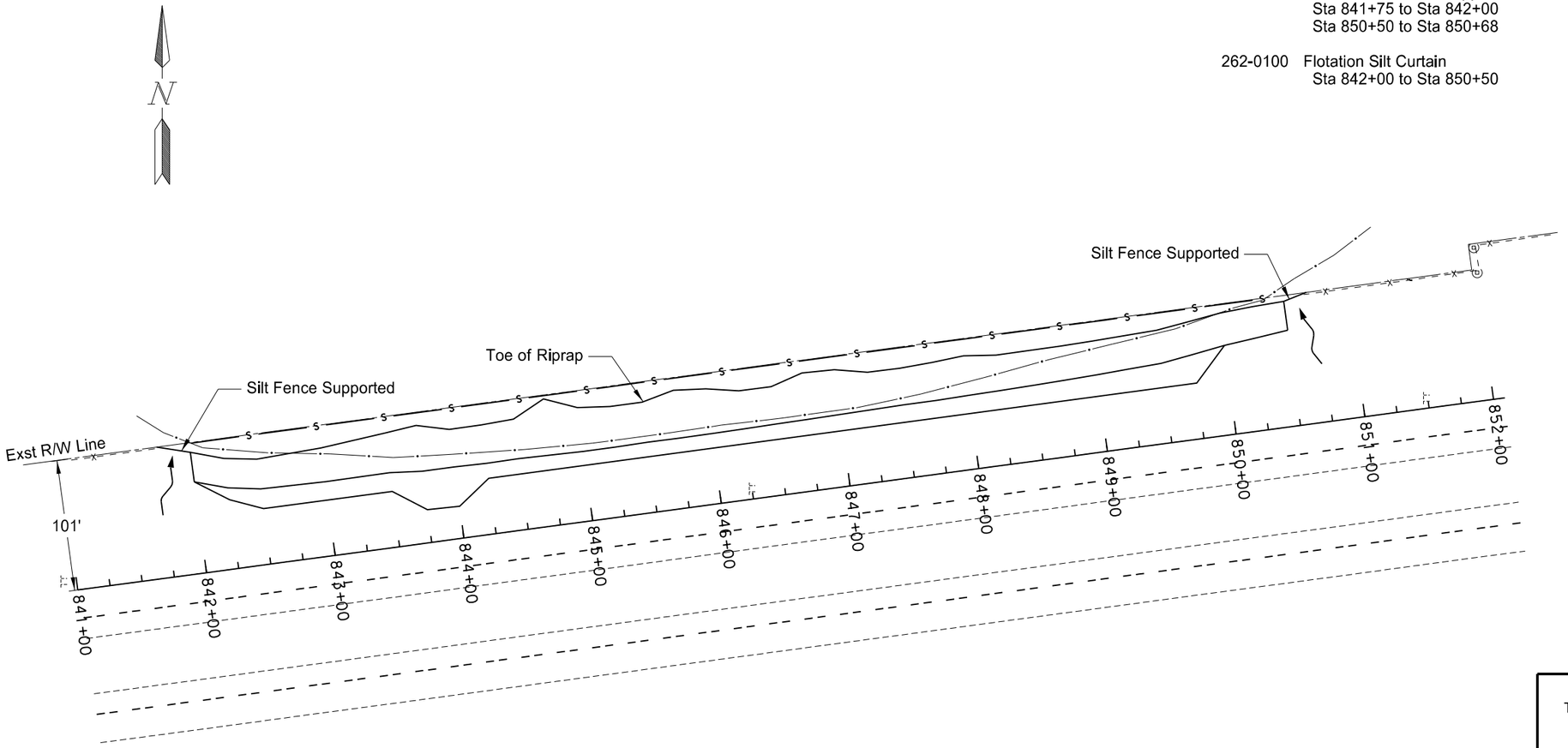
Wetland Impacts
Site 4
Wetland 3a & 3b and Other Water 3c
2 Miles West of Cleveland Interchange
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	76	1

Item	Description	Quantity	Unit
260-0200	Silt Fence Supported		
	Sta 841+75 to Sta 842+00	25	LF
	Sta 850+50 to Sta 850+68	18	LF
260-0201	Remove Silt Fence Supported		
	Sta 841+75 to Sta 842+00	25	LF
	Sta 850+50 to Sta 850+68	18	LF
262-0100	Flotation Silt Curtain		
	Sta 842+00 to Sta 850+50	850	LF



Legend

S S	Flotation Silt Curtain
SF SF	Silt Fence Supported

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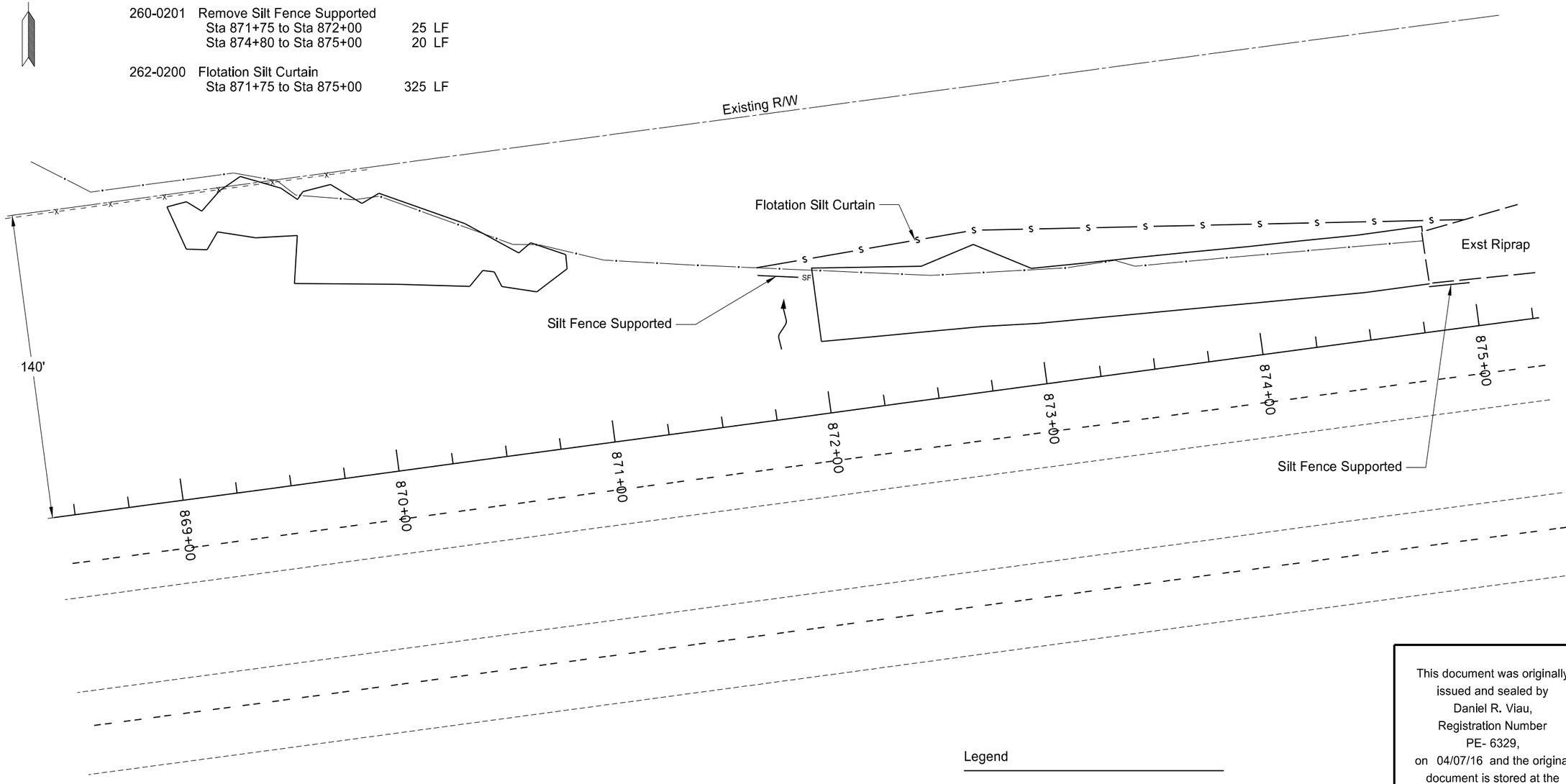
Temporary Erosion Control

Site 1
0.75 Miles East of Crystal Springs Rest Area
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	76	2

Item	Discription	Quantity	Unit
260-0200	Silt Fence Supported		
	Sta 871+75 to Sta 872+00	25	LF
	Sta 874+80 to Sta 875+00	20	LF
260-0201	Remove Silt Fence Supported		
	Sta 871+75 to Sta 872+00	25	LF
	Sta 874+80 to Sta 875+00	20	LF
262-0200	Flotation Silt Curtain		
	Sta 871+75 to Sta 875+00	325	LF



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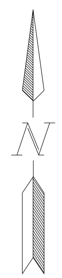
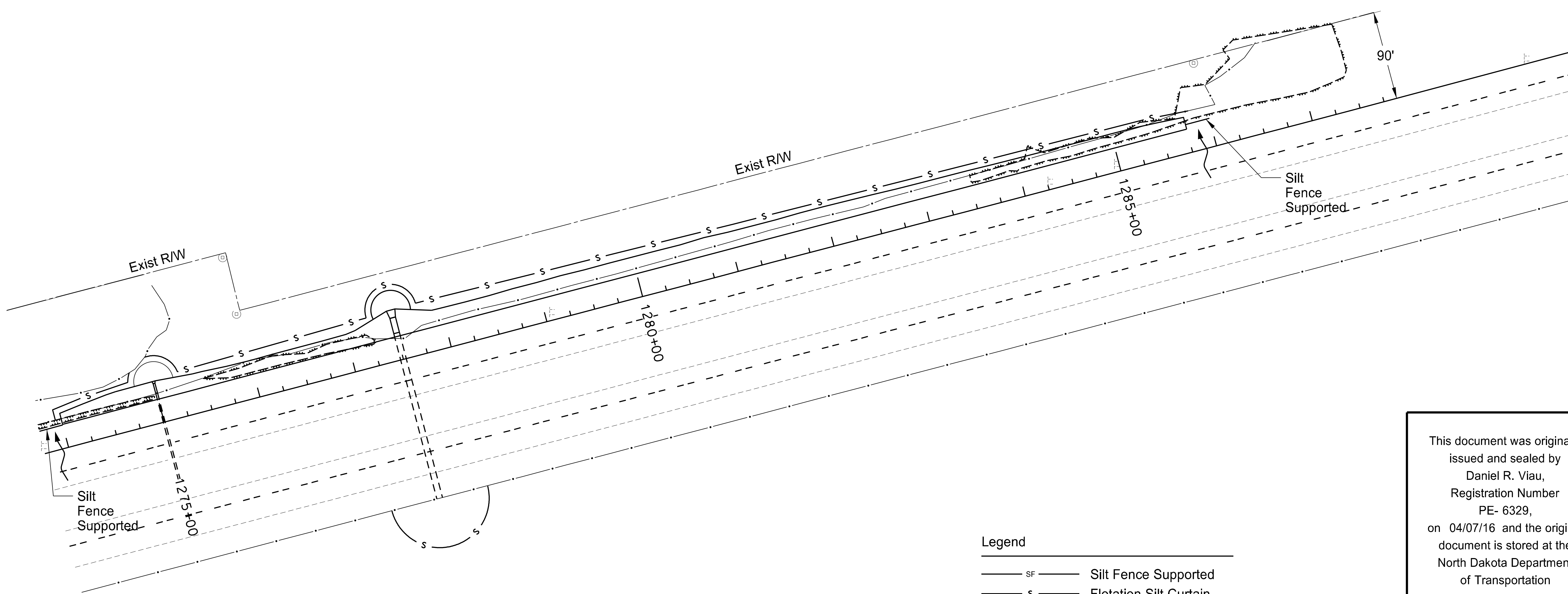
Temporary Erosion Control

Site 2
1.3 Miles East of Crystal Springs Rest Area
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	76	3

Item	Description	Quantity	Unit
260-0200	Silt Fence Supported		
	Sta 1273+75 to Sta 1274+00	25	LF
	Sta 1285+75 to Sta 1286+00	25	LF
260-0201	Remove Silt Fence Supported		
	Sta 1273+75 to Sta 1274+00	25	LF
	Sta 1285+75 to Sta 1286+00	25	LF
262-0100	Flotation Silt Curtain		
	Sta 1274+94 to Sta 1274+50	102	LF
	Sta 1275+00 to Sta 1285+81	1126	LF
	South Side of Sta 1277+50	150	LF





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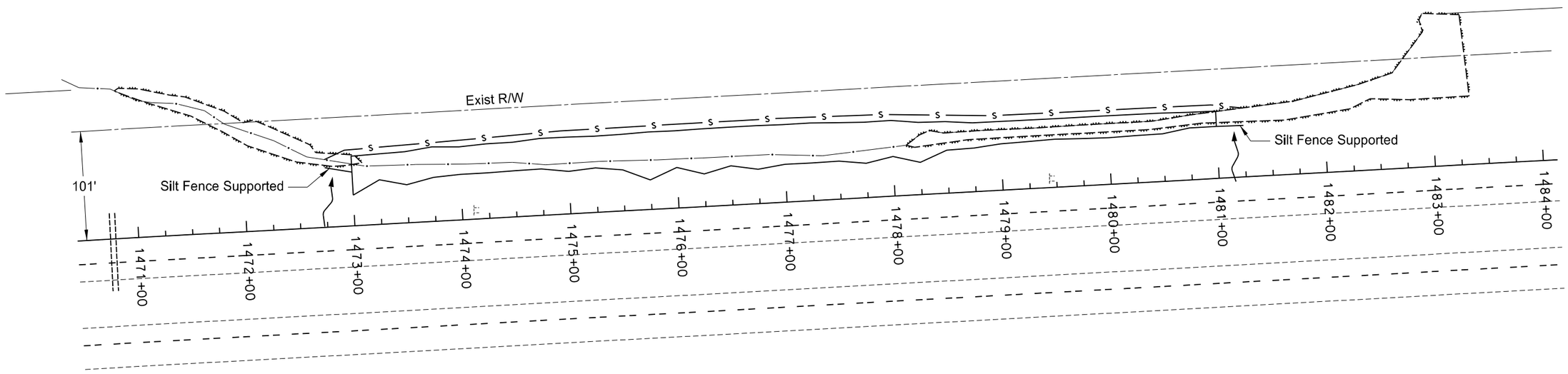
Temporary Erosion Control

Site 3
2.24 Miles East of Medina Interchange
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	76	4

Item	Description	Quantity	Unit
260-0200	Silt Fence Supported		
	Sta 1472+75 to Sta 1473+00	25	LF
	Sta 1481+00 to Sta 1481+25	25	LF
260-0201	Remove Silt Fence Supported		
	Sta 1472+75 to Sta 1473+00	25	LF
	Sta 1481+00 to Sta 1481+25	25	LF
262-0100	Flotation Silt Curtain		
	Sta 1472+75 to Sta 1481+25	850	LF



Legend

S S Flotation Silt Curtain

SF SF Silt Fence Supported

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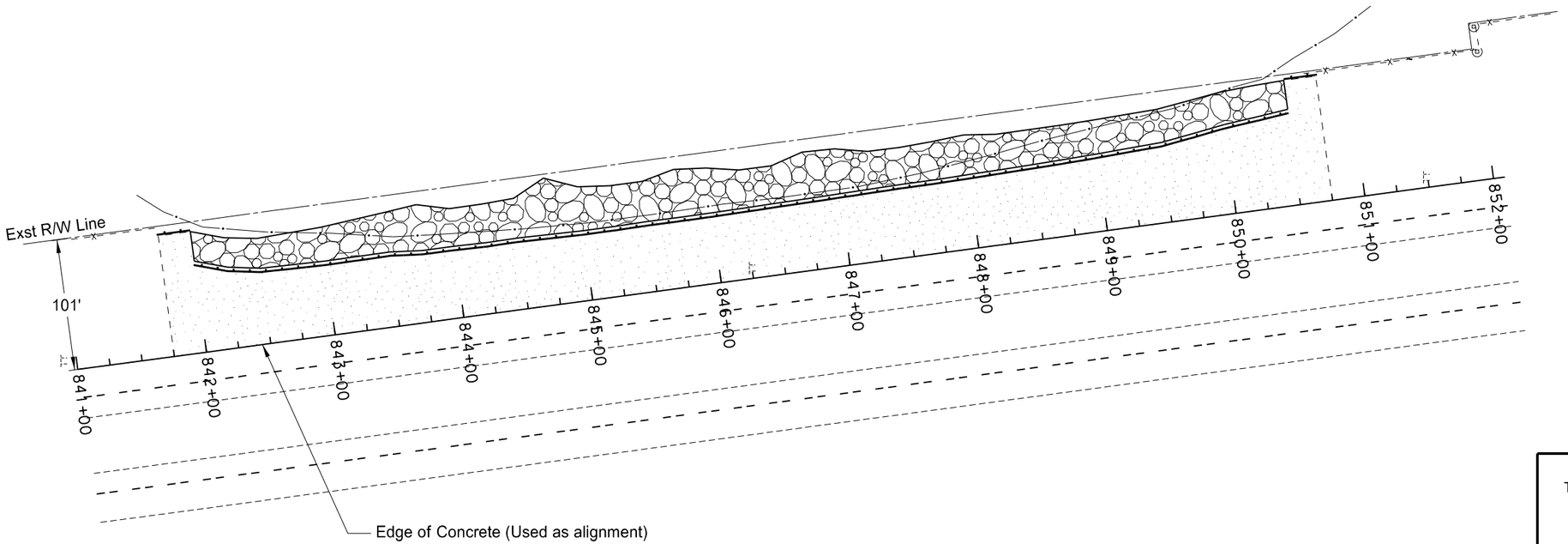
Temporary Erosion Control

Site 4
2 Miles West of Cleveland Interchange
Westbound I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(142)224	77	1

Item	Description	Quantity	Unit	
203-0109	Topsoil			
	Sta 841+75 to Sta 850+75	261.34	CY	
251-0200	Seeding Class II			
	Sta 841+75 to Sta 850+75	1.29	Acre	
253-0101	Straw Mulch			
	Sta 841+75 to Sta 850+75	1.29	Acre	(per application)
256-0201	Riprap Grade II			
	Sta 842+00 to Sta 850+50	2,676.99	Ton	
261-0112	Fiber Rolls 12 In			
	Sta 841+74 to Sta 842+00	26	LF	
	Sta 842+00 to Sta 850+50	850	LF	
	Sta 850+50 to Sta 850+76	26	LF	
709-0155	Geosynthetic Material Type RR			
	Sta 842+00 to Sta 850+50	3,149.76	SY	



Legend

- Riprap Grade II
- Seeding Class II & Straw Mulch
- Fiber Roll 12 In

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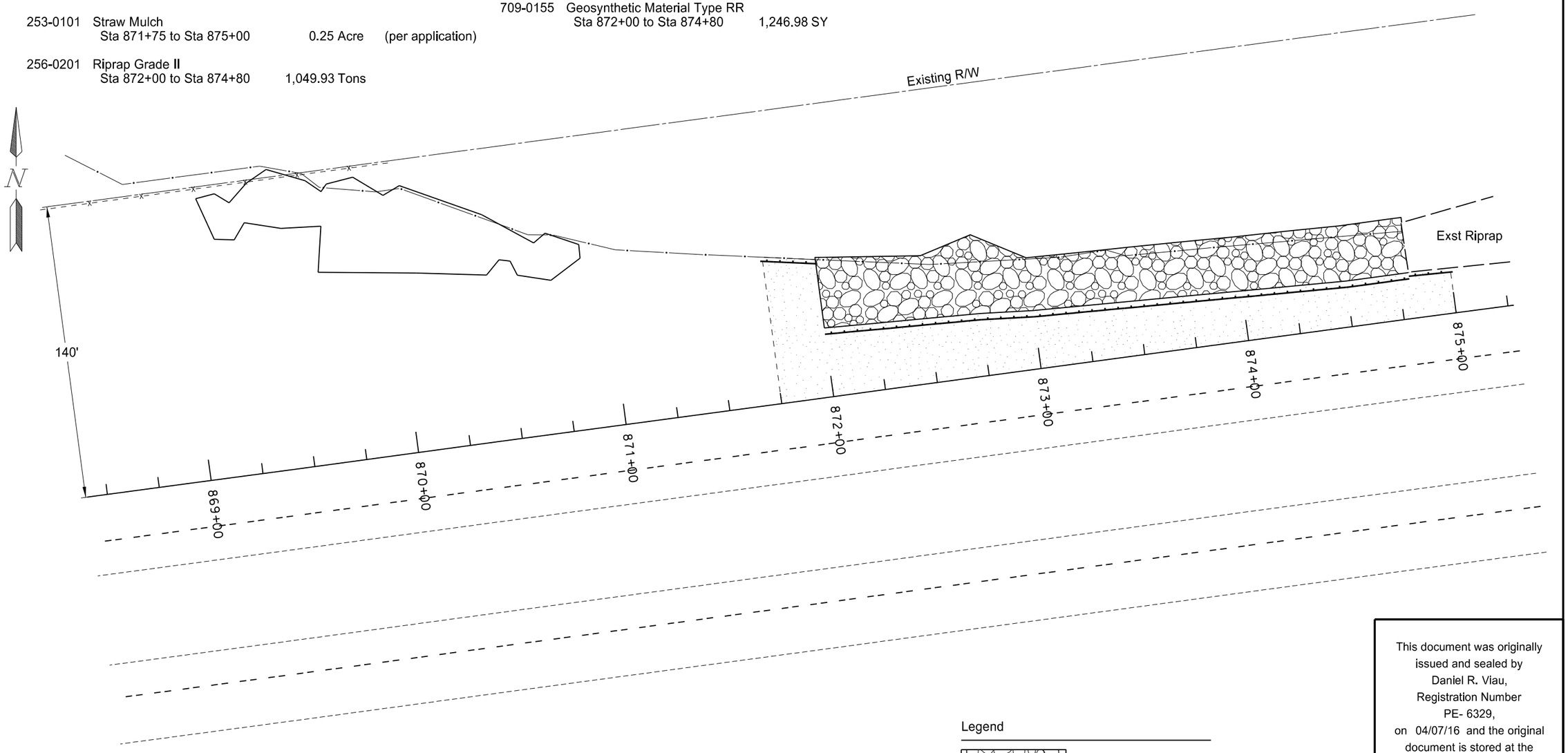
Permanent Erosion Control

Site 1
0.75 Miles East of Crystal Springs Rest Area
Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	77	2

Item	Discription	Quantity	Unit	
203-0109	Topsoil			
	Sta 871+75 to Sta 875+00	147.25	CY	
251-0200	Seeding Class II			
	Sta 871+75 to Sta 875+00	0.25	Acre	
253-0101	Straw Mulch			
	Sta 871+75 to Sta 875+00	0.25	Acre	(per application)
256-0201	Riprap Grade II			
	Sta 872+00 to Sta 874+80	1,049.93	Tons	

Item	Discription	Quantity	Unit
261-0112	Fiber Rolls 12 In		
	Sta 871+74 to Sta 872+00	26	LF
	Sta 872+00 to Sta 874+80	280	LF
	Sta 874+80 to Sta 875+01	26	LF
709-0155	Geosynthetic Material Type RR		
	Sta 872+00 to Sta 874+80	1,246.98	SY



Legend

Riprap Grade II

Seeding Class II & Straw Mulch

Fiber Roll 12 In

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Permanent Erosion Control

Site 2
1.3 Miles East of Crystal Springs Rest Area
Westbound I-94

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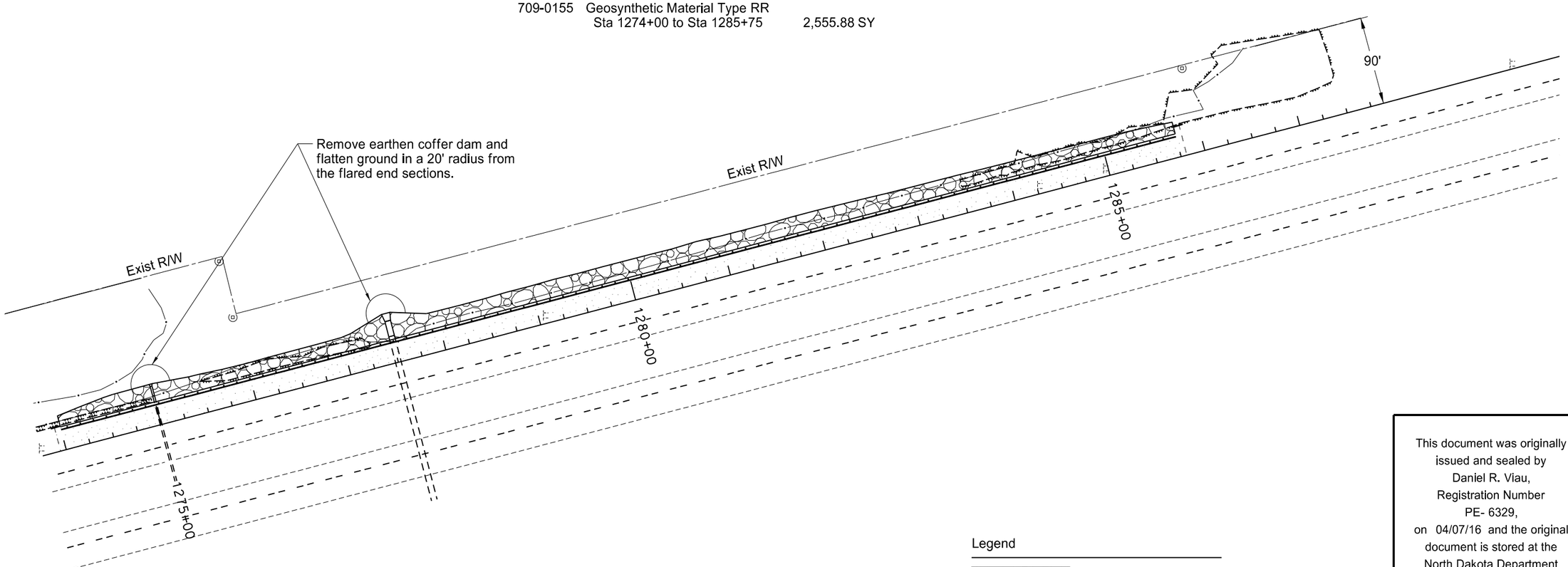
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	77	3

Item	Description	Quantity	Unit	
203-0109	Topsoil			
	Sta 1273+94 to Sta 1285+81	645.30	CY	
	Transport to Site 4	40	CY	
251-0200	Seeding Class II			
	Sta 1273+94 to Sta 1285+81	0.68	Acre	
253-0101	Straw Mulch			
	Sta 1273+94 to Sta 1285+81	0.68	Acre	(per application)
256-0201	Riprap Grade II			
	Sta 1274+00 to Sta 1285+75	1,589.19	Ton	
261-0112	Fiber Rolls 12 In			
	Sta 1273+90 to Sta 1274+00	10	LF	
	Sta 1274+00 to Sta 1285+75	1175	LF	
	Sta 1285+75 to Sta 1285+85	10	LF	
709-0155	Geosynthetic Material Type RR			
	Sta 1274+00 to Sta 1285+75	2,555.88	SY	



Legend

- Riprap Grade II
- Seeding Class II & Straw Mulch
- Fiber Roll 12 In

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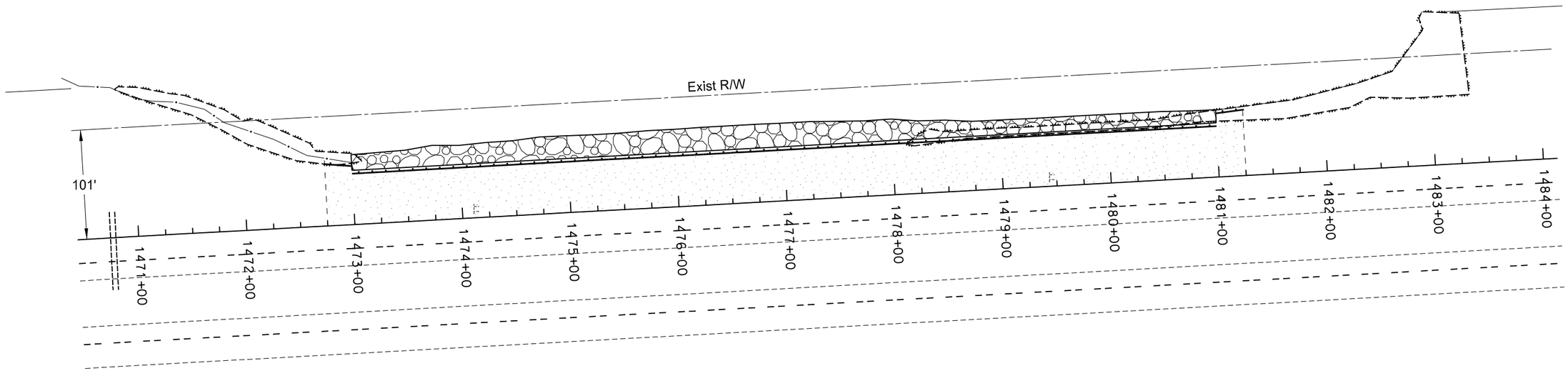
Permanent Erosion Control

Site 3
2.24 Miles East of Medina Interchange
Westbound I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(142)224	77	4

Item	Description	Quantity	Unit	
203-0109	Topsoil			
	Sta 1472+75 to Sta 1481+25	110.06	CY	
	Transported from Site 3	40	CY	
251-0200	Seeding Class II			
	Sta 1472+75 to Sta 1481+25	1.01	Acre	
253-0101	Straw Mulch			
	Sta 1472+75 to Sta 1481+25	1.01	Acre	(per application)
256-0201	Riprap Grade II			
	Sta 1473+00 to Sta 1481+00	1,246.33	Ton	
261-0112	Fiber Rolls 12 In			
	Sta 1472+74 to Sta 1473+00	26	LF	
	Sta 1473+00 to Sta 1481+00	800	LF	
	Sta 1481+00 to Sta 1481+26	26	LF	
709-0155	Geosynthetic Material Type RR			
	Sta 1476+00 to Sta 1481+00	1,881.46	SY	



Legend

- Riprap Grade II
- Seeding Class II & Straw Mulch
- Fiber Roll 12 In

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Permanent Erosion Control

Site 4
2 Miles West of Cleveland Interchange
Westbound I-94

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	IM-2-094(142)224	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
D3-36	36"x6"	STREET NAME SIGN (Sign and installation only)		6	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		34	
G20-1b-60	60"x24"	WORK IN PROGRESS/ NO WORK IN PROGRESS (Sign and installation only)		26	
G20-2-48	**48"x24"**	**END ROAD WORK**	**4**	**19**	**76**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-10-108	108"x48"	CONTRACTOR SIGN		64	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		37	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		30	
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)		10	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR ARROW RIGHT or LEFT		23	
M5-1-21	21"x15"	ARROW AHD AND RT or LT(Mounted on route marker post)		7	
M5-2-21	21"x15"	ARROW AHD UP & RT or LT (Mounted on route marker post)		7	
M6-1-21	21"x15"	ARROW RT or LT (Mounted on route marker post)		7	
M6-2-21	21"x15"	ARROW UP & RT or LT (Mounted on route marker post)		7	
M6-3-21	21"x15"	ARROW AHD (Mounted on route marker post)		7	
R1-1-48	**48"x48"**	**STOP**	**4**	**32**	**128**
R1-1a-18	**18"x18"**	**STOP and SLOW PADDLE Back to Back**	**2**	**5**	**10**
R1-2-60	60"x60"	YIELD		29	
R2-1-48	**48"x60"**	**SPEED LIMIT __**	**12**	**39**	**468**
R2-1a-24	**24"x18"**	**MINIMUM FEE $80 (Mounted on Speed Limit post)**	**4**	**10**	**40**
R3-7-48	48"x48"	LEFT or RIGHT LANE MUST TURN LEFT or RIGHT		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT SYMBOL		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-36	36"x12"	ONE WAY RIGHT or LEFT		13	
R7-1-12	12"x18"	NO PARKING		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	48"x30"	ROAD CLOSED		28	
R11-2a-48	48"x30"	STREET CLOSED		28	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY		31	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC		31	
W1-3-48	48"x48"	RIGHT or LEFT SHARP REVERSE CURVE ARROW		35	
W1-4-48	48"x48"	RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-4b-48	48"x48"	DOUBLE RIGHT or LEFT REVERSE CURVE ARROW		35	
W1-6-48	48"x24"	LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD SYMBOL		35	
W3-3-48	48"x48"	SIGNAL AHEAD SYMBOL		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"**	**RIGHT or LEFT LANE TRANSITION SYMBOL**	**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 SYMBOL		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-9a-48	48"x48"	SHOULDER DROP-OFF		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER STRIPE		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	**48"x48"**	**TRUCKS ENTERING AHEAD or __ FT.**	**2**	**35**	**70**
W8-55-48	**48"x48"**	**TRUCKS CROSSING AHEAD or __ FT.**	**2**	**35**	**70**
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W12-2-48	48"x48"	LOW CLEARANCE SYMBOL		35	
W13-1-24	24"x24"	__ MPH ADVISORY SPEED PLATE (Mounted on warning sign post)		11	
W13-4-48	48"x60"	RAMP ARROW		39	
W14-3-48	48"x36"	NO PASSING ZONE		23	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**4**	**35**	**140**
W20-2-48	48"x48"	DETOUR AHEAD or __ FT		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT.		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT.		35	
W20-5-48	**48"x48"**	**RIGHT or LEFT LANE CLOSED AHEAD or __ FT.**	**4**	**35**	**140**
W20-7a-48	**48"x48"**	**FLAGGING SYMBOL**	**2**	**35**	**70**
W20-7k-24	24"x18"	__ FEET (Mounted on warning sign post)		10	
W20-8-48	48"x48"	STREET CLOSED		35	
W20-51-48	48"x48"	EQUIPMENT WORKING		35	
W20-52-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1a-48	48"x48"	WORKERS SYMBOL		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT		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.		35	
W21-6a-48	48"x48"	SURVEY CREW AHEAD		35	
W21-50-48	48"x48"	BRIDGE PAINTING AHEAD or __ FT.		35	
W21-51-48	48"x48"	MATERIAL ON ROADWAY		35	
W22-8-48	48"x48"	FRESH OIL LOOSE ROCK		35	
	24"x24"	TAKE TURNS (6" D letters) (Mounted on stop sign post)		11	

SPECIAL SIGNS

SPEC & CODE			
704-1000	**TRAFFIC CONTROL SIGNS**	**TOTAL UNITS**	**1728**

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	**FLAGGING**	**MHR**	**350**
704-1041	ATTENUATION DEVICE-TYPE B-55	EACH	
704-1043	ATTENUATION DEVICE-TYPE B-65	EACH	
704-1044	ATTENUATION DEVICE-TYPE B-70	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1051	TYPE II BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**2**
704-1060	**DELINEATOR DRUMS**	**EACH**	**44**
704-1065	TRAFFIC CONES	EACH	
704-1067	**TUBULAR MARKERS**	**EACH**	**70**
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	**SEQUENCING ARROW PANEL - TYPE C**	**EACH**	**2**
704-1088	SEQUENCING ARROW PANEL - TYPE C - CROSSOVER	EACH	
704-1095	TYPE B FLASHERS	EACH	
704-1500	OBLITERATION OF PVMT MK	SF	
704-3501	PORTABLE PRECAST CONCRETE MED BARRIER	LF	
704-3510	PRECAST CONCRETE MED BARRIER - STATE FURNISHED	EACH	
762-0200	RAISED PAVEMENT MARKERS	EACH	
762-0420	SHORT TERM 4IN LINE - TYPE R	LF	
762-0430	SHORT TERM 4IN LINE - TYPE NR	LF	
772-2110	FLASHING BEACON - POST MOUNTED	EACH	

NOTE:
If additional signs are required, units will be calculated using the formula from Section III-19.06 of the Design Manual.
http://www.dot.nd.gov/

This document was originally issued and sealed by Daniel R. Viau, Registration Number PE-6329, on 4/7/16 and the original document is stored at the North Dakota Department of Transportation.

Traffic Control Devices List

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
N.D.	IM-2-094(142)224	110	1

Sta/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	Galv Steel Post Standard Pipe 1st LF	Galv Steel Post 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
1284+95 Lt		12.1						15.4		3.5				17.4			1.3	6.0	0.3		1						
Sub Total		12.1	0.0	0.0	0.0	0.0	0.0	**Total** 15.4			**Total** 0.0								0.3	0	1	0	0	0	0	0	
Grand Total		12.1	0.0	0.0	0.0	0.0	0.0	**Total** 15.4			**Total** 0.0								0.3	0	1	0	0	0	0	0	

Basis of Estimate
Sign Support Lengths

The sign support lengths have been calculated
using the following vertical clearances:

Areas where parking and/or pedestrian movement will occur - 84"
Urban/rural expressway and freeway - 84" (Offset - 60")
Rural Roadway - 60"

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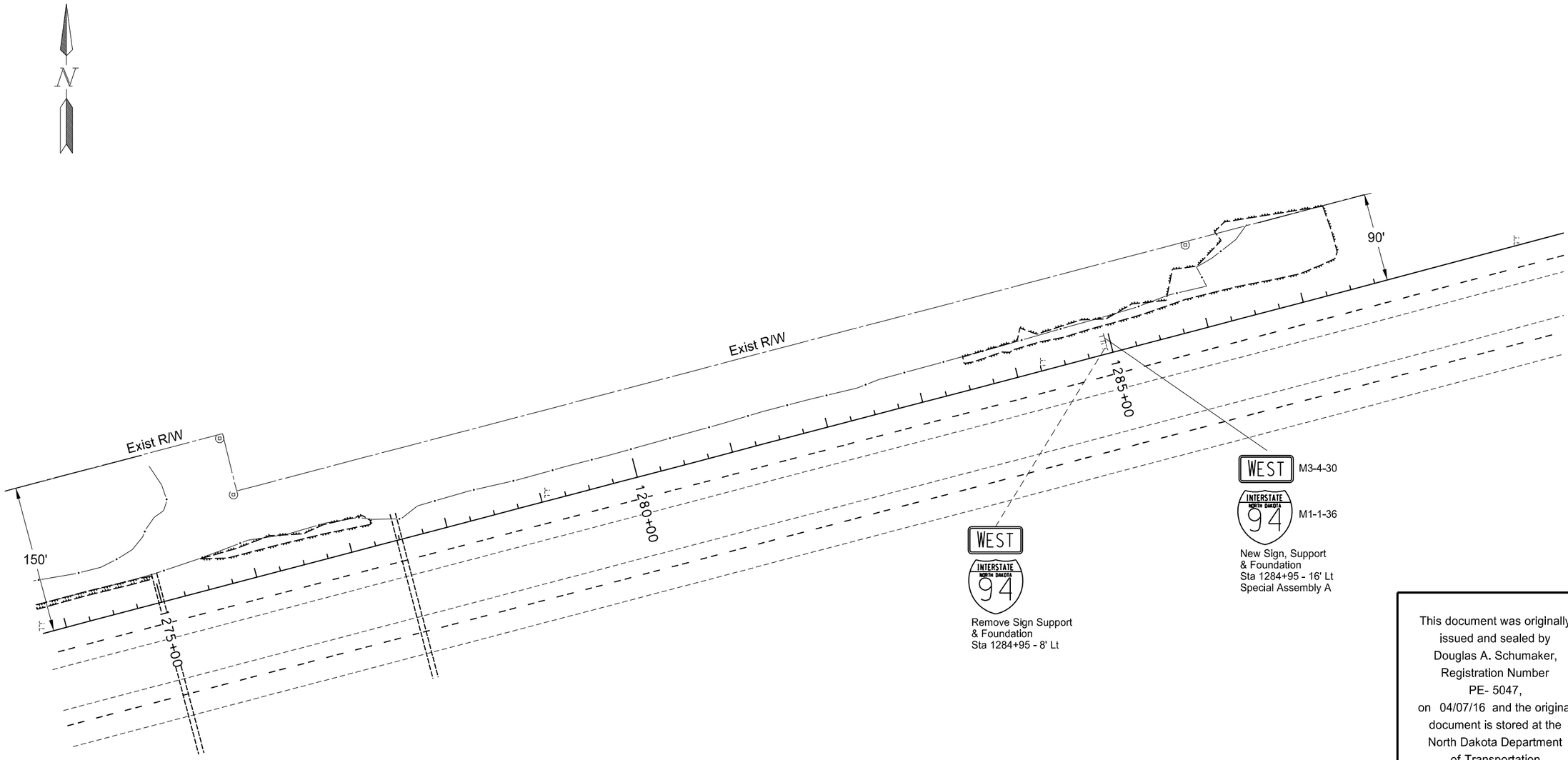
Sign Summary
Round Steel Pipe and W-Shape

Site 3
2.24 Miles east of Medina Interchange

Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	110	2



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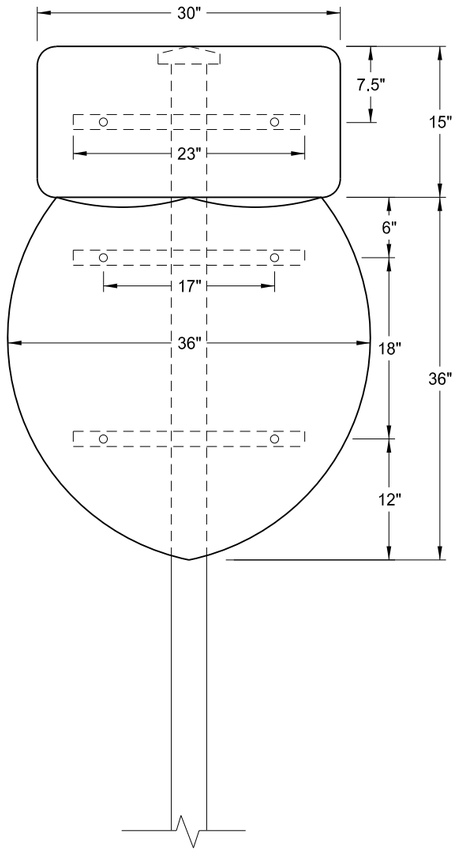
Sign Layout

Site 3
2.24 Miles east of Medina Interchange

Westbound I-94

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	110	3



Special Assembly A

Sta 1284+95 - 16' Lt

Pay area: 12.125 SF

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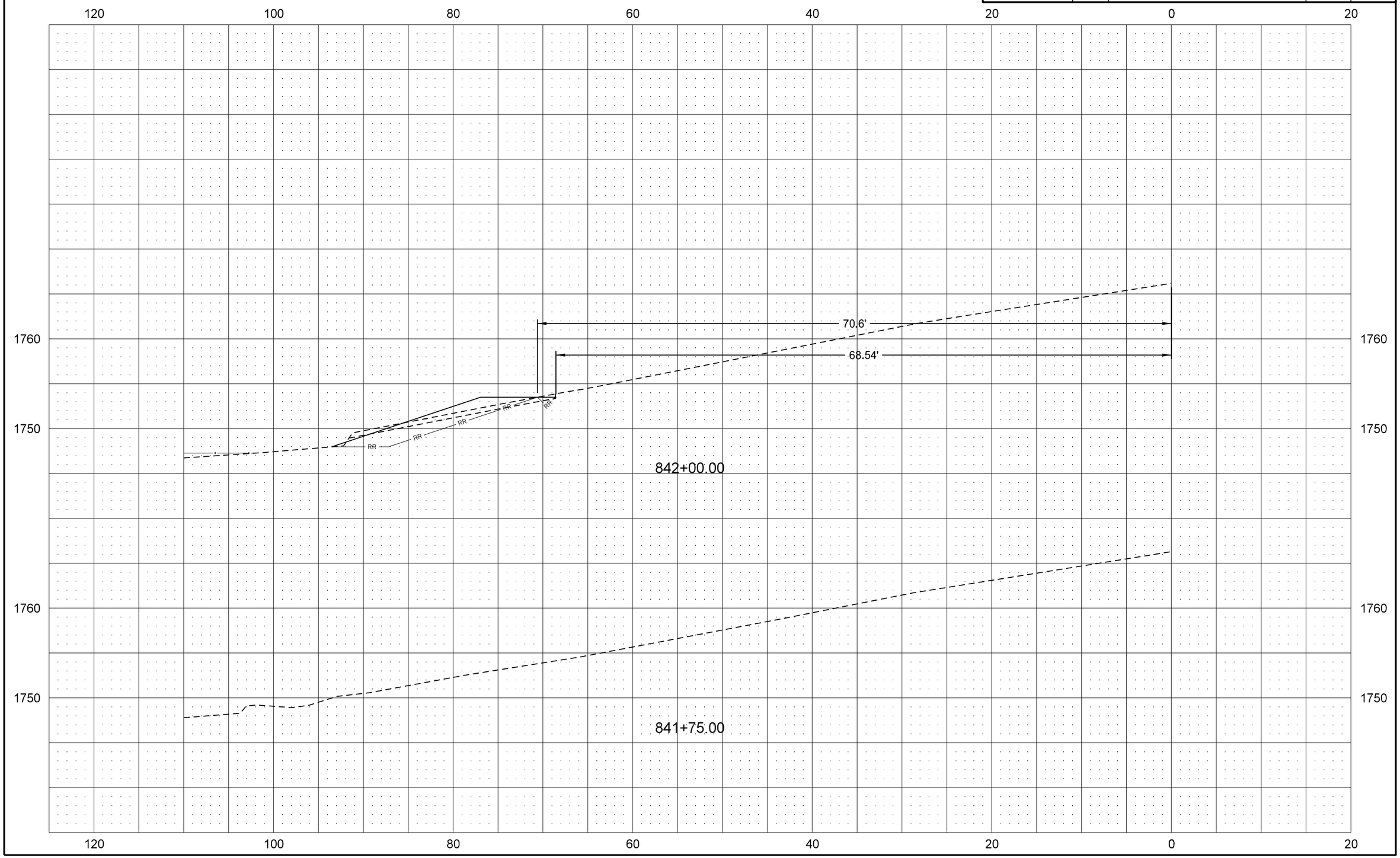
Sign Assembly

Site 3
2.24 Miles east of Medina Interchange

Westbound I-94

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	1



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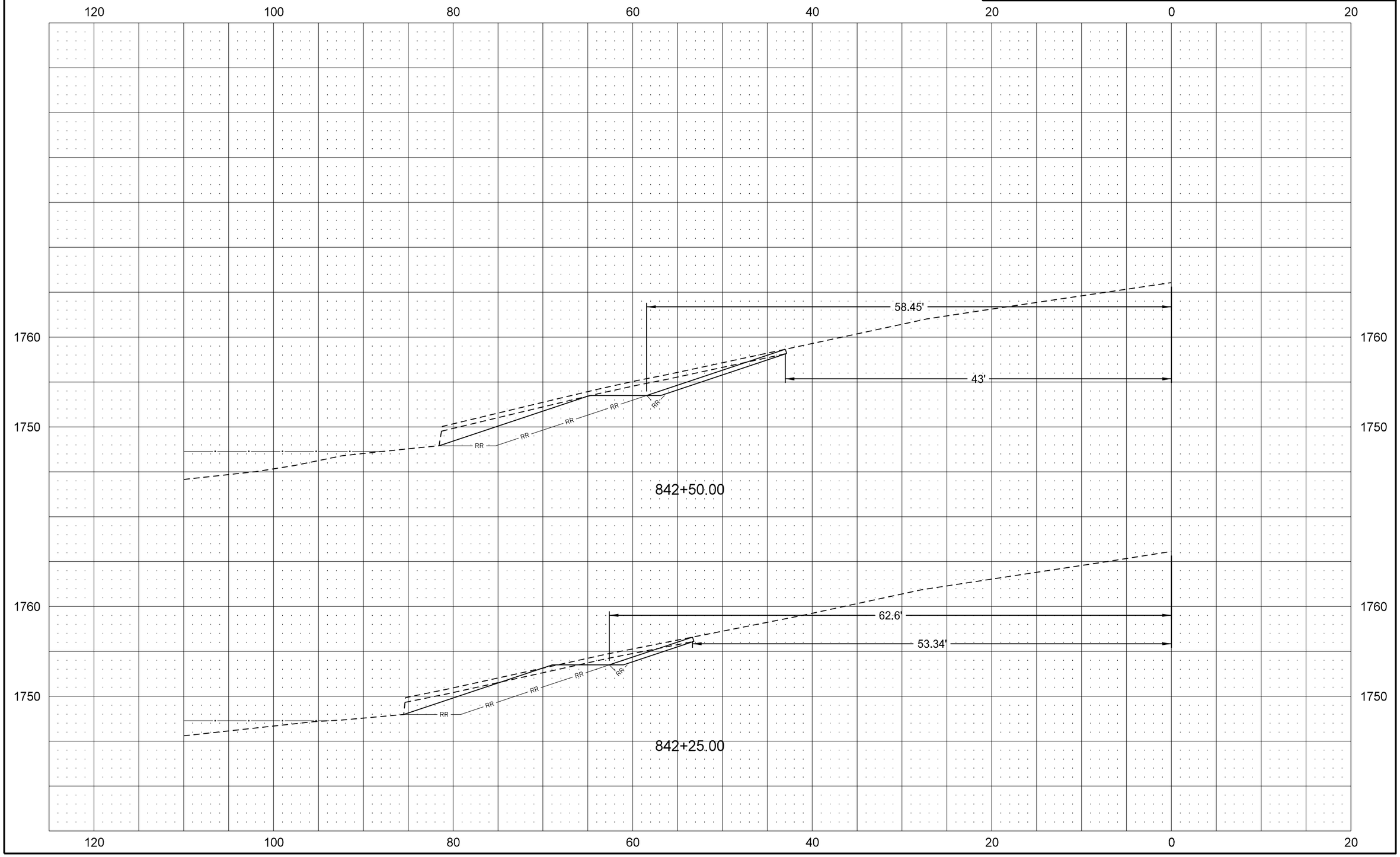
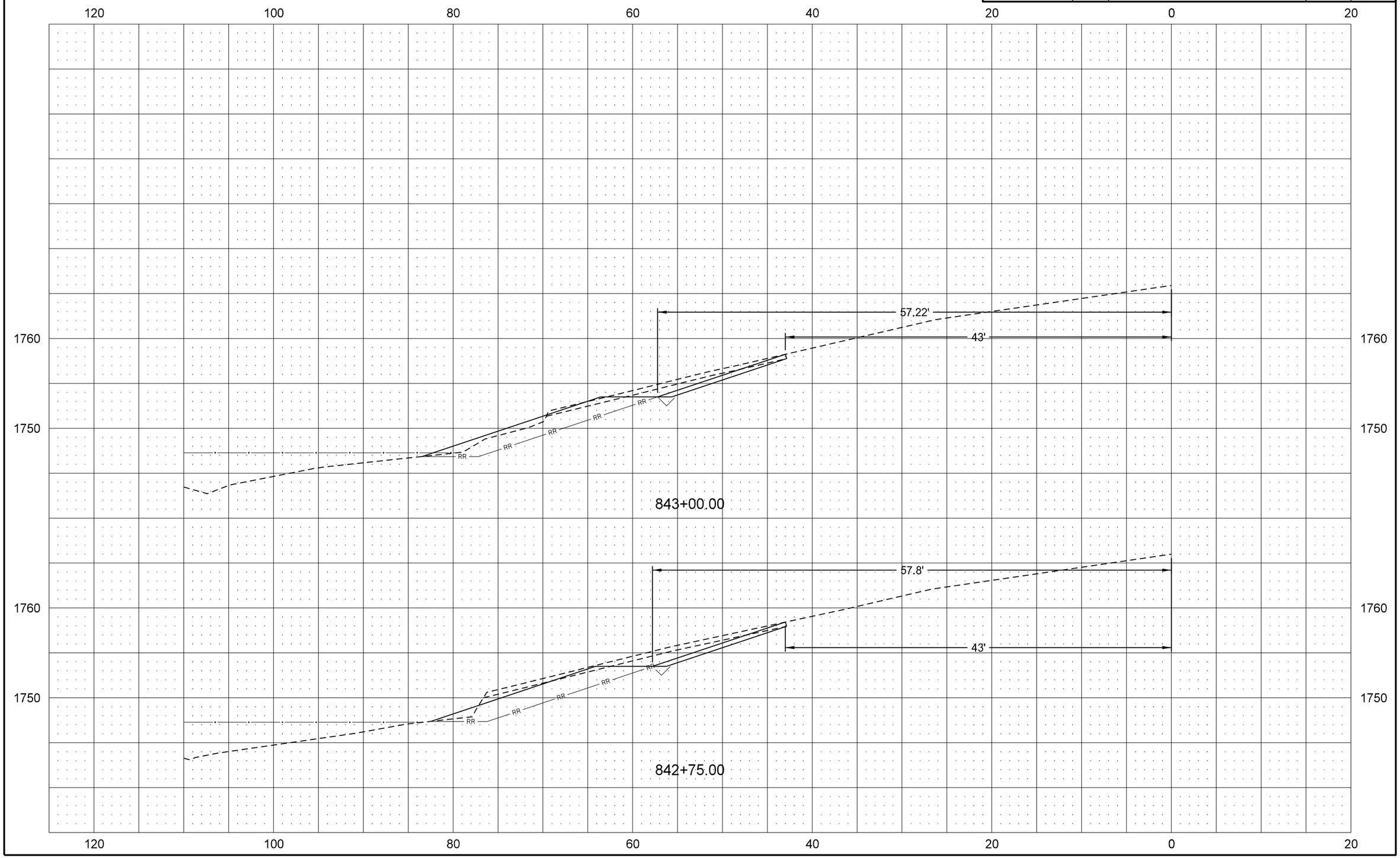
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	2

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	3

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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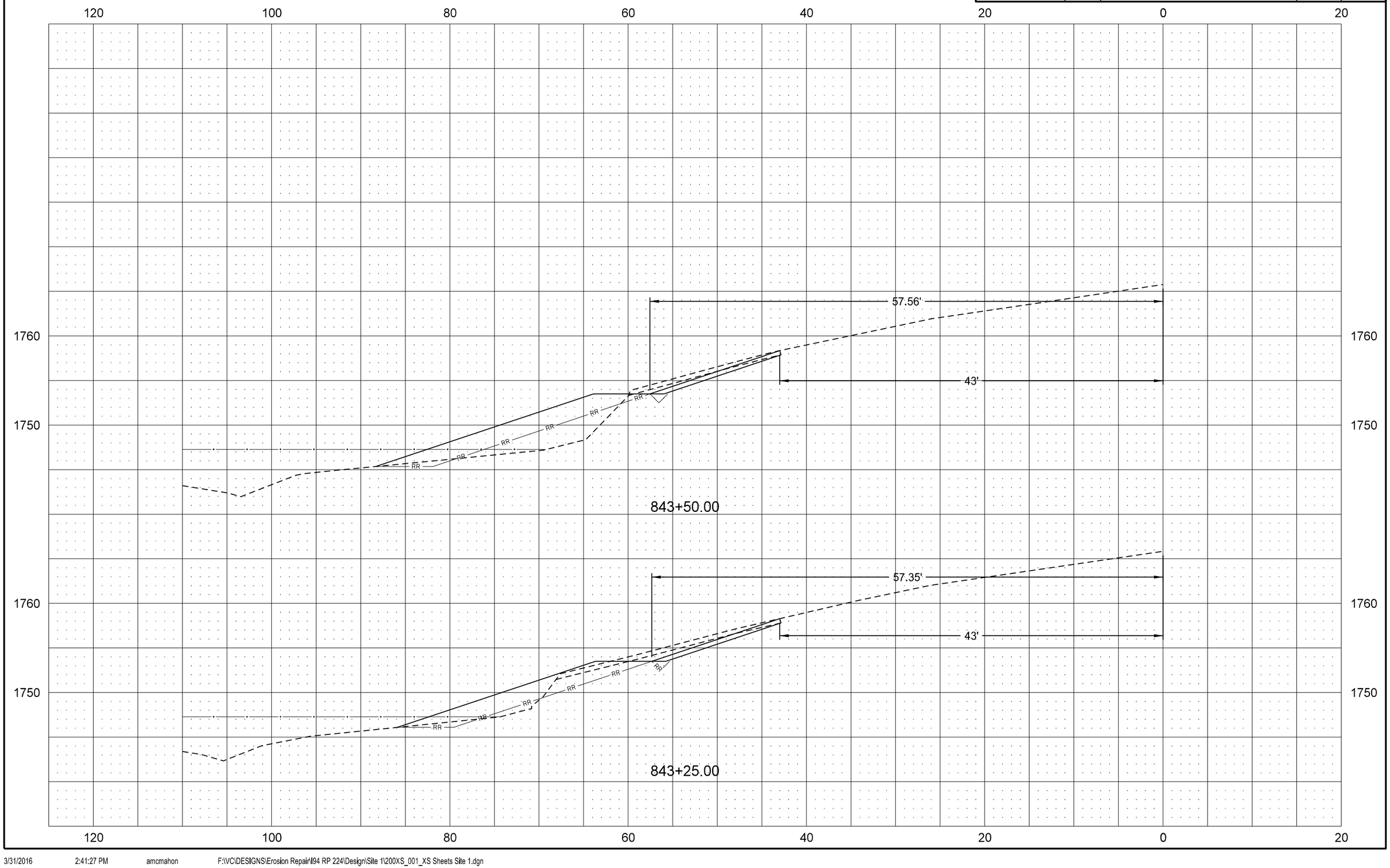
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	4

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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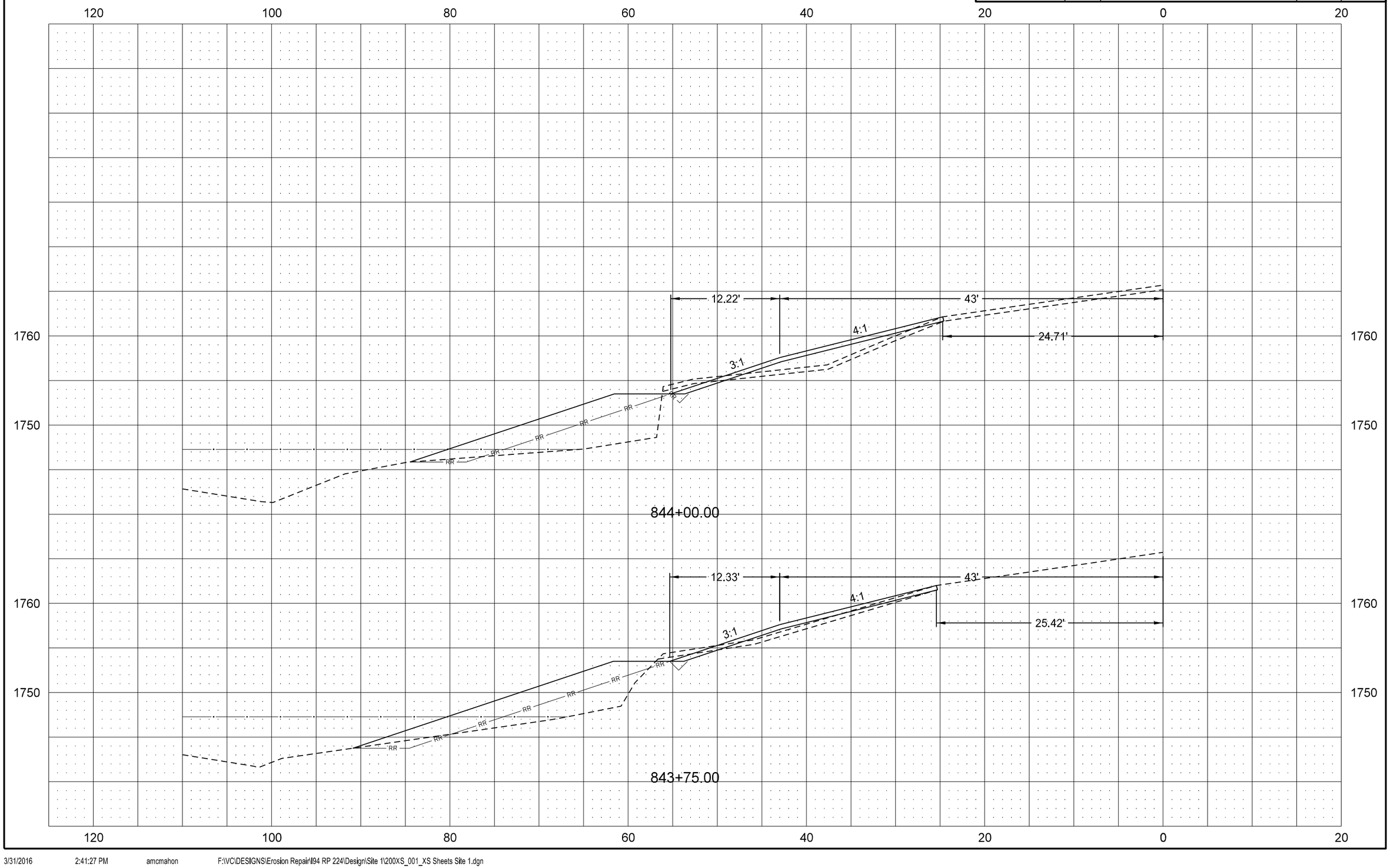
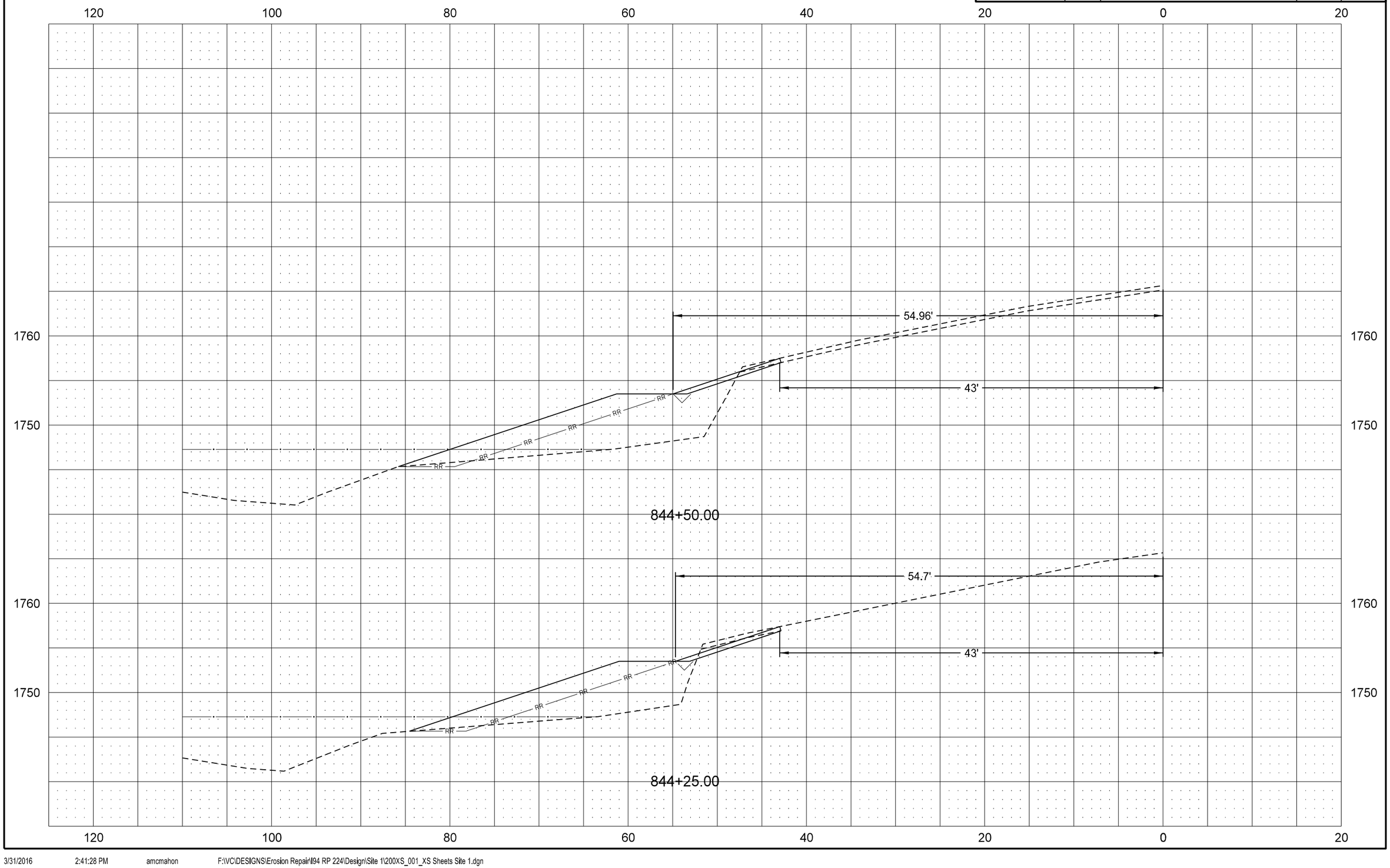
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	5

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	6

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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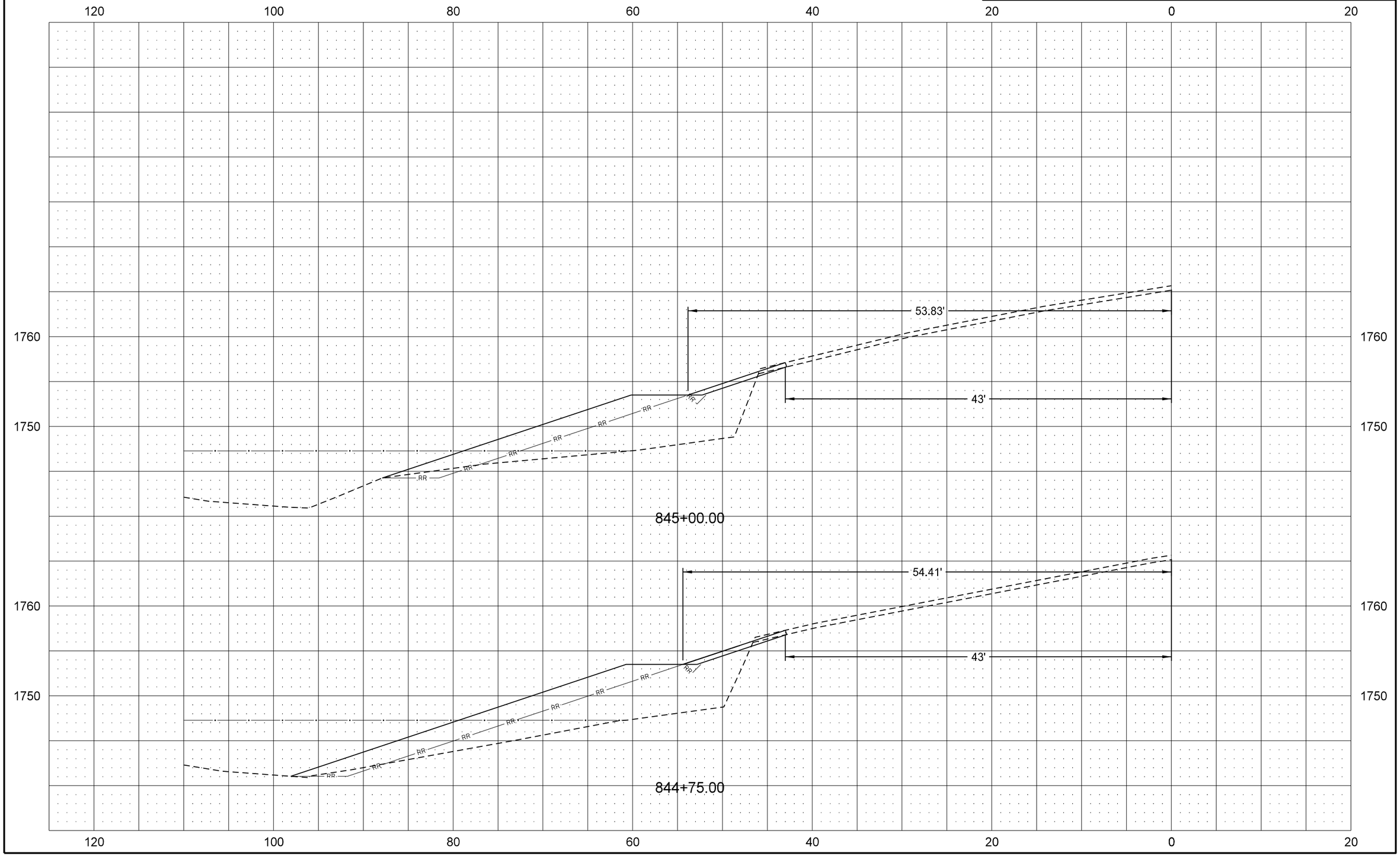
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	7

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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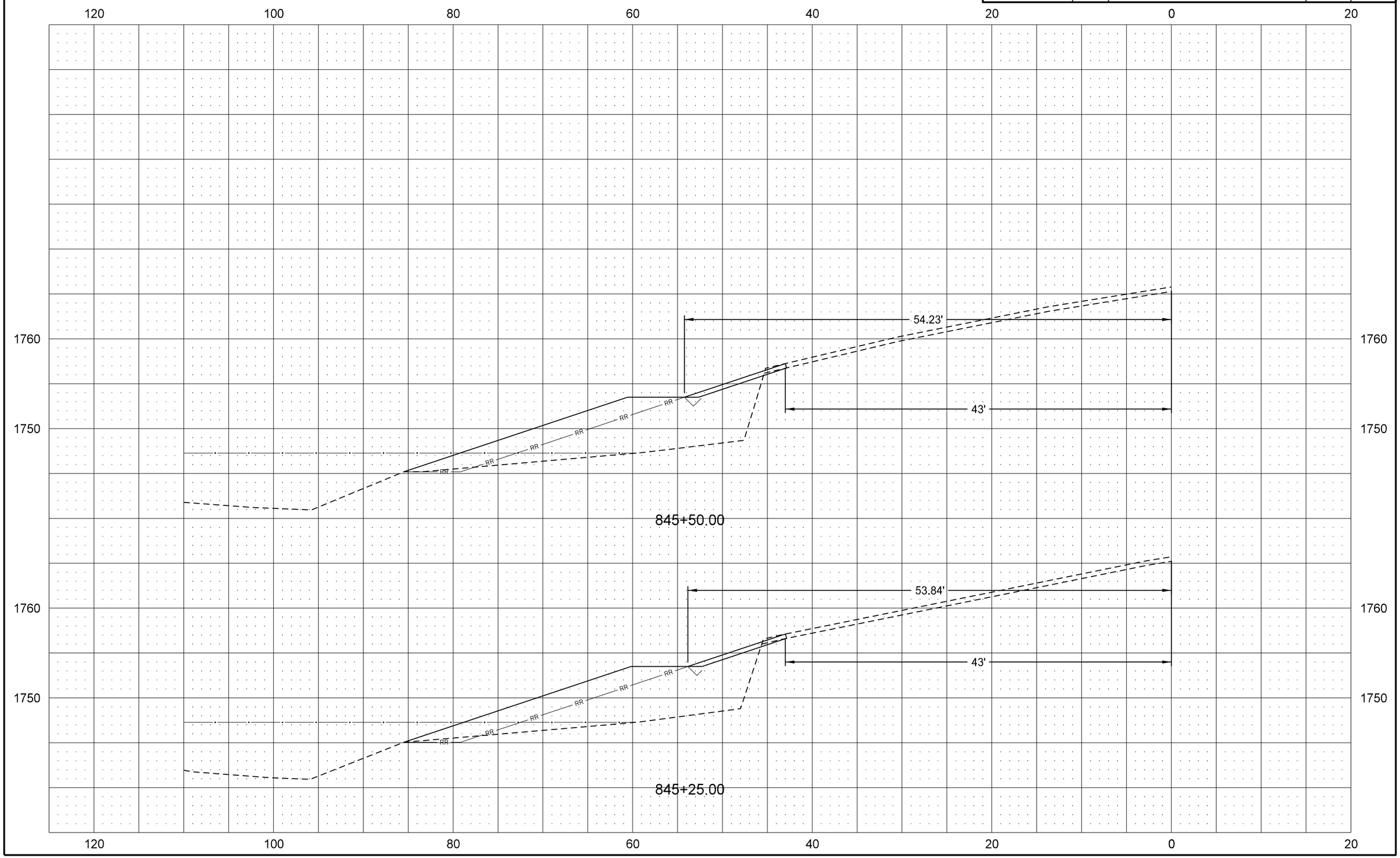
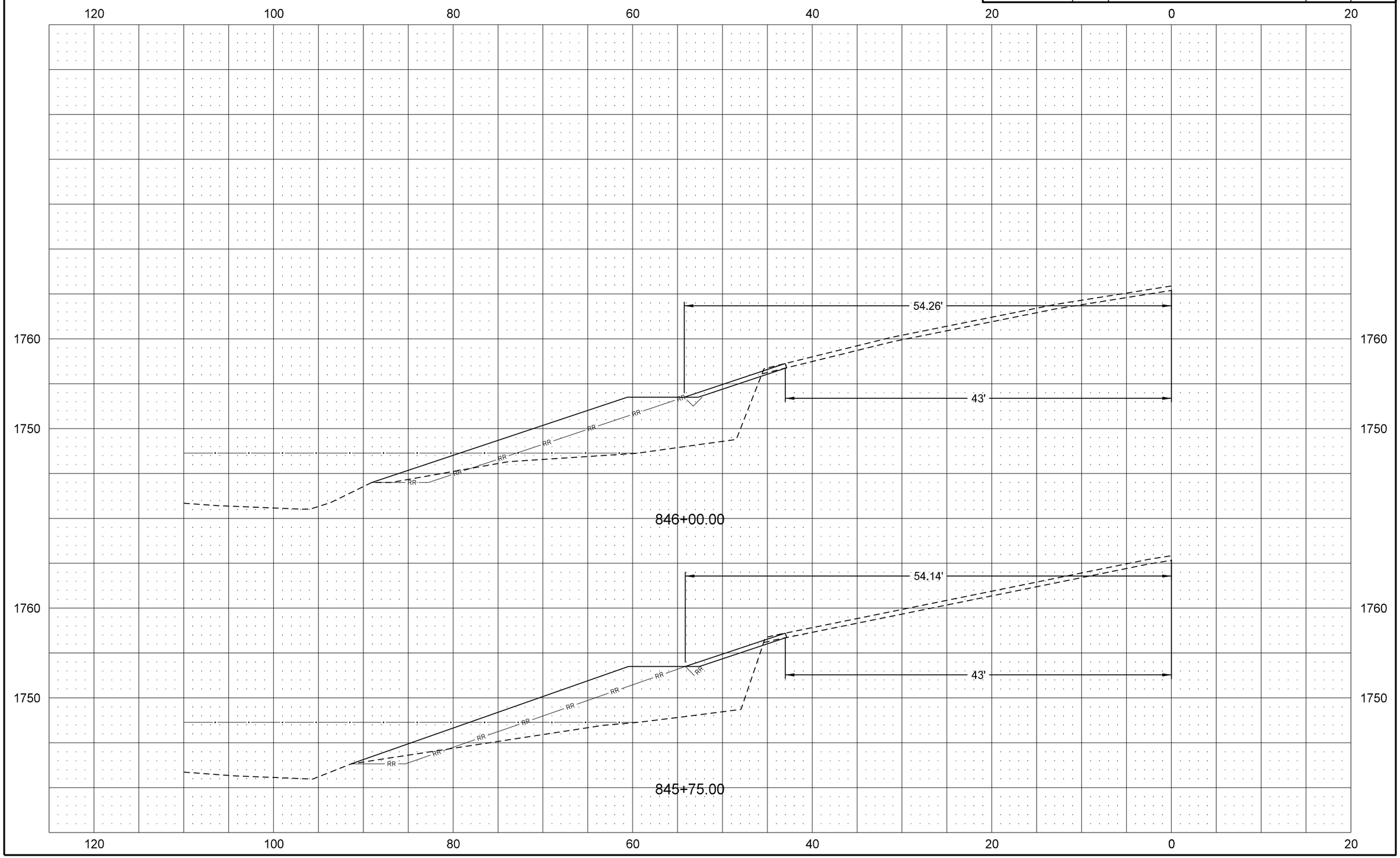
Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	8



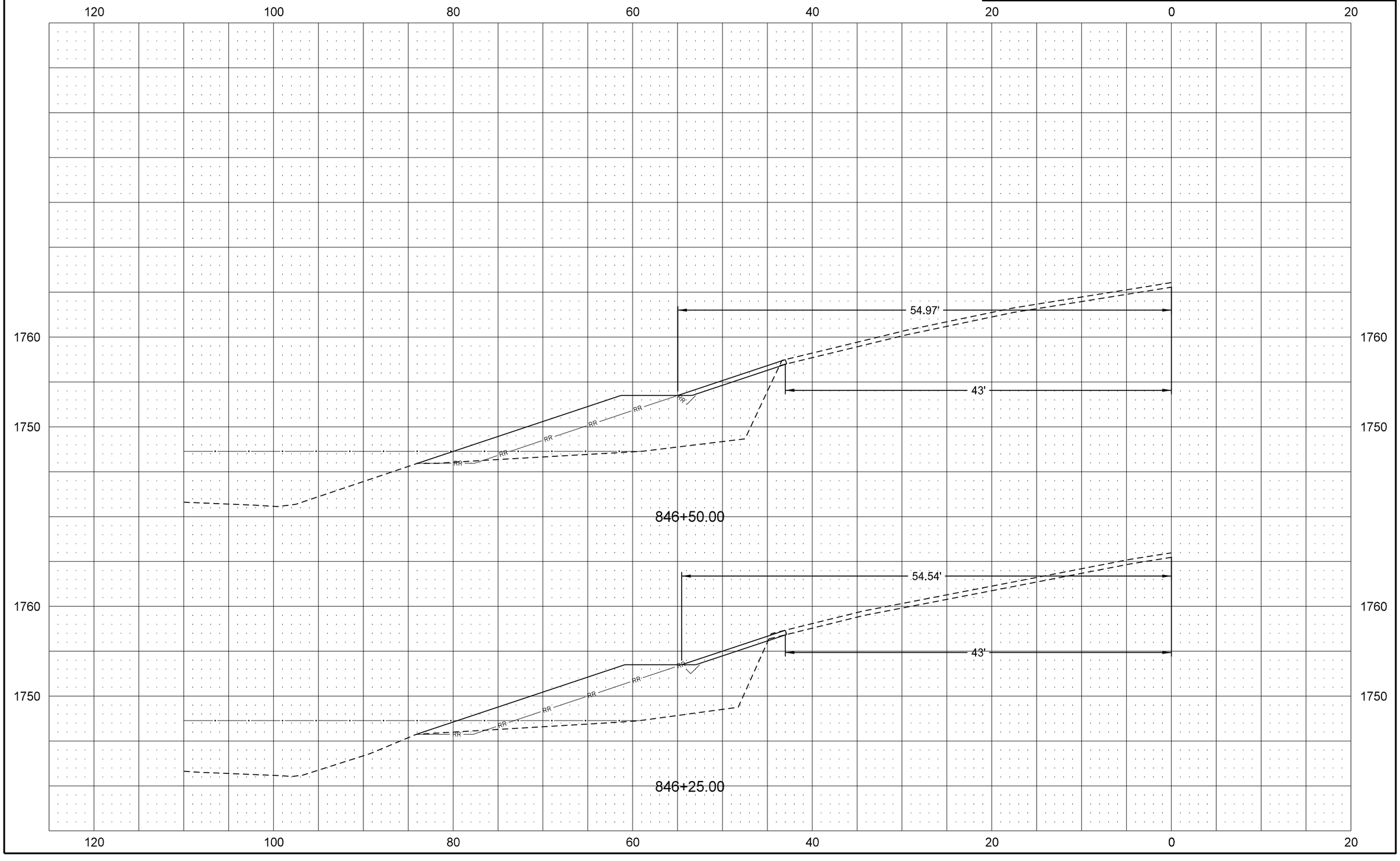
Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	9



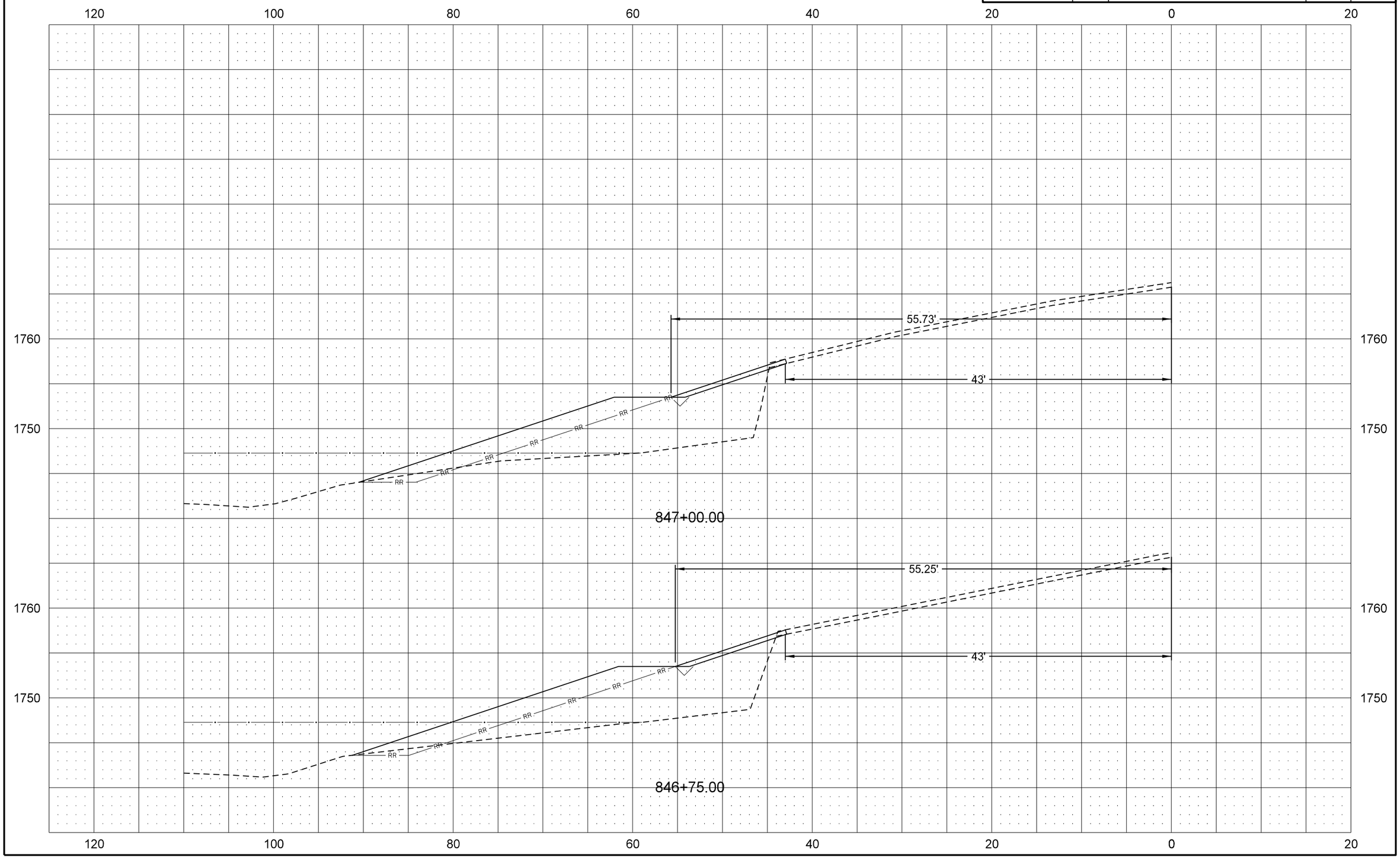
Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	10



Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	11



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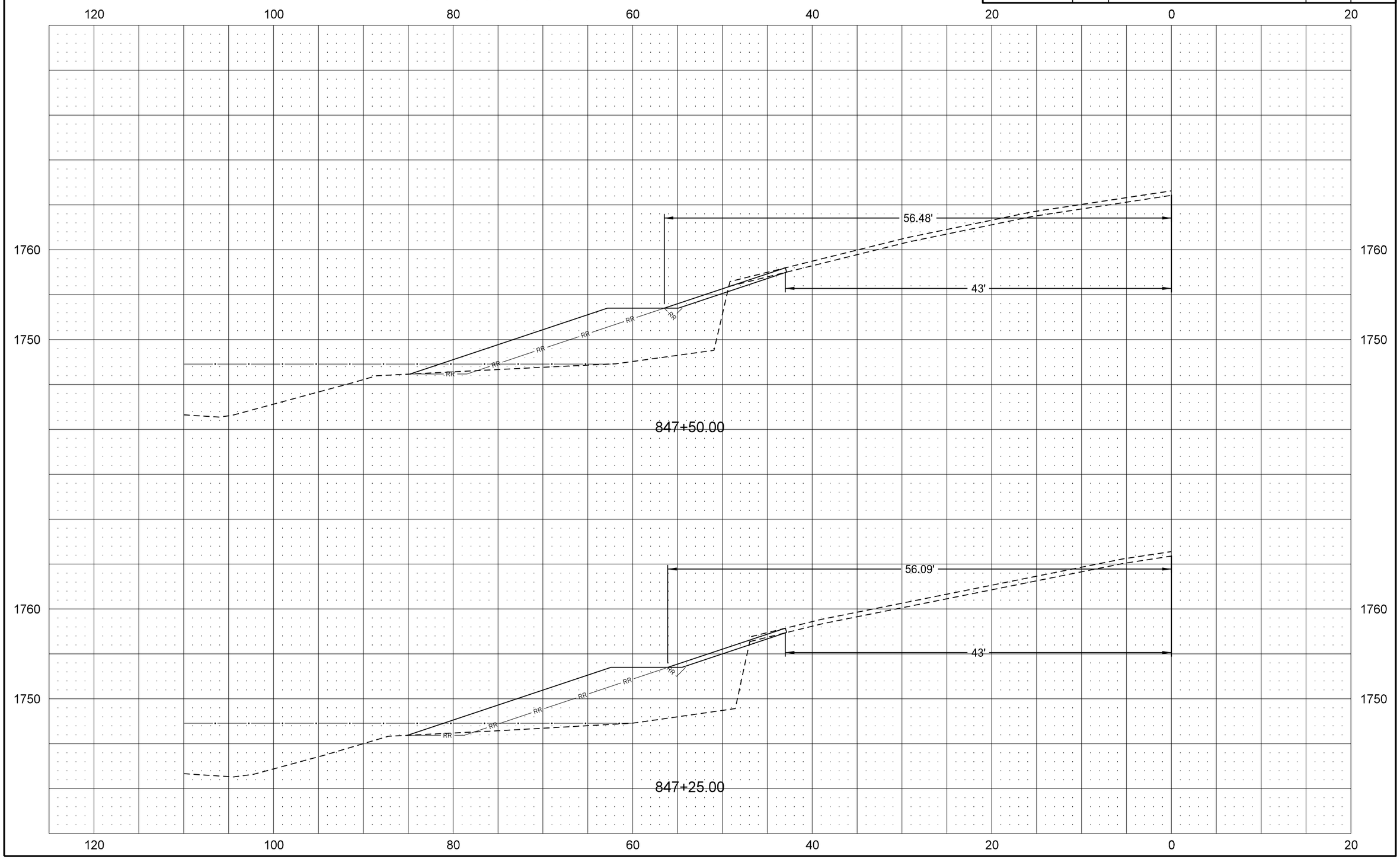
Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	12



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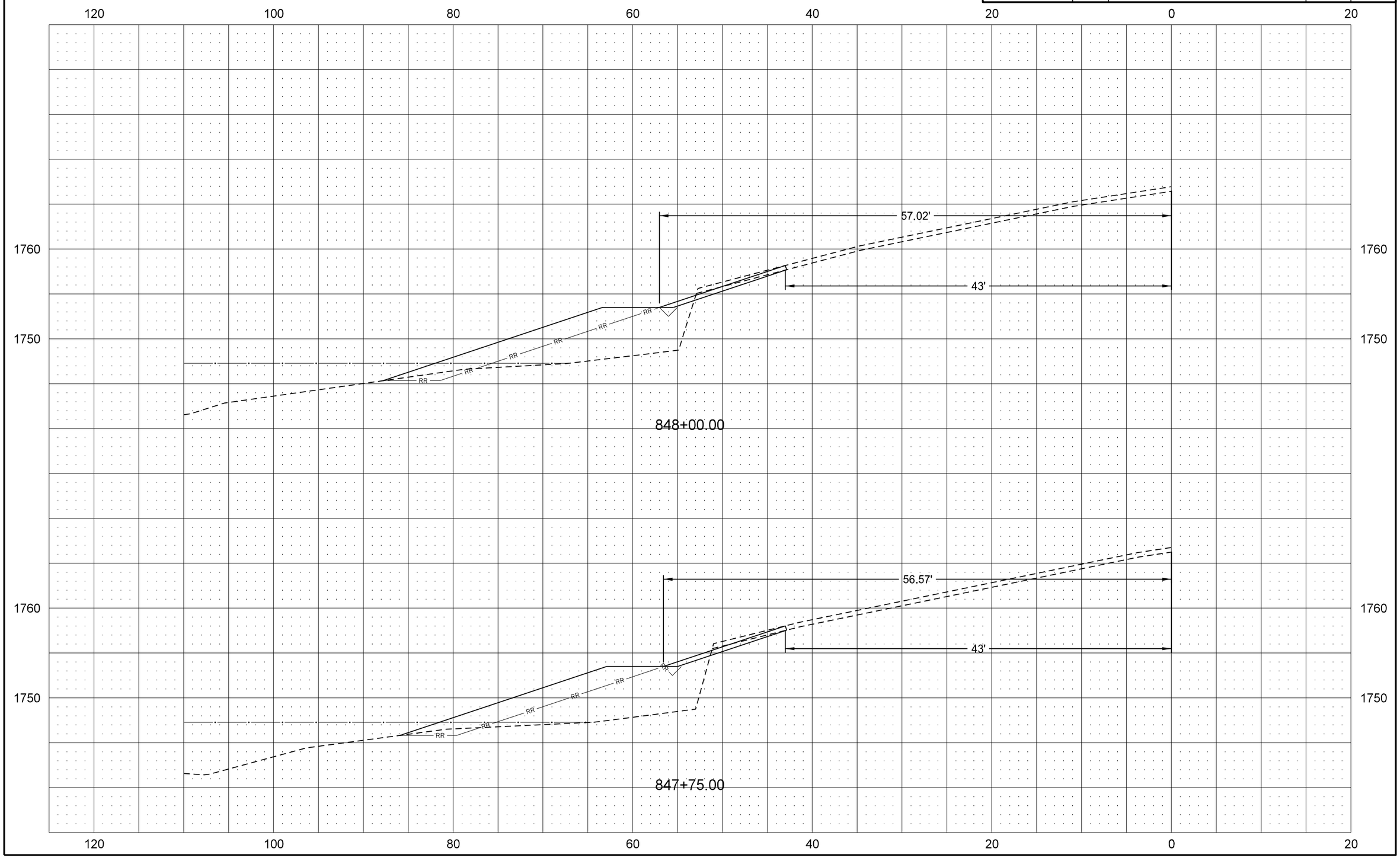
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	13

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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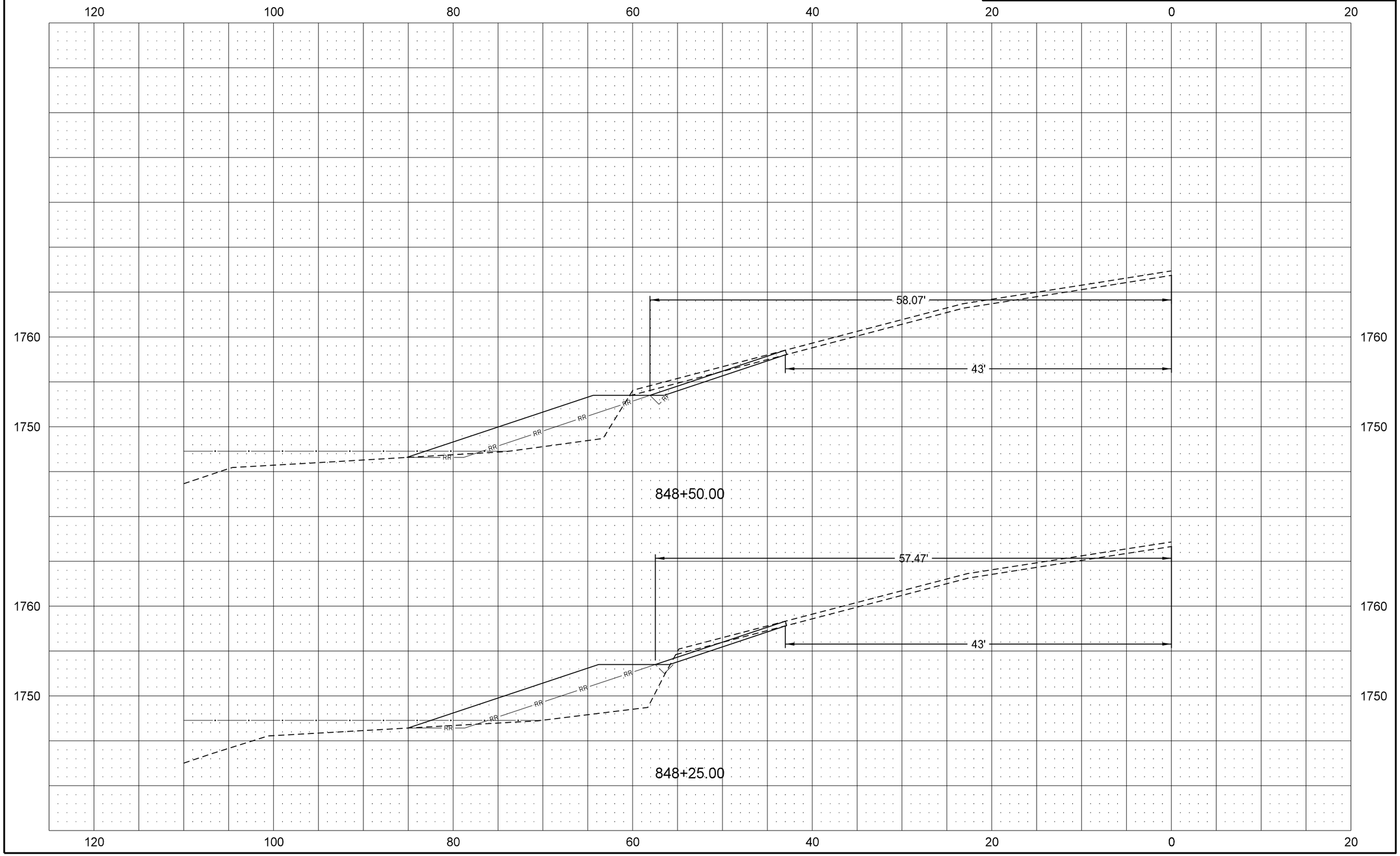
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	14

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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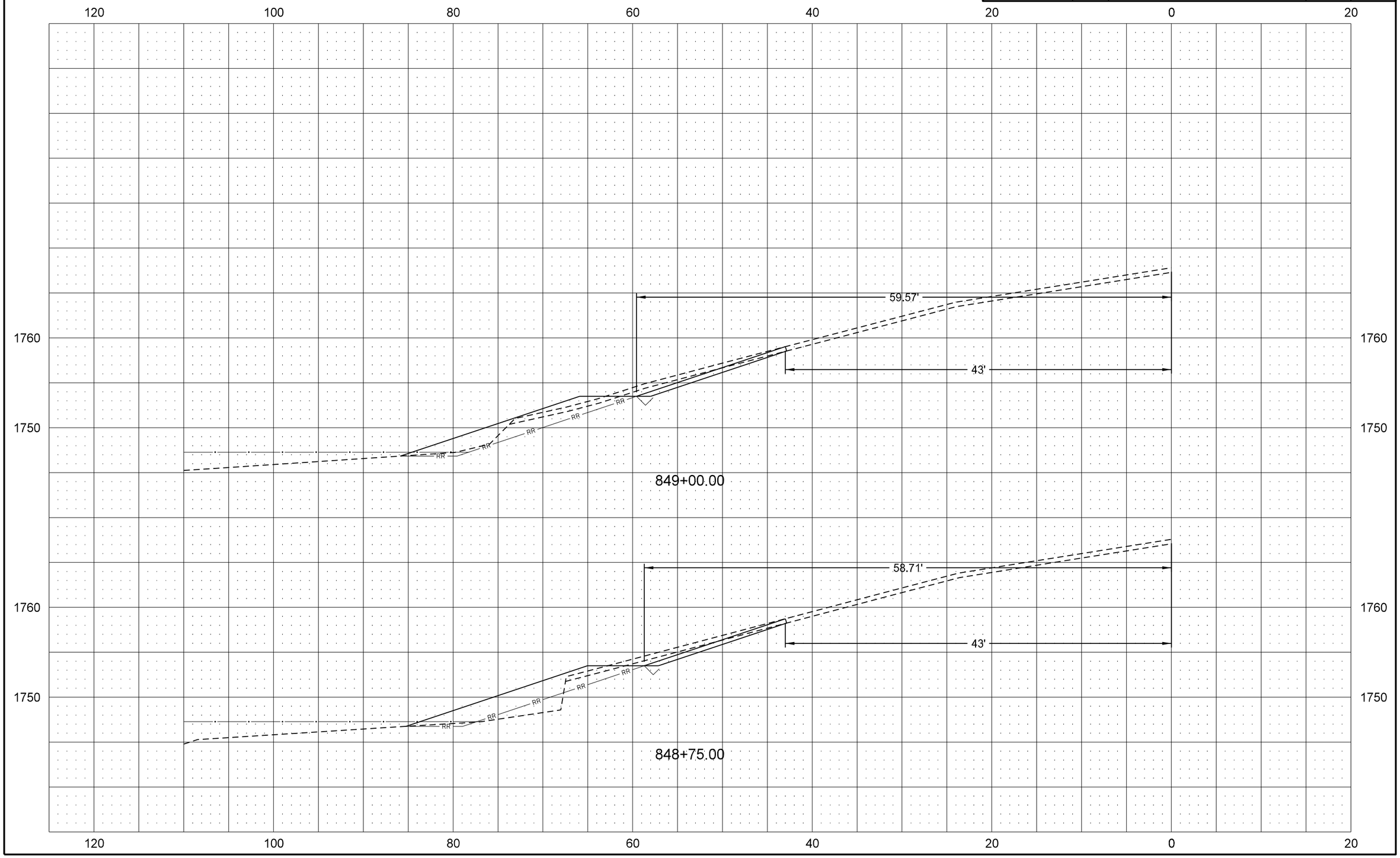
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	15

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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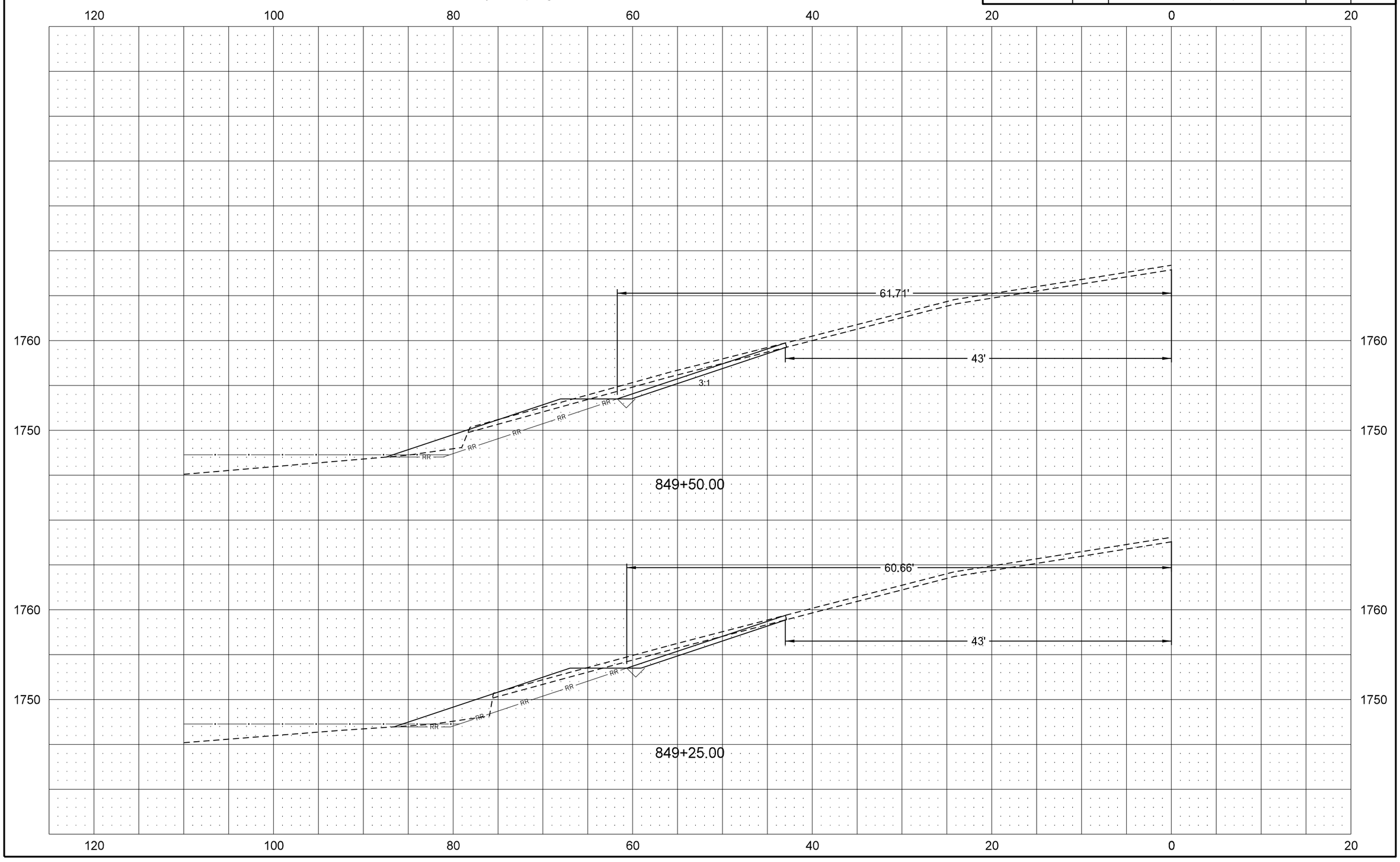
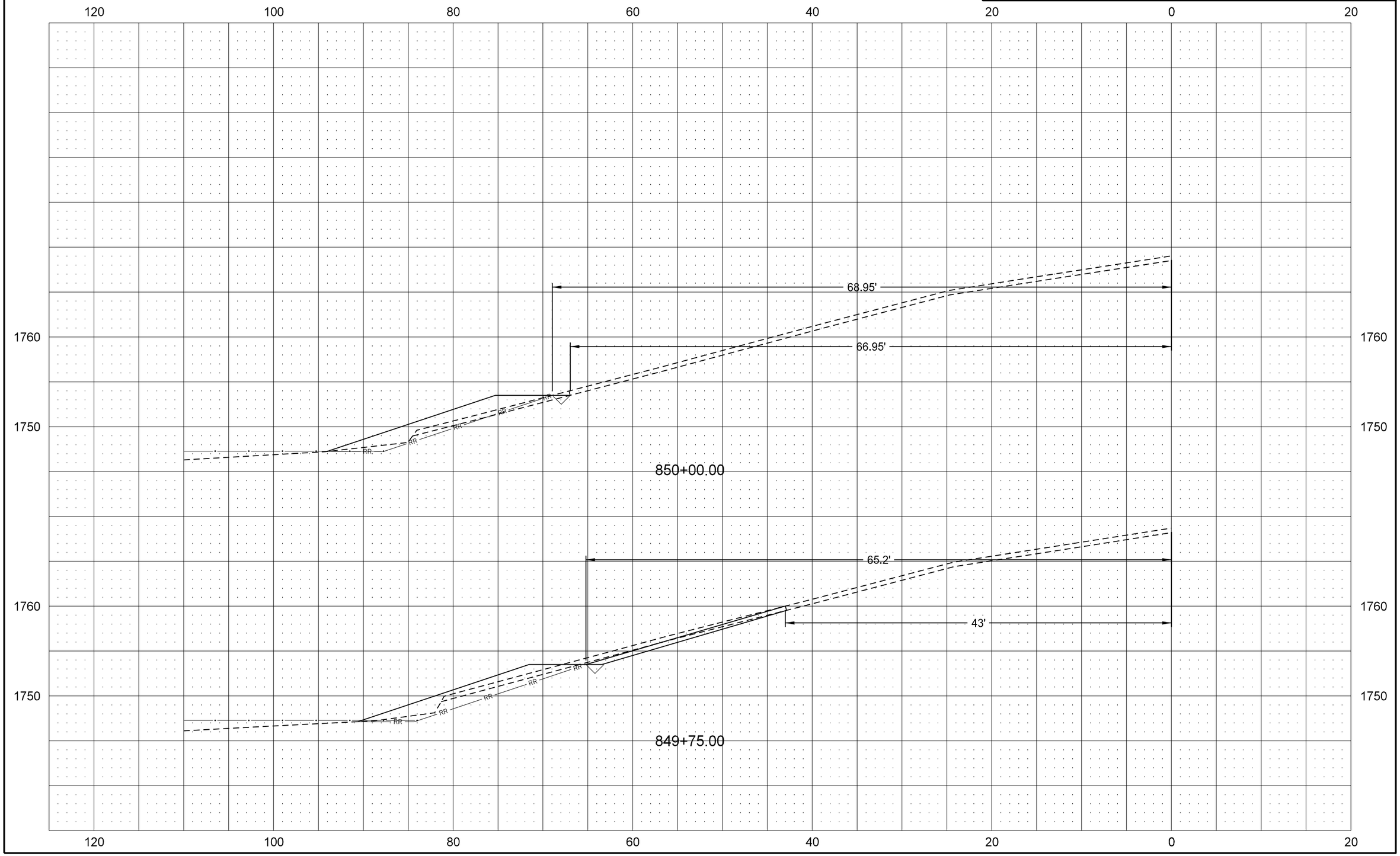
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	16

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	17

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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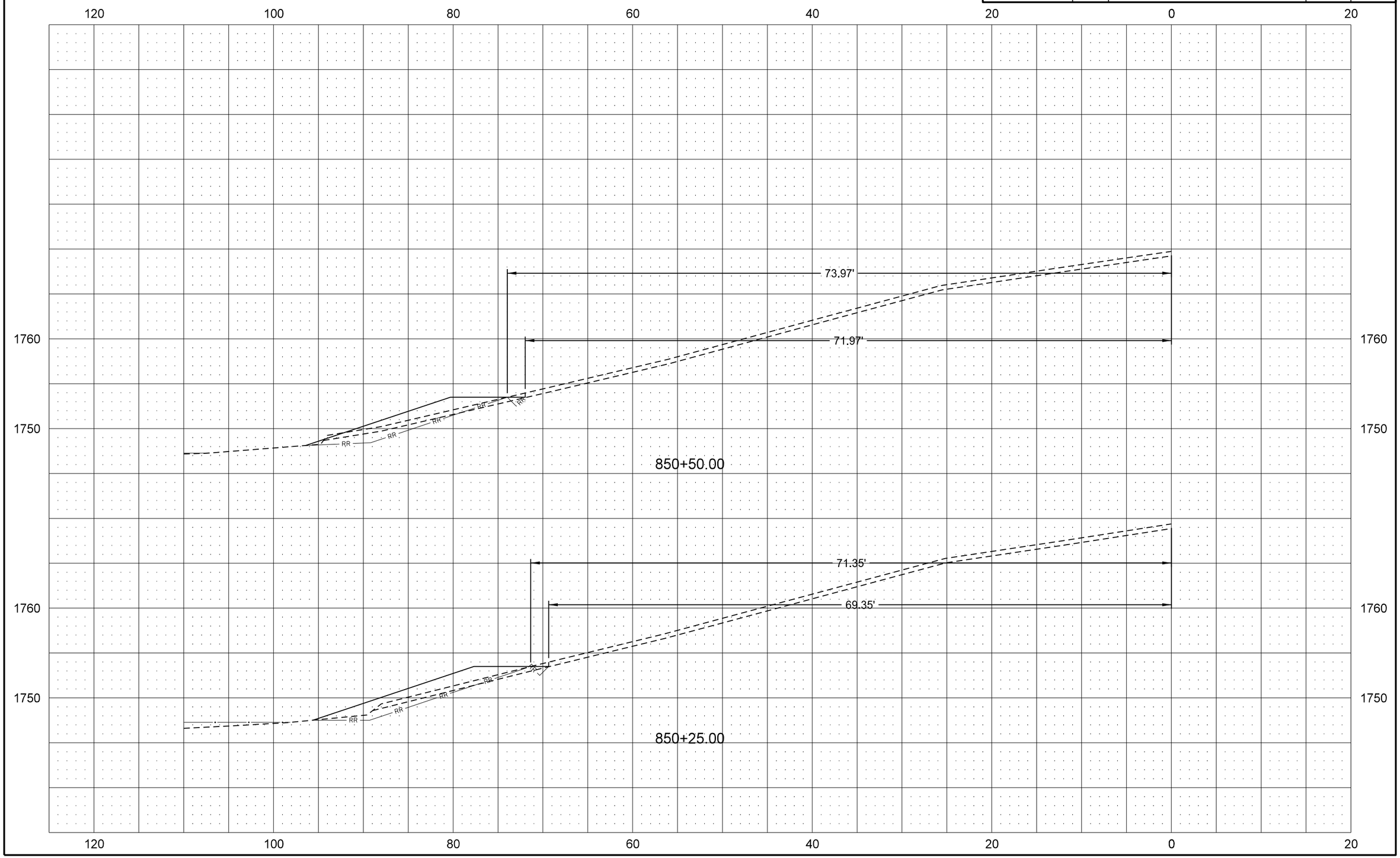
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	18

Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area



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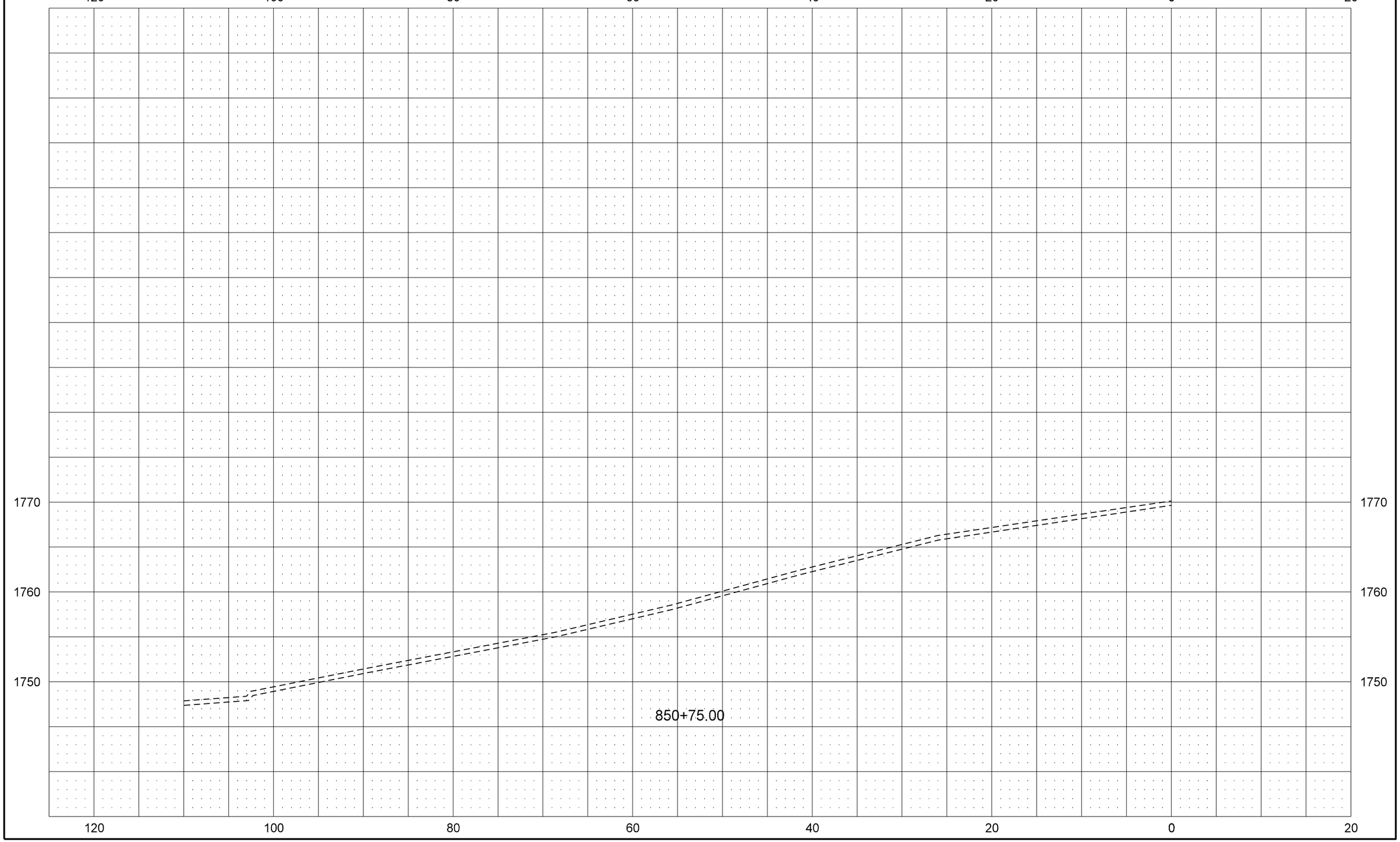
Westbound I-94 Site 1
0.75 Miles East of Crystal Springs Rest Area

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	19



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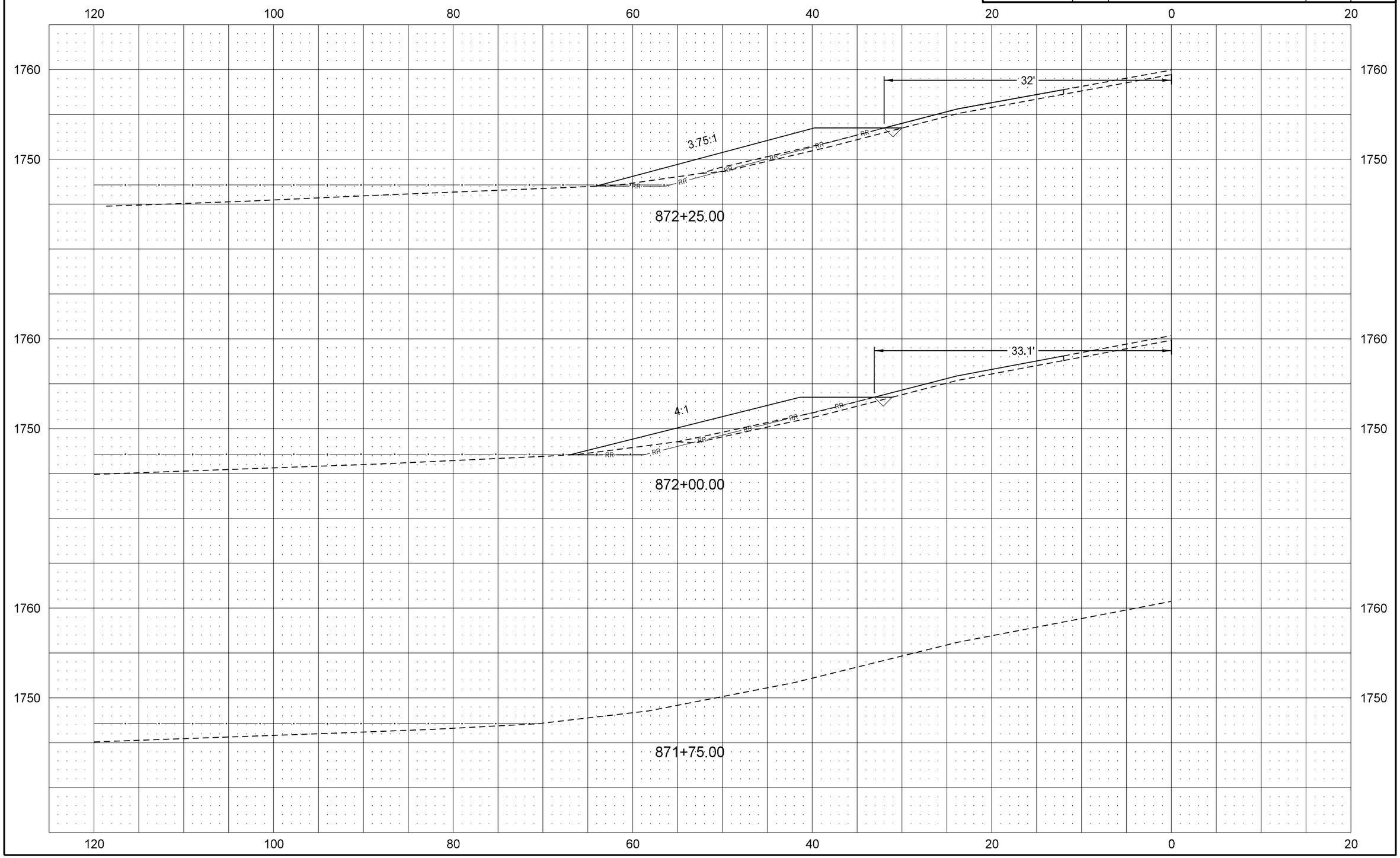
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	20

Westbound I-94 Site 2
1.3 Miles East of Crystal Springs Rest Area



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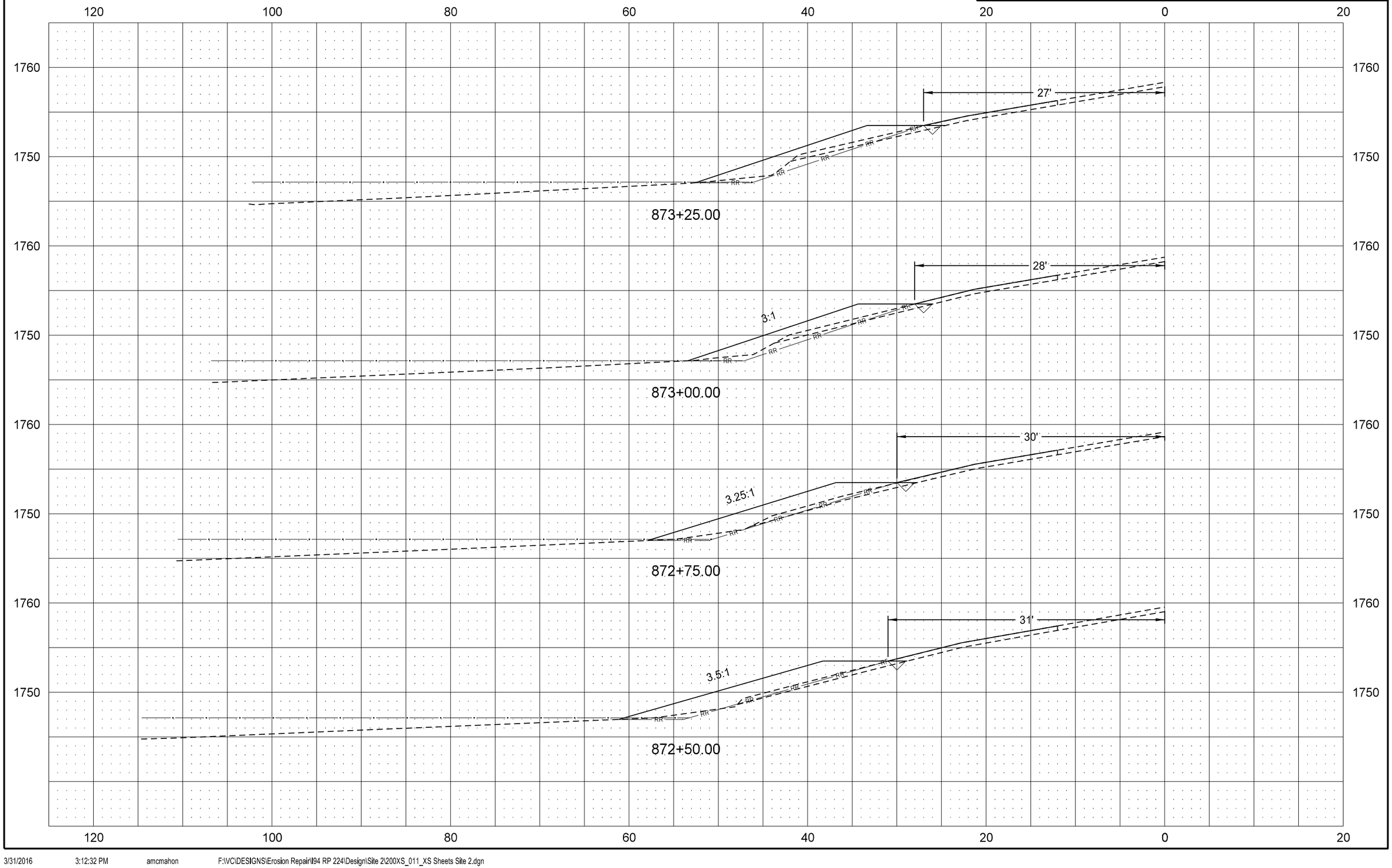
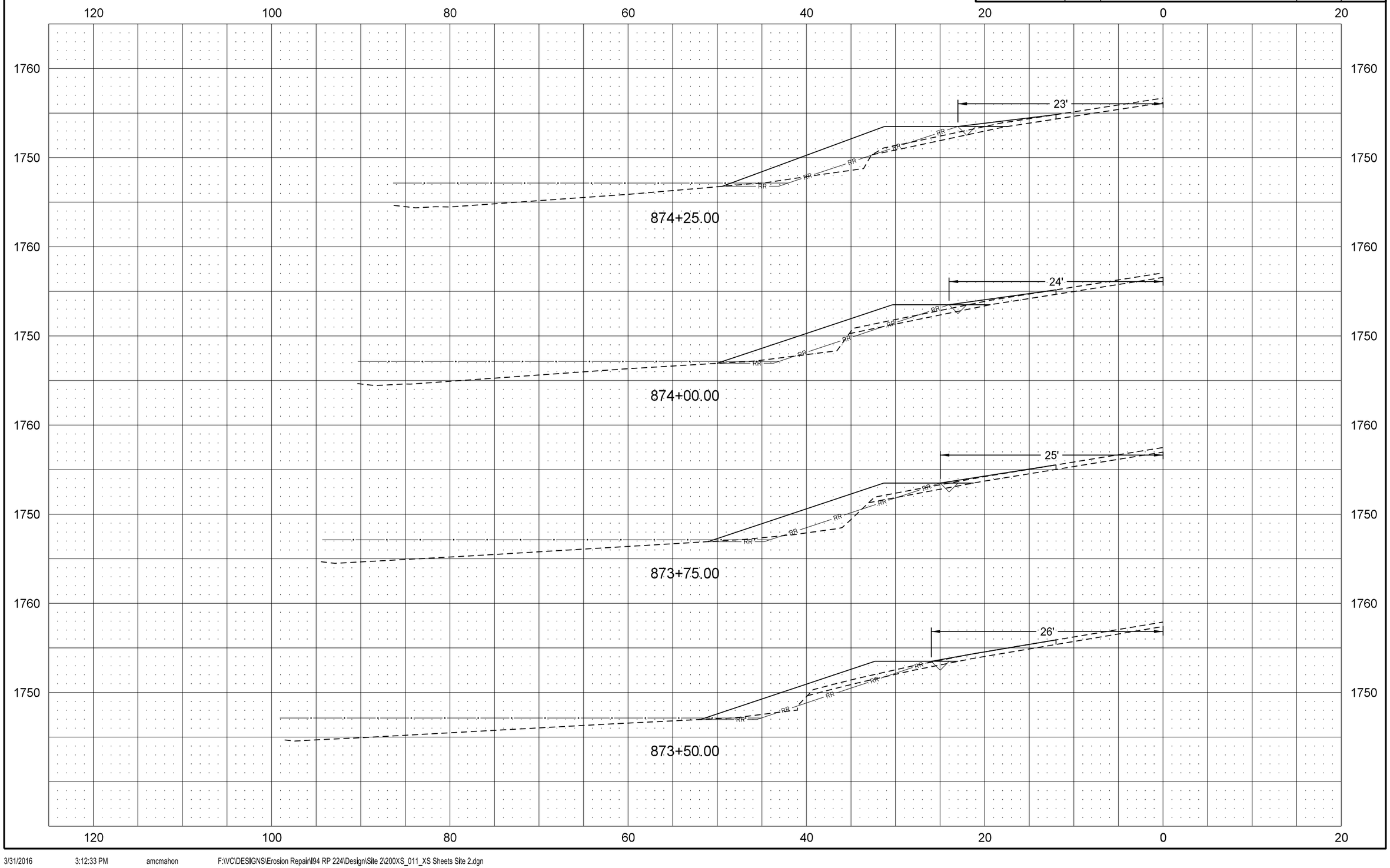
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	21

Westbound I-94 Site 2
1.3 Miles East of Crystal Springs Rest Area



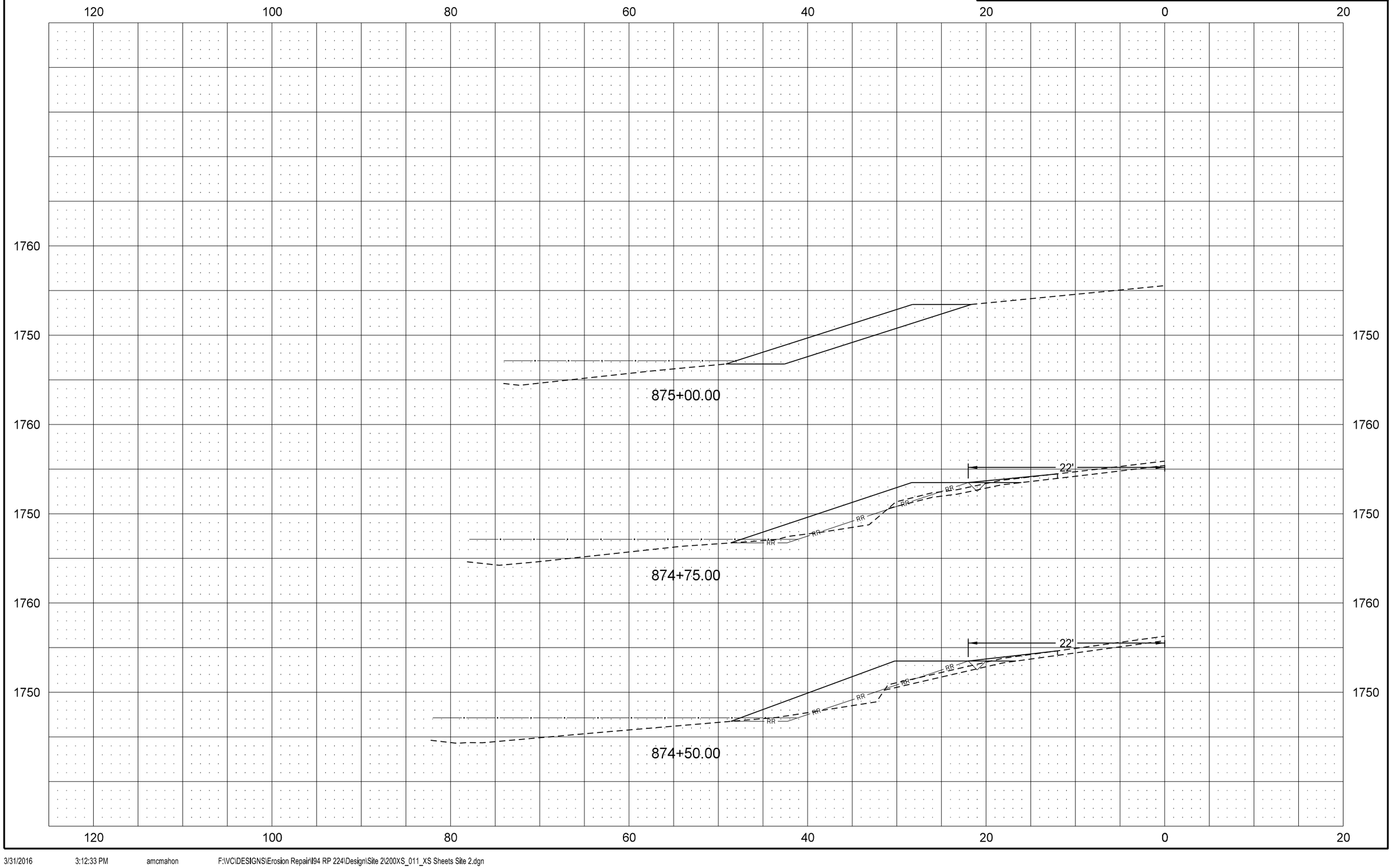
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	22

Westbound I-94 Site 2
1.3 Miles East of Crystal Springs Rest Area



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	23

Westbound I-94 Site 2
1.3 Miles East of Crystal Springs Rest Area



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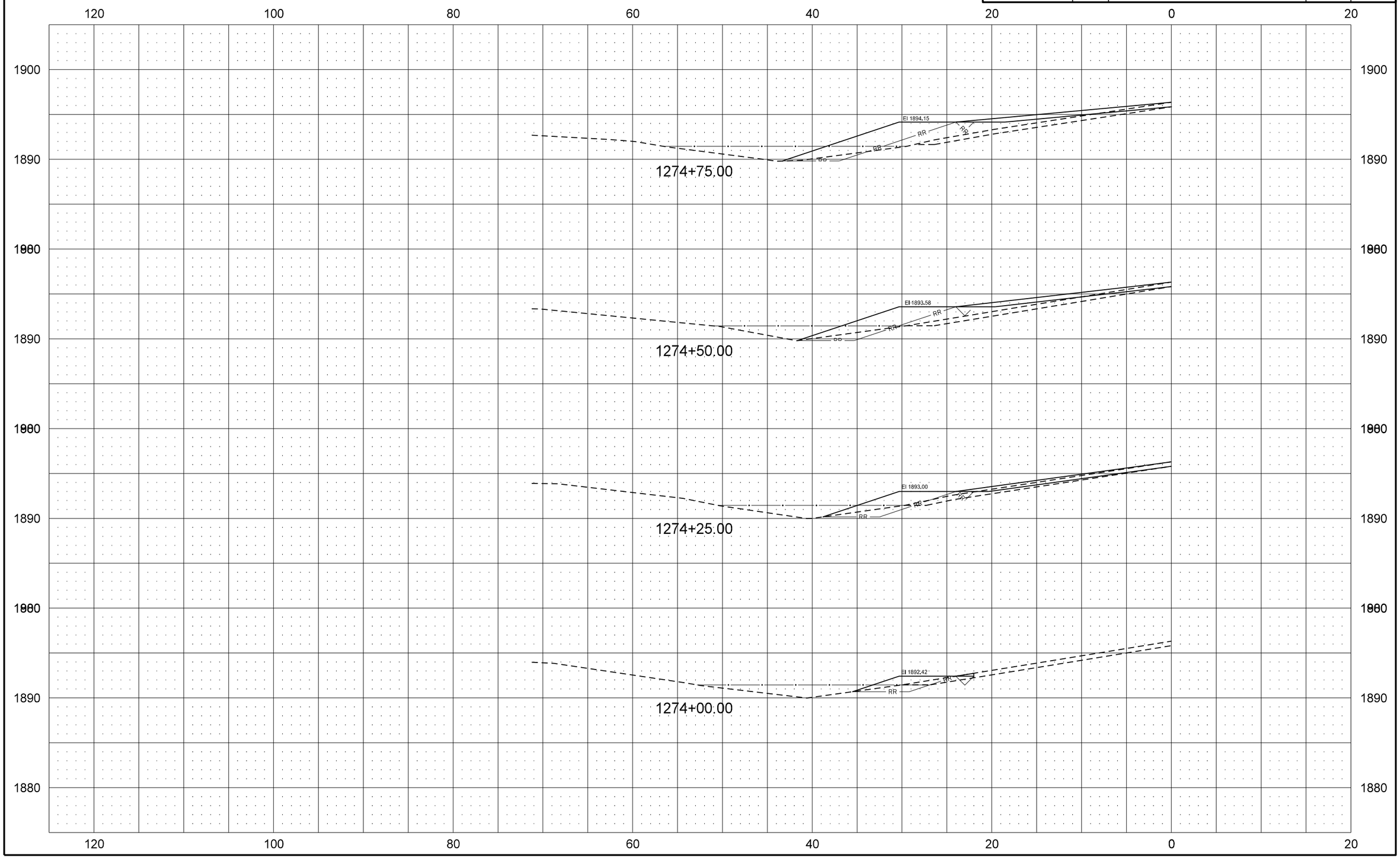
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	24

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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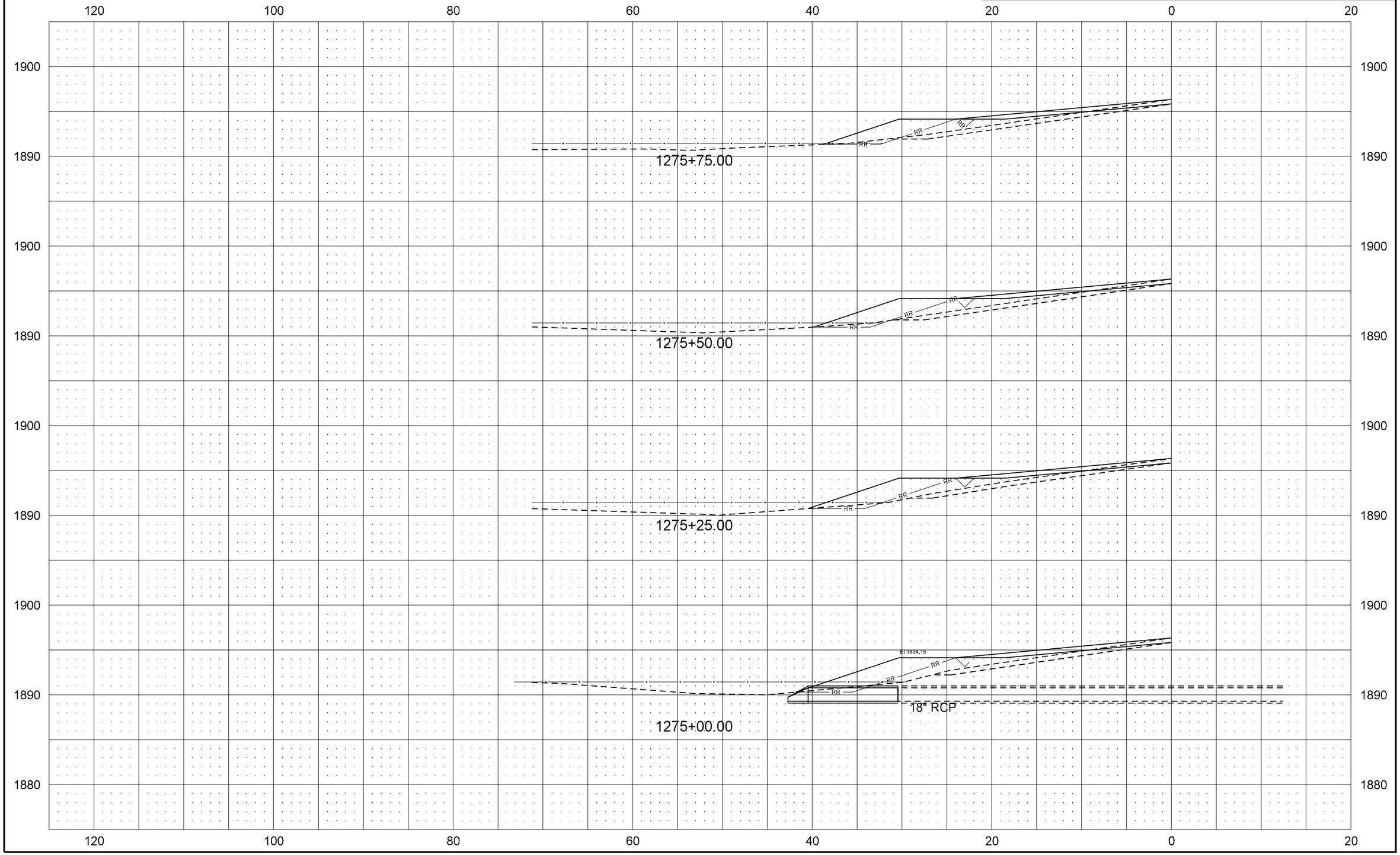
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	25

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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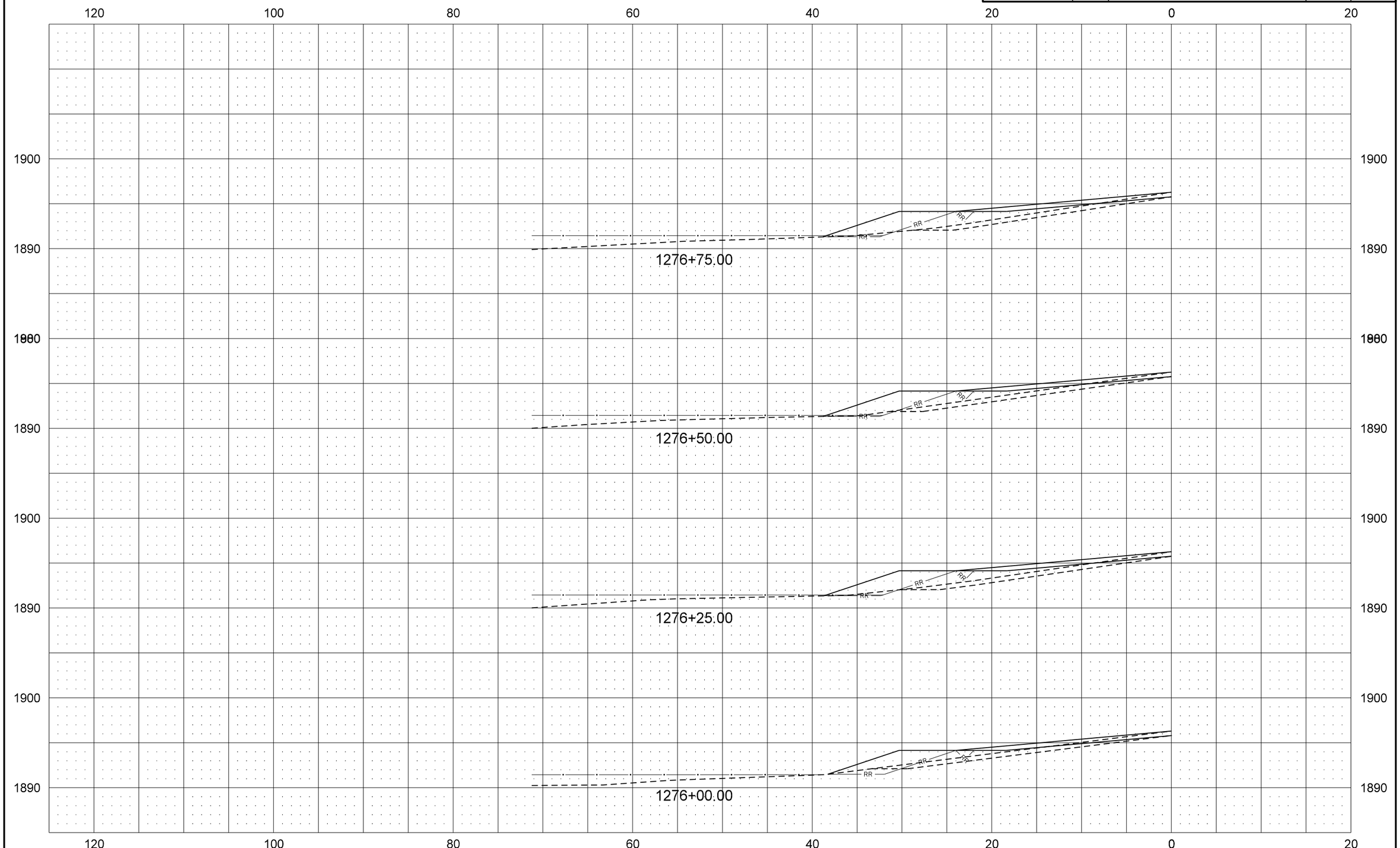
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	26

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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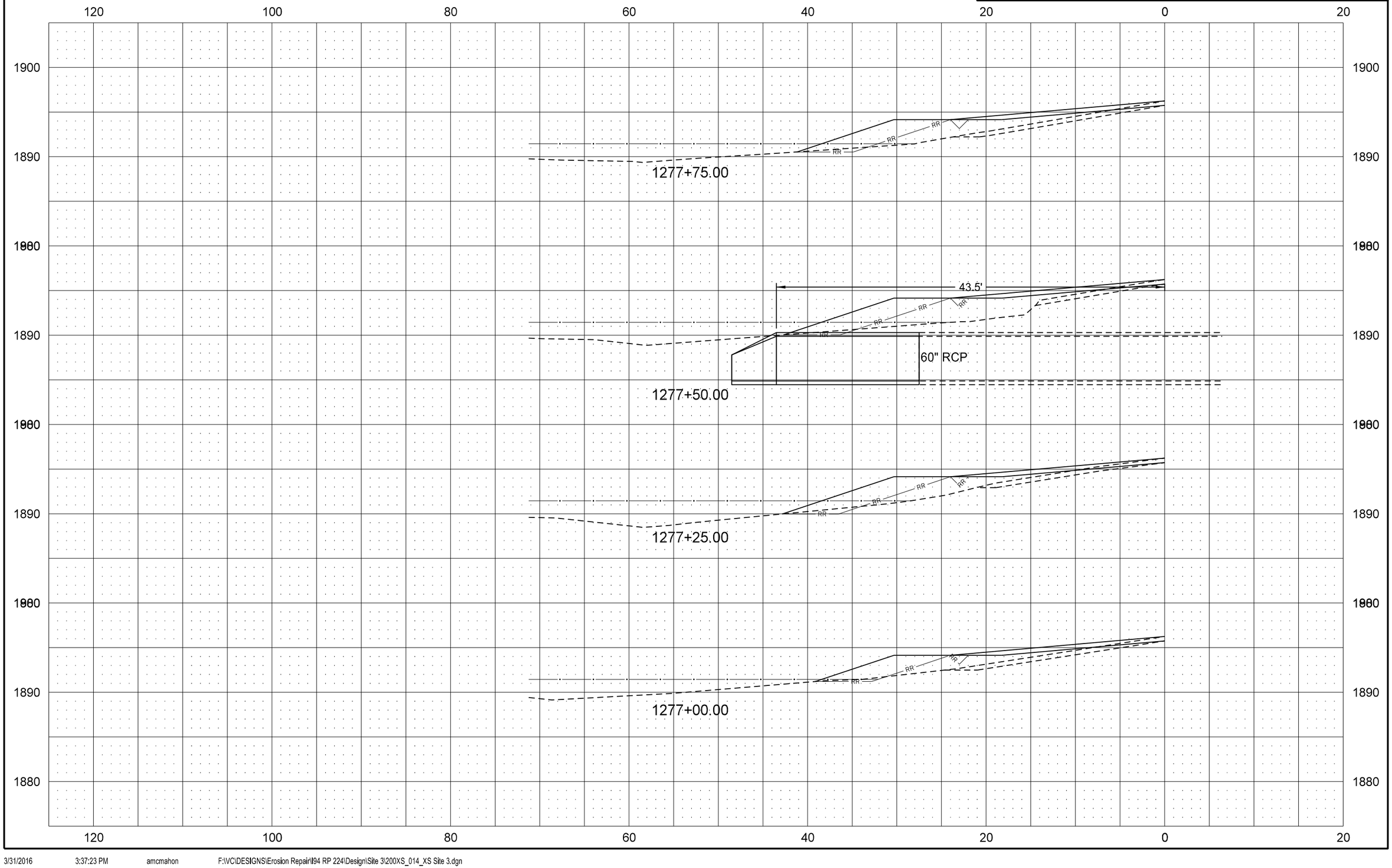
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	27

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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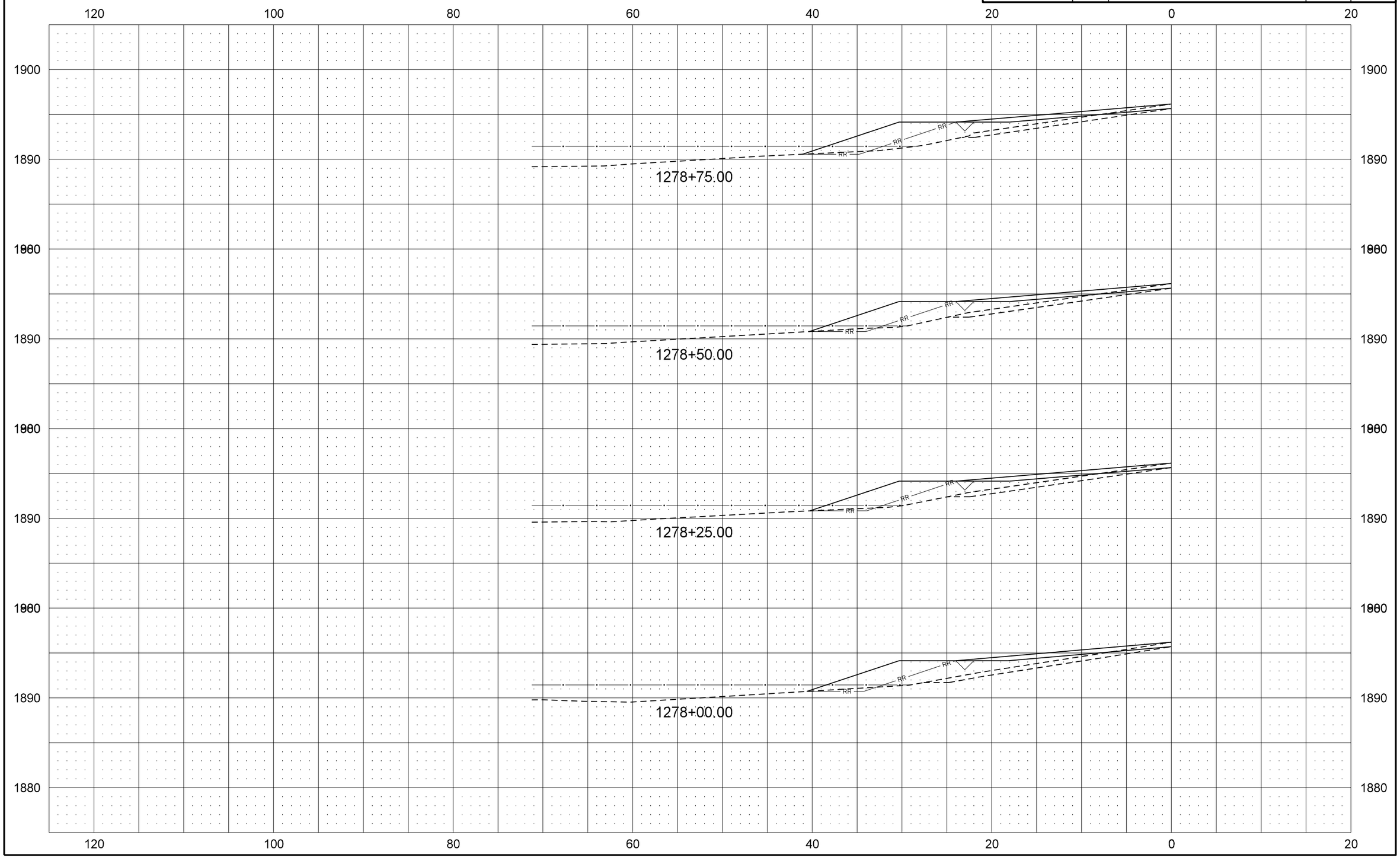
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	28

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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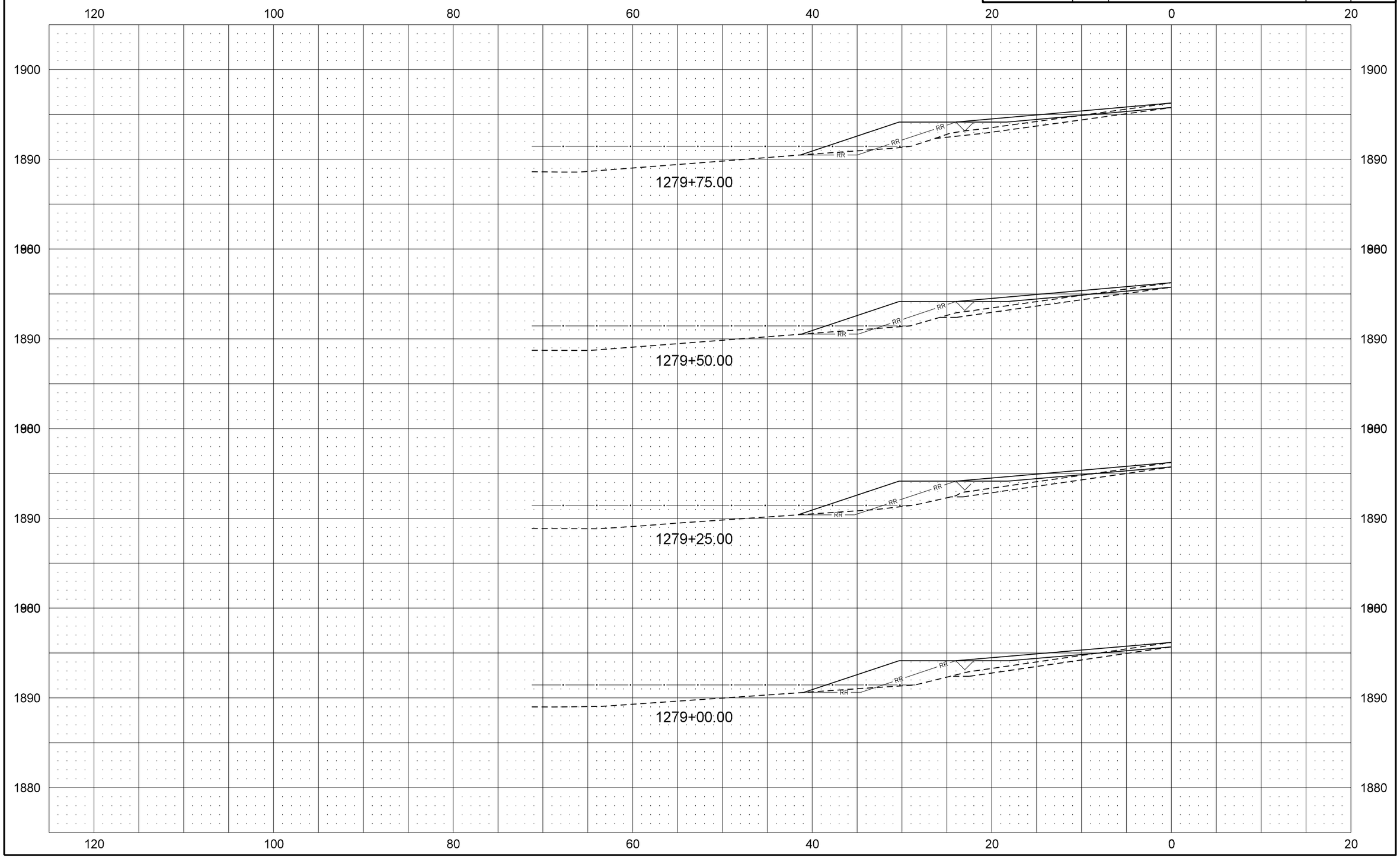
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	29

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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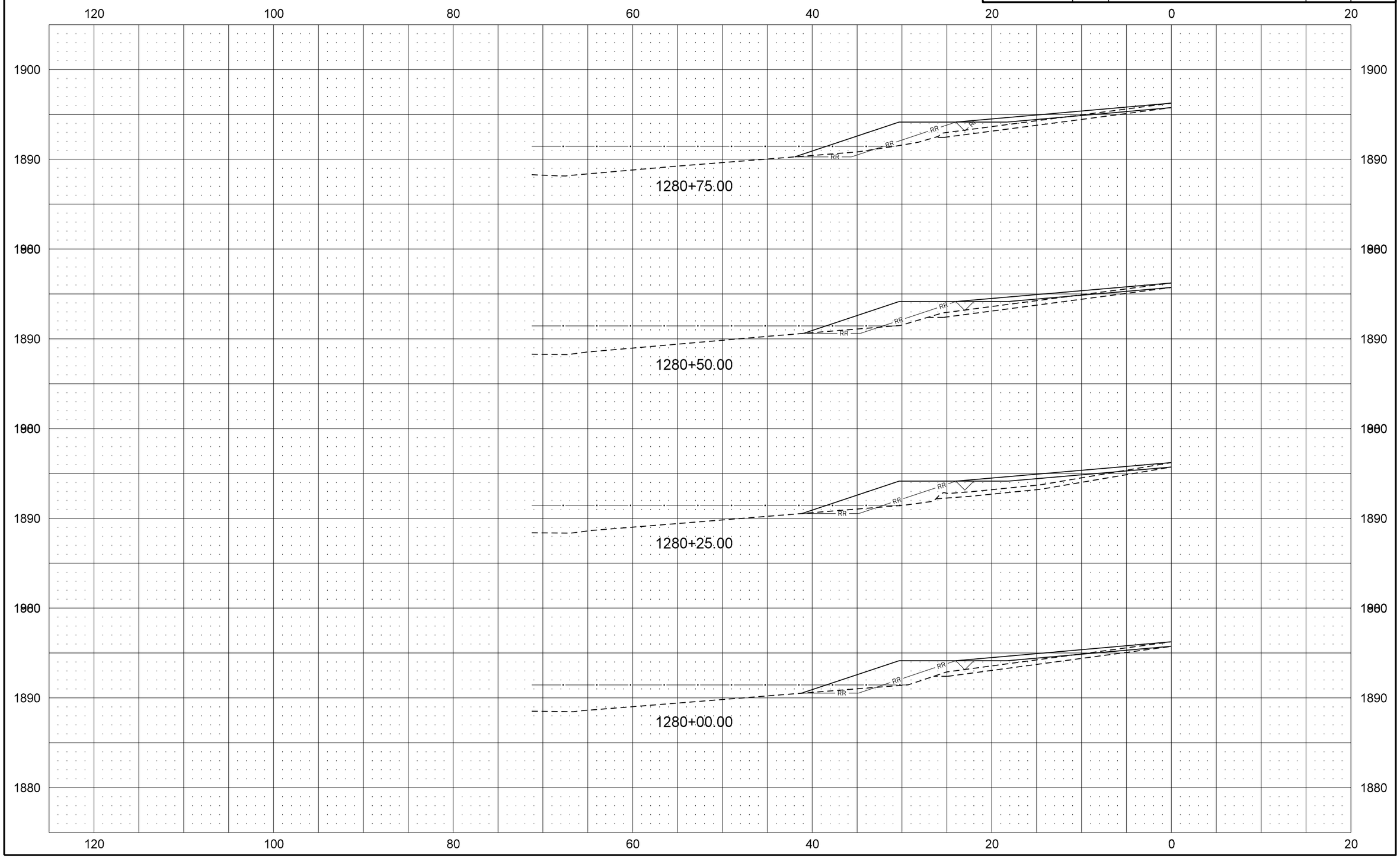
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	30

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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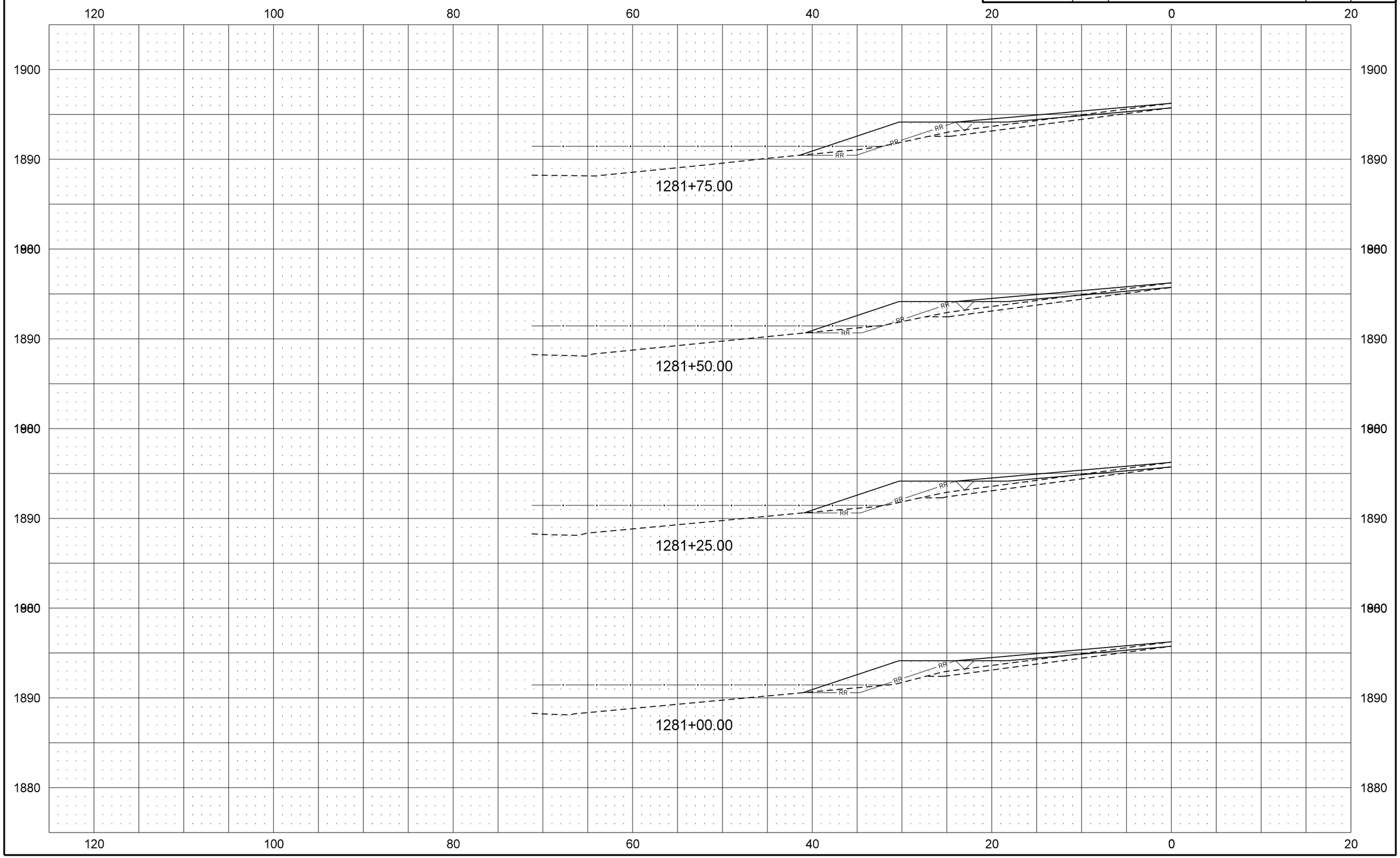
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	31

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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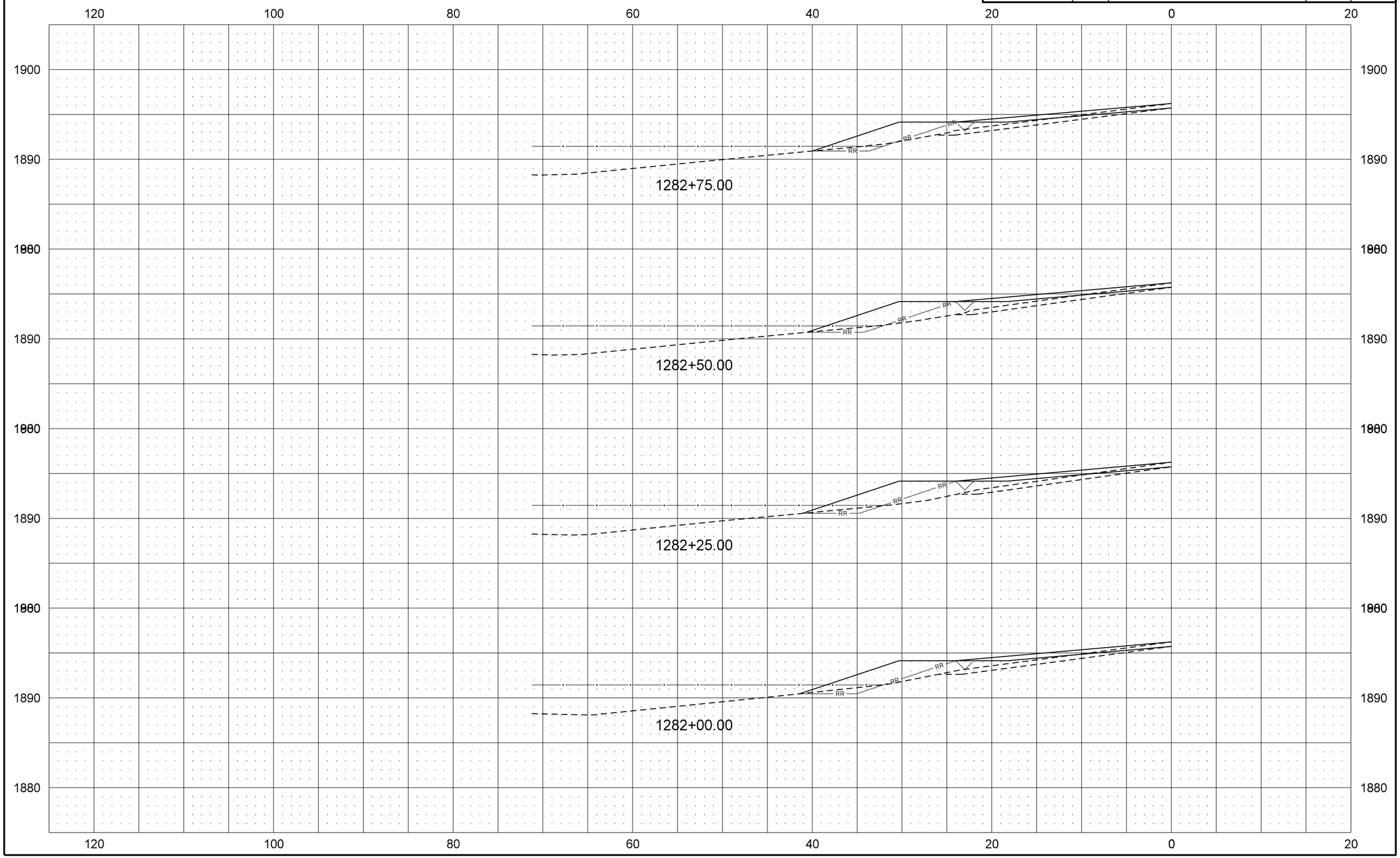
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	32

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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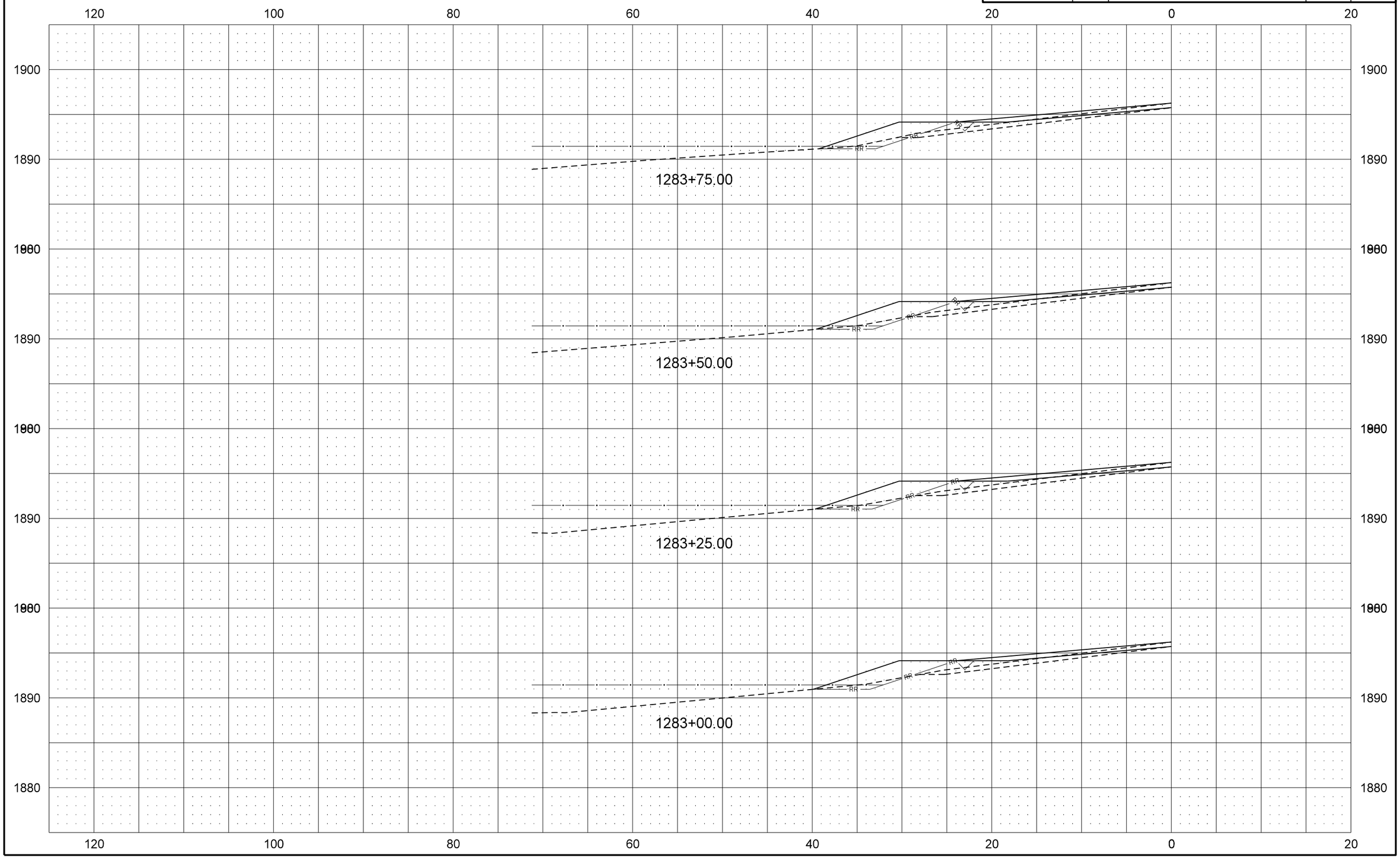
Westbound I-94 Site 3
2.24 Miles East of Medina Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	33



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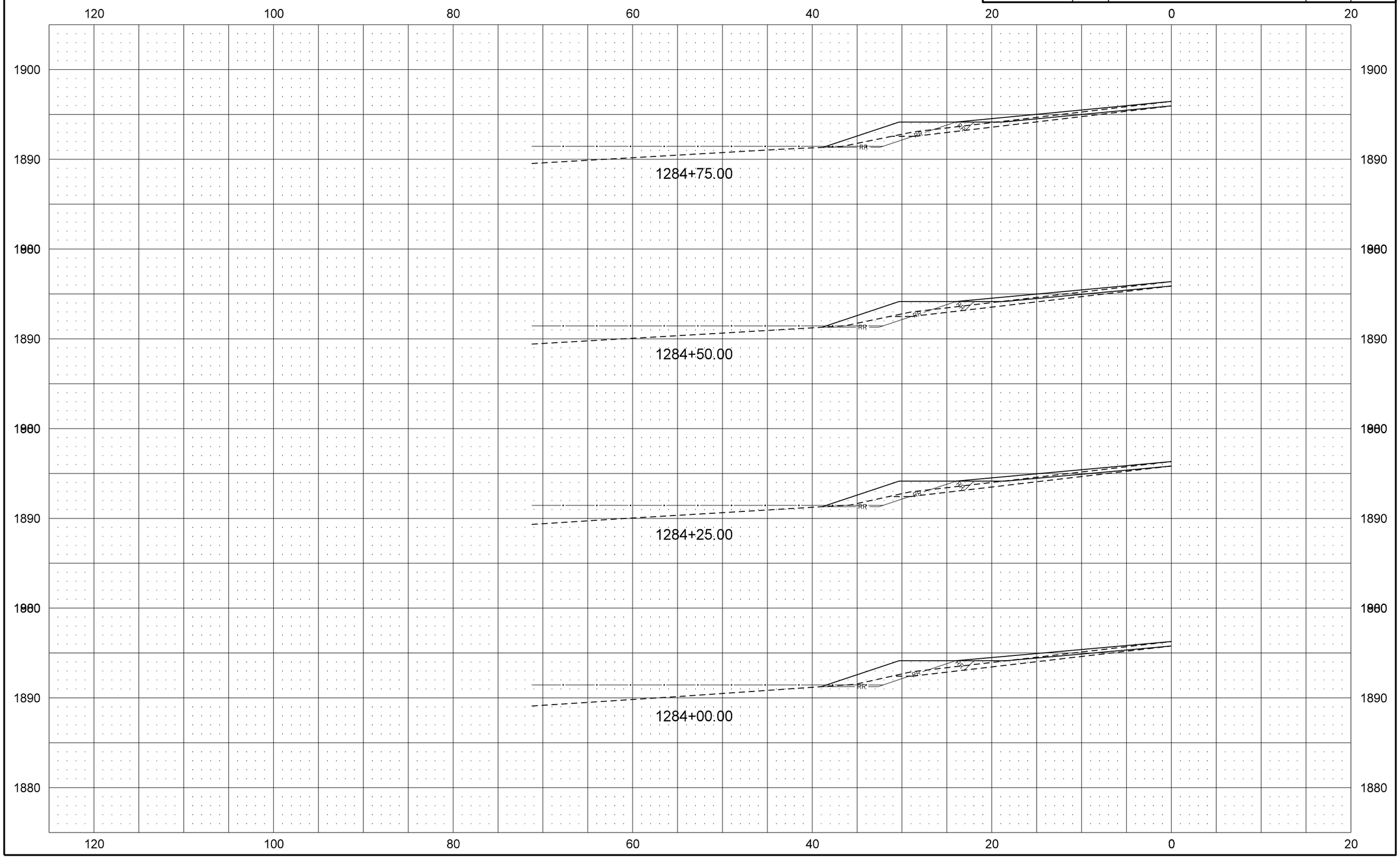
Westbound I-94 Site 3
2.24 Miles East of Medina Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	34



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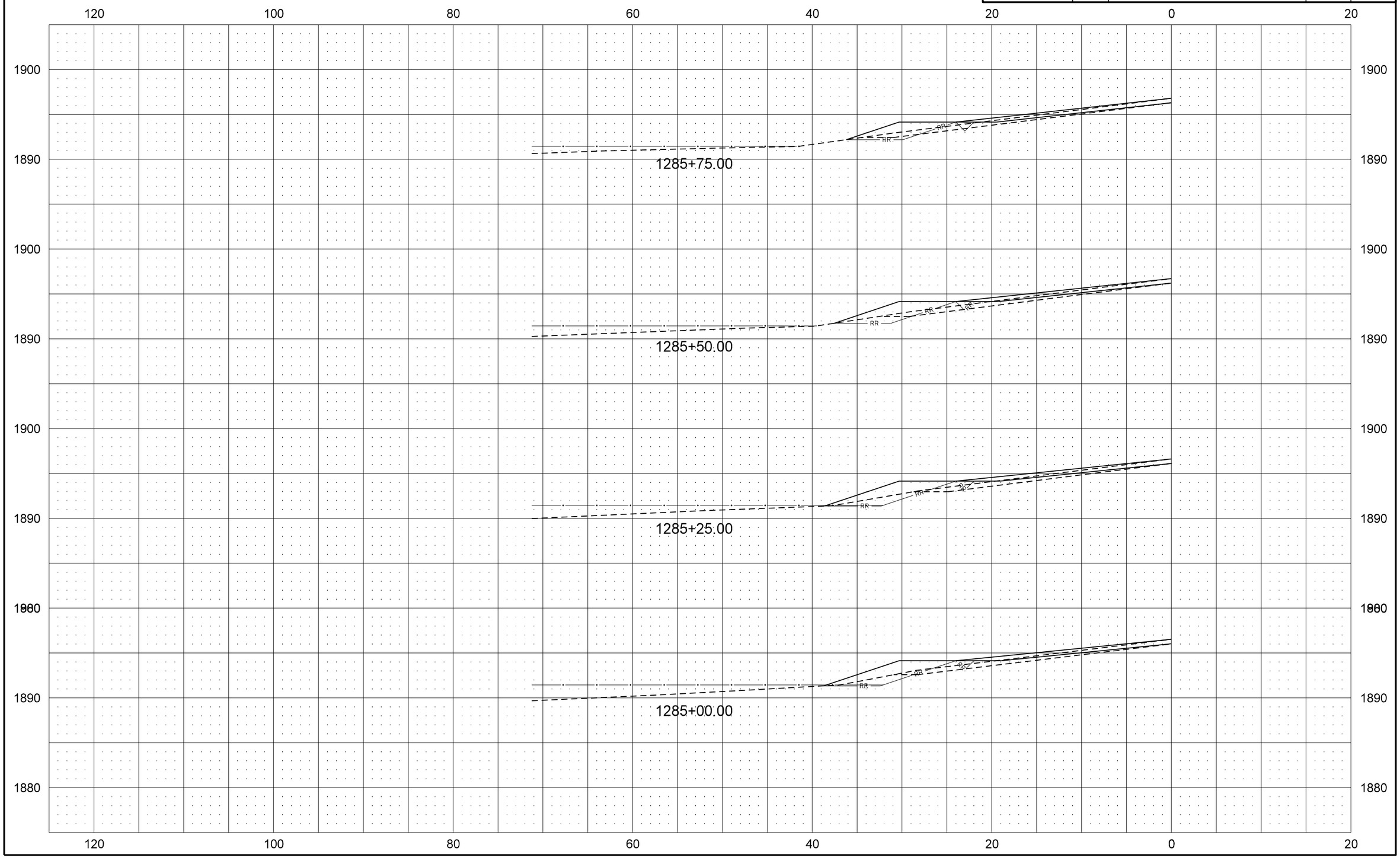
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	35

Westbound I-94 Site 3
2.24 Miles East of Medina Interchange



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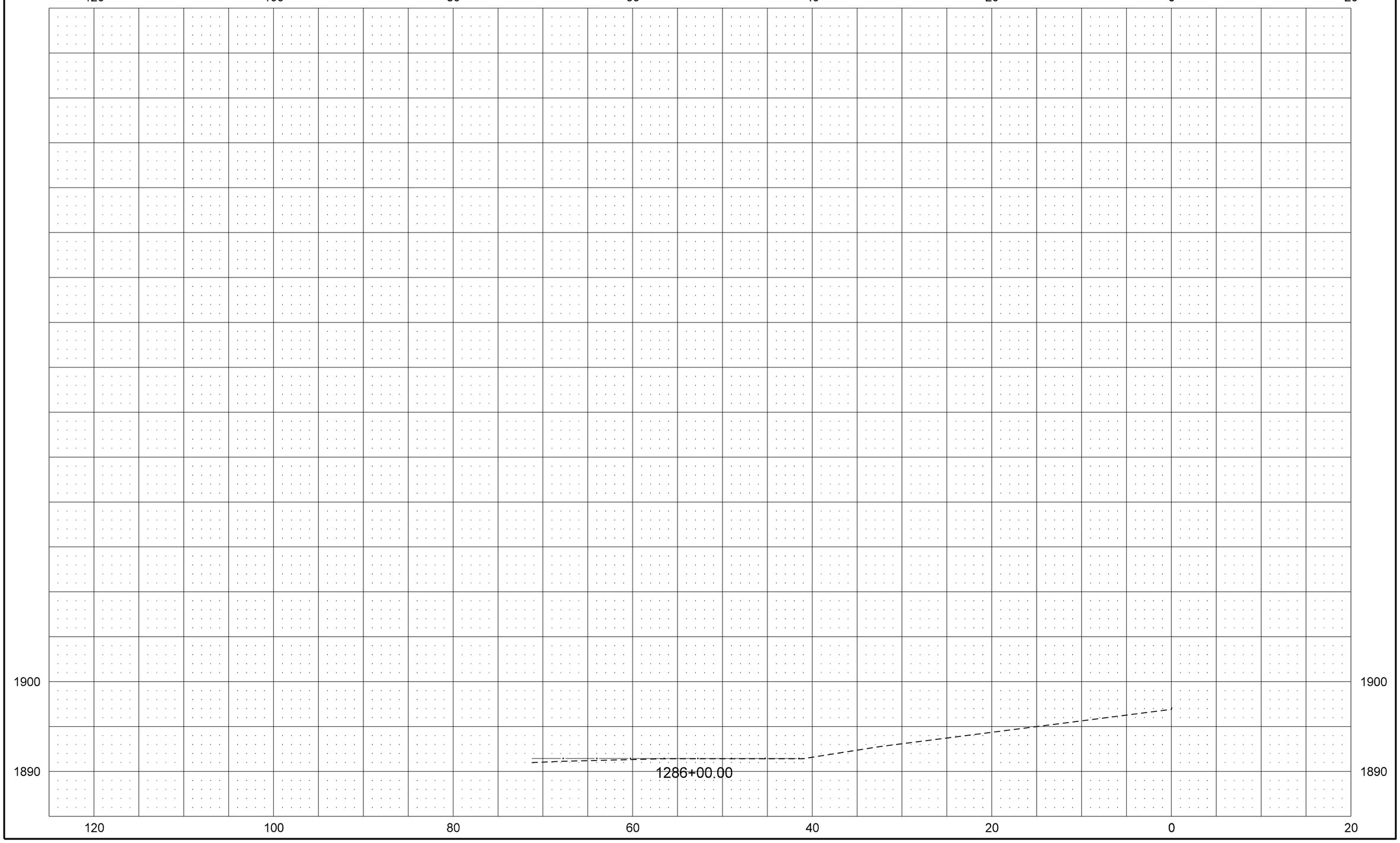
Westbound I-94 Site 3
2.24 Miles East of Medina Interchange

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	36



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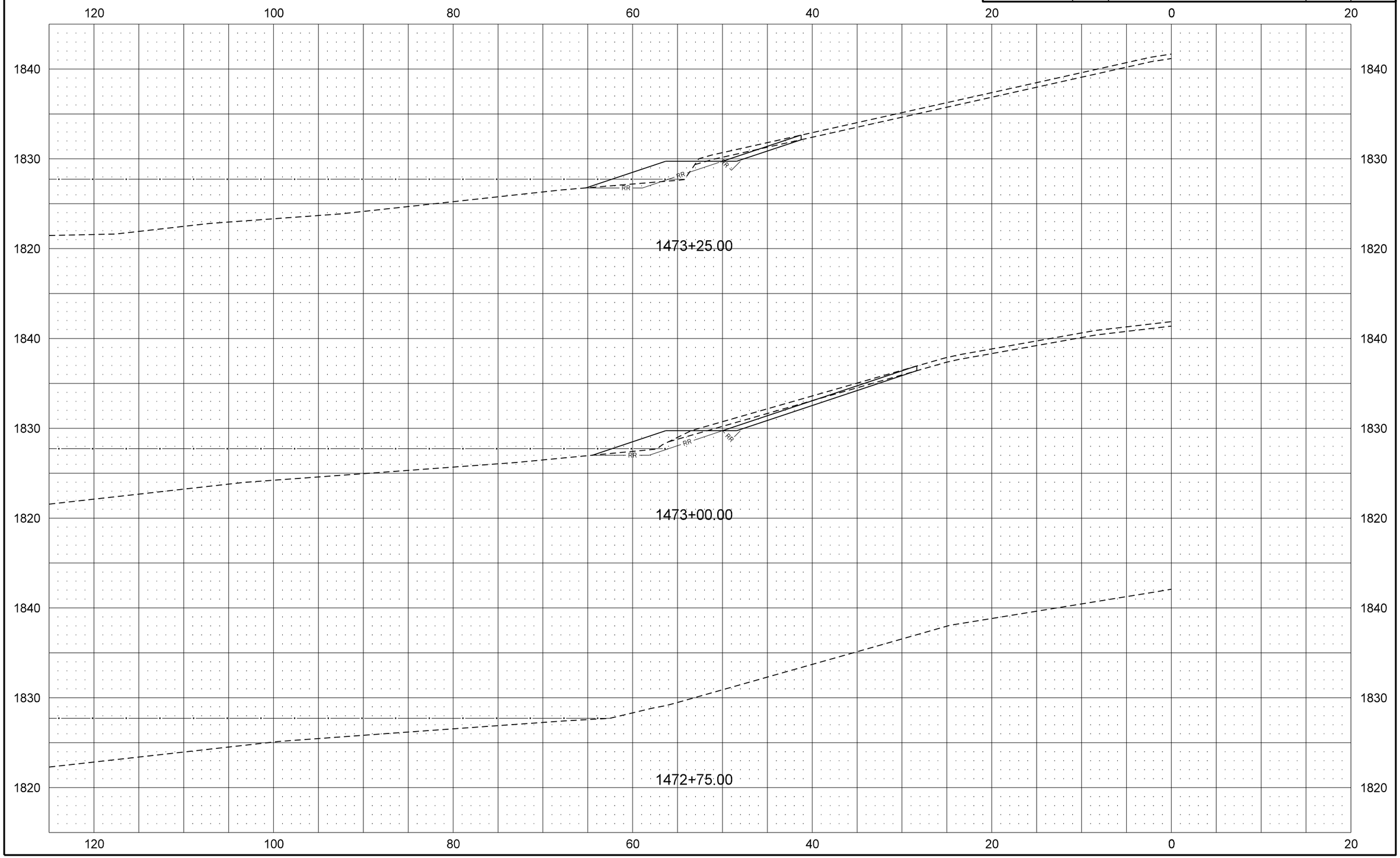
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	37

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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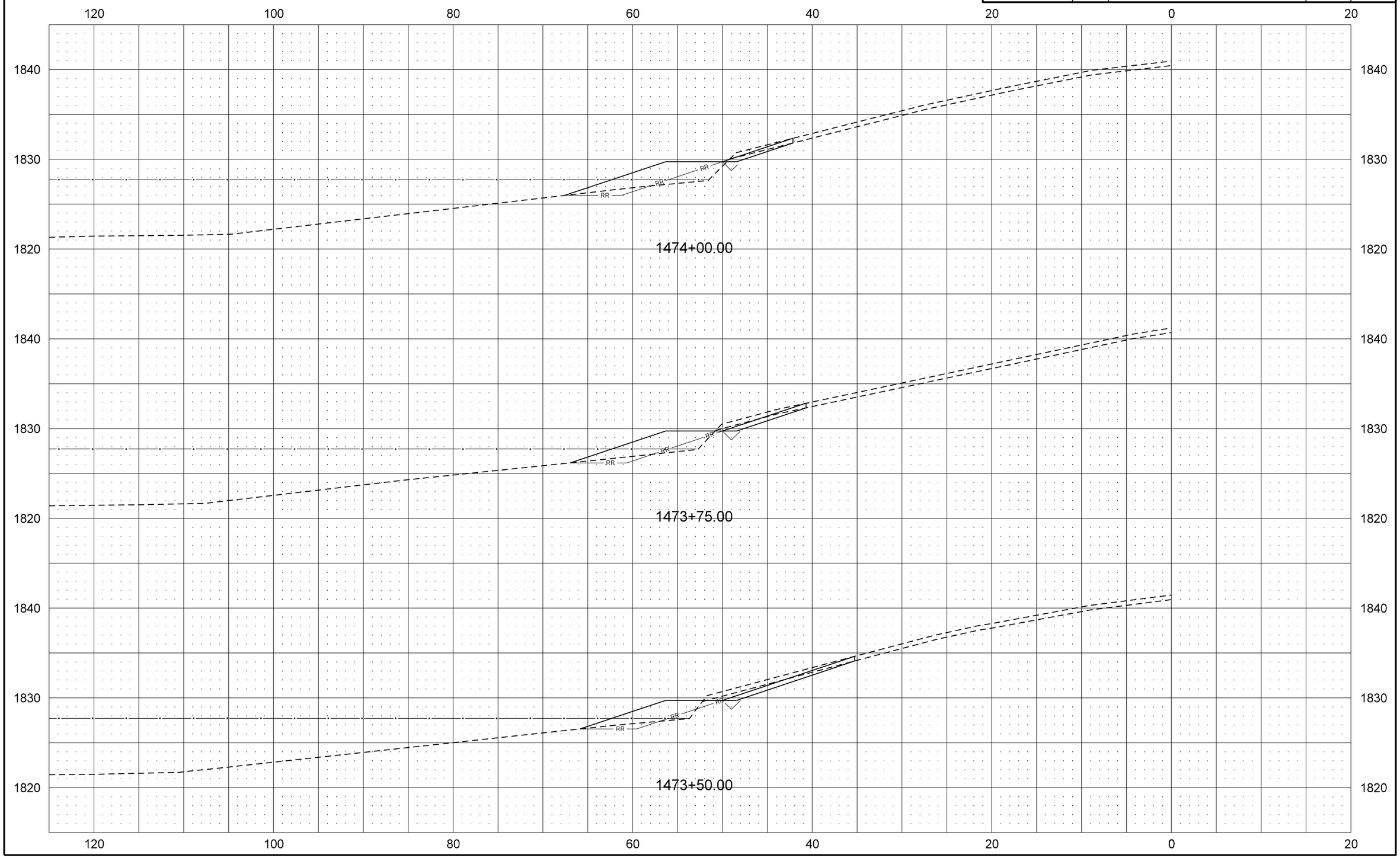
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	38

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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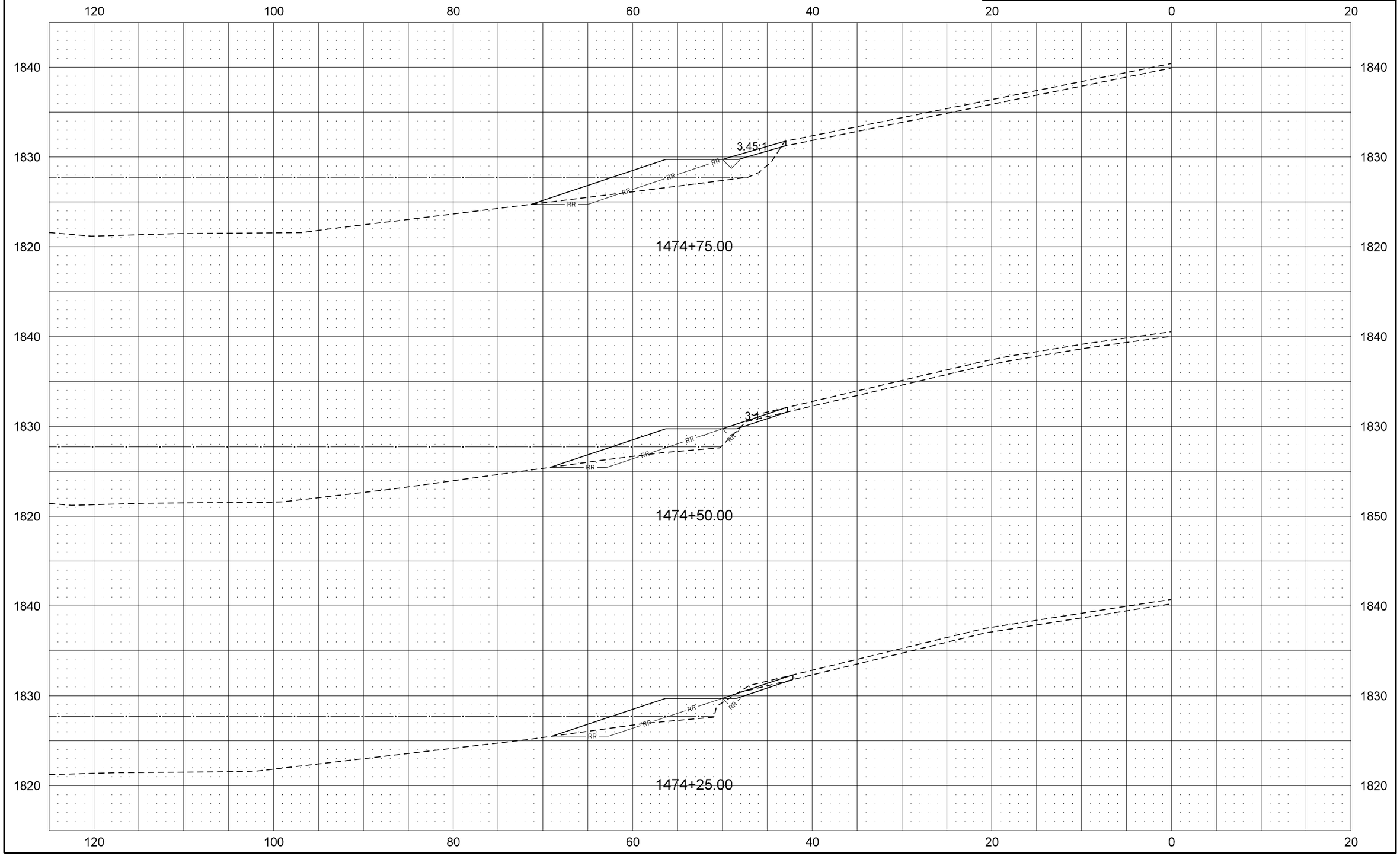
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	39

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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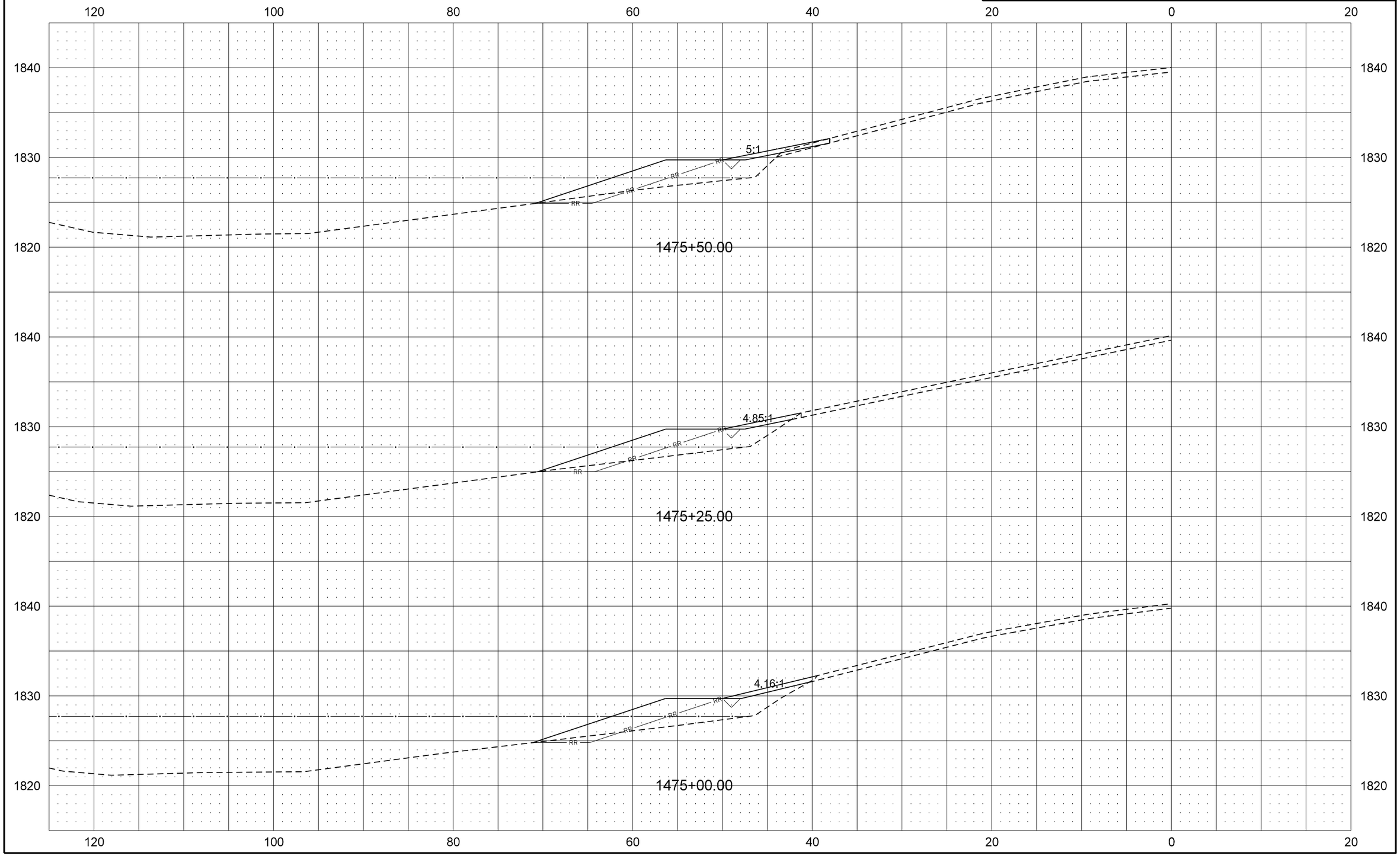
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	40

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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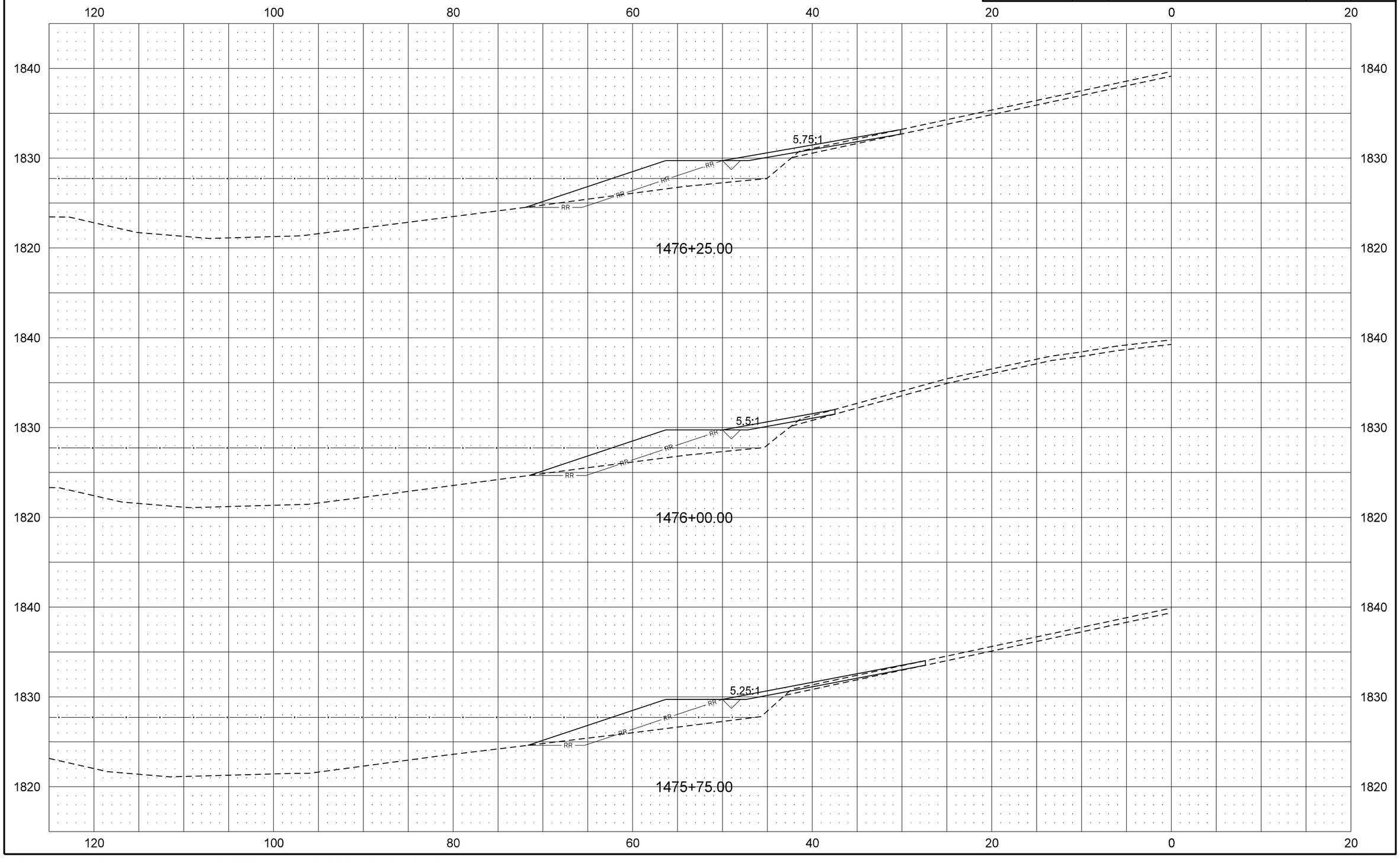
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	41

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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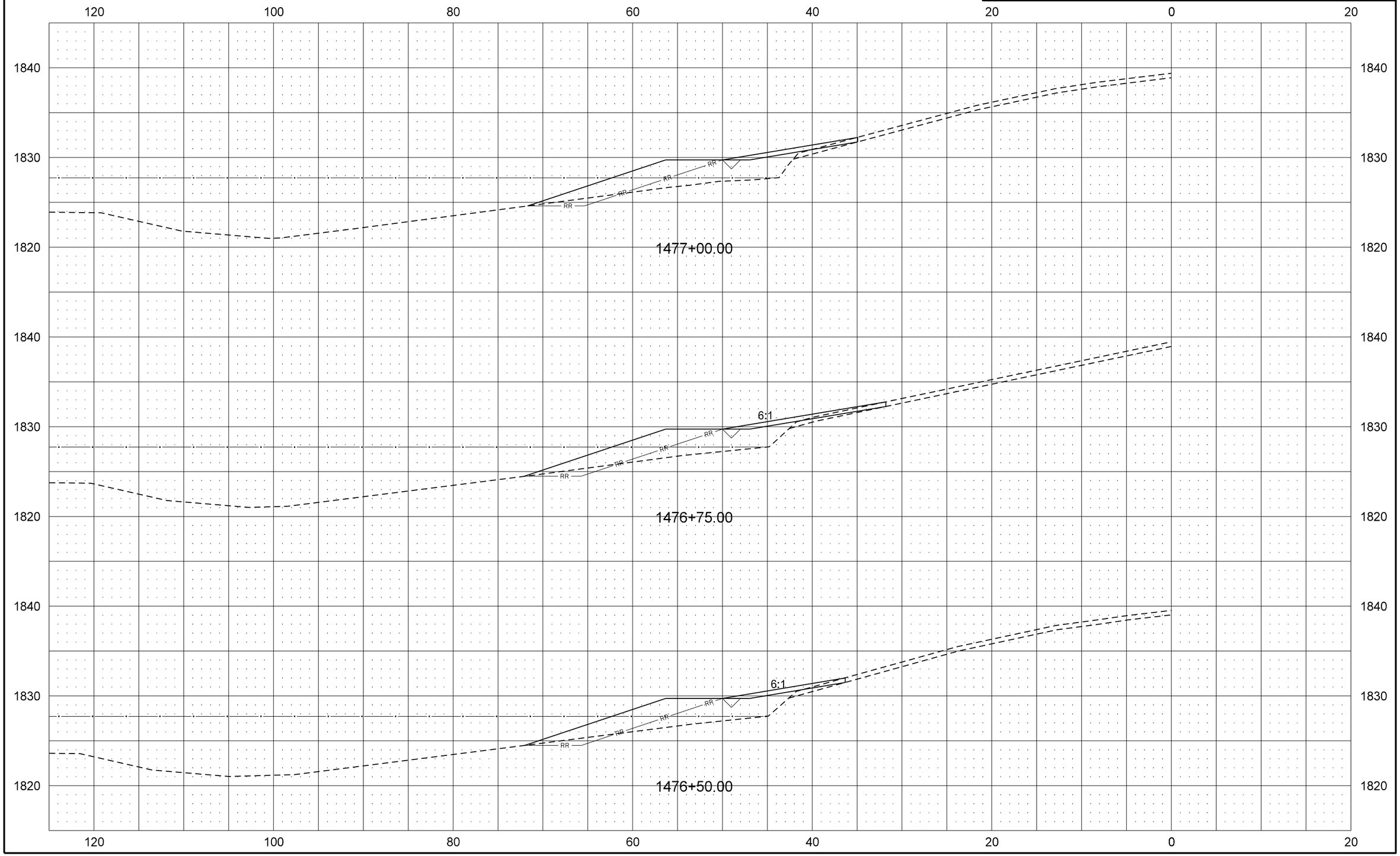
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	42

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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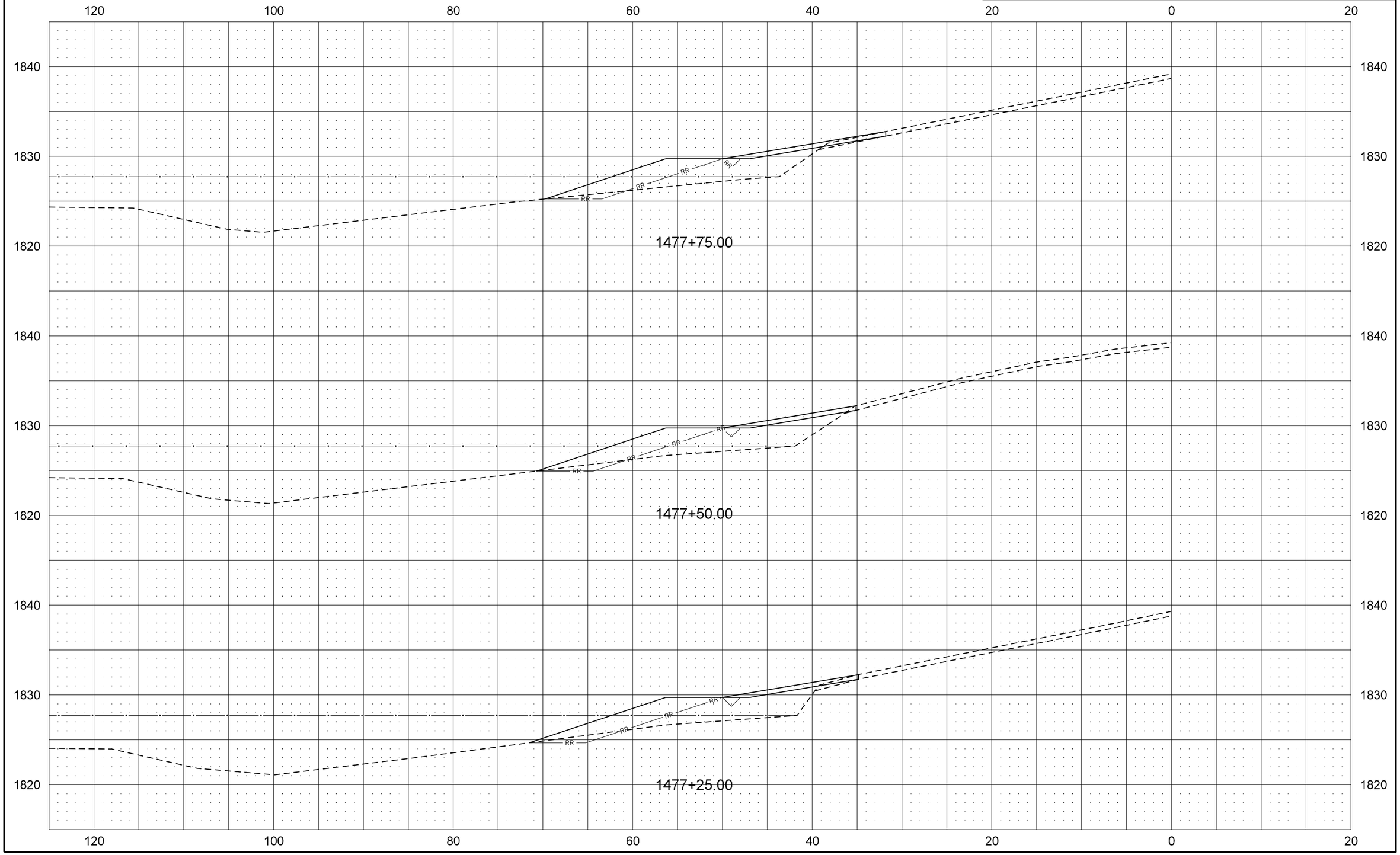
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	43

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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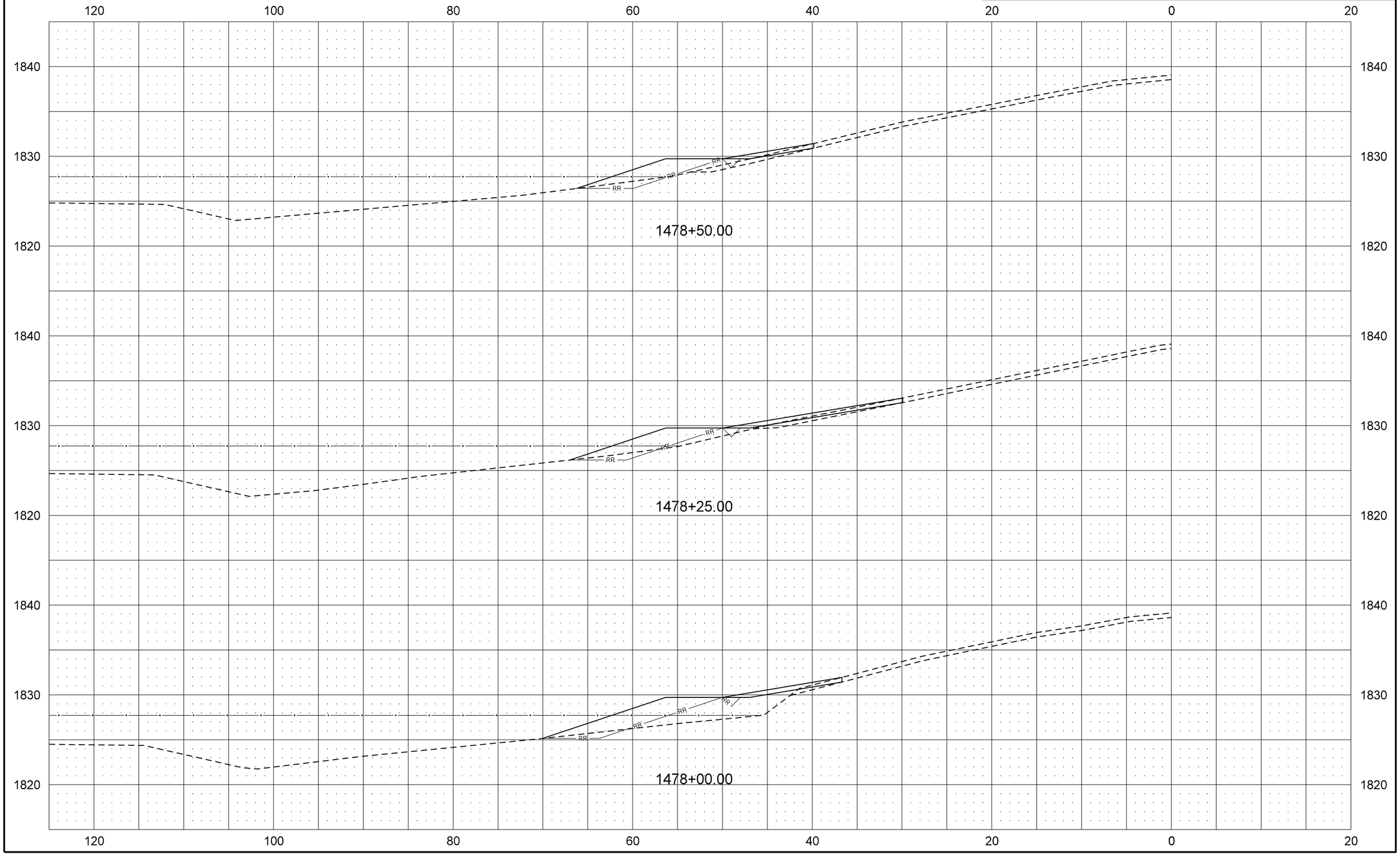
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	44

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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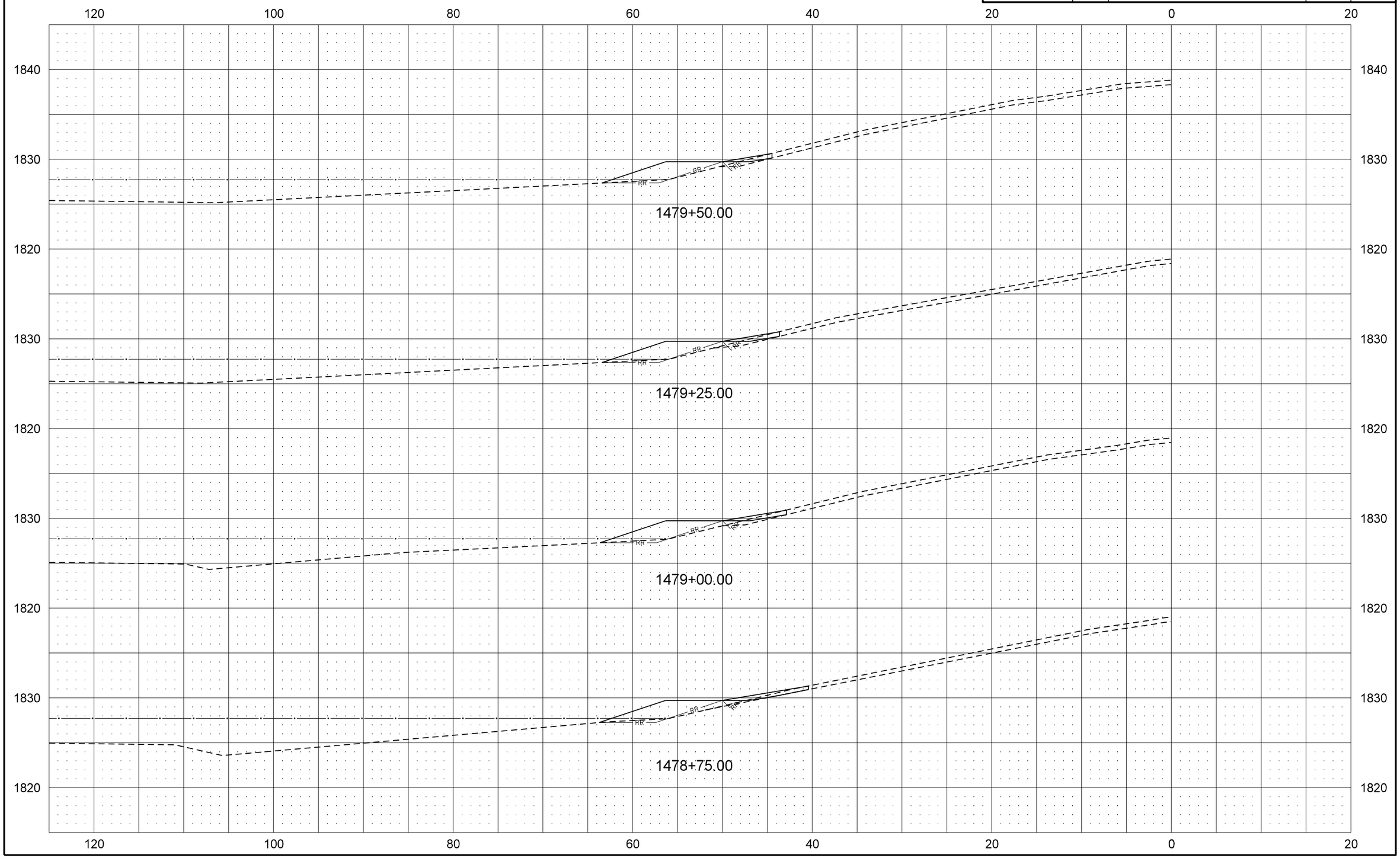
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	45

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
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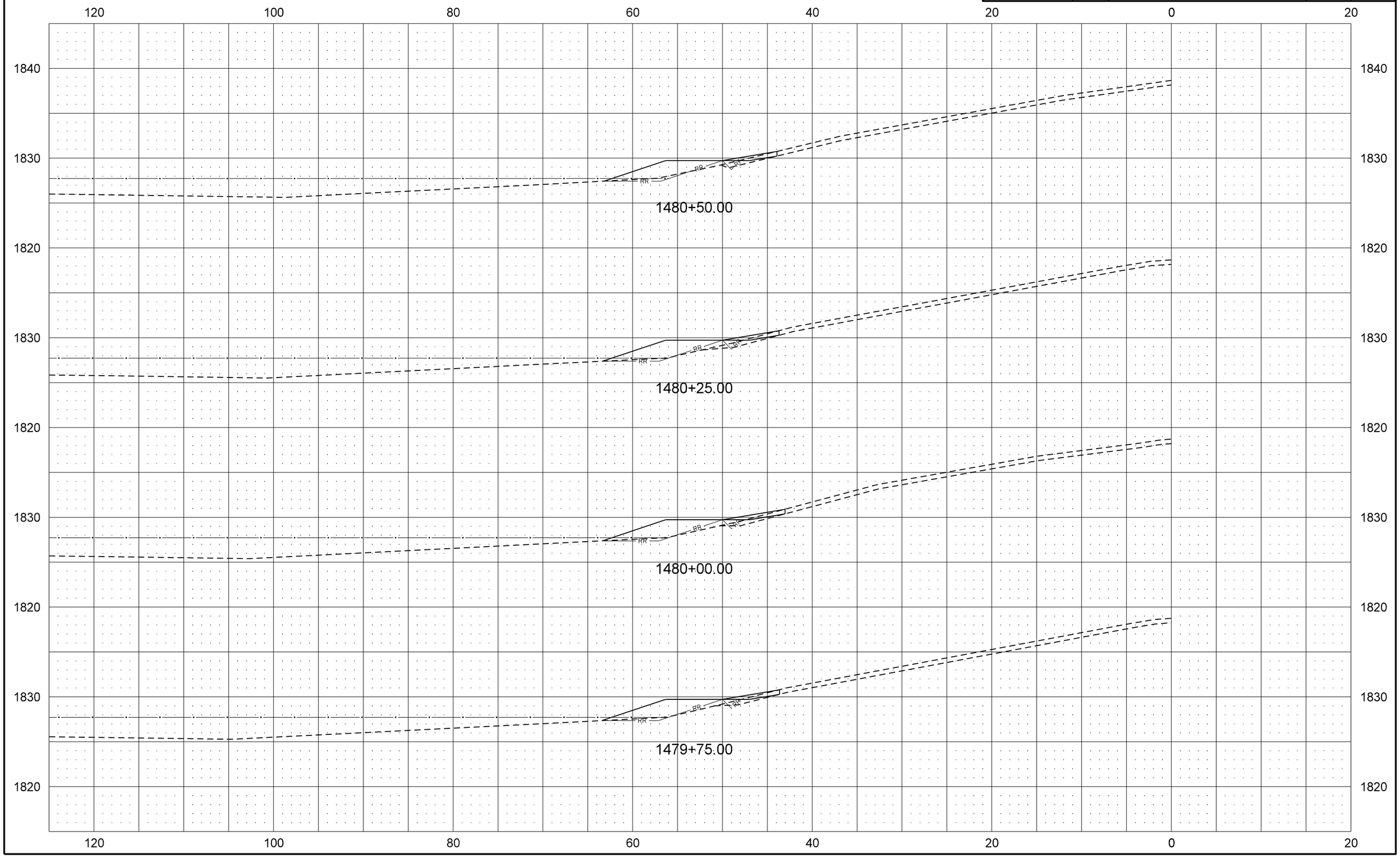
Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



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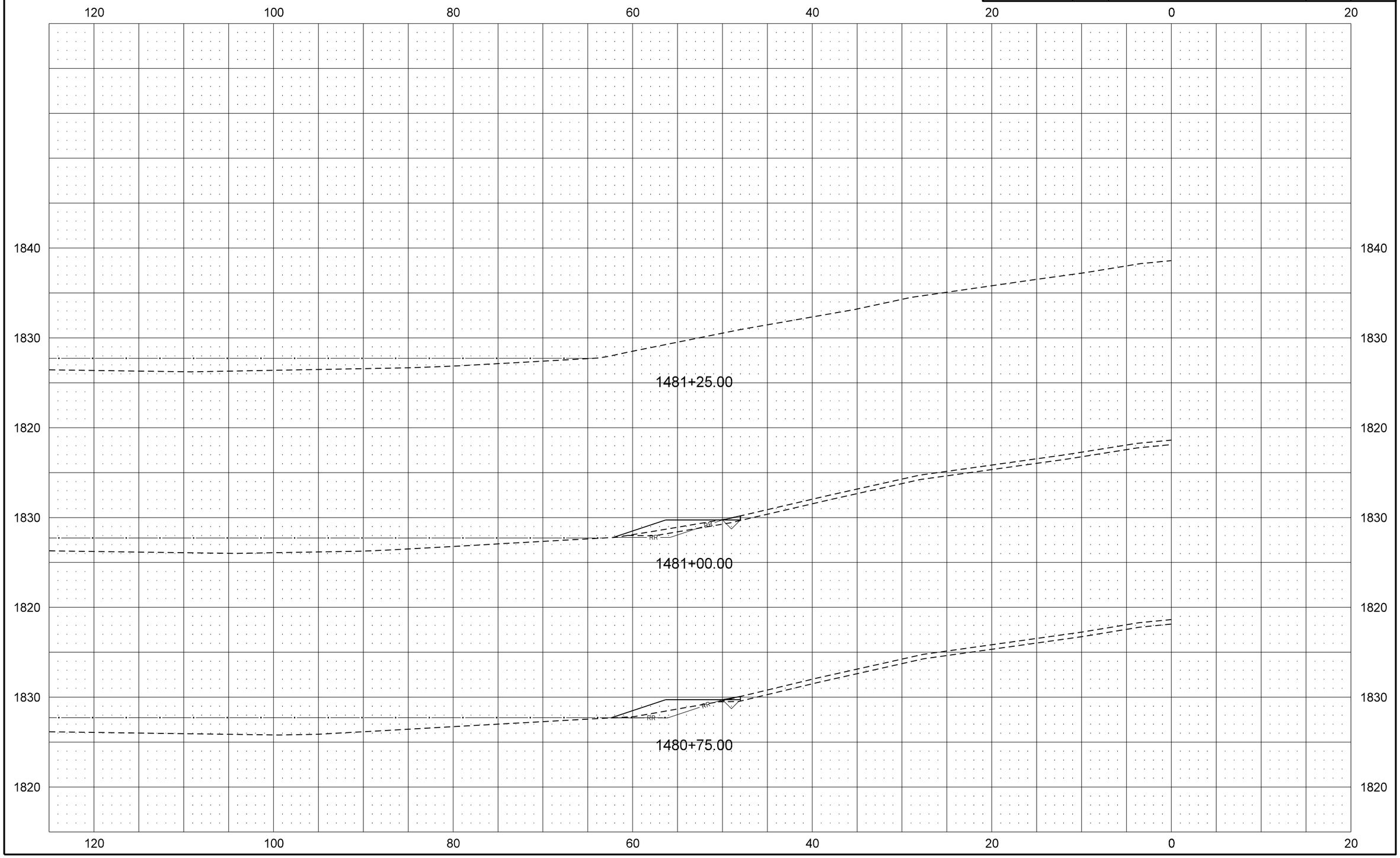
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	IM-2-094(142)224	200	47

Westbound I-94 Site 4
2 Miles West of Cleveland Interchange



3/31/2016 3:52:29 PM amcmahon F:\VC\DESIGNS\Erosion Repair\I94 RP 224\Design\Site 4\200XS_021_XS Site 4.dgn

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
Ac	acres
Adj	adjusted
Aggr	aggregate
Ahd	ahead
ARV	air release valve
Align	alignment
Al	alley
Alt	alternate
Alum	aluminum
ADA	Americans with Disabilities Act
A	ampere
&	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
Az	azimuth
Bk	back
BF	back face
Bs	backsight
Balc	balcony
B Wire	barbed wire
Barr	barricade
Btry	battery
Brg	bearing
BI	beehive inlet
Beg	begin
BM	bench mark
Bkwy	bikeway
Bit	bituminous
Blk	block
Bd Ft	board feet
BH	bore hole
BS	both sides
Bot	bottom
Blvd	Boulevard
Bndry	boundary
BC	brass cap
Brkwy	breakaway
Br	bridge
Bldg	building
BV	butterfly valve
Byp	bypass
C Gdrl	cable guardrail
Calc	calculate
Cd	candela
CIP	cast iron pipe
CB	catch basin
CRS	cationic rapid setting
C Gd	cattle guard
C To C	center to center
Cl or ℄	centerline
Cm	centimeter
Ch	chain
Chnlk	chain-link
Ch Blk	channel block
Ch Ch	channel change
Chk	check
Chsld	chiseled
Cir	circle
Cl	class
Cl	clay
Cl F	clay fill
Cl Hvy	clay heavy
Cl Lm	clay loam
Clnt	clean-out
Clr	clear
Cl&gr	clearing & grubbing
Co S	coal slack
Comb.	combination
Coml	commercial
Compr	compression
CADD	computer aided drafting & design
Conc	concrete
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
CSP	corrugated steel pipe
C	coulomb
Co	County
Crse	course
C Gr	course gravel
CS	course sand
Ct	Court
Xarm	cross arm
Xbuck	cross buck
Xsec	cross sections
Xing	crossing
Xrd	Crossroad
Crn	crown
CF	cubic feet
M3	cubic meter
M3/s	cubic meters per second
CY	cubic yard
Cy/mi	cubic yards per mile
Culv	culvert
C&G	curb & gutter
CI	curb inlet
CR	curb ramp
CS	curve to spiral
C	cut
Dd Ld	dead load
Defl	deflection
Defm	deformed
Deg or D	degree
Dlnt	delineate
Dlntr	delineator
Depr	depression
Desc	description
Det	detail
DWP	detectable warning panel
Dtr	detour
Dia	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
Eq	equation
Evgr	evergreen
Exc	excavation
Exst	existing
Exp	expansion
Expy	Expressway
E	external of curve
Extru	extruded
FOS	factor of safety
F	Fahrenheit
FS	far side
F	farad
Fed	Federal
FP	feed point
Ft	feet/foot
Fn	fence
Fn P	fence post
FO	fiber optic
FB	field book
FD	field drive
F	fill
FAA	fine aggregate angularity
FS	fine sand
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
Fs	foresight
Fnd	found
Fdn	foundation
Frac	fractional
Frwy	freeway
Frt	front
FF	front face
F Disp	fuel dispenser

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

NDDOT ABBREVIATIONS

D-101-2

FFP	fuel filler pipes
FLS	fuel leak sensor
Furn	furnish/ed
Gal	gallon
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
Geod	geodetic
GIS	Geographical Information System
G	giga
GPS	Global Positioning System
Gov	government
Grd	graded/grade
Gr	gravel
Grnd	ground
GWM	ground water monitor
Gdrl	guardrail
Gtr	gutter
H Plg	H piling
Hdwl	headwall
Ha	hectare
Ht	height
HI	height of instrument
Hel	helical
H	henry
Hz	hertz
HDPE	high density polyethylene
HM	high mast
HP	high pressure
HPS	high pressure sodium
Hwy	highway
Hor	horizontal
HBP	hot bituminous pavement
HMA	hot mix asphalt
Hr	hour(s)
Hyd	hydrant
Ph	hydrogen ion content
Id	identification
In or "	inch
Incl	inclinometer tube
IMH	inlet manhole
ID	inside diameter
Inst	instrument
Intchg	interchange
Intmdt	intermediate
Intscn	intersection
Inv	invert
IM	iron monument
I Pn	Iron Pin
IP	iron Pipe
Jt	joint
J	joule
Jct	junction
K	kelvin
Kn	kilo newton
Kpa	kilo pascal
Kg	kilogram
Kg/m3	kilogram per cubic meter
Km	kilometer
K	Kip(s)
LS	Land Surveyor (licensed)
LSIT	Land Surveyor In Training
Ln	lane
Lg	large
Lat	latitude
Lt	left
L	length of curve
Lens	lenses
Lvl	level
LB	level book
Lvlng	leveling
Lht	light
LP	light pole
Ltg	lighting
Lig Co	lignite coal
Lig Sl	lignite slack
LF	linear foot
Liq	liquid
LL	liquid limit
L	litre
Lm	loam
Loc	location
LC	long chord
Long.	longitude
Lp	loop
LD	loop detector
Lm	lumen
Lum	luminaire
L Sum	lump sum
Lx	lux
ML	main line
M Hr	man hour
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
M	mega
Mer	meridian
M	meter
M/s	meters per second
M	mid ordinate of curve
Mi	mile
MM	mile marker
MP	mile post
Ml	milliliter
Mm	millimeter
Mm/hr	millimeters per hour
Min	minimum
Misc	miscellaneous
Mon	monument
Mnd	mound
Mtbl	mountable
Mtd	mounted
Mtg	mounting
Mk	muck
Mun	municipal
N	nano
NGS	National Geodetic Survey
NS	near side
Neop	neoprene
Ntwk	network
N	newton
N	North
NE	North East
NW	North West
NB	Northbound
No. or #	number
Obsc	obscure(d)
Obsn	observation
Ocpd	occupied
Ocpy	occupy
Off Loc	office location
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
PK	Parker-Kalon nail
Pa	pascal
PSD	passing sight distance
Pvmt	pavement
Ped	pedestal
Ped	pedestrian
PPP	pedestrian pushbutton post
Pen.	penetration
Perf	perforated
Per.	perimeter
PL	pipeline
Pl	place
P&P	plan & profile
PL	plastic limit
Pl	plate
Pt	point
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
PE	polyethylene
PVC	polyvinyl chloride
PCC	Portland Cement concrete
Lb or #	pounds
PP	power pole
Preempt	preemption
Prefab	prefabricated
Prfmd	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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions

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NDDOT ABBREVIATIONS

Qty	quantity
Qtr	quarter
Rad or R	radius
RR	railroad
Rlwy	railway
Rsd	raised
RTP	random traverse point
Rge or R	range
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
Refl	reflectorized
RCB	reinforced concrete box
RCES	reinforced concrete end section
RCP	reinforced concrete pipe
RCPS	reinforced concrete pipe sewer
Reinf	reinforcement
Res	reservation
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
Salv	salvage(d)
Sd	sand
Sdy Cl	sandy clay
Sdy Cl Lm	sandy clay loam
Sdy Fl	sandy fill
Sdy Lm	sandy loam
San	sanitary sewer line
Sc	scoria
Sec	seconds
Sec	section
SL	section line
Sep	separation
Seq	sequence
Serv	service
Sh	shale
Sht	sheet
Shtng	sheeting
Shldr	shoulder
Sw	sidewalk
S	siemens
SD	sight distance
SN	sign number
Sig	signal
Si Cl	silt clay
Si Cl Lm	silty clay loam
Si Lm	silty loam
Sgl	single
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
SC	spiral to curve
ST	spiral to tangent
SB	split barrel sample
SH	sprinkler head
SV	sprinkler valve
Sq	square
SF	square feet
Km2	square kilometer
M2	square meter
SY	square yard
Stk	stake
Std	standard
N	standard penetration test
Std Specs	standard specifications
Sta	station
Sta Yd	station yards
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
SE	superelevation
SS	supplement specification
Supp	supplemental
Surf	surfacing
Surv	survey
Sym	symmetrical
SI	systems international
Tan	tangent
T	tangent (semi)
TS	tangent to spiral
Tel	telephone
Tel B	Telephone Booth
Tel P	telephone pole
Tv	television
Temp	temperature
Temp	temporary
TBM	temporary bench mark
T	tesla
T	thinwall tube sample
T/mi	tons per mile
Ts	topsoil
Twp or T	township
Traf	traffic
TSCB	traffic signal control box
Tr	trail
Transf	transformer
TB	transit book
Trans	transition
TT	transmission tower
Trans	transverse
Trav	traverse
TP	traverse point
Trtd	treated
Trmt	treatment
Qc	triaxial compression
TERO	tribal employment rights ordinance
Tpl	triple
TP	turning point
Typ	typical
Qu	unconfined compressive strength
Ugrnd	underground
USC&G	US Coast & Geodetic Survey
USGS	US Geologic Survey
Util	utility
VG	valley gutter
Vap	vapor
Vert	vertical
VC	vertical curve
VCP	vitrified clay pipe
V	volt
Vol	volume
Wkwy	walkway
W	water content
WGV	water gate valve
WL	water line
WM	water main
WMV	water main valve
W Mtr	water meter
WSV	water service valve
WW	water well
W	watt
Wrng	wearing
Wb	weber
WIM	weigh in motion
W	west
WB	westbound
Wrng	wiring
W/	with
W/o	without
WC	witness corner
WGS	world geodetic system
Z	zenith

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE
08-03-15	General Revisions

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 08/03/15 and the original document is stored at the North Dakota Department of Transportation

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 PI	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
COE	Corps of Engineers
CONS TEL	Consolidated Telephone
CONT RES	Continental Resource Inc
CPR	Canadian Pacific Railway
D O E	Department Of Energy
DAK CARR	Dakota Carrier Network
DAK CENT TEL	Dakota Central Telephone
DAK RWD	Dakota Rural Water District
DGC	Dakota Gasification Company
DICKEY R NET	Dickey Rural Networks
DICKEY RWU	Dickey Rural Water Users Association
DICKEY TEL	Dickey Telephone
DNRR	Dakota Northern Railroad
DOME PL	Dome Pipeline Company
DVELEC	Dakota Valley Electric Cooperative
DVMW	Dakota, Missouri Valley & Western
ENBRDG	Enbridge Pipelines Incorporated
ENVENTIS	Enventis Telephone
FALK MNG	Falkirk Mining Company
FHWA	Federal Highway Administration
G FKS-TRL WD	Grand Forks-traill Water District
GETTY TRD & TRAN	Getty Trading & Transportation
GLDN W ELEC	Golden West Electric Cooperative
GRGS CO TEL	Griggs County Telephone
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
MID-CONT CABLE	Mid-Continent Cable
MIDSTATE TEL	Midstate Telephone Company
MINOT CABLE	Minot Cable Television
MINOT TEL	Minot Telephone Company
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
ONEOK	Oneok gas
OSHA	Occupational Safety and Health Administration
OTTR TL PWR	Otter Tail Power Company
P L E M	Prairielands Energy Marketing
POLAR COM	Polar Communications
PVT ELEC	Private Electric
QWEST	Qwest Communications
R&T W SUPPLY	R & T Water Supply Association
RAMSEY R SEW	Ramsey Rural Sewer Association
RAMSEY RW	Ramsey Rural Water Association
RAMSEY UTIL	Ramsey County Rural Utilities
RED RIV TEL	Red River Rural Telephone
RESVTN TEL	Reservation Telephone
ROBRTS TEL	Roberts Company Telephone
R-RIDER ELEC	Roughrider Electric Coop
RRVW	Red River Valley & Western Railroad
RSR ELEC	R.S.R. Electric Cooperative
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
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

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

D-101-20

Line Styles

- Limits of Const Transition Line
- Bale Check
- Rock Check
- Sight Distance Triangle Line
- Small Hidden Object
- Dimension Leader
- Existing Ground
- Existing Topsoil (Cross Section View)
- Large Hidden Object
- Edge Drain
- Geotextile Fabric Type D
- Existing Electrical
- Existing Fiber Optic Line
- Existing TV Fiber Optic
- Existing Gas Pipe
- Geogrid
- Existing Overhead Utility Line
- Existing Power
- Existing Fuel Pipeline
- Existing Undefined Above Ground Pipe Line
- Geotextile Fabric Type R
- Geotextile Fabric Type R1
- Remove Line
- Geotextile Fabric Type RR
- Geotextile Fabric Type S
- Floating Silt Curtain
- Existing Telephone Line
- Existing TV Line
- Existing Assumed Ground (Not Surveyed)
- Tentative Ground Line
- Existing Water or Steam Line
- Existing Under Drain
- Under Drain
- Wall
- Existing Slotted Drain
- Existing Cemetary Boundary
- 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
- Wetland Mitigation
- Existing Box Culvert Bridge
- Existing Concrete Surface
- Existing Drainage Structure
- Easement
- Existing Concrete
- Existing Easement
- Existing Gravel Surface
- Existing Aggregate (Cross Section View)
- Existing Curb and Gutter (Cross Section View)
- Existing Riprap
- Existing Underground Vault or Lift Station
- Tangent Line
- Hidden Object
- Existing Dirt Surface
- Existing Conduit
- Topsoil Profile
- Existing Conductor
- Conductor
- Fiber Optic
- Existing Loop Detector
- Subgrade, Subcut or Ditch Grade
- Existing Asphalt Surface
- Existing Asphalt (Cross Section View)
- Existing Reinforcement Rebar
- Existing Tie Point Line
- Existing State or International Line
- Existing Quarter Section Line
- Existing County
- Existing Section Line
- Existing Township
- Existing Railroad Centerline
- Centerline
- Existing Centerline
- Supplemental Contour
- Right of Way
- Existing Right of Way
- Existing Right of Way Railroad
- Failure Line
- Existing Conditions
- Existing Ground (Details)
- Existing Sixteenth Section Line
- Existing Right of Way Not State Owned
- Phantom Object
- Centerline Main
- Existing Guardrail Cable
- Existing Guardrail Metal
- Existing Edge of Water
- Excavation Limits
- Existing Government Lot Line
- Existing Adjacent Block Lines
- Existing Adjacent Lot Lines
- Existing Adjacent Property Line
- Existing Adjacent Subdivision Lines

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Line Styles

- Subgrade Reinforcement
- Existing Down Guy Wire Down Guy
- Existing Fence
- Existing Railroad
- Existing Sanitary Sewer
- Existing Sanitary Force Main
- Existing Storm Drain
- Existing Storm Drain Force Main
- Fence
- Silt Fence
- Existing Field Line
- Exst Flow
- Flow
- Existing Culvert
- Existing Curb
- Existing Valley Gutter
- Existing Driveway Gutter
- Existing Curb and Gutter
- Existing Mountable Curb and Gutter
- Existing Double Micro Loop Detector
- Micro Loop Detector Double
- Existing Overhead Sign Structure
- Existing Micro Loop Detector
- Micro Loop Detector
- Existing Overhead Sign Structure Cantilever
- Existing Railroad Switch
- Overhead Sign Structure Cantilever
- 24 Inch Pipe
- Reinforced Concrete Pipe
- Signal Head with Mast Arm
- Existing Signal Head with Mast Arm
- Tie Bar at Random Spacing
- 3-Cable w Posts
- Existing 3-Cable w Posts
- Site Boundary
- Fiber Rolls
- Doweled Joint
- Tie Bar 30 Inch 4 Foot Center to Center
- Tie Bar 18 Inch 3 Foot Center to Center
- Existing Berm, Dike, Pit, or Earth Dam
- Existing Ditch Block
- Depression Contours
- Existing City Corporate Limits or Reservation Boundary
- Gravel Pit - Borrow Area
- Existing Tree Boundary
- Tree Row
- Existing Brush or Shrub Boundary
- Existing Retaining Wall
- Existing Planter or Wall
- Retaining Wall (Plan View)
- Sheet Piling
- W-Beam w Posts
- Existing W-Beam Guardrail with Posts
- Exst Wet Area-Vegetation Break
- Existing Wetland Delineated

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-30

North Arrow (Half Scale)

Truck Mounted Attenuator

Type I Barricade

Type II Barricade

Type III Barricade

Catch Basin

Cairn or Stone Circle

Video Detection Camera

Storm Drain Cap or Stub

Corrugated Metal End Section 18 Inch

Corrugated Metal End Section 24 Inch

Corrugated Metal End Section 30 Inch

Corrugated Metal End Section 36 Inch

Corrugated Metal End Section 42 Inch

Corrugated Metal End Section 48 Inch

Concrete Foundation

Ground Connection Conductor

Neutral Connection Conductor

Phase 1 Connection Conductor

Phase 2 Connection Conductor

Traffic Cone

Signal Controller

Pad Mounted Signal Controller

Alignment Data Point

Emergency Vehicle Detector

Attenuation Device

Diamond Grade Delineator Type A

Diamond Grade Delineator Type B

Diamond Grade Delineator Type C

Diamond Grade Delineator Type D

Diamond Grade Delineator Type E

Flexible Delineator

Flexible Delineator Type A

Flexible Delineator Type B

Flexible Delineator Type C

Flexible Delineator Type D

Flexible Delineator Type E

Delineator Type A

Delineator Type A Reset

Delineator Type B

Delineator Type B Reset

Delineator Type C

Delineator Type D

Delineator Type E

Delineator Drums

Spot Elevation

Existing Access Control Arrow

Existing Artifact

Existing Flashing Beacon

Existing Benchmark

Existing Railroad Battery Box

Existing Bush or Shrub

Existing Gas Cap or Stub

Existing Sanitary Cap or Stub

Existing Storm Drain Cap or Stub

Existing Water Cap or Stub

Existing Sanitary Cleanout

Existing Concrete Foundation

Existing Traffic Signal Controller

Existing Pad Mounted Signal Controller

Existing Sixteenth Section Corner

Existing Quarter Section Corner

Existing Section Corner

Existing Railroad Crossbuck

Existing Satellite Dish

Existing Fuel Dispensers

Existing Flexible Delineator Type A

Existing Flexible Delineator Type B

Existing Flexible Delineator Type C

Existing Flexible Delineator Type D

Existing Flexible Delineator Type E

Existing Delineator Type A

Existing Delineator Type B

Existing Delineator Type C

Existing Delineator Type D

Existing Delineator Type E

Existing EFB Misc

Existing Flashing Beacon

Existing Pipe Mounted Flasher

Existing Pad Mounted Feed Point

Existing Pipe Mounted Feed Point with Pad

Existing Pole Mounted Feed Point

Existing Railroad Frog

Existing Snow Gate 18

Existing Snow Gate 28

Existing Snow Gate 40

Existing Headwall

Existing Pedestrian Head with Number

Existing Signal Head

Existing Sprinkler Head

Existing Fire Hydrant

Existing Catch Basin Drop Inlet

Existing Curb Inlet

Existing Manhole Inlet

Existing Junction Box

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-31

- Existing Light Standard
- Existing High Mast Light Standard 10 Luminaire
- Existing High Mast Light Standard 3 Luminaire
- Existing High Mast Light Standard 4 Luminaire
- Existing High Mast Light Standard 5 Luminaire
- Existing High Mast Light Standard 6 Luminaire
- Existing High Mast Light Standard 7 Luminaire
- Existing High Mast Light Standard 8 Luminaire
- Existing High Mast Light Standard 9 Luminaire
- Existing Overhead Sign Structure Load Center
- Existing Luminaire
- Existing Light Standard Luminaire
- Existing Federal Mailbox
- Existing Private Mailbox
- Existing Meander Section Corner
- Existing Meter
- Existing Electrical Manhole
- Existing Gas Manhole
- Existing Sanitary Manhole
- Existing Sanitary Force Main Manhole
- Existing Sanitary Manhole with Valve
- Existing Storm Drain Manhole
- Existing Force Main Storm Drain Manhole
- Existing Force Main Storm Drain Manhole with Valve
- Existing Telephone Manhole
- Existing Manhole with Valve Water
- Existing Water Manhole
- Existing Mile Post Type A
- Existing Mile Post Type B
- Existing Mile Post Type C
- Existing Reference Marker
- Existing RW Marker
- Existing Utility Marker
- Iron Monument Found
- Iron Pin R/W Monument
- Existing Object Marker Type I
- Existing Object Marker Type II
- Existing Object Marker Type III
- Existing Electrical Pedestal
- Existing Telephone Pedestal
- Existing Fiber Optic Telephone Pedestal
- Existing TV Pedestal
- Existing Fiber Optic TV Pedestal
- Existing Fuel Filler Pipes
- Existing Traverse PI Aerial Panel
- Existing Pole
- Existing Power Pole
- Existing Power Pole with Transformer
- Existing Telephone Pole
- Existing Wood Pole
- Existing Post
- Existing Pedestrian Push Button Post
- Existing Control Point CP
- Existing Control Point GPS-RTK
- Existing Control Point TRI
- Existing Reference Marker Point NGS
- Existing Pull Box
- Existing Intelligent Transportation Pull Box
- Existing Water Pump
- Existing Slotted Reinforced Concrete Pipe
- Existing RR Profile Spot
- Existing Fuel Leak Sensors
- Existing Highway Sign
- Existing Miscellaneous Spot
- Existing Lighting Standard Pole
- Existing Traffic Signal Standard
- Existing Transformer
- Existing Large Evergreen Tree
- Existing Small Evergreen Tree
- Existing Large Tree
- Existing Small Tree
- Existing Tree Trunk
- Existing Pad Mounted Traffic Signal Control Box
- Existing Undefined Manhole
- Existing Undefined Pull Box
- Existing Undefined Pedestal
- Existing Undefined Valve
- Existing Undefined Pipe Vent
- Existing Gas Valve
- Existing Water Valve
- Existing Fuel Pipe Vent
- Existing Gas Pipe Vent
- Existing Sanitary Pipe Vent
- Existing Storm Drain Pipe Vent
- Existing Water Pipe Vent
- Existing Weather Station
- Existing Ground Water Well Bore Hole
- Existing Windmill or Tower
- Existing Witness Corner
- Flashing Beacon
- Flagger
- Pipe Mounted Flasher
- Sanitary Force Main with Valve

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 07/01/14 and the original document is stored at the North Dakota Department of Transportation

Symbols

D-101-32

- Pad Mounted Feed Point
- Pipe Mounted Feed Point with Pad
- Pole Mounted Feed Point
- Headwall
- Double Headwall with Vegitation Barrier
- Single Headwall with Vegitation Barrier
- Pole Mounted Head
- Sprinkler Head
- Fire Hydrant
- Inlet Type 1
- Inlet Type 2
- Double Inlet Type 2
- Inlet Grate Type 2
- Junction Box
- High Mast Light Standard 10 Luminaire
- High Mast Light Standard 3 Luminaire
- High Mast Light Standard 4 Luminaire
- High Mast Light Standard 5 Luminaire
- High Mast Light Standard 6 Luminaire
- High Mast Light Standard 7 Luminaire
- High Mast Light Standard 8 Luminaire
- High Mast Light Standard 9 Luminaire
- Relocate Light Standard
- Overhead Sign Structure Load Center
- Light Standard 100 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 1000 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 150 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 175 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 35 Watt High Pressure Sodium Vapor Luminaire
- Light Standard 400 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 700 Watt High Pressure Sodium Vapor Luminaire
- Manhole
- Manhole 48 Inch
- Sanitary Force Main Manhole
- Sanitary Sewer Manhole
- Storm Drain Manhole
- Storm Drain Manhole with Inlet
- Reset Mile Post
- Mile Post Type A
- Mile Post Type B
- Mile Post Type C
- Right of Way Marker
- Tubular Marker
- Alignment Monument
- Iron Pin Reference Monument
- Object Marker Type I
- Object Marker Type II
- Object Marker Type III
- Caution Mode Arrow Panel
- Back to Back Vertical Panel Sign
- Double Direction Arrow Panel
- Left Directional Arrow Panel
- Right Directional Arrow Panel
- Sequencing Arrow Panel
- Truck Mounted Arrow Panel
- Power Pole
- Wood Pole
- Pedestrian Push Button Post
- Property Corner
- Pull Box
- Intelligent Transportation Pull Box
- Sanitary Pump
- Storm Drain Pump
- Reinforced Pavement
- Reinforced Concrete End Section 15 Inch
- Reinforced Concrete End Section 18 Inch
- Reinforced Concrete End Section 24 Inch
- Reinforced Concrete End Section 30 Inch
- Reinforced Concrete End Section 36 Inch
- Reinforced Concrete End Section 42 Inch
- Reinforced Concrete End Section 48 Inch
- Reinforced Concrete End Section 54 Inch
- Reset Right of Way Marker
- Reset USGS Marker
- Right of Way Markers
- Riser 30 Inch
- Continuous Split Barrel Sample (CSB)
- Flight Auger Sample (FA)
- Split Barrel Sample (SB)
- Thinwall Tube Sample (T)
- Highway Sign
- SNOW GATE 18 FT
- SNOW GATE 28 FT
- SNOW GATE 40 FT
- Standard Penetration Test (N)
- Transformer
- Inclinometer Tube (Incl)
- Underdrain Cleanout
- Excavation Unit
- Water Valve

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
07-01-14	
REVISIONS	
DATE	CHANGE

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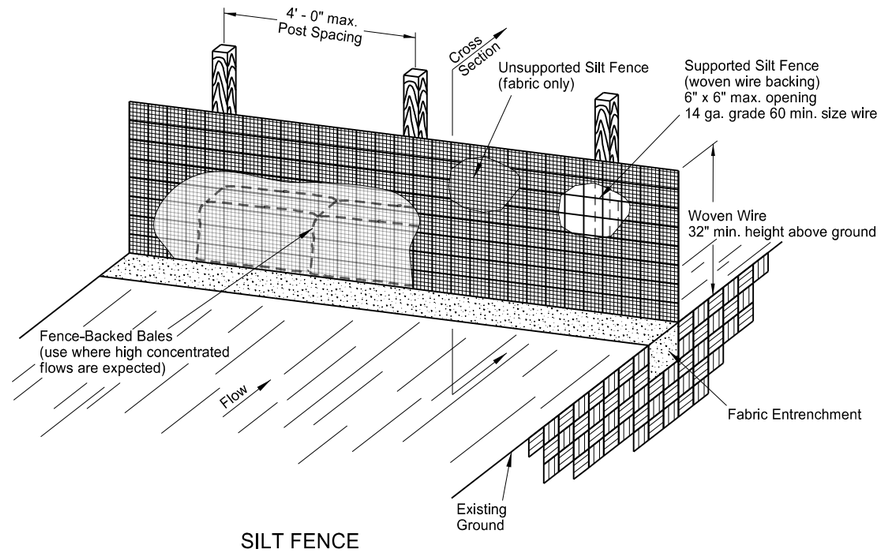
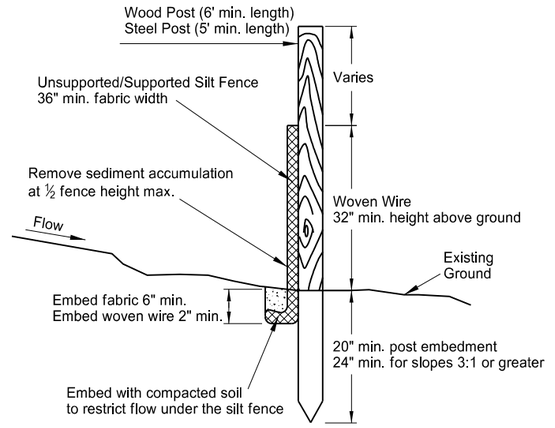
EROSION AND SILTATION CONTROLS - SILT FENCE

D-260-1



SILT FENCE
SUPPORTED AND UNSUPPORTED



SILT FENCE
CROSS SECTION

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-03-13	
REVISIONS	
DATE	CHANGE
06-26-14	Standard drawing resulted from splitting standard D-708-2.

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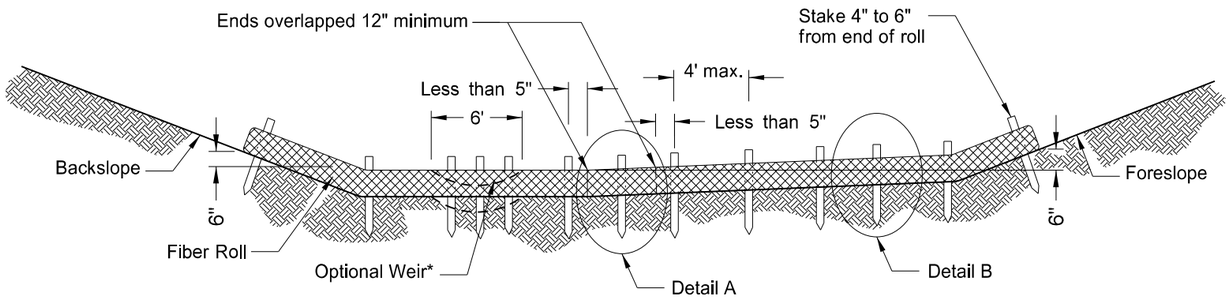
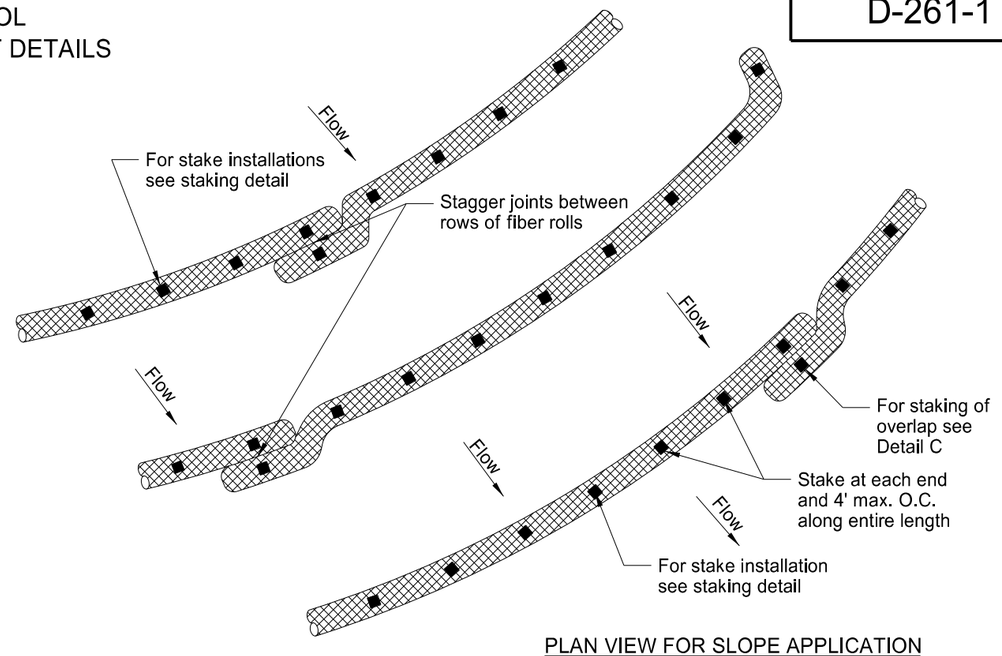
D-261-1

EROSION CONTROL
FIBER ROLL PLACEMENT DETAILS

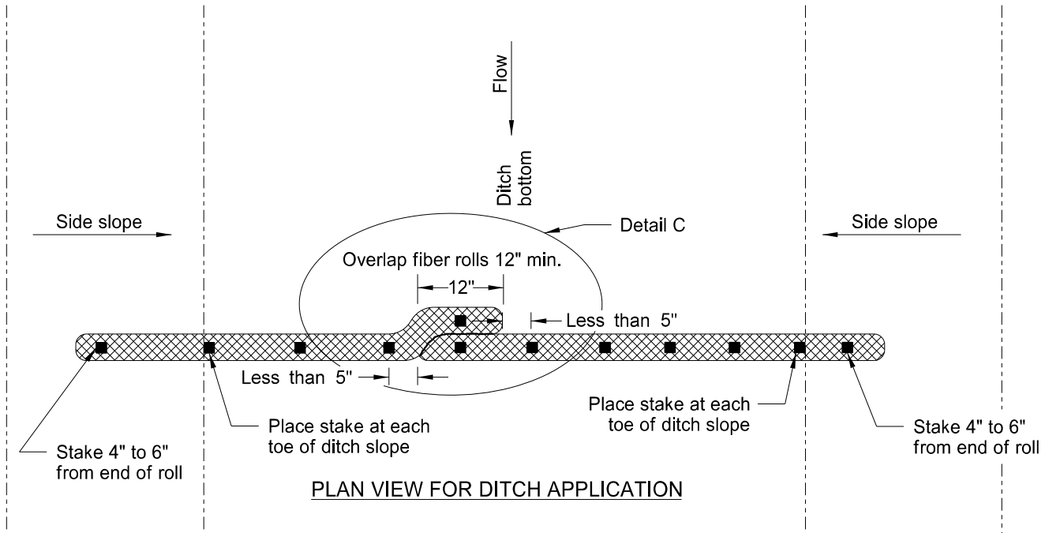


*Optional Weir. Use in flat areas, such as the Red River Valley, where there is potential for water to back up on adjacent property. Lower fiber roll enough to prevent water from backing up on adjacent property. Do not use 20-inch fiber rolls in flat areas where there is potential for water to back up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

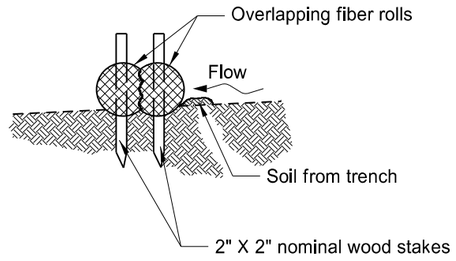
12 OR 20 INCH FIBER ROLL - DITCH BOTTOM



PLAN VIEW FOR SLOPE APPLICATION

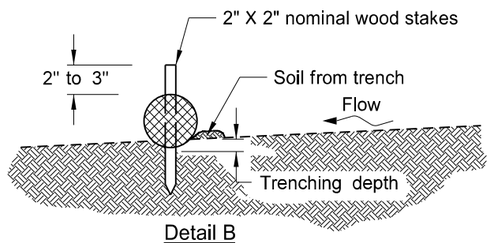


PLAN VIEW FOR DITCH APPLICATION



Detail A

Fiber Roll Overlapping Staking Detail



Detail B

Fiber Roll Staking Detail

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-18-10	
REVISIONS	
DATE	CHANGE
06-10-13	Added plan view for ditch and slope application. Added table with values for stake and trench dimensions.
10-04-13	Revised fiber roll overlap detail.
06-26-14	Changed standard drawing number from D-708-7 to D-261-1

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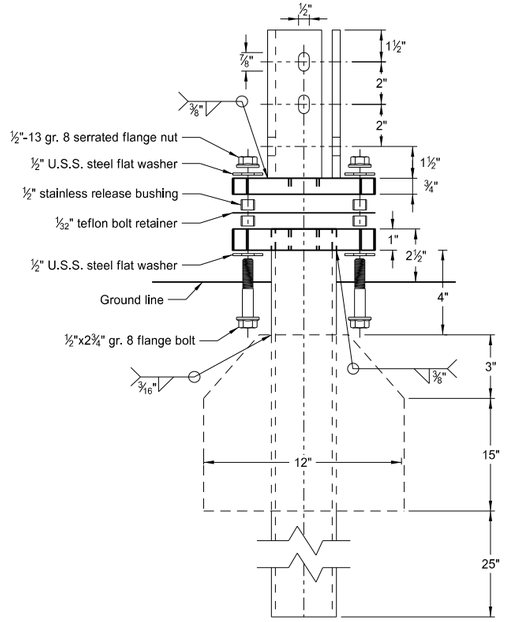
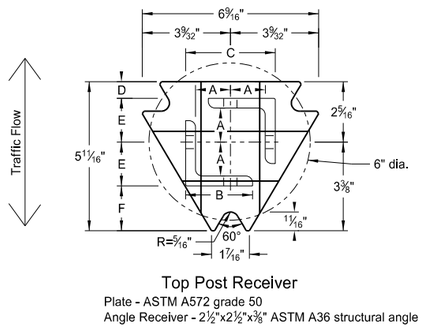
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-7

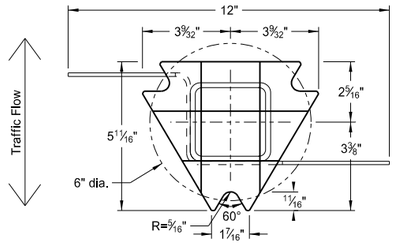


Multi-Directional
Slip Base Assembly

Perforated Tube



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



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

Notes:

1. Slip base bolts shall be torqued as specified by the manufacturer.
2. Anchor shall have a yield strength of 43.9 KSI and tensile strength of 59.3 KSI.
3. The 4" vertical clearance is required for the anchor or breakaway base. The 4"x60" measurement shall be made above and below post location and also back and ahead of the post.
4. When used in concrete sidewalk, anchor shall be same except without the wings.
5. Four post signs shall have over 7' between the first and the fourth posts.

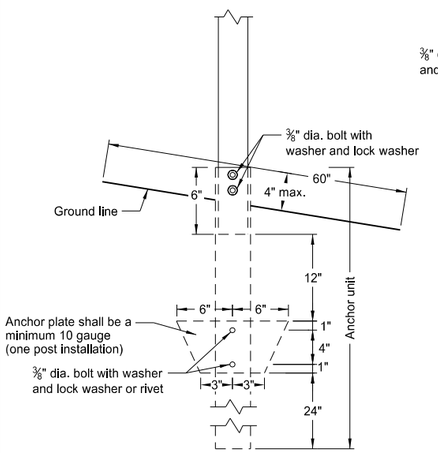
Telescoping Perforated Tube						
Number of Posts	Post Size in.	Wall Thick-ness Gauge	Sleeve Size in.	Wall Thick-ness Gauge	Slip Base	Anchor Size without Slip Base in.
1	2	12			No	2¼
1	2¼	12			No	2½
1	2½	12			(A)	3
1	2½	10			Yes	
1	2¼	12	2	12	Yes	
1	2½	12	2¼	12	Yes	
2	2	12			No	2¼
2	2¼	12			No	2½
2	2½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

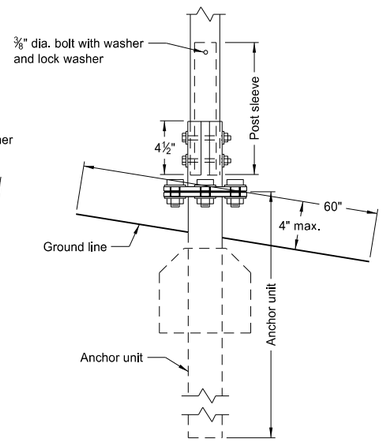
Top Post Receiver Data Table						
Square Post Sizes (B)	A	B	C	D	E	F
2³⁄₁₆"x10 ga.	1⁹⁄₆₄"	2½"	3¹⁄₃₂"	25⁄₃₂"	1³³⁄₆₄"	1⅞"
2½"x10 ga.	1⁹⁄₃₂"	2½"	3⁵⁄₁₆"	⅝"	1²¹⁄₃₂"	1¾"

(A) The breakaway base is required when the support is placed in weak soils. The Engineer shall determine if the soils are weak.

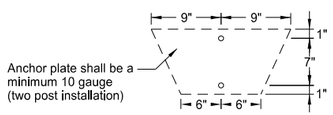
(B) The 2³⁄₁₆"x10 ga. may be inserted into 2½"x10 ga. for additional wind load.

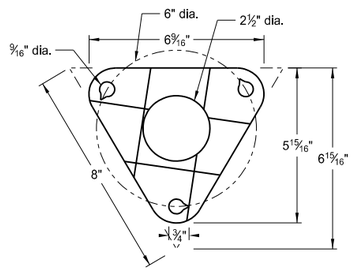


Anchor Unit and Post Assembly



Multi-Directional
Slip Base Anchor Unit
and Post Sleeve Assembly





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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
2-28-14	
REVISIONS	
DATE	CHANGE

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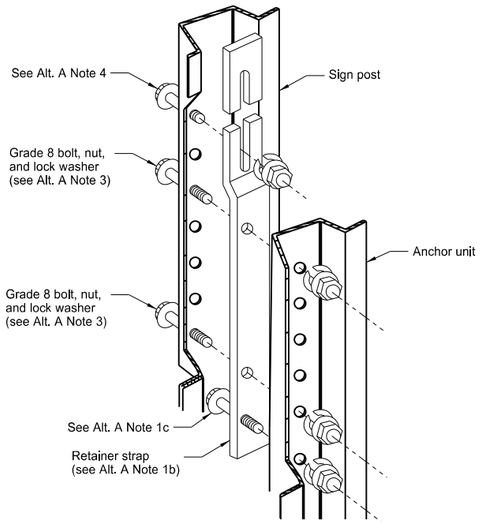
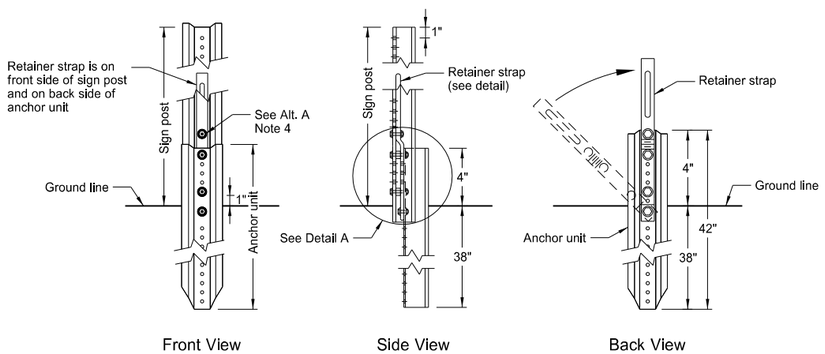
BREAKAWAY SYSTEMS FOR CONSTRUCTION ZONE SIGNS

D-704-8

U-Channel Post



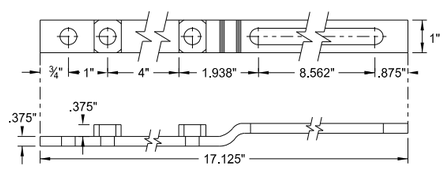
Detail A



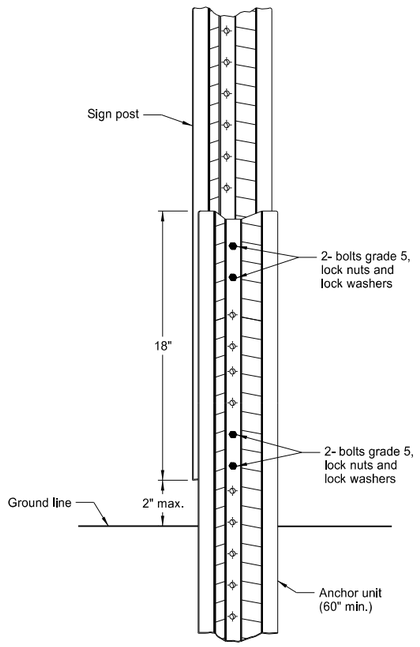
Front View Side View Back View

Breakaway U-Channel Detail
Alternate A

A maximum of 2 posts shall be installed within 7'.

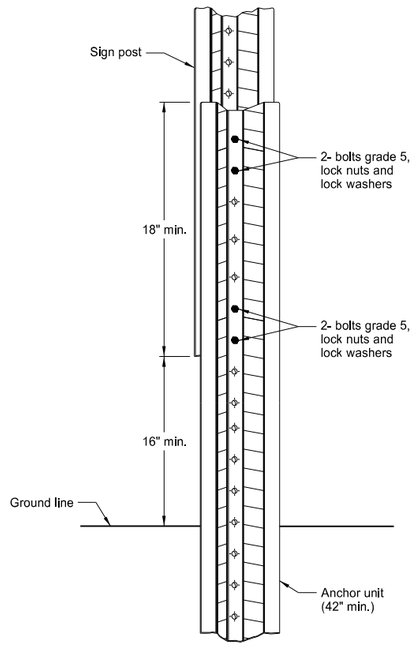


Retainer Strap Detail



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

A maximum of 3 posts shall be installed within 7'.



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

A maximum of 3 posts shall be installed within 7'.

Alternate A Steps of Installation:

1. a) Drive anchor unit to within 12" of ground level.
   b) Proper assembly established by lining up the bottom hole of retainer strap with the 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. The base post, strap and sign post shall be properly nested. 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

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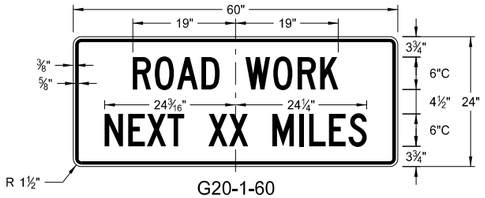
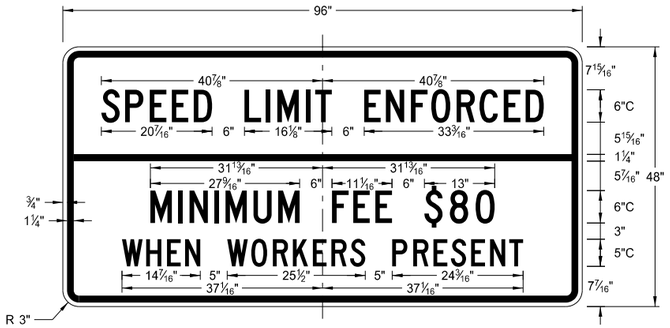
CONSTRUCTION SIGN DETAILS
TERMINAL AND GUIDE SIGNS



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

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



G20-55-96
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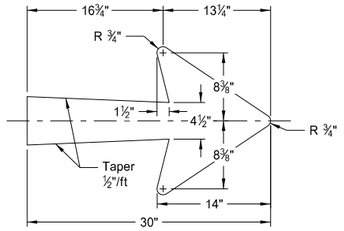
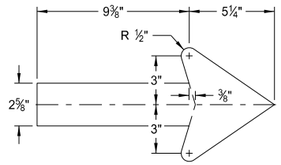
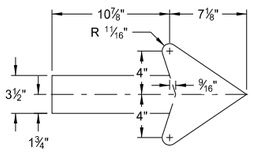
Background: orange



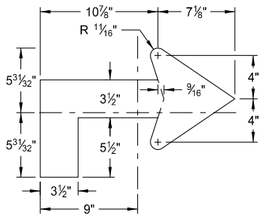
E5-1-48



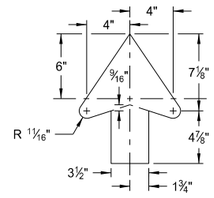
G20-50a-72
G20-52a-72



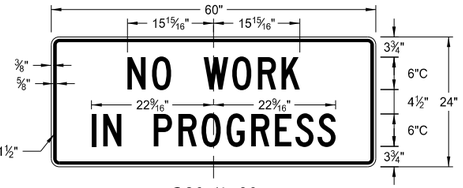
M4-9(L or R)-30
Right or Left



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



M4-9-30
Straight



G20-1b-60
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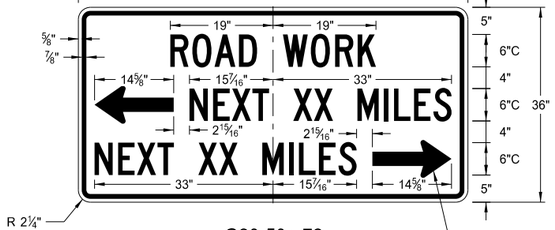
Background: orange



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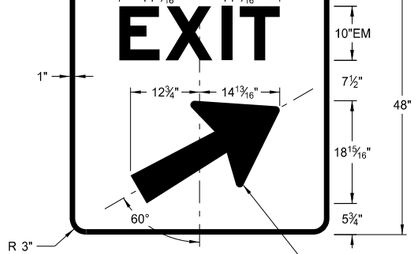
Background: orange



E5-1(L or R)-48
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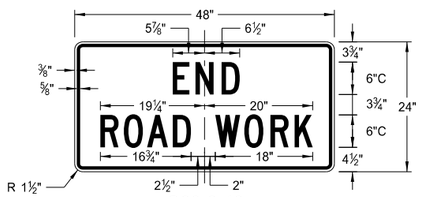
Background: green



G20-2-48
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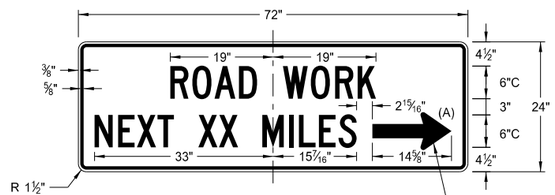
Background: orange



G20-52a-72
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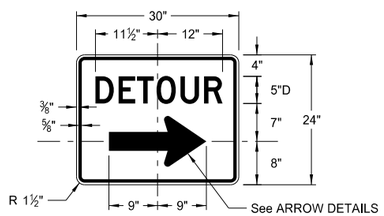

M4-9(L or R)-30 &
M4-9-30
Legend: black (non-refl)
Background: orange

ARROW DETAILS

NOTES:

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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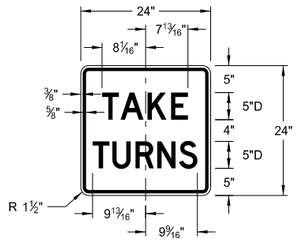
CONSTRUCTION SIGN DETAILS
REGULATORY SIGNS



R1-50-24
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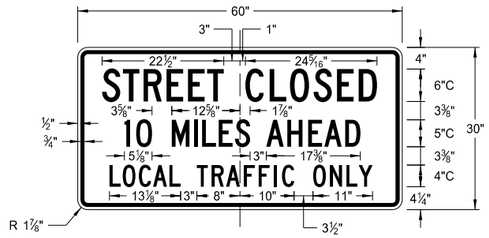
Background: white



R11-3c-60
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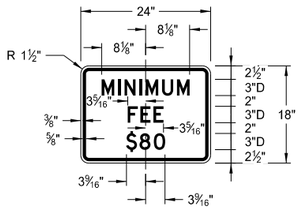
Background: white



R2-1a-24
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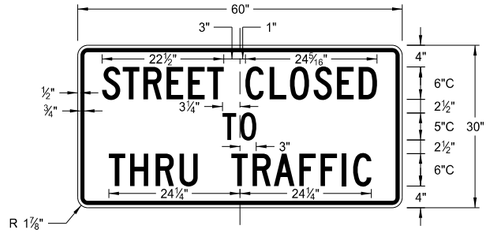
Background: white



R11-4a-60
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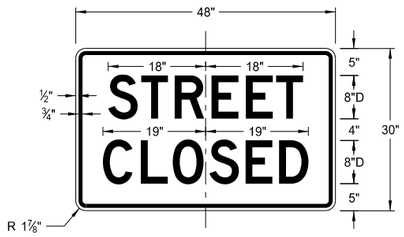

R11-2a-48
Legend: black (non-refl)
Background: white

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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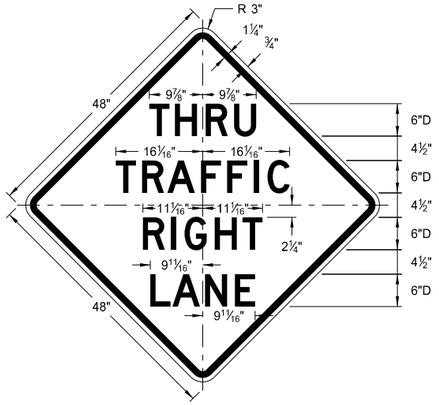
CONSTRUCTION SIGN DETAILS
WARNING SIGNS



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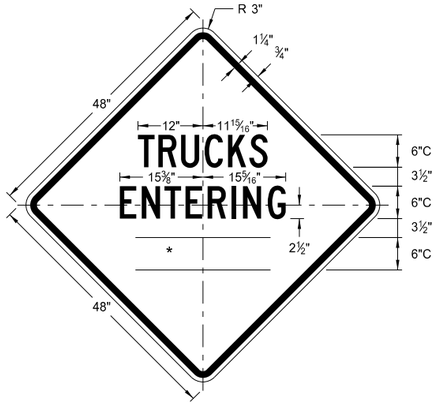

W8-54-48
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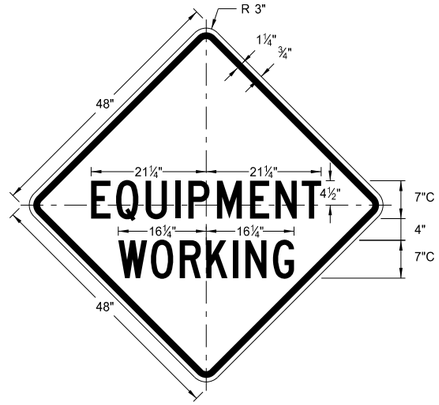

W20-51-48
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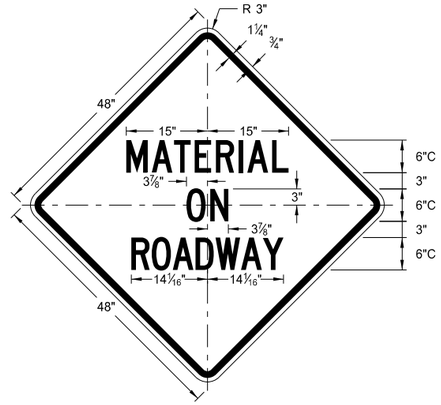
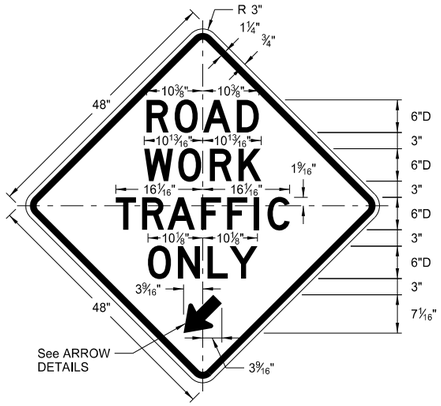


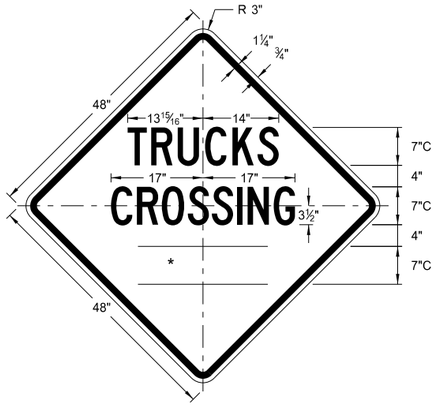
W21-51-48
Legend: black (non-refl)
Background: orange

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

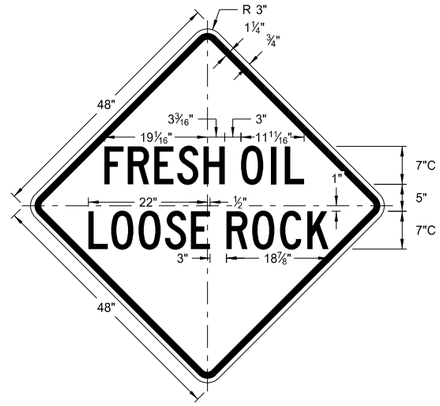


W5-9-48
Legend: black (non-refl)
Background: orange



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

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



W22-8-48
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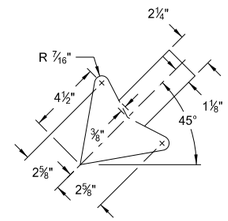
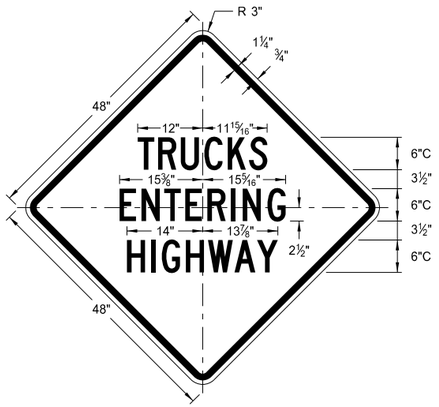
Background: orange



W5-9-48

ARROW DETAILS



W8-53-48
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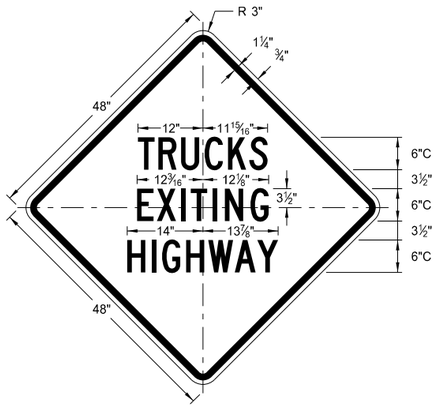
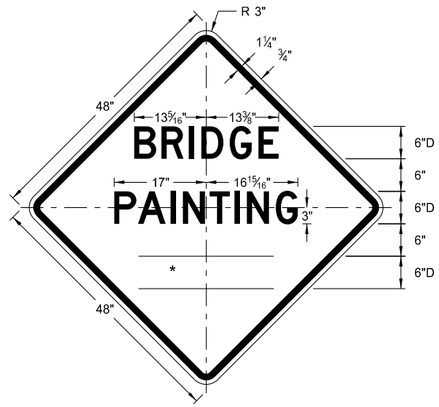
Background: orange



W8-56-48
Legend: black (non-refl)
Background: orange



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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-13-13	
REVISIONS	
DATE	CHANGE

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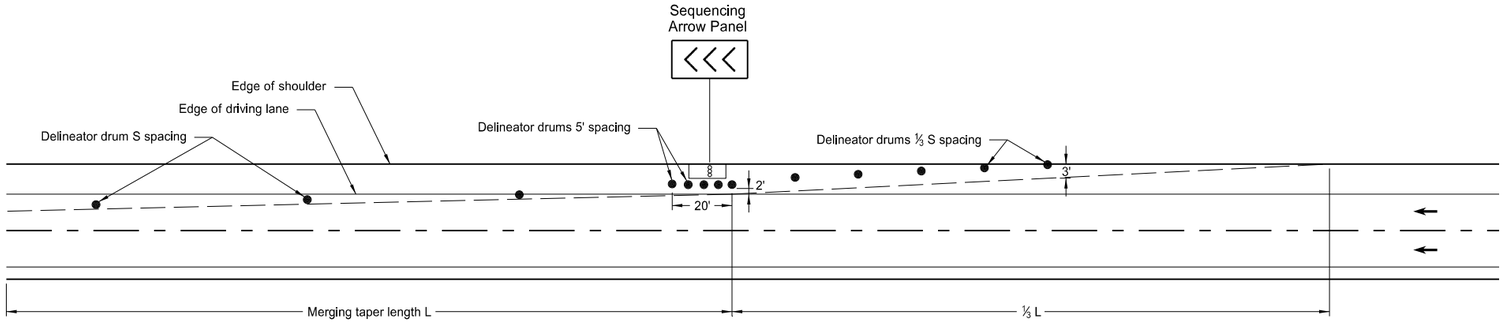
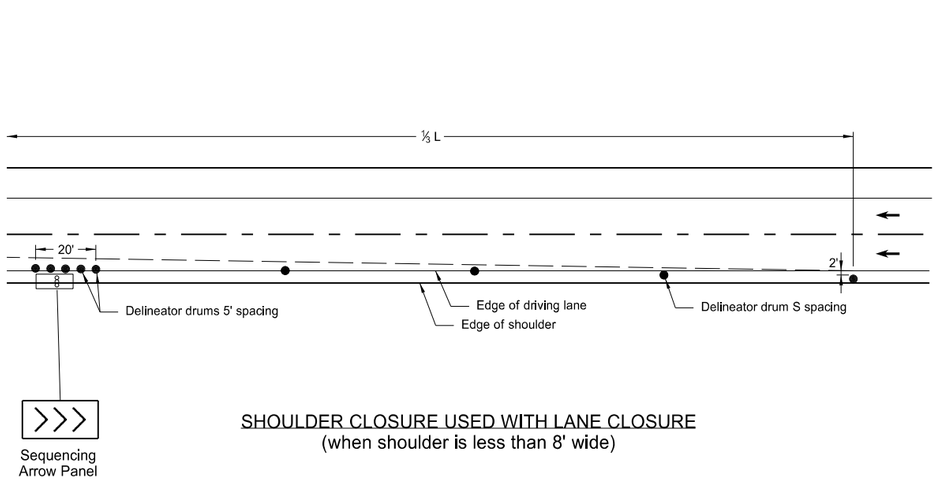
SHOULDER CLOSURE TAPERS

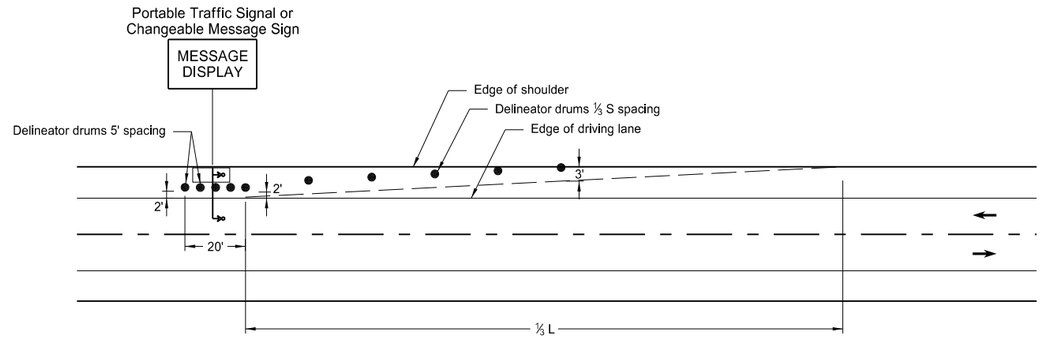
D-704-12



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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
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DATE	CHANGE

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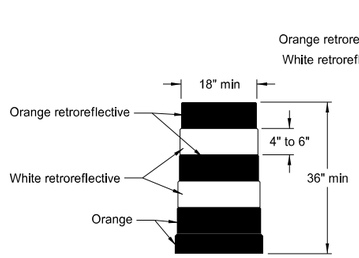
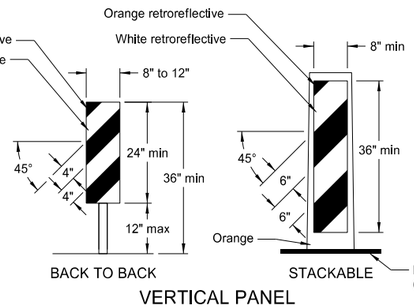
BARRICADE AND CHANNELIZING DEVICE DETAILS

D-704-13



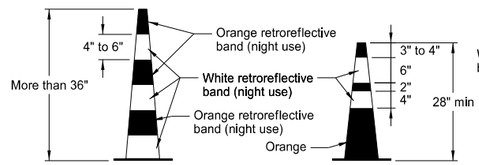
DELINEATOR DRUM

The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 4" to 6" wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized spaces between the horizontal orange and white stripes shall not exceed 3" wide. Stripes shall not be placed on ribs or indentations in the drum. Drums shall have closed tops that will not allow collection of construction debris or other debris. Ballast shall not be placed on the top of a drum.



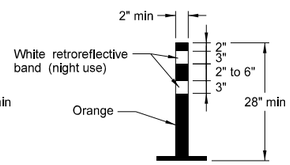
VERTICAL PANEL

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward in the direction vehicular traffic is to pass. Retroreflective sheeting shall be placed on both sides of panel and shall have 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, a stripe width of 6 inches shall be used.



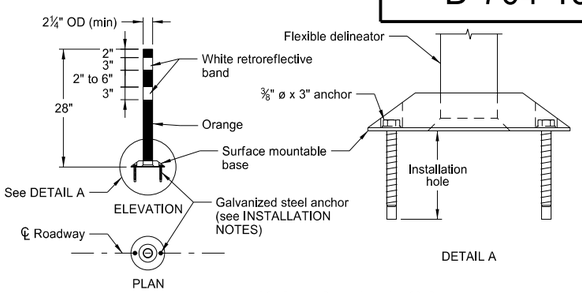
TRAFFIC CONE

Retroreflectorization of cones more than 36" in height shall be provided by alternating orange and white retroreflective stripes. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized space between the orange and white stripes shall not exceed 3" wide.



TUBULAR MARKER

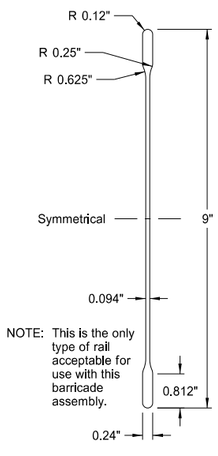
Retroreflectorization of tubular markers more than 42" in height shall be provided by alternating four 4" to 6" wide orange and white stripes with the top stripe being orange.



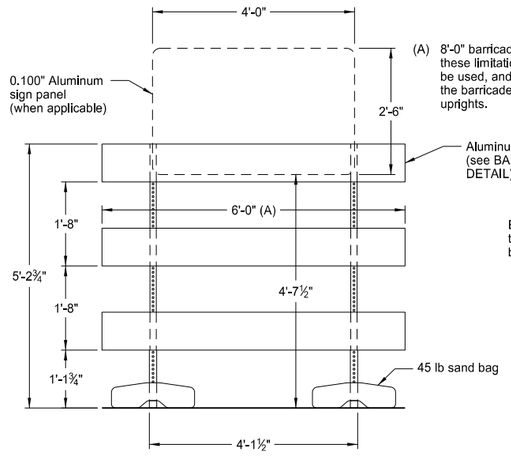
FLEXIBLE DELINEATOR

INSTALLATION NOTES:

1. Drill installation holes to diameter and depth as 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, the contractor may use an 8" x 8" butyl pad or hot melt butyl. Butyl shall be removed as close as possible to pavement surface.

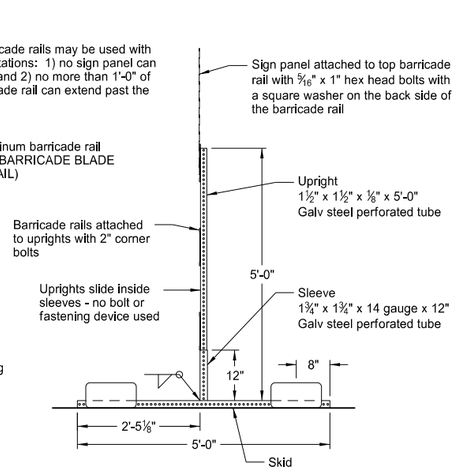


BARRICADE BLADE DETAIL



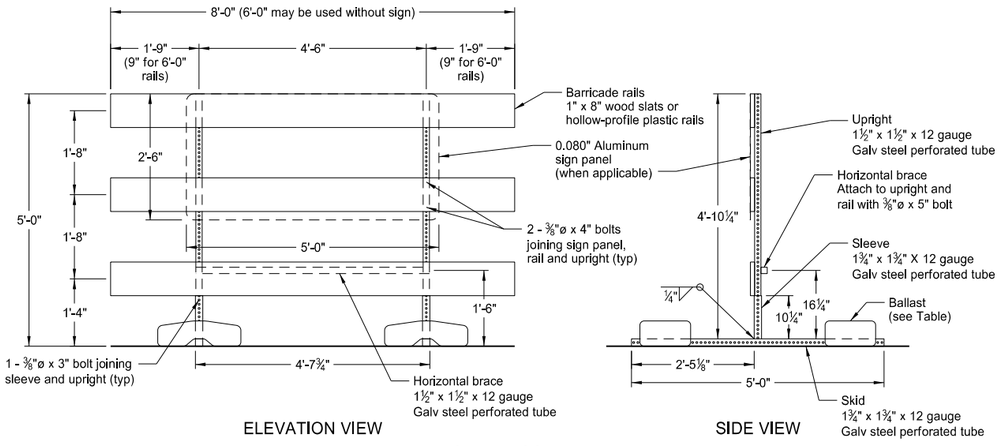
ELEVATION VIEW

(A) 8'-0" barricade rails may be used with these limitations: 1) no sign panel can be used, and 2) no more than 1'-0" of the barricade rail can extend past the uprights.



SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Aluminum Barricade Rails)

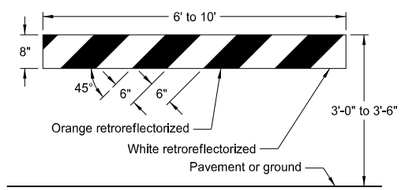


ELEVATION VIEW

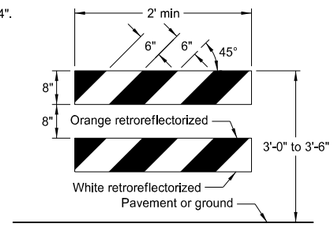
SIDE VIEW

BARRICADE ASSEMBLY DETAIL
(Wood or Plastic Rails)

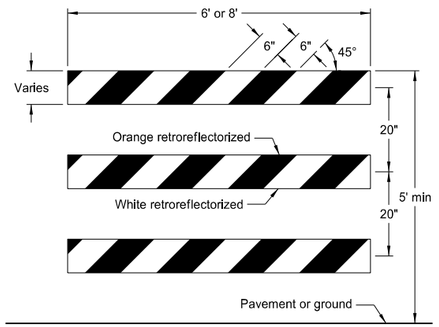
NOTE: Markings for barricades shall be alternating orange and white retroreflective stripes, sloping downward in the direction traffic is to pass. Retroreflective sheeting shall be placed on both sides of the rails and shall have a minimum of 270 square inches of visible retroreflective area facing vehicular traffic. When the barricade length is less than 36", the rail stripe width shall be 4".



TYPE I BARRICADE

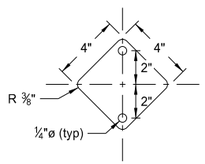


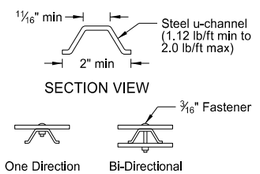
TYPE II BARRICADE

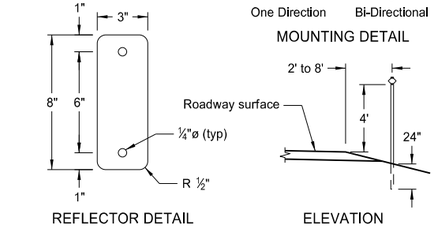


TYPE III BARRICADE

BARRICADE RAIL DETAILS







DELINEATORS

MINIMUM BALLAST
(For each side of barricade support)

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

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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-13	
REVISIONS	
DATE	CHANGE

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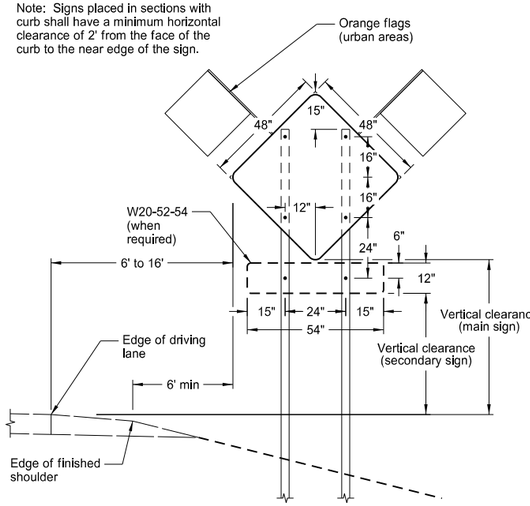
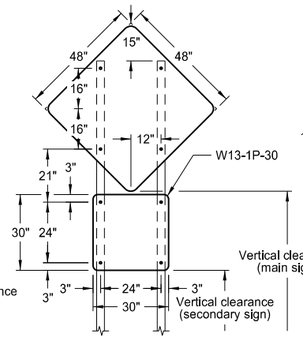
CONSTRUCTION SIGN PUNCHING AND MOUNTING DETAILS

D-704-14

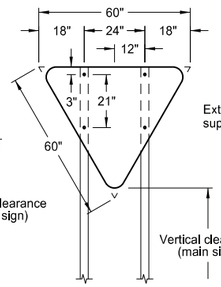
Note: Signs placed in sections with curb shall have a minimum horizontal clearance of 2' from the face of the curb to the near edge of the sign.



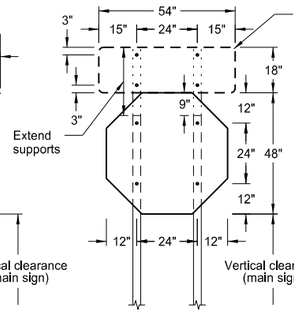
TYPICAL SECTION
(48" x 48" diamond warning sign shown)



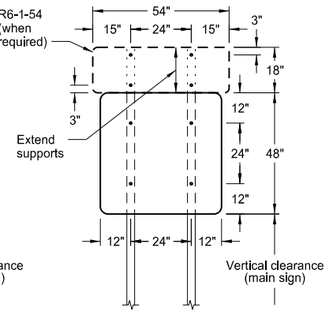
48" x 48" DIAMOND SIGN
(with 30" x 30" secondary sign)



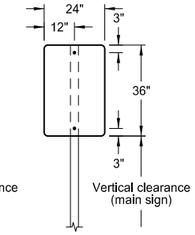
R1-2-60 - YIELD SIGN



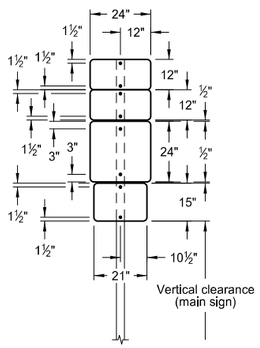
R1-1-48 - STOP SIGN
(with R6-1-54 sign as required)



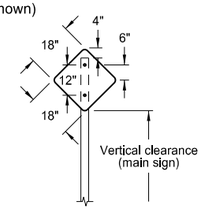
48" x 48" SIGN
(with R6-1-54 sign as required)



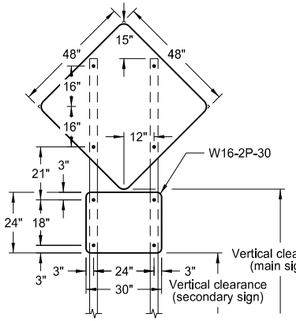
24" x 36" SIGN



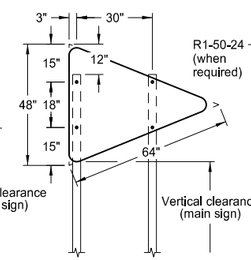
24" x 24"
ROUTE MARKER
ASSEMBLY



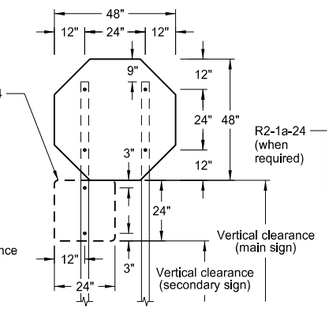
18" x 18"
DIAMOND SIGN



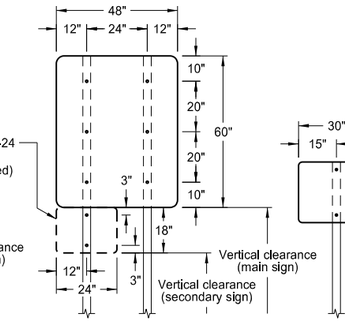
48" x 48" DIAMOND SIGN
(with 30" x 24" secondary sign)



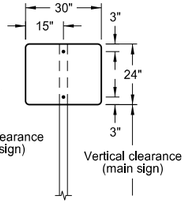
W14-3-64 - PENNANT SIGN



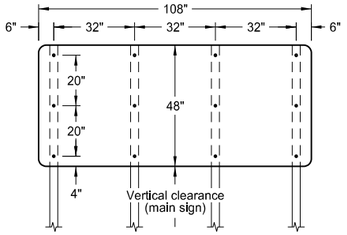
R1-1-48 - STOP SIGN
(with R1-50-24 sign as required)



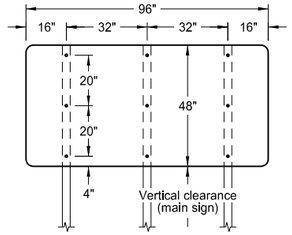
48" x 48" SIGN
(with R2-1a-24 sign as required)



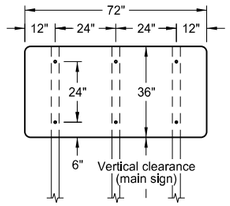
30" x 24" SIGN



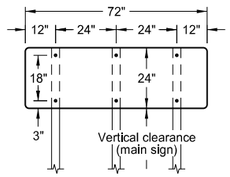
108" x 48" SIGN



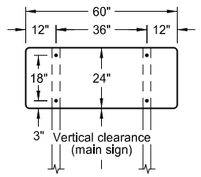
96" x 48" SIGN



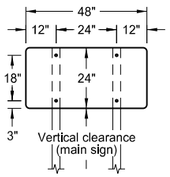
72" x 36" SIGN



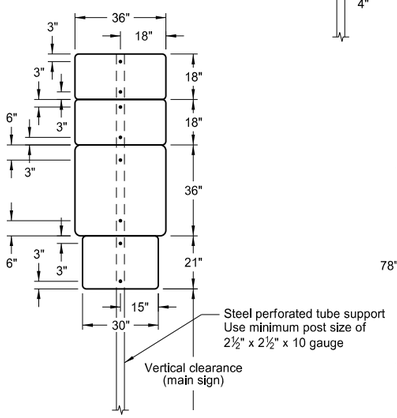
72" x 24" SIGN



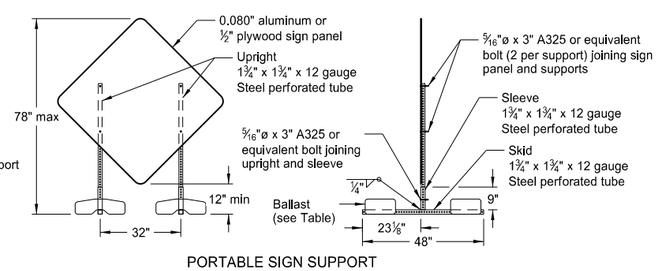
60" x 24" SIGN



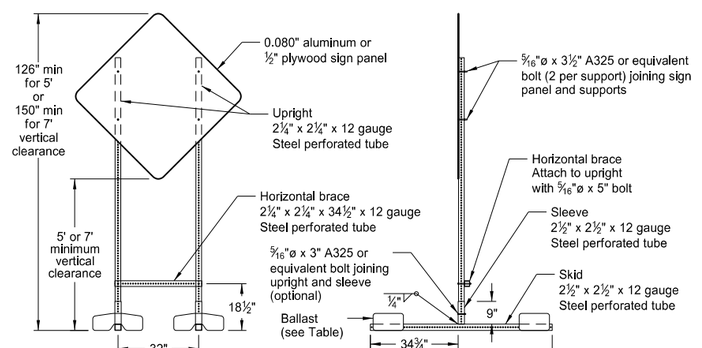
48" x 24" SIGN



36" x 36"
ROUTE MARKER
ASSEMBLY



PORTABLE SIGN SUPPORT
LOW-MOUNTING HEIGHT



PORTABLE SIGN SUPPORT
HIGH-MOUNTING HEIGHT

NOTES:

1. Sign Supports: Supports shall be galvanized or painted. 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, the minimum post size for assemblies containing a secondary sign is 3.0 lb/ft. Post sizes are based on a wind speed of 55 MPH.

   Signs over 50 square feet should be installed on 2½" x 2½" perforated tube supports as a minimum.

   Guy wires shall not be attached to sign supports. Wind beams may be attached to u-posts behind the sign panels.

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

3. Alternate Messages: The signs that have alternate messages may have these alternate messages placed on a reflectorized plate (without a border) and installed and removed as required. (i.e. "Left" and "Right" message on a 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 as stated above.

   Large signs having an area exceeding 50 square feet shall have a minimum clearance of 7'-0" from the ground at the post.

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

   When portable signs are used for 5 days or less, low-mounting height (minimum 12" vertical clearance) sign supports may be used 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. The R9-8 through R9-11a series, W1-6 through W1-8 series, M4-10, and E5-1 may be used for longer than 5 days.

   Signs mounted to the portable sign supports shown in the LOW-MOUNTING HEIGHT and HIGH-MOUNTING HEIGHT Details shall have 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

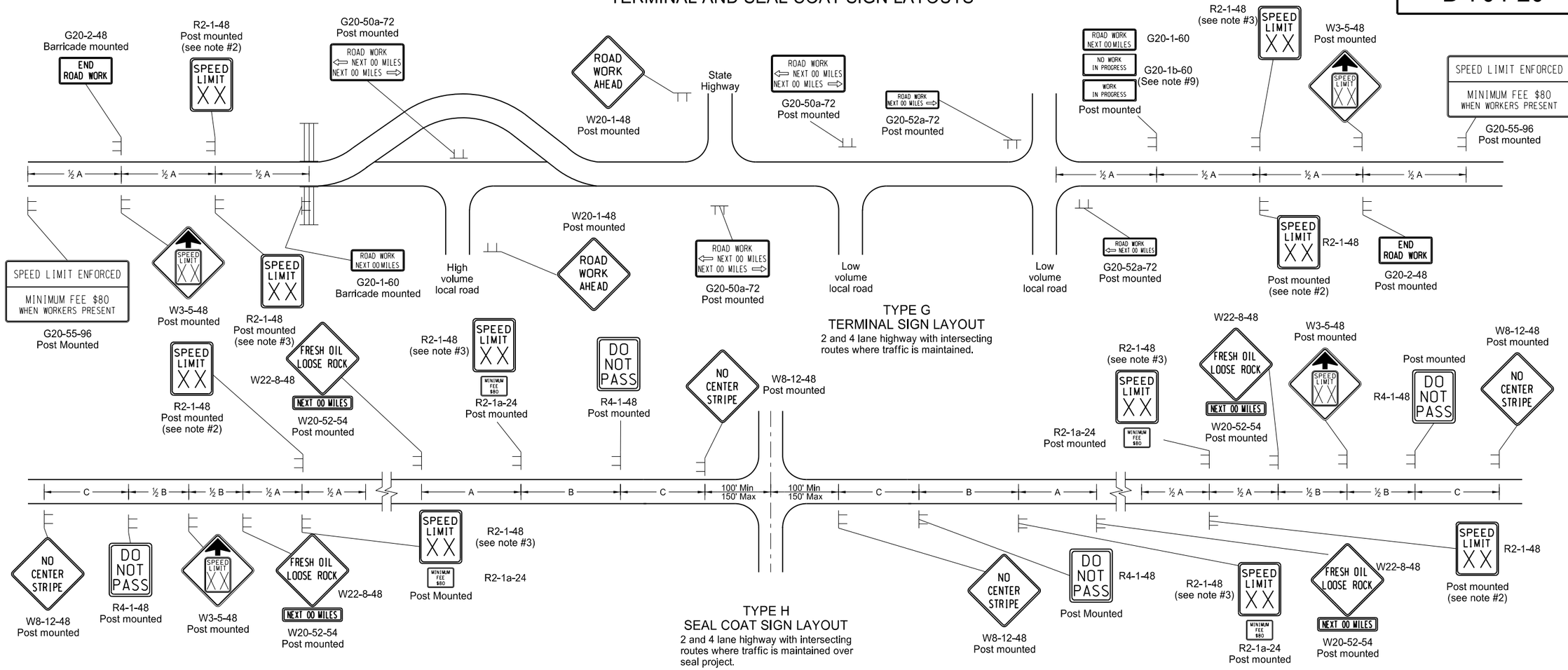
Note: The number of sandbags are based on a wind speed of 55 MPH. The sandbags are assumed to be placed at or near the ends of the skids.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-4-13	
REVISIONS	
DATE	CHANGE
11-14-13	Revised Note 6.

This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 11/14/13 and the original document is stored at the North Dakota Department of Transportation

TERMINAL AND SEAL COAT SIGN LAYOUTS

D-704-20



1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. The speed limit shall be re-established. The exact speed limit shall be determined in the field, dependent on location and conditions.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 MPH below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 MPH. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. On seal projects, signs R2-1-48, R2-1a-24, R4-1-48, W22-8-48 and W20-52-54 shall be placed just after all important intersections and at five mile intervals thereafter. Sign W8-12-48 shall be placed just after all important intersections and at 2 mile intervals thereafter until the short term center line pavement marking is in place. No short term pavement markings are placed when traffic volumes are 750 ADT or less.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. Type H construction sign traffic control shall have the speed limit signs covered or removed once the loose aggregate has been removed.
9. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
10. Other traffic control layouts will be required in the immediate work areas. If the speed limit is reduced in the work area, speed limit signs shall have the R2-1a-24 sign placed below.
11. G20-55-96 sign is not required if work is less than 15 days.

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

KEY

Type III barricade

Sign

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

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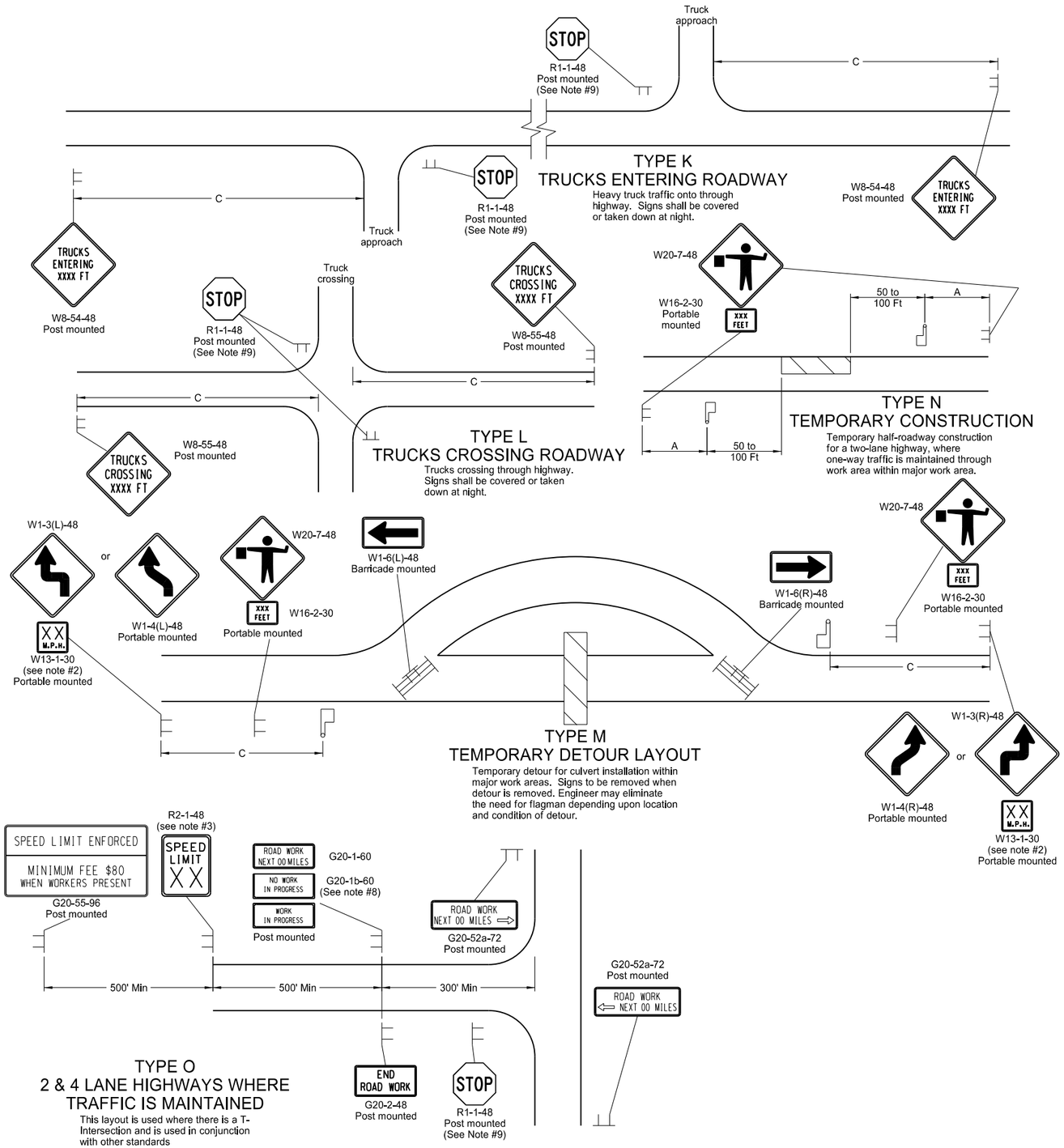
CONSTRUCTION TRUCK AND TEMPORARY DETOUR LAYOUTS

D-704-22



Notes

1. Barricades placed on roadway shall be on a moveable assembly. Signs placed on the roadway shall be placed on skid mounted assemblies.
2. Where necessary, safe speed to be determined by the Engineer.
3. The reduced speed limit shall be determined dependent on the in place speed limit before construction. The speed limit reduction should not exceed 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. In this case, the speed limit reduction shall not exceed 30 MPH. Where speed limits are to be reduced more than 30 MPH, a second speed limit sign shall be installed with the desired speed reduction but shall not exceed 30 MPH. The second speed limit sign shall be placed at ½ B.
4. When warning signs are used in urban areas and the signs are not portable, flags shall be installed. The flags shall be 24 inches square, mounted perpendicular to the edges of the diamond sign, and at such a distance above the edge so that when the flag is limp it will not touch the sign. Rural areas will not require flags.
5. Existing speed limit signs within a reduced speed zone shall be covered.
6. Obliterated or covered pavement marking shall be paid for as Obliteration of Pavement Marking. The covering shall be approved by the engineer.
7. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with the NDDOT Standard Specifications.
8. The contractor shall install the G20-1b-60 sign when work is suspended for winter.
9. If existing stop sign is in place, a 48" stop sign is not required.
10. G20-55-96 sign is not required if this standard is part of other traffic control layouts with this sign or the work is less than 15 days.

KEY

Type III barricade — Work area

Sign — Flagger

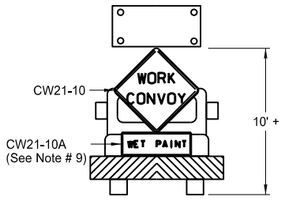
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min. (ft)		
	A	B	C
Urban - Low Speed (30 mph or less)	150	150	150
Urban - Low Speed (over 30 to 40mph)	280	280	280
Urban - High Speed (over 40 mph to 50 mph)	360	360	360
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway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

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE

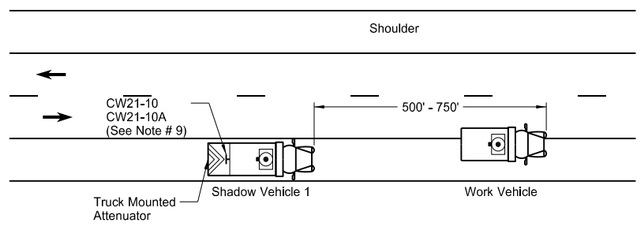
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 09/27/13 and the original document is stored at the North Dakota Department of Transportation

TRAFFIC CONTROL PLAN FOR MOVING OPERATIONS

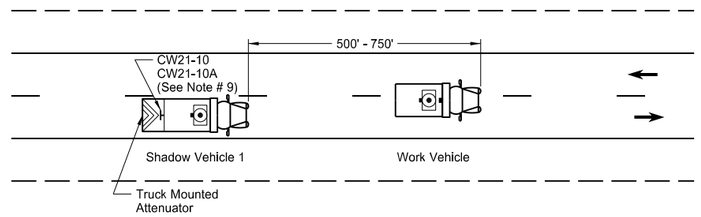
D-704-27



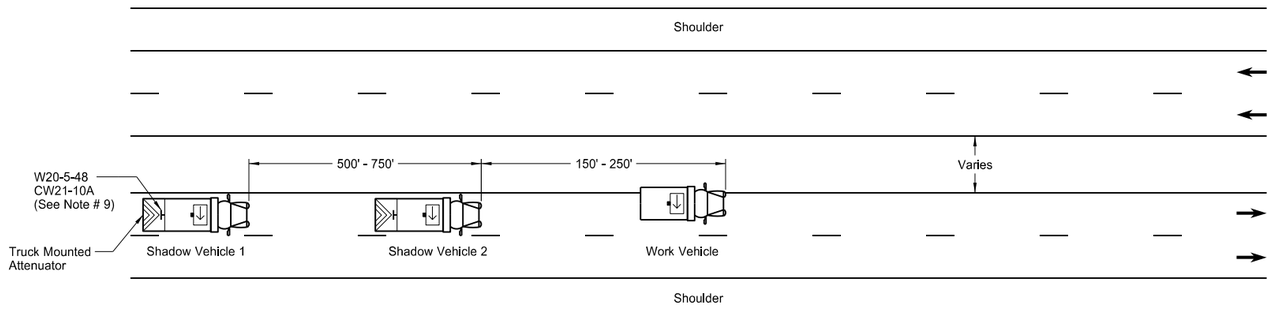
Typical Shadow Vehicle 1
Two-Way Roaday



Two-Way Roadway with Paved Shoulders

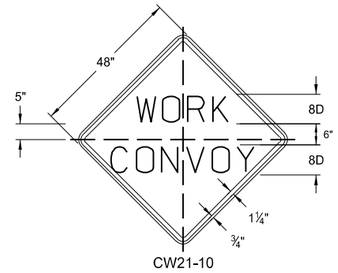


Two-Way Roadway without Paved Shoulders

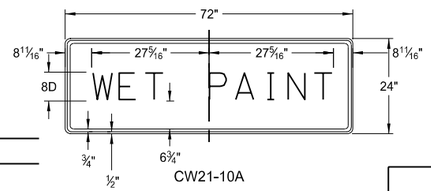


Undivided Multi-Lane Roadway

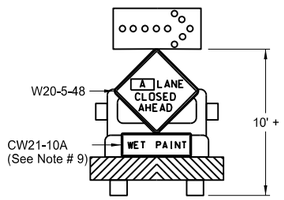
Sign Details



CW21-10

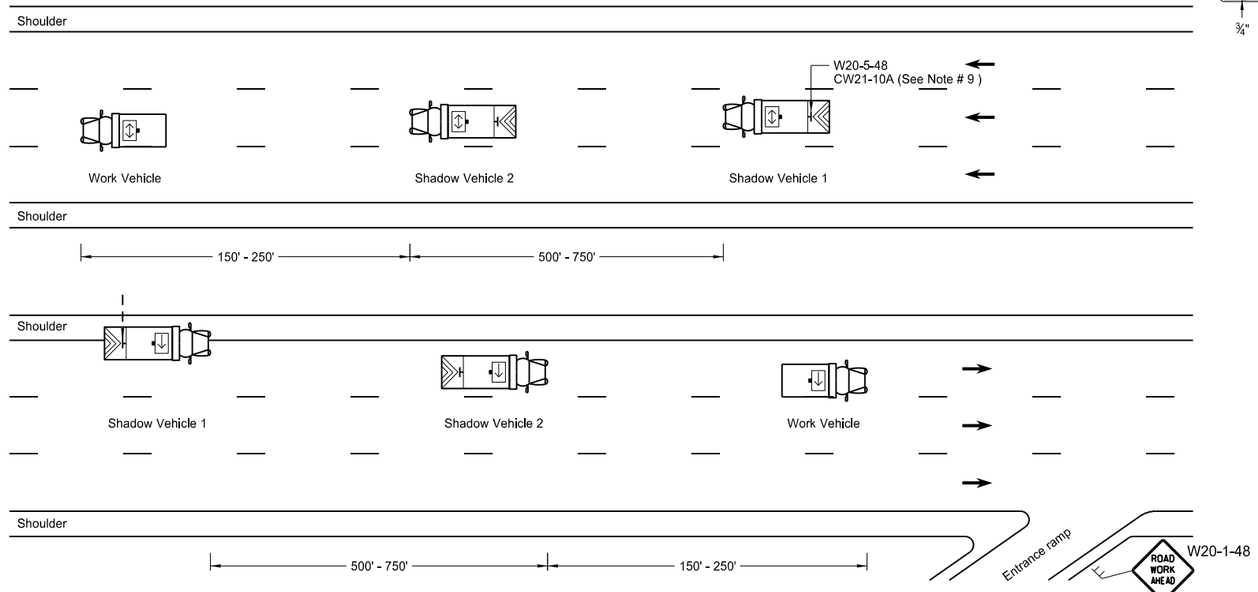


CW21-10A



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

Notes

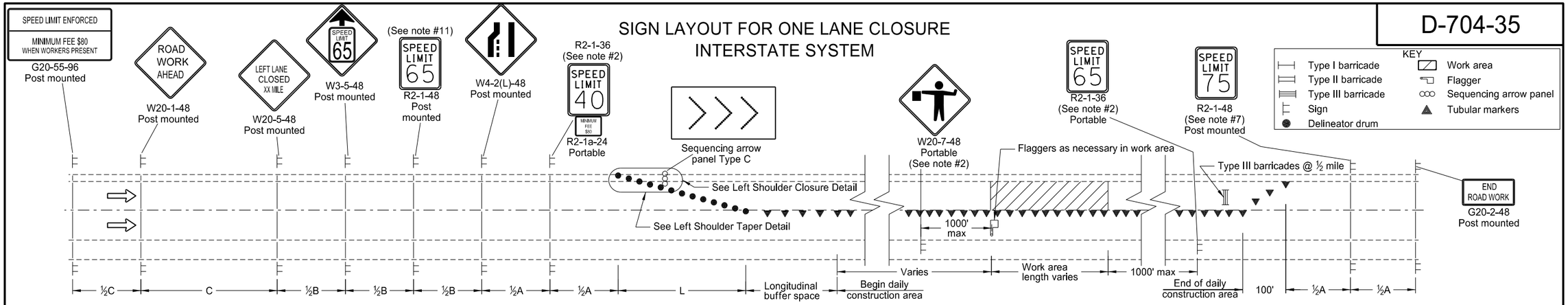
1. If the contractor chooses to place more vehicles in the convoy than are shown, these vehicles shall have the truck mounted attenuator and shall be at the contractor's expense.
2. Shadow and work vehicles shall display yellow rotating beacons or strobe lights unless otherwise stated elsewhere in the plans.
3. Flashing arrow panels shall be Type B or Type C. The panel operation shall be controlled from inside the vehicle.
4. Each vehicle shall have two-way electronic communication capability.
5. When work convoys must change lanes, shadow vehicle 1 should change lanes first to shadow other convoy vehicles.
6. Vehicle spacing between the shadow vehicle 1 and shadow vehicle 2 will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the trail vehicle in time to slow down and/or change lanes as they approach the shadow vehicle.
7. Sign Colors
   Letters = Black
   Border = Black
   Background = Orange
8. Shadow vehicle 2 may be used as the paint tender vehicle.
9. Sign CW21-10A shall only be used during a painting operation.
10. On two lane - two way roadways, the work and shadow vehicles should pull over periodically to allow motor vehicle traffic to pass.

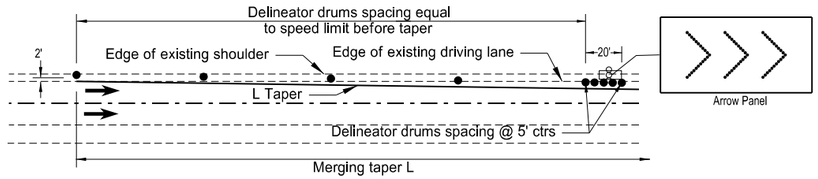
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-27-13	
REVISIONS	
DATE	CHANGE
6-18-14	Removed shadow vehicle 2 on two lane roadways

This document was originally issued and sealed by Roger Weigel Registration Number PE- 2930, on 06/18/14 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 SHOULDER TAPER DETAIL

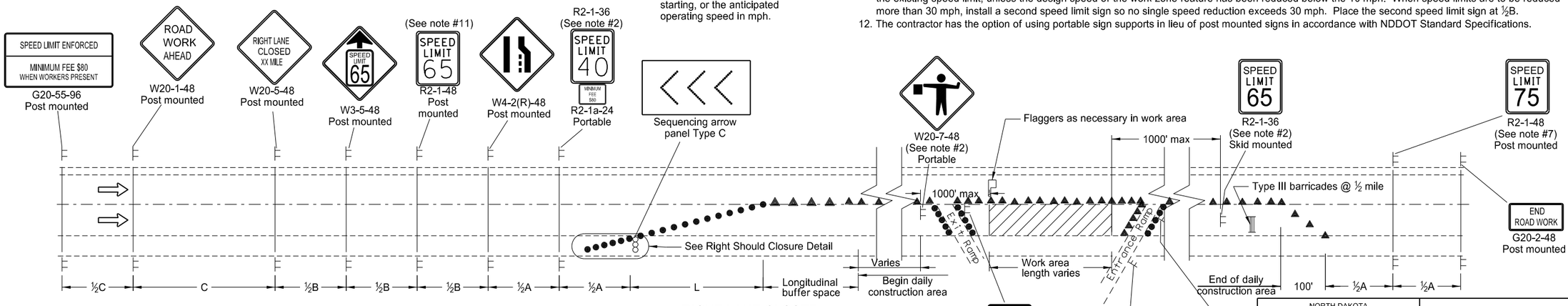
ADVANCE WARNING SIGN SPACING			
Road Type	Distance Between Signs Min (ft)		
	A	B	C
Rural - High Speed (over 50 mph to 65 mph)	720	720	720
Urban Expressway and Freeway (55 mph to 60 mph)	850	1350	2200
Rural Expressway and Freeway (70 mph to 75 mph)	1000	1500	2640
Interstate/4-Lane Divided (Maintenance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

LEFT LANE CLOSED WORKERS IN WORK AREA

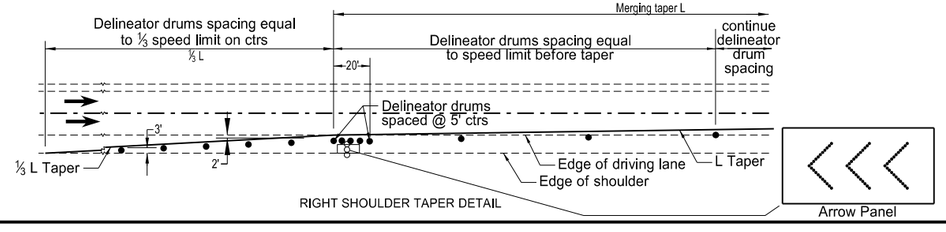
Longitudinal Buffer Space	
Speed (mph)*	Length Min (feet)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

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

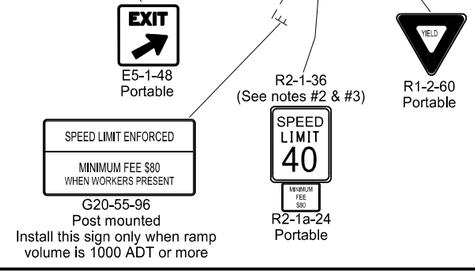
Notes:
1. Install advance signs for flagging when flaggers are flagging.
2. Move the advanced flagger sign and the speed limit signs as the work area moves through the construction zone. When the work area is not visible from the flagger, move the flagger station so the work area is visible. Space the 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 whenthe 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 when warning signs are used in urban areas and the 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. Rural areas will not require flags.
11. Determine the reduced speed limit dependent on the in place speed limit before construction. Do not exceed a speed limit reduction of 10 mph below the existing speed limit, unless the design speed of the work zone feature has been reduced below the 10 mph. When speed limits are to be reduced more than 30 mph, install a second speed limit sign so no single speed reduction exceeds 30 mph. Place the second speed limit sign at ½B.
12. The contractor has the option of using portable sign supports in lieu of post mounted signs in accordance with NDDOT Standard Specifications.



RIGHT LANE CLOSED WORKERS IN WORK AREA



RIGHT SHOULDER TAPER DETAIL



NORTH DAKOTA DEPARTMENT OF TRANSPORTATION

9-7-2012

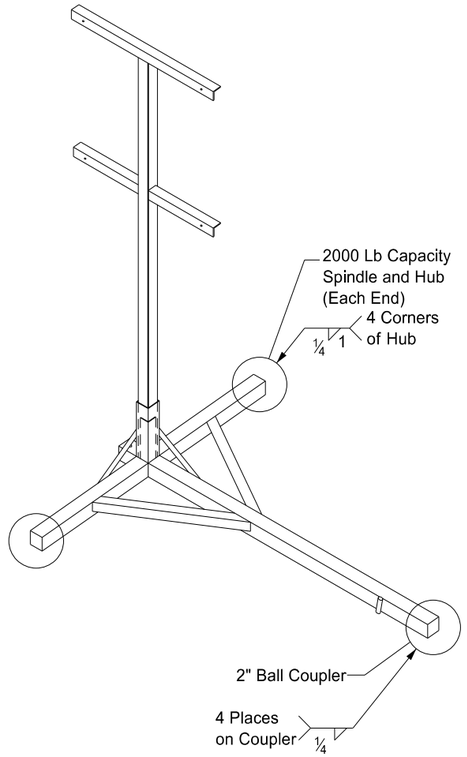
REVISIONS

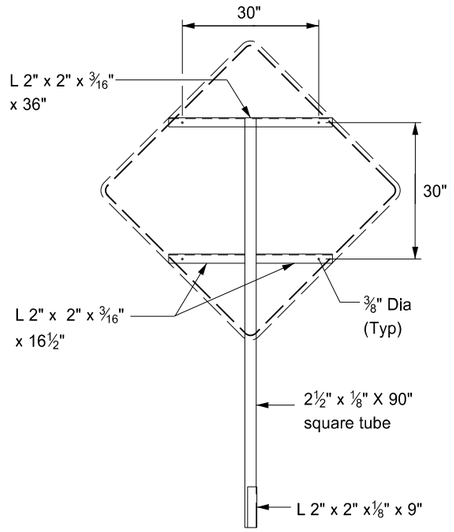
DATE	CHANGE
6/23/2014	Revised Note 12
3/15/2016	Removed Do Not Pass signs and updated notes

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930, on 3/15/16 and the original document is stored at the North Dakota Department of Transportation

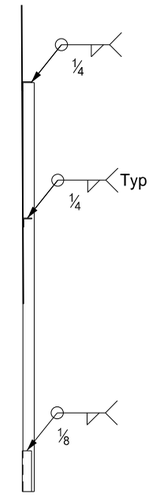
PORTABLE SIGN SUPPORT ASSEMBLY

D-704-50



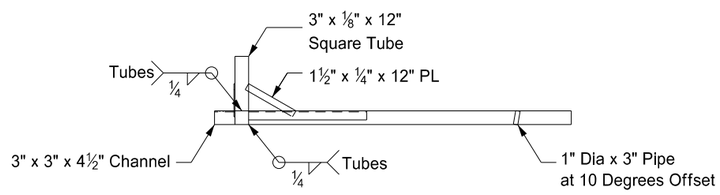


FRONT



RIGHT

SIGN SUPPORT



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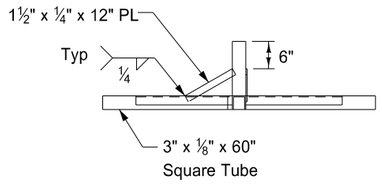

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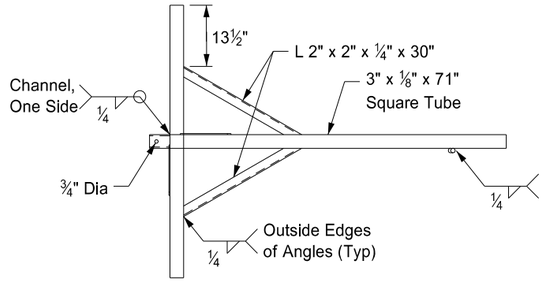


TOP

TRAILER

Notes:

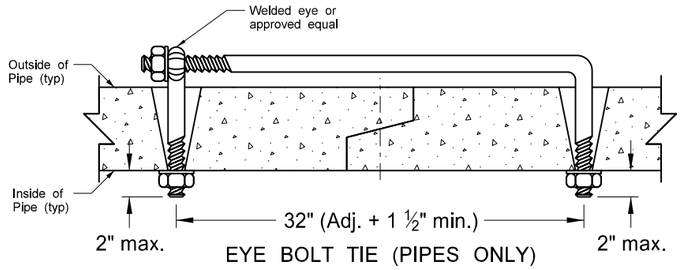
1. The maximum weight of the assembly is 250 pounds.
2. Use a 14" wheel and tire.
3. Automotive and equipment axle assemblies may not be used for trailer-mounted sign supports.
4. Other NCHRP 350 crash tested assemblies are acceptable.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
11-23-10	
REVISIONS	
DATE	CHANGE

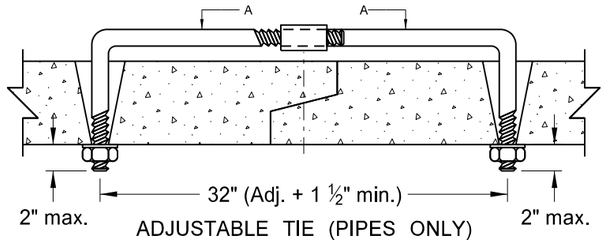
This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 11/23/10 and the original document is stored at the North Dakota Department of Transportation

CONCRETE PIPE OR PRECAST CONCRETE BOX CULVERT TIES

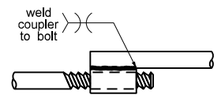
D-714-22



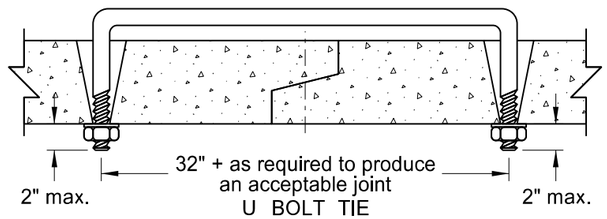
EYE BOLT TIE (PIPES ONLY)



ADJUSTABLE TIE (PIPES ONLY)



SECTION A-A



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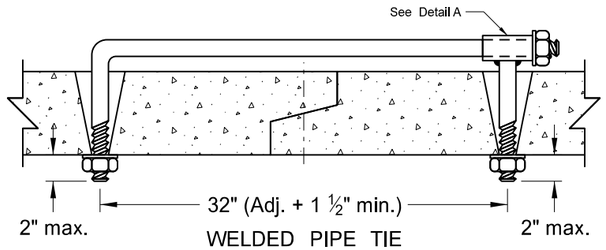
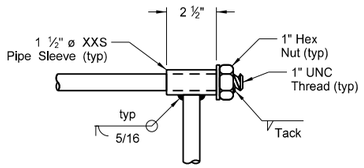
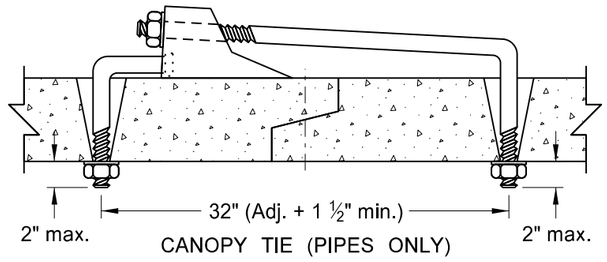


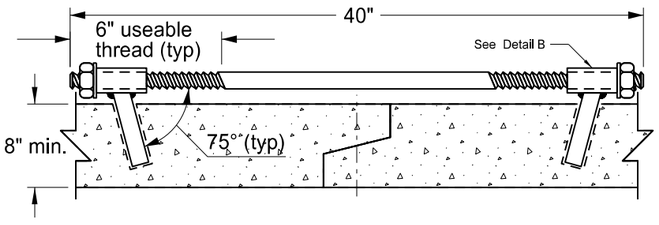
WELDED PIPE TIE



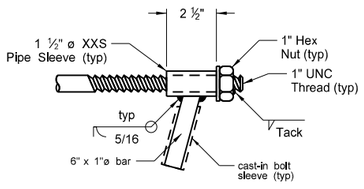
DETAIL A



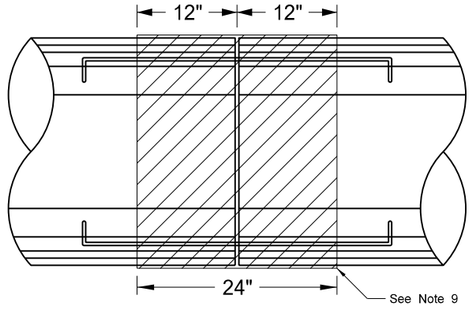
CANOPY TIE (PIPES ONLY)



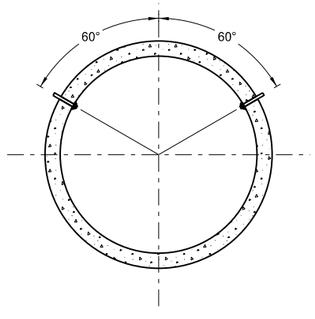
HIDDEN TIE (RCB ONLY)

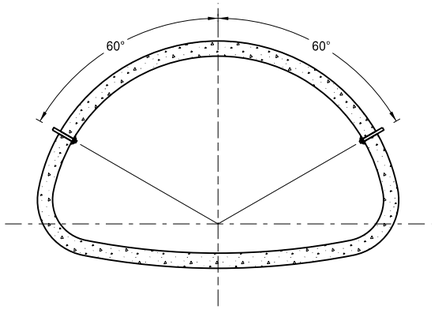


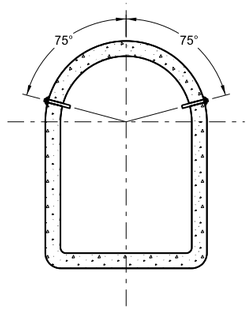
DETAIL B



PLAN VIEW







END VIEW

REQUIRED SIZE OF TIE BOLTS		
Pipe Size	Thread ø	XXS Pipe Sleeve Inner ø
18" - 24"	⅝" See note 2	¾"
30" - 66"	¾"	1"
72" - 78"	1"	1 ¼"
RCB		

NOTES:

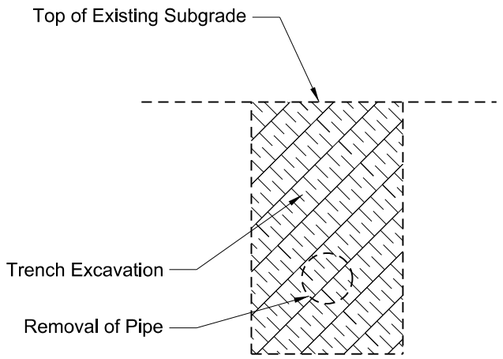
1. The pipe size listed is the inside diameter of round pipe or the equivalent diameter of pipe arch.
2. Nuts and washers are not required on Jacked and Bored pipes or pipes with a 24" diameter or less. Where nuts and washers are not used, the tie bars shall be inserted and grouted into place.
3. Ties are only for holding pipe or RCB sections together, not for pulling sections tight.
4. Tie bolt assembly shall be hot dip galvanized in accordance with AASHTO M232.
5. Holes in pipes to accommodate tie bolts can be precast or drilled. Tapered holes are permitted when precast. Holes shall have a diameter ¼" larger than the diameter of the thread. Holes in precast RCB's shall contain cast-in bolt sleeves with an inside diameter of 1 ¼".
6. The contractor has the option of selecting the type of tie bolt used from those shown.
7. The cost of precasting or drilling the required holes and furnishing and installing the tie bolts shall be included in the price bid for the appropriate conduit or RCB pay item.
8. All centerline and approach RCP culvert joints shall be tied. Storm drain systems shall have the first three joints including the end section of all free ends tied. Free ends are defined as any storm drain end which does not terminate at an inlet or manhole. Outfall culverts with end sections which drain adjacent ditches are examples of free ends.
9. When joint wrap is specified in the plans, place wrap beneath ties. Overlap the joint by 12" in both directions.
10. Tie bolts shall conform to ASTM A 36. Nuts shall be be heavy hex and conform to ASTM A 563. Washers shall conform to ASTM F 436, Type 1. Welded pipe sleeves and cast-in bolt sleeves shall conform to ASTM A 53, Grade B.
11. Cattle Pass and Jacked and Bored pipes shall have pipe ties inserted from the inside of the pipes and grouted into place. Jacked and bored pipes with a diameter of 24" or less do not require pipe ties.
12. RCB tie locations shall be as shown on the plans.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
3-18-14	
REVISIONS	
DATE	CHANGE
7-21-15	Note 8

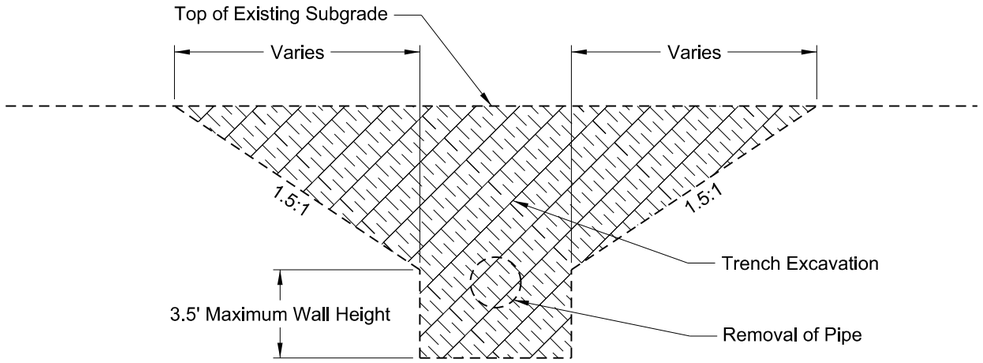
This document was originally issued and sealed by Terrence R. Udland, Registration Number PE-2674, on 07/21/15 and the original document is stored at the North Dakota Department of Transportation

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

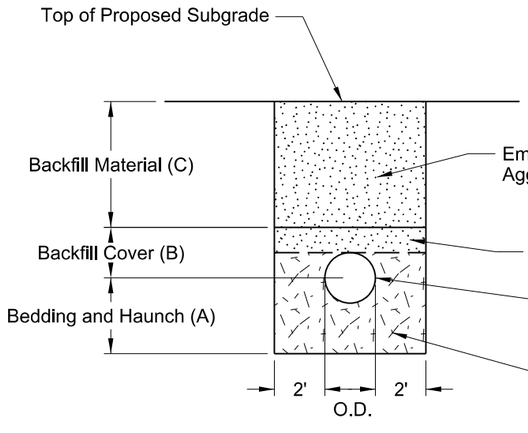
D-714-27



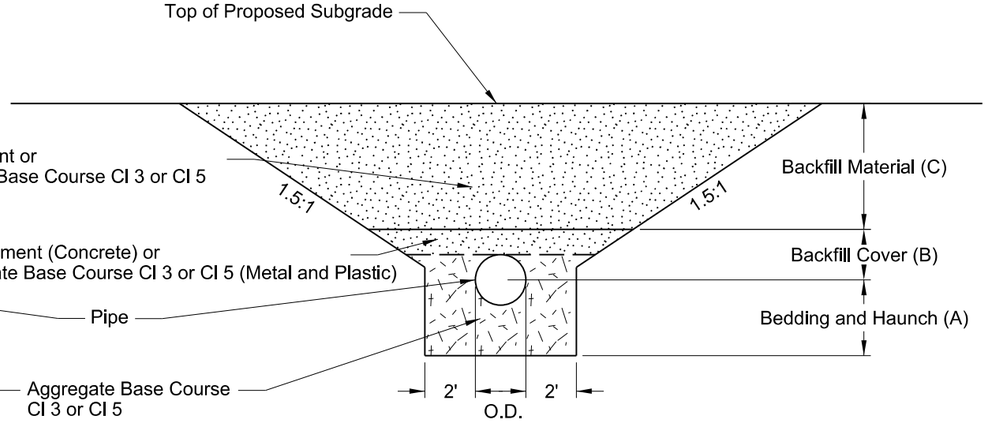
EXCAVATION DETAIL A



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

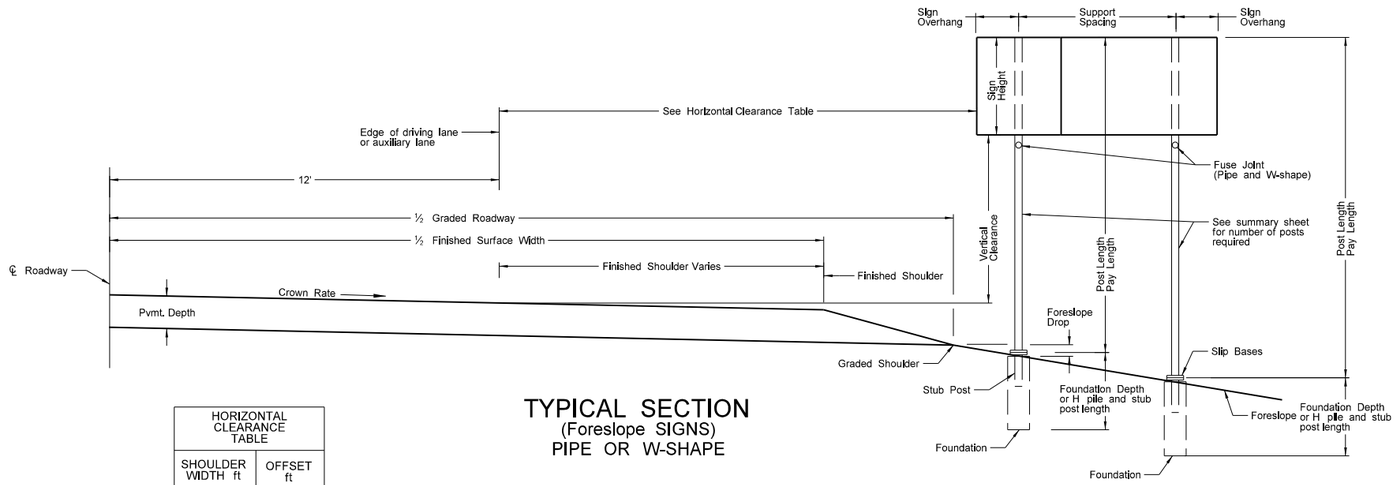
Bedding and Haunch (A)
Pipes Not Under Roadway = 0.5 O.D. + 4 Inches
Pipes Under the Roadway = 0.5 O.D. + 2 Feet
Backfill Cover (B)
Concrete Pipe = 0.5 O.D.
Metal and Plastic = 0.5 O.D. + 1 Foot
Backfill Material (C)
Top of Pipe 4 Feet or Less Below the Top of Proposed Subgrade = Aggregate Base Course 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 1-21-15 12-10-15	Label Formatting Nomenclature Added Plastic Pipe

This document was originally issued and sealed by Ron Horner, Registration Number PE- 2087, on 12/10/2015 and the original document is stored at the North Dakota Department of Transportation

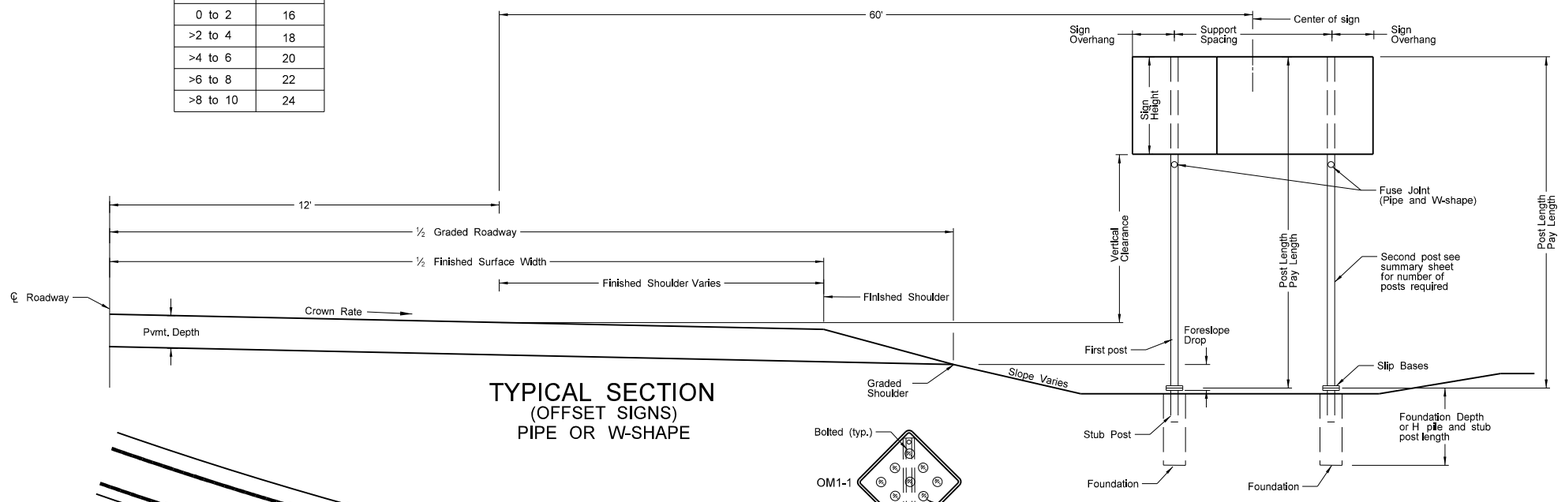
PIPE OR W-SHAPE ASSEMBLY DETAILS

D-754-1

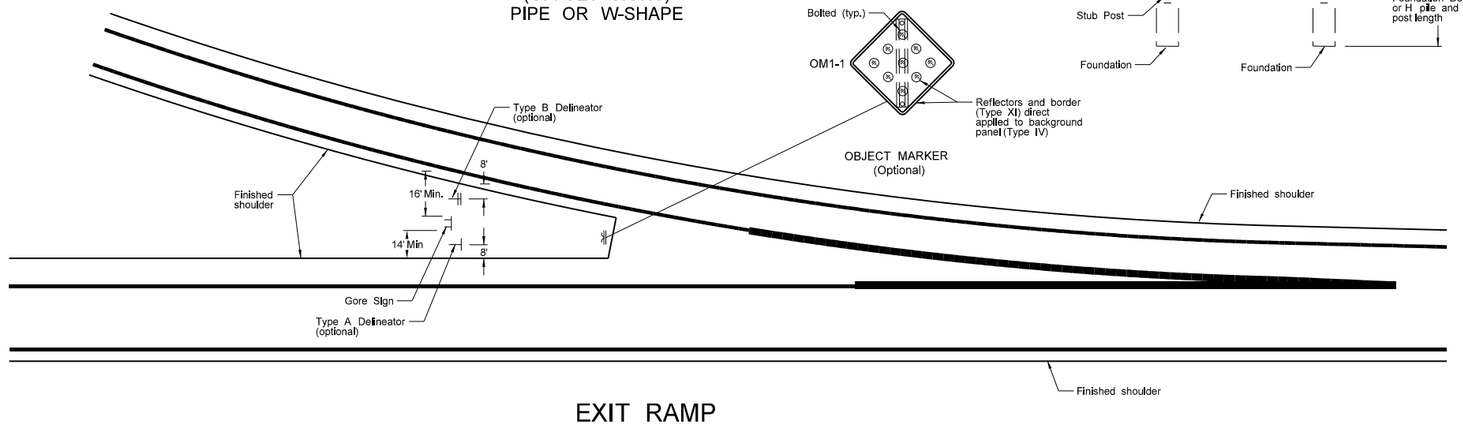


TYPICAL SECTION
(Foreslope SIGNS)
PIPE OR W-SHAPE

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



OBJECT MARKER
(Optional)

EXIT RAMP
GORE SIGN PLACEMENT

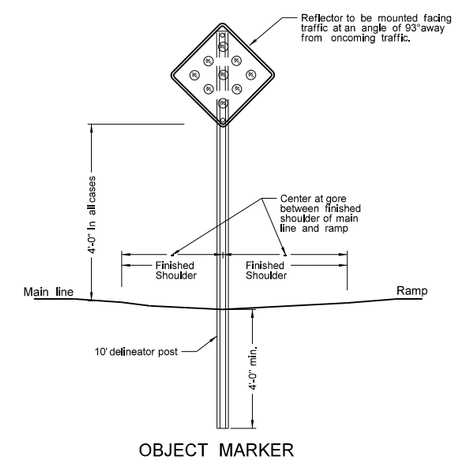
NOTES:

MINIMUM VERTICAL CLEARANCE:
Signs installed at the side of the road in rural districts shall be at least 5 feet measured from the bottom of the sign to the edge of driving lane, or Auxiliary Lane. Where parking or pedestrian movements occur, the clearance to the bottom of the sign shall be at least 7 feet.

Signs on freeways, expressways, and multi-lane conventional roadways shall be installed with a minimum height of 7 feet.

Where signs are placed at least 30 feet or more from the edge of the traveled way, the height to the bottom of such sign shall be 5 feet above the edge of driving lane.

Signs may be placed a maximum of 6" above the vertical clearance specified above.

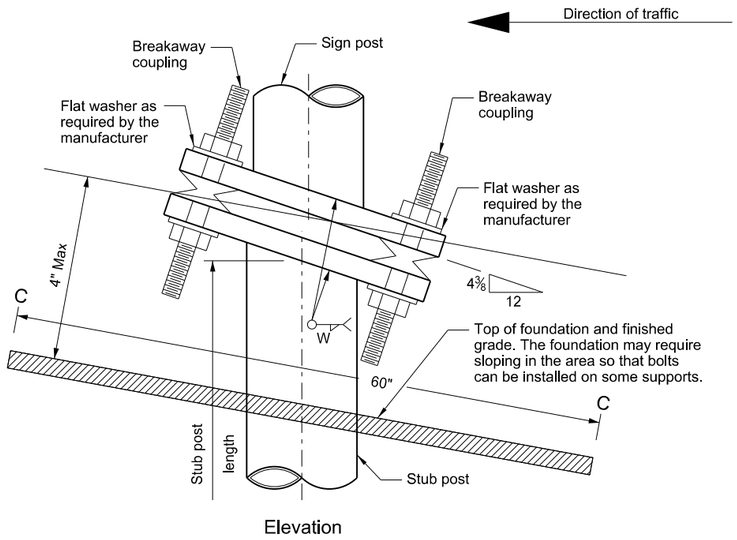


OBJECT MARKER
INSTALLATION
(Posts shall conform to section 894.04 A of Standard Specifications.)

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.

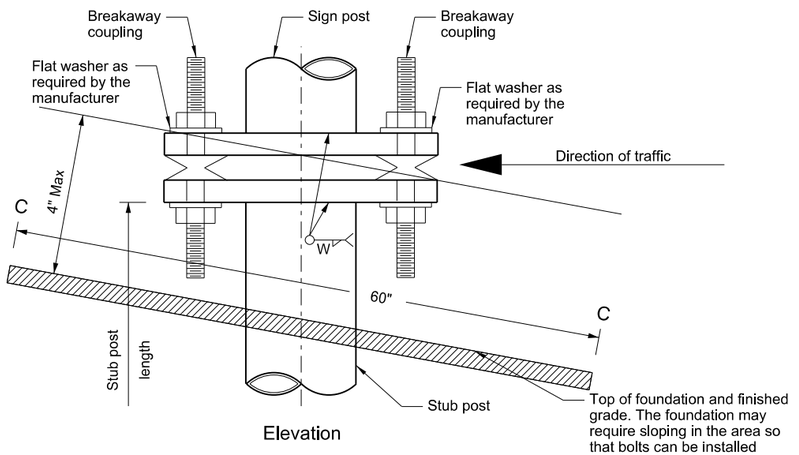
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation

Breakaway Coupler System for Standard Pipe Stub Post



Elevation

Single Post Sign and Stub Post
Type A

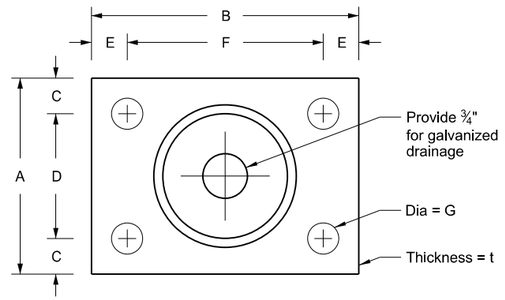


Elevation

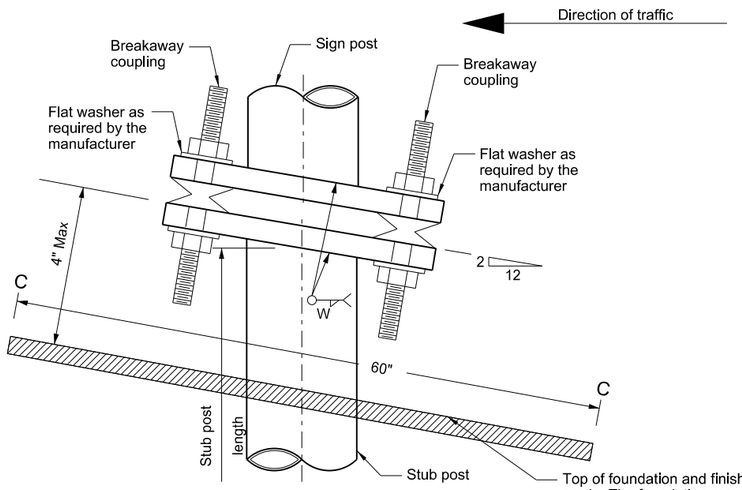
Two or More Post Sign and Stub Post
For two post signs with 8' or more post spacing and all three or more post signs
Type C

Notes:

1. In lieu of the breakaway base system on standards D-754-3 and D-754-4 the breakaway coupler system may be used. The breakaway coupler system shall be 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. Fuse Joint Cuts - Steel posts may be cut after galvanizing and cut surface treated in accordance with ASTM A780 or the cut may be galvanized after fabrication. Aluminum posts will need no treatment.
3. Shim as required to plumb post.
4. Tighten all bolts the maximum possible with 12" to 15" wrench.

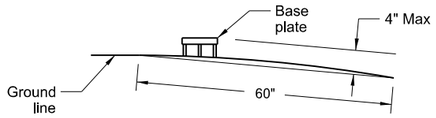


Plan Base Plate



Elevation

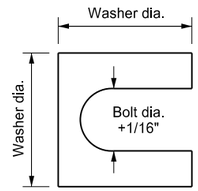
Two Post Sign and Stub Post
For signs with less than 8' post spacing
Type B



Section C - C

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

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



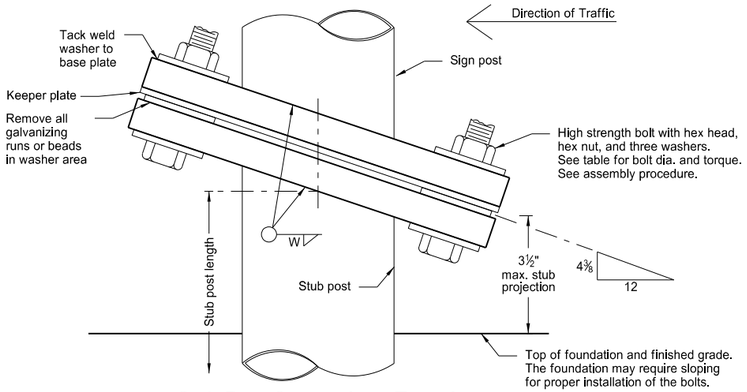
Shim Detail

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

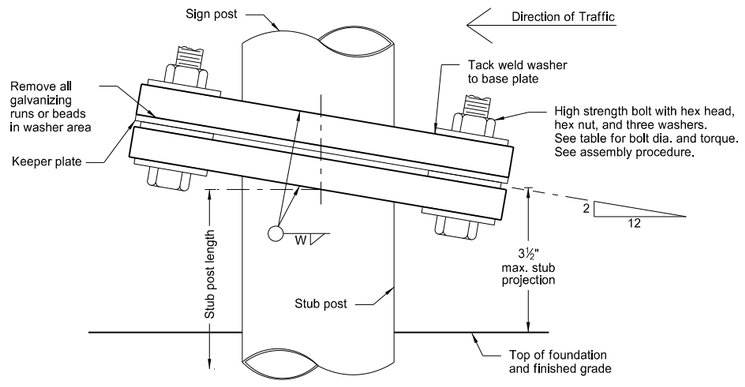
NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
10-3-2013	
REVISIONS	
DATE	CHANGE

This document was originally issued and sealed by Roger Weigel Registration Number PE-2930, on 10/3/13 and the original document is stored at the North Dakota Department of Transportation

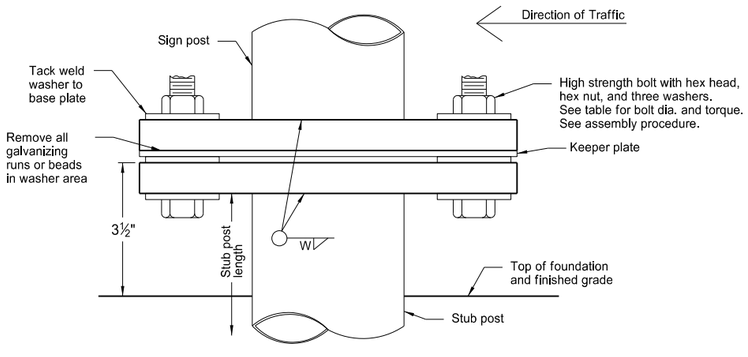
Breakaway System for Standard Pipe Stub Post



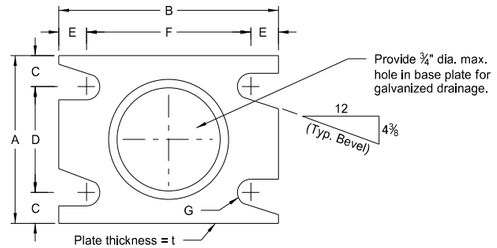
Stub Post Connection - Type A
Elevation View
(Single Post)



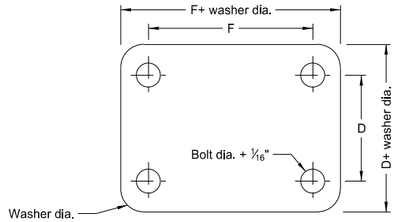
Stub Post Connection - Type B
Elevation View
(Two Posts)



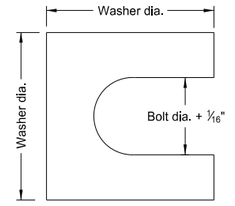
Stub Post Connection - Type C
Elevation View
(Two Posts)



Base Plate Plan View
The bevel shall be toward the roadway on the approach side and away on the other.



Keeper Plate Detail
Keeper plate shall be placed above the center washer between the top and bottom slip bases. Keeper plate shall be fabricated from 28 gauge material, galvanized after fabrication conforming to ASTM A653 G60 coating.



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.

Notes:
When the base plate is fabricated in aluminum, the aluminum base plate washers shown shall be tack welded to the base as shown.

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

Assembly Procedure:
1. Assemble post to stub with bolts and with 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 and 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. The liquid locking resin shall conform to ASTM D5363-03 (2008). The thread locker shall secure the entire assembly from vibration, pressure and corrosion. The thread locker shall fill the gaps between the thread and the mating surface to form solid, one part assemblies.
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.

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 5047, on 2/28/14 and the original document is stored at the North Dakota Department of Transportation

FOUNDATION DATA FOR STEEL SUPPORTS

D-754-5

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

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

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

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

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

NOTES:

1. All reinforcing steel shall be Grade 60 steel.

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

10-3-13

REVISIONS

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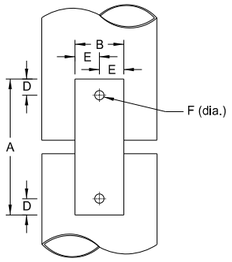
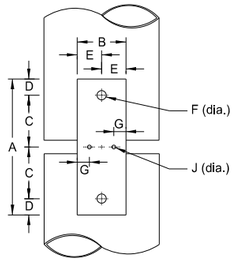
Hinge Plate, Fuse Plate and Foundation Details for Standard Pipe

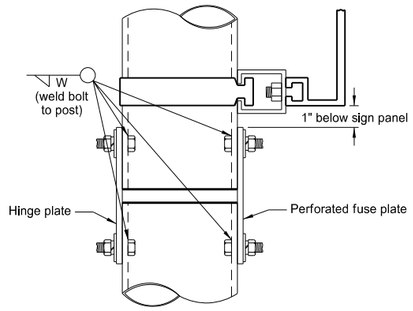
D-754-6



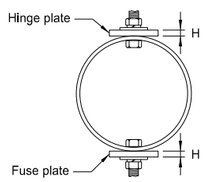
Hinge Plate



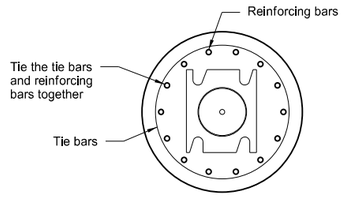
Perforated Fuse Plate



Side View



Top View



Top View

See standard drawing D-754-5 for size, number and length of rebar. If using Type D only 3 bolt base plate is required.

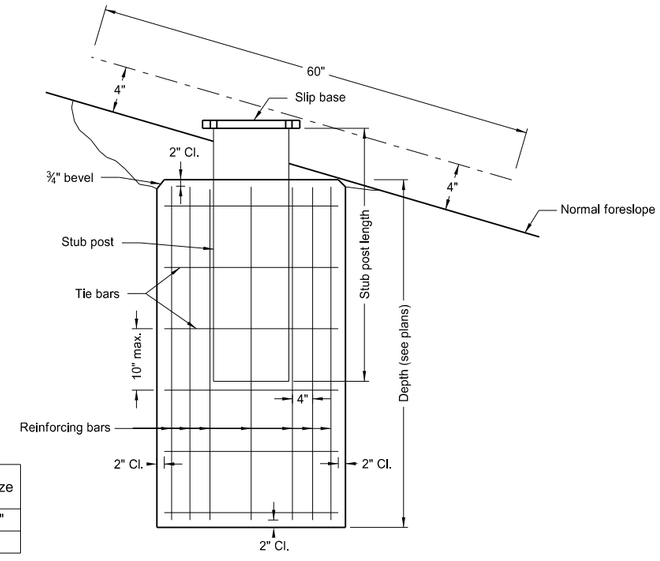
Notes:
Fuse joints cuts for steel posts may be cut after galvanizing and cut surface shall be treated with an approved method meeting ASTM A780 or the cut may be galvanized after fabrication. Aluminum posts will not require treatment.

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

The vertical clearance of the break-away base, 4" height and 60" clearance, shall be made above and below post location, and also back and ahead of post.

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.



Foundation
Front View

Foundation detail for breakaway base with stub post connection.

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

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"

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2-28-14	
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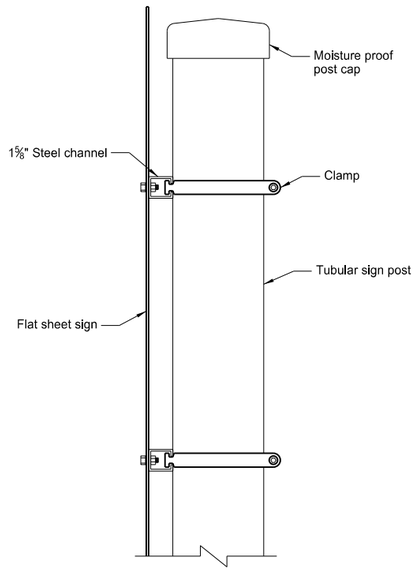
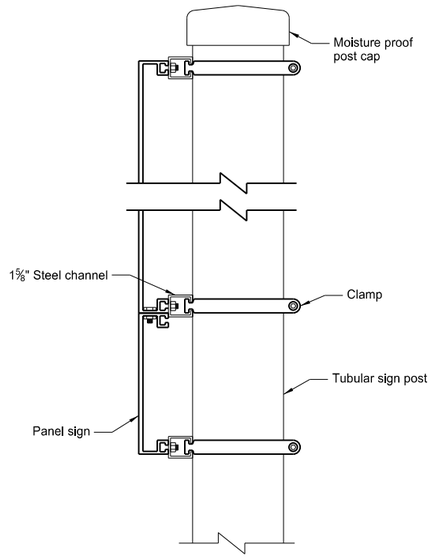
PIPE SUPPORT AND SIGN MOUNTING DETAILS

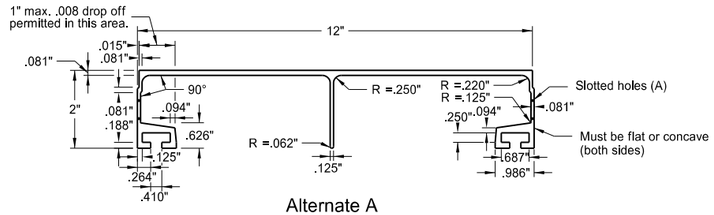
D-754-7



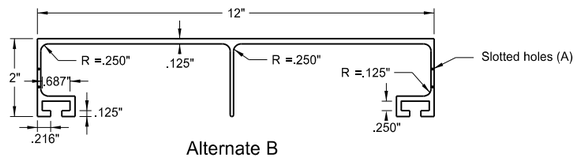
Side View



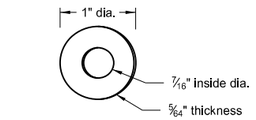
Side View



Alternate A
12" Extruded Panel



Alternate B
12" Extruded Panel



Flat Washer Detail

Slotted Hole Detail

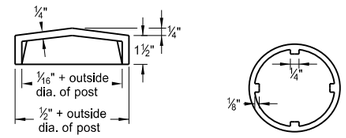
6" Extruded Panel

Aluminum Panel Details

(A) Slotted holes shall be punched in the aluminum panels at 1'-0" on center, spacing 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.

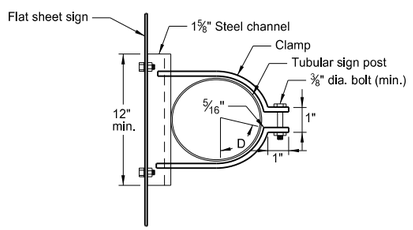
Wall thickness = .078" unless specified otherwise.
All inside and outside corners = .031" radius unless specified otherwise.



Side View Top View

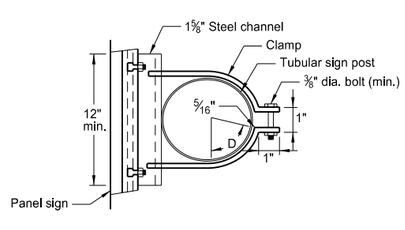
Post Cap Detail

Post caps shall be furnished for all steel or aluminum posts.
In place of post cap, a ⅛" plate welded all around may be used.



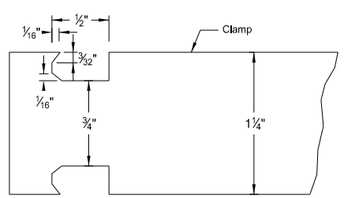
Top View

Flat Sheet Sign Clamp Mounting Details

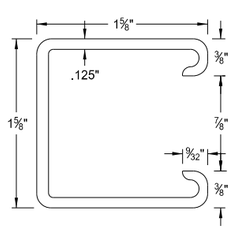


Top View

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	
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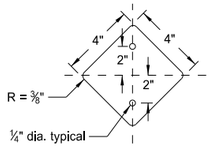
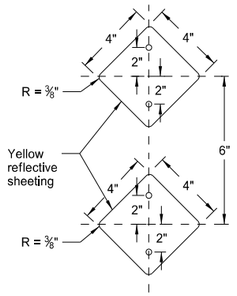
REFLECTORIZED DELINEATORS

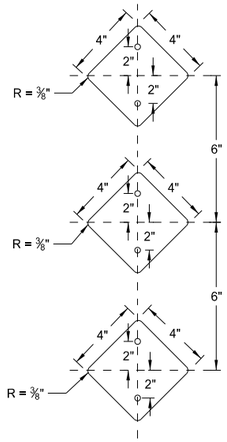
D-754-21



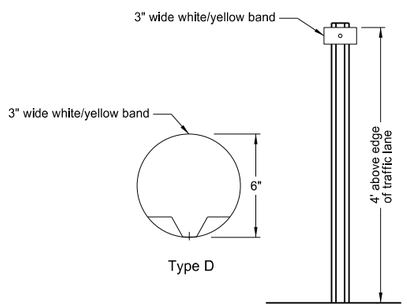
Main line
One reflector
(Type A delineator)



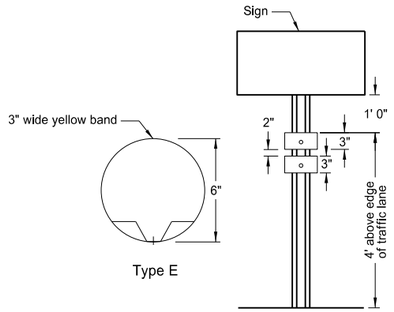
Ramps
Two reflectors
(Type B delineator)



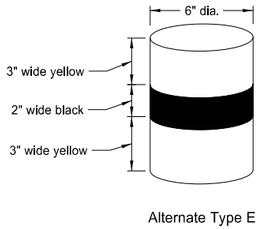
Narrow Bridges
Three reflectors
(Type C delineator)



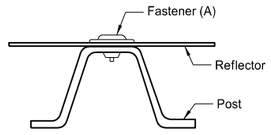
Median
One reflector
(Type D delineator)



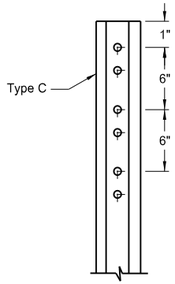
Median
One or Two reflectors
(Type E delineator)

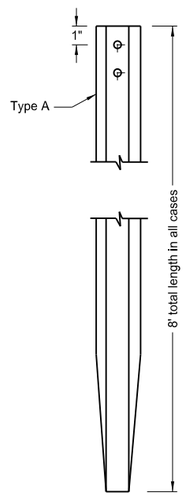


Alternate Type E

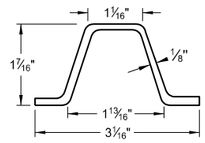


Delineator Attachment Detail

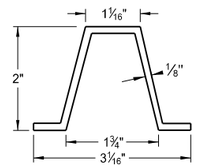




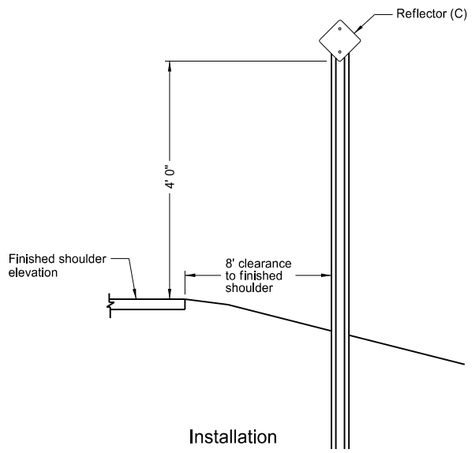
U-type Post



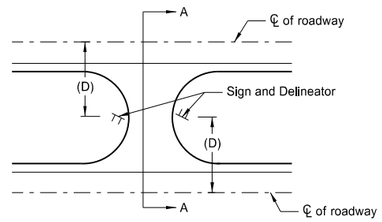
Steel Post Detail
Approx. 2.0 lbs/ft

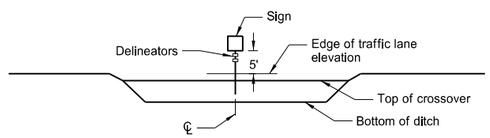


Aluminum Post Detail
Approx. 0.88 lbs/ft



Installation





Section A - A

Median Crossovers
Signing and Delineation system

Delineator Details

Type A, B, and C

Installation: Posts are to be installed along the right shoulder line unless shown otherwise on the plans.

Reflectors: Reflector shall be the same color as the adjacent pavement marking.

Spacing: Delineator spacing along main line tangents and curves with radius greater than 11500' (less than 0° 30') shall be at 528' centers. Curves with a radius less than 11500' but greater than 1200' the spacing shall be at 264' centers. With curves less than 1200' use spacing (S) = 3*√R-50

Type E

Alternate: One unit band consisting of two yellow stripes separated by a 2" black stripe may be used in place of two 3" yellow bands.

(A) The fastener shall be ⅜" dia. with flat washer having a min. outside dia. of 13/16". Fasteners shall be tension pin type or other non-rust vandal resistant fastener.

(B) The contractor may 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.

(C) Reflector to be mounted facing traffic at an angle of 93° away from oncoming traffic.

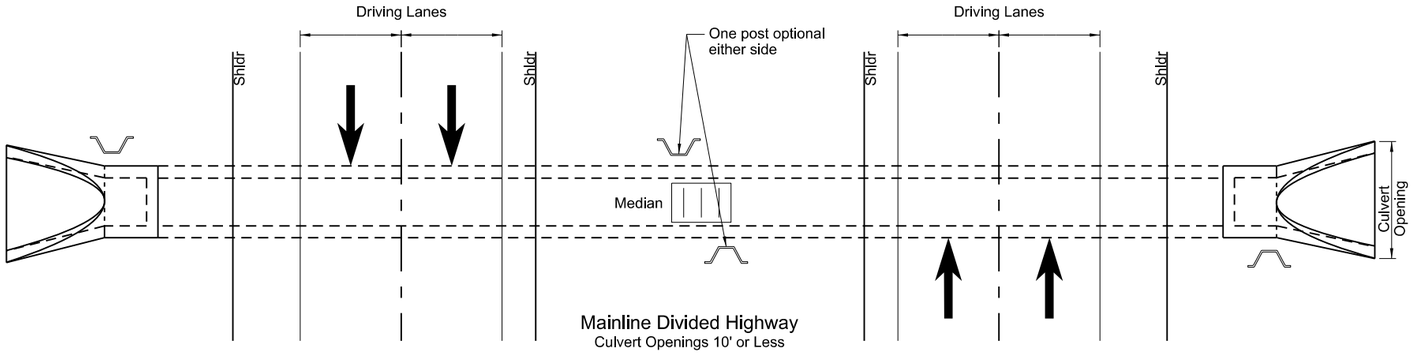
(D) The median width may vary. The sign and delineator assembly shall be placed in the median crossover an equal distance from each roadway.

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
9-25-12	
REVISIONS	
DATE	CHANGE
7-18-14	Revised reflective sheeting

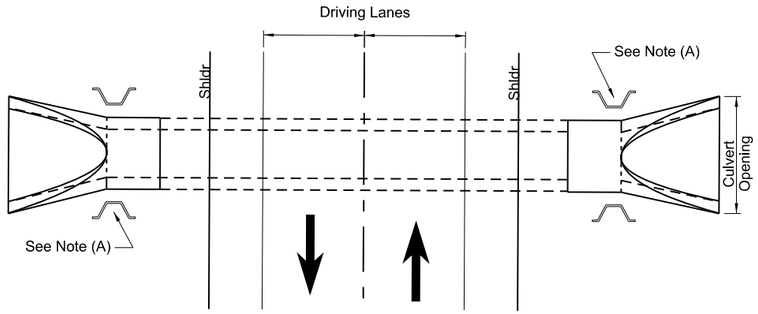
This document was originally issued and sealed by Roger Weigel, Registration Number PE-2930, on 7/18/14 and the original document is stored at the North Dakota Department of Transportation

OBJECT MARKERS - CULVERTS

D-754-83

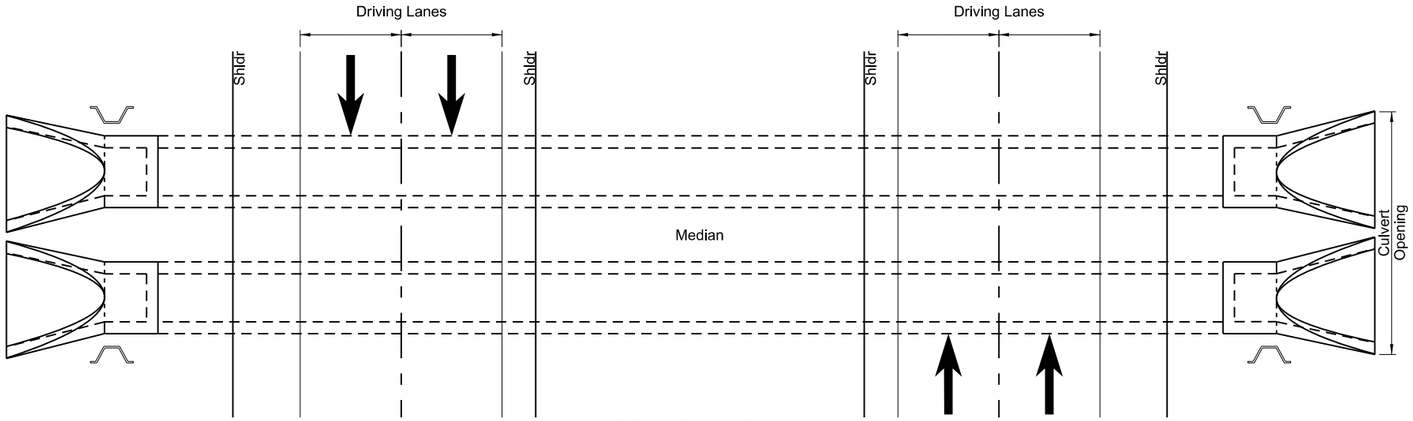


Mainline Divided Highway
Culvert Openings 10' or Less

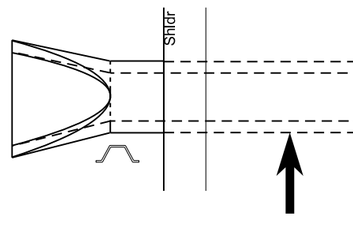


Two-Lane Highway

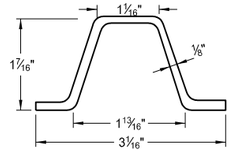
(A) Additional marker shall be installed where multiple pipe installations have a width of greater than 10'.



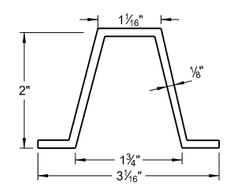
Mainline Divided Highway
Culvert Openings Greater than 10'
Multiple Installations



Ramp



Steel Post Detail
Approx. 2.0 lbs/ft



Aluminum Post Detail
Approx. 0.88 lbs/ft

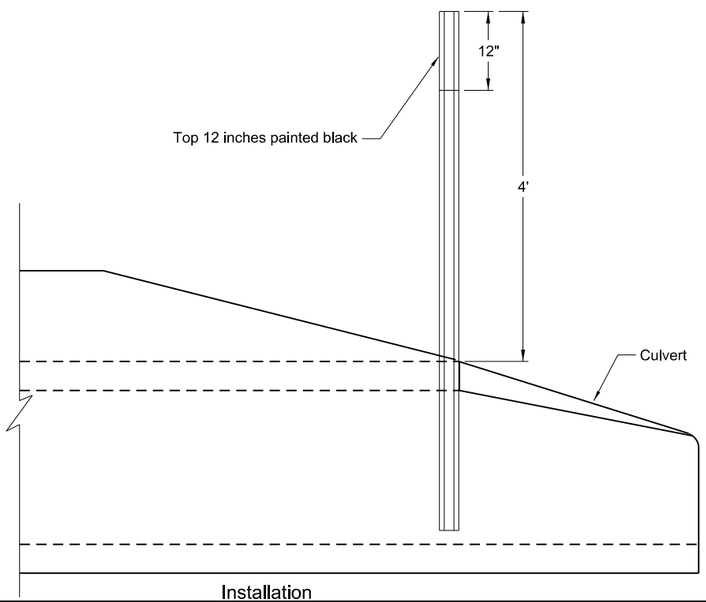
Post Location

Notes:

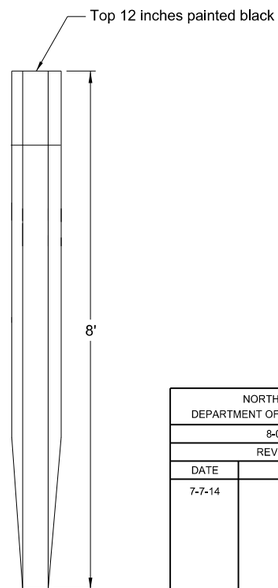
Installation: Construction requirements shall meet 754.04D. Each end of culverts crossing the roadway within the right-of-way shall be marked with a post as shown. Posts are to be installed in front of the culvert in the direction of travel along the side of the culvert and one foot from the culvert opening unless shown otherwise on the plans.

Posts: Posts shall conform to section 894.04A of the Standard Specifications with the exception that the post may or may not have holes drilled.

Basis of Payment: The quantity will be measured by the number of object markers each installed. All costs for furnishing and installing the markers shall be included in the price bid for the item "Object Markers - Culverts".



Installation



U-Type Post

NORTH DAKOTA DEPARTMENT OF TRANSPORTATION	
8-05-13	
REVISIONS	
DATE	CHANGE
7-7-14	Revised Notes

This document was originally issued and sealed by Roger Weigel, Registration Number PE- 2930 , on 7/7/2014 and the original document is stored at the North Dakota Department of Transportation