DESIGN DATA				
Traffic	Average Daily			
Current 2018	Pass: 15	Trucks: 5	Total: 20	
Forecast 2038	Pass: 18	Trucks: 6	Total: 24	
Clear Zone Distance: 10'		Design Speed: 30		
Minimum Sight Dist. for Stopping: N/A		Bridges: #19-109-26.0		
Sight Dist. for No Passing Zone: N/A				
Pavement Design Life N/A				
Design Accumulated One-way N/A ESALs: N/A				

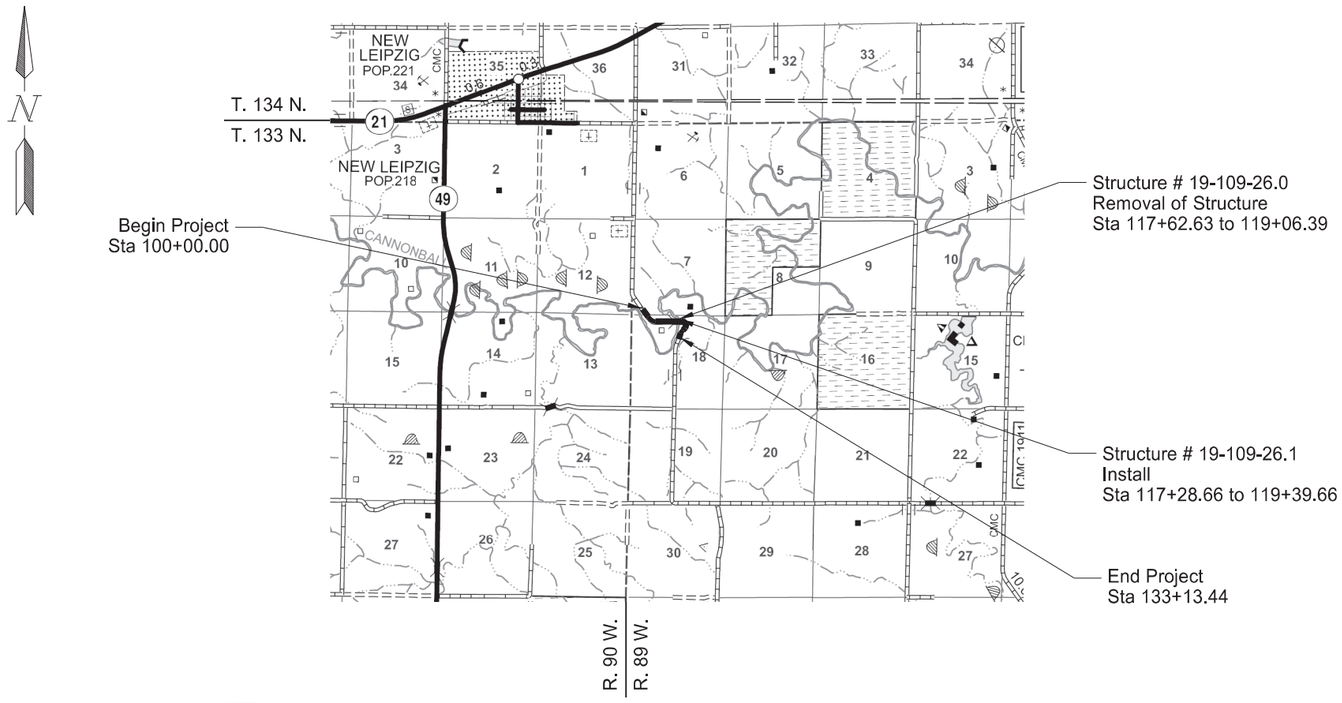
STATE	PROJECT NO.	PCN	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	23710	1	1

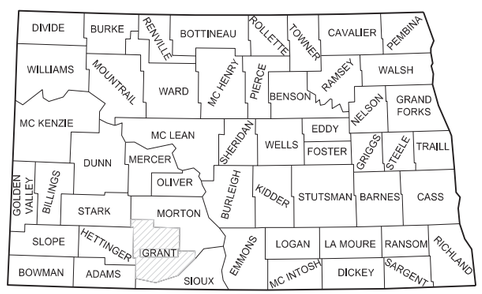
NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

BRJ-0019(025)
PCN 23710
Grant County
2 Miles South and 2 Miles East of New Leipzig, ND
Existing Structure #19-109-26.0
New Structure #19-109-26.1
Structure Replacement, Grading, & Incidentals

GOVERNING SPECIFICATIONS	Date Published and Adopted by the North Dakota Department of Transportation
Standard Specifications	7/1/2025
Supplemental Specifications	NONE

PROJECT NUMBER \ DESCRIPTION	NET MILES	GROSS MILES
BRJ-0019(025) \ Structure Replacement	0.63	0.63





STATE COUNTY MAP

DESIGNER
Eric Urness, PE
DESIGNER
Don Hammond, PE
DESIGNER
Ryan Kleppinger
DESIGNER
Christian Hammond

Brosz Engineering, Inc.

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	2	1

TABLE OF CONTENTS

PLAN SECTIONS

LIST OF STANDARD DRAWINGS

SPECIAL PROVISIONS

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	4	1

Sec. 12
T. 133 N.
R. 90 W.

Sec. 7
T. 133 N.
R. 89 W.

Sec. 8
T. 133 N.
R. 89 W.

Begin Project
Sta 100+00.00

Structure # 19-109-26.0
Sta 117+28.66 to 119+39.66

End Project
Sta 133+13.44

Sec. 13
T. 133 N.
R. 90 W.

Sec. 18
T. 133 N.
R. 89 W.

Sec. 17
T. 133 N.
R. 89 W.

LEGEND

Grading, Culverts, Incidentals

Structure Replacement

Grant County

Scope of Work

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:48:49 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\004SW_001.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	6	1

NOTES

GENERAL NOTES

105-P01 **UTILITY COORDINATION:** The Contractor is to coordinate the work schedule with the utility companies, the County and the Engineer. The County will be responsible for the cost of any utility adjustments, except in cases of negligence by the Contractor.

Work around power poles, telephone lines, pipelines and other utilities not designated for adjustments. Coordinate your schedule with the utility owners for utilities that will require adjustments.

105-P02 **RIGHT OF WAY:** Permanent Easements and Temporary Construction Easements have been obtained by Grant County and are shown in the plans. Utilize Temporary Construction Easements for cutting slopes, construction staging and stockpiling topsoil. Minimize impacts within the Temporary Construction Easement areas as much as possible.

201-P01 **CLEARING & GRUBBING:** Include the cost to remove and dispose of all trees, stumps and brush within the construction area or wherever designated in the plans in the contract lump sum price for "Clearing and Grubbing." No field measurements will be taken. This includes the cost of removing and disposing of large trees. Exercise care in your construction operations to ensure that trees, shrubs and native grass outside of the construction area are not disturbed.

202-P01 **REMOVE AGGREGATE SURFACING:** After the new structure and roadway are complete and opened to traffic, remove and salvage the existing aggregate surfacing prior to roadway obliteration. Salvage and relay the existing aggregate surfacing on the new approaches and roadway as determined by the Engineer. The estimated depth of existing aggregate surfacing is 4 inches. No additional payment will be made for deviations in the depth of material. Include all costs associated with this work in the unit price bid for “Salvage and Relay Aggregate Surface Course”.

203-P01 **BORROW EXCAVATION:** Build the new roadway while keeping the existing roadway open to traffic during construction. Furnish approximately 16,150 cubic yards of Borrow Excavation material to build the new roadway.

203-P02 **ROADWAY OBLITERATION:** Obliterate the existing roadway to the grades and elevations shown in the plans. Do not obliterate the existing roadway until the new roadway and bridge is open to traffic. It is estimated that approximately 6,500 cubic yards of material will be generated by obliterating the existing roadway. Waste this material in the borrow area(s) if approved by the landowner or waste the material in areas approved by the Engineer. Include all costs to obliterate the roadway and waste the material in the unit price bid for “Roadway Obliteration.”

RESTRICTION: The existing bridge is currently posted at a 10-ton load limit.

203-P03 **EMBANKMENT CONSTRUCTION:** Use Compaction Control Type A with method “ND T 180”. Borrow material shall consist of approved natural compactable soil. The soil shall not be saturated or contain organic material.

203-010 **SHRINKAGE:** 30 percent additional volume is included for shrinkage in earth embankment.

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

302-P01 **PLACEMENT AND COMPACTION:** Delete the first sentence of Section 302.04 B in its entirely and insert the following:

Haul, place, lay, and compact aggregate on a damp surface in two (2) equal depth lifts.

704-P01 **TRAFFIC CONTROL:** The existing roadway and bridge will be left in place for traffic while the proposed road and bridge are constructed. Close the proposed roadway by installing three Type III Barricades with a road closed sign on each end. When making the connection into the existing roadway maintain one lane of traffic with flagging at all times during working hours. Open the roadway to two-way traffic during non-working hours and leave the work area free of all hazards. Furnish flagging as specified in Section 704, “Temporary Traffic Control” when needed. All flagging hours shall be incidental to the cost of the project. Remove the traffic control devices for flagging when they are not being used and reinstall when flagging is needed. Obliterate the existing roadway only after the new bridge is completed, the aggregate surfacing has been installed, and the new segment of roadway is opened to traffic.

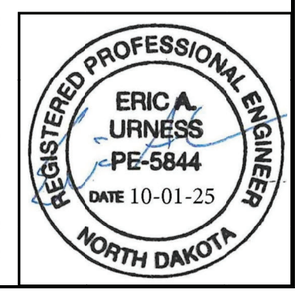
714-P01 **APPROACH CULVERTS:** Provide approach culverts that are zinc galvanized and meet the requirements of Section 830.02 B of the Standard Specifications.

752-P01 **REMOVAL EXISTING FENCING:** Remove and stockpile the existing fencing materials that are to be replaced on the property of the adjacent landowner with the approval of the Engineer.

752-P02 **TEMPORARY FENCING:** Place temporary fencing prior to removing existing fencing. Place temporary fencing around temporary construction easements where existing fence is removed until permanent fencing is in place. Field fit temporary fencing in areas of deep draws or wooded areas, with the approval of the Engineer. Verify the need for temporary fence with the landowner. The cost to install and remove temporary fencing is included in the price bid for “Temporary Fence”.

752-P03 **PERMANENT FENCING:** Double brace assemblies will be paid as corner assemblies

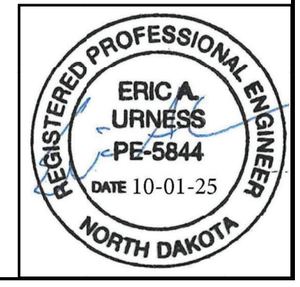
752-P04 **VEHICLE GATE:** Install vehicle gates with double brace assemblies as shown in Standard Drawing D-752-1. Include



NOTES

the cost of all materials and labor to install brace assemblies and gate in the EA bid item for “Vehicle Gate”.

752-P05 **FENCE REMOVE & RESET:** The fence called out in the plans to be removed, and reset is either a 4-cable fence with steel pipe top and steel pipe posts or a steel cattle panel type fencing with round steel posts. The existing driveway also has an entrance arch made of three wooden telephone poles that is called out to be removed and reset. All costs associated with removing and resetting the entrance arch shall be included in the unit price bid for “Fence Removal & Reset”. The landowner shall be contacted when removing and resetting this fence and arch. Contact Nick Brown at 701-261-9588.



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	6	3

ENVIRONMENTAL NOTES

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

EN-1 SPAWNING RESTRICTION: Do not work within the Cannonball River from April 15 to June 1.

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

EN-3 WILDLIFE ACCOMODATION: At each end of the new structure in the riprap, the Contractor is to place a 3- to 5-foot-wide traversable path to allow wildlife to cross the riprap. The path shall consist of placing Class 5 or 13 Aggregate or salvaged aggregate from the existing roadway in the voids of the riprap but not to exceed the normal water elevation mark as identified in the field. The exact location of this path shall be determined in the field and should correspond with any noticeable wildlife paths near the area. All costs associated with this work and material shall be included in the unit price bid for “RIPRAP GRADE II”.

EN-4 WETLAND MITIGATION: Prior to beginning work on the project, purchase exactly 0.90 acres of wetland mitigation credits from Ducks Unlimited to satisfy the Environmental Commitments shown in Section 75 of the plans. No work shall begin on the project until a Credit Sales Letter from Ducks Unlimited is submitted and accepted by the US Army Corps of Engineers (USACE), North Dakota Regulatory Office. The wetland mitigation credits shall be purchased from the Southwest Slope service area. The details are:

Southwest Slope 0.84 credits @ $85,000/credit = $71,400

The contact information to purchase the wetland mitigation credits from Ducks Unlimited is provided below (refer to project number NWO-2024-00892-BIS):

Trenton Hieb
Biologist in Ecosystem Services – Mitigation
Ducks Unlimited (Great Plains Region)
2525 River Road
Bismarck, ND 58503
Phone: 701-355-3573
Email: thieb@ducks.org

PERMITS REQUIRED:

US Army Corps of Engineers – Section 404 Permit

Status: To be obtained

ND Department of Water Resources Regulatory Division – Authorization to Construct a Project within Sovereign Lands of ND

Status: To be obtained

ND Department of Health – NDPDES Permit

Status: To be obtained by contractor prior to construction. Owner to be listed as Grant County on permit.

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	8	1

Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline:				TOTAL
103	0100	CONTRACT BOND	L SUM	1				1
201	0330	CLEARING & GRUBBING	L SUM	1				1
202	0104	REMOVAL OF STRUCTURE	EA	1				1
202	0312	REMOVE EXISTING FENCE	LF	2154				2154
203	0101	COMMON EXCAVATION-TYPE A	CY	16303				16303
203	0109	TOPSOIL	CY	4679				4679
203	0140	BORROW-EXCAVATION	CY	22650				22650
203	0180	ROADWAY OBLITERATION	LF	2100				2100
210	0099	CLASS 1 EXCAVATION	L SUM	1				1
210	0111	CLASS 2 EXCAVATION	L SUM	1				1
210	0127	CHANNEL EXCAVATION	L SUM	1				1
210	0201	FOUNDATION PREPARATION	EA	1				1
216	0100	WATER	M GAL	367				367
251	0200	SEEDING CLASS II	ACRE	8.5				8.5
251	2000	TEMPORARY COVER CROP	ACRE	8.5				8.5
253	0101	STRAW MULCH	ACRE	17				17
255	0102	ECB TYPE 2	SY	66				66
256	0200	RIPRAP GRADE II	CY	2907.4				2907.4
261	0112	FIBER ROLLS 12IN	LF	4794				4794
261	0113	REMOVE FIBER ROLLS 12IN	LF	2397				2397
262	0100	FLOTATION SILT CURTAIN	LF	160				160
262	0101	REMOVE FLOTATION SILT CURTAIN	LF	160				160
302	0120	AGGREGATE BASE COURSE CL 5	TON	17.4				17.4
302	0356	AGGREGATE SURFACE COURSE CL 13	TON	3867				3867
302	0405	SALVAGE & RELAY AGGREGATE SURFACE COURSE	CY	612				612
602	0130	CLASS AAE-3 CONCRETE	CY	240				240
602	1130	CLASS AE-3 CONCRETE	CY	319				319
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	750				750
604	9900	PRESTRESSED I-BEAM-36IN	LF	1038.8				1038.8
612	0115	REINFORCING STEEL-GRADE 60	LBS	44625				44625
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	35197				35197
616	0364	STRUCTURAL STEEL M270-GRADE 36	LBS	4879				4879
622	0014	STEEL H-PILING POINTS 12 X 53	EA	54				54
622	0040	STEEL PILING HP 12 X 53	LF	3000				3000
622	1200	STEEL TEST PILING HP 12 X 53	LF	260				260
624	0128	TRAFFIC RAIL-STEEL	LF	422				422
702	0100	MOBILIZATION	L SUM	1				1
704	1000	TRAFFIC CONTROL SIGNS	UNIT	506				506
704	1052	TYPE III BARRICADE	EA	4				4
704	1060	DELINEATOR DRUMS	EA	12				12
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	3481				3481
709	0800	PERFORATED GEOCELL	SY	52				52
714	4099	PIPE CONDUIT 18IN-APPROACH	LF	202				202
752	0320	FENCE BARBED WIRE 4 STRAND-STEEL POST	LF	2160				2160
752	0905	TEMPORARY FENCE	LF	3158				3158
752	0911	TEMPORARY SAFETY FENCE	LF	880				880
752	0922	FENCE REMOVE & RESET	LF	1094				1094

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	8	2

Estimated Quantities

SPEC	CODE	ITEM DESCRIPTION	UNIT	Mainline:				TOTAL
752	2100	VEHICLE GATE	EA	1				1
752	3150	CORNER ASSEMBLY BARBED WIRE-WOOD POST	EA	9				9
754	0110	FLAT SHEET FOR SIGNS-TYPE XI REFL SHEETING	SF	30				30
754	0112	FLAT SHEET FOR SIGNS-TYPE IV REFL SHEETING	SF	10				10
754	0206	STEEL GALV POSTS-TELESCOPING PERFORATED TUBE	LF	84				84
764	0131	W-BEAM GUARDRAIL	LF	172				172
764	0145	W-BEAM GUARDRAIL END TERMINAL	EA	4				4
900	2001	WETLAND MITIGATION SITE 1	ACRE	0.84				0.84
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2				2

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	10	1

		Proposed Typical Section			
		Station		Station	
		100+00.00		117+28.66	
		119+39.66		133+13.44	
		Total Stations		31.024	
Material	**Unit**	**Width (ft)**	**Area (sf)**	**Quantity per Station**	**TOTAL**
Salvaged & Relay Aggregate Surface Course (Based on SF on Typical Sections)	CY	28	5.33	19.7	612
Aggregate Surface Course CL 13 (Based on 6" Depth)	TON	28	15.51	107.7	3,342

216 - 0100 WATER				
Description	Basis	Amount	Unit	Quantity
Dust Pallative	25 M Gal/Mile	0.588	M GAL	15
Aggregate	10 Gal/CY	2,674	M GAL	27
Embankment	10 Gal/CY	32,454	M GAL	325
			TOTAL:	367

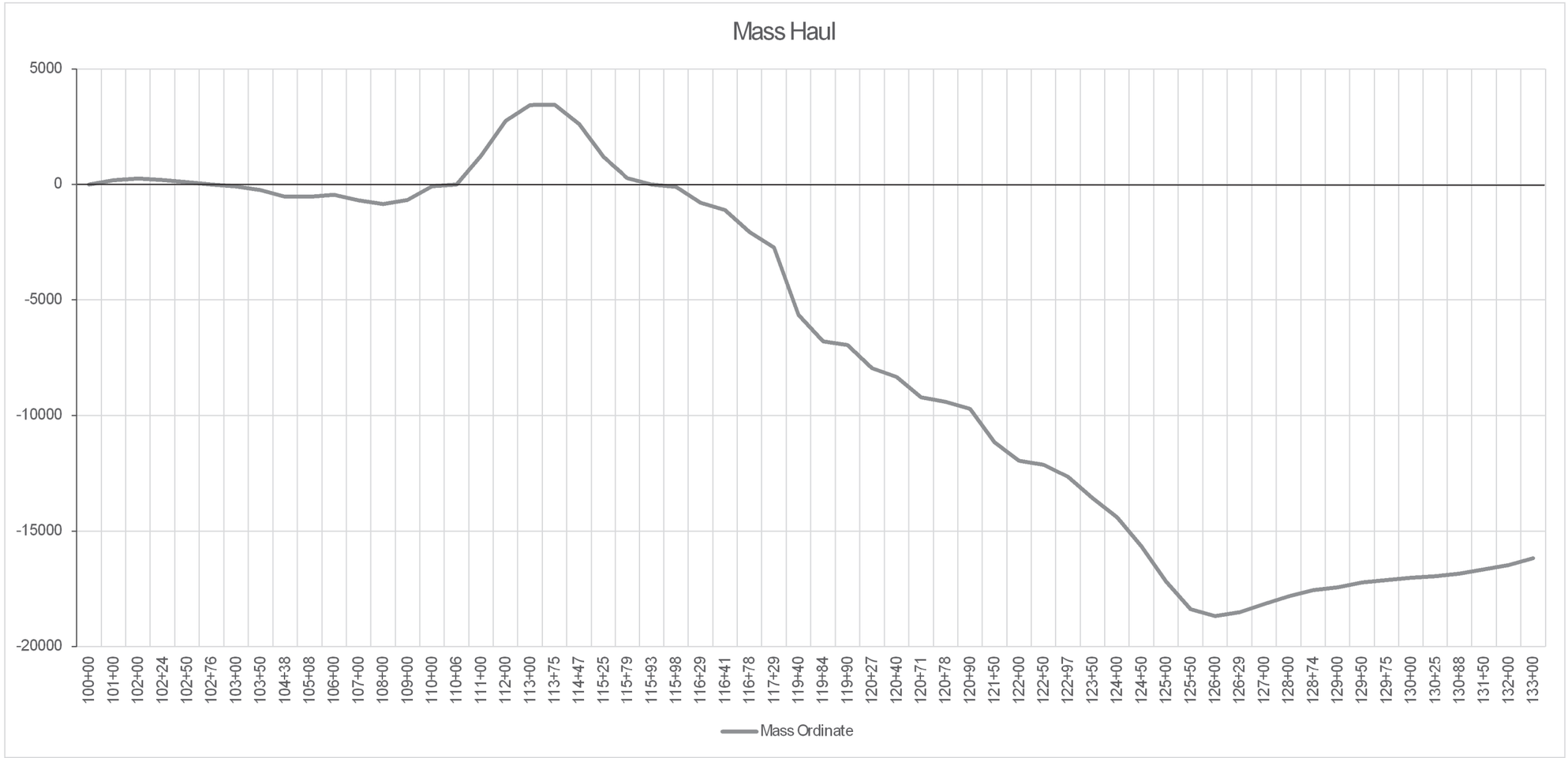
Grant County

Basis of Estimate

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	11	1



COMMON EXCAVATION = 16,303 CY

EMBANKMENT = 32,454 CY

TOPSOIL = 4,679 CY

Grant County

Mass Haul Diagram

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	11	2

Station	Excavation (CY)	Embankment (CY)	Mass Ordinate
100+00	0	0	0
101+00	260.488	77.097	183.391
102+00	360.41	285.417	258.384
102+24	51.595	114.828	195.151
102+50	44.513	144.086	95.578
102+76	68.516	212.713	0
103+00	91.419	278.195	-91.199
103+50	72.128	227.664	-246.734
104+38	43.959	334.008	-536.783
105+08	222.156	221.798	-536.426
106+00	491.079	407.707	-453.054
107+00	406.72	641.416	-687.749
108+00	432.107	588.877	-844.52
109+00	597.4	428.609	-675.729
110+00	927.695	331.911	-79.944
110+06	971.647	331.976	0
111+00	1653.932	332.981	1241.006
112+00	1822.438	316.231	2747.213
113+00	1040.168	351.647	3435.734
113+75	410.504	393.429	3452.809
114+47	344.195	1182.218	2614.786
115+25	378.852	1801.001	1192.637
115+79	254.688	1170.671	276.655
115+93	124.719	648.099	0
115+98	76.806	455.451	-101.99
116+29	107.001	799.475	-794.464
116+41	36.738	345.609	-1103.335
116+78	100.603	1059.624	-2062.356
117+29	64.519	736.037	-2733.874

Station	Excavation (CY)	Embankment (CY)	Mass Ordinate
119+40	404.072	3308.083	-5637.885
119+84	122.06	1275.395	-6791.221
119+90	9.912	164.355	-6945.663
120+27	44.808	1053.288	-7954.144
120+40	12.066	385.475	-8327.553
120+71	41	922.758	-9209.31
120+78	13.396	214.835	-9410.749
120+90	23.599	322.965	-9710.115
121+50	148.507	1598.732	-11160.34
122+00	211.194	1007.613	-11956.76
122+50	330.808	504.806	-12130.759
122+97	292.728	811.837	-12649.868
123+50	237.952	1159.395	-13571.311
124+00	182.617	1011.643	-14400.337
124+50	122.751	1385.246	-15662.832
125+00	89.125	1605.903	-17179.61
125+50	82.246	1283.332	-18380.696
126+00	187.122	482.766	-18676.34
126+29	200.213	36.509	-18512.636
127+00	479.342	126.103	-18159.397
128+00	598.821	266.878	-17827.455
128+74	487.731	212.455	-17552.179
129+00	177.439	62.99	-17437.73
129+50	321.289	103.034	-17219.475
129+75	142.369	40.907	-17118.014
130+00	127.17	27.443	-17018.287
130+25	84.774	17.099	-16950.611
130+88	123.535	19.21	-16846.286
131+50	195.007	9.876	-16661.155
132+00	199.685	5.808	-16467.278
133+00	296.584	1.544	-16172.238
133+13	21.054	0	-16151.184
TOTAL	16303.087	32454.272	

Grant County

End Area Tables

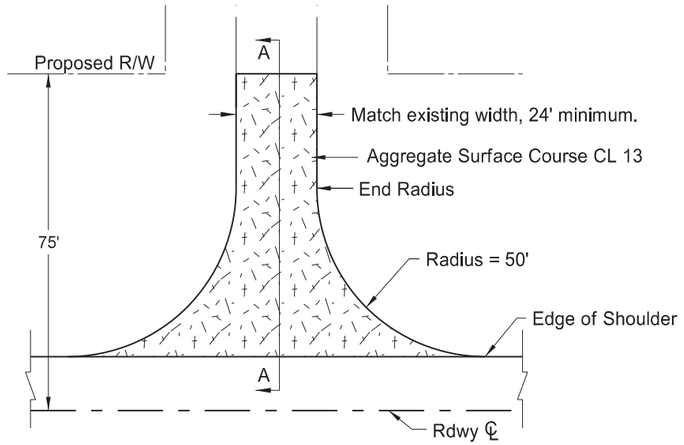
Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

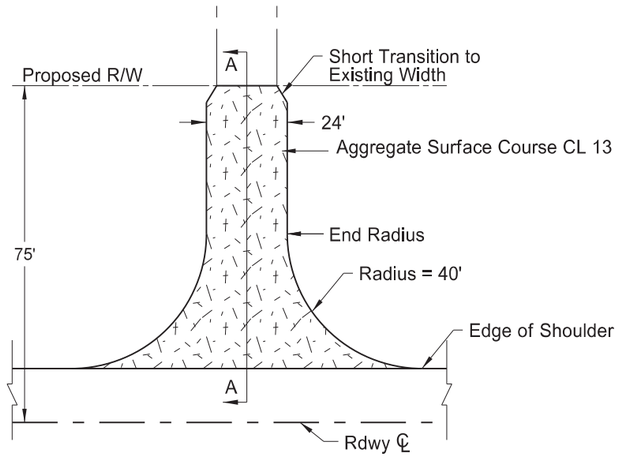
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	20	1

Notes:

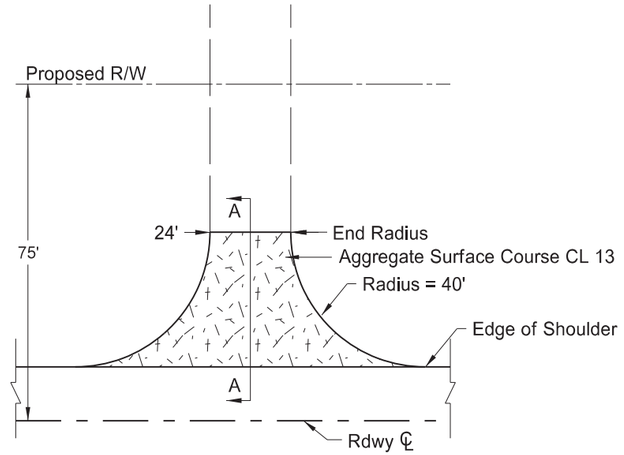
1. Actual gravel surfacing locations may vary in the field, as approved by the Engineer.



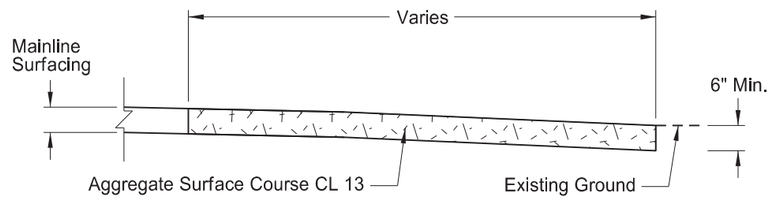
(1) Gravel Section Line, County Road, or Street Approach



(2) Gravel Private Drive Approach



(3) Field Drive Approach



Section A-A

Approaches					
Spec-Code	Description	Unit	Depth (in)	Area Total (sf)	TOTAL
302-0356	AGGREGATE SURFACE COURSE CL 13	TON	6	15116.8	525

Approaches		
Location	Offset	Type
104+38	LT	Field
104+38	RT	Field
114+47	LT	Field
123+02	LT	Private
130+88	LT	Field

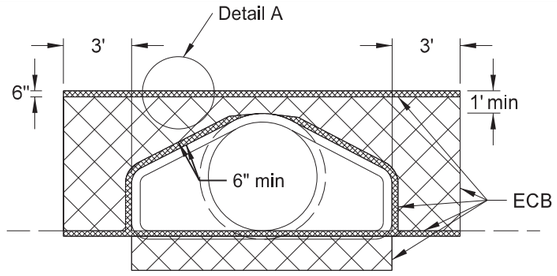
Grant County

Approach Details

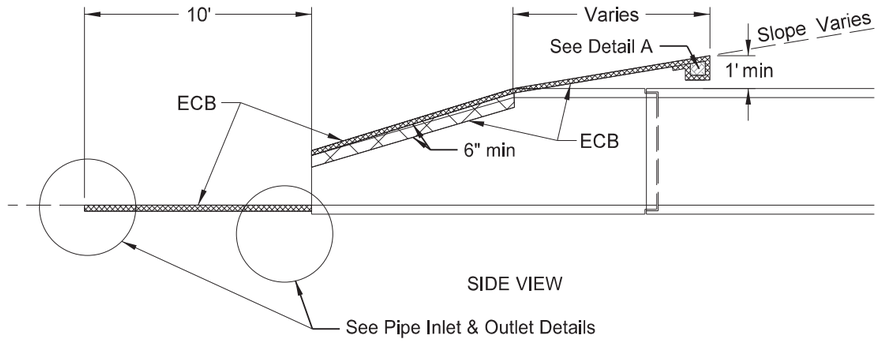
Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	20	2

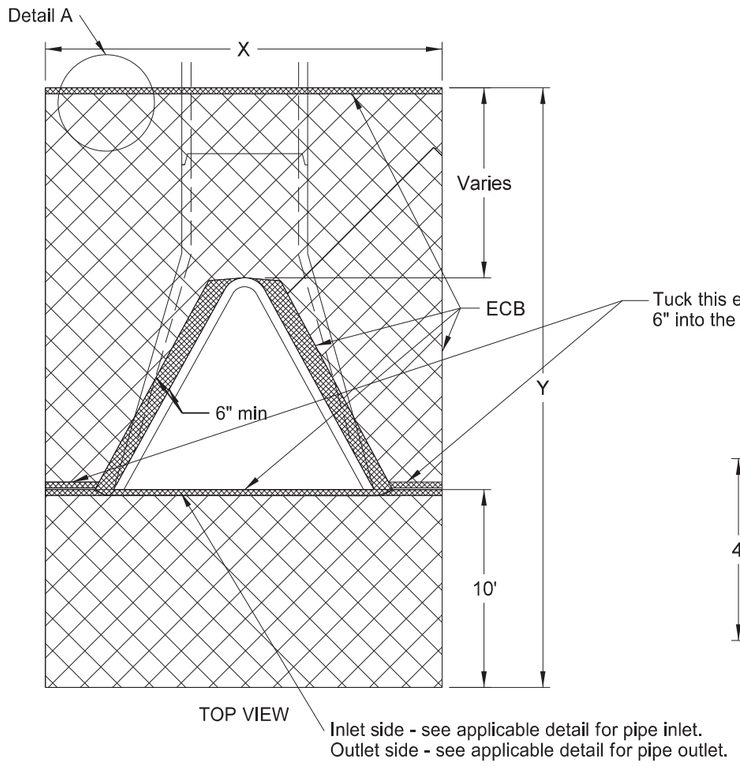


FRONT VIEW



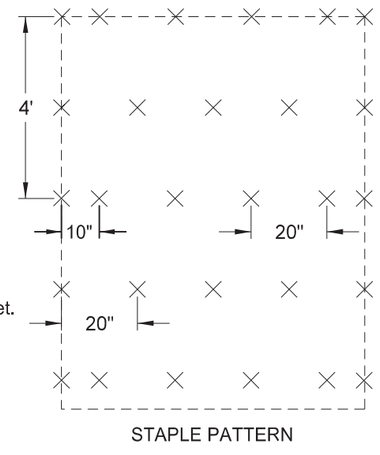
SIDE VIEW

Erosion Control Blanket (ECB)					
Location to be Station	Culvert Type Appr/CL	Pipe Diam (Inch)	No	Unit Quantity (SY)	Total Quantity Type 2 (SY)
104+38 Lt	Appr	18	1	22	22
104+38 Rt	Appr	18	1	22	22
130+88 Lt	Appr	18	1	22	22
Total (SYs)					66



TOP VIEW

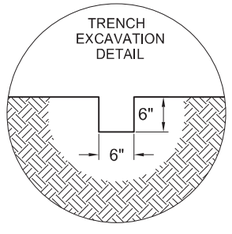
NOTE: Tuck the ECB a minimum of 6" into the embankment (against the flared end section) around the opening of the flared end section.

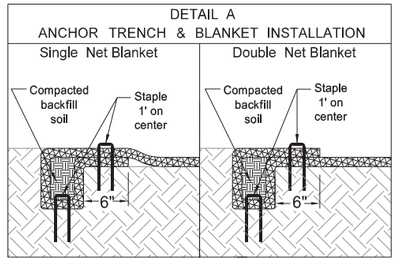


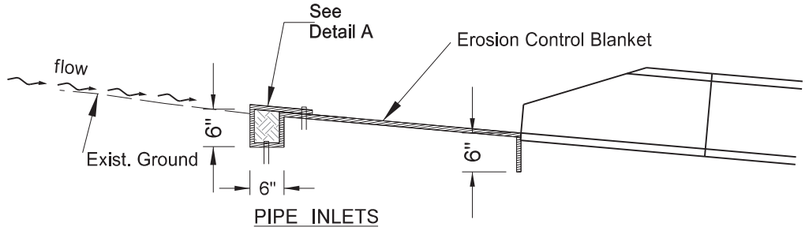
STAPLE PATTERN

APPROACH CULVERTS				
DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY
15	9.0	20.0	176.0	20
18	9.5	20.7	190.7	22
21	9.5	21.0	190.9	22
24	10.5	21.6	214.1	24
27	11.0	22.0	226.3	25
30	11.6	22.5	241.5	27
36	12.7	23.3	268.8	30
42	13.3	23.3	279.7	31
48	13.8	24.0	293.2	33
54	14.5	23.4	300.6	34
60	15.0	23.0	307.5	35
66	15.6	24.0	325.6	37
72	16.2	24.5	340.6	38
Note: Quantities based on 8:1 slope.				

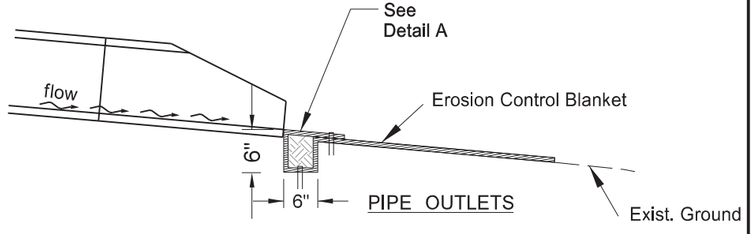
CENTERLINE CULVERTS									
DIA	X	Y	Surface area to be protected	ECB	DIA	X	Y	Surface area to be protected	ECB
In	Ft	Ft	SF	SY	In	Ft	Ft	SF	SY
24	10.5	19.6	193.1	22	24	10.5	17.6	172.1	20
27	11.0	20.0	204.3	23	27	11.0	18.0	182.3	21
30	11.6	20.5	218.3	25	30	11.6	18.5	195.1	22
36	12.7	21.2	242.1	27	36	12.7	19.2	216.7	24
42	13.3	21.2	251.8	28	42	13.3	19.2	225.2	25
48	13.8	22.0	265.6	30	48	13.8	20.0	238.0	27
54	14.5	21.5	273.7	31	54	14.5	19.5	244.7	28
60	15.0	21.0	278.3	31	60	15.0	19.0	248.3	28
66	15.6	22.0	295.7	33	66	15.6	20.0	264.5	30
72	16.2	22.5	309.2	35	72	16.2	20.5	276.8	31
Note: Quantities based on 6:1 slope.					Note: Quantities based on 4:1 slope.				







PIPE INLETS



PIPE OUTLETS

Grant County

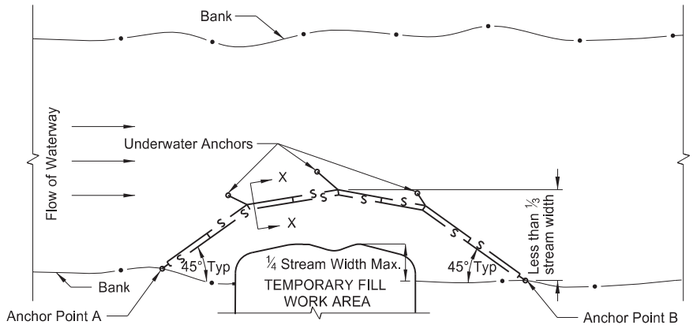
Erosion Control at Culvert Flared End Sections

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	20	3

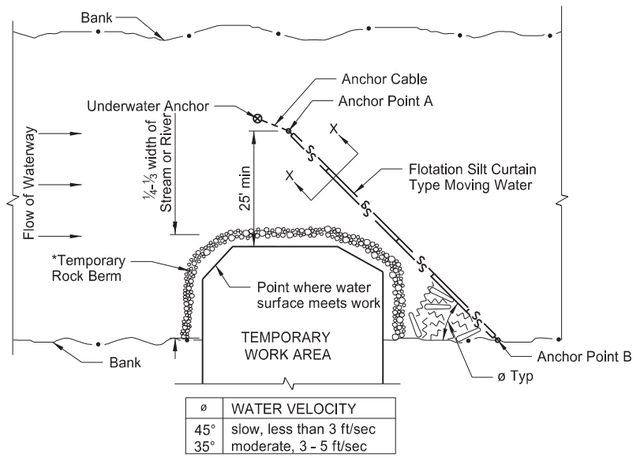
TYPICAL INSTALLATIONS
May vary with conditions



PLAN VIEW

FLOTATION SILT CURTAIN - TYPE WORK AREA

DESIGN GUIDELINES:
When temporary work encroaches less than ¼ of the width of stream.



ø	WATER VELOCITY
45°	slow, less than 3 ft/sec
35°	moderate, 3 - 5 ft/sec

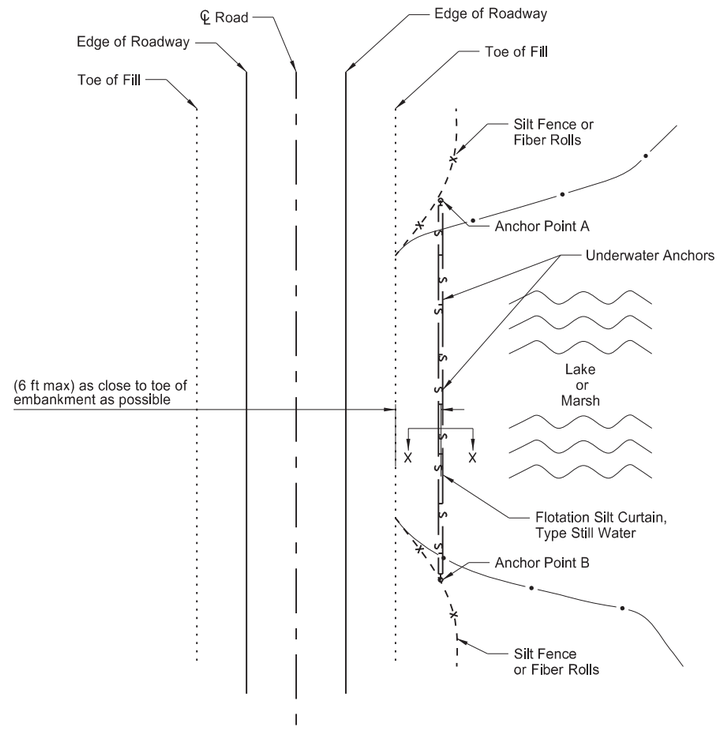
PLAN VIEW

FLOTATION SILT CURTAIN - TYPE MOVING WATER

DESIGN GUIDELINES:
When temporary work encroaches more than ¼ but less than ⅓ width of the stream.

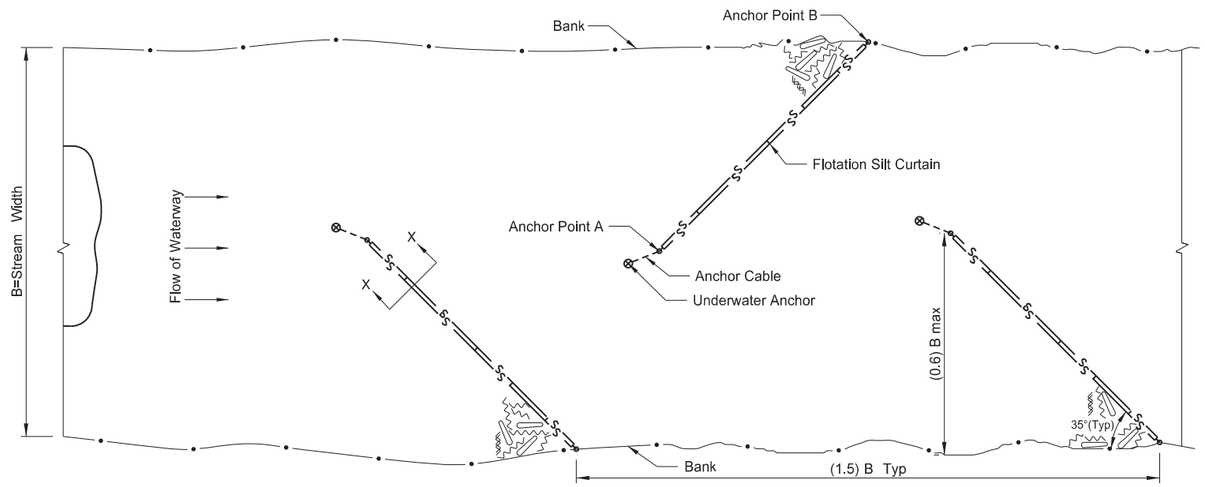
For narrow waterways, the curtain may be placed 1 foot above the bottom of waterway to allow water flow.

*In areas where the plans call for riprap at the bridge, provide a temporary rock berm. Include all costs for the temporary rock berm in price bid for the "Riprap".



FLOTATION SILT CURTAIN - TYPE STILL WATER

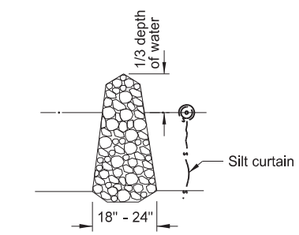
Extend silt curtain onto shore and anchor there also.



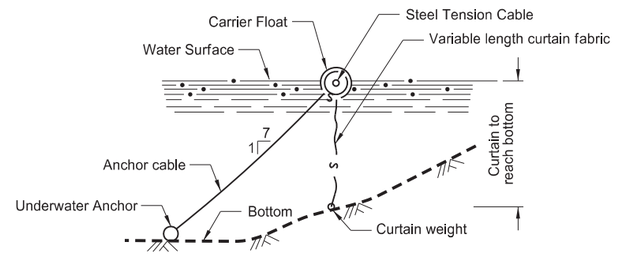
PLAN VIEW

FLOTATION SILT CURTAIN - TYPE HERRING BONE PATTERN

DESIGN GUIDELINES:
When temporary work encroaches more than ⅓ width of the stream
Or where stream width doesn't allow use of Type Moving Water



TEMPORARY ROCK BERM



SECTION X-X
FLOTATION SILT CURTAINS

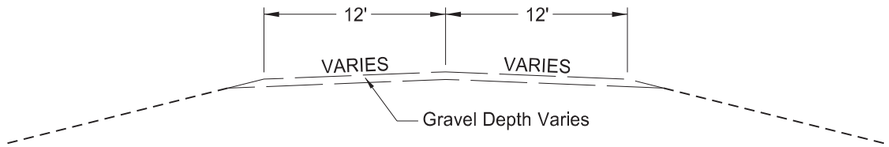
Grant County

Temporary Erosion Control - Flotation Silt Curtain

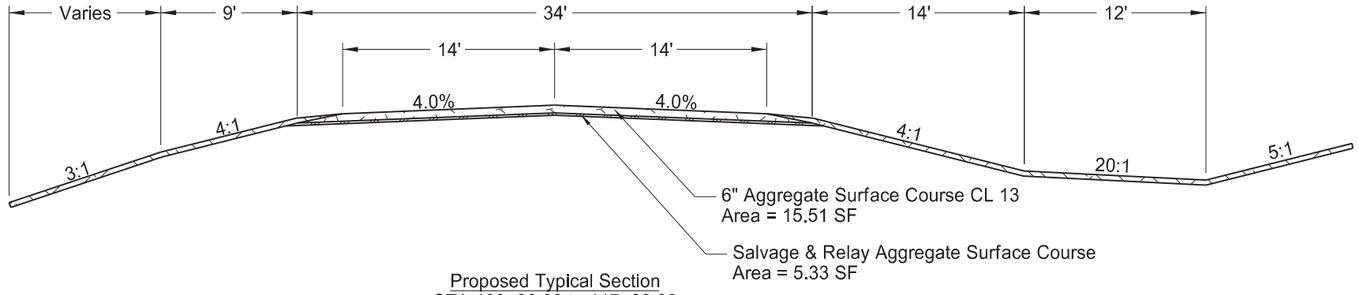
Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	30	1



Existing Typical Section



Proposed Typical Section
STA 100+00.00 to 117+28.66
STA 119+39.66 to 133+13.44

Grant County

Typical Sections

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	51	1

Begin Station / Location	Begin Offset	End Station / Location	End Offset	Pipe Installation (Pay Item)			Allowable Material	Required Diameter	Steel Pipe Coatings	Steel Pipe Corrugations or Spiral Ribs	Steel Pipe Minimum Thickness	Geosynthetic Material - Type G (Pay Item)	(*) End Sections		Applicable Backfill
				In	Bid Item	LF		In	Type		Gauge	SY	Begin EA	End EA	
104+01.3	41.4' Lt	104+81.1	40.8' Lt	18	Pipe Conduit-Approach	70	All Corrugated Steel Pipe (CSP) shall be Aluminized Type 2	18	A	2-2/3" x 1/2"	16	-	FES	FES	Specification 714.04A
104+13.7	39.1' Rt	104+67.5	39.6' Rt	18	Pipe Conduit-Approach	60	All Corrugated Steel Pipe (CSP) shall be Aluminized Type 2	18	A	2-2/3" x 1/2"	16	-	FES	FES	Specification 714.04A
131+18.4	40.5' Lt	130+56.4	40.5' Lt	18	Pipe Conduit-Approach	62	All Corrugated Steel Pipe (CSP) shall be Aluminized Type 2	18	A	2-2/3" x 1/2"	16	-	FES	FES	Specification 714.04A

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

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

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

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

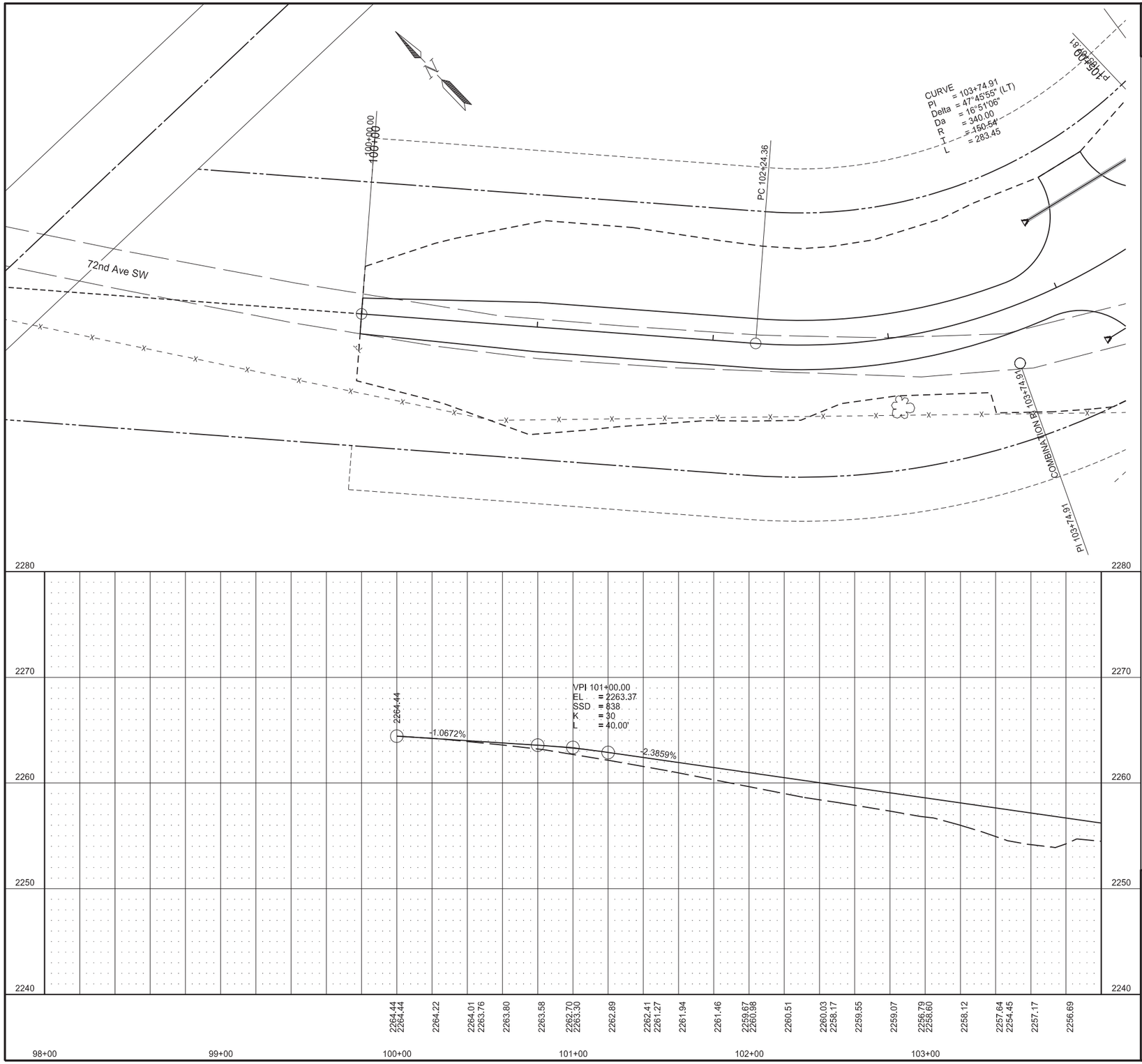
Grant County

Allowable Pipe List

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	60	1

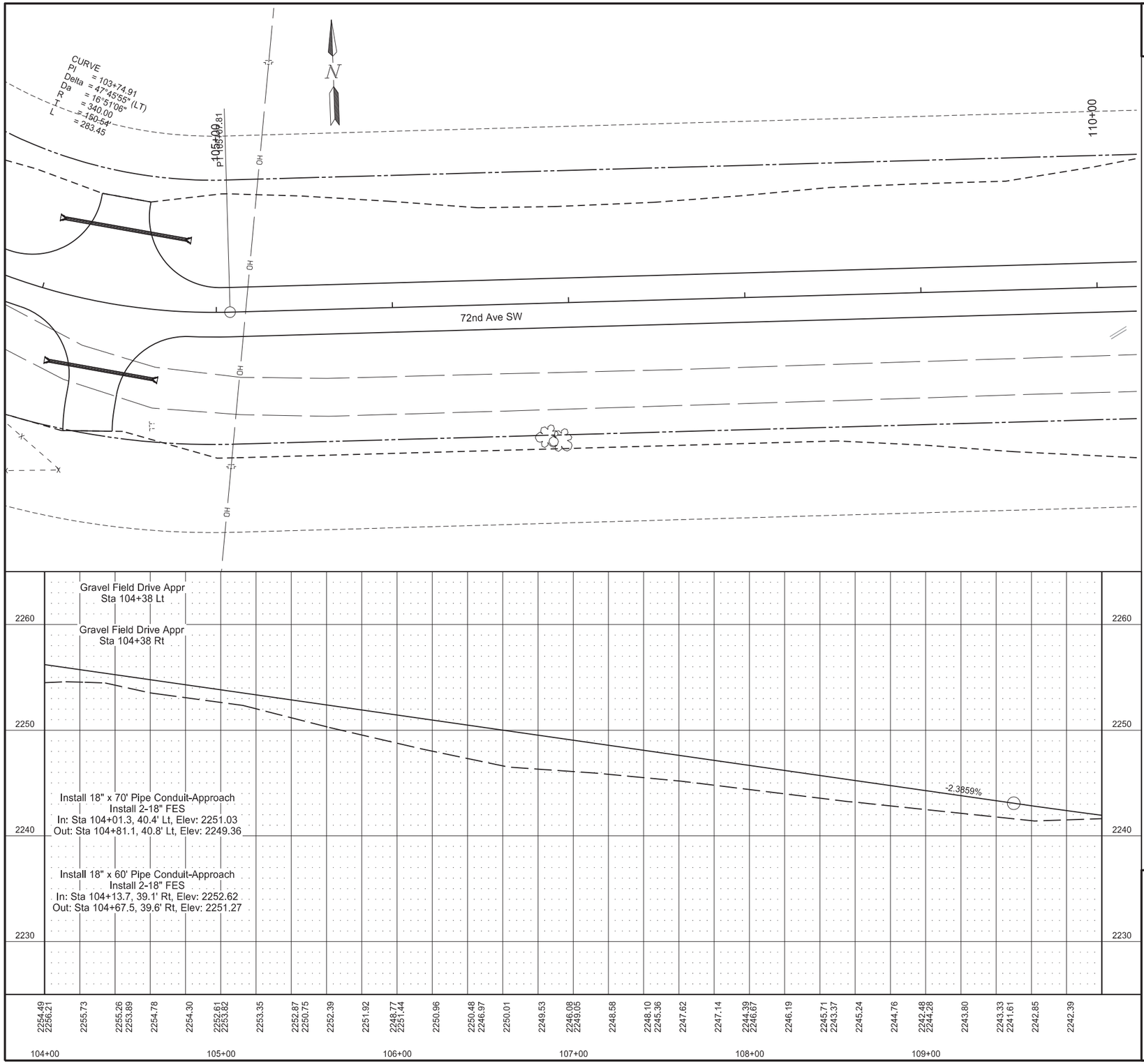


Grant County

Plan & Profile

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	60	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
714	4099	**PIPE CONDUIT 18IN-APPROACH**		
		Sta 104+38 Lt	70	LF
		Sta 104+38 Rt	60	LF

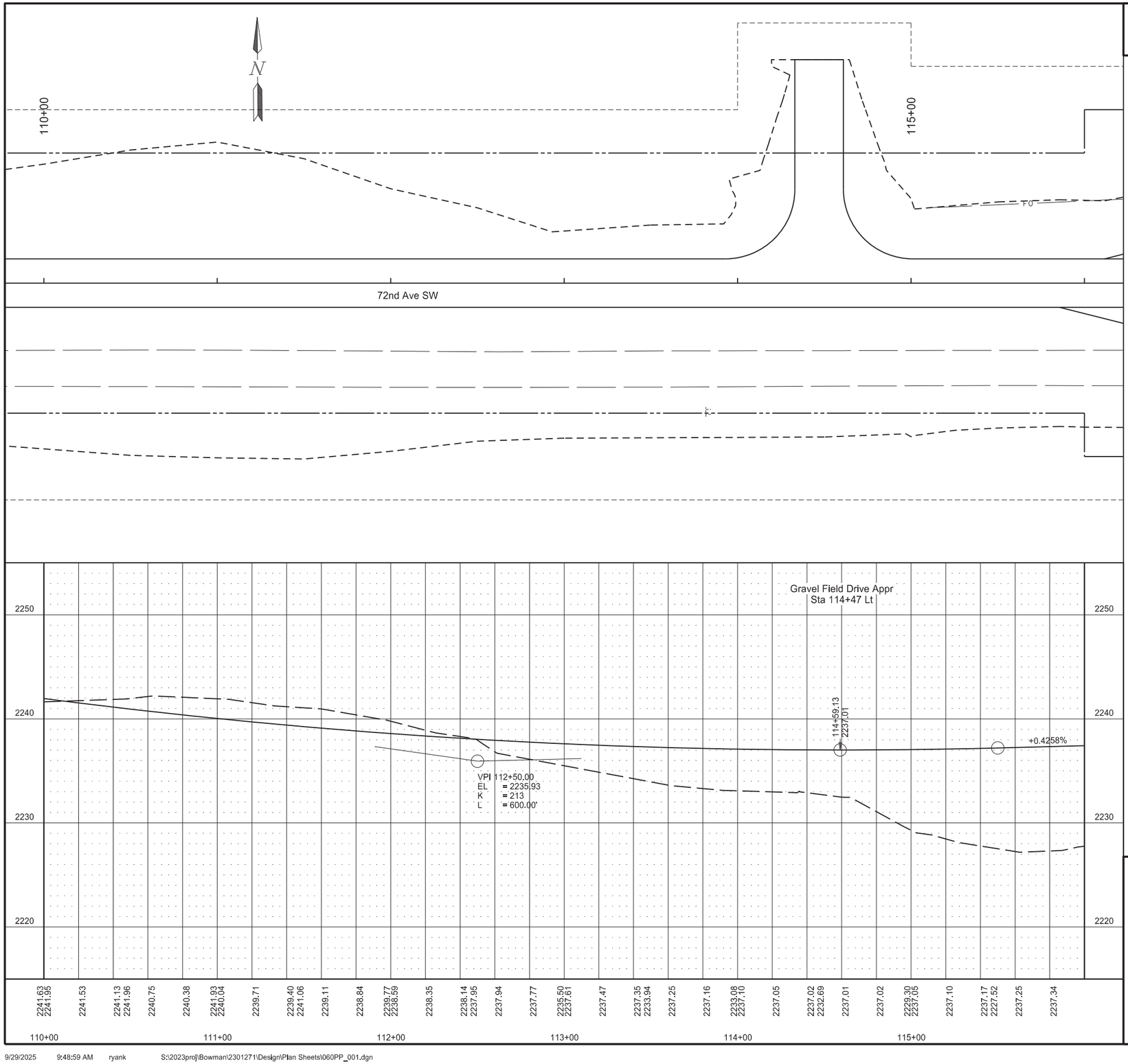
Grant County

Plan & Profile

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	60	3



Grant County

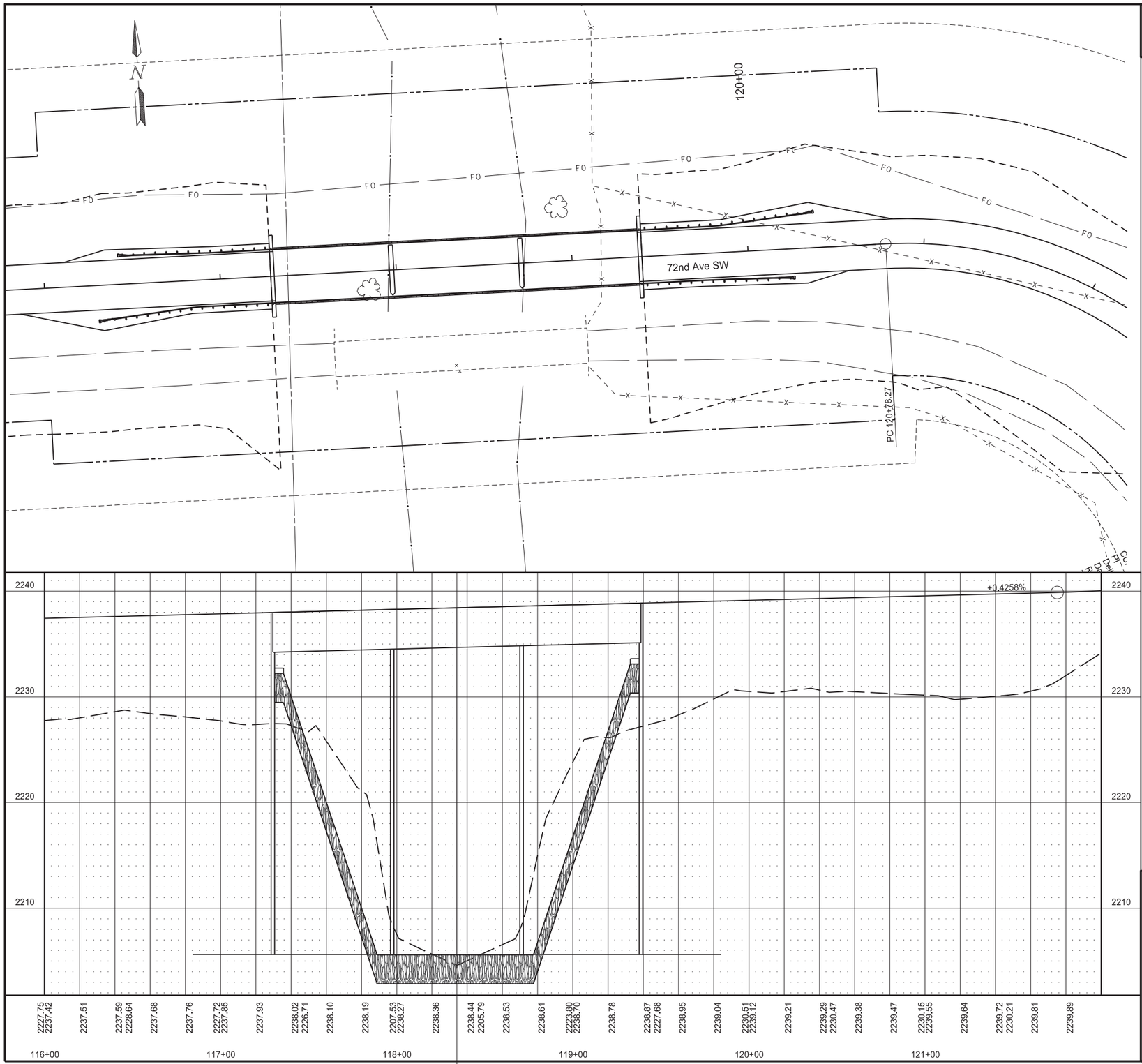
Plan & Profile

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:48:59 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\060PP_001.dgn

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	60	4



Grant County

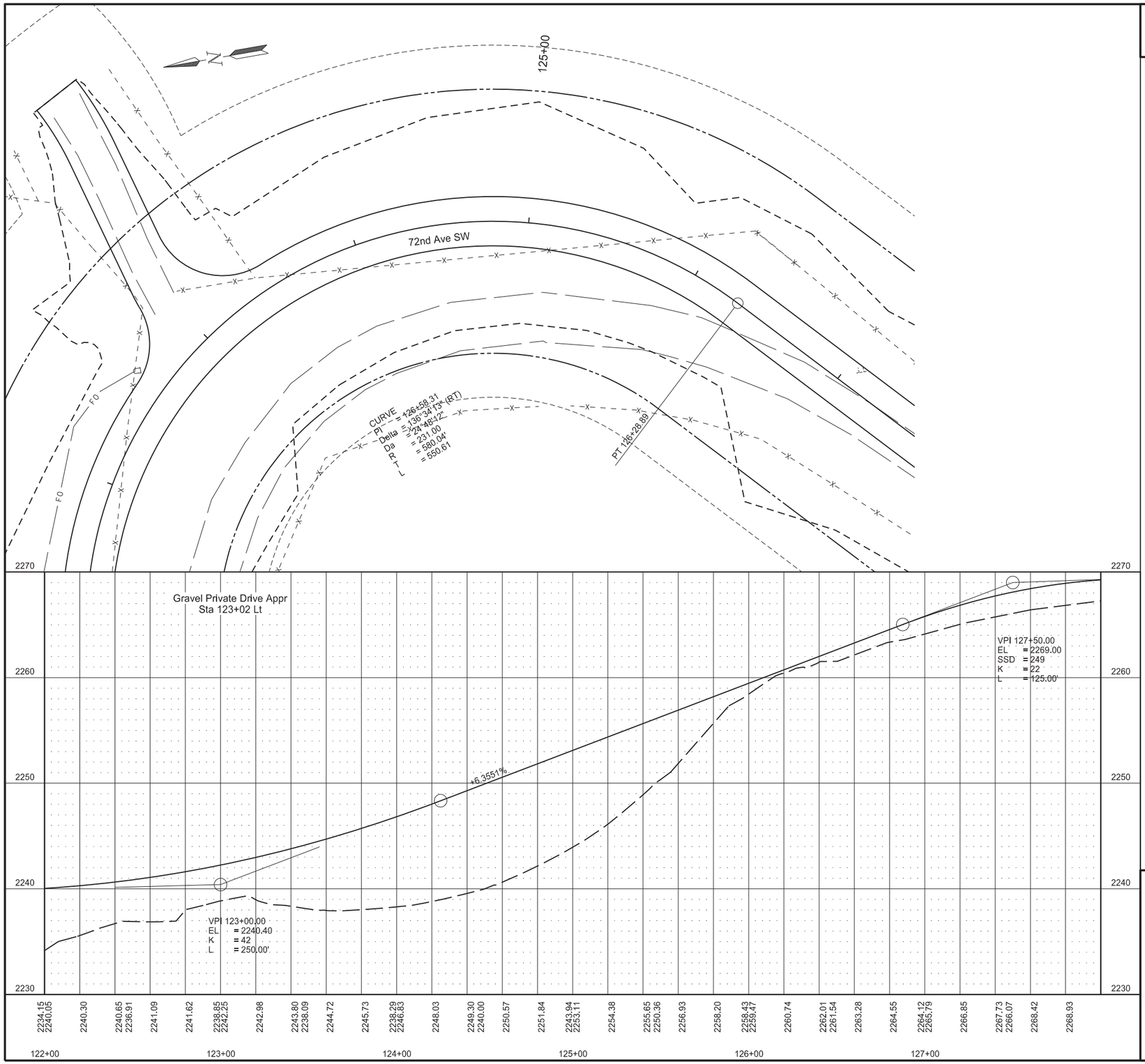
Plan & Profile

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:48:59 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\060PP_001.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	60	5

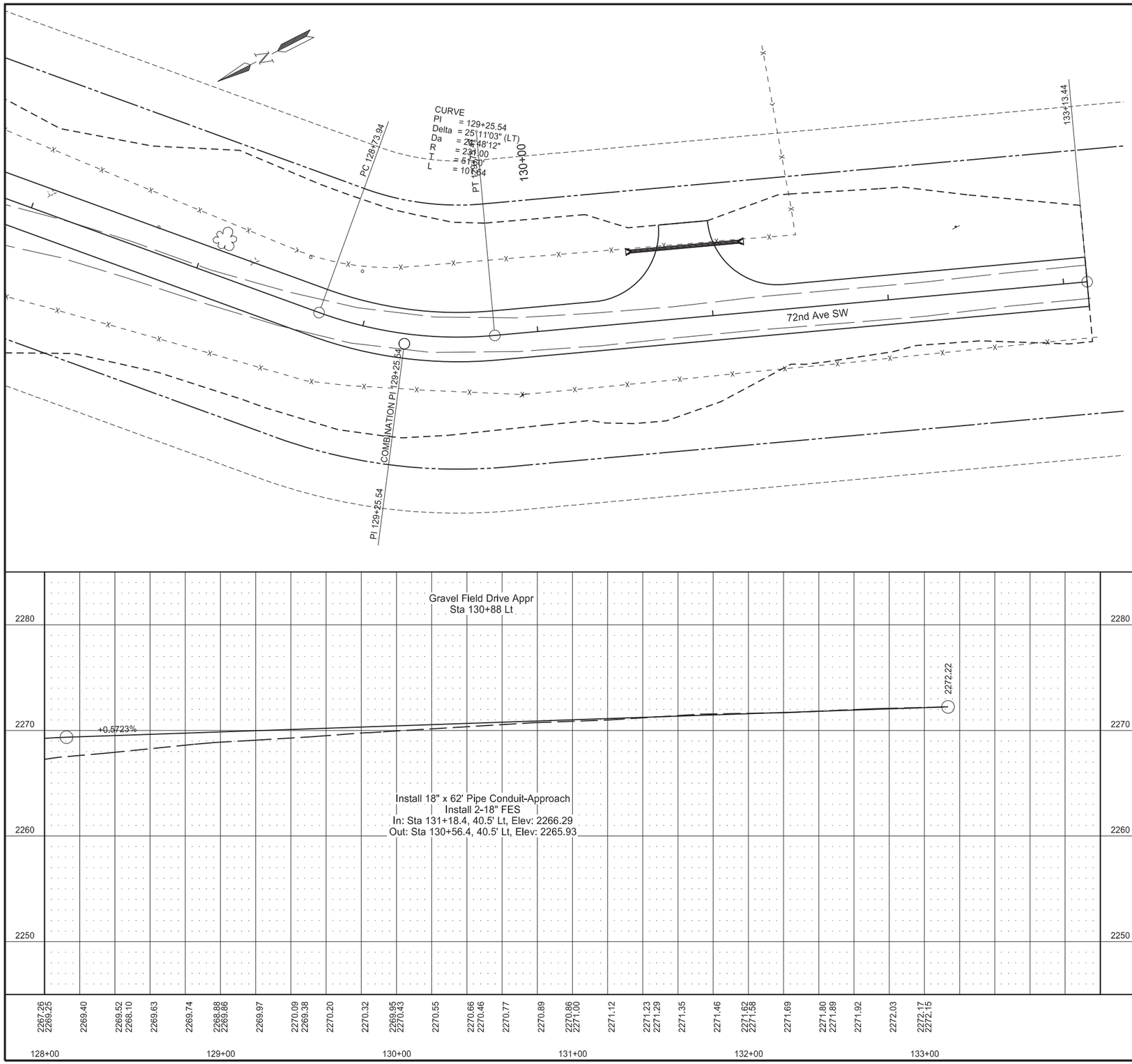


Grant County

Plan & Profile

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	60	6

SPEC	CODE	BID ITEM	QUANTITY	UNIT
714	4099	**PIPE CONDUIT 18IN-APPROACH**		
		Sta 130+88 Lt	62	LF

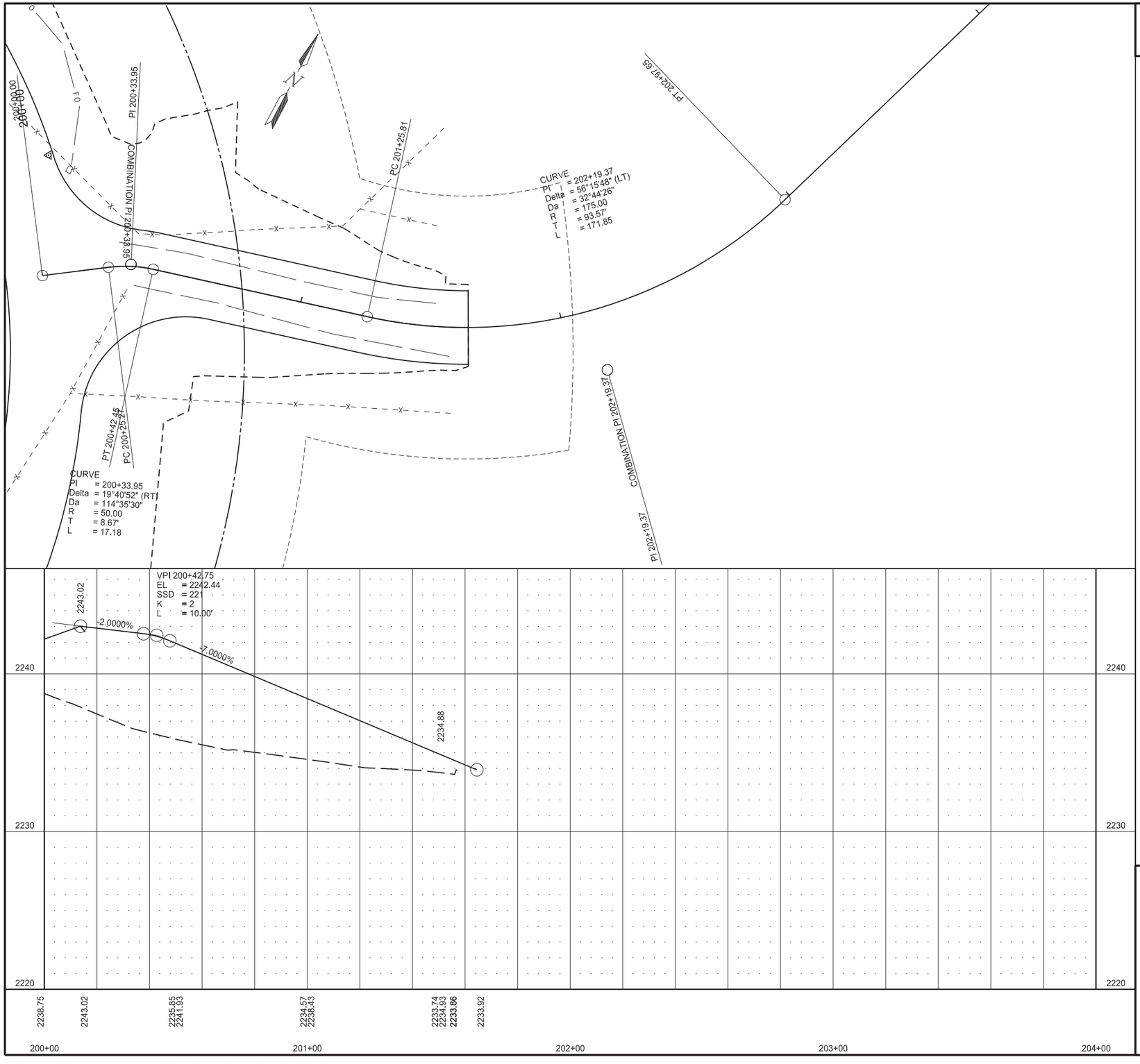
Grant County

Plan & Profile

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	60	7



Grant County

Plan & Profile

Cannonball River Structure Replacement Approach

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	75	1

Other Waters Impact Table

Other Waters											Other Water Mitigation				
			Size				Impacts to Other Waters				Mitigation Required				
							Acre(s)		Linear Feet						
Number	Location	Type	Acre(s)	Linear Feet	Feature	USACE Jurisdictional[1]	Temp	Perm	Temp	Perm	EO 11990	USACE	USFWS	Mitigation Location; ratio	Method
OW 1	Sec.18, T133N, R89W	River	3.19	1162	Natural	Yes	0.05	0.42	20	176	N	N	N	NA	NA
OW 2-d	Sec 18, T133N, R89W	Ephemeral Drainage Swale	0.13	84		Yes	0.00	0.00	0	0	N	N	N	NA	NA
OW 4-d	Sec 18, T133N, R89W	Ephemeral Drainage Swale	0.03	73		No	0..00	0.00	0	0	N	N	N	NA	NA
		Totals	**3.35**	**1319**			**0.05**	**0.42**	**20**	**176**					

[1] A wetland Jurisdictional Determination was issued by the USACE on 7/12/2024; NWO-2024-00892-BIS.

Impact Summary Table			
Permanent Impact Summary		**Temporary Impacts and additional information**	
Wetland Type	**Total (Acres)**	**Wetland Type**	**Total (Acres/Lf)**
Natural/JD	0.00	**Temporary JD**	0.00
Natural/Non-JD	0.00	**Non-JD Temporary**	0.00
Artificial/JD	0.00	**Permanent JD > 0.10**	0.00
Artificial /Non-JD	0.00	**Permanent OW**	0.42 ac/176 ft.
Total	**0.00**	**Temporary OW**	0.05/20

Mitigation Summary Table					
	Location	**Onsite Acre(s)**	**11990 Bank Acre(s)**	**USACE/11990 Bank Acre(s)**	**USFWS Bank Acre(s)**
USACE Only	NA	---		---	
EO 11990 Only	NA	---	---		
USACE/11990	Ducks Unlimited	---		0.84	
USFWS	NA				---
	Total	**0**	**0**	**0.84**	**0**

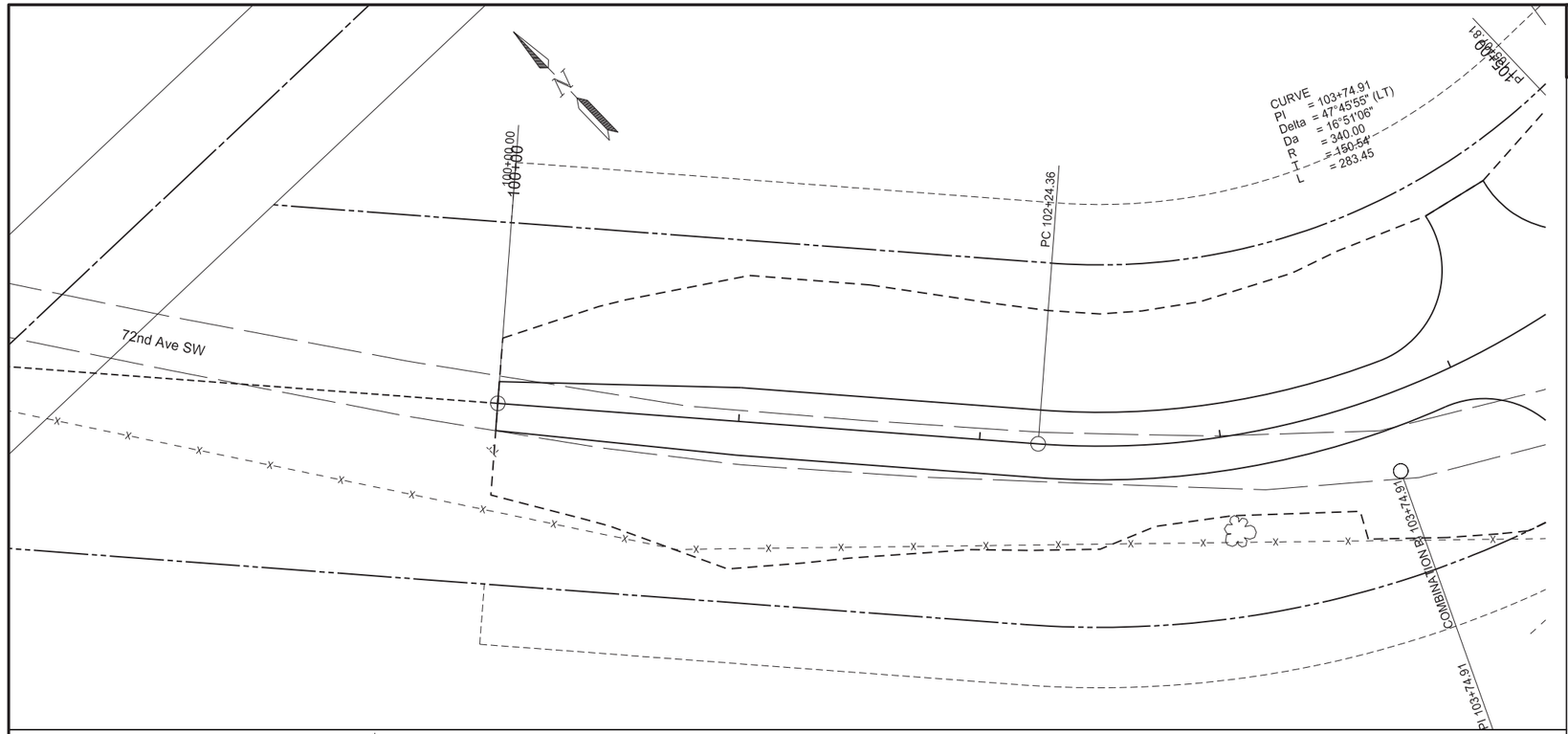
REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

Grant County

Cannonball River Structure Replacement

Wetland Impacts

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	75	2



LEGEND

- Other Water Impact Permanent
- Other Water Impact Temporary
- Existing Delineated Wetland
- Other Water D
- Other Water

Grant County

Wetland Impacts

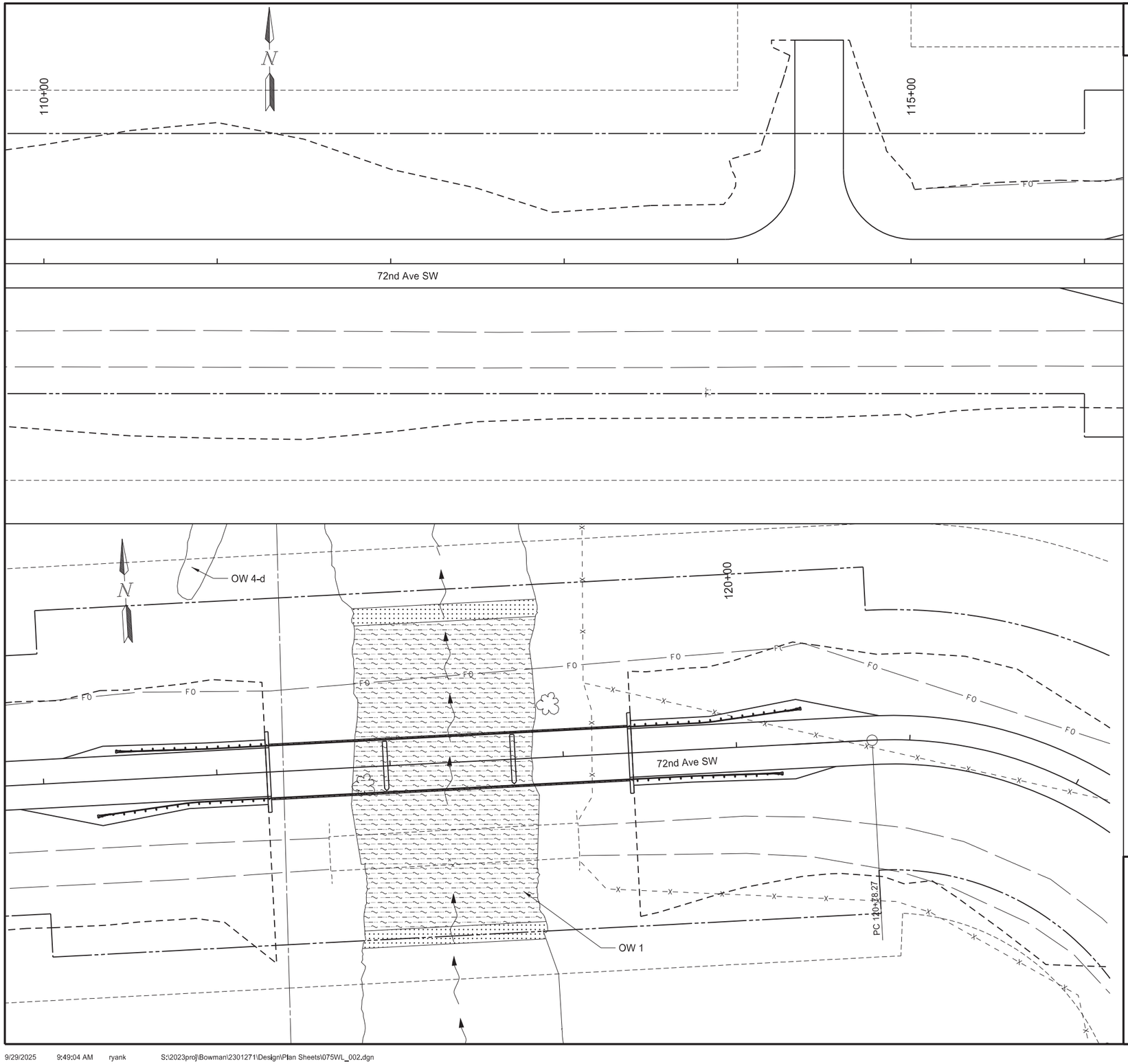
Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:04 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\075WL_002.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	75	3

Wetland Impacts		
STA 110+00 to 122+00		
Number	Temporary Impact (Acres)	Permanent Impact (Acres)
OW 1	0.05	0.42
OW 4-d	0.00	0.00



LEGEND

- Other Water Impact Permanent
- Other Water Impact Temporary
- Existing Delineated Wetland
- Other Water D
- Other Water

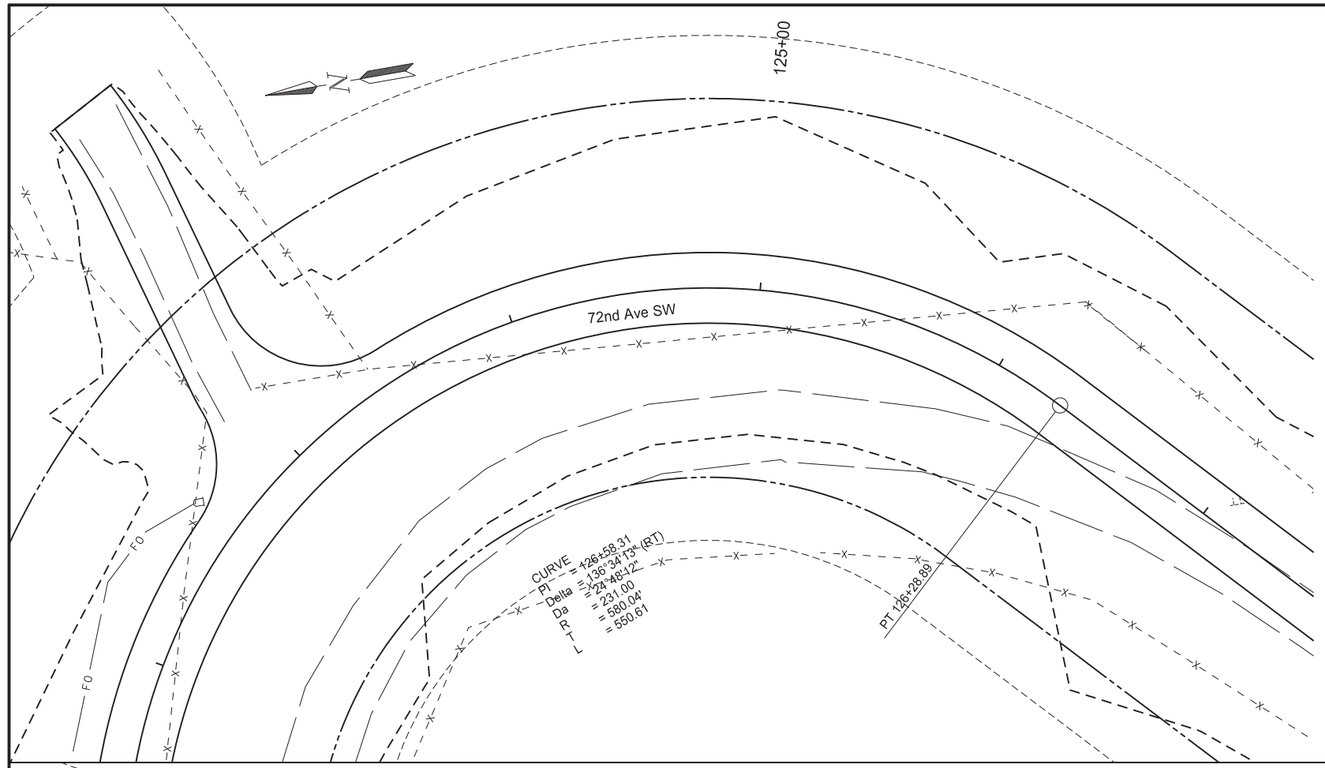
Grant County

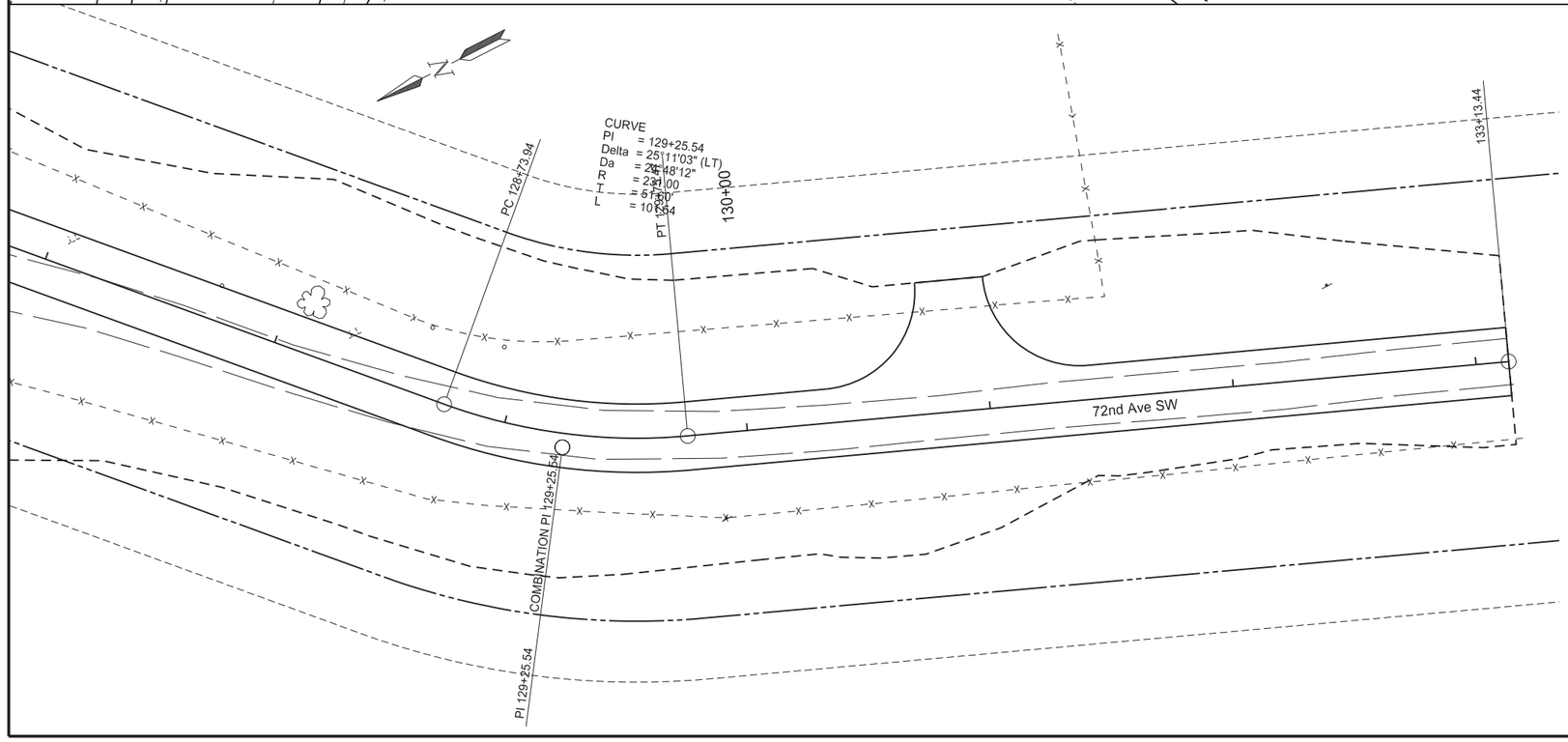
Wetland Impacts

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:04 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\075WL_002.dgn





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	75	4

LEGEND

- Other Water Impact Permanent
- Other Water Impact Temporary
- Existing Delineated Wetland
- Other Water D
- Other Water

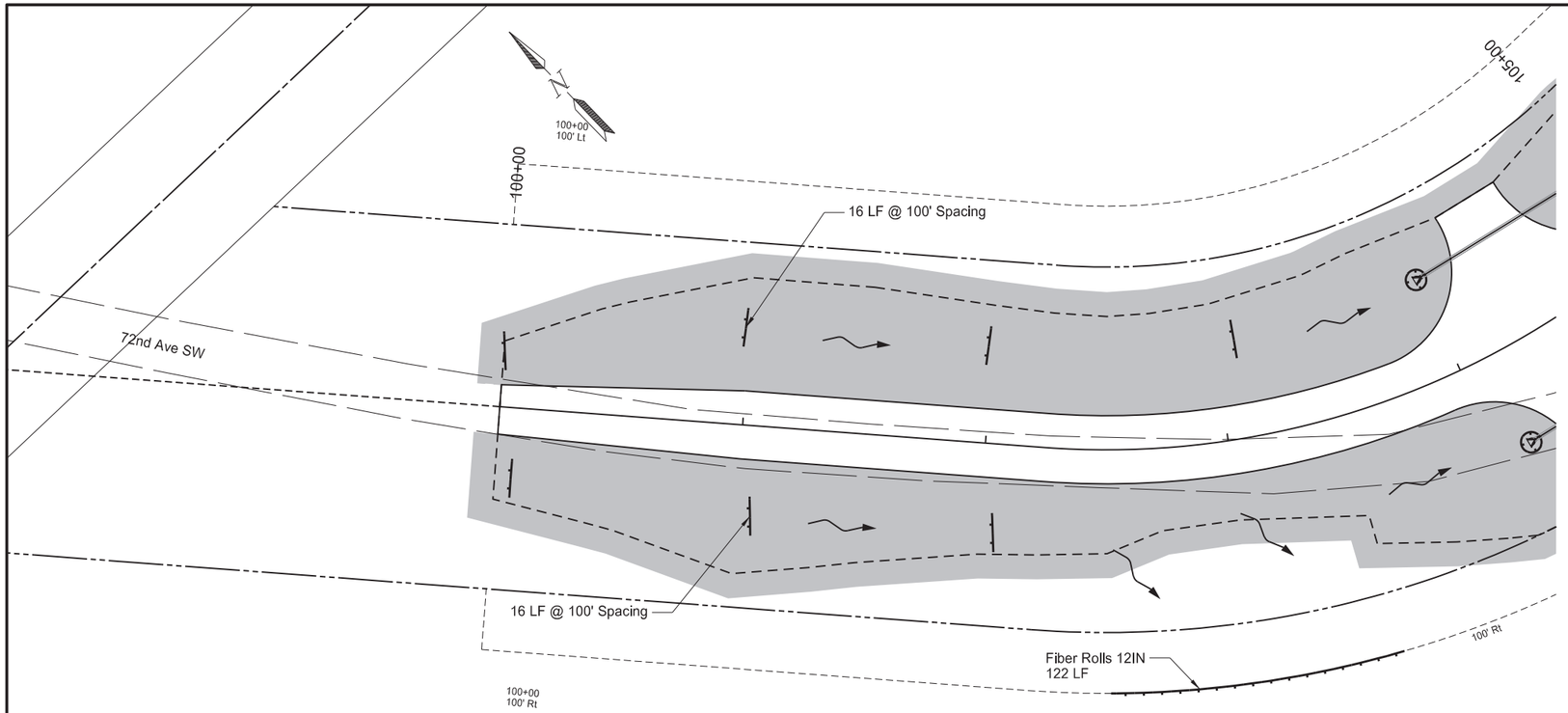
Grant County

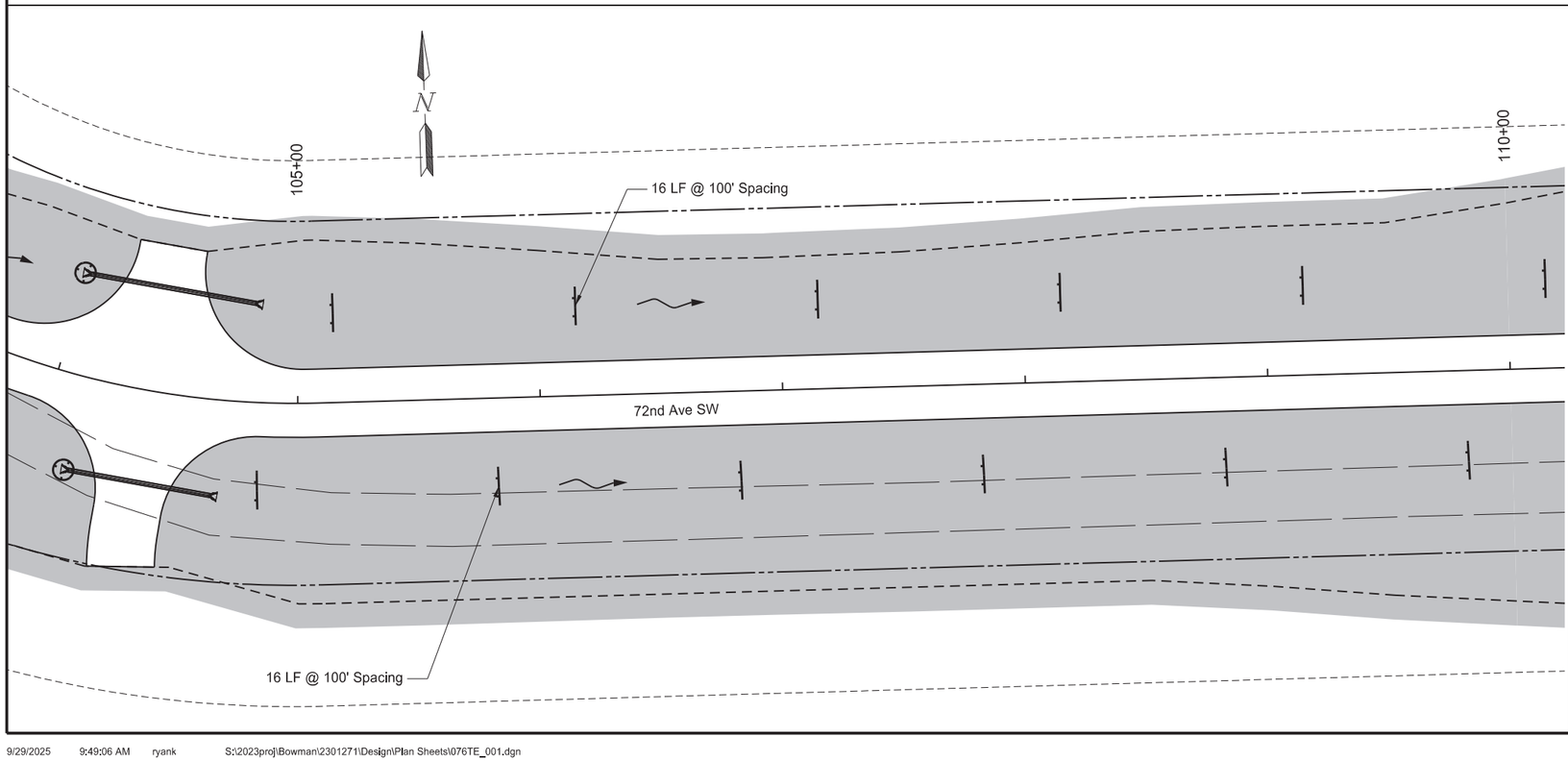
Wetland Impacts

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:05 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\075WL_002.dgn





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	76	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	**TEMPORARY COVER CROP**		
		STA 100+00 to 110+00 LT	1.2	ACRE
		STA 100+00 to 110+00 RT	1.5	ACRE
253	0101	**STRAW MULCH**		
		STA 100+00 to 110+00 LT	1.2	ACRE
		STA 100+00 to 110+00 RT	1.5	ACRE
261	0112	**FIBER ROLLS 12 IN**		
		STA 100+00 to 110+00 LT	144	LF
		STA 100+00 to 110+00 RT	266	LF
		Culvert Inlet Locations (32 LF EA)	64	LF
261	0113	**REMOVE FIBER ROLLS 12 IN**		
		STA 100+00 to 110+00 LT	144	LF
		STA 100+00 to 110+00 RT	266	LF
		Culvert Inlet Locations (32 LF EA)	64	LF

DITCH FIBER ROLL SPACING	
Ditch Grade	Spacing
1%	200
2%	100
3%	65
4%	50
5%	40

LEGEND

- Fiber Rolls 12IN
- S — Flotation Silt Curtain
- Flow Arrow
- Temporary Cover Crop & Straw Mulch

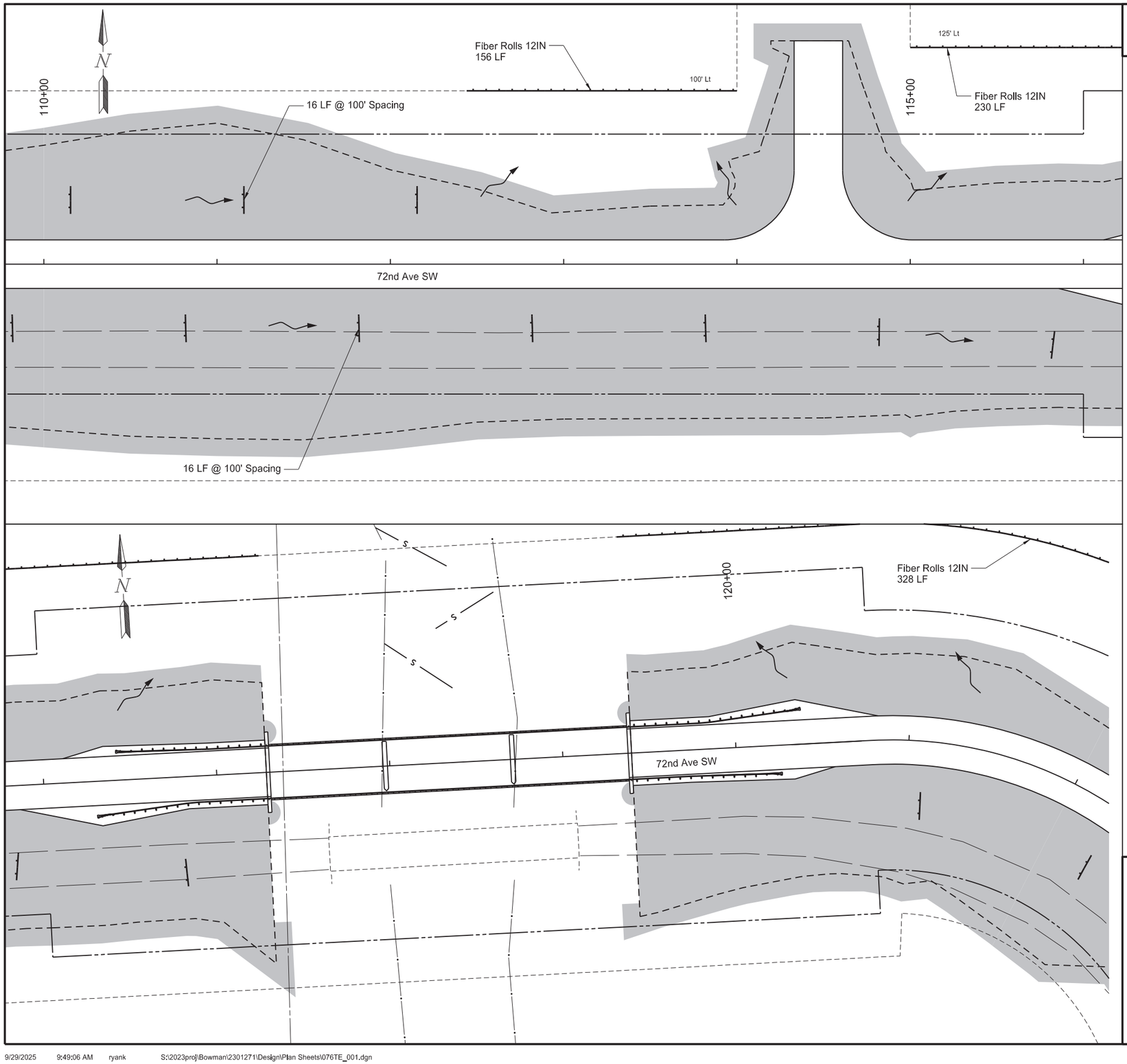
Grant County

Temporary Erosion Control

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:06 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\076TE_001.dgn



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	76	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	**TEMPORARY COVER CROP**		
		STA 110+00 to 122+00 LT	1.1	ACRE
		STA 110+00 to 122+00 RT	1.9	ACRE
253	0101	**STRAW MULCH**		
		STA 110+00 to 122+00 LT	1.1	ACRE
		STA 110+00 to 122+00 RT	1.9	ACRE
261	0112	**FIBER ROLLS 12 IN**		
		STA 110+00 to 122+00 LT	762	LF
		STA 110+00 to 122+00 RT	128	LF
261	0113	**REMOVE FIBER ROLLS 12 IN**		
		STA 110+00 to 122+00 LT	762	LF
		STA 110+00 to 122+00 RT	128	LF
262	0100	**FLOTATION SILT CURTAIN**		
		STA 110+00 to 122+00 LT	160	LF
262	0101	**REMOVE FLOTATION SILT CURTAIN**		
		STA 110+00 to 122+00 LT	160	LF

DITCH FIBER ROLL SPACING	
Ditch Grade	Spacing
1%	200
2%	100
3%	65
4%	50
5%	40

LEGEND

- Fiber Rolls 12IN
- S — Flotation Silt Curtain
- Flow Arrow
- Temporary Cover Crop & Straw Mulch

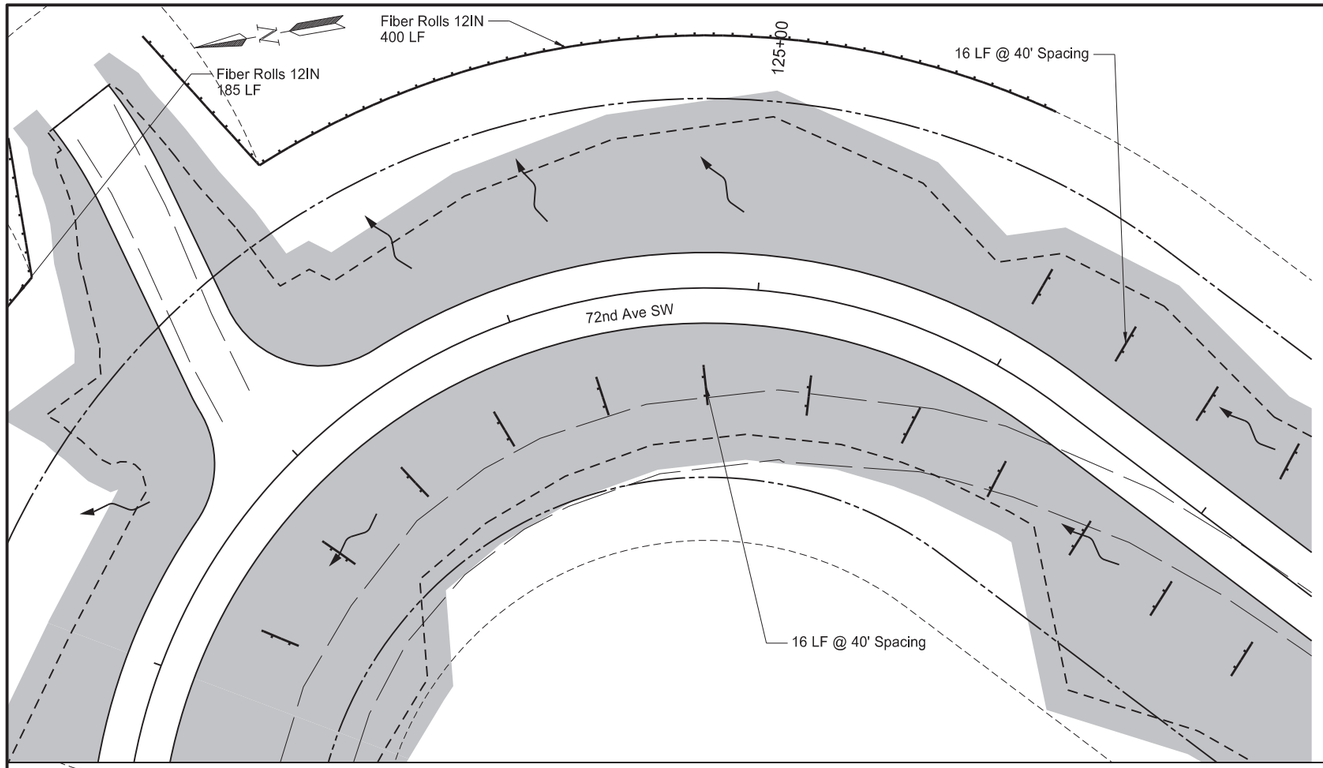
Grant County

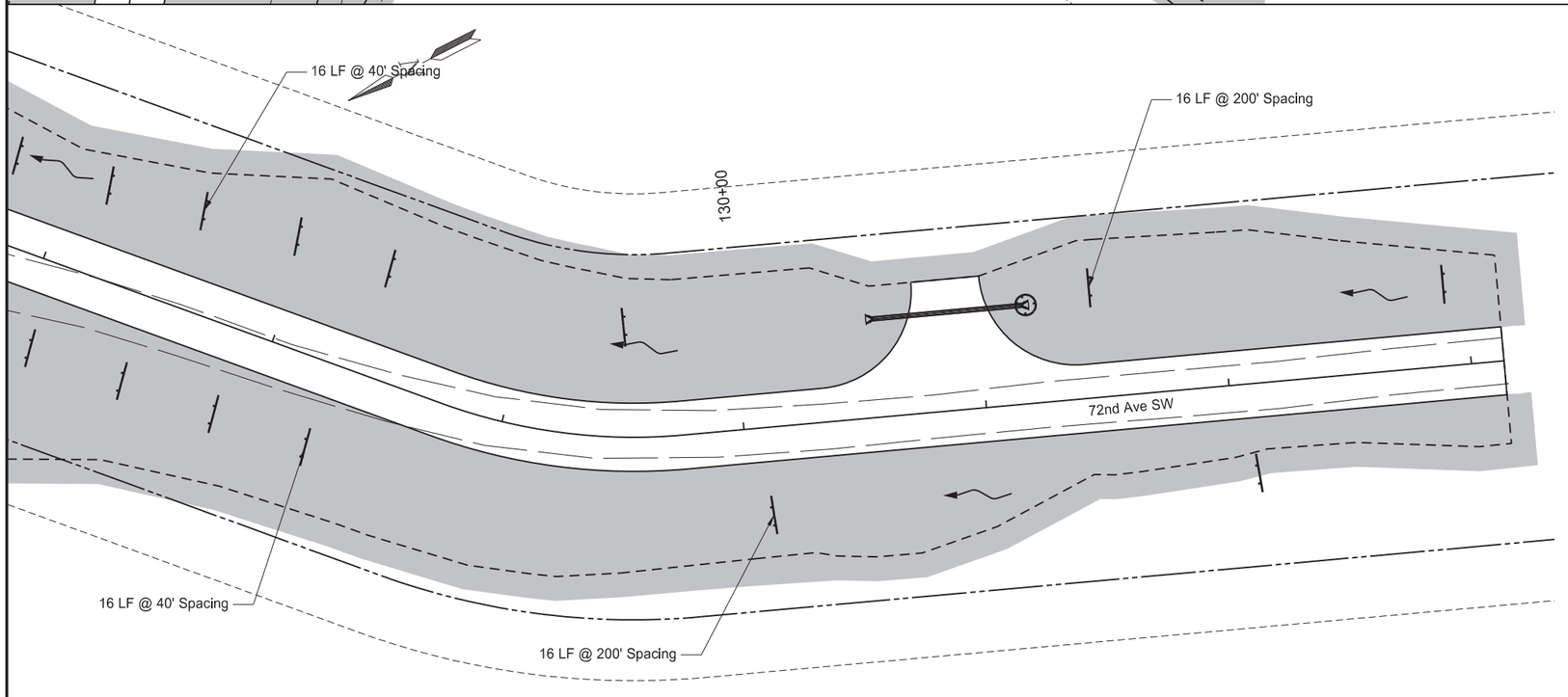
Temporary Erosion Control

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:06 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\076TE_001.dgn





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	76	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	2000	**TEMPORARY COVER CROP**		
		STA 122+00 to 133+13 LT	1.5	ACRE
		STA 122+00 to 133+13 RT	1.3	ACRE
253	0101	**STRAW MULCH**		
		STA 122+00 to 133+13 LT	1.5	ACRE
		STA 122+00 to 133+13 RT	1.3	ACRE
261	0112	**FIBER ROLLS 12 IN**		
		STA 122+00 to 133+13 LT	745	LF
		STA 122+00 to 133+13 RT	256	LF
		Culvert Inlet Locations (32 LF EA)	32	LF
261	0113	**REMOVE FIBER ROLLS 12 IN**		
		STA 122+00 to 133+13 LT	745	LF
		STA 122+00 to 133+13 RT	256	LF
		Culvert Inlet Locations (32 LF EA)	32	LF

DITCH FIBER ROLL SPACING	
Ditch Grade	Spacing
1%	200
2%	100
3%	65
4%	50
5%	40

LEGEND

- Fiber Rolls 12IN
- S — Flotation Silt Curtain
- Flow Arrow
- Temporary Cover Crop & Straw Mulch

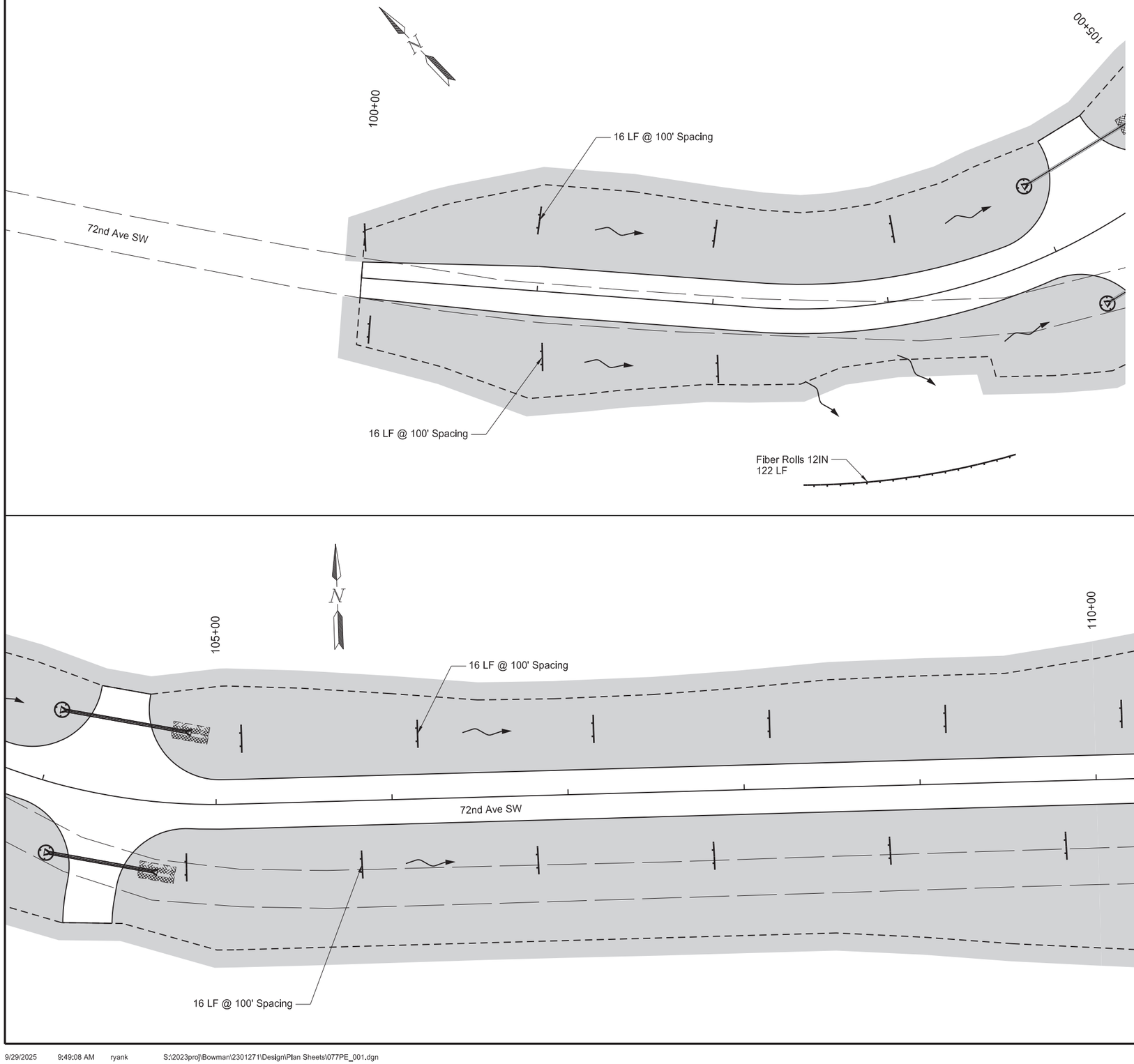
Grant County

Temporary Erosion Control

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:07 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\076TE_001.dgn



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	77	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	**SEEDING CLASS II**		
		STA 100+00 to 110+00 LT	1.2	ACRE
		STA 100+00 to 110+00 RT	1.5	ACRE
253	0101	**STRAW MULCH**		
		STA 100+00 to 110+00 LT	1.2	ACRE
		STA 100+00 to 110+00 RT	1.5	ACRE
255	0102	**ECB TYPE 2**		
		STA 100+00 to 110+00 LT	22	SY
		STA 100+00 to 110+00 RT	22	SY
261	0112	**FIBER ROLLS 12 IN**		
		STA 100+00 to 110+00 LT	144	LF
		STA 100+00 to 110+00 RT	266	LF
		Culvert Inlet Locations (32 LF EA)	64	LF

DITCH FIBER ROLL SPACING	
Ditch Grade	Spacing
1%	200
2%	100
3%	65
4%	50
5%	40

LEGEND

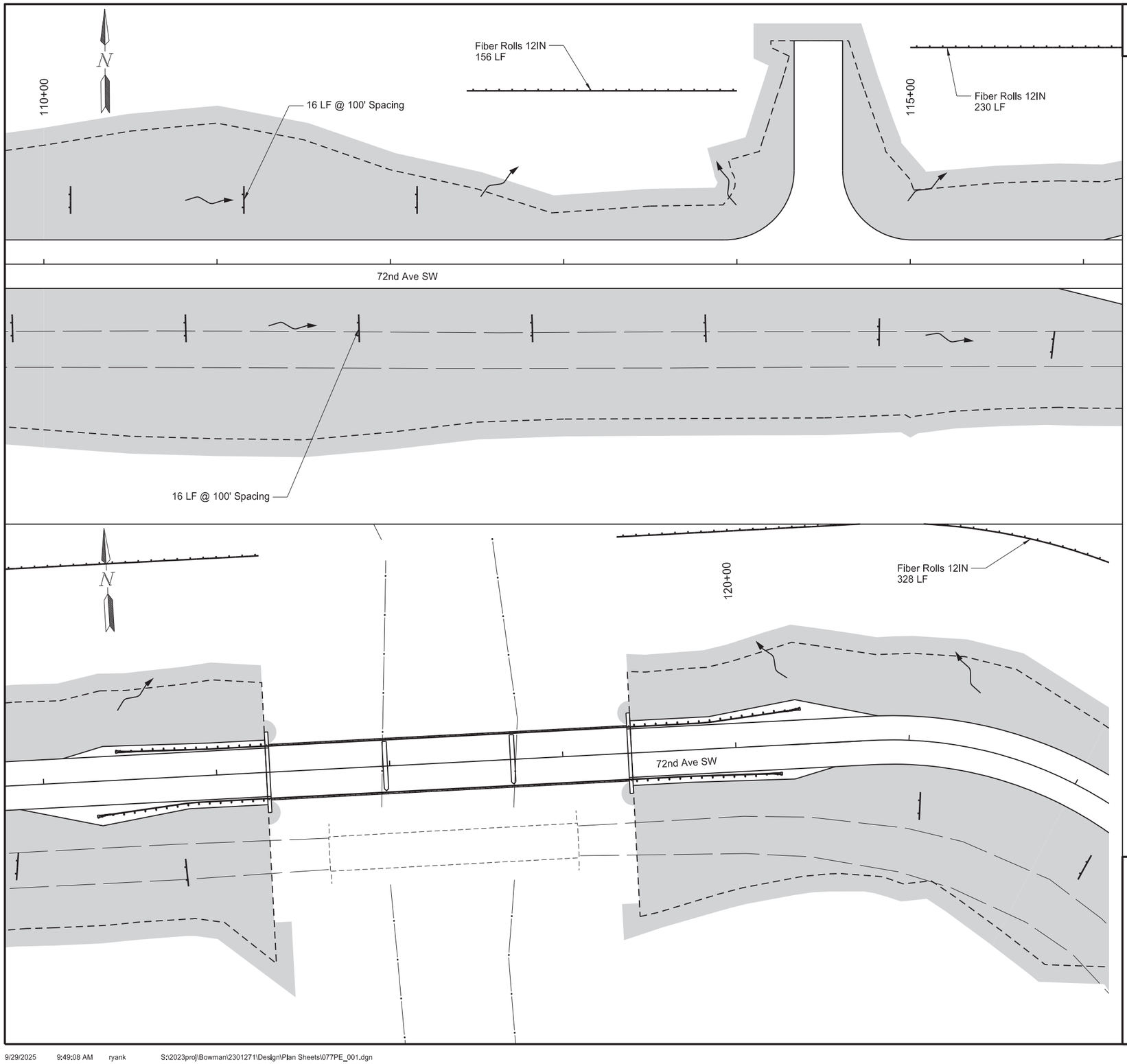
- Fiber Rolls 12IN
- Flow Arrow
- Seeding Class III & Straw Mulch
- ECB Type 2

Grant County

Permanent Erosion Control

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA



STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	77	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	**SEEDING CLASS II**		
		STA 110+00 to 122+00 LT	1.1	ACRE
		STA 110+00 to 122+00 RT	1.9	ACRE
253	0101	**STRAW MULCH**		
		STA 110+00 to 122+00 LT	1.1	ACRE
		STA 110+00 to 122+00 RT	1.9	ACRE
261	0112	**FIBER ROLLS 12 IN**		
		STA 110+00 to 122+00 LT	762	LF
		STA 110+00 to 122+00 RT	128	LF

DITCH FIBER ROLL SPACING	
Ditch Grade	Spacing
1%	200
2%	100
3%	65
4%	50
5%	40

LEGEND

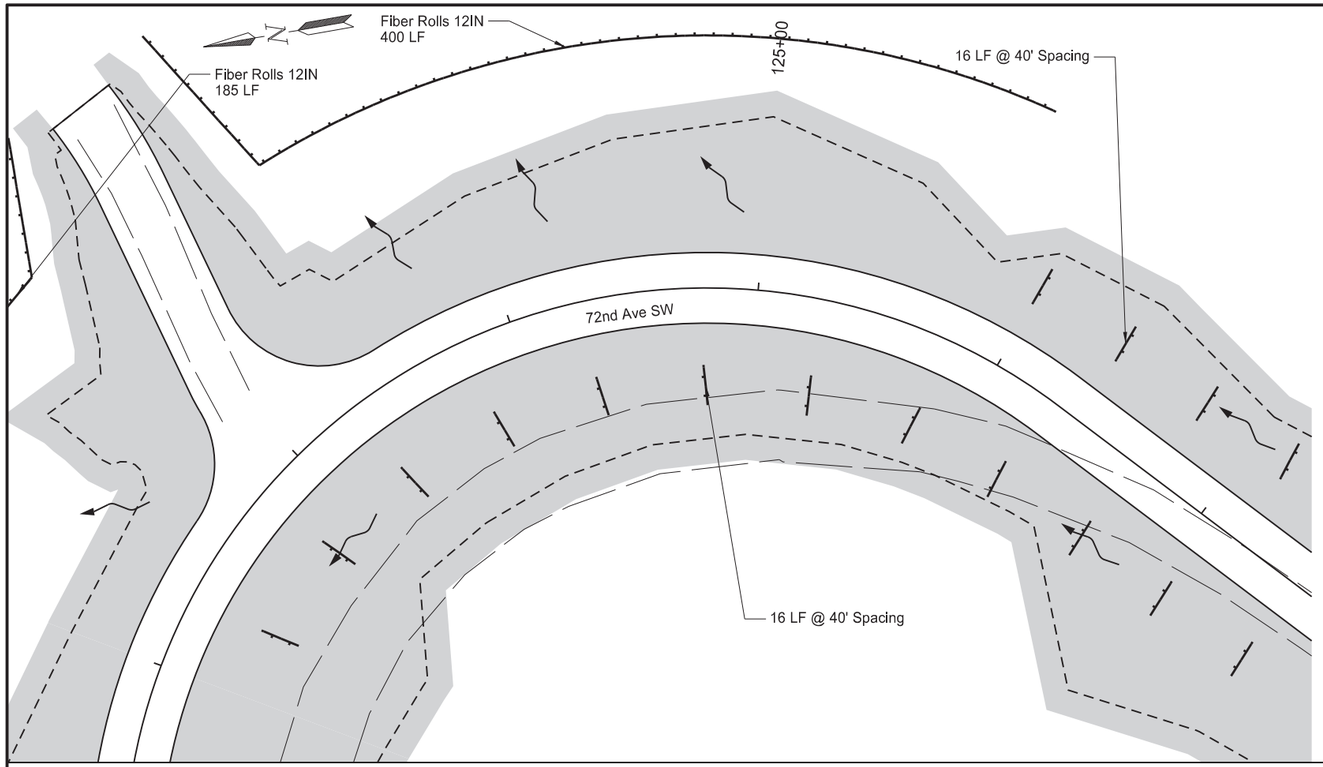
- Fiber Rolls 12IN
- Flow Arrow
- Seeding Class III & Straw Mulch
- ECB Type 2

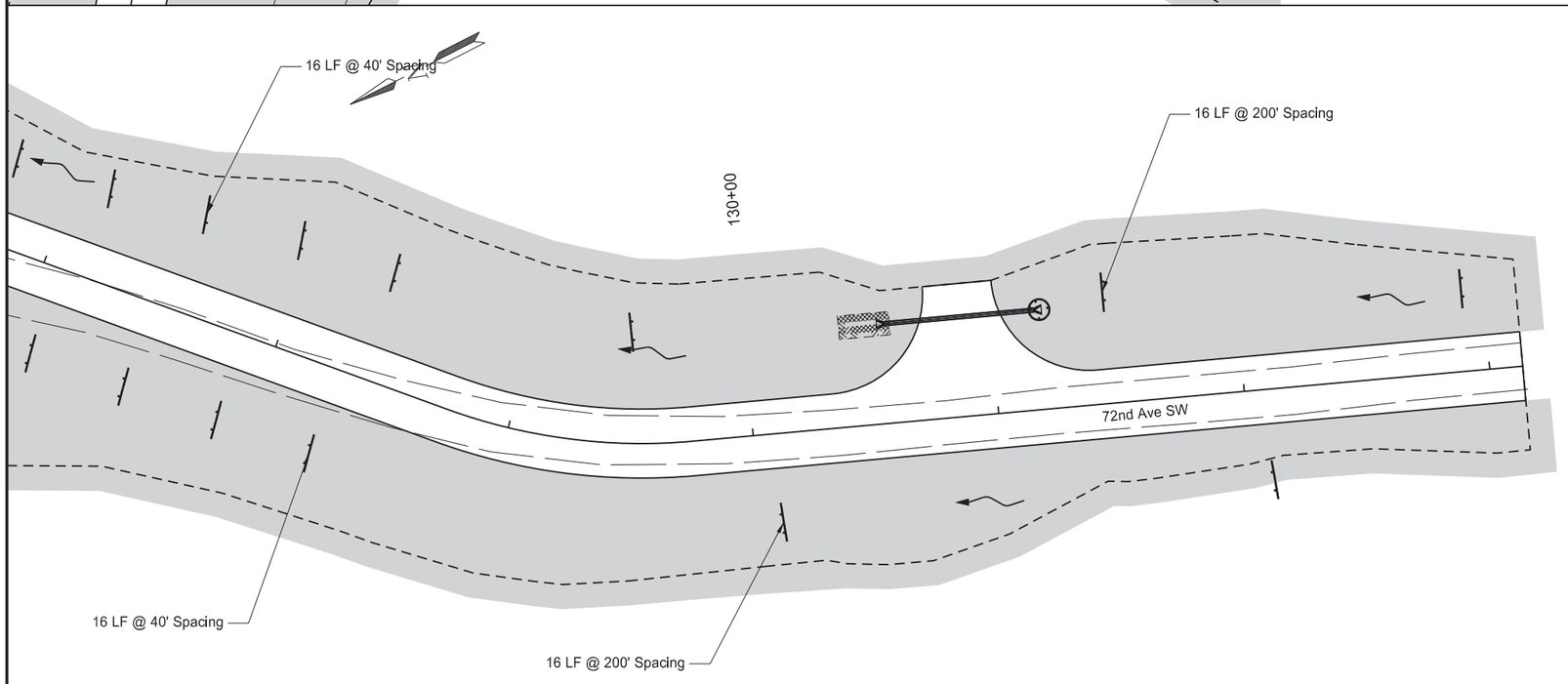
Grant County

Permanent Erosion Control

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA





STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	77	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
251	0200	**SEEDING CLASS II**		
		STA 122+00 to 133+13 LT	1.5	ACRE
		STA 122+00 to 133+13 RT	1.3	ACRE
253	0101	**STRAW MULCH**		
		STA 122+00 to 133+13 LT	1.5	ACRE
		STA 122+00 to 133+13 RT	1.3	ACRE
255	0102	**ECB TYPE 2**		
		STA 122+00 to 133+13 LT	22	SY
261	0112	**FIBER ROLLS 12 IN**		
		STA 122+00 to 133+13 LT	745	LF
		STA 122+00 to 133+13 RT	256	LF
		Culvert Inlet Locations (32 LF EA)	32	LF

DITCH FIBER ROLL SPACING	
Ditch Grade	Spacing
1%	200
2%	100
3%	65
4%	50
5%	40

LEGEND

- Fiber Rolls 12IN
- Flow Arrow
- Seeding Class III & Straw Mulch
- ECB Type 2

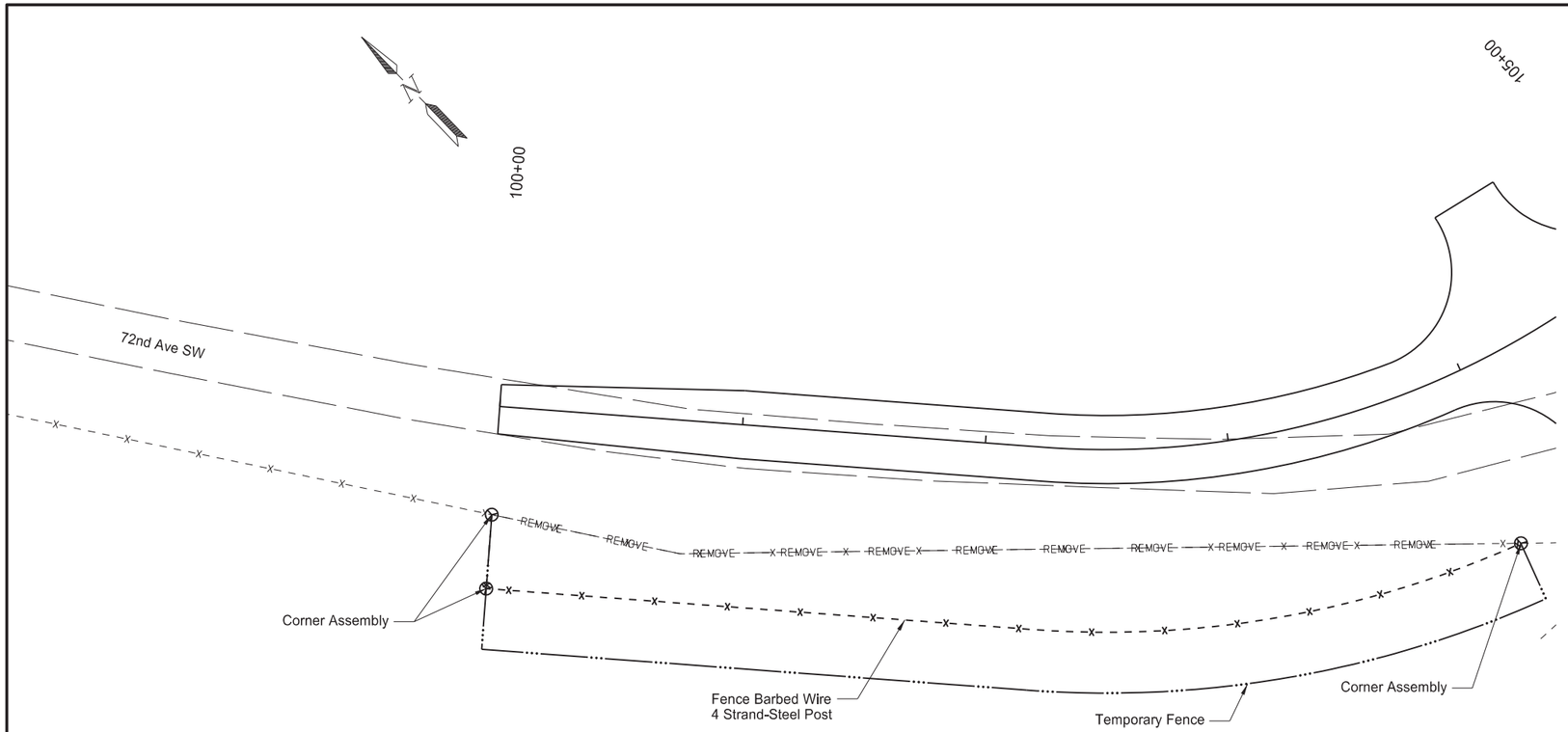
Grant County

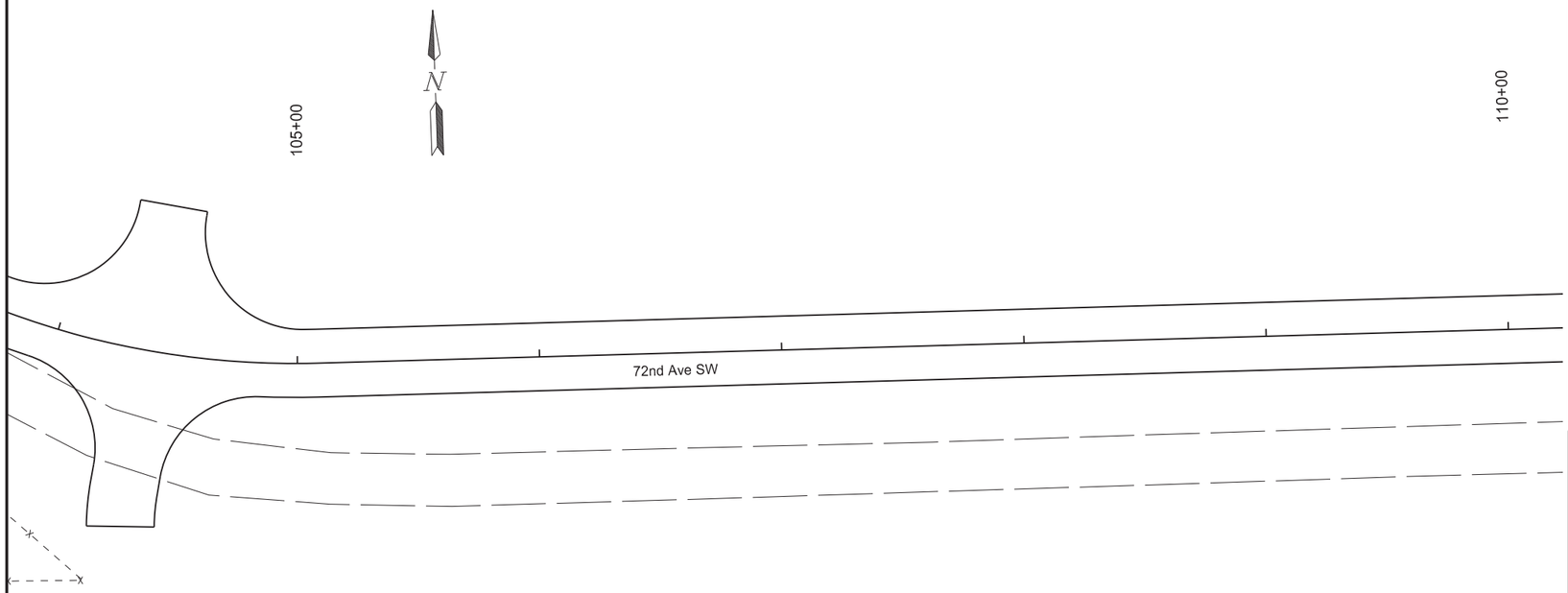
Permanent Erosion Control

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:08 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\077PE_001.dgn





	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	80	1

SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0312	**REMOVE EXISTING FENCE**		
		STA 100+00 to 103+94 Rt	425	LF
752	0320	**FENCE BARBED WIRE 4 STRAND-STEEL POST**		
		STA 100+00 to 103+94 Rt	461	LF
752	0905	**TEMPORARY FENCE**		
		STA 100+00 to 103+94 Rt	524	LF
752	3150	**CORNER ASSEMBLY BARBED WIRE-WOOD POST**		
		STA 100+00, 45' Rt	1	EA
		STA 100+00, 75' Rt	1	EA
		STA 103+94, 75' Rt	1	EA

LEGEND

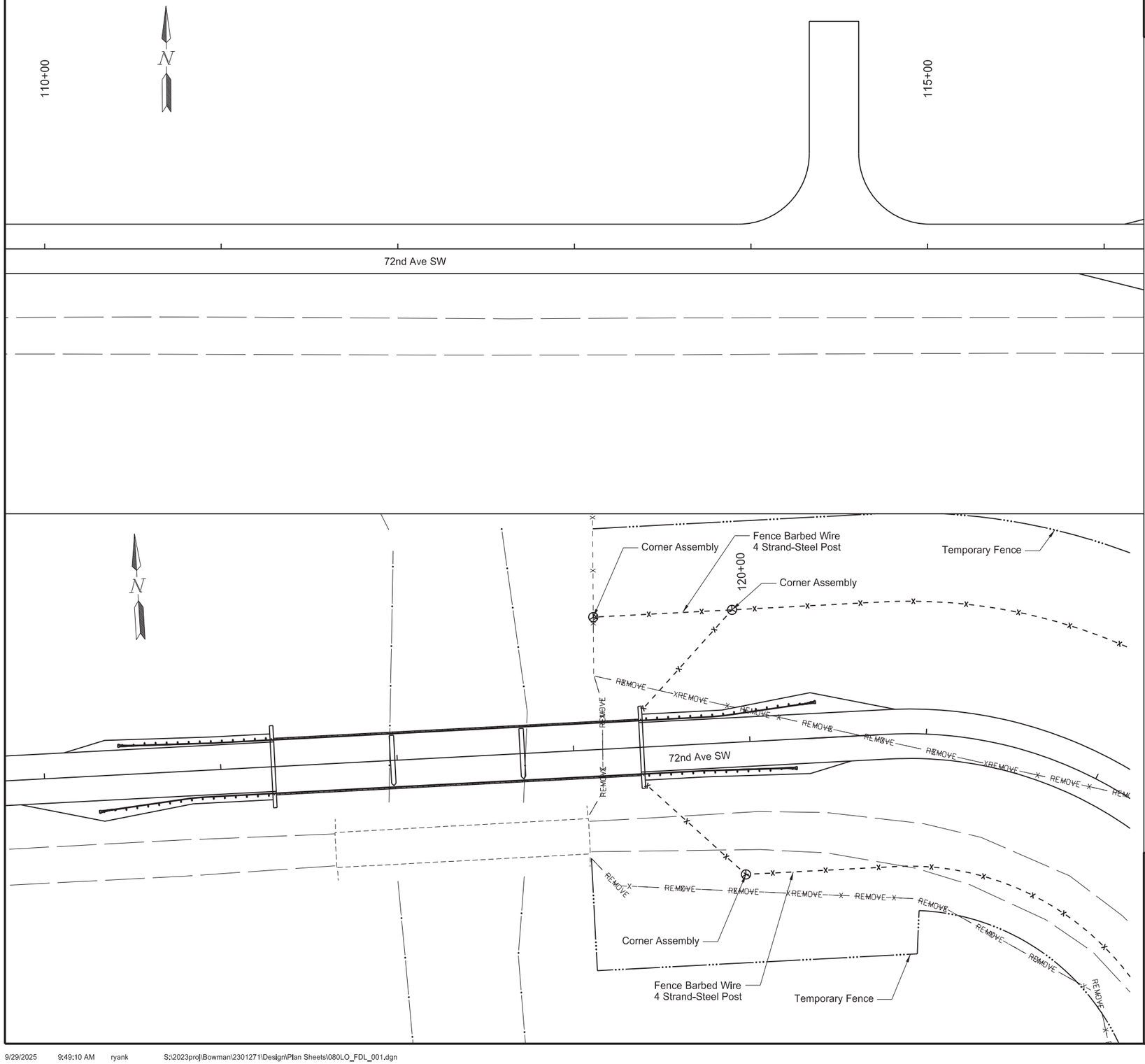
- REMOVE — Remove Existing Fence
- x– – – –x– Fence Barbed Wire
- Temporary Fence
- Corner Assembly & Double Brace Assembly

Grant County

Fencing Layout

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	80	2

SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0312	**REMOVE EXISTING FENCE**		
		STA 119+15 to 122+00 Lt	503	LF
		STA 119+06 to 122+00 Rt	289	LF
752	0320	**FENCE BARBED WIRE 4 STRAND-STEEL POST**		
		STA 119+15 to 122+00 Lt	402	LF
		STA 119+40 to 122+00 Rt	244	LF
752	0905	**TEMPORARY FENCE**		
		STA 119+07 to 122+00 Rt	326	LF
		STA 119+17 to 122+00 Lt	348	LF
752	3150	**CORNER ASSEMBLY BARBED WIRE-WOOD POST**		
		STA 119+15, 75' Lt	1	EA
		STA 119+94, 75' Lt	1	EA
		STA 119+94, 75' Rt	1	EA

LEGEND

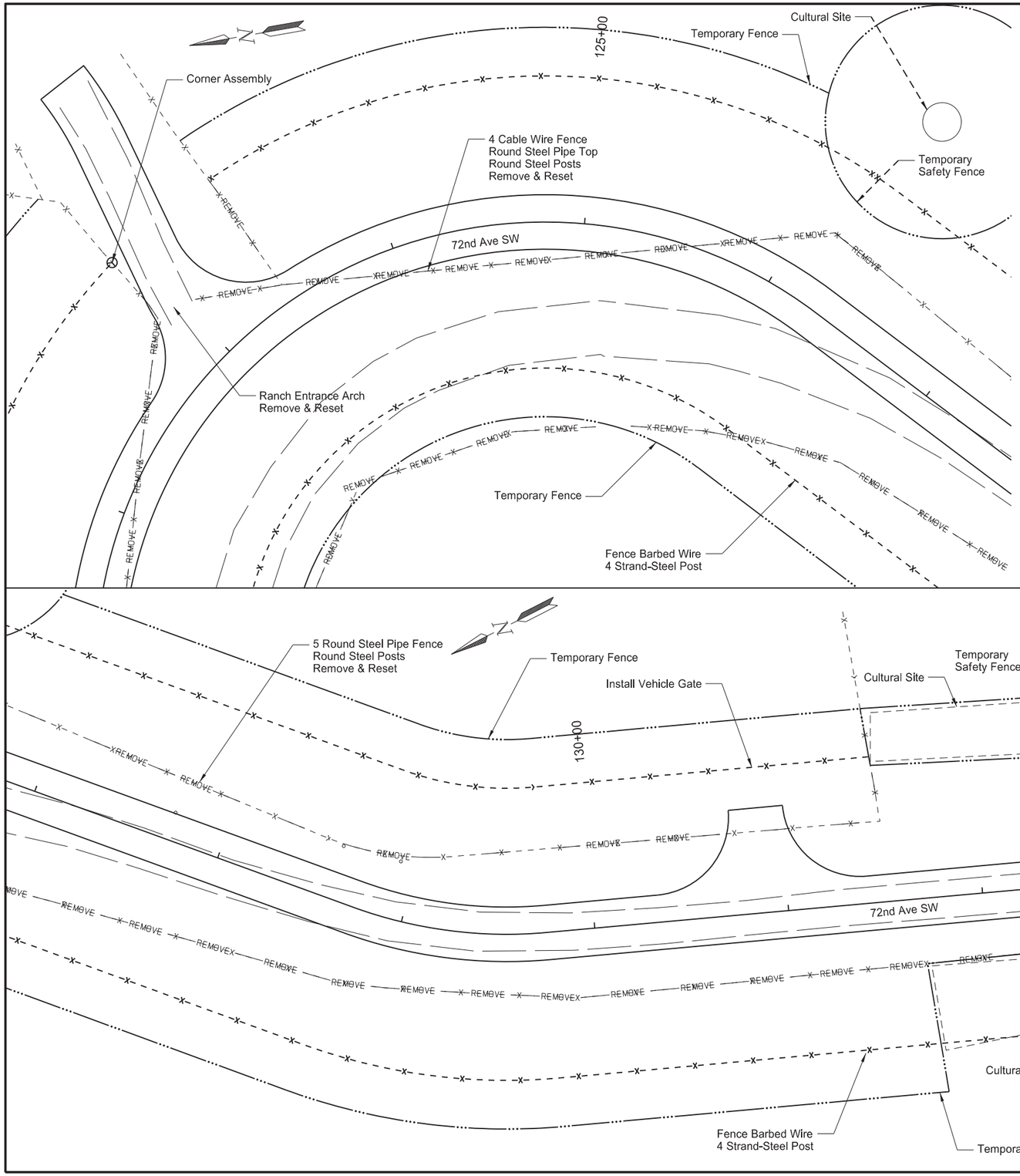
- REMOVE — Remove Existing Fence
- x– – – –x– Fence Barbed Wire
- Temporary Fence
- Corner Assembly & Double Brace Assembly

Grant County

Fencing Layout

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	80	3

SPEC	CODE	BID ITEM	QUANTITY	UNIT
202	0312	**REMOVE EXISTING FENCE**		
		STA 122+00 to 133+16 Rt	937	LF
752	0320	**FENCE BARBED WIRE 4 STRAND-STEEL POST**		
		STA 122+00 to 131+16 Rt	1053	LF
752	0905	**TEMPORARY FENCE**		
		STA 122+00 to 133+16 Rt	1047	LF
		STA 122+00 to 122+90 Lt	139	LF
		STA 123+41 to 125+85 Lt	351	LF
		STA 126+79 to 131+46 Lt	423	LF
752	0911	**TEMPORARY SAFETY FENCE**		
		STA 126+24 Lt (Cultural Site Perimeter)	377	LF
		STA 131+46 to 133+67 Lt (Cultural Site Perimeter)	503	LF
752	0922	**FENCE REMOVE & RESET**		
		STA 122+00 to 122+92 Lt	140	LF
		STA 123+05 to 131+48 Lt	888	LF
		STA 123+41 to 123+42 Lt	66	LF
752	2100	**GATE-VEHICLE**		
		STA 130+88, 75' Lt	1	EA
752	3150	**CORNER ASSEMBLY BARBED WIRE-WOOD POST**		
		STA 122+92, 75' Lt	1	EA
		STA 133+16, 32' Rt	1	EA
		STA 133+16, 75' Rt	1	EA

LEGEND

- REMOVE — Remove Existing Fence
- Fence Barbed Wire
- Temporary Fence
- Corner Assembly & Double Brace Assembly

Grant County

Fencing Layout

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	100	1

SIGN NUMBER	SIGN SIZE	DESCRIPTION	AMOUNT REQUIRED	UNITS PER AMOUNT	UNITS SUB TOTAL
E5-1-48	48"x48"	EXIT GORE		35	
G20-1-60	60"x24"	ROAD WORK NEXT __ MILES		28	
G20-1b-60	60"x24"	NO WORK IN PROGRESS (Sign and installation only)		18	
G20-2-48	**48"x24"**	**END ROAD WORK**	**2**	**26**	**52**
G20-4-36	36"x18"	PILOT CAR FOLLOW ME (Mounted to back of pilot car)		18	
G20-4b-36	36"x30"	WAIT FOR PILOT CAR		18	
G20-50a-72	72"x36"	ROAD WORK NEXT __ MILES RT & LT ARROWS		43	
G20-52a-72	72"x24"	ROAD WORK NEXT __ MILES RT or LT ARROW		36	
G20-55-96	96"x48"	SPEED LIMIT ENFORCED - MINIMUM FEE $150 WHEN WORKERS PRESENT		59	
M1-1-36	36"x36"	INTERSTATE ROUTE MARKER (Post and installation only)		11	
M1-4-24	24"x24"	U.S. ROUTE MARKER (Post and installation only)		10	
M1-5-24	24"x24"	STATE ROUTE MARKER (Post and installation only)		10	
M3-1-24	24"x12"	NORTH (Mounted on route marker post)		7	
M3-2-24	24"x12"	EAST (Mounted on route marker post)		7	
M3-3-24	24"x12"	SOUTH (Mounted on route marker post)		7	
M3-4-24	24"x12"	WEST (Mounted on route marker post)		7	
M4-8-24	24"x12"	DETOUR (Mounted on route marker post)		7	
M4-9-30	30"x24"	DETOUR ARROW RIGHT or LEFT/AHD AND RT or LT		15	
M4-10-48	48"x18"	DETOUR (INSIDE ARROW) RIGHT or LEFT (Mounted on barricade)		7	
M5-1-21	21"x15"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		7	
M5-1-30	30"x21"	ADVANCE TURN ARROW RT or LT(Mounted on route marker post)		9	
M6-1-21	21"x15"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		7	
M6-1-30	30"x21"	DIRECTIONAL ARROW RT or LT (Mounted on route marker post)		9	
M6-3-21	21"x15"	DIRECTIONAL ARROW UP (Mounted on route marker post)		7	
R1-1-48	48"x48"	STOP		32	
R1-2-60	60"x60"	YIELD		29	
R2-1-36	**36"x48"**	**SPEED LIMIT __ (Portable only)**	**4**	**30**	**120**
R2-1-48	48"x60"	SPEED LIMIT __		39	
R2-1aP-24	**24"x18"**	**MINIMUM FEE $150 (Mounted on Speed Limit post)**	**2**	**10**	**20**
R3-2-48	48"x48"	NO LEFT TURN		35	
R4-1-48	48"x60"	DO NOT PASS		39	
R4-7-48	48"x60"	KEEP RIGHT		39	
R5-1-48	48"x48"	DO NOT ENTER		35	
R6-1-54	54"x18"	ONE WAY RIGHT or LEFT (Mounted on STOP or DO NOT ENTER post)		14	
R7-1-12	12"x18"	NO PARKING ANY TIME		11	
R10-6-24	24"x36"	STOP HERE ON RED		16	
R11-2-48	**48"x30"**	**ROAD CLOSED (Mounted on barricade)**	**2**	**12**	**24**
R11-2a-48	48"x30"	STREET CLOSED (Mounted on barricade)		12	
R11-3a-60	60"x30"	ROAD CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-3c-60	60"x30"	STREET CLOSED __ MILES AHEAD LOCAL TRAFFIC ONLY (Mtd on barricade)		15	
R11-4a-60	60"x30"	STREET CLOSED TO THRU TRAFFIC (Mounted on barricade)		15	
W1-3-48	48"x48"	REVERSE TURN RIGHT or LEFT		35	
W1-4-48	48"x48"	REVERSE CURVE RIGHT or LEFT		35	
W1-4b-48	48"x48"	TWO LANE REVERSE CURVE RIGHT or LEFT		35	
W1-6-48	48"x24"	ONE DIRECTION LARGE ARROW		26	
W3-1-48	48"x48"	STOP AHEAD		35	
W3-3-48	48"x48"	SIGNAL AHEAD		35	
W3-4-48	**48"x48"**	**BE PREPARED TO STOP**	**2**	**35**	**70**
W3-5-48	**48"x48"**	**SPEED REDUCTION AHEAD**	**2**	**35**	**70**
W4-2-48	48"x48"	LANE ENDS RIGHT or LEFT		35	
W5-1-48	48"x48"	ROAD NARROWS		35	
W5-8-48	48"x48"	THRU TRAFFIC RIGHT LANE		35	
W5-9-48	48"x48"	ROAD WORK TRAFFIC ONLY DOWN & LT or RT ARROW		35	
W6-3-48	48"x48"	TWO WAY TRAFFIC		35	
W8-1-48	48"x48"	BUMP		35	
W8-3-48	48"x48"	PAVEMENT ENDS		35	
W8-7-48	48"x48"	LOOSE GRAVEL		35	
W8-11-48	48"x48"	UNEVEN LANES		35	
W8-12-48	48"x48"	NO CENTER LINE		35	
W8-17-48	48"x48"	SHOULDER DROP-OFF SYMBOL		35	
W8-53-48	48"x48"	TRUCKS ENTERING HIGHWAY		35	
W8-54-48	48"x48"	TRUCKS ENTERING AHEAD or __ FT or _ MILE		35	
W8-55-48	48"x48"	TRUCKS CROSSING AHEAD or __ FT or _ MILE		35	
W8-56-48	48"x48"	TRUCKS EXITING HIGHWAY		35	
W9-3a-48	48"x48"	CENTER LANE CLOSED SYMBOL		35	
W13-1P-30	30"x30"	__ MPH ADVISORY SPEED PLAQUE (Mounted on warning sign post)		14	
W14-3-64	64"x48"	NO PASSING ZONE		28	
W16-2P-30	30"x24"	__ FEET PLAQUE (Mounted on warning sign post)		10	
W20-1-48	**48"x48"**	**ROAD WORK AHEAD or _FT or _ MILE**	**2**	**35**	**70**
W20-2-48	48"x48"	DETOUR AHEAD or __FT or _MILE		35	
W20-3-48	48"x48"	ROAD or STREET CLOSED AHEAD or __ FT or _ MILE		35	
W20-4-48	48"x48"	ONE LANE ROAD AHEAD or __ FT or _ MILE		35	
W20-5-48	48"x48"	RIGHT or CENTER or LEFT LANE CLOSED AHEAD or __ FT or _ MILE		35	
W20-7-48	**48"x48"**	**FLAGGER**	**2**	**35**	**70**
W20-8-18	**18"x18"**	**STOP - SLOW PADDLE Back to Back**	**2**	**5**	**10**
W20-52P-54	54"x12"	NEXT __ MILES (Mounted on warning sign post)		12	
W21-1-48	48"x48"	WORKERS		35	
W21-2-48	48"x48"	FRESH OIL		35	
W21-3-48	48"x48"	ROAD MACHINERY AHEAD or __ FT or _ MILE		35	
W21-5-48	48"x48"	SHOULDER WORK		35	
W21-5a-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED		35	
W21-5b-48	48"x48"	RIGHT or LEFT SHOULDER CLOSED AHEAD or __ FT or _ MILE		35	

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

SPECIAL SIGNS

SPEC & CODE

704-1000	TRAFFIC CONTROL SIGNS	TOTAL UNITS	506

SPEC & CODE	DESCRIPTION	UNIT	QUANTITY
704-0100	FLAGGING	MHR	
704-1048	PORTABLE RUMBLE STRIPS	EACH	
704-1050	TYPE I BARRICADES	EACH	
704-1052	**TYPE III BARRICADES**	**EACH**	**4**
704-1060	**DELINEATOR DRUMS**	**EACH**	**12**
704-1065	TRAFFIC CONES	EACH	
704-1067	TUBULAR MARKERS	EACH	
704-1070	DELINEATOR	EACH	
704-1072	FLEXIBLE DELINEATORS	EACH	
704-1080	STACKABLE VERTICAL PANELS	EACH	
704-1081	VERTICAL PANELS - BACK TO BACK	EACH	
704-1085	SEQUENCING ARROW PANEL - TYPE A	EACH	
704-1086	SEQUENCING ARROW PANEL - TYPE B	EACH	
704-1087	SEQUENCING ARROW PANEL - TYPE C	EACH	
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	

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

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

Traffic Control Devices List
Grant County
Cannonball River Structure Replacement

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	100	2

1		W20-7-48 Post mounted
2		R2-1-36 Portable only R2-1aP-24 Mounted on Speed Limit post
3		W3-4-48 Post mounted
4		W3-5-48 Post mounted
5		W20-1-48 Post mounted
6		G20-2-48 Post mounted
7		R2-1-36 Portable only

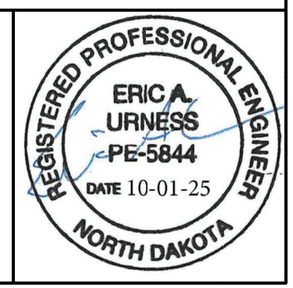
NOTES:

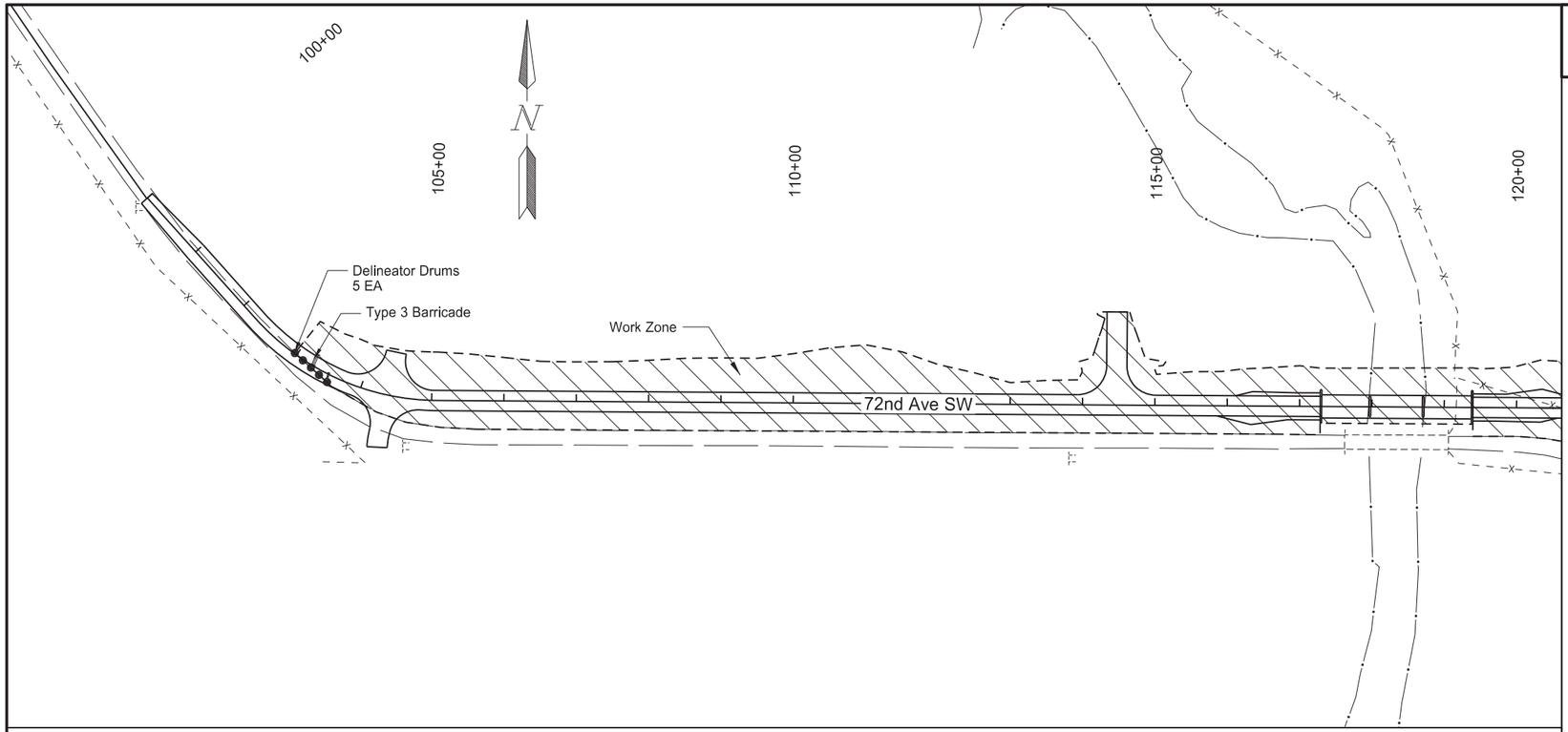
See Standard Drawing D-704-15 Type A for sign spacing

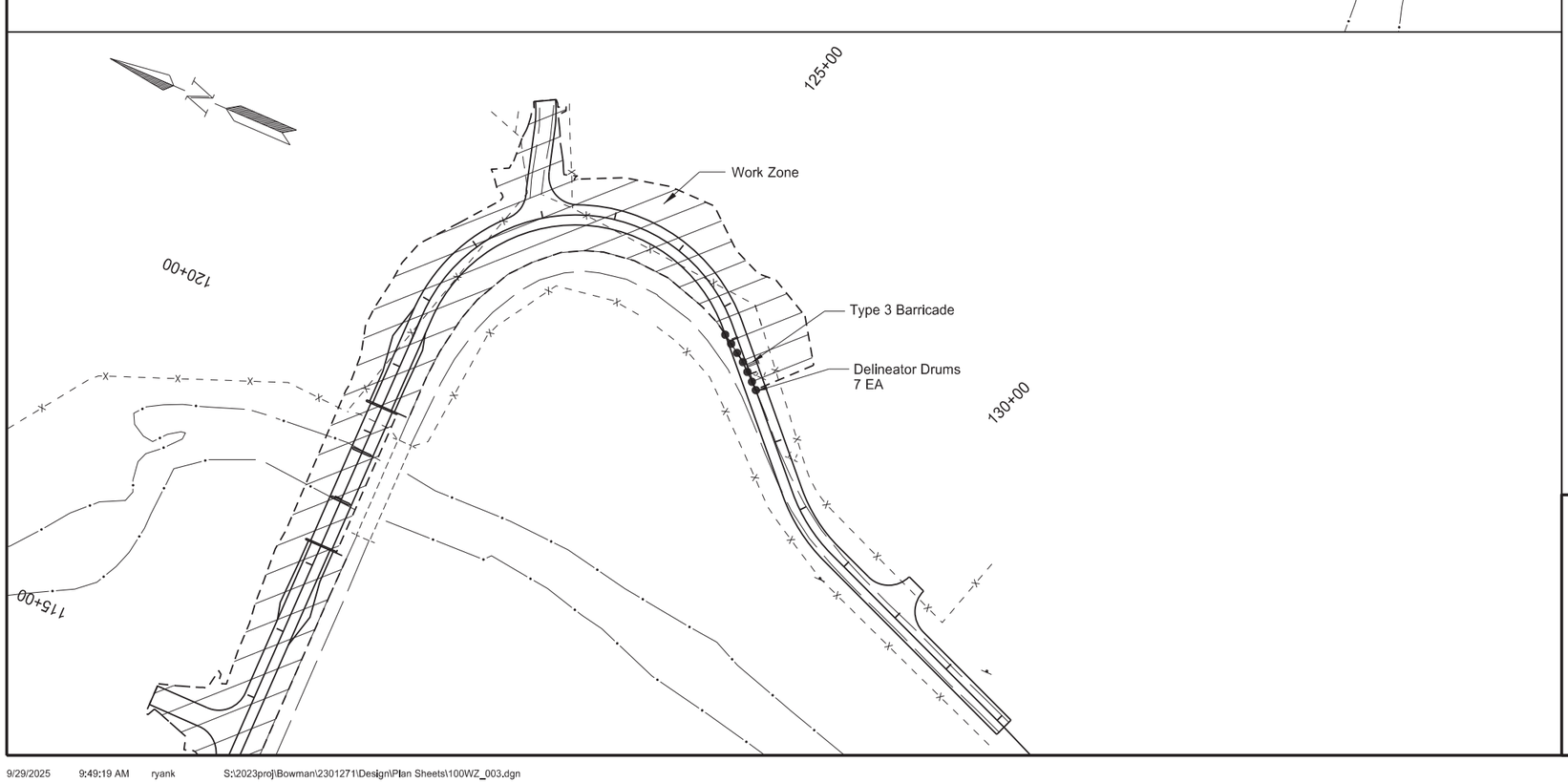
Grant County

Work Zone Traffic Control

Cannonball River Structure Replacement







	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	100	3

NOTES:

See Standard Drawing D-704-15 Type A for sign spacing

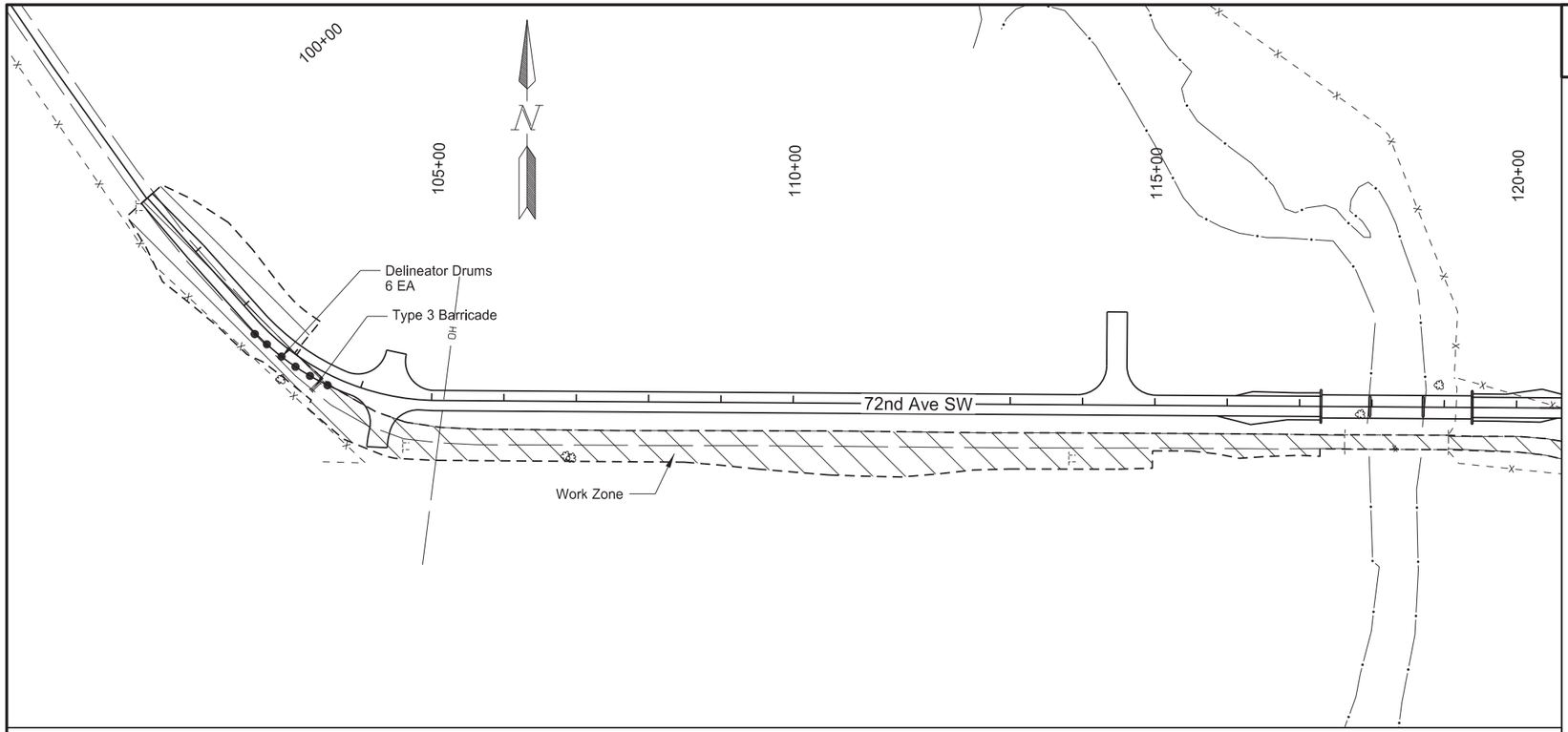
Grant County

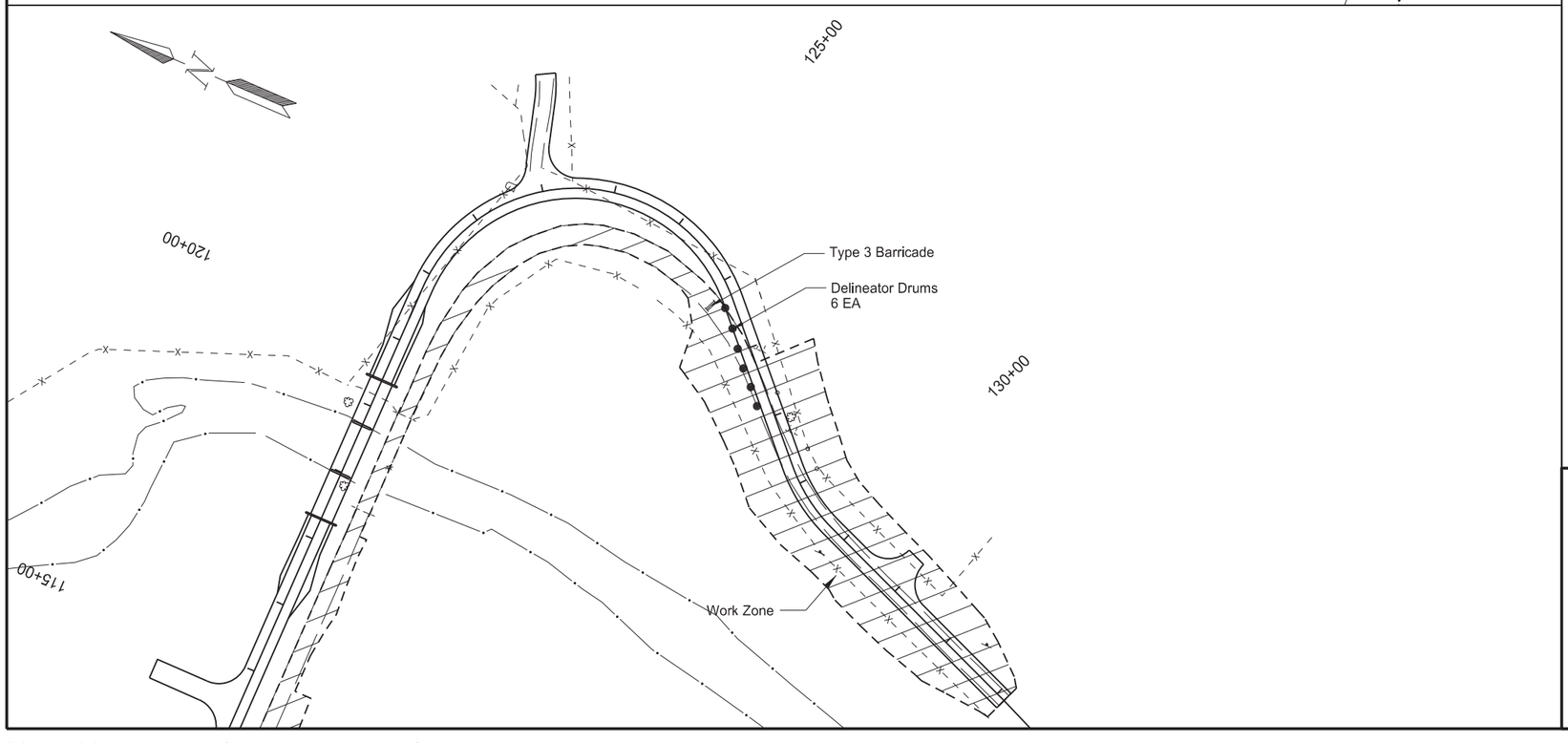
Work Zone Traffic Control
Phase 1

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	100	4





Grant County

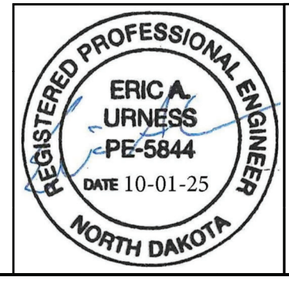
Work Zone Traffic Control
Phase 2

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	N.D.	BRJ-0019(025)	110	1

Station / RP	Sign No.	Assembly No.	Flat Sheet For Signs IV SF	Flat Sheet For Signs XI SF	Sign Support Length 1st LF	2nd LF	3rd LF	4th LF	Vert Clear-ance FT	Support Size	Max Post Len LF	Sleeve Length 1st LF	2nd LF	3rd LF	4th LF	Sleeve Size	Anchor EA	Anchor LF	Anchor Size	Reset Sign Panel EA	Reset Sign Support EA	Break-Away EA	Comments
100+74 Rt	W1-2L-30	19		6.3	12.7				5.0	2.5 x 2.5 12 ga	14.5						1	4	3 x 3 7 ga				
104+74 Rt	SA 1E		9.8		10.9				5.0	2 x 2 12 ga	15.8						1	4	2.25 x 2.25 12 ga				
106+58 Lt	W1-2R-30	19		6.3	12.7				5.0	2.5 x 2.5 12 ga	14.5						1	4	3 x 3 7 ga				
119+53 Rt	W1-4R-30	53		8.5	14.0				5.0	2.5 x 2.5 10 ga	14.7						1	4	3 x 3 7 ga			1	
131+25 Lt	W1-4R-30	53		8.5	13.7				5.0	2.5 x 2.5 10 ga	14.7						1	4	3 x 3 7 ga			1	
Sub Total			9.8	29.6		**Total**	64.0										**Total**	20.0		0	0	2	
Grand Total			**9.8**	**29.6**		**Total**	**64.0**										**Total**	**20**	**0**	**0**	**0**	**2**	

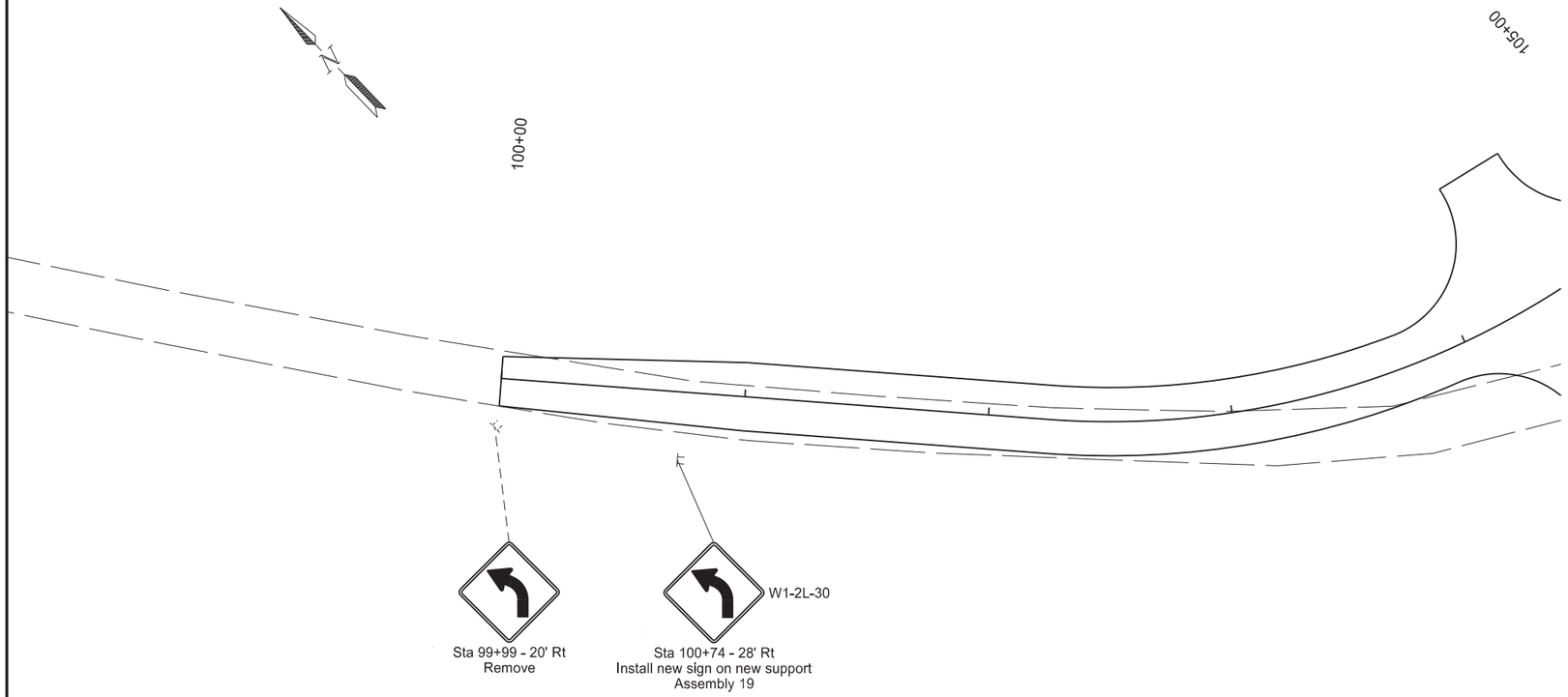


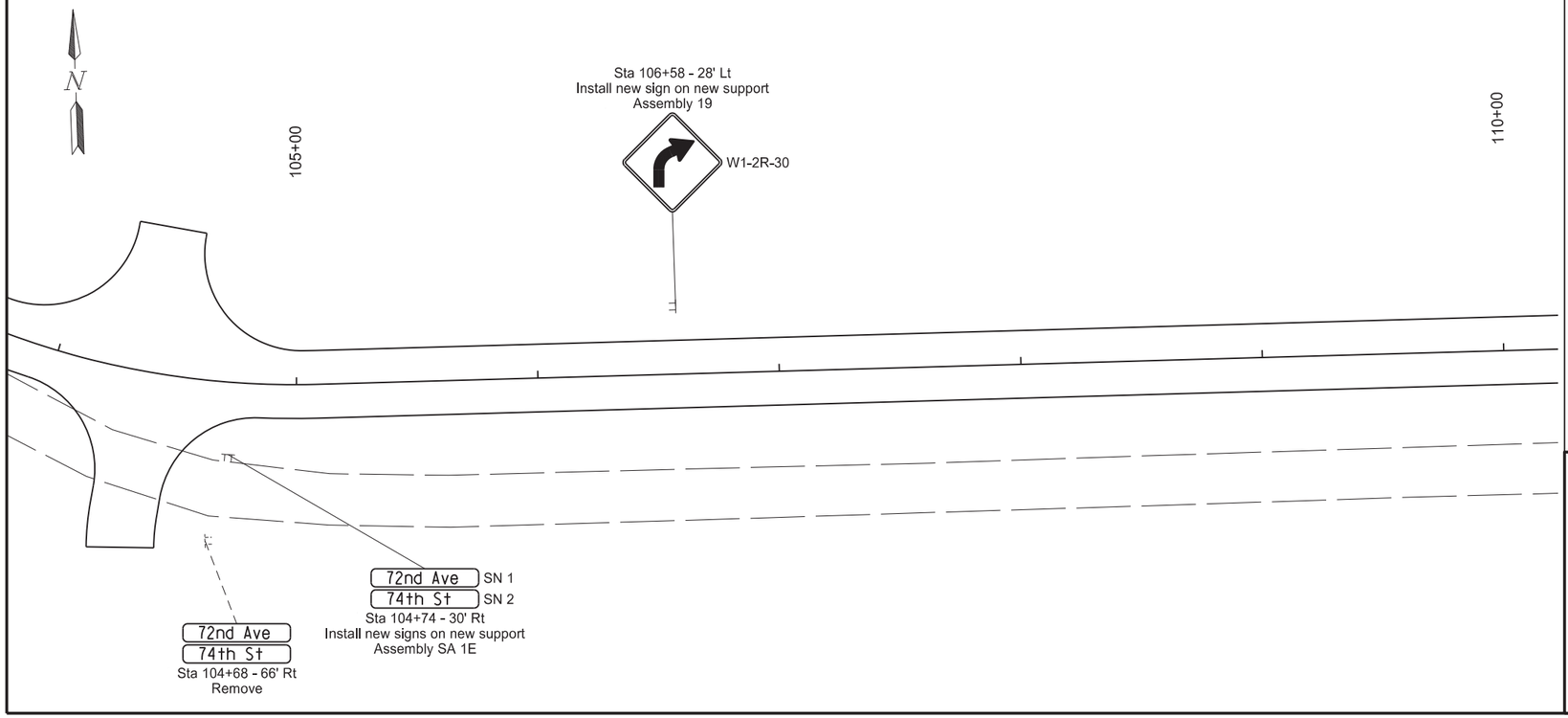
Sign Summary
Perforated Tube

Grant County

Cannonball River Structure Replacement

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	110	2





Grant County

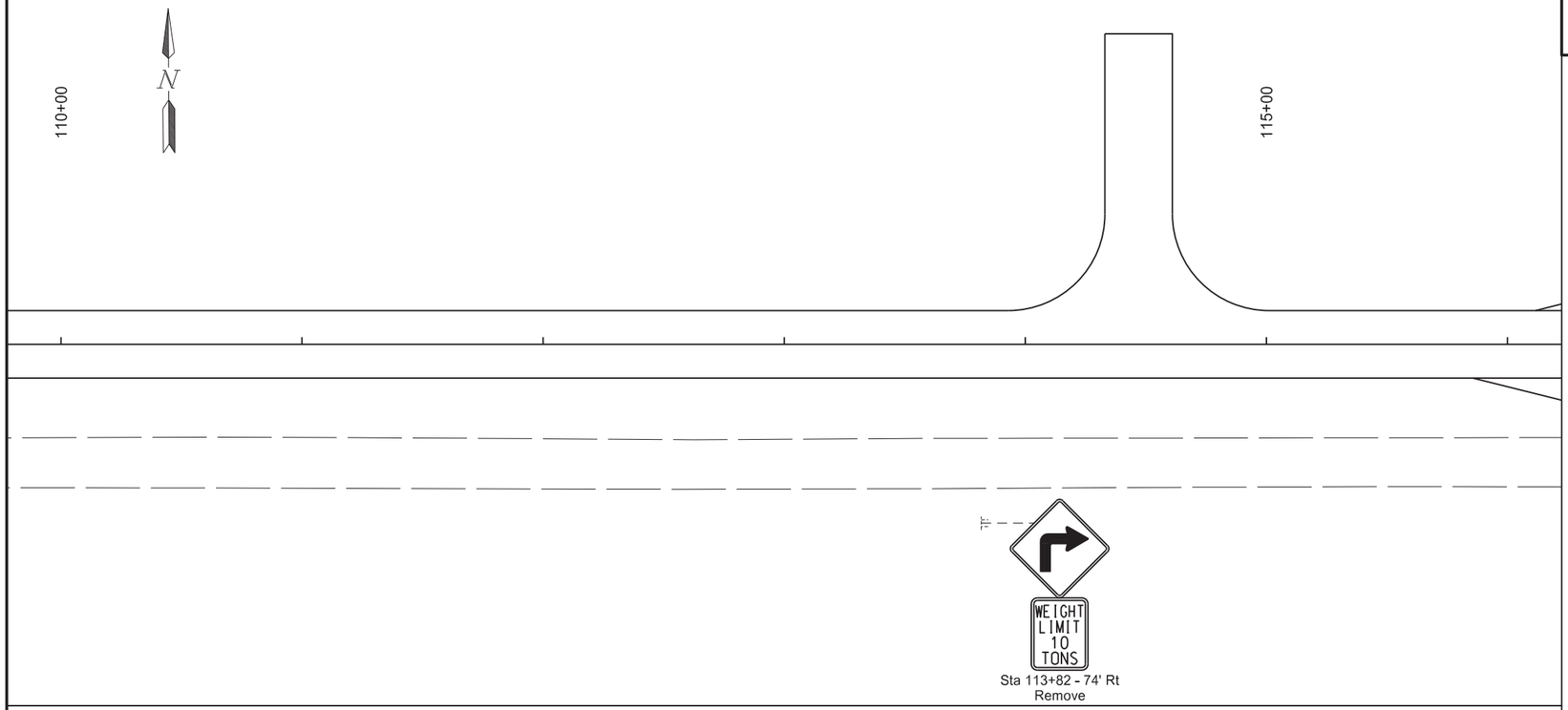
Sign Layout

Cannonball River Structure Replacement

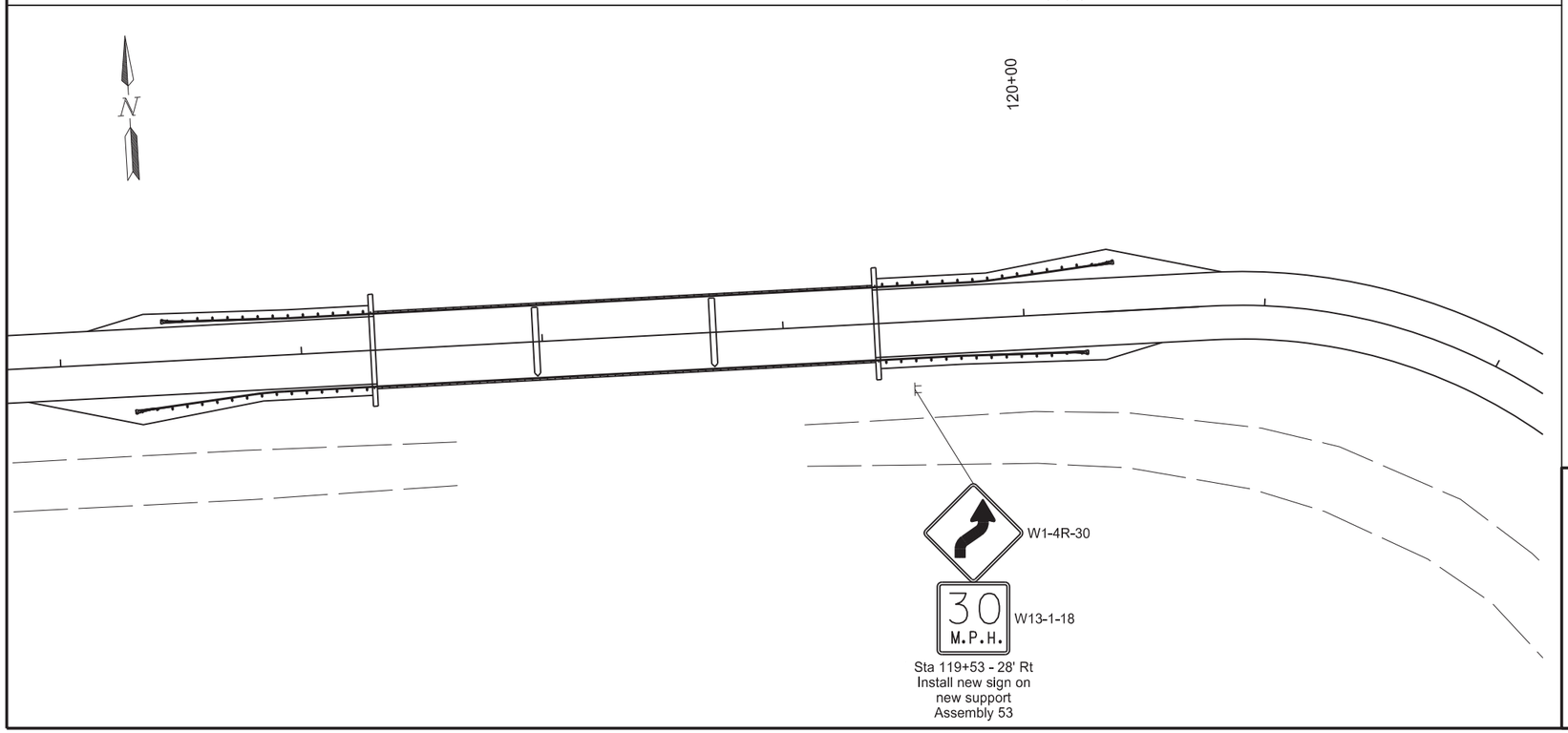
REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

9/29/2025 9:49:21 AM ryank S:\2023proj\Bowman\2301271\Design\Plan Sheets\110SN_002.dgn

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	110	3



Sta 113+82 - 74' Rt
Remove



Sta 119+53 - 28' Rt
Install new sign on
new support
Assembly 53

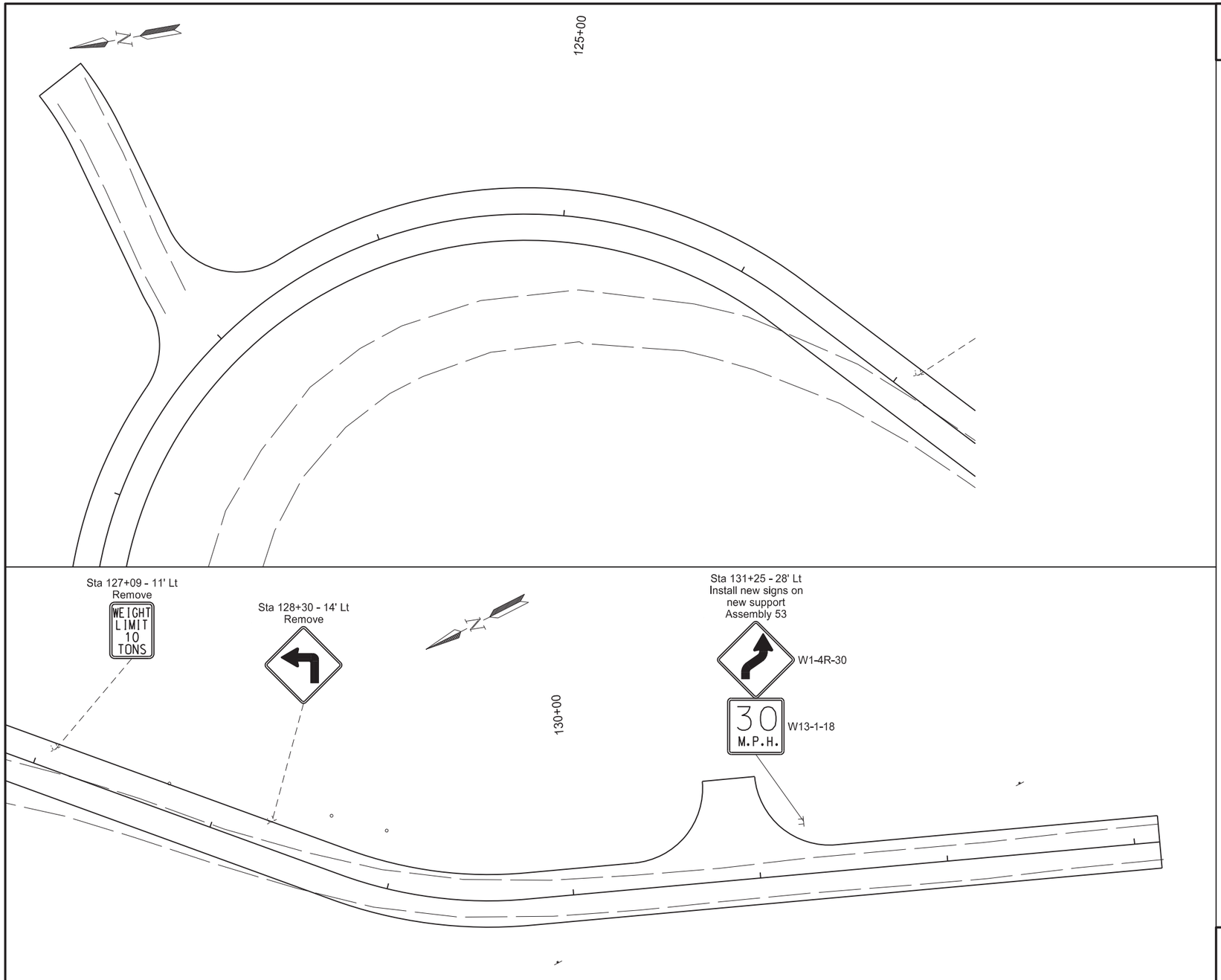
Grant County

Sign Layout

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

STATE	PROJECT NO.	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	110	4



Grant County

Sign Layout

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

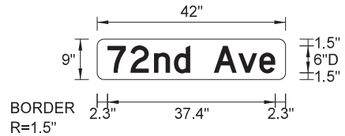
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	110	5

SIGN NUMBER	SN 1
WIDTH X HEIGHT	42" x 9"
BORDER WIDTH	(inset)
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: RGB[240,240,240]

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
104+74

AREA: 2.6" Sq.Ft.



Panel Style: ND_911_6in_No Border.ssi
M.U.T.C.D.: 2023 Edition

Dimensions are in inches tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_911_6in_No Border.ssl

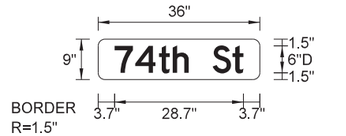
LETTER POSITION (X)																		LENGTH	SIZE	SERIES
7	2	n	d		A	v	e											37.4"	6"/4.5"	D 2000
2.3"	7.4"	12.7"	17.1"	21.3"	26"	31.4"	36.2"													

SIGN NUMBER	SN 2
WIDTH X HEIGHT	36" x 9"
BORDER WIDTH	(inset)
CORNER RADIUS	1.5"
MOUNTING	Ground
BACKGROUND	TYPE: IV Reflective
	COLOR: Green
LEGEND/BORDER	TYPE: IV Reflective
	COLOR: RGB[240,240,240]

SYMBOL	X	Y	WID	HT	ANGLE

STATION(S):
104+74

AREA: 2.3" Sq.Ft.



Panel Style: ND_911_6in_No Border.ssi
M.U.T.C.D.: 2023 Edition

Dimensions are in inches tenths

Letter locations are panel edge to lower left corner

PANEL STYLE: ND_911_6in_No Border.ssl

LETTER POSITION (X)																		LENGTH	SIZE	SERIES
7	4	t	h		S	t												28.7"	6"/4.5"	D 2000
3.7"	8.3"	13.6"	16.6"	20.7"	25.5"	30"														

Grant County

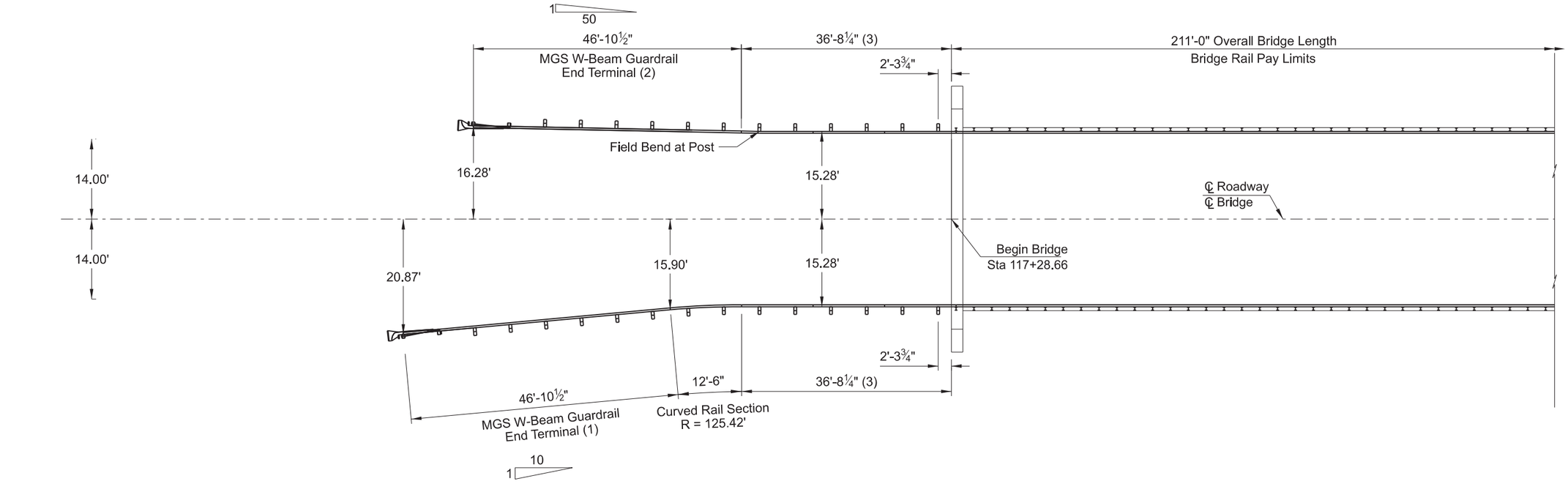
Sign Details

Cannonball River Structure Replacement

REGISTERED PROFESSIONAL ENGINEER
ERIC A. URNESS
PE-5844
DATE 10-01-25
NORTH DAKOTA

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	130	1



NOTES:

1. Install a FLEAT end terminal at this location.
   See Standard Drawing D-764-38.
2. Install Sequential Kinking End Terminal.
   See Standard Drawing D-764-51.
3. Refer to Standard Drawing D-764-40 and D-764-48
   for additional details.
4. Post spacing for guardrail is 6'-3" unless dimensioned otherwise.

QUANTITIES	
W-Beam Guardrail End Terminal	4 EA
W-Beam Guardrail	172 LF

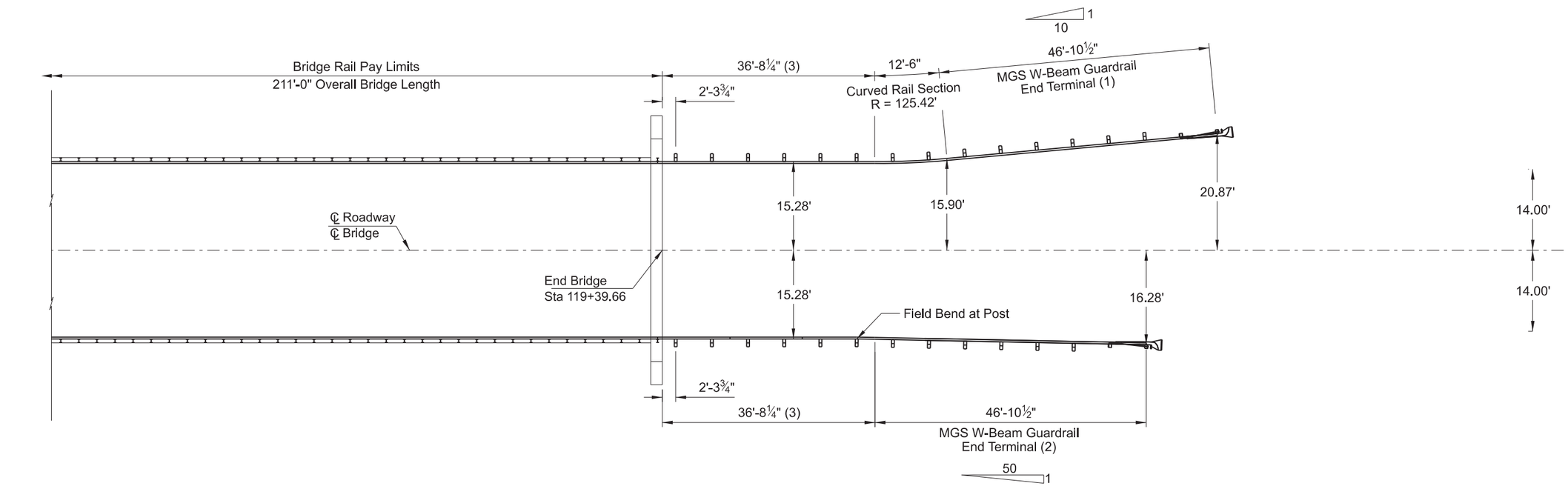
REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

MGS W-Beam Guardrail Layout
at Beginning of Bridge
Cannonball River Bridge

Grant County

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	130	2



NOTES:

1. Install a FLEAT end terminal at this location.
   See Standard Drawing D-764-38.
2. Install Sequential Kinking End Terminal.
   See Standard Drawing D-764-51.
3. Refer to Standard Drawing D-764-40 and D-764-48
   for additional details.
4. Post spacing for guardrail is 6'-3" unless dimensioned otherwise.

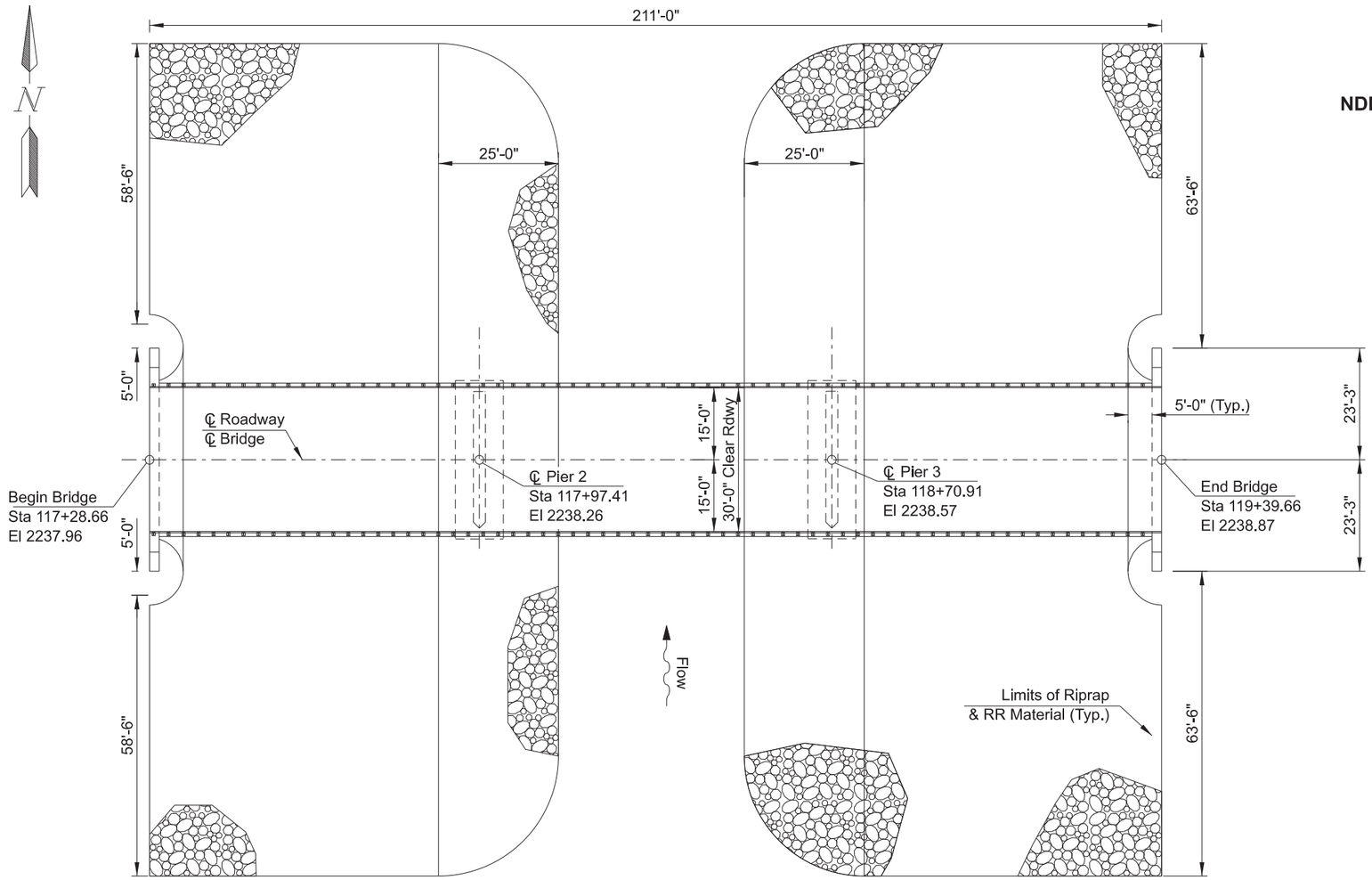
REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

W-Beam Guardrail Layout
at End of Bridge
Cannonball River Bridge

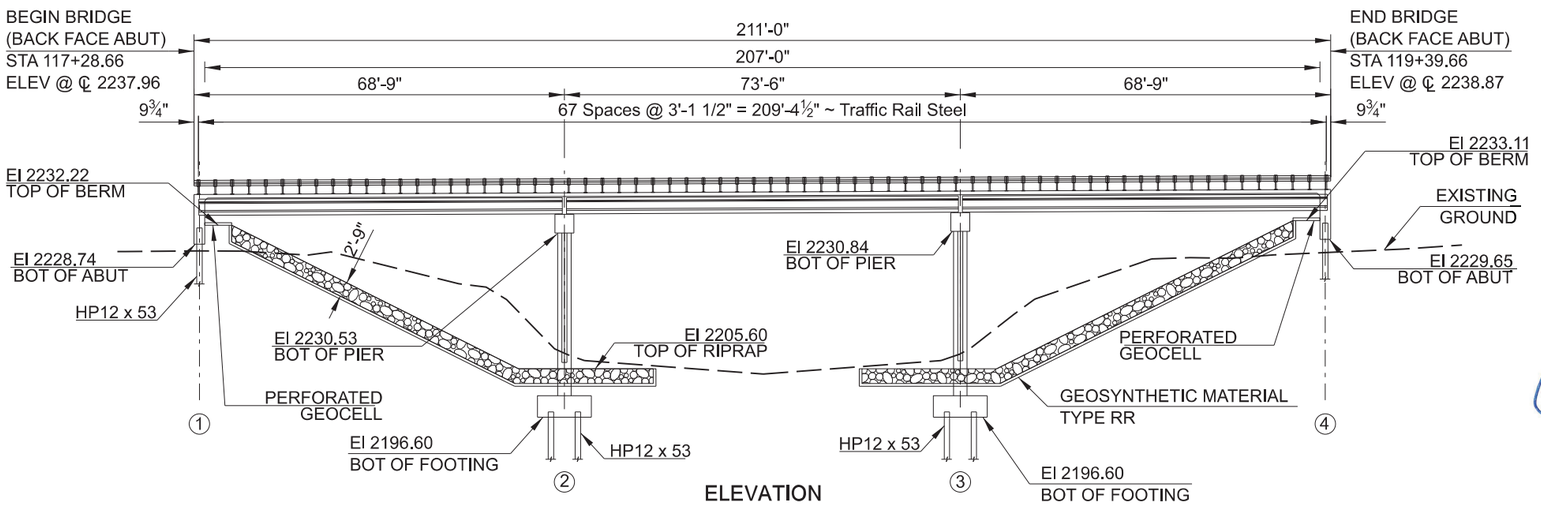
Grant County

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	1

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



PLAN



ELEVATION

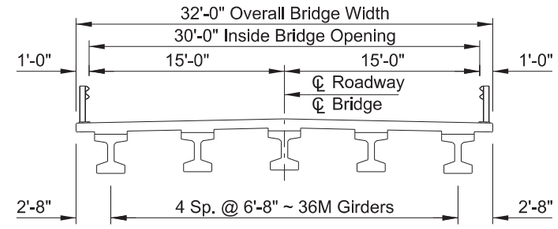
HYDRAULIC DATA:

Drainage Area	1194	sq mi
Stream Gradient	0.0006	ft/ft
Design Frequency	15	yr
Design Discharge	12,985	cfs
Design Headwater Stage	2230.5	ft
Design Tailwater Stage	2230.4	ft
Velocity Through Bridge	3.0	fps
100-Year Frequency Discharge	23,624	cfs
100-Year Frequency Headwater	2234.8	ft
Overtopping Stage	2235.8	ft
Overtopping Discharge	26,800 ±	cfs

DESIGN STRENGTHS:

f'c = 3,000 psi ~ Class AE-3 Concrete
f'c = 4,000 psi ~ Class AAE-3 Concrete
f'c = 7,000 psi ~ Prestressed Beam Concrete
fy = 60,000 psi ~ Reinforcing Steel

Load & Resistance Factor Design



TYPICAL SECTON

SPECIAL PROVISIONS	
SSP 2	MIGRATORY BIRD TREATY ACT

STANDARD DRAWINGS
D-622-1, D-714-18

F.W.S. 15 PSF

HL-93 DESIGN LOADING

NORTH DAKOTA
DEPARTMENT OF TRANSPORTATION

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER
BRIDGE LAYOUT

PROJECT: BRJ-0019(025)
STATION: 118+34.16
GRANT COUNTY

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

DATE BRIDGE ENGINEER

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

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	2

STRUCTURAL NOTES

100-P01 **SCOPE OF WORK:** This project consists of building a new 3-span prestressed concrete I-beam bridge with an overall bridge length of 211'-0" and a clear roadway width of 30'-0".

100-P02 **GENERAL:** The cost of furnishing and placing preformed expansion joint filler, concrete inserts, grout pads and other miscellaneous items shall be included in the bid price for "CLASS AE-3 CONCRETE" and "CLASS AAE-3 CONCRETE.

All exposed concrete corners shall be chamfered ¾" unless noted otherwise.

The physical properties of the elastomeric bearing pads shall conform to the requirements of Section 18.2 of the AASHTO LFRD Bridge Construction Specification and the AASHTO Materials Specification M251.The elastomeric bearing pads shall conform to Grade 60 (durometer).The cost of the pads shall be incidental to the contract unit price per cubic yard for "CLASS AAE-3 CONCRETE". Certification that pads are 60 durometer and meet the requirements of AASHTO LFRD Bridge Construction Specification Section 18.2 and AASHTO Materials Specification M251 shall be furnished to the Engineer with the shop drawings. No laminated bearing pads will be allowed.

Scrapers shall not be driven across the new structure.

202-P01 **REMOVAL OF STRUCTURE:** The existing structure is a three span concrete bridge with steel girders, concrete deck, and metal railing. The abutments and bents are concrete with timber piling under the concrete pile caps. The structure is 21.7' wide by 144.0' long. All materials removed and salvaged from the structure shall become property of the Contractor and disposed of at their expense. All bridge piling shall be removed to a minimum of 1' below the bottom of the flow line of the river.

Payment for removing, salvaging, and disposing of the existing bridge and piling in accordance with the standard specifications shall be included in the lump sum price for the bid item "Removal of Structure" and include the cost of removing all components of the bridge, loading, hauling and any other incidentals to complete this work.

210-P01 **EXCAVATION:** The excavation at the abutments, as shown, shall be included in the lump sum bid item "CLASS 1 EXCAVATION". The excavation at the piers, as shown, shall be included in the lump sum bid item, "CLASS 2 EXCAVATION".

For informational purposes, the quantity of Class 1 Excavation is estimated at 0 cubic yards, and the quantity of Class 2 Excavation is estimated at 310 cubic yards. The quantities are based on the plan shown dimensions and will not be measured.

210-P02 **CHANNEL EXCAVATION:** Any unsuitable or excess channel excavation material shall be disposed of at a location determined by the contractor and acceptable to the Engineer. All costs associated with excavating, hauling, and leveling the material shall be included in the lump sum bid item, "CHANNEL EXCAVATION".

210-P03 **SELECT BACKFILL:** Select back fill shall meet the requirements of Section 816.02, Class 3. The backfill shall be placed in layers of not more than 6 inches, moistened or dried as required, and thoroughly compacted with mechanical tamping equipment. Moisture and density controls shall be in accordance with Section 203.04G Type A of the Standard Specifications. All costs associated with hauling, leveling, and compacting the material shall be included in the unit bid price for "ABUTMENT UNDERDRAIN SYSTEM".

210-P04 **FOUNDATION PREPARATION:** High groundwater elevations may be present on this project. Dewatering may be required in the wet areas to handle water seeping. Fluctuations in the groundwater level may occur due to rainfall, spring thaw, drainage, or other factors. Bidders should recognize the possibility of changes in the existing water conditions. The bidder is responsible for examining the site of the proposed work, becoming familiar with the site conditions, both soil and water conditions, before submitting a proposal. The County assumes no responsibility for the soil and water conditions encountered during construction. The submission of a bidding proposal will be considered conclusive evidence that the bidder is satisfied with the conditions to be encountered in performing the work and as to the requirements of the proposed contract.

256-P01 **RIPRAP-GRADE II:** Place riprap on the prepared slopes as shown in the plans and as determined in the field by the Engineer.

Include all costs to furnish and install the riprap and all incidentals required to complete this work and dispose of any waste material generated from excavating to the limits of the riprap shown in the plans, unit price bid per cubic yard for "Riprap-Grade II".

Remove and salvage the existing riprap under the old bridge. Salvage and stockpile the existing riprap within the roadway right of way at a location approved by the Engineer. Stockpile the existing riprap in a single location. The County will retain ownership of the existing riprap. Include all costs associated with removing and stockpiling the existing riprap in the unit price bid for "Riprap-Grade II".

602-P01 **DECK CONCRETE:** The girders will have minor differences in anticipated camber. To build the deck to the designated thickness will require slight adjustments in deck elevation and/or riser thickness. These adjustments in the haunch will result in minor concrete quantity discrepancies. The deck concrete will not be measured and payment for furnishing and installing the deck concrete shall be included in the unit price per cubic yard for "CLASS AAE-3 CONCRETE."

Girder lift hooks shall be cut off prior to placement of deck concrete.

The deck concrete shall be placed at a minimum rate of 35 CY per hour.

Deck Tining shall be stopped 18 inches from the sides of the deck, and 6 inches from the end of the deck.

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

STRUCTURAL NOTES

602-P02 **DIAPHGRAMS AND ENDWALLS:** The diaphragms and the end walls/top of the abutments above the construction joint shall be placed at the same time as the deck. Placement of diaphragms at the bents shall not slow down the rate of concrete placement and finishing. The contractor shall place the concrete in the diaphragms ahead of the deck concrete in such a manner that advancement of the deck concrete reaches the diaphragm just as placement of concrete in the diaphragm is complete. The tops of the abutment shall have a broomed finish.

602-P03 **DECK CONCRETE SLAB CURING:** The deck shall be cured by the wet-cure method. The surface shall be kept moist between the final finish and the beginning of the wet-cure by means of a light fog spray. The wet cure material shall be placed and the wet-cure started not later than 30 minutes after the finish of the completed area unless directed otherwise by the Engineer. The wet-cure method shall consist of covering the deck with a double thickness of burlap or a geotextile fabric capable of retaining moisture. The burlap or fabric shall be kept continuously moist for the next seven days. The burlap or fabric shall be moistened at a minimum every four hours. If strong winds or high temperatures are present, the watering rate shall be increased. Covering the deck with curing compounds will not be allowed. No vehicles or equipment not required in the curing process shall be on the bridge deck.

602-P04 **PENETRATING WATER REPELLENT TREATMENT:** Penetrating water repellant shall be applied to the entire concrete deck surface.

612-P01 **REINFORCING STEEL:** All reinforcing steel shall be grade 60, FY=60 ksi. Dimensions are given out to out and to tangent unless noted otherwise. Fabrications and tolerances shall follow the CRSI manual of Standard Practice. Minimum clear cover shall be 2 inches unless noted otherwise.

622-P01 **PILING**: Piling shall meet AASHTO M 270, Grade 50. Pile tips are required on all piling.

622-P02 **PILING**: Piling shall be driven with air, steam or diesel hammers, gravity hammers will not be allowed. Piling shall be driven with a hammer with a rated energy and ram weight not less than 36,296 foot-pound-tons, as computed by the formula W(E-14,014) + 0.518E, where W is the weight of the ram in tons and E is the rated hammer energy. In no case shall the ram weight be less than 4,000 pounds. The hammer shall be run at an energy that produces an average penetration at bearing between 1/2” and 3 inches.

The contractor shall submit to the Engineer the certification and information concerning the performance of the pile hammer to be used a minimum of (1) week prior to use.

624-P01 **RAILING**: Railings shall be furnished and installed as shown in the details for Type T631 rail. All equipment, labor, and materials, including bolts and hardware, shall be incidental to the unit price bid per lineal foot for “Traffic Rail-Steel.” The pay limits shall be as shown on the drawings. It shall be the contractor’s responsibility to verify that the plate/bolt assemblies are installed at the proper location and elevation to assure that the bolts are of proper length and projection.

709-P01 **GEOSYNTHETIC FABRIC-TYPE RR:** The Geosynthetic Fabric-Type RR shall be placed under all riprap and up the vertical face between the riprap and earth edge. The minimum lap for all Type RR fabric shall be 2’-0”.

709-P02 **PERFORATED GEO CELL:** Perforated Geocell will be from the following company or equivalent:

Company: Agtec
Phone: 1-818-724-7657
Website: http://www.agtec.com

Perforated Geocell will be 6 inches tall with Geosynthetic Fabric-Type RR underlying the Perforated Geocell. Installation will adhere to the manufacturer’s recommendation.

Perforated Geocell will be filled with Class 5 Aggregate meeting the requirements of Section 816.02, Class 5.

Perforated Geocell will be paid for at the contract unit price per square yard. Payment will be full compensation for furnishing and installing the Perforated Geocell.

The Class 5 Aggregate will be paid for at the contract unit price per ton of material furnished. Payment will be full compensation for furnishing, loading, hauling, and placing the Class 5 Aggregate.

WORK DRAWINGS: The Contractor shall submit the following work drawings to the Engineer via email at donh@broszengineering.com or paper at Brosz Engineering Inc., PO Box 357, Bowman, ND 58623 for review:

1. Prestressed Concrete I-Beam
2. Traffic Rail-Steel
3. Structural Steel

FALSEWORK: The Contractor shall be required to include along with his Falsework Plans details for the construction of an adequate “Walk-Way” including railing.

FALL PROTECTION: The Contractor shall install a Fall Protection System conforming to OSHA Regulations. When working on the girders prior to decking installation, a Horizontal Lifeline – or other OSHA approved system shall be installed. The Contractor shall have one Personal Fall Arrest System (PFAS) available for use by a Department Inspector. The PFAS shall be compatible with the installed Fall Protection System.

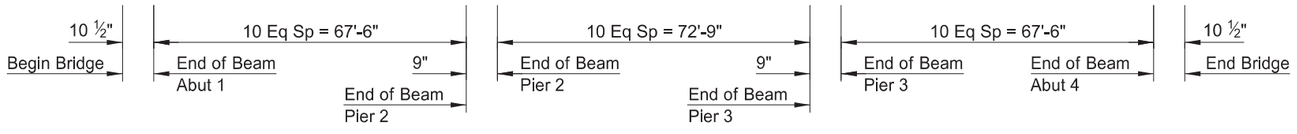
Modifications to any bridge components used to accommodate the Fall Protection System shall be shown on the Falsework Plans and/or the appropriate Shop Plans. Field welding to bridge components will not be allowed. Field placed concrete inserts or drilled-in anchor bolts will be allowed if approved by the Engineer. All costs associated with providing the Fall Protection System shall be incidental to the other contract items.

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

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

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	4

Tenth Points	Dead Load Deflection (Ft)	Centerline Beam 5	Centerline Beam 4	Centerline Beam 3	Centerline Beam 2	Centerline Beam 1
0	0.000	2237.70	2237.83	2237.97	2237.83	2237.70
1	0.018	2237.75	2237.88	2238.01	2237.88	2237.75
2	0.036	2237.79	2237.93	2238.06	2237.93	2237.79
3	0.049	2237.84	2237.97	2238.10	2237.97	2237.84
4	0.058	2237.87	2238.01	2238.14	2238.01	2237.87
5	0.061	2237.91	2238.04	2238.17	2238.04	2237.91
6	0.058	2237.93	2238.07	2238.20	2238.07	2237.93
7	0.049	2237.95	2238.09	2238.22	2238.09	2237.95
8	0.036	2237.97	2238.10	2238.24	2238.10	2237.97
9	0.018	2237.98	2238.11	2238.25	2238.11	2237.98
10	0.000	2237.99	2238.12	2238.26	2238.12	2237.99
	0.000	2237.99	2238.12	2238.26	2238.12	2237.99
1	0.025	2238.05	2238.18	2238.32	2238.18	2238.05
2	0.048	2238.10	2238.24	2238.37	2238.24	2238.10
3	0.066	2238.15	2238.29	2238.42	2238.29	2238.15
4	0.078	2238.20	2238.33	2238.46	2238.33	2238.20
5	0.082	2238.23	2238.37	2238.50	2238.37	2238.23
6	0.078	2238.26	2238.39	2238.53	2238.39	2238.26
7	0.066	2238.28	2238.41	2238.55	2238.41	2238.28
8	0.048	2238.29	2238.43	2238.56	2238.43	2238.29
9	0.025	2238.30	2238.43	2238.57	2238.43	2238.30
10	0.000	2238.31	2238.44	2238.57	2238.44	2238.31
	0.000	2238.31	2238.44	2238.57	2238.44	2238.31
1	0.018	2238.36	2238.49	2238.62	2238.49	2238.36
2	0.036	2238.40	2238.54	2238.67	2238.54	2238.40
3	0.049	2238.45	2238.58	2238.71	2238.58	2238.45
4	0.058	2238.48	2238.62	2238.75	2238.62	2238.48
5	0.061	2238.52	2238.65	2238.78	2238.65	2238.52
6	0.058	2238.54	2238.68	2238.81	2238.68	2238.54
7	0.049	2238.56	2238.70	2238.83	2238.70	2238.56
8	0.036	2238.58	2238.71	2238.84	2238.71	2238.58
9	0.018	2238.59	2238.72	2238.86	2238.72	2238.59
10	0.000	2238.60	2238.73	2238.87	2238.73	2238.60



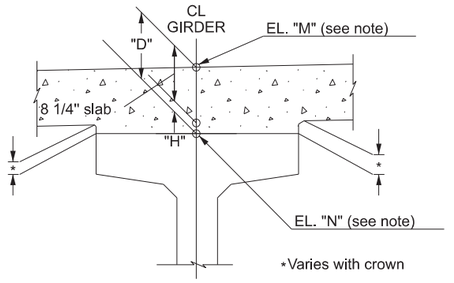
Beam 1 is the north beam

SCREED ELEVATION

NOTE:

Elevations are to top of finished roadway.
Beam #1 is the north beam.
The dead load deflection shown is for D.L. of the slab, and haunch and but does not include D.L. of beams.

The table contains the information necessary to determine the depth of concrete over the girders at points shown. Elevation "M" is the design elevation at the top of slab before any concrete has been poured. Elevation "N" is a field measured elevation taken on top of the girders at the points shown with the girders in their positions on the bearings. This elevation must be taken after erection is completed, but prior to placing any of the false work. Girders shall not be supported between bearings when elevations are taken.



DETAIL "E"

Based on a "D" of 11 inches at the centerline of each bent and abutment (see "Abutment Details Sheet"), it is anticipated that the mid-span haunch dimension "H" over the centerline of each girder will be 2½ inches in spans 1 and 3 and 2½ inches in span 2. If "H" is less than zero or greater than 3½ inches, The Bowman office of Brosz Engineering Inc. must be notified immediately.

BRIDGE BID ITEMS

SPEC	CODE	ITEM DESCRIPTION	UNIT	QUANTITY
202	0105	REMOVAL OF STRUCTURE	L SUM	1
210	0099	CLASS 1 EXCAVATION	L SUM	1
210	0111	CLASS 2 EXCAVATION	L SUM	1
210	0127	CHANNEL EXCAVATION	L SUM	1
210	0201	FOUNDATION PREPARATION	EA	1
256	0200	RIPRAP GRADE II	CY	2,907.4
302	0120	AGGREGATE BASE COURSE CL 5	TON	17.4
602	0130	CLASS AAE-3 CONCRETE	CY	240.0
602	1130	CLASS AE-3 CONCRETE	CY	319.0
602	1250	PENETRATING WATER REPELLENT TREATMENT	SY	750
604	9900	PRESTRESSED I-BEAM-36 IN	LF	1,038.8
612	0115	REINFORCING STEEL-GRADE 60	LBS	44,625
612	0116	REINFORCING STEEL-GRADE 60-EPOXY COATED	LBS	35,197
616	0364	STRUCTURAL STEEL M270-GRADE 36	LBS	4,879
622	0014	STEEL H-PILING POINTS 12 X 53	EA	54
622	0040	STEEL PILING HP 12 X 53	LF	3,000
622	1200	STEEL TEST PILING HP 12 X 53	LF	260
624	0128	TRAFFIC RAIL STEEL	LF	422
709	0155	GEOSYNTHETIC MATERIAL TYPE RR	SY	3,481
709	0800	PERFORATED GEOCELL	SY	52
930	9537	ABUTMENT UNDERDRAIN SYSTEM	EA	2

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

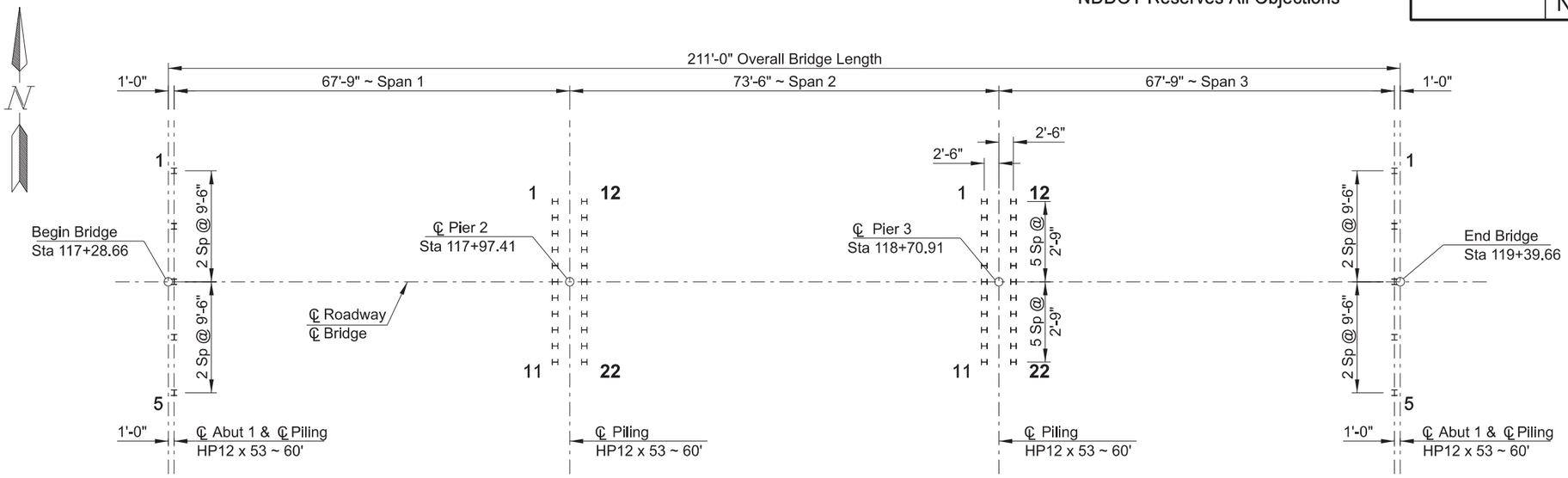
CANNONBALL RIVER BRIDGE

OVER CANNONBALL RIVER

SCREED ELEVATIONS &
BID ITEM QUANTITIES

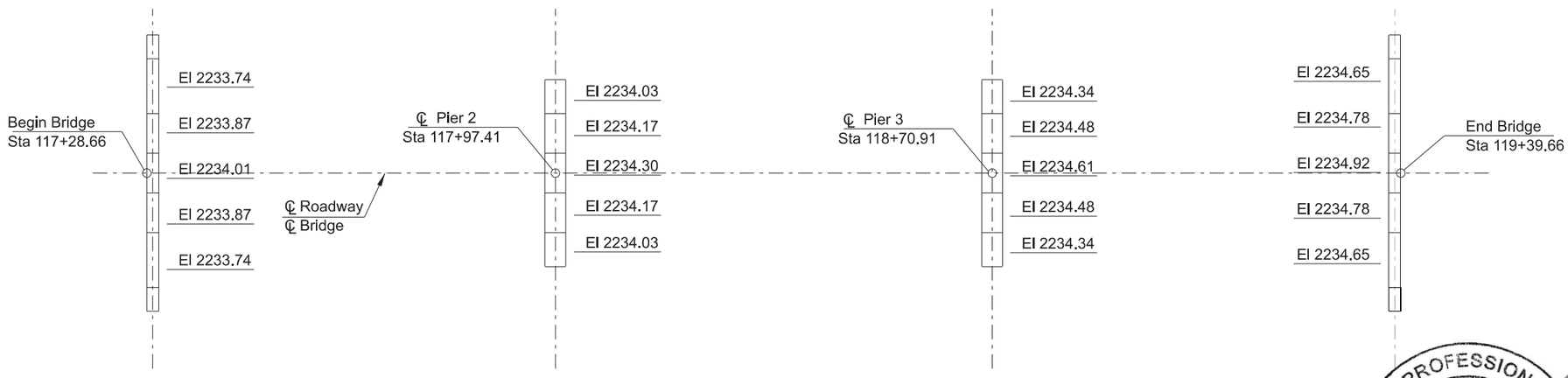
23 U.S.C. 407
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	5



Test pile is the center pile or near the center in each substructure unit.
HP12 x 53 Pile shall be driven to 130 tons.

PILING LAYOUT



Elevations shown are to top of finished concrete.

BEARING ELEVATIONS

NOTE:

For double acting or single acting diesel hammers, calculate the safe bearing value of piles by the following formula:

$$P = \frac{4.5E}{S + 0.2} \times \frac{W + 0.2M}{W + M}$$

Where:

P = Safe bearing value, in pounds.
W = Weight of striking parts (ram), in pounds.
M = Weight of parts being driven, in pounds. Includes pile weight, anvil (if any), driving cap, etc.
E = Energy per blow, in foot-pounds.
S = Average penetration of pile in inches per blow for last ten blows.

For single acting hammers, calculate E by multiplying observed stroke (ft) and W (lbs).

PILE COORDINATES			
	PILE	NORTHING	EASTING
ABUT 1	1	249,023.11	1,611,885.31
	5	248,985.11	1,611,885.06
PIER 2	1	249,017.42	1,611,950.53
	11	248,989.92	1,611,950.35
	12	249,017.39	1,611,955.53
	22	248,989.89	1,611,955.34
PIER 3	1	249,016.93	1,612,024.03
	11	248,989.43	1,612,023.84
	12	249,016.90	1,612,029.02
	22	248,989.40	1,612,028.84
ABUT 4	1	249,021.72	1,612,094.31
	5	248,983.72	1,612,094.06

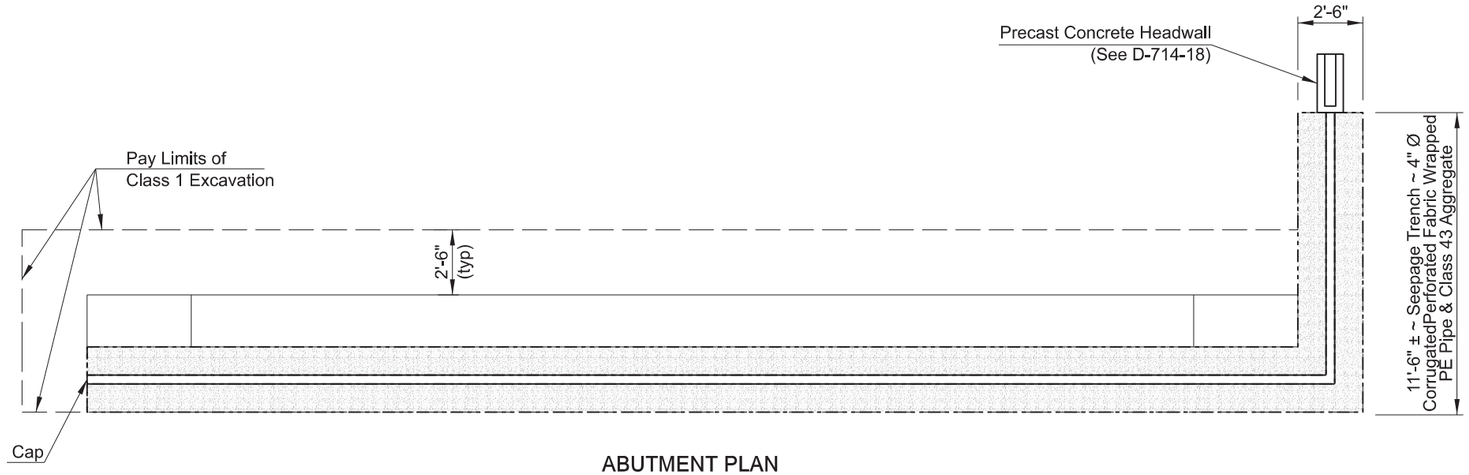
REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

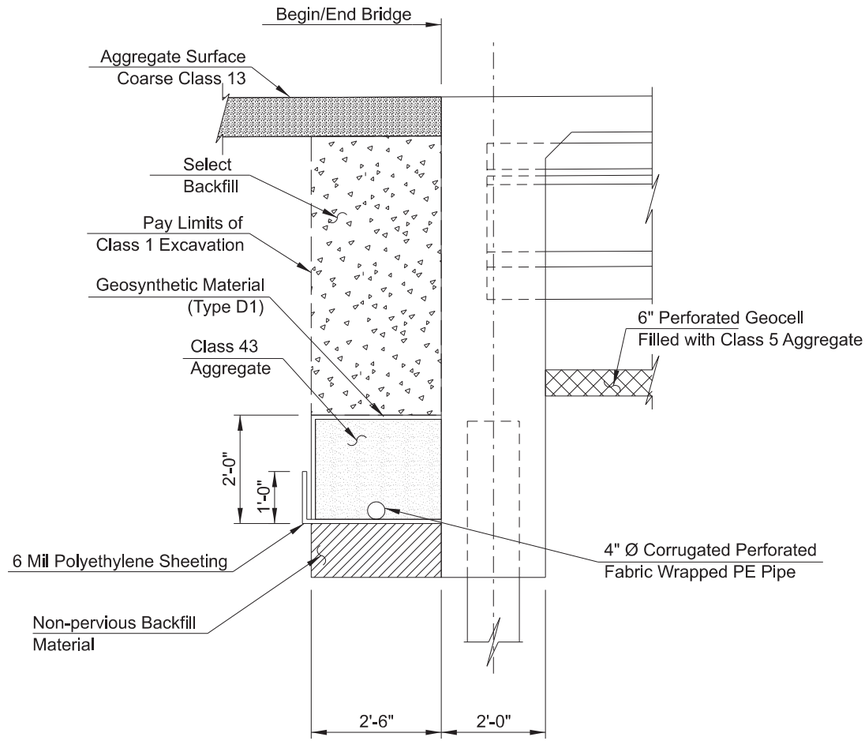
PILING LAYOUT &
BEARING ELEVATIONS

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

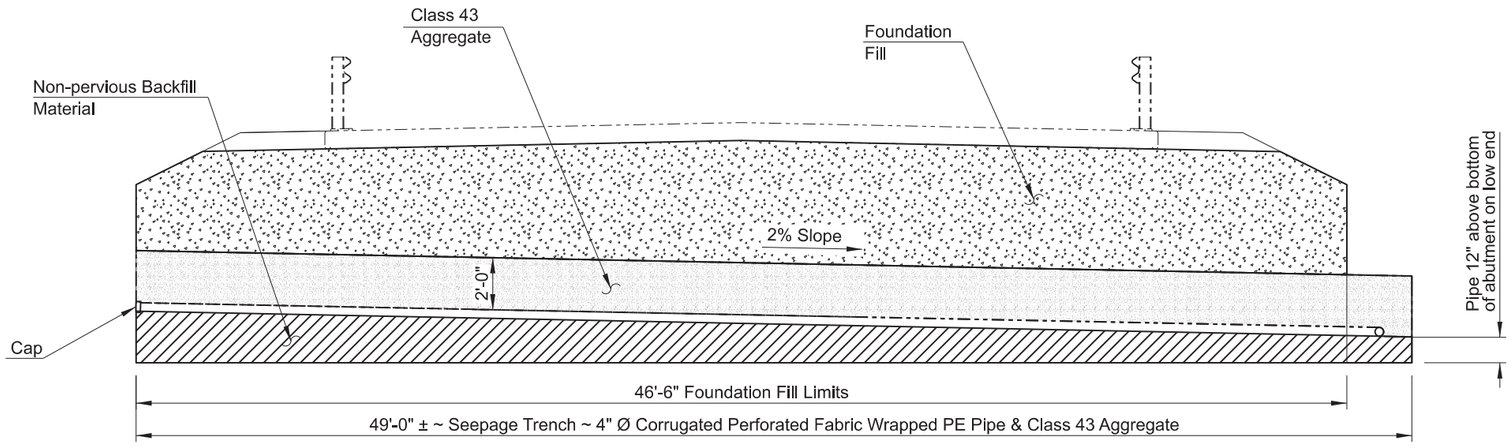
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	6



ABUTMENT PLAN



DETAIL AT ABUTMENT



BACK FACE OF ABUTMENT

NOTES:

Use corrugated perforated fabric wrapped PE pipe that meets the requirements of Section 830.03 A.4. Provide fabric wrapping for the pipe that meets the requirements of Section 858.01 for D3 or D4 drainage fabric. Provide aggregate that meets the requirements of Section 816.03, Class 43. Provide foundation fill that meets the requirements of Section 210.

Include the cost to furnish and place the select backfill, aggregate, geosynethetic material, 6 mil polyethylene, corrugated perforated pipe and headwalls in the pay item "Abutment Underdrain System."

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

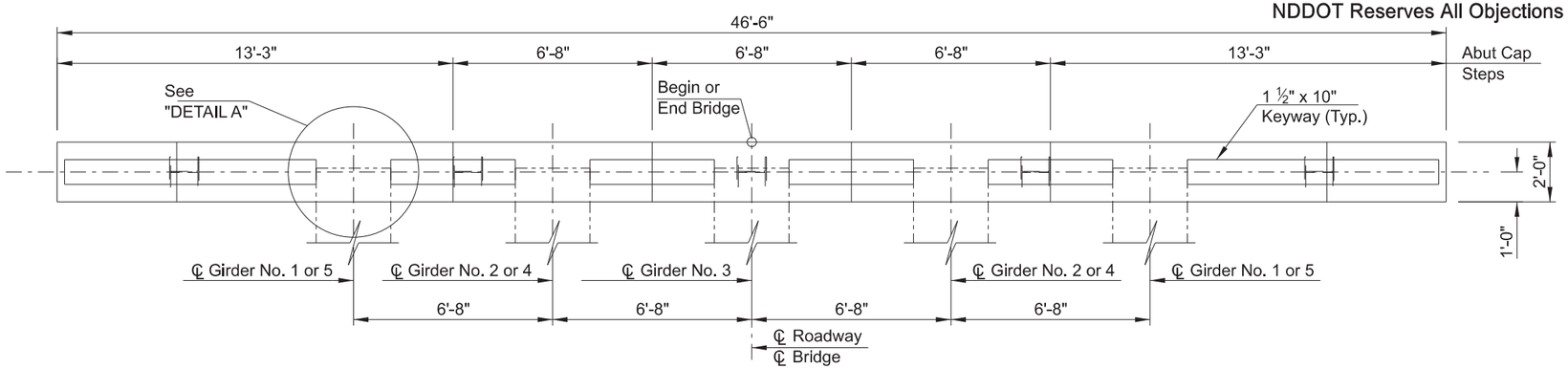
CANNONBALL RIVER BRIDGE

OVER CANNONBALL RIVER

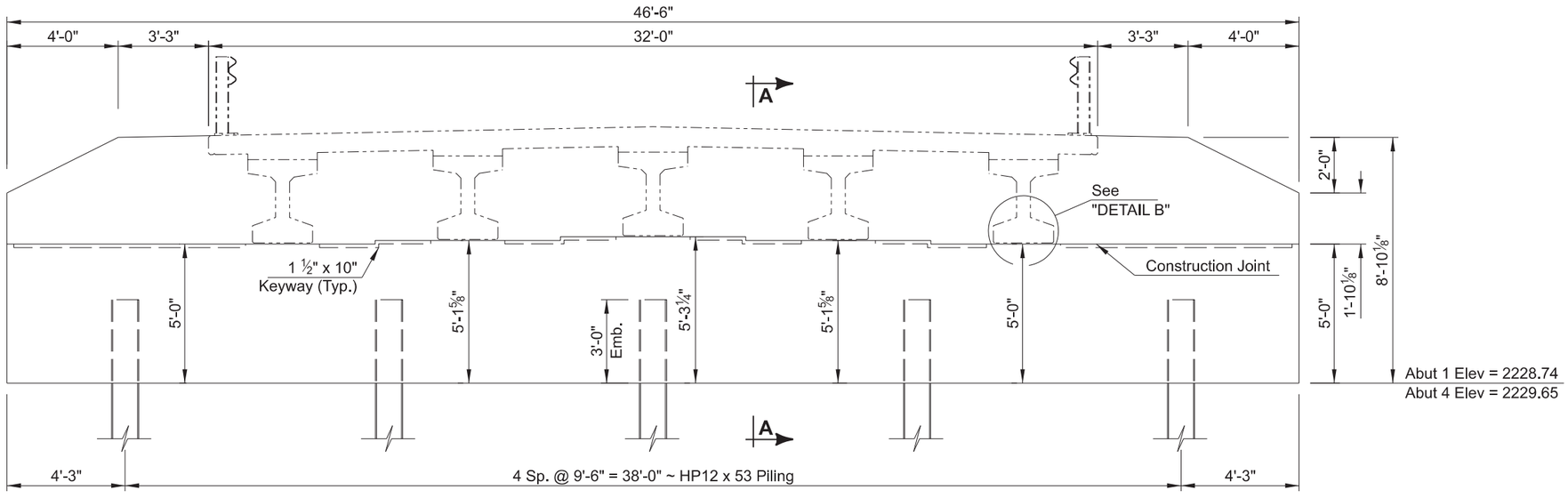
ABUTMENT UNDERDRAIN & EXCAVATION DETAILS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	7

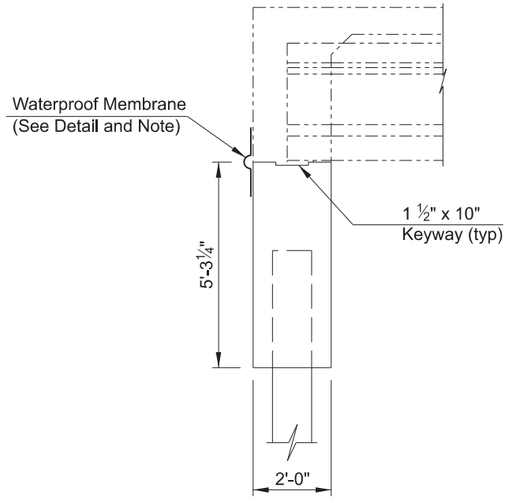
23 U.S.C. 407
NDDOT Reserves All Objections



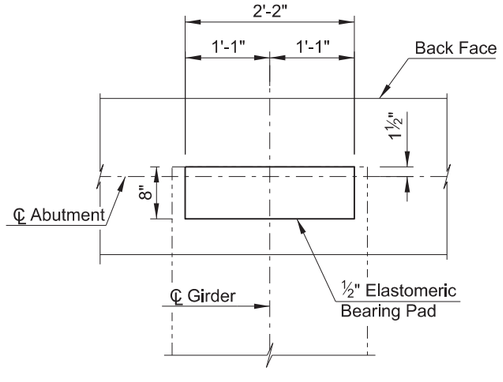
PLAN



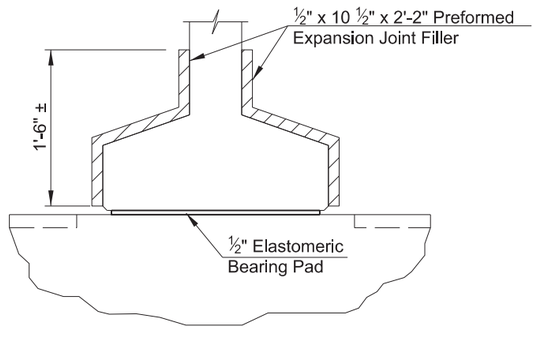
ELEVATION



A-A

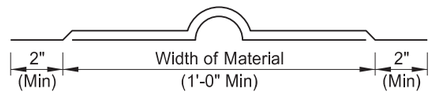


DETAIL A



(Typical at Girder Ends Abutments Only)

DETAIL B



Use waterproof membrane that meets the requirements of Section 602.03 B. Include the cost of the waterproof membrane in the contract unit price for "Class AE-3 Concrete."

WATERPROOF MEMBRANE DETAIL

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES
SEE DWG 170-4

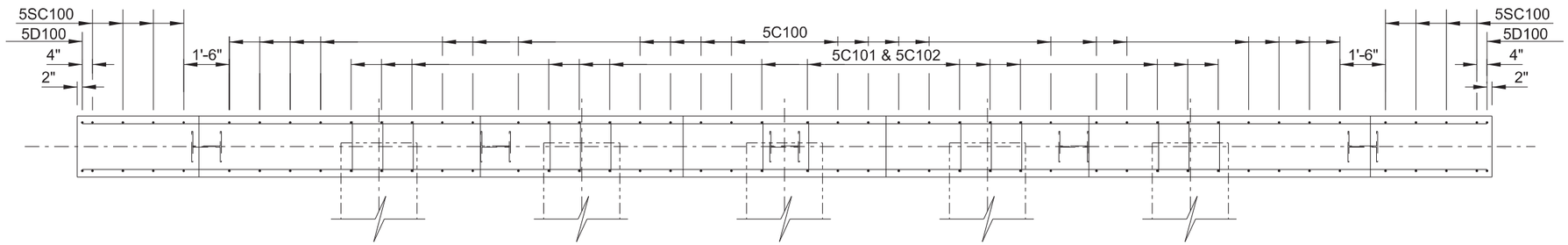
CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

(SHOWING DIMENSIONS)

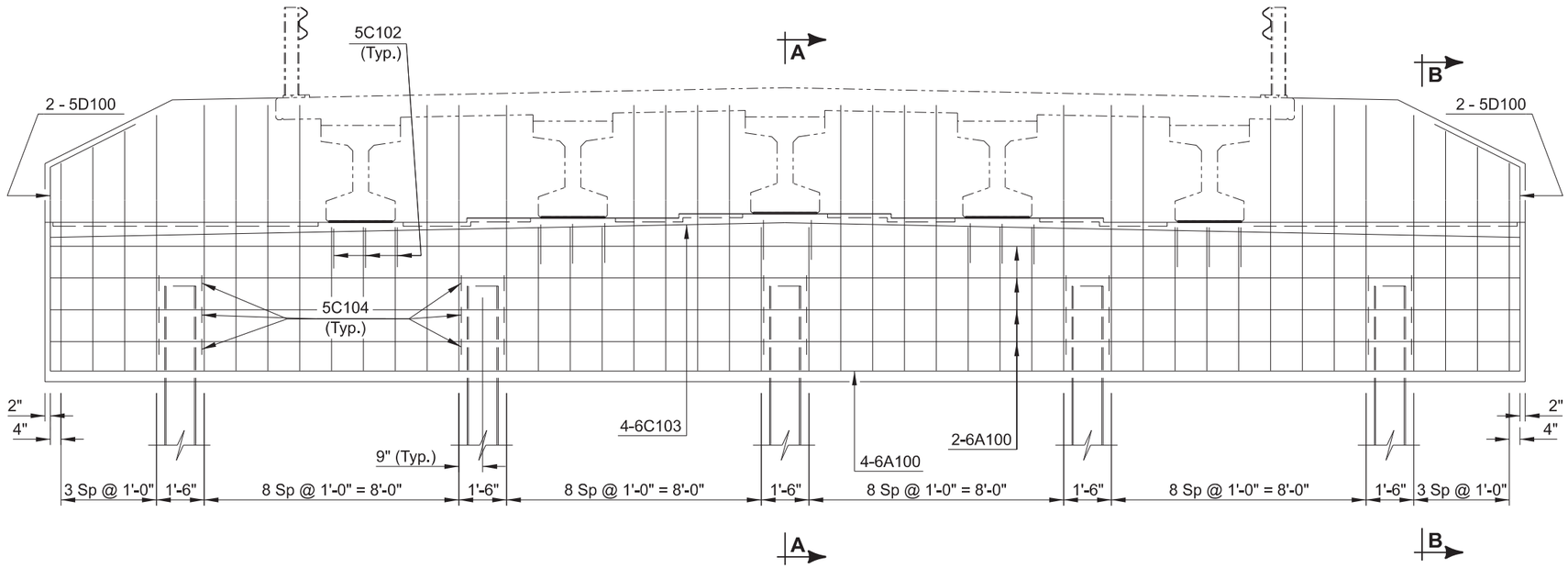
ABUTMENT DETAILS

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

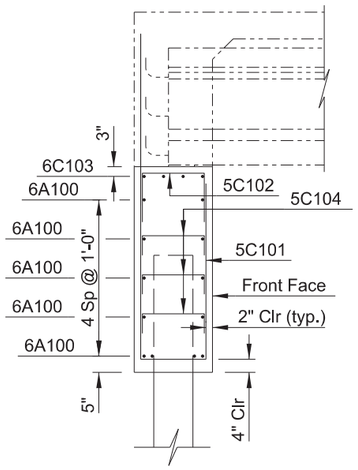
STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	170	8



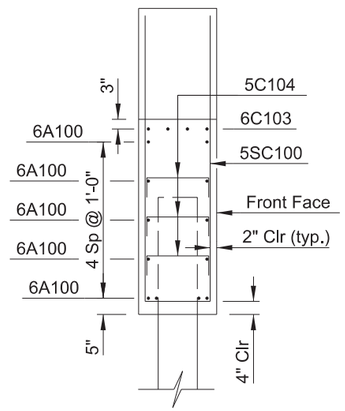
PLAN



ELEVATION



A-A



B-B

QUANTITIES	(ONE ABUTMENT)
CLASS AE-3 CONCRETE	17.5 CY
REINFORCING STEEL	2075 LBS

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

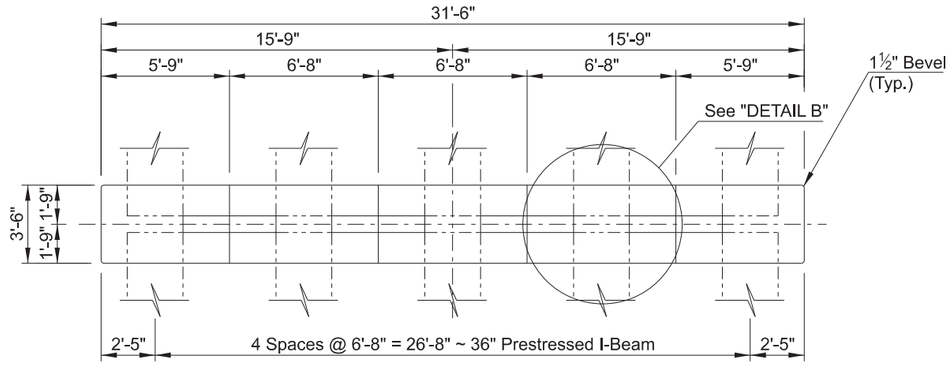
CANNBALL RIVER BRIDGE
OVER CANNONBALL RIVER

(SHOWING REINFORCING)

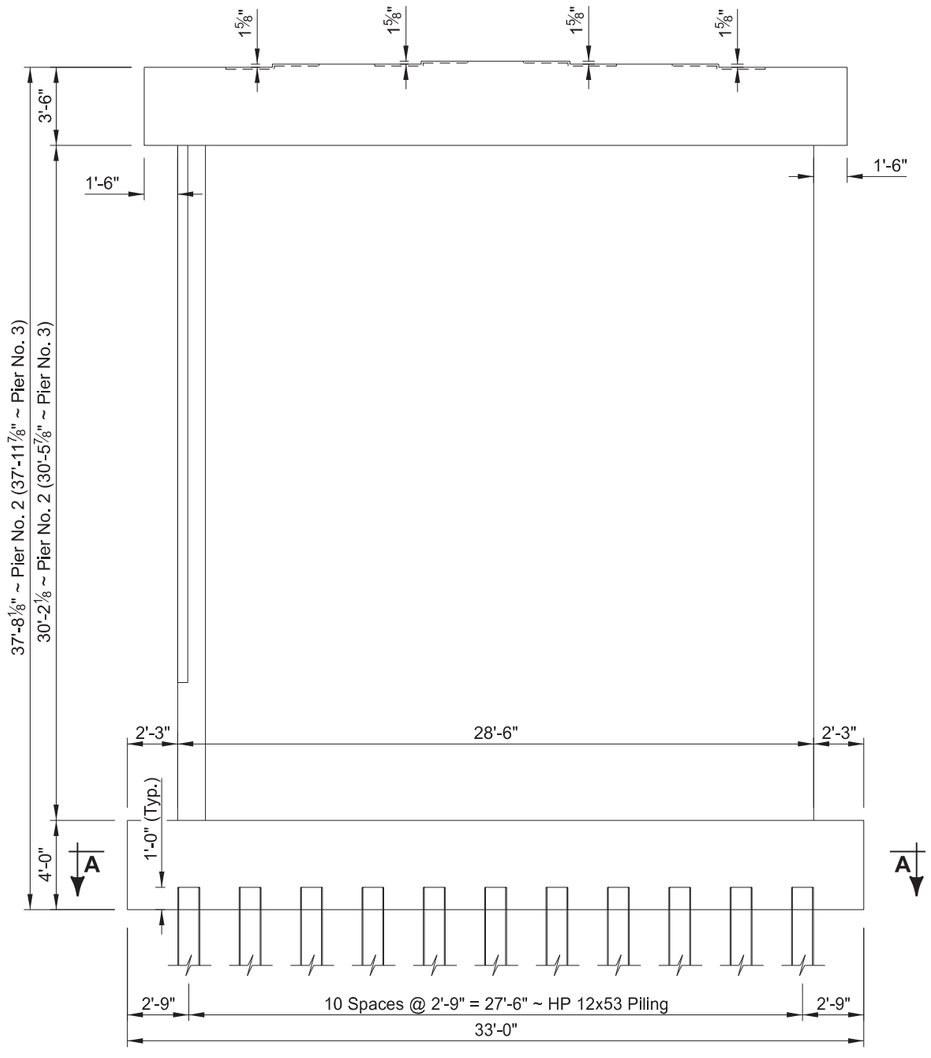
ABUTMENT DETAILS

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

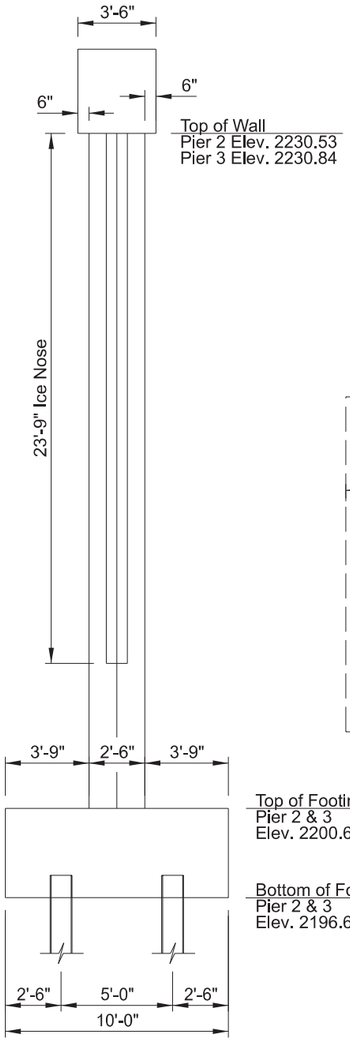
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	9



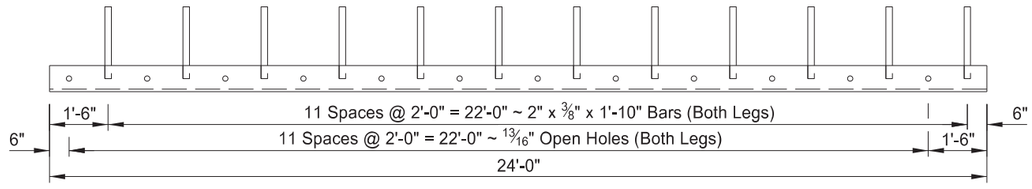
PLAN



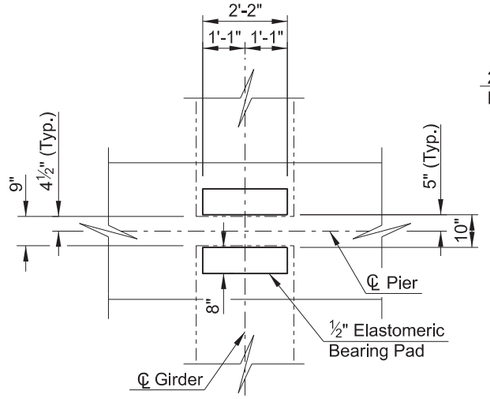
ELEVATION



END VIEW

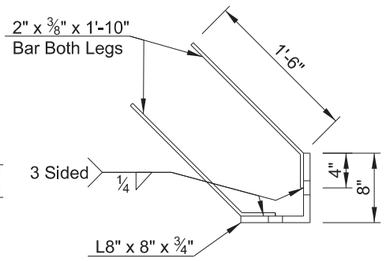


ICE NOSE DETAIL

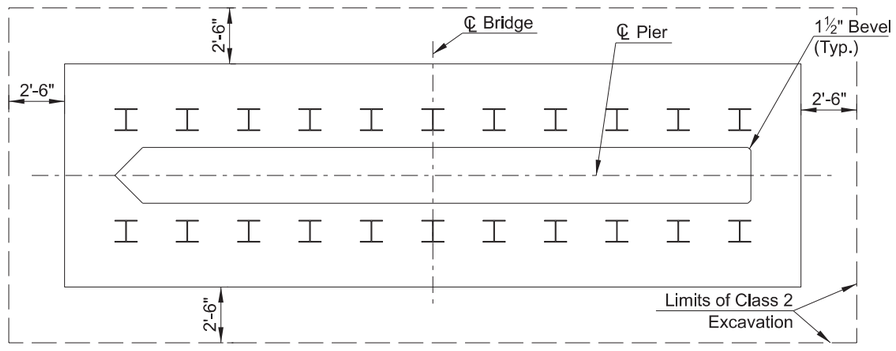


DETAIL B

Galvanize in accordance with Section 854 after fabrication.



BAR DETAIL



A-A

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES

SEE DWG 170-4

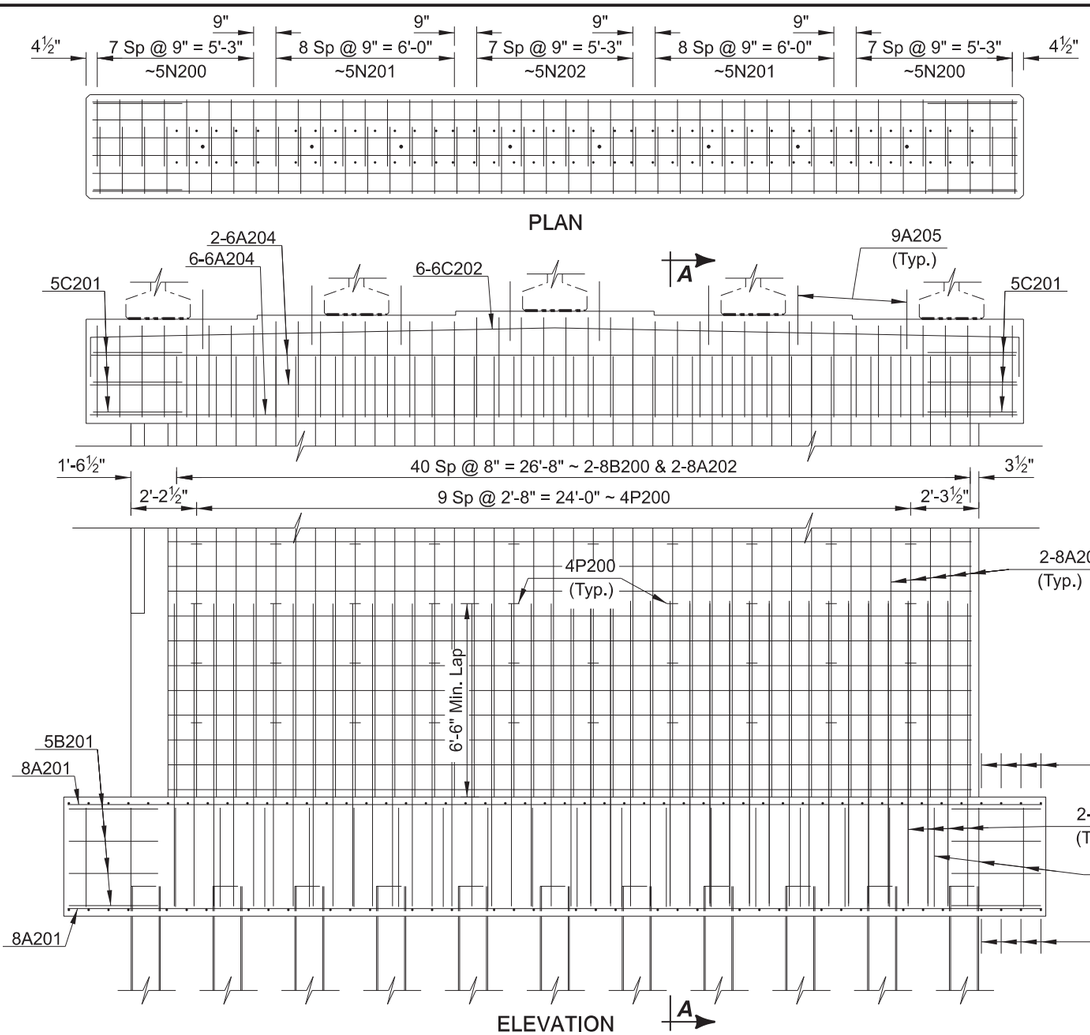
CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

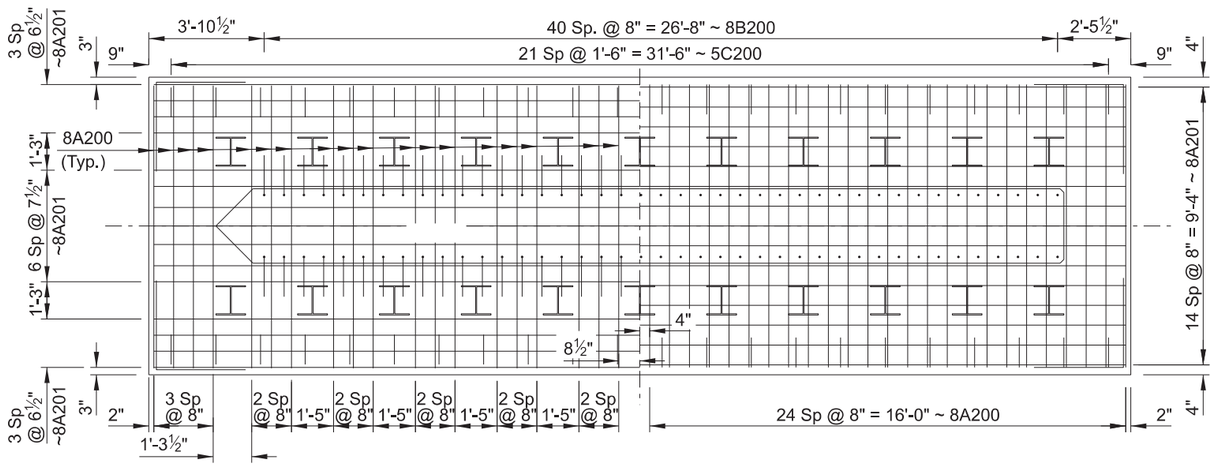
(SHOWING DIMENSIONS)

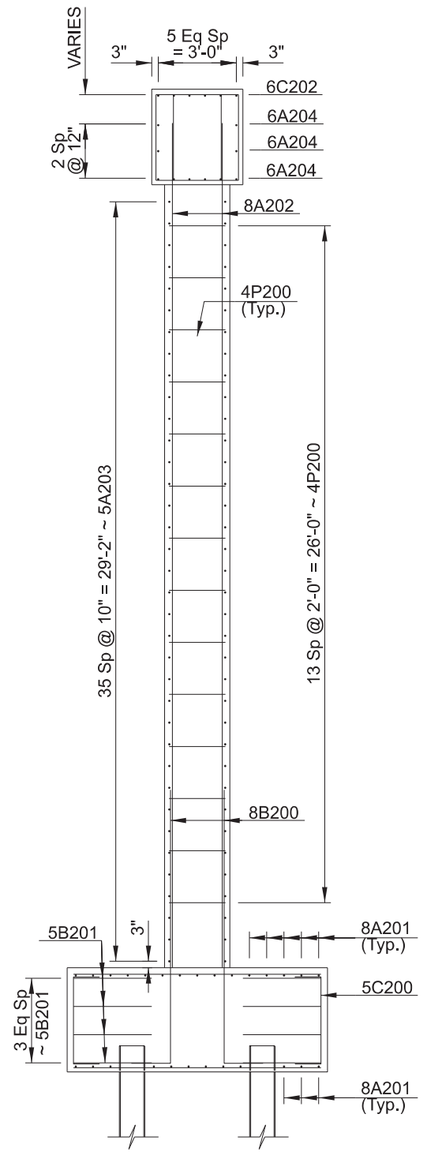
PIER DETAILS

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

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	10







REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES	(ONE PIER)
CLASS AE-3 CONCRETE	142.0 CY
REINFORCING STEEL	19,139 LBS
STRUCTURAL STEEL	1,046 LBS

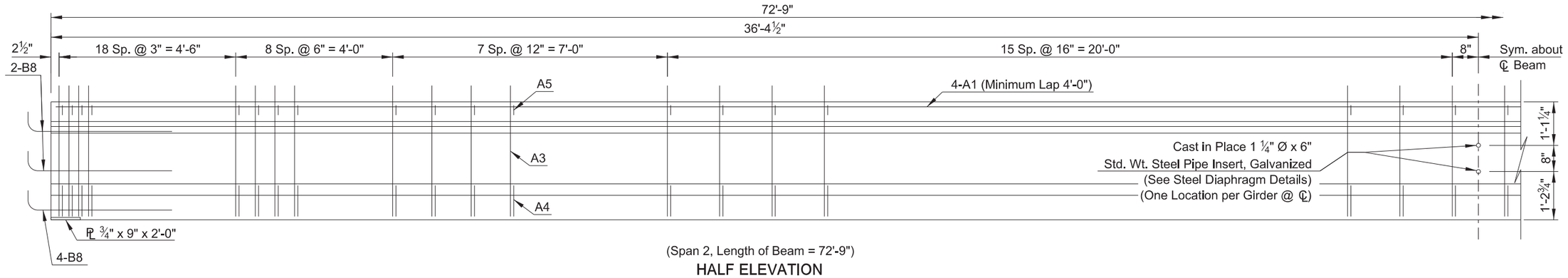
CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

(SHOWING REINFORCING)

PIER DETAILS

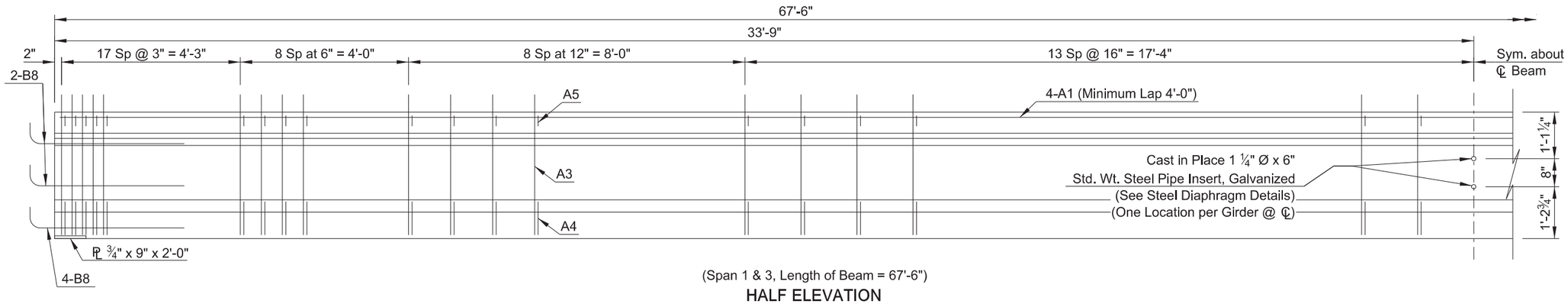
23 U.S.C. 407
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	11



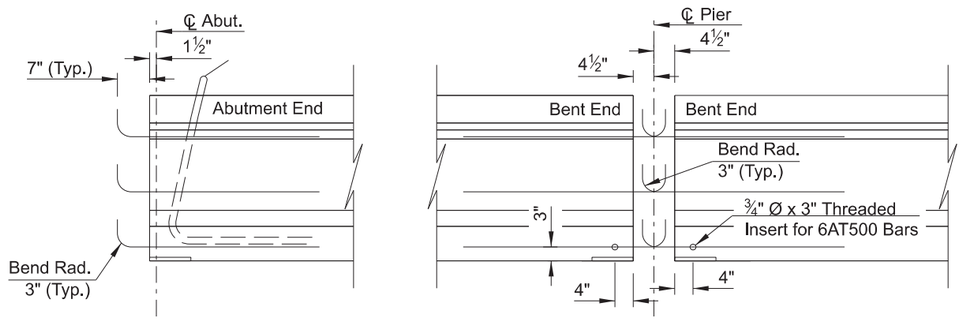
(Span 2, Length of Beam = 72'-9")

HALF ELEVATION



(Span 1 & 3, Length of Beam = 67'-6")

HALF ELEVATION



DETAIL "X"

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES
SEE DWG 170-4

BEAM SECTION DATA
WT = 594.0 LBS/FT
CROSS SECTIONAL AREA = 570 IN^2
C.G. (FROM BOTTOM) = 17.96 IN
I = 93,528 IN^4
S_x = 5,209 IN^3

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

PRE-TENSIONED 36"
PRESTRESSED I-Beam

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	170	12

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

NOTES:

At least 14 days prior to the forming and pouring of any beams, the Contractor shall submit shop drawings to the Engineer for review. The shop drawings shall include design calculations showing the total initial prestress force taken from the contract drawings and the losses in the prestress due to elastic shortening, shrinking or creeping of concrete, and the relaxation of steel stress as determined by the Contractor for his method of stressing.

Shop drawings shall show strand layout, pull down locations (if applicable), tensioning forces, elongation and any proposed changes in reinforcing steel.

The final prestress force (remaining after all losses have been accounted for) and its corresponding center of gravity, shall be selected from those on a curve determined by the three values shown. All prestressing steel shall conform to AASHTO M203.

The beams shall be poured in all steel forms.

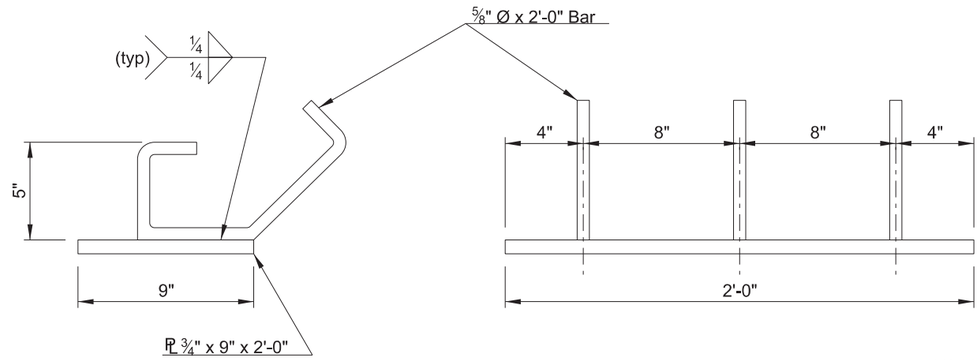
Holes and inserts to accommodate the diaphragm bars shall be provided in the beams at locations as shown.

All reinforcing steel shall have a clearance of 1"unless otherwise noted.

Minor changes to the shape of the beam and to reinforcing steel may be made to accommodate the forms of various contractors and their construction methods with the approval of the Engineer.

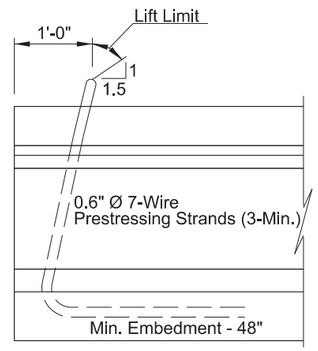
The tops of the beams shall be rough floated and tined transversely for bond.

Provide handling hooks or devices as required by the Contractor. Hooks or devices provided will be subject to approval by the Engineer and shall be installed within 4'-0"of the end of beams, as shown on the "Typical Lifting Detail". The design of the lifting devices shall be the design of the fabricator.



(Bearing Plate to be Structural Steel M 270 Grade 36
hot dipped galvanized and included in the bid price for the beam.)

BEARING DETAIL

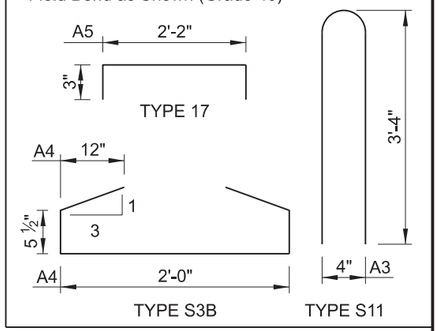


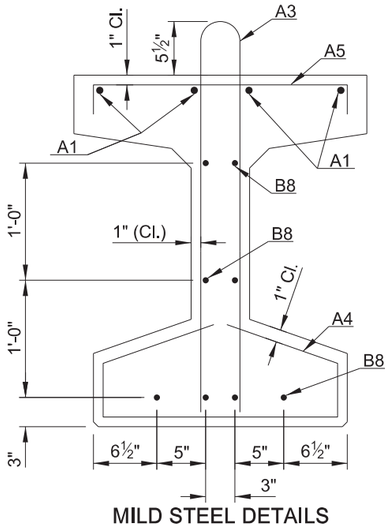
TYPICAL LIFTING DETAIL

REINFORCING SCHEDULE
(For One Girder)

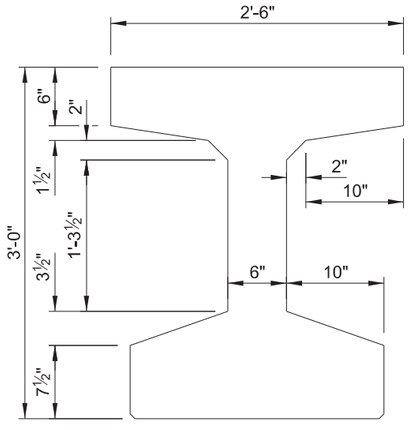
	MARK	NO.	SIZE	LENGTH	TYPE
67'-6" Girder	A1	12	6	25'-1"	Str.
	A3	93	4	6'-10"	S11
	A4	93	4	5'-0"	S3B
	A5	93	4	2'-8"	17
	*B8	16	5	4'-0"	Str.
72'-9" Girder	A1	12	6	26'-10"	Str.
	A3	98	4	6'-10"	S11
	A4	98	4	5'-0"	S3B
	A5	98	4	2'-8"	17
	*B8	16	5	4'-0"	Str.

* Field Bend as Shown (Grade 40)

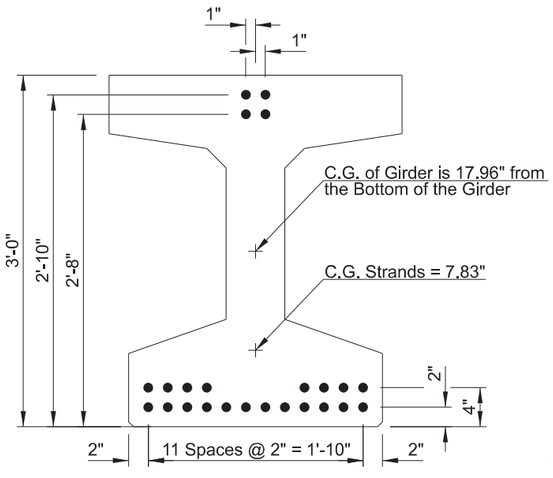




MILD STEEL DETAILS



SECTION DIMENSIONS
Type 36M Girders (End View)



STRAND PATTERN (SPANS 1,2,&3)
(24) - 0.6" Low Relaxation Strands
C.G. = 7.83" from bottom

PRESTRESSING DATA

C.G.	FINAL FORCE	DETENSION STRENGTH	ACCEPTANCE STRENGTH	WEIGHT (TONS)	BEAM LENGTH
7.83"	1054.6	6,000 psi (Min)	7,000 psi (Min)	19.5	67'-6"
7.83"	1054.6	6,000 psi (Min)	7,000 psi (Min)	20.9	72'-9"

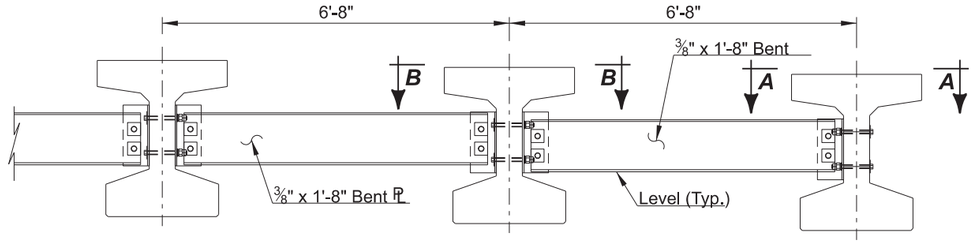
REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

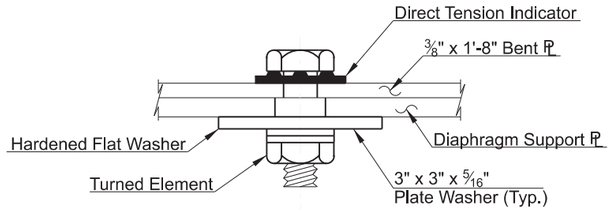
PRE-TENSIONED 36"
PRESTRESSED I-BEAM

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

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	170	13



SECTIONS AT DIAPHRAGM



DIRECT TENSION INDICATOR DETAIL

NOTES:

1. All steel for the diaphragms including plate washers shall conform to ASTM A36 and shall be galvanized in accordance with ASTM A123 or ASTM 153. Bolts, nuts, and washers shall be galvanized in accordance with ASTM F2329.

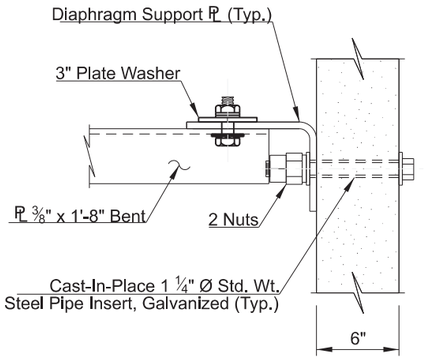
2. The steel diaphragms between adjacent girders shall be installed as soon as possible and in conjuction with girder erection.

3. The estimated weight shown below is the estimated weight of the ⅜" x 1'-8" Bent Plate Diaphragms and the ½" Support Plate. A C12x30 may be substituted for the ⅜" Bent Plate Diaphragm.

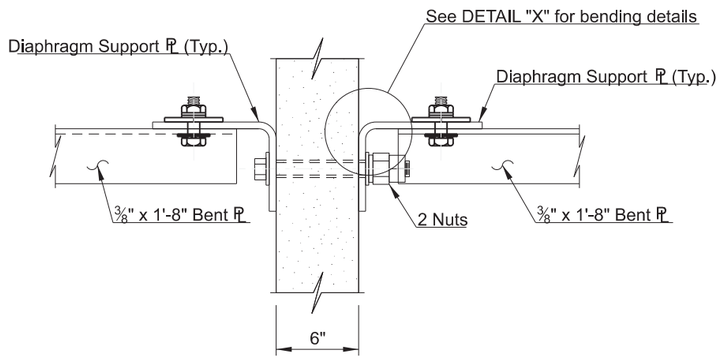
4. All costs associated with furnishing, fabricating, assembly and installation of diaphragms, bolts and all hardware shall be incidental to the contract lump sum price for Structural Steel, Miscellaneous.

ESTIMATED QUANTITIES		
Item	Unit	Quantity
Structural Steel M270-Grade 36	LBS	2787

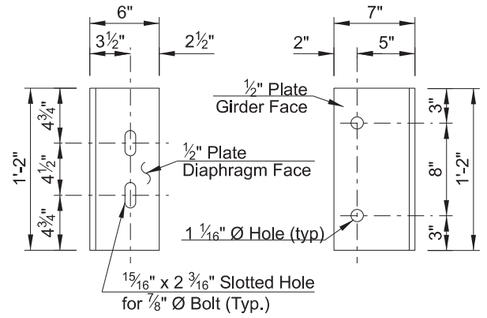
For informational purposes only, the estimated weight of structural steel is 929 Lbs per Diaphragm location.



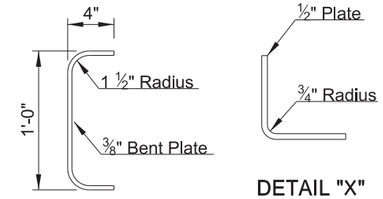
A-A



B-B

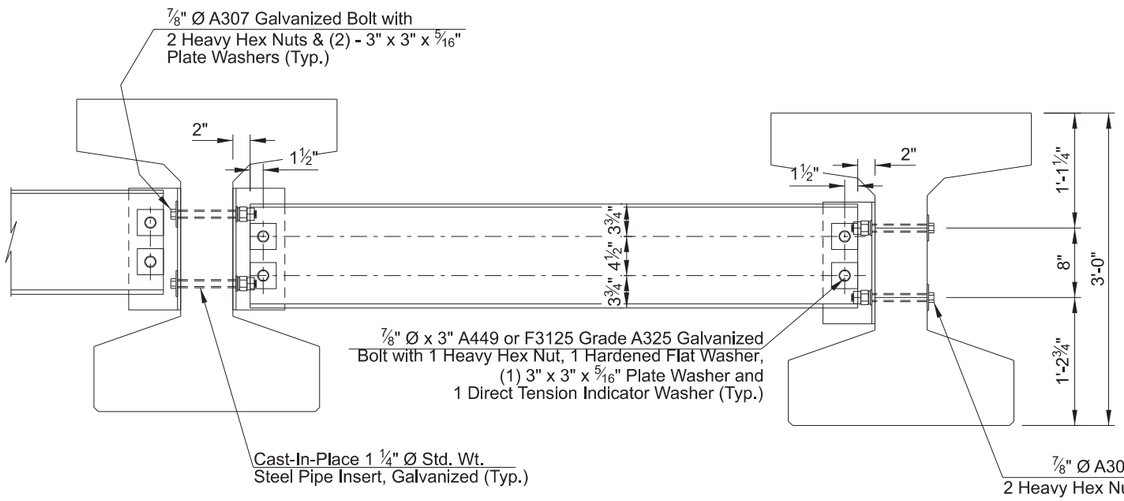


DIAPHRAGM SUPPORT PLATE



END VIEW BENT PLATE DIAPHRAGM

DETAIL "X"



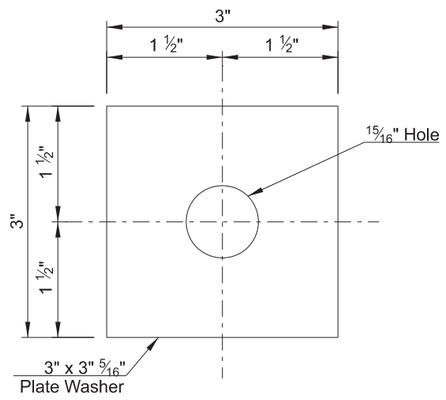


PLATE WASHER DETAIL

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

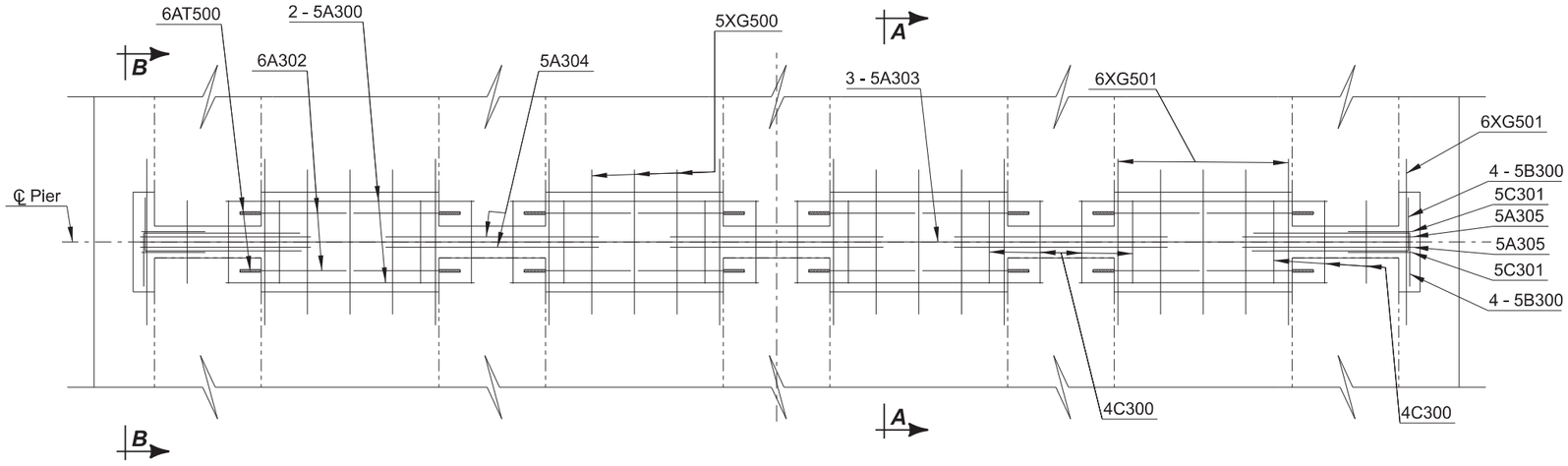
QUANTITIES
SEE DWG 170-4

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

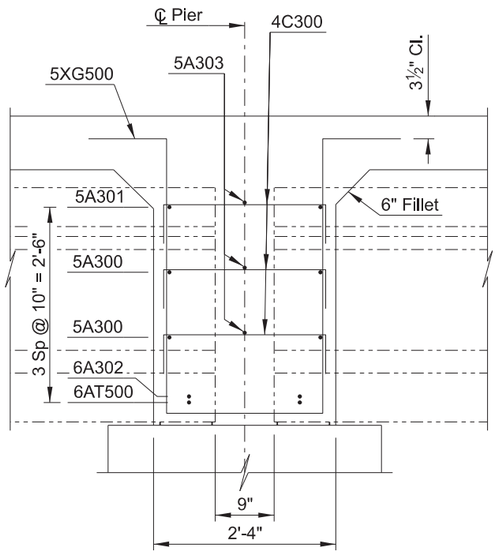
STEEL DIAPHRAGM DETAILS

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

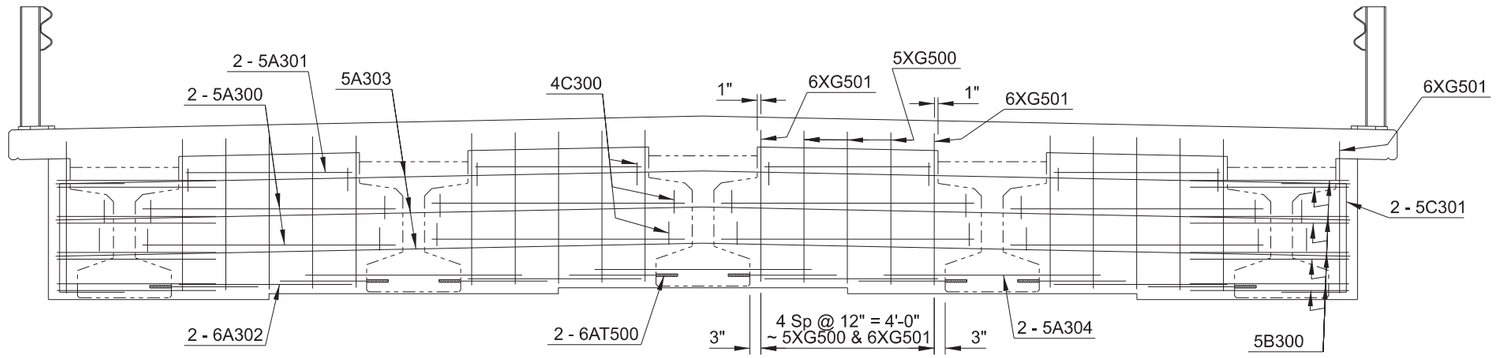
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	14



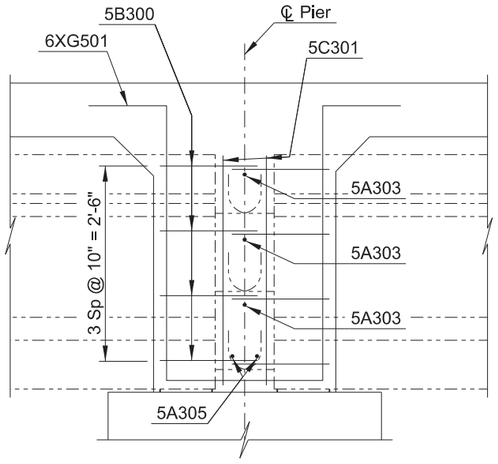
PLAN



A-A



ELEVATION



B-B

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES

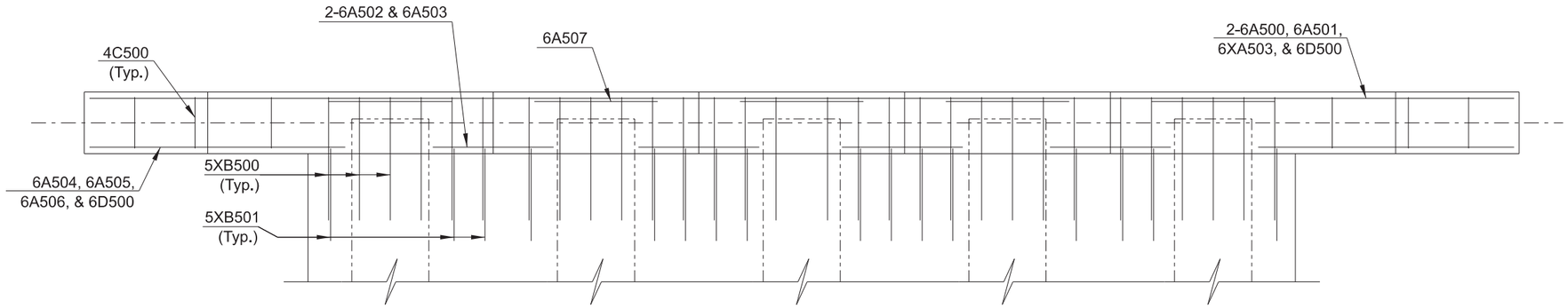
SEE DWG 170-4, 170-18

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

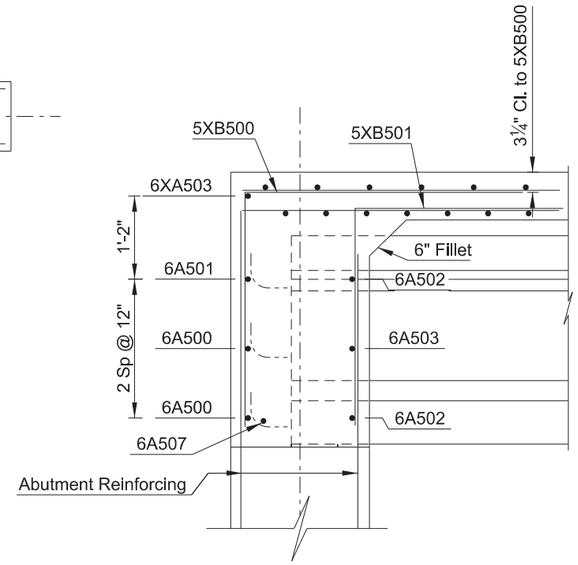
BENT DIAPHRAGM DETAILS

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

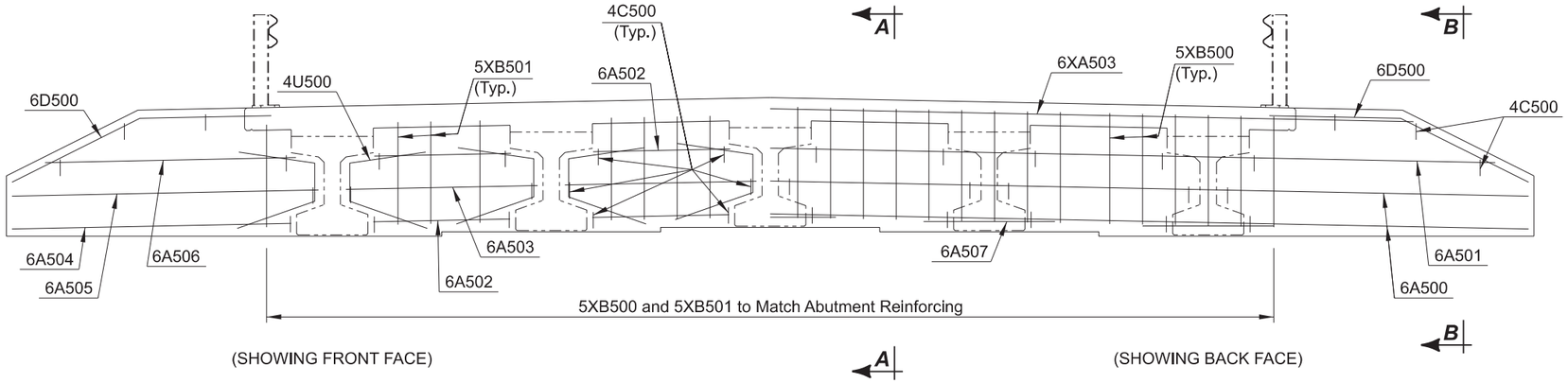
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	15



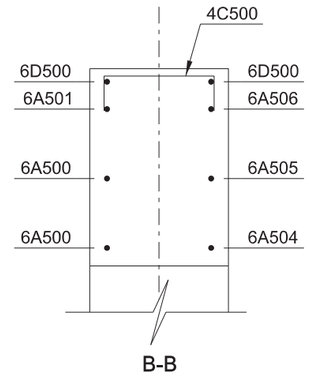
PLAN



A-A



ELEVATION



B-B

QUANTITIES

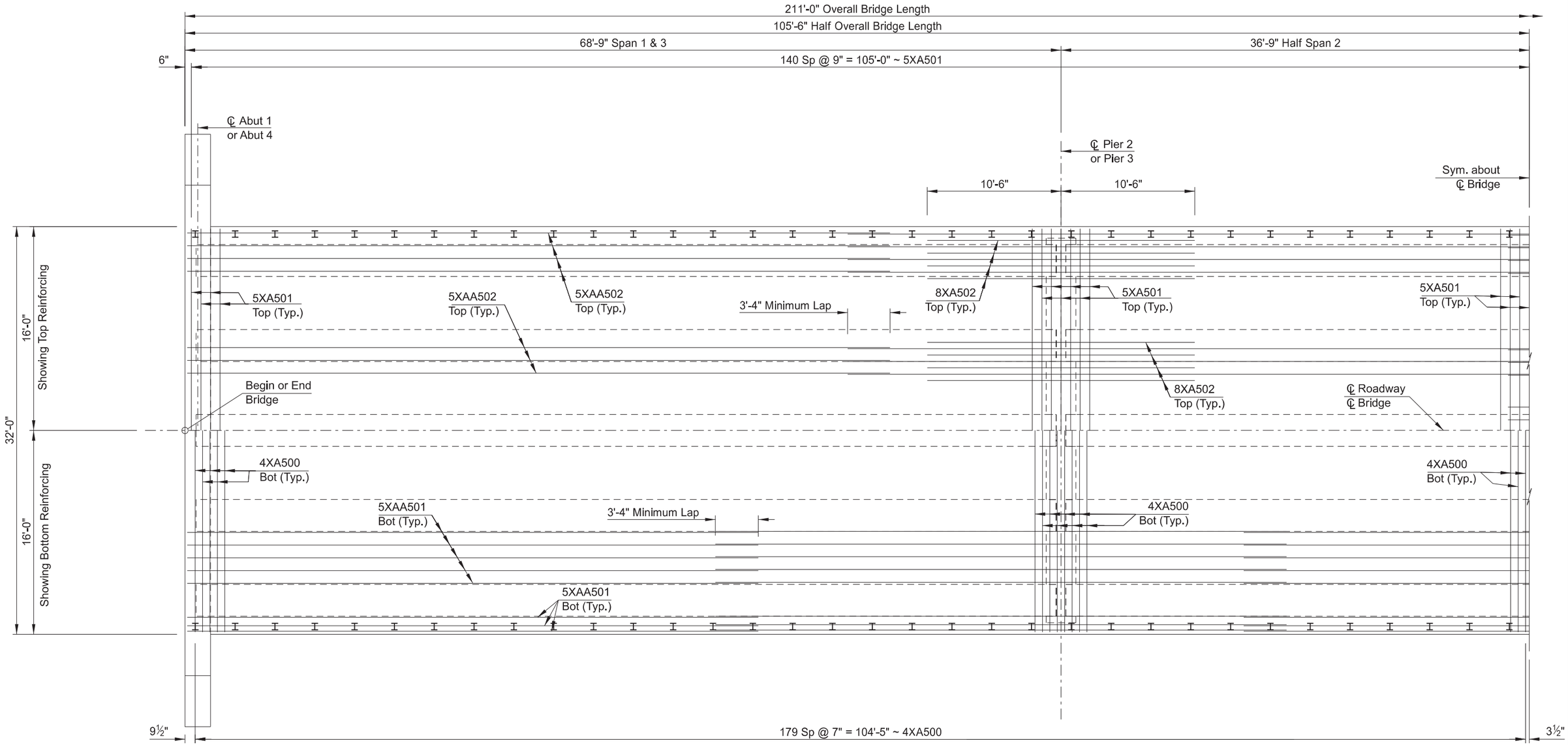
SEE DWG 170-4, 170-18

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

ENDWALL DETAILS

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

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	16



HALF PLAN

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES

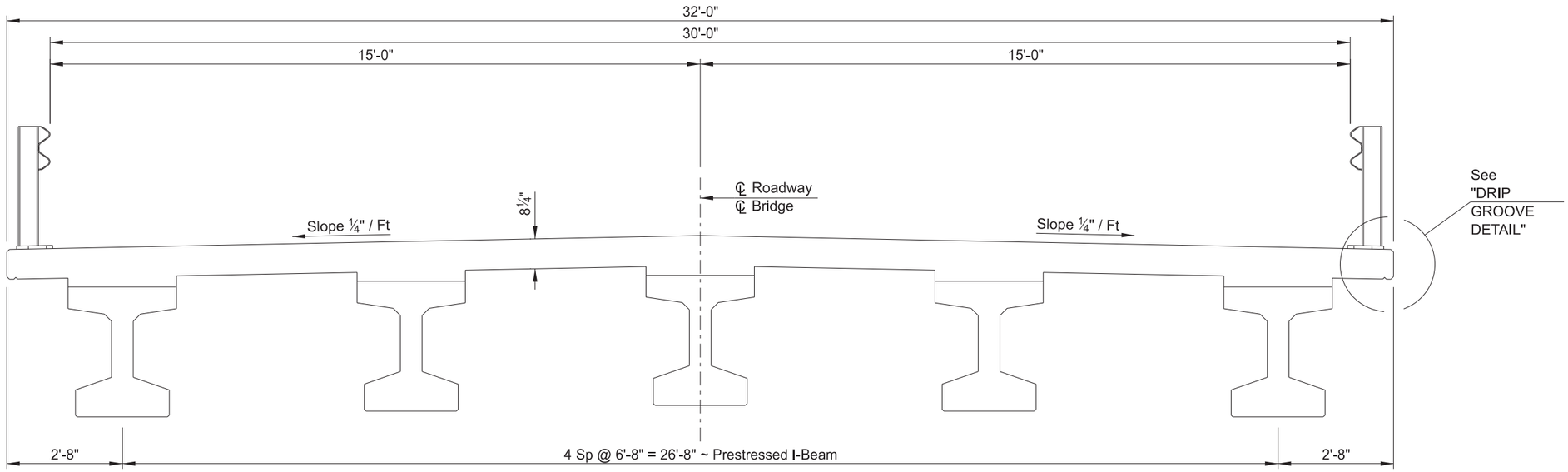
SEE DWG 170-4, 170-18

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

HALF SLAB LAYOUT

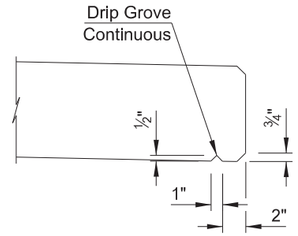
23 U.S.C. 407
NDDOT Reserves All Objections

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	17

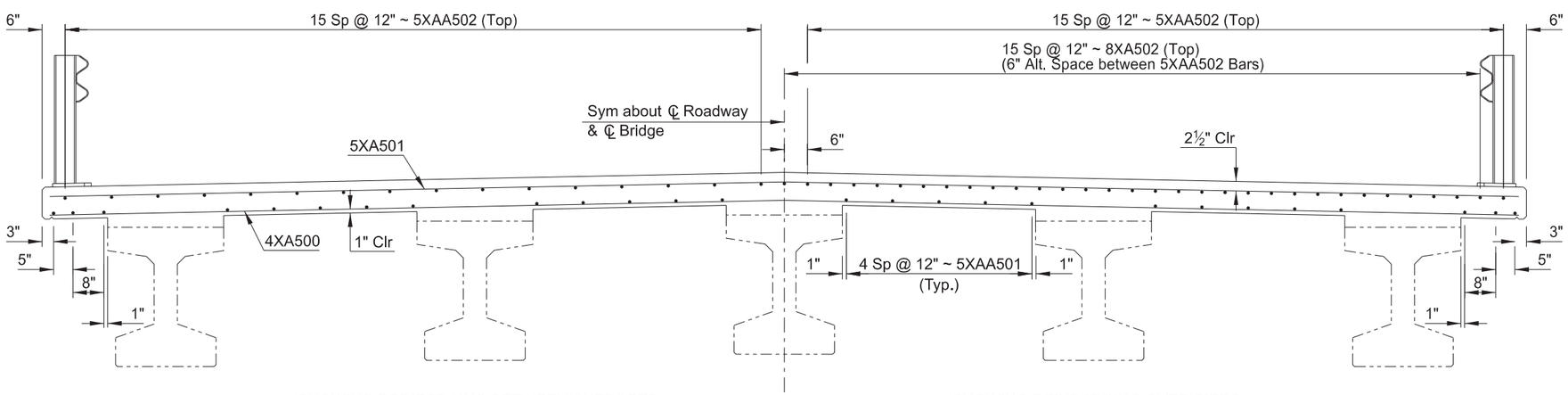


(SHOWING DIMENSIONS)

SLAB SECTION



DRIP GROOVE DETAIL



(SHOWING REINFORCING BETWEEN SUPPORTS)

(SHOWING REINFORCING OVER PIERS)

SLAB SECTION

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES
SEE DWG 170-4, 170-18

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

SLAB SECTION

BILL OF REINFORCING STEEL, GRADE 60

LETTER PREFIX OF BAR MARK DENOTES SHAPE ~ SEE BAR DETAILS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	170	18

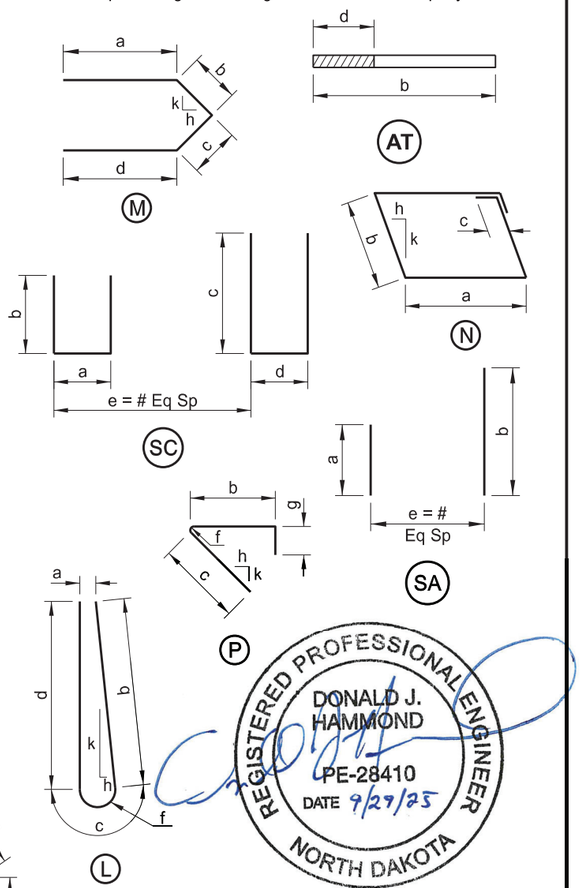
LOCATION	SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
ABUTMENTS	6	A100	24	46'-2"		46'-2"							
	5	C100	44	18'-4"		8'-4"	1'-8"	8'-4"					
	5	C101	28	14'-6"		8'-4"	1'-8"	4'-6"					
	5	C102	28	4'-2"		1'-3"	1'-8"	1'-3"					
	6	C103	8	48'-8"		1'-3"	46'-2"	1'-3"					
	5	C104	60	2'-8"		6"	1'-8"	6"					
	5	D100	8	9'-5"		6'-5"	3'-0"					6	12
	5	SC100	4	64'-8"	1'-8"	6'-6"	8'-0"	1'-8"	3				
PIERS	8	A200	176	9'-6"		9'-6"							
	8	A201	60	32'-8"		32'-8"							
	8	A202	164	32'-6"		32'-6"							
	5	A203	144	27'-0"		27'-0"							
	6	A204	20	31'-2"		31'-2"							
	9	A205	16	2'-0"		2'-0"							
	8	B200	164	12'-0"		1'-6"	10'-6"						
	5	B201	32	6'-0"		3'-0"	3'-0"						
	5	C200	88	5'-4"		1'-0"	3'-4"	1'-0"					
	5	C201	12	8'-11"		3'-0"	2'-11"	3'-0"					
	6	C202	12	33'-10"		1'-4"	31'-2"	1'-4"					
	5	N200	64	11'-10"	2'-3"	3'-2"	6"					0	12
	5	N201	72	12'-2"	2'-3"	3'-4"	6"					0	12
	5	N202	32	12'-4"	2'-3"	3'-5"	6"					0	12
	4	P200	280	2'-6"		1'-8"	3"			2"	5"		

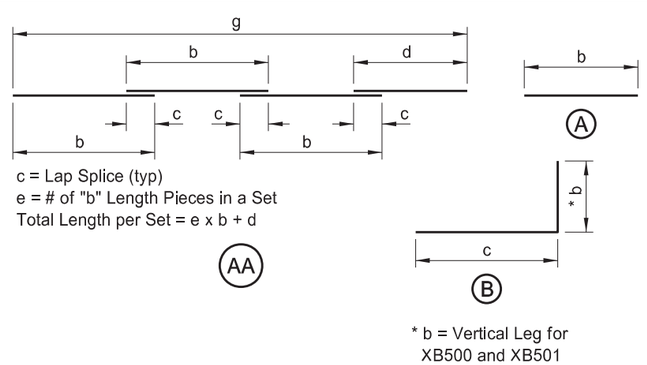
LOCATION		SIZE	MARK	NO. EACH /SET	NOMINAL LENGTH	DETAILING DIMENSIONS a	b	c	d	e	f	g	h	k
DIAPHRAGMS		5	A300	32	5'-10"		5'-10"							
		5	A301	16	3'-10"		3'-10"							
		6	A302	16	4'-0"		4'-0"							
		5	A303	6	29'-10"		29'-10"							
		5	A304	12	5'-0"		5'-0"							
		5	A305	8	4'-0"		4'-0"							
		6	AT500	32	2'-6"		2'-6"		5"	Min.				
		5	B300	32	4'-11"		1'-3"	3'-8"						
		4	C300	56	3'-4"		8"	2'-0"	8"					
		5	C301	8	5'-6"		1'-6"	2'-6"	1'-6"					
SUPERSTRUCTURE	REGULAR	6	A500	4	46'-2"		46'-2"							
		6	A501	2	44'-2"		44'-2"							
		6	A502	16	4'-2"		4'-2"							
		6	A503	8	5'-10"		5'-10"							
		6	A504	4	8'-6"		8'-6"							
		6	A505	4	9'-4"		9'-4"							
		6	A506	4	7'-8"		7'-8"							
		6	A507	10	4'-0"		4'-0"							
		4	C500	72	2'-8"		6"	1'-8"	6"					
		6	D500	8	8'-4"		4'-0"	4'-4"					12	6
		4	U500	20	6'-2"		1'-2"	2'-6"					3	12
	EPOXY	4	XA500	360	31'-8"		31'-8"							
		5	XA501	281	31'-8"		31'-8"							
		8	XA502	62	21'-0"		21'-0"							
		6	XA503	2	39'-2"		39'-2"							
		5	XAA501	26	224'-2"		44'-10"	3'-4"		5		210'-8"		
		5	XAA502	32	220'-8"		55'-2"	3'-4"		4		210'-8"		
		5	XB500	60	7'-5"		3'-5"	4'-0"						
		5	XB501	32	6'-2"		3'-2"	3'-0"						
		5	XG500	24	10'-6"	3'-6"	2'-0"	3'-6"	9"				12	0
		6	XG501	20	11'-0"	3'-6"	2'-0"	3'-6"	12"				12	0

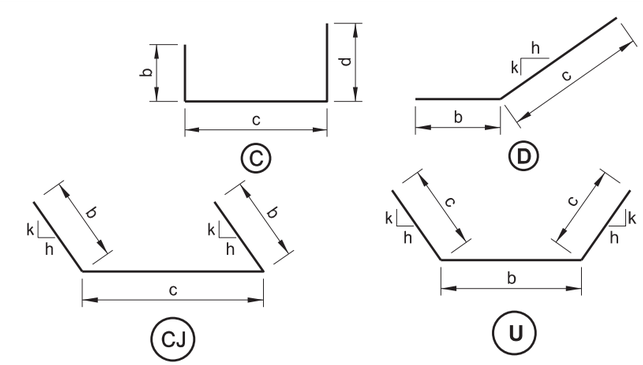
23 U.S.C. 407
NDDOT Reserves All Objections

NOTES:

1. All dimensions are out to out of bars.
2. Nominal length of each bent bar or cut bar is the sum total of the detailing dimensions for that bar, unless otherwise noted.
3. Turn adjacent "AA" bars end for end so that the splice locations are staggered.
4. The "f" dimension indicates the inside radius unless otherwise noted.
5. An "X" preceding a bar designation indicates an epoxy coated bar.





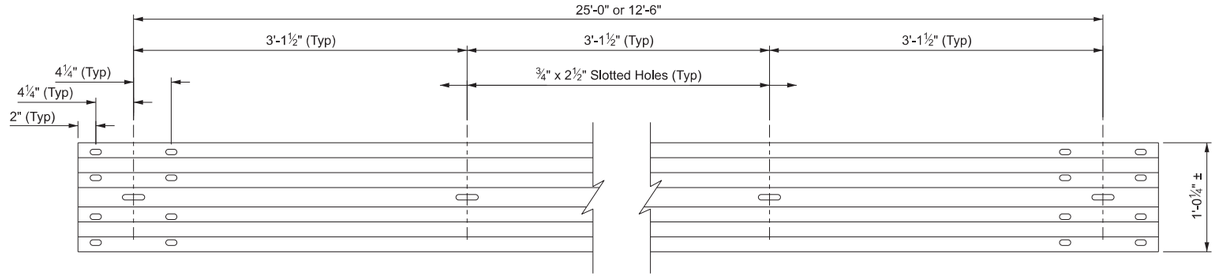


CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

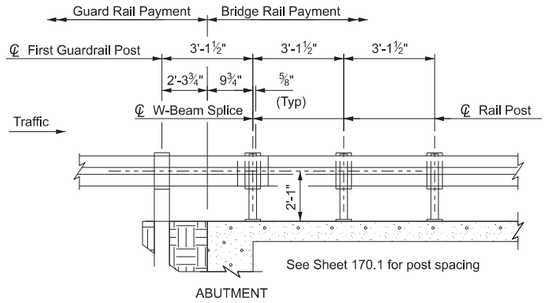
REINFORCING BAR LIST & DETAILS

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

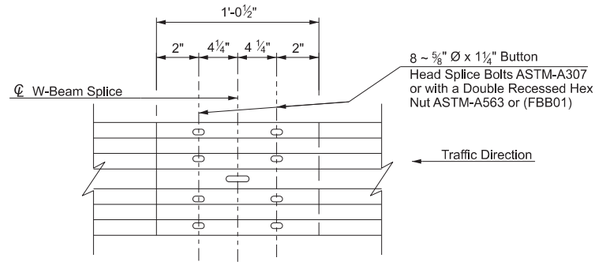
	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	170	19



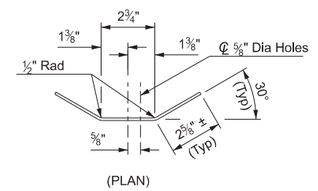
W-BEAM ELEVATION



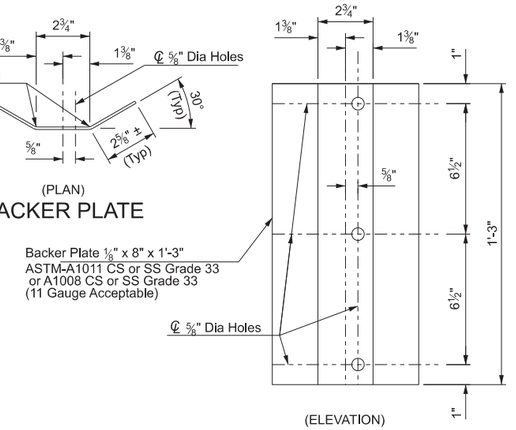
INSIDE ELEVATION OF RAIL



W-BEAM SPLICE ELEVATION



(PLAN)
BACKER PLATE



(ELEVATION)
BACKER PLATE

CONSTRUCTION NOTES:

Install post perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding prior to galvanizing. Work drawings are required for this rail.

MATERIAL NOTES:

Galvanize all steel components. Use anchor bolts for base plates that are ⅝" Dia ASTM F3125 Gr 325 or A449 bolts or ASTM A193 Gr B7 or F1554 Gr 105 threaded rod with one ASTM F436 hardened steel washer and one regular lock washer placed under each heavy hex nut. Use nuts conforming to A563 requirements. One additional heavy hex nut must be furnished and tack welded for each threaded rod.

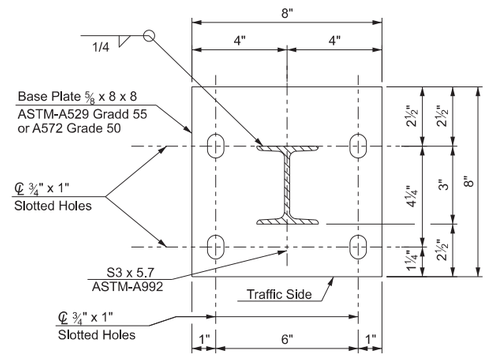
Use W-beam meeting the requirements of Section 862 of the Standard Specifications except as modified in these plans. The Contractor may furnish rail elements of 25'-0", or 12'-6" (Nominal) lengths. Use W-Beams with slotted holes at 3'-1½".

GENERAL NOTES:

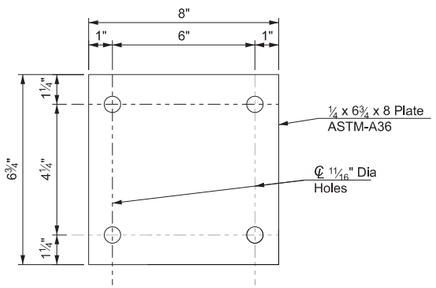
This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criterial. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

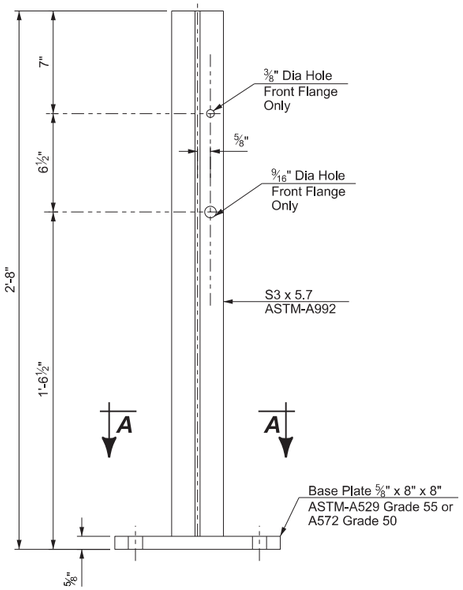
Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact damaged posts with a new post and base plate unit.



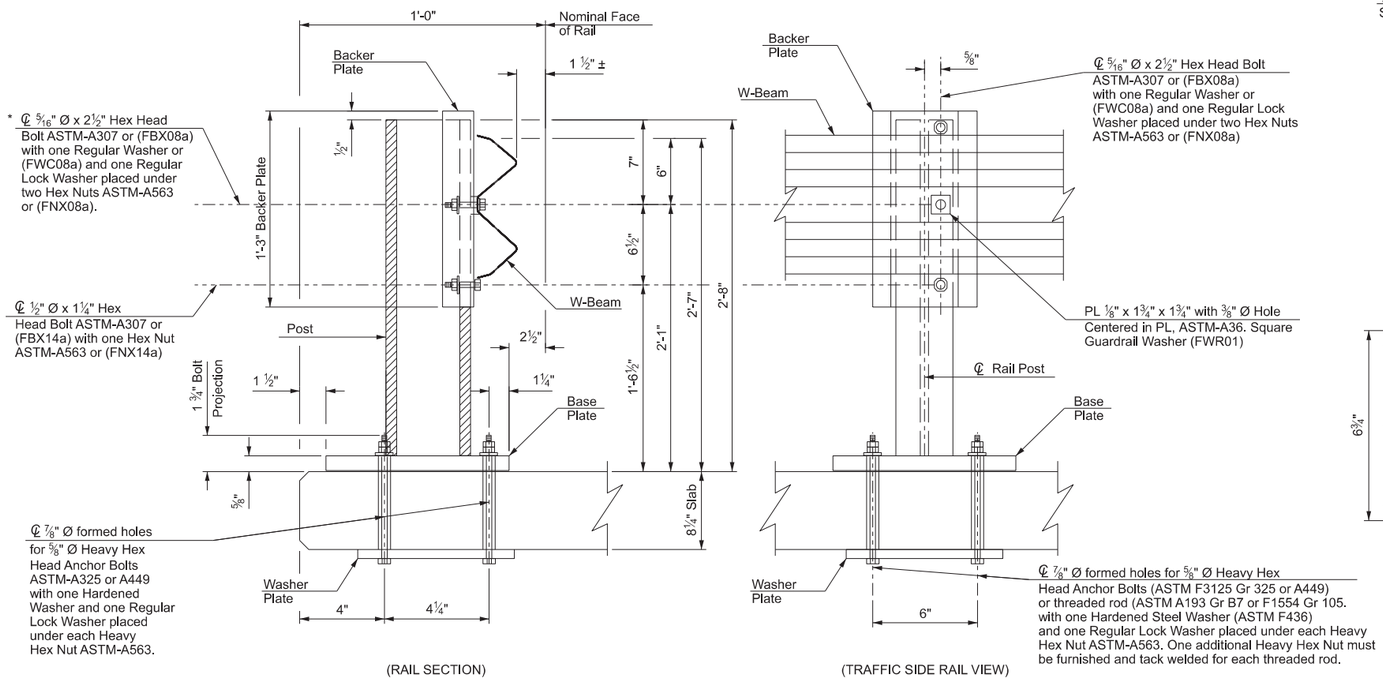
SECTION A-A



WASHER PLATE DETAIL



POST ELEVATION



RAIL DETAILS ON BRIDGE SLAB

* Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

REGISTERED PROFESSIONAL ENGINEER
DONALD J. HAMMOND
PE-28410
DATE 9/29/25
NORTH DAKOTA

QUANTITIES

SEE DWG 170-4

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

TRAFFIC RAIL - STEEL DETAILS

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

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	175	1

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

GEOTECH

BORING LOGS

	STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	175	2

SUBSURFACE BORING LOG

AET JOB NO: **P-0027073** LOG OF BORING NO. **B-1 (p. 1 of 1)**

PROJECT: **Grant County Structure 19-109-26.0 Replacement; New Liepzig, ND**

SURFACE ELEVATION: **2233.0** LATITUDE: **46.3403944** LONGITUDE: **-101.9128882**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1	FILL, silty sand, with trace gravel, brown, moist	FILL	9	M	SS	24					
5	SILTY SAND, brown, loose to medium dense, moist (SM)	COARSE ALLUVIUM	5	M	SS	20					
5			13	M	SS	21					
6											
7			4	M	SS	18					
8											
10			5	M	SS	19					
11											
12			4	M	SS	16					
14			5	M	SS	20					
15											
16											
18											
19											
20			4	M	SS	19					
21											
22											
23											
24	SILTY SAND, with gravel, brown, medium dense, water bearing (SM)	SLOPE FORMATION	21	W/M	SS	18					
25	SILTY SAND, grey, dense, medium dense to very dense, moist (SM)		50/.1	M	SS	0.5					
30	SILTY SAND, with lenses of sandstone, grey, very dense, moist (SM)		92/.7	M	SS	20					
31											
32											
34											
35											
36											
37											
38											
39											
40			80/.8	M	SS	19					
41											
42											
43											
44											
45			86/.8	M	SS	20					
46											
47											
48											
49											
50			62	M	SS	24					
51											
52											
53											
54			65	M	SS	24					
55											
56											
57											
58											
59											
60	SILTY SAND, with lenses of sandstone, grey, dense to very dense, moist (SM)		56	M	SS	24					
61											
62											
63											
64			42	M	SS	24					
65											
66											
67											
68											
69											
70			53	M	SS	24					
71											
72											
73											
74											
75	FAT CLAY, grey, hard, moist (CH)		44	M	SS	24					
76											
77											
78											
79											
80			70	M	SS	24					
81	END OF BORING										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-79½' 3.25" HSA	**3/28/24**		**24.5-26**	**24.5**	**NA**	**NA**	**24.0**	
BORING COMPLETED: **3/28/24**								
DR: **KM** LG: **AA** Rig: **14**								

AET_CORP W-LAT-LONG P-0027073 BORING LOGS.GPJ AET+CPT+WELL.GDT 8/30/24

03/2011 01-DHR-060

SUBSURFACE BORING LOG

AET JOB NO: **P-0027073** LOG OF BORING NO. **B-2 (p. 1 of 1)**

PROJECT: **Grant County Structure 19-109-26.0 Replacement; New Liepzig, ND**

SURFACE ELEVATION: **2228.0** LATITUDE: **46.340620** LONGITUDE: **-101.912176**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1	TOPSOIL, silty sand with roots, cobble at 4", brown, dry (6")	TOPSOIL	75/.2	M	SS	24					
5	SILTY SAND, brown, loose, moist (SM)	COARSE ALLUVIUM	4	M	SS	24	8				23
5			5	M	SS	18	6				
6											
7			4	M	SS	18					
8											
10			3	M	SS	18	18				
11											
12			3	M	SS	18					40
14			3	M	SS	18	24				
15											
16											
18											
19											
20	SILTY SAND, trace gravel, grey, medium dense to very dense, wet (SM)	SLOPE FORMATION	13	W	SS	18					21
21											
22											
23											
24			78	W	SS	18					
25											
26											
27											
28											
29											
30	-Started Mud Rotary Drilling		86	W	SS	18	21				26
31											
32											
34											
35			85/.4	W	SS	18					
36											
37											
38											
39											
40			46	W	SS	18					
41											
42											
43											
44											
45			68	W	SS	18					
46											
47											
48											
49											
50	SANDY LEAN CLAY, grey, hard, wet (CL)		42	W	SS	18			46	24	
51											
52											
53											
54			47	W	SS	18					
55											
56											
57											
58											
59											
60			47	W	SS	18					
61											
62											
63											
64											
65	FAT CLAY, with laminations of silt, grey, hard, moist (CH)		45	M	SS	18			57	34	
66											
67											
68											
69											
70			37	M	SS	18					
71											
72											
73											
74											
75			48	M	SS	18					
76											
77											
78											
79											
80			48	M	SS	18					
81	END OF BORING										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-34½' 3.25" HSA	**6/12/24**	**17:40**	**19.5-21**	**19.5**	**NA**	**NA**	**19.7**	
34½'-79½'								
BORING COMPLETED: **6/12/24**								
DR: **KM** LG: **AA** Rig: **14**								

AET_CORP W-LAT-LONG P-0027073 BORING LOGS.GPJ AET+CPT+WELL.GDT 8/30/24

03/2011 01-DHR-060

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

GEOTECH

BORING LOGS

STATE	PROJECT NUMBER	SECTION NO.	SHEET NO.
ND	BRJ-0019(025)	175	3

AMERICAN ENGINEERING TESTING

SUBSURFACE BORING LOG

AET JOB NO: **P-0027073** LOG OF BORING NO. **B-3 (p. 1 of 1)**

PROJECT: **Grant County Structure 19-109-26.0 Replacement; New Liepzig, ND**

SURFACE ELEVATION: **2228.0** LATITUDE: **46.340591** LONGITUDE: **-101.912804**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1	TOPSOIL, clayey sand, dark brown, moist	TOPSOIL	9	M	SS	24					
3	SILTY SAND, brown, very loose, moist (SM)	COARSE ALLUVIUM	4	M	SS	24					
5			3	M	SS	18					
7			4	M	SS	18					
8	LEAN CLAY, brown, soft to firm, moist (CL)	FINE ALLUVIUM	9	M	SS	18					97
12	SILTY SAND, with trace gravel, brown, loose, wet (SM)	COARSE ALLUVIUM	-	M/W	TW	24					
14			6	W	SS	18					
20	SILTY SAND, grey, very dense, wet (SM)	SLOPE FORMATION	92/.2	W	MC	18	21	91			
25			81	W	SS	18					32
30	-Started Mud Rotary Drilling		81/.3	W	SS	18	21				
35			48	W	SS	18	21				17
40			79	W	MC	18	19	105			
45			58	M	SS	18					
50			50	M	SS	18					
55			80/.4	M	SS	18					
60	FAT CLAY, with laminations of silt, grey, hard, moist (CH)		67	M	MC	18	24				
65			80	M	SS	18	21		67	38	
70			56	M	SS	18					
75			48	M	SS	18	23				
80			63	M	SS	18					
81	END OF BORING										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-29½' 3.25" HSA							
29½'-79½'	**6/13/24**	**17:00**	**14.5-16**	**14.5**	**NA**	**NA**	**15.8**
BORING COMPLETED: **6/13/24**							
DR: **KM** LG: **AA** Rig: **14**							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-LAT-LONG P-0027073 BORING LOGS.GPJ AET+CPT+WELL.GDT 8/30/24

03/2011 01-DHR-060

CANNONBALL RIVER BRIDGE
OVER CANNONBALL RIVER

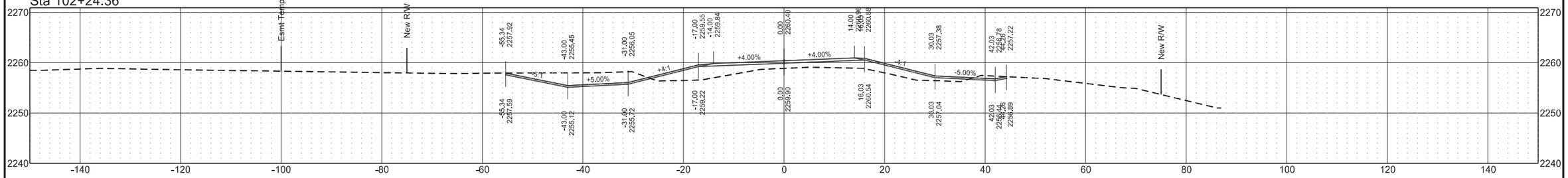
GEOTECH

BORING LOGS

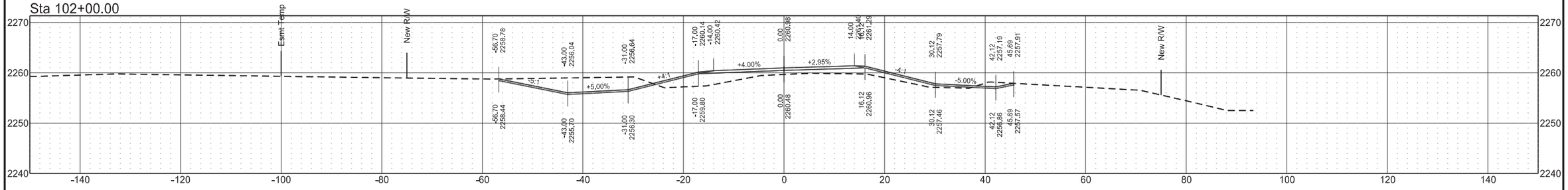
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	1

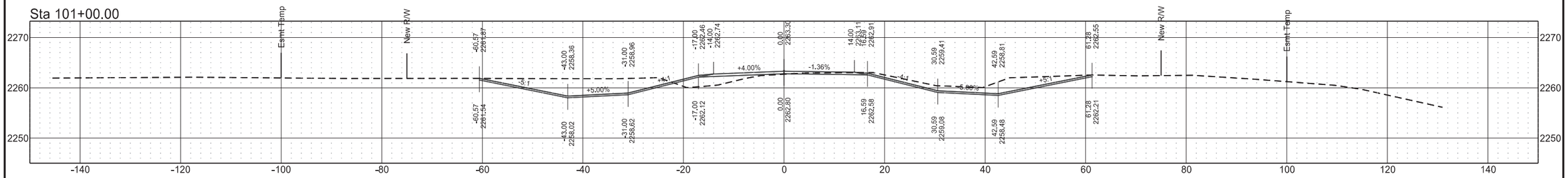
Sta 102+24.36



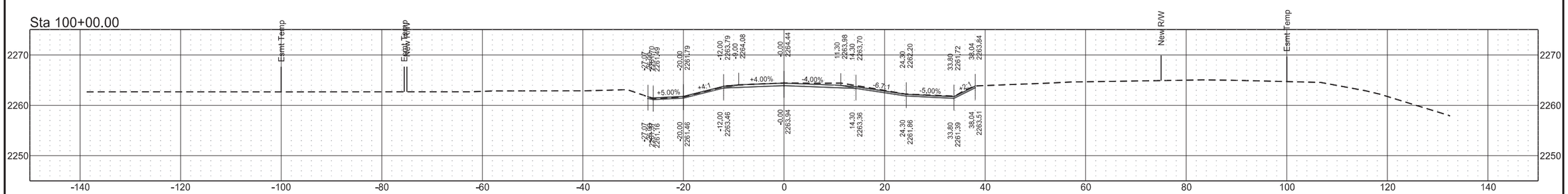
Sta 102+00.00



Sta 101+00.00



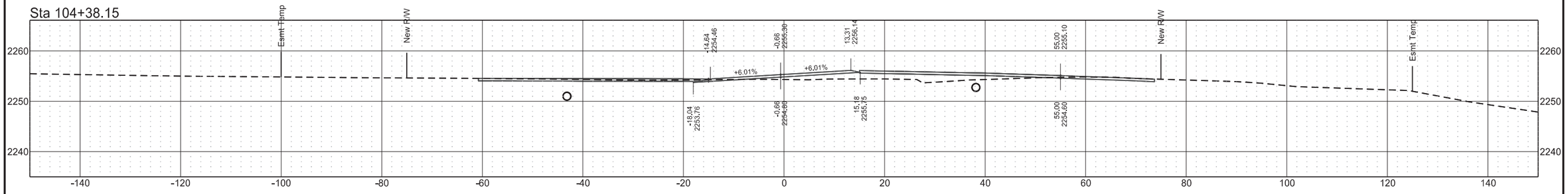
Sta 100+00.00



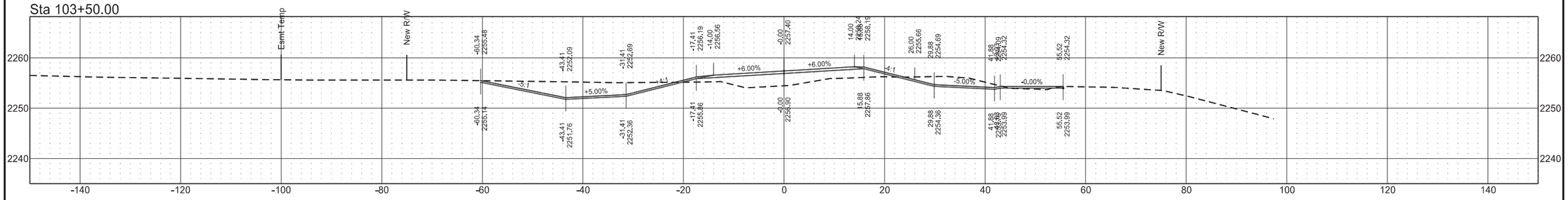
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	2

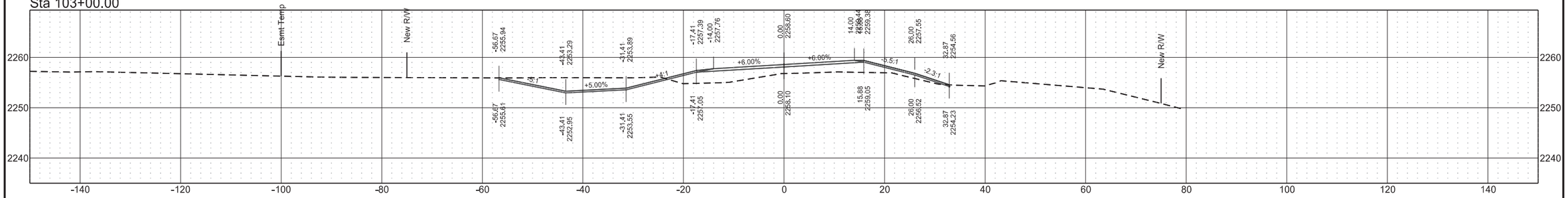
Sta 104+38.15



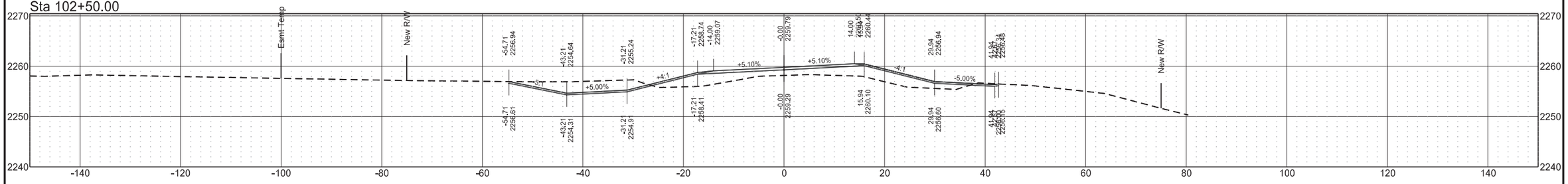
Sta 103+50.00



Sta 103+00.00



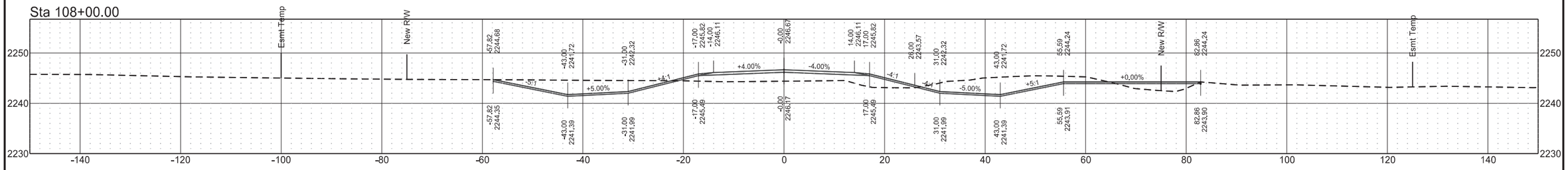
Sta 102+50.00



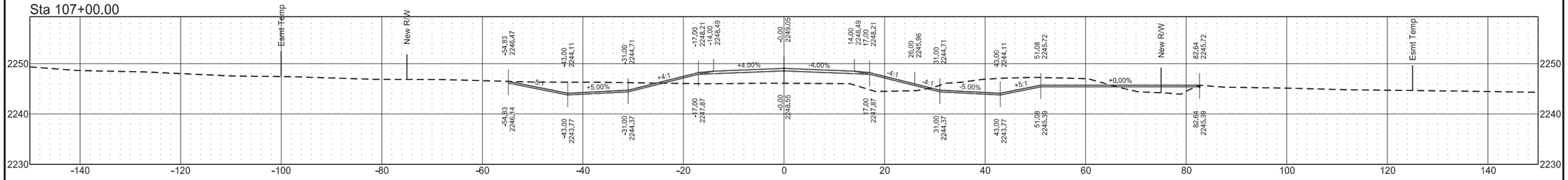
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	3

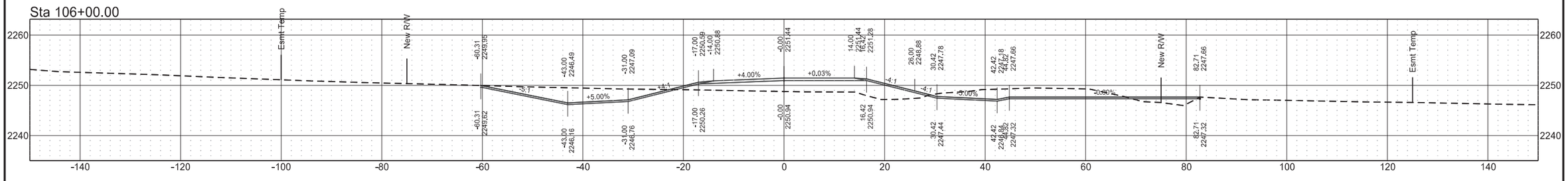
Sta 108+00.00



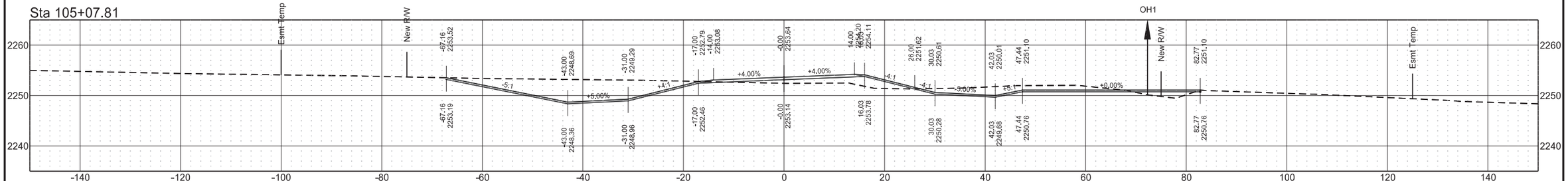
Sta 107+00.00



Sta 106+00.00



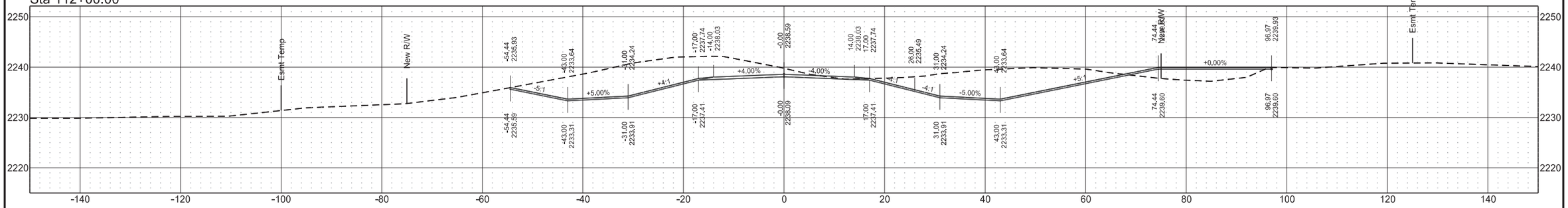
Sta 105+07.81



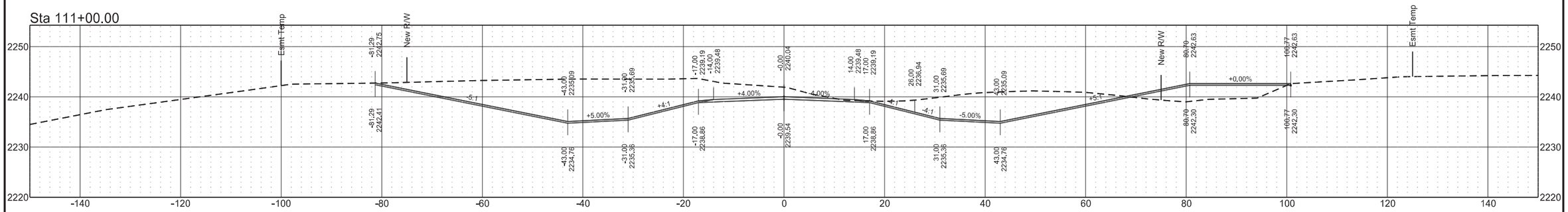
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	4

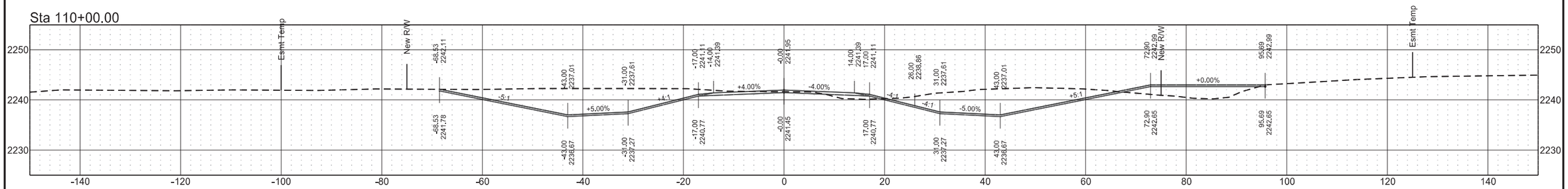
Sta 112+00.00



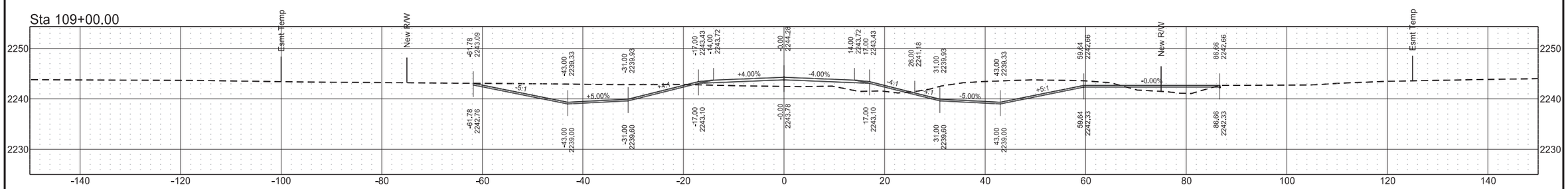
Sta 111+00.00



Sta 110+00.00



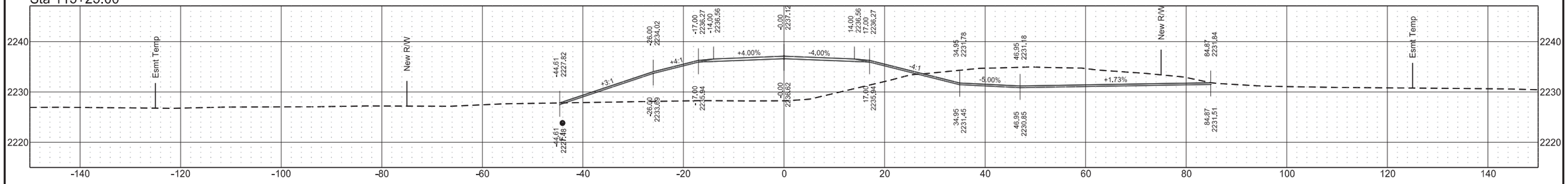
Sta 109+00.00



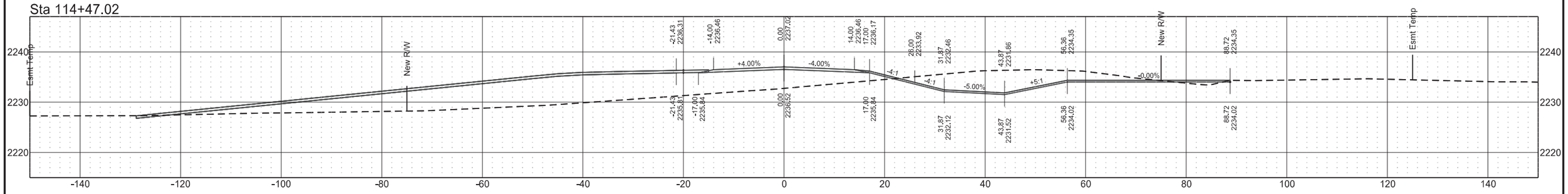
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	5

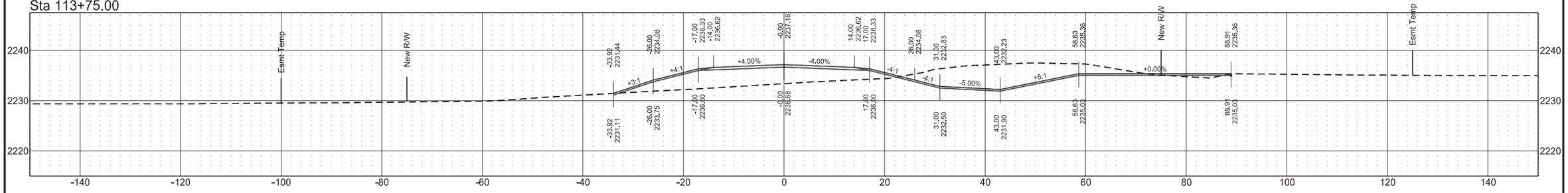
Sta 115+25.00



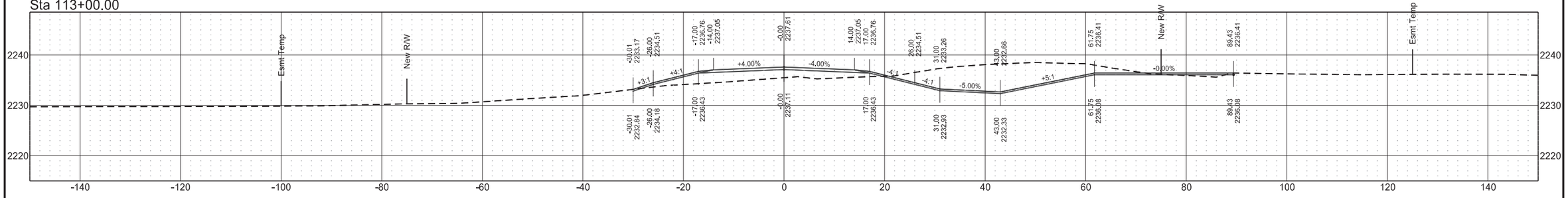
Sta 114+47.02



Sta 113+75.00



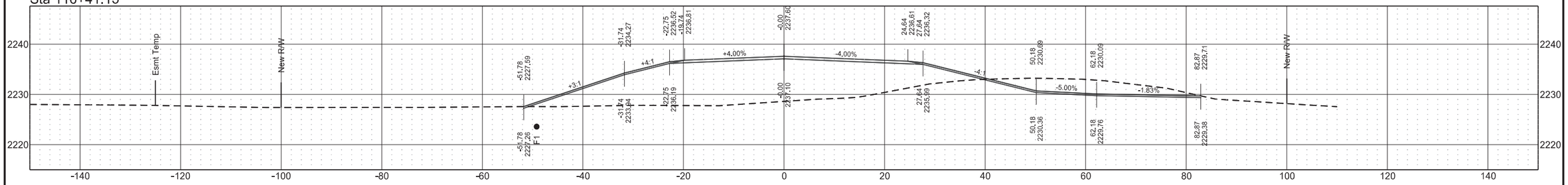
Sta 113+00.00



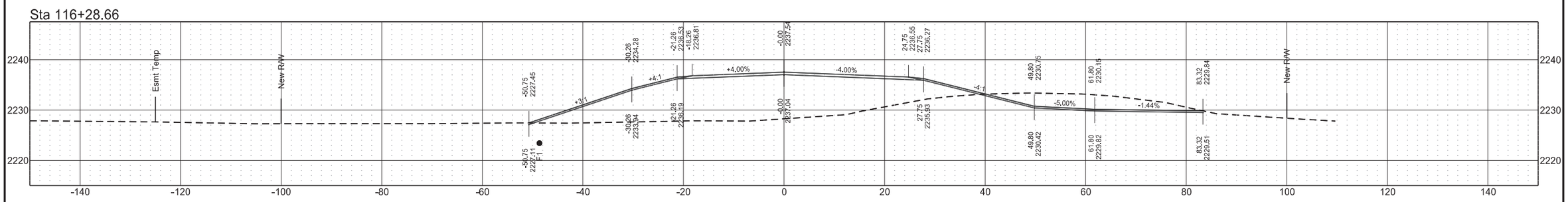
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	6

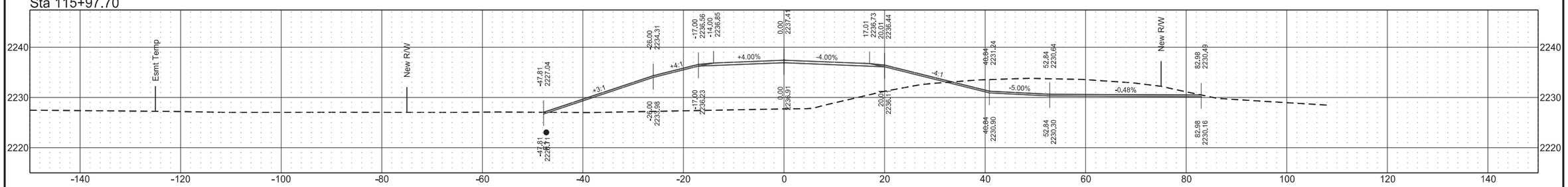
Sta 116+41.15



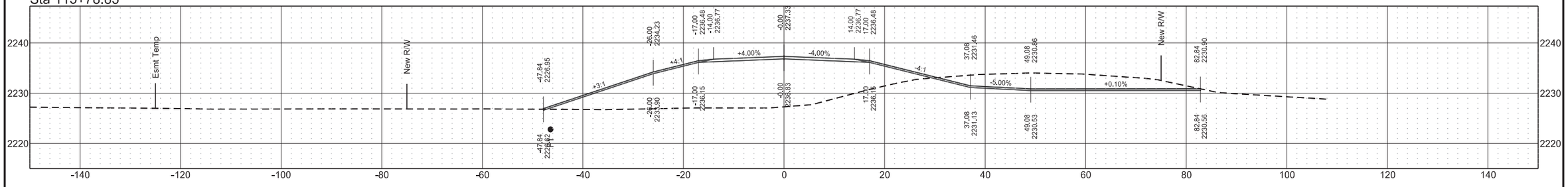
Sta 116+28.66



Sta 115+97.70



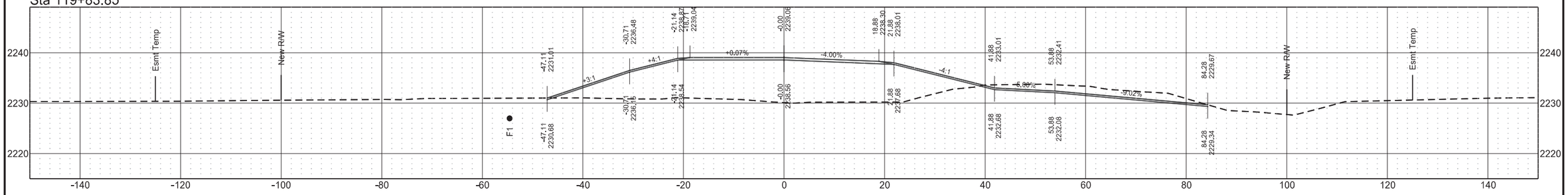
Sta 115+78.83



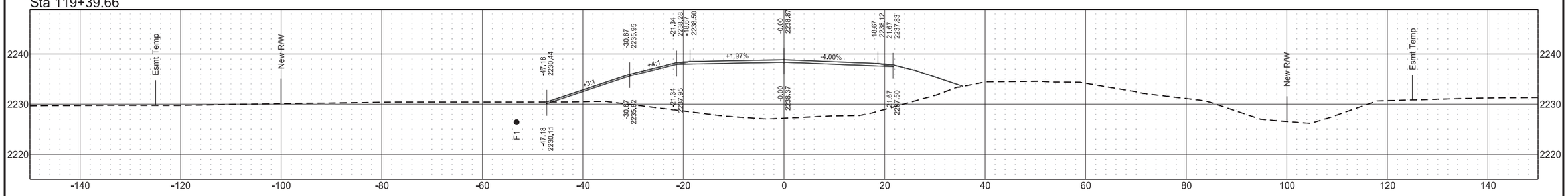
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	7

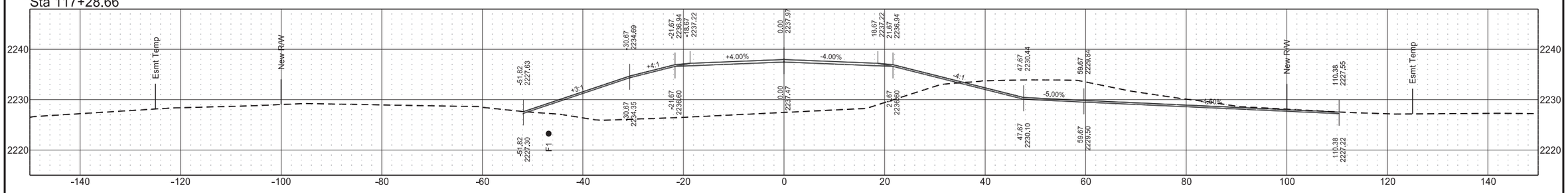
Sta 119+83.85



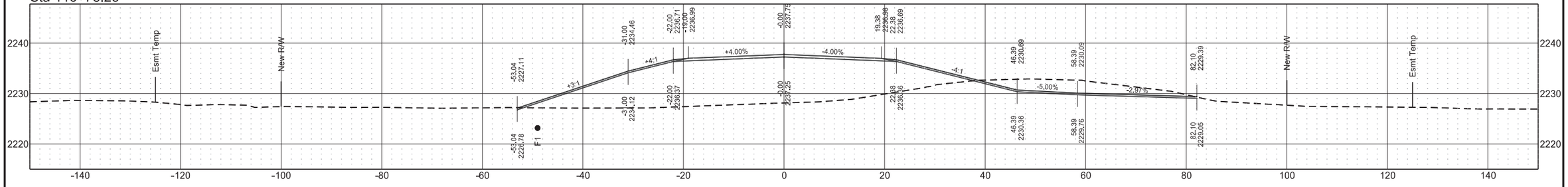
Sta 119+39.66



Sta 117+28.66



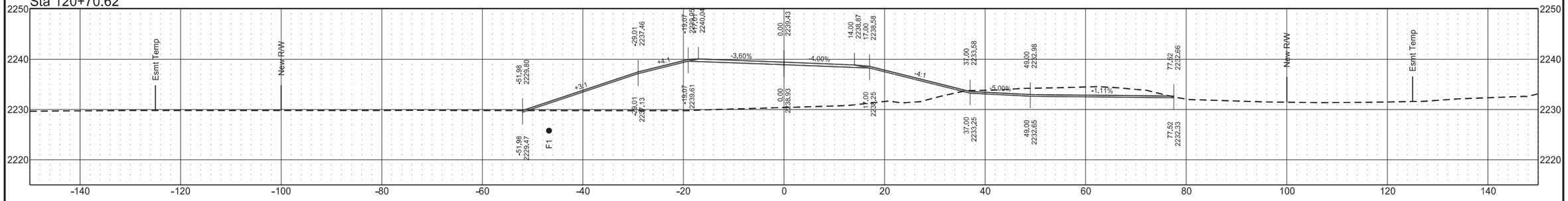
Sta 116+78.23



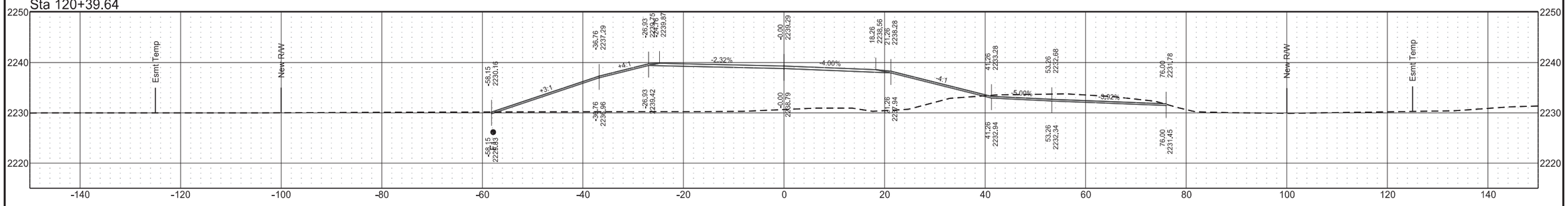
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	8

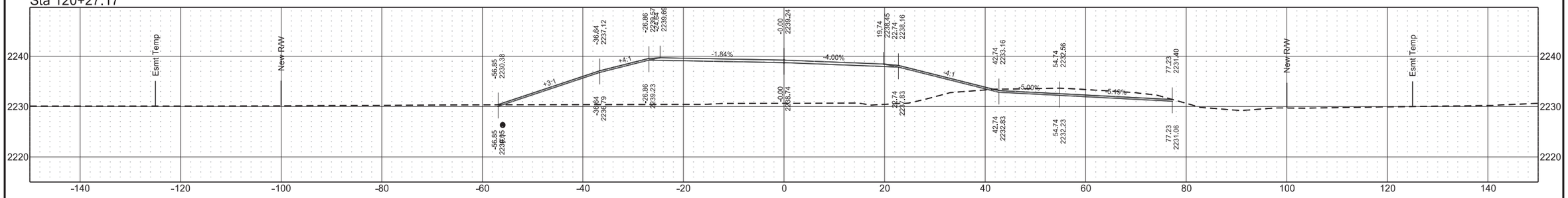
Sta 120+70.62



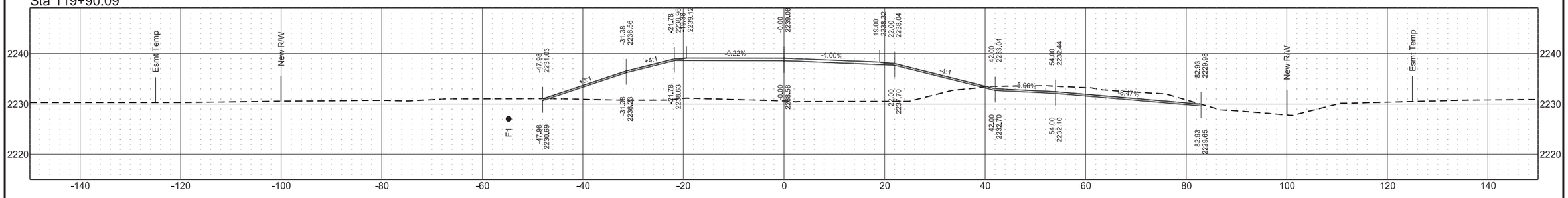
Sta 120+39.64



Sta 120+27.17



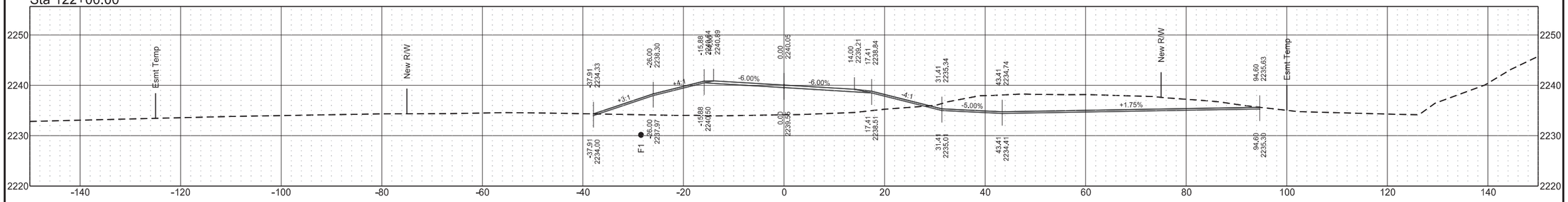
Sta 119+90.09



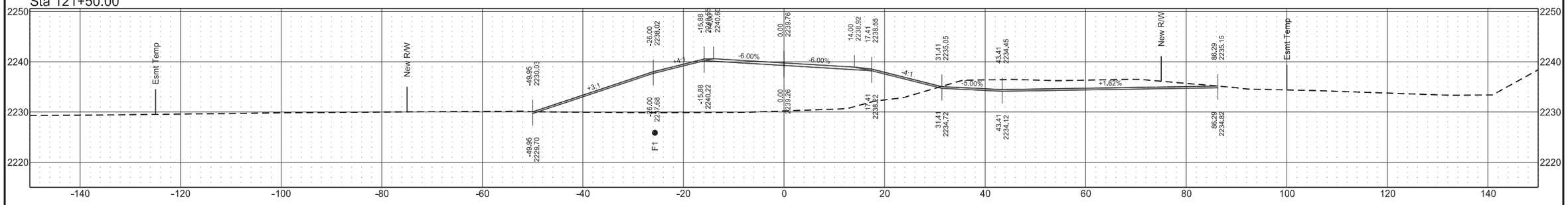
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	9

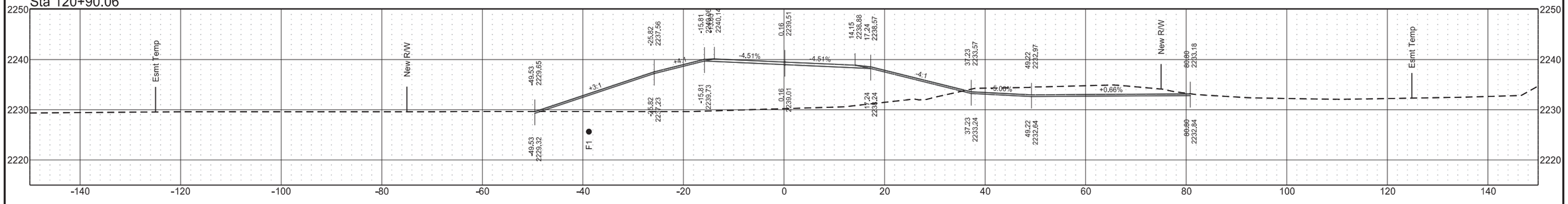
Sta 122+00.00



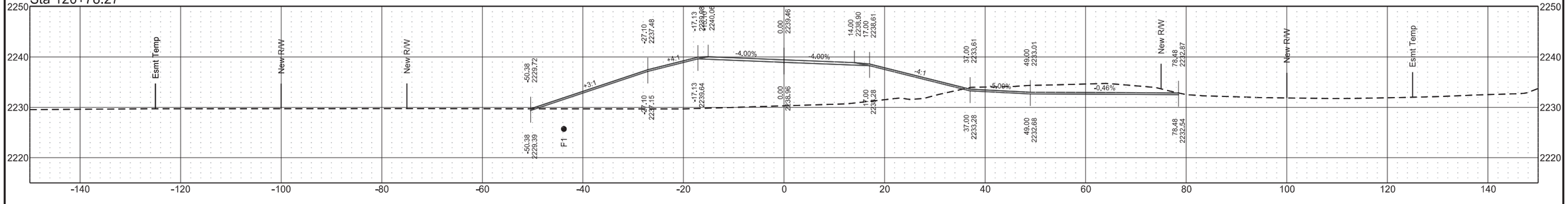
Sta 121+50.00



Sta 120+90.06



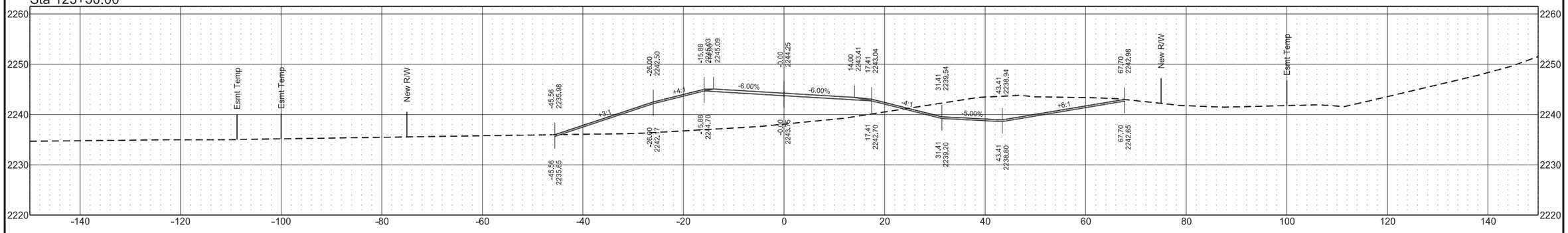
Sta 120+78.27



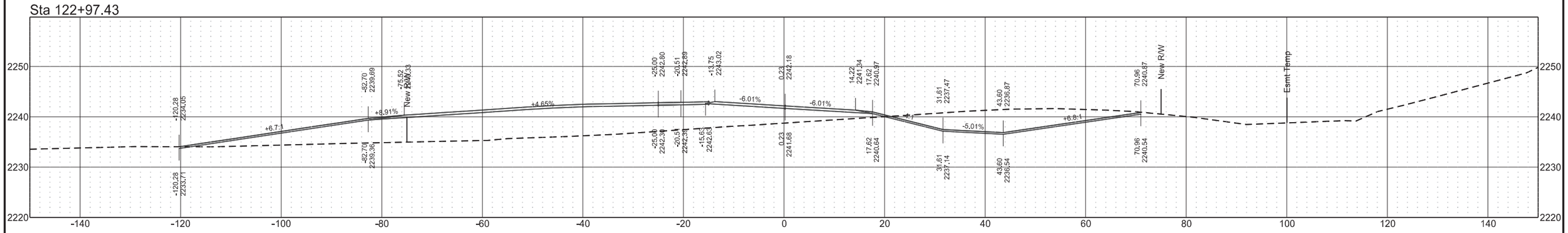
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	10

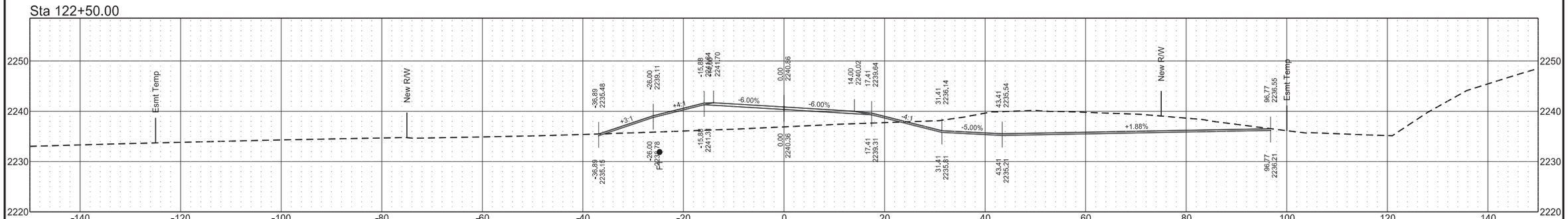
Sta 123+50.00



Sta 122+97.43



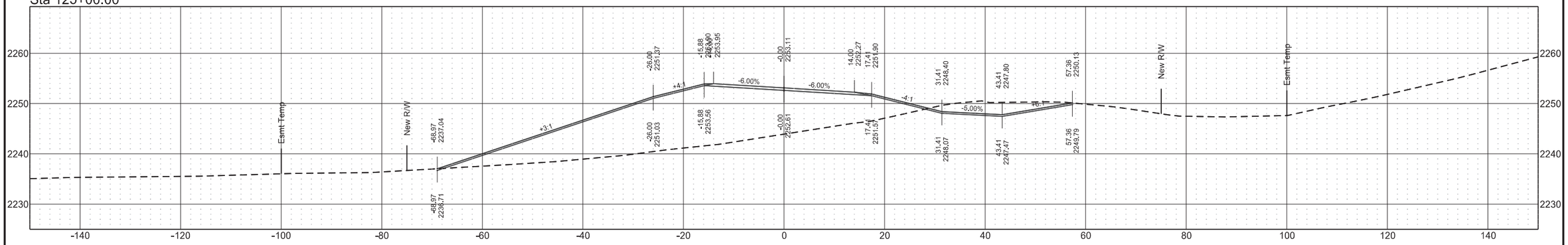
Sta 122+50.00



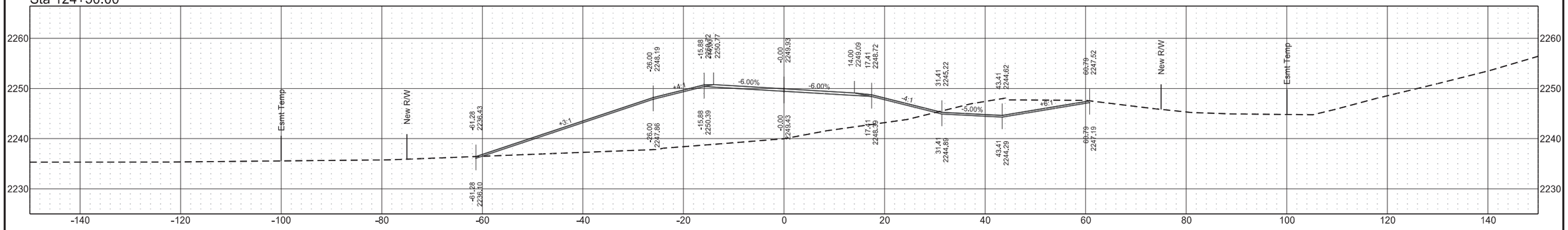
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	11

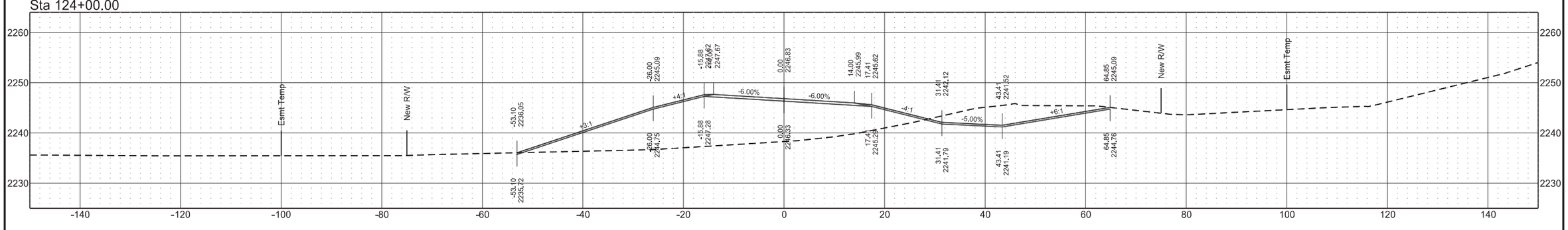
Sta 125+00.00



Sta 124+50.00



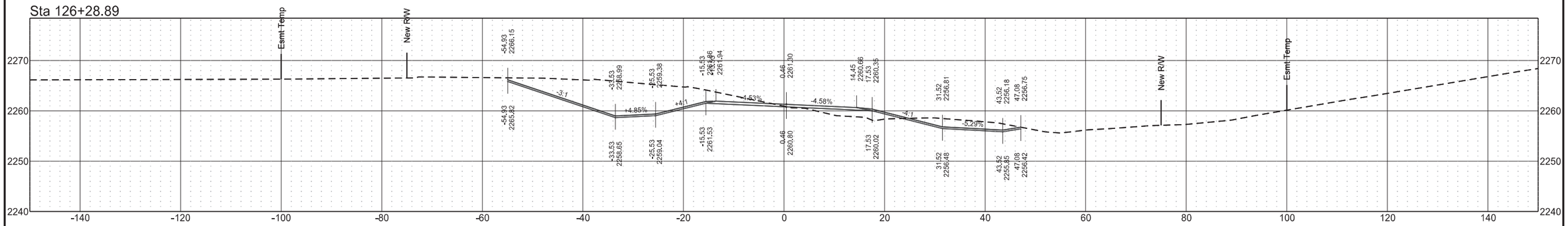
Sta 124+00.00



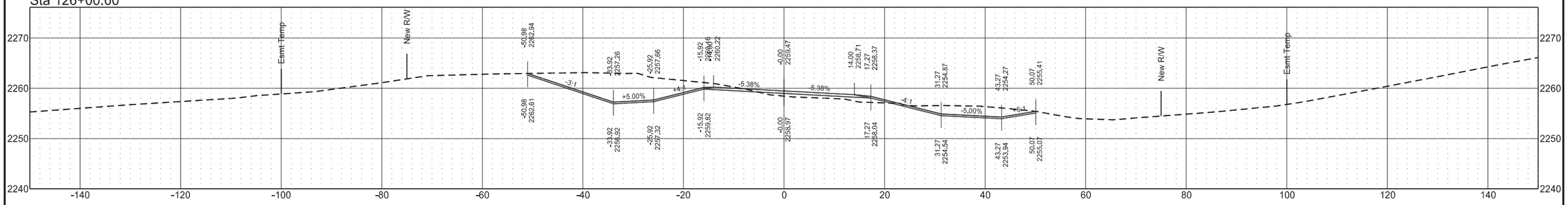
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	12

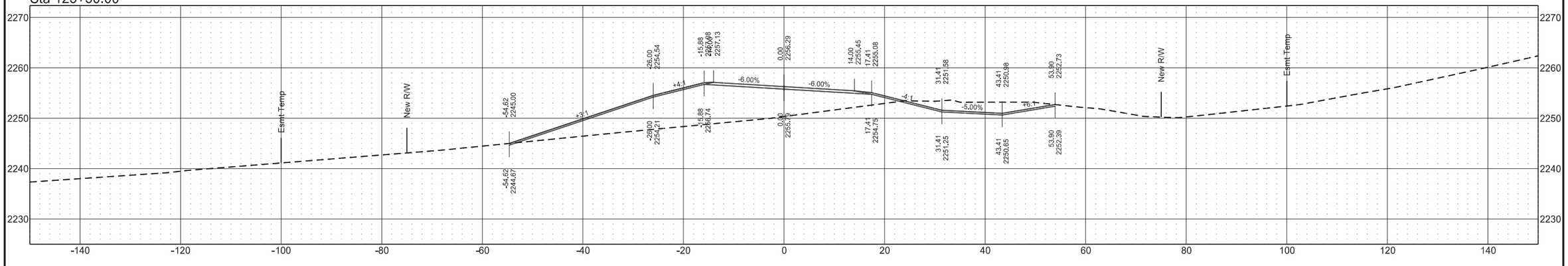
Sta 126+28.89



Sta 126+00.00



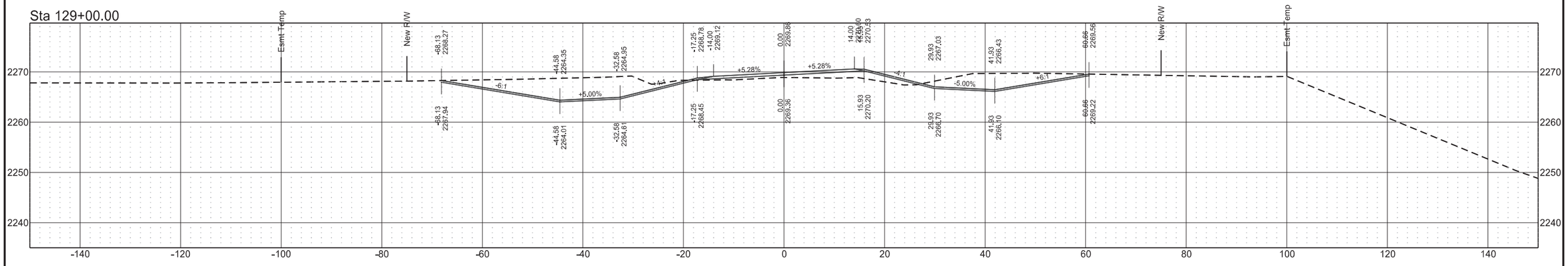
Sta 125+50.00



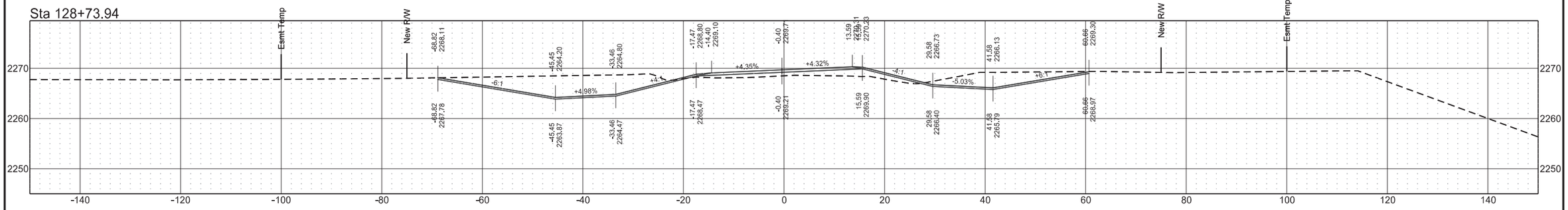
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	13

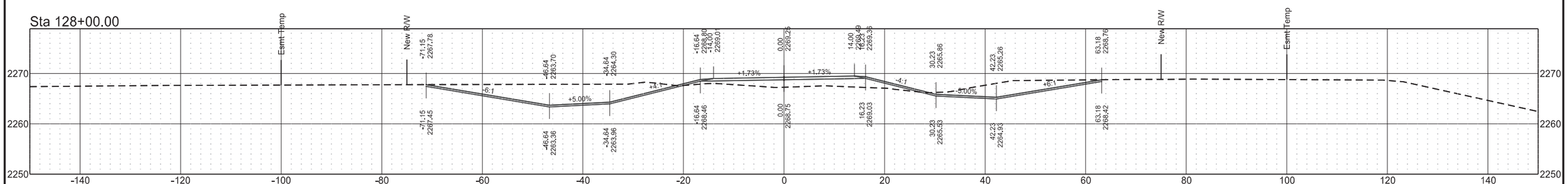
Sta 129+00.00



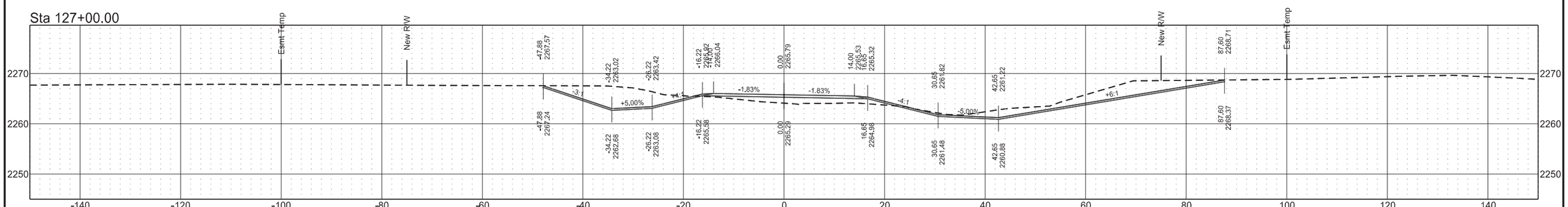
Sta 128+73.94



Sta 128+00.00



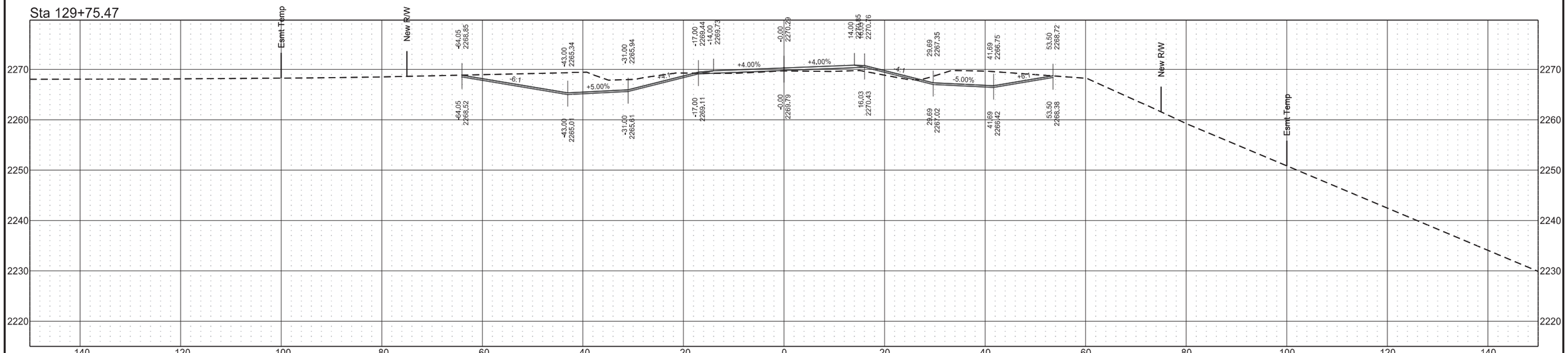
Sta 127+00.00



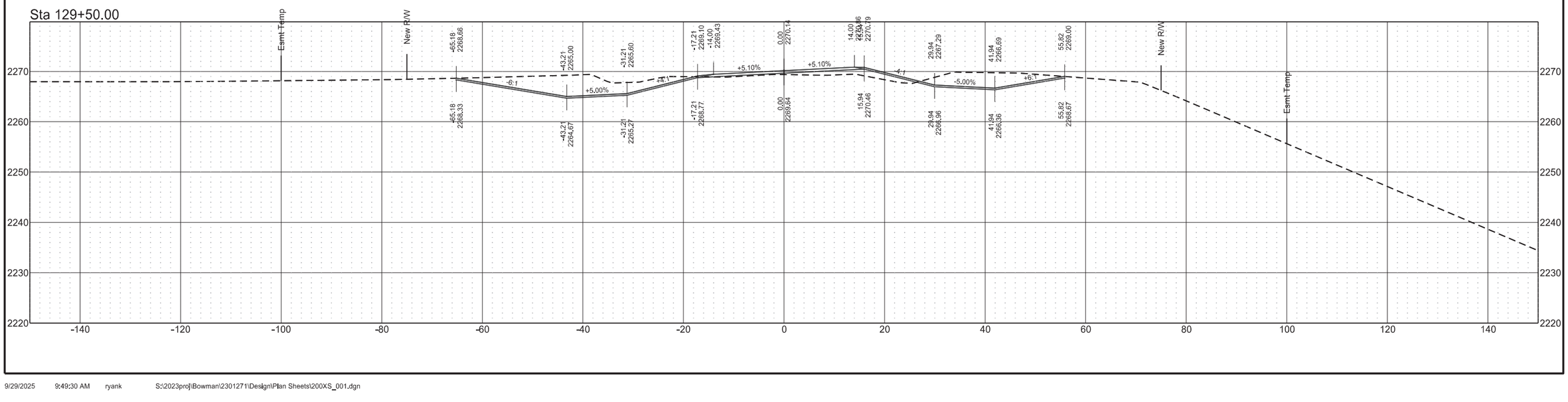
Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	14

Sta 129+75.47



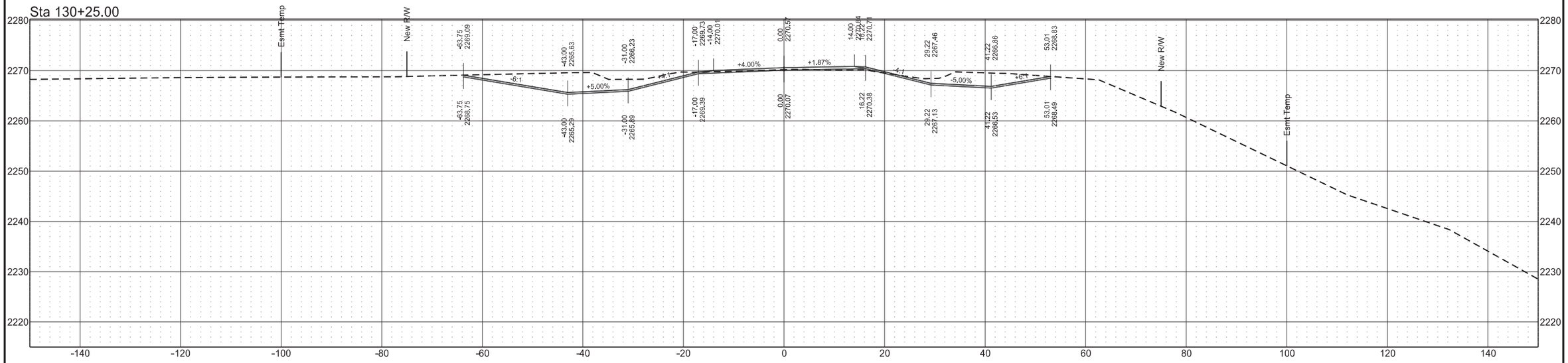
Sta 129+50.00



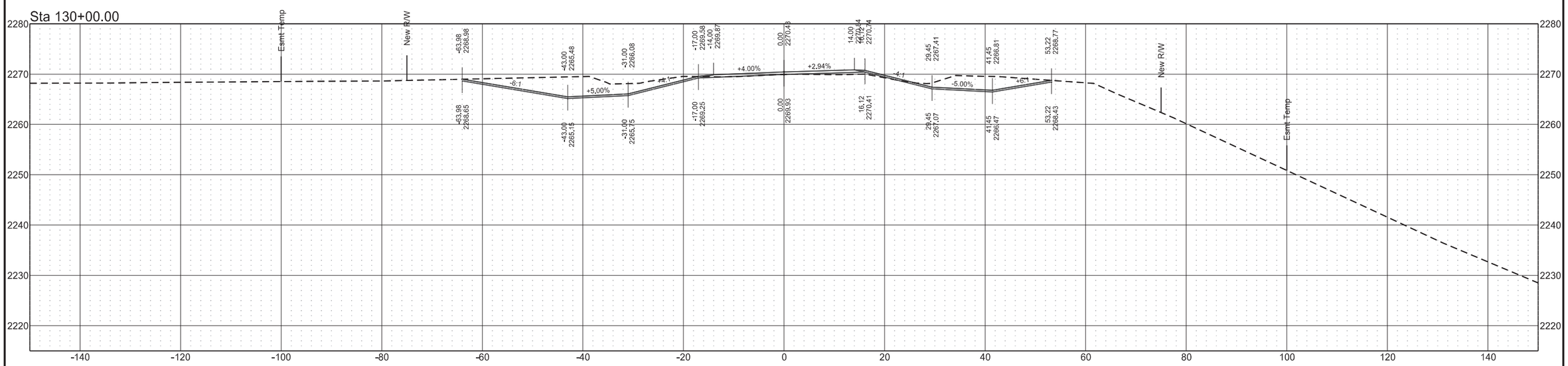
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	15

Cannonball CL

Sta 130+25.00

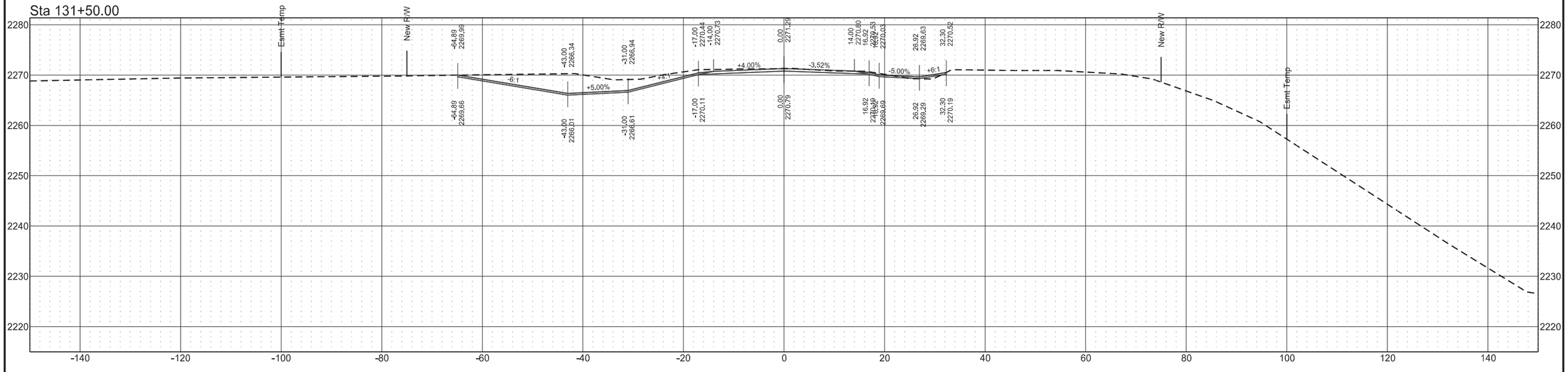


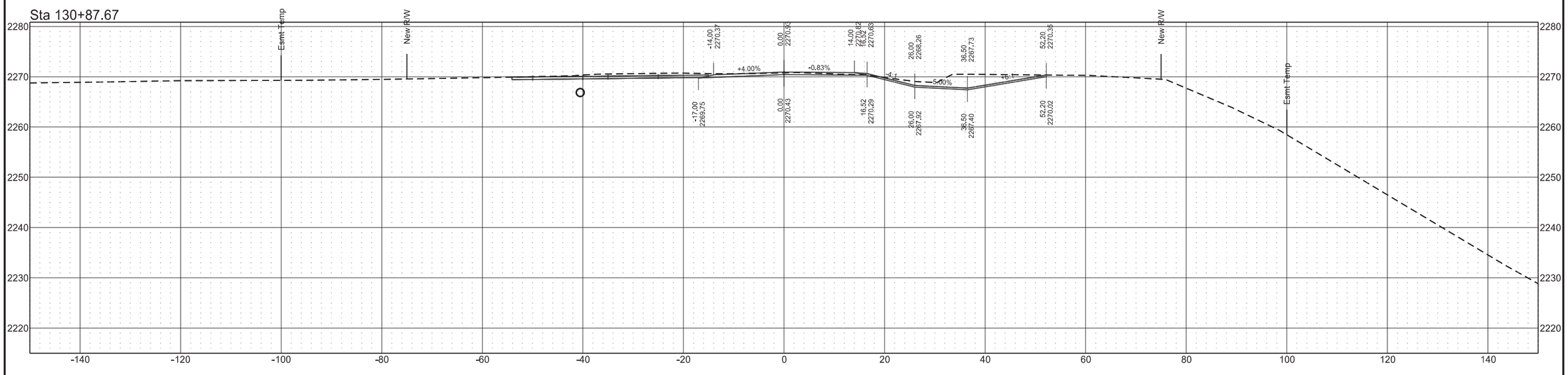
Sta 130+00.00



	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	16

Cannonball CL

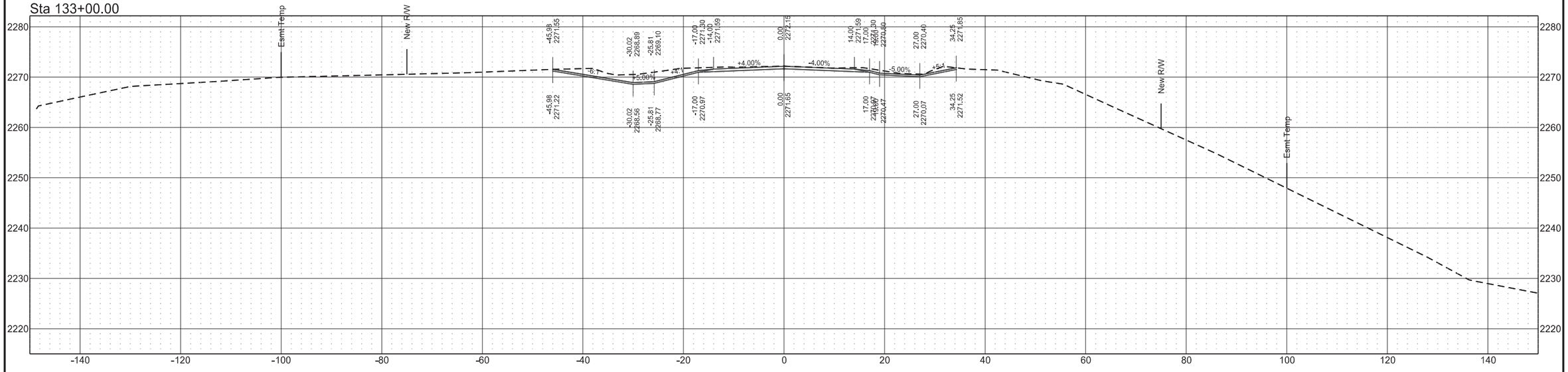




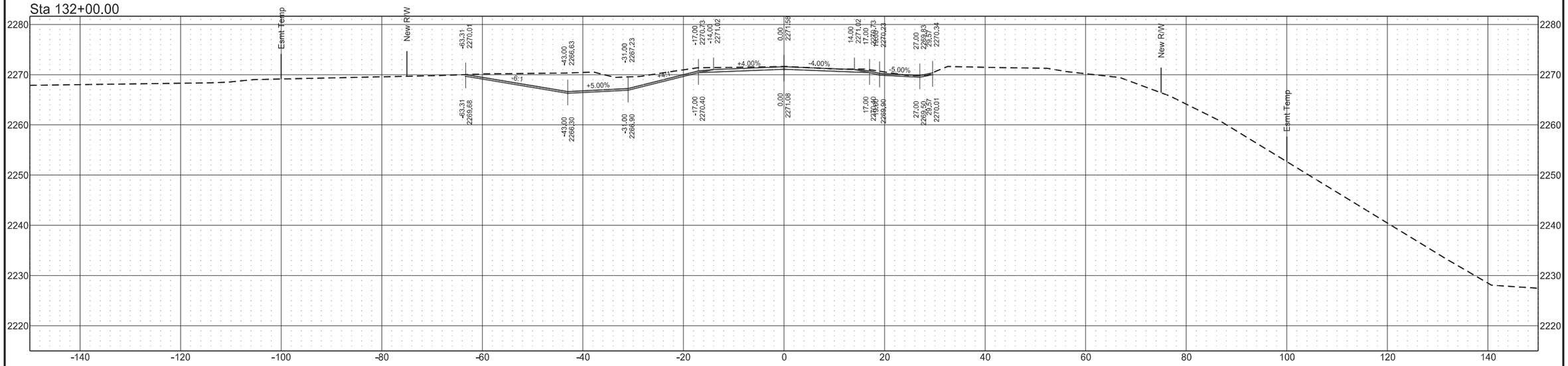
	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	17

Cannonball CL

Sta 133+00.00



Sta 132+00.00



Cannonball CL

	STATE	PROJECT NO.	SECTION NO.	SHEET NO.
	ND	BRJ-0019(025)	200	18