

LETTING DATE
10-19-2021

BRIDGE REPLACEMENT-PPCB
BRF-059-1(31)--38-73

PAGE CO.



Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM
PAGE COUNTY
BRIDGE REPLACEMENT-PPCB

East Nishnabotna River 1.0 mi N of IA 48

SCALES: As Noted



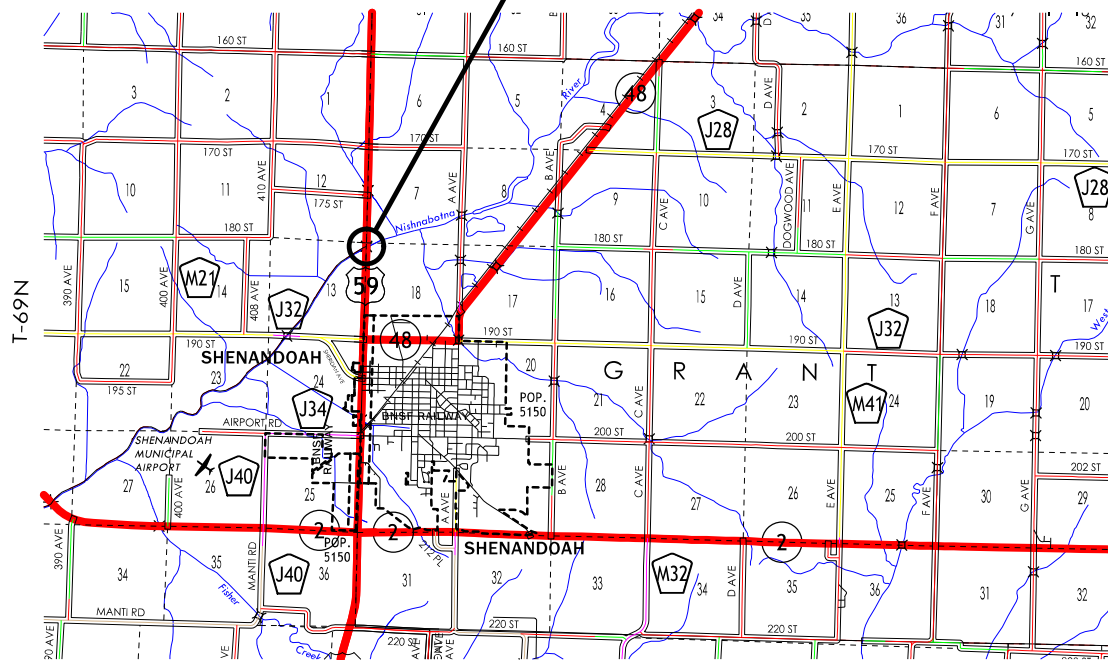
REVISIONS

TOTAL	--
PROJECT IDENTIFICATION NUMBER	16-73-059-010
PROJECT NUMBER	BRF-059-1(31)--38-73
R.O.W. PROJECT NUMBER	NHSN-059-1(32)--2R-73
	NHSN-059-1(33)--2R-36

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X.1 - 6	South Berm Cross Sections
X.50 - 54	North Berm Cross Sections
	* Color Plan Sheets

Project Location
Sta. 71+74.50
Ref. Loc. 14.18



Schedule:

D3-	11-27-2019
B1-	02-28-2020
D5-	03-13-2020
D4-	06-22-2021
B3-	08-03-2021

DESIGN DATA RURAL

2021 AADT	1700	V.P.D.
2041 AADT	1900	V.P.D.
20 -- DHV	--	V.P.H.
TRUCKS	17	%
Total Design ESALs	--	

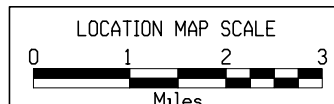
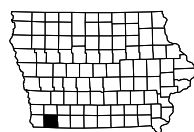
Preliminary Earthwork:

Total Cut -	74,200 CY
Total Fill (Adj.) -	8,800 CY
Total Waste -	65,400 CY

PRELIMINARY PLANS

Subject to change by final design.

D2 PLAN - Date: 12-05-2019



- * Review the project concept for any new items that should be included and/or any old items that should be removed.
- * What relationship does drainage have with adjacent property?
- * Are the proposed drainage structures satisfactory, and is there diversion of water?
- * Are proposed ditches going to satisfactorily drain the road without erosion problems or diversion of water?
- * Determine if any "letdown" structures are needed.
- * Review the traffic management assessment. Examine whether or not additional measures are required to mitigate traffic congestion. Discuss and document the traffic control measures decided on.
- * Discuss detour in regard to surfacing, potential improvements for capacity or other safety measures.
- * Review whether proposed field entrances give satisfactory access and whether there is adequate sight distance for entering the road.
- * Can entrances with steep grades be adjusted or moved to reduce grade?
- * Are there trees or similar environmentally sensitive areas which can be saved?
- * Are there areas that appear to be wetlands? Could line shifts reduce impacts? What type of mitigation may be needed? Are there impacts to any ponds?
- * Review the proposals for the disposition of removal items such as pavement (will it be used for subbase?), bridges, culverts, guardrail, etc.
- * Ascertain the stations of locating tile lines.
- * Will Floating Silt Curtains be needed?
- * Ditching- do we need ditch or channel bank let down revetment? If needed, do we want to include in Road or Bridge Plans?
- * Need for new pipes or pipe replacement through ag dikes/Do we want to offer installation of flapgate(s)?
- * Project Team awareness of permanent easement needs: reconstructed dikes and carve out areas.
- * Project Team awareness of flowage easement needs: 0.32 Acres total
- * Confirmation of 34 inch height barrier rail on the bridge (vs. 44 inch)
- * Utility conduit request On the bridge, one conduit per side was requested by the District.

Field Exam Checklist

FILE NO. 31409	ENGLISH	DESIGN TEAM Holst \ Dudley	COUNTY	PROJECT NUMBER BRF-059-1(31)--38-73	SHEET NUMBER A.2
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Roadway	US 59		
PIN Number	19-73-059-010	Submittal Date	
Project Number	BRF-059-1(31)--38-73	Approval Date	
District	District 4	Assistant District Engineer	Wes Mayberry
County	PAGE	or	
Route	US 59	Office Director	
Location	Bridge over Nishnabotna River, one mile north of IA 48		
Work Type	Bridge Replacement		
Segment Manager			
Designer	Holst / Dudley		

Rural Two-Lane Highways (Rural Arterials)			
Design Element	Preferred	Acceptable	Project Values
Design speed (mph)	60	50	60
Maximum superelevation rate (Refer to Section 2A-2)	8%	8%	N/A
Design lane width (ft)	12	12	12
Full depth paved width (ft)	12	12	14 (1)
Right turn lane (ft)	12	10	N/A
Climbing Lane (ft)	12	12	N/A
Left turn lane (ft)	12	10	N/A
Pavement cross-slope (on tangent sections)	Through lanes	1.5% minimum, 2% maximum	2%
	Auxiliary and turn lanes	3% maximum	N/A
	Crown break at centerline	4% maximum	4%
Shoulder cross-slope (on tangent sections)	4%	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders	4%
Curb type (Refer to Section 3C-2)	Design speed = 50 or 55 mph	6-inch sloped	N/A
	Design speed ≥ 60 mph	4-inch sloped	N/A
Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance)	Adjacent to shoulder	10:1 for 4' then 6:1	6:1
	Beyond standard ditch depth and design clear zone	3.5:1	3:1
	Curbed roadways	2%	not steeper than 3:1
Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)	3:1	2.5:1	2.5:1
Transverse Slopes	w/ drainage structures	8:1	8:1
	w/o drainage structures	10:1	N/A
Ditches (Refer to Section 3G-1)	Outside ditch (depth x width) (ft)	5 x 10	5 X 10
Bridge width—new*	Bridge length ≤ 200 ft	design lane widths + effective shoulder widths	N/A
	Bridge length > 200 ft	design lane widths + effective shoulder widths	44
Bridge width—existing*	design lane widths + no less than 2 ft left and right	design lane widths + 2 ft offset left and right	28
	Vertical clearance (ft)	16.5	16
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5 at interchange locations, 15 at all other locations	N/A
	Over non-primary	16.5 at interchange locations, 15 at all other locations	14
	Over railroad	16.5 at interchange locations, 15 at all other locations	23.3
Structural Capacity	Sign trusses and pedestrian bridges	17.5	N/A
Level of Service	Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	-
Level of Service	B	B	-

*FHWA notification via email is required if acceptable criteria is not met on the NHS system (No formal design exception is required)

Roadway Design Speed (mph) = 60		Design Criteria for High Speed Roadways															
Design Element	Design Criteria	Preferred Criteria					Acceptable Criteria					Project Values					
		50	55	60	65	70	75	50	55	60	65		70	75			
Stopping sight distance (ft) (Refer to Section 3D-1)		425	495	570	645	730	820	425	495	570	645	730	820	570			
Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3)	Method 5 superelevation and side friction distribution e _{max} = 6% f _{max} = 8%	833	1060	1330	1660	2040	2500	833	1060	1330	1660	2040	2500	N/A			
Minimum vertical curve length (ft) (Refer to Section 2B-1)	(a) (Refer to Section 2B-1)	150	165	180	195	210	225	150	165	180	195	210	225	500			
Minimum rate of vertical curvature (K)	(b) (Refer to Section 2B-1)	84	114	151	193	247	312	84	114	151	193	247	312	500			
Maximum gradient (%) (Refer to Section 2B-1)	roadways without fixed source lighting	96	115	136	157	181	206	96	115	136	157	181	206	N/A			
	roadways with fixed source lighting	96	115	136	157	181	206	54	66	78	91	106	121	N/A			
Minimum gradient (%) (Refer to Section 2B-1)	Urban roadways	0.5					0.3% with a curb, 0.0% without a curb					0.2%					
Maximum gradient (%) (Refer to Section 2B-1)	Urban roadways	4					3					7	8	8	8	N/A	
	Rural roadways	4					3					5	5	4	4	4	1.2%
	Interstates	4					3					5	5	4	4	4	N/A
Clear zone		See "Preferred Clear Zone" table in Section 3A-2					See "Acceptable Clear Zone" table in Section 3A-2					30					

Design year ADT = 1700		Effective Shoulder Width and Type for Two-Lane Highways				
Design Element	Design Criteria	Preferred (values shown in feet)		Acceptable (values shown in feet)		Project Values
		Rural Roadways	Urban Roadways	Rural Roadways	Urban Roadways	
Turn lanes with shoulders		6	6	6	0	N/A
		6	See Section 3C-2	6	0	N/A
Turn lanes with curbs		Effective Shoulder Width	Paved Width	Effective Shoulder Width	Paved Width	
		6	6	6	0	
Climbing Lanes		6	4	4	0	N/A
Two-Lane Highways		Effective Shoulder Width	Paved Width	Effective Shoulder Width	Paved Width	
		10	10	8	0*	
Routes where bicycles are to be accommodated		10	10	8	0*	
On roadways approaching urban areas (due to increased bike traffic)		10	10	8	0*	
On all curves with a superelevation rate of 7.0% or greater		10	10	8	0*	
On roadways with design year ADT > 5000		10	6	6	0*	
On all other NHS		10	6	6	0*	
On non-NHS routes with design year ADT > 3000		10	6	6	0*	
On non-NHS routes with design year ADT < 3000		8	0*	4	0*	

Notes:

(1) Matching existing condition due to short shoulder reconstruction lengths outside of bridge approach and guardrail installation. (SE=16', SW=32', NW=39', NE=36')

Project Criteria

FINAL PROJECT CONCEPT STATEMENT

US 59 - Bridge over East Nishnabotna River, one mile north of IA 48

Page County
BRF-059-1(31)--38-73
PIN: 16-73-059-010
Maint. No. 7314.2S059
FHWA No. 38610

Highway Division
Office of Design

John Bartholomew, P.E.
515-239-1540

June 6, 2019

I. STUDY AREA

A. Project Description

This project involves the replacement of the US 59 bridge (Maint. No. 7314.2S059) over East Nishnabotna River, one mile north of IA 48.

It is recommended the existing 372'-0 x 28'-0 Continuous I-Beam bridge be replaced with a 541'-0 x 44'-0 Pretensioned Prestressed Concrete Beam bridge.

B. Need for Project

This is a 372' long by 28' wide steel girder bridge which was built in 1929, reconstructed in 1958 and overlaid in 1988 and is near the end of its useful life. The bottom of the deck has several hollow areas and leaching transverse cracks. The bridge was designed for live loads below current standards. The bridge also has a crack in the sole plate of bearing number 3 on pier 2 and is fatigue vulnerable; therefore, this bridge should be replaced.

Page County
BRF-059-1(31)--38-73
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Page 2



Looking North



Looking South

C. Present Facility

The existing structure is a 372' x 28' Continuous I-Beam bridge constructed in 1929.

US 59 in the project area is 24' wide PCC pavement with 7' wide granular shoulders and 6:1\3:1 foreslopes, constructed in 1963. HMA resurfacing and widening to 28' wide pavement and 8' granular shoulders was accomplished in 2013.

D. Traffic Estimates

The 2021 construction year and 2041 design year average daily traffic estimates are 1700 ADT with 16% trucks and 1900 ADT with 17% trucks, respectively.

E. Sufficiency Ratings

US 59 is classified as an "Area Development" route and is a maintenance service level "C" road. The federal bridge sufficiency rating is 64.8.

F. Access Control

Access rights will not be acquired for this project.

G. Crash History

During the five-year study period from January 1, 2011 through December 31, 2016, there was one personal property crash.

Project Concept Statement

II. PROJECT CONCEPT

A. Replace with a 541'-0 x 44' bridge.

The existing 372'-0 x 28' Continuous I-Beam bridge will be replaced with a 541'-0 x 44' Pretensioned Prestressed Concrete Beam bridge.

The typical cross section adjacent to the bridge will consist of a 24 ft. roadway with 10 ft. shoulders and 6:1/3:1 foreslopes.

The existing profile will be raised to meet a 3' minimum freeboard which will require approximately 200 ft. of roadway reconstruction. New bridge approaches will be constructed. The existing guardrail will be replaced with new guardrail and the shoulders will be paved 20 ft. beyond the ends of the guardrail. Class 10 will be necessary to flatten the existing foreslopes and to construct the new guardrail blisters. Class E revetment will be placed under the bridge for slope protection. New bridge end drains will be constructed on both ends of the bridge.

There are privately owned agricultural berms that are impacting this project and must be modified to meet DNR criteria. The south side agricultural berm downstream of the bridge requires realignment to match the proposed end of the longer, replacement bridge. The north and south agricultural berms downstream of the bridge require profile lowering for a length of approximately 1000 feet.

A farm field access will need to be relocated farther to the north due to the length of the new bridge.

Apply erosion control and rural seeding and fertilizing to all disturbed areas.

Traffic will be maintained by an off-site detour.

Bridge Items	<u>Estimated Costs</u>
New Bridge	\$2,838,000
Coffer Dams (3)	150,000
Bridge Removal	128,000
Rip Rap for Berms	114,000
Remove 8' x 8' RCB with Flume	2,000
Mobilization - 10%	323,000
M & C - 15%	<u>711,000</u>
Bridge Costs	\$ 4,266,000

Roadway Items

Bridge Approaches	\$97,500
Removal of Pavement	22,000
PCC Pavement	64,200
Modified Subbase	15,300
Granular Shoulder	8,900
Embankment in place, contractor furnished	195,000
Excavation Class 10 Waste	80,400
Guardrail (Includes Removal)	19,300
Paved Shoulders for Guardrail	90,500
Class 10 for Guardrail Blisters	24,900
Bridge End Drains	11,500
Subdrain and Outlets	6,300
Granular Surface (field drive)	1,100
Clearing and Grubbing	6,000
Seeding and Fertilizing	3,800
Erosion Control	63,800
Right of Way	40,000
Traffic Control - 5%	66,400
Mobilization - 5%	86,800
M & C - 30%	<u>382,800</u>
Roadway costs	\$1,286,500

Project Total **\$5,552,500**

B. Detour Analysis

U.S. 59 will be closed, and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 120 days. The detour would go west on county road J32, to county road M16, go north to J18, and go east again to US 59. Signing improvements will be required to the intersection of M16 and County Road J18. Out of distance travel is 10 miles. The total distance user cost is anticipated to be \$515,000. The cost for county road maintenance will be \$22,325 as calculated by the Gas Tax Method. Detour signing costs will be \$10,000.

C. Recommendations

It is recommended that the present structure be replaced with a 541'-0 x 44' Pretensioned Prestressed Concrete Beam bridge.

Project Concept Statement

D. Construction Sequence

It is anticipated that all work on this project will be awarded to one prime contractor. The Office of Bridges and Structures will coordinate the plan preparation with assistance from the Office of Design.

E. ADA Accommodations

There are no bike paths or sidewalks adjacent to US 59; therefore, no ADA accommodations are planned in conjunction with this project.

F. Special Considerations

This will not be a traffic critical project.

The ABC Rating Score of 39 is less than the first stage filter threshold of 50, therefore this bridge will not be considered for an ABC approach.

No bike path or sidewalk will be required as part of this project.

Right of Way/Right of Entry will be required for this project.

A Hydrologic/Hydraulic Analysis has been completed. (TUFLOW Model – HDR Report dated May 2018)

The Office of Location and Environment has reviewed this project and based on preliminary desktop observations, has determined that a Section 404 Permit will be required. It is expected that the work will be covered by Nationwide Permit 14. Mitigation needs will be determined at a later date. If mitigation is required, it will be set up under a separate mitigation project and additional funding will be requested.

F. Program Status

Site data has been developed by the Office of Design. This project is listed in the 2019-2023 Iowa Transportation Improvement Program, with \$3,412,000 programmed for replacement in FY 2022. Costs for this project may be eligible for bridge replacement funds. A schedule of events will be developed following approval of the Project Concept.

JEB: sh

Project Concept Statement

Bridge Office Attachment for Concept Statement

Date: May 30, 2019
By: Patricia Schwarz
Location: US 59 over E. Nishnabotna River

County: Page
Project No.: BRF-059-1(31)--38-73
Pin No.: 16-73-059-010

1. Regulatory/Coordination
 - a. Iowa DNR Flood Plain permit = Yes (HDR under contract to complete)
 - b. Iowa DNR Sovereign Lands permit = No
 - c. Local Record of Coordination = No
 - d. Flood Insurance Study = Yes, Zone A
 - e. Drainage District = No
 - f. Corps of Engineers Section 408 = No
 - g. Railroad = No
2. Hydrologic/Hydraulic Analysis/RIDB Dataset
 - a. Hydrologic/Hydraulic Analysis is Complete (TUFLOW Model - HDR Report dated May 2018)
 - b. RIDB Dataset is required (Drainage Area is greater than 10 square miles)
3. Road Design/Proposed Grading Considerations
 - a. A proposed roadway profile grade to meet the Iowa DNR minimum freeboard requirement was provided by Paul Flattery on March 29, 2018. Due to the additional half inch crown drop needed for the 44' wide bridge, we request a small additional profile grade raise (1 inch+). The intent will be to provide a small freeboard buffer while maintaining the same or similar extent of roadway reconstruction. A small buffer is desired due to beam haunch uncertainty at the preliminary design phase.
 - b. The south side agricultural berm downstream of the bridge requires realignment to match the proposed end of the longer, replacement bridge.
 - c. The north and south side agricultural berms downstream of the bridge require profile lowering for a length of approximately 1000-feet. The berm modifications are necessary in order to meet Iowa DNR criteria for high damage potential structures upstream of US 59. The lowering of the top of agricultural berm profile may result in a greater area being inundated after berm overtop for certain flood events, but will not lower the level of flood protection. The additional inundated areas are low damage potential cultivated fields.
 - d. Reconstructed agricultural berms shall be a minimum 10 feet across the top with 3:1 side slopes. HDR provided the proposed agricultural berm alignment and profile information used in the hydraulic model by coordinate points.
 - e. HDR has provided grading control coordinate points for the south overbank.
4. Special construction/ROW issues

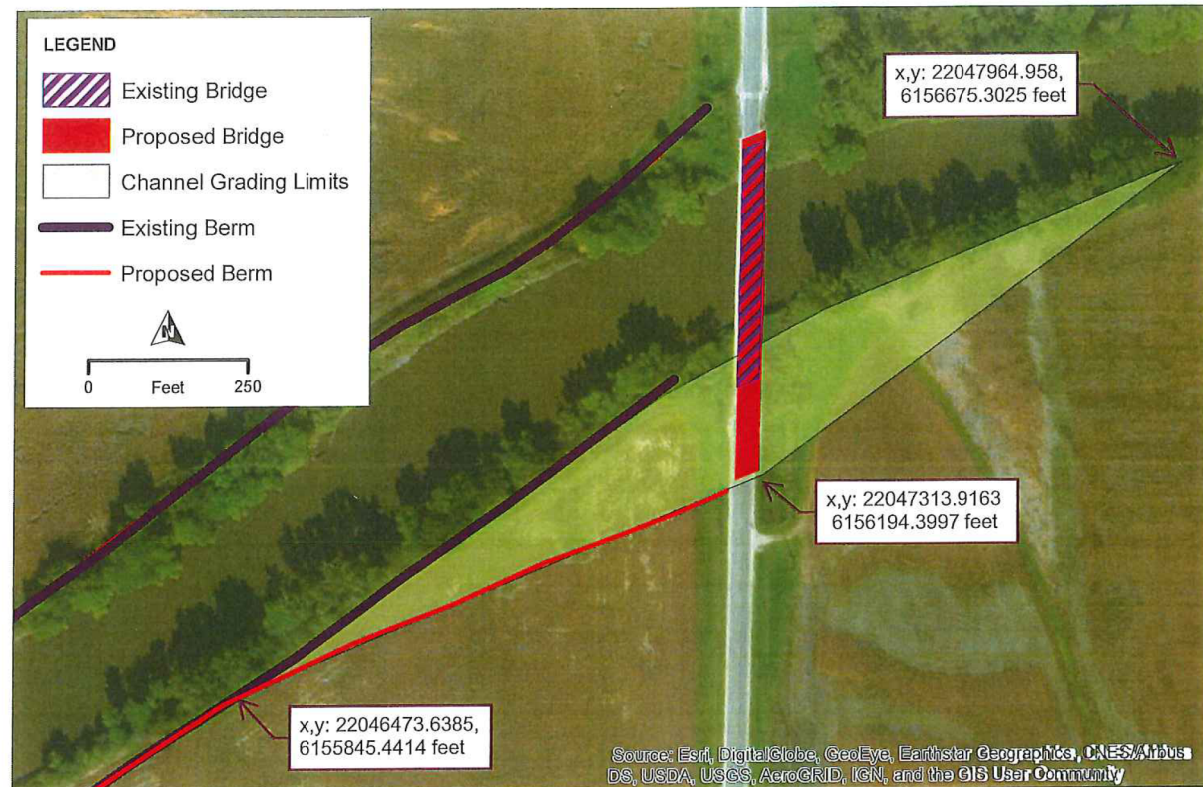
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Concept Statement - Bridge Office Attachment

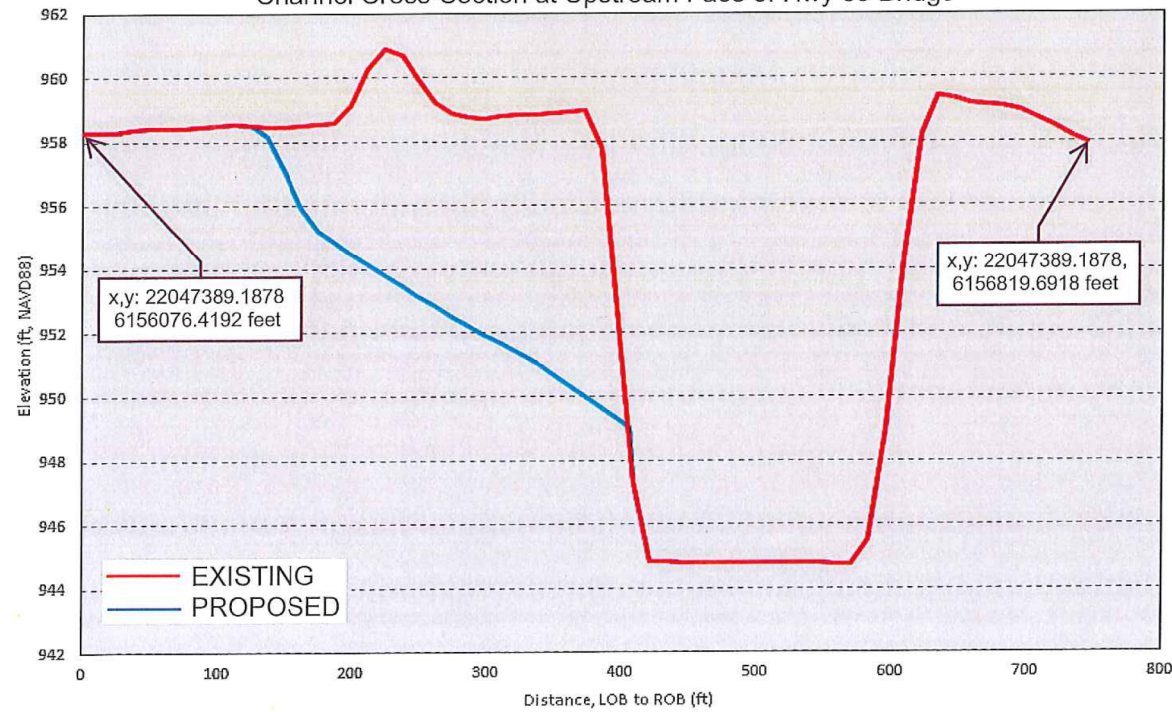
- a. A permanent ROW easement is anticipated to be required for the modified agricultural berms and special graded areas.
 - b. A flowage easement is required north of the bridge for a small area (~0.32 acres) that exceeds the Iowa DNR backwater limit for low damage potential areas.
5. Aesthetic enhancements = No
 6. Other
 - a. Traffic is proposed to be placed on an off-site detour.
 7. The survey requested for hydraulic modeling and bridge replacement is complete.

~2~

Project Concept Statement



Channel Cross-Section at Upstream Face of Hwy 59 Bridge



PROPOSED HWY 59 BERM REALIGNMENT AND CHANNEL GRADING

FIGURE 12

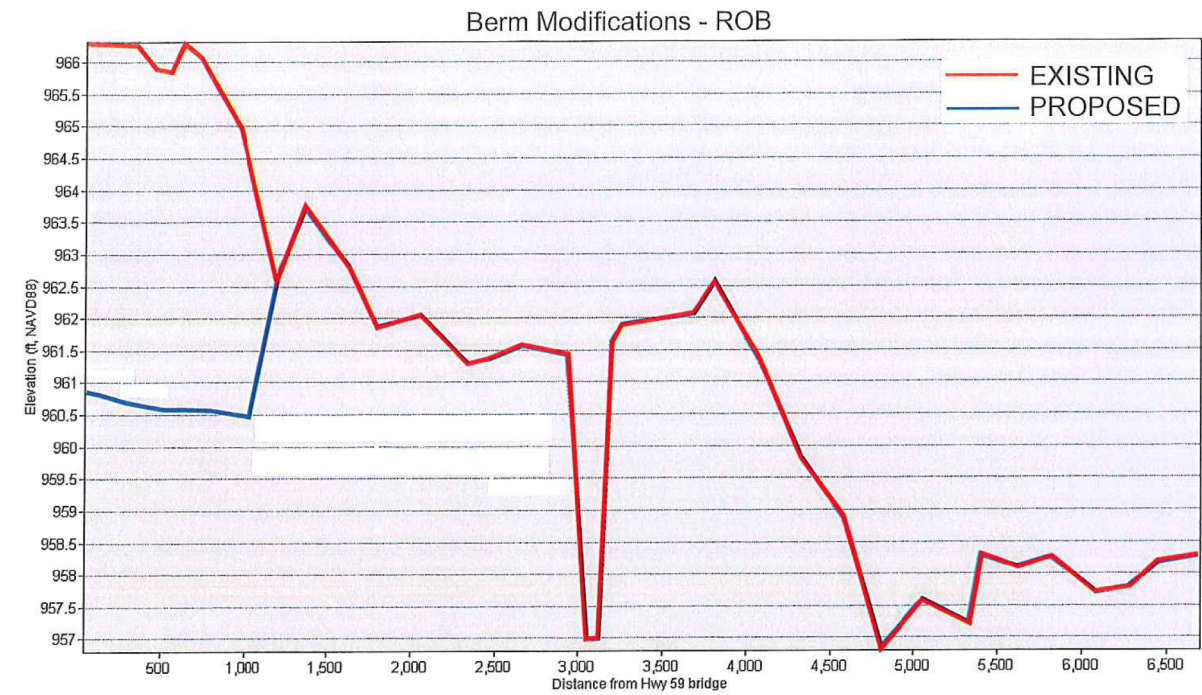


Figure 10. Proposed berm modifications for right (northern) bank

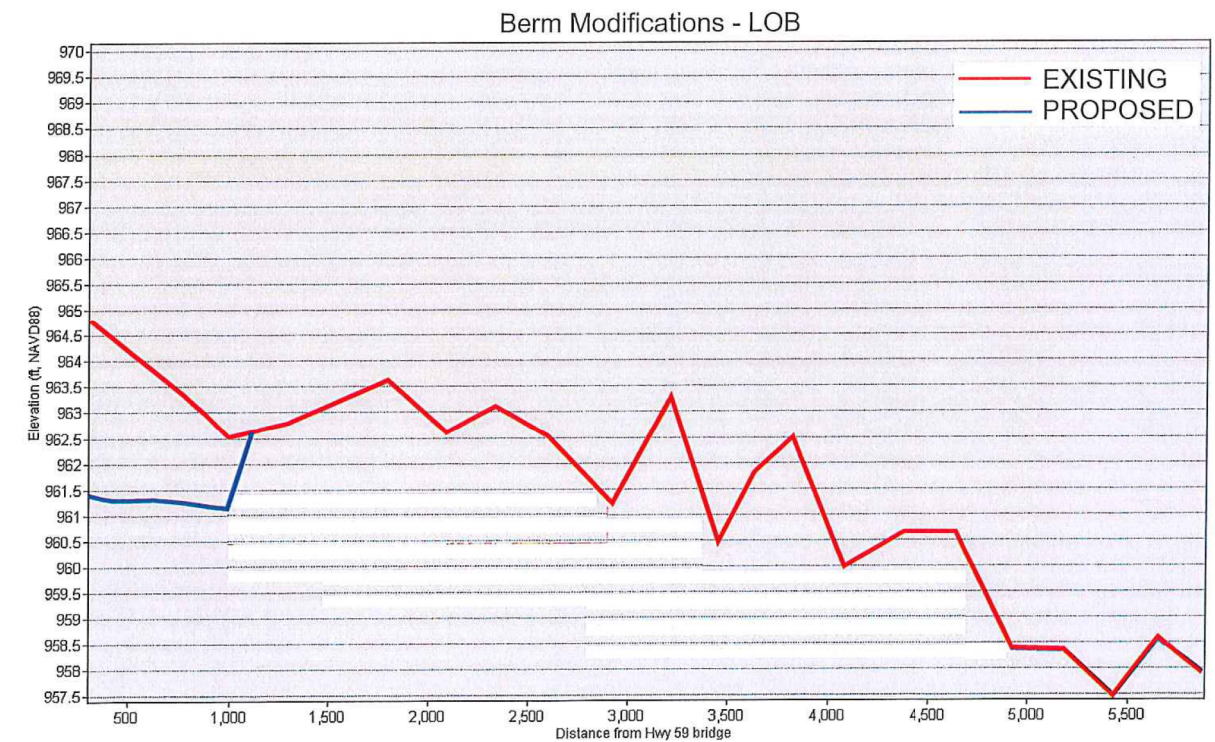


Figure 11. Proposed berm modifications for left (southern) bank



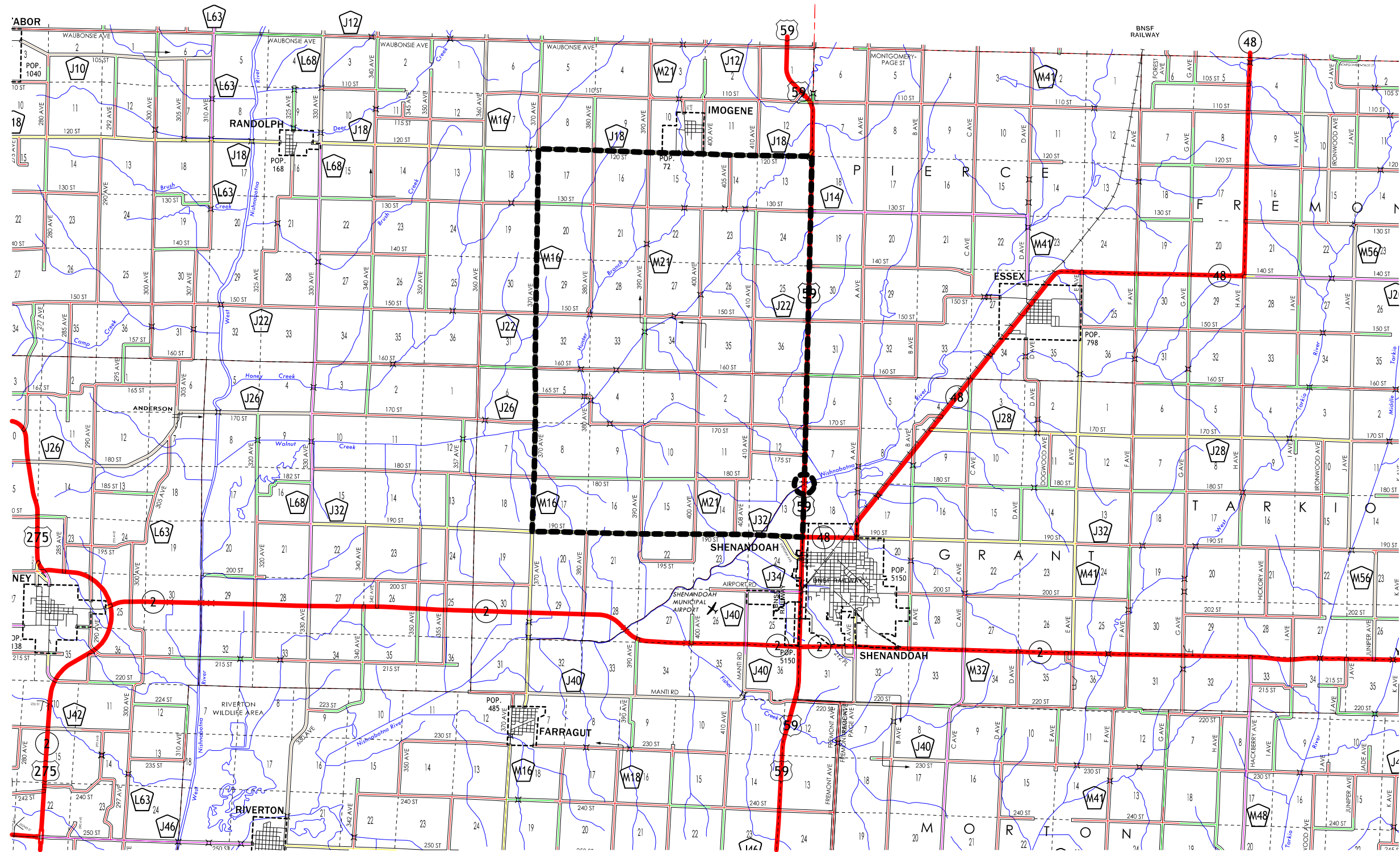
DRAFT

PROPOSED HWY 59 BERM MODIFICATION LEFT AND RIGHT BANKS

FIGURE 10 & 11

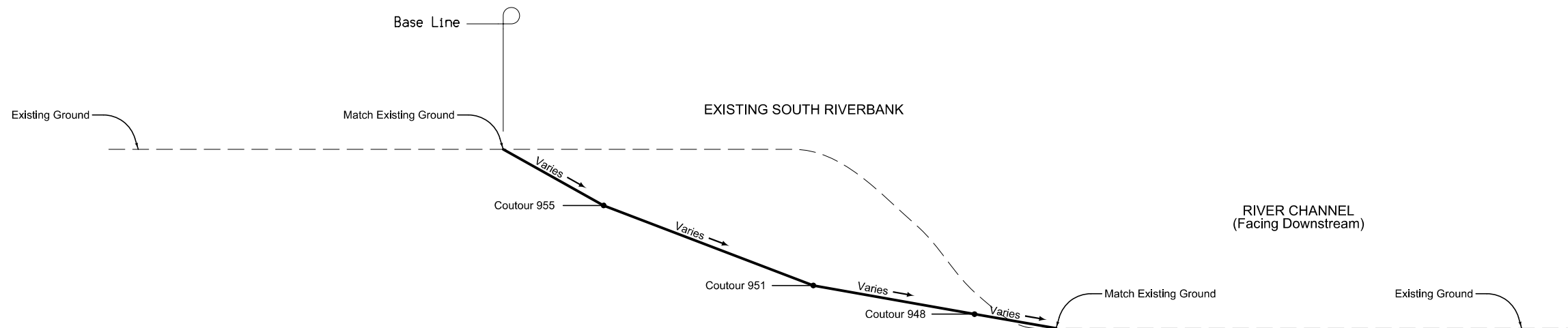
Project Concept Statement

Detour

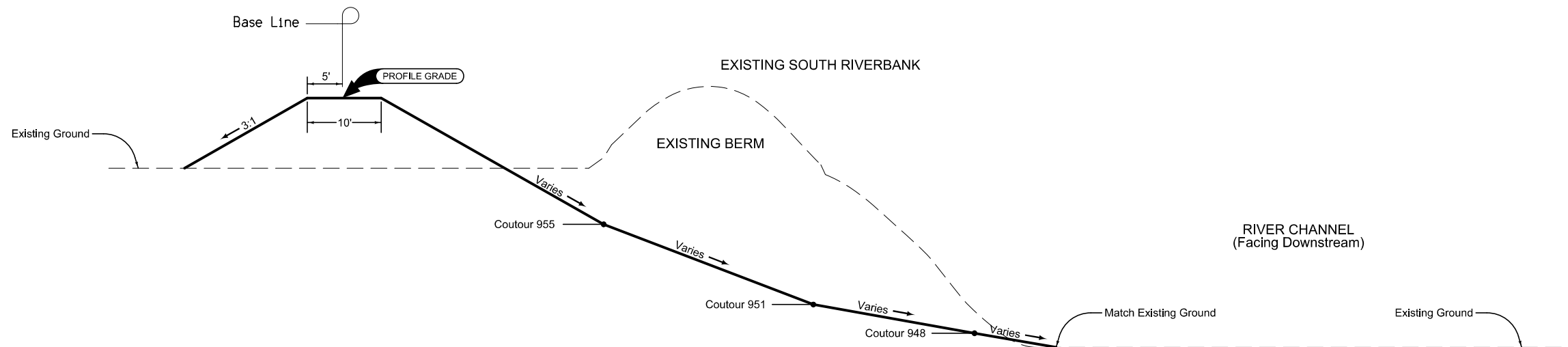


Project Concept Statement

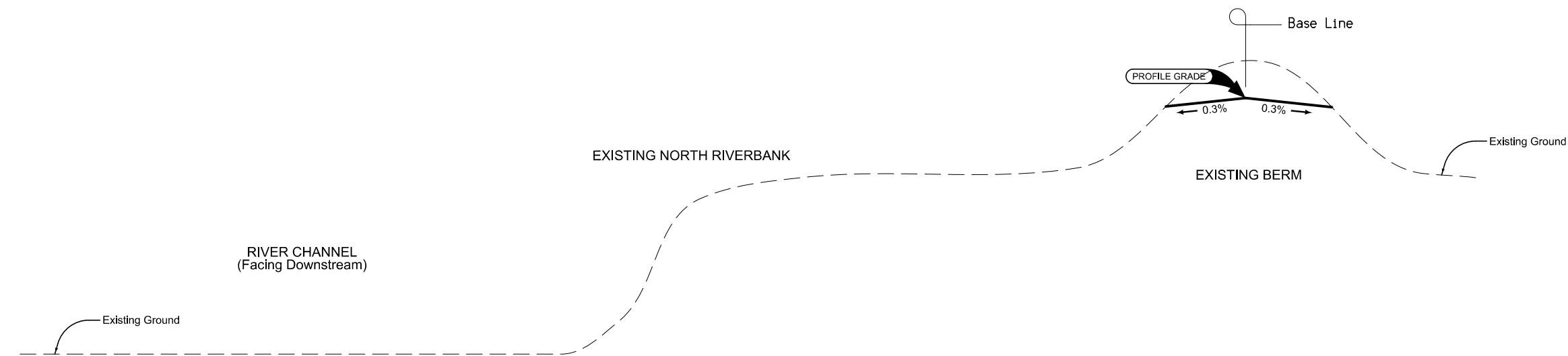
South Berm Grading_1	
STATION TO STATION	
201+69.00	210+43.65



South Berm Grading_2	
STATION TO STATION	
210+43.65	220+84.00



North Berm Grading_1	
STATION TO STATION	
100+65.00	112+21.00

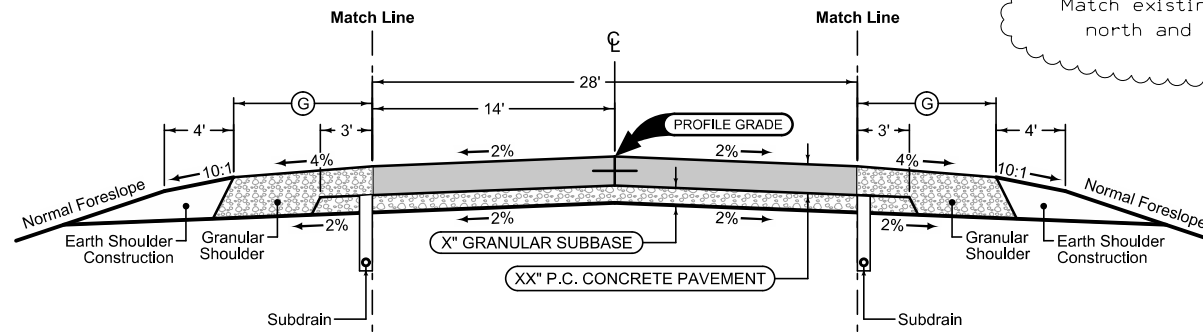


Granular Shoulder

2_G_SR_10-19-10		ⓐ
STATION TO STATION		
xx	xx	6-8
xx	xx	8

Granular Shoulder

2_G_SR_10-19-10		ⓐ
STATION TO STATION		
xx	xx	6-8
xx	xx	8



Match existing condition at north and south tie-in.

Mainline Jointing:
 Transverse joints: CD at 17' spacing
 Longitudinal joint: L-2

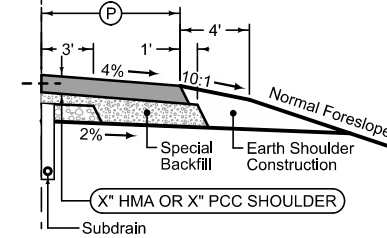
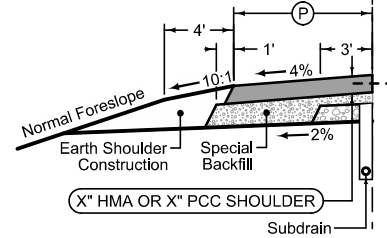
2P_MODIFIED	
STATION TO STATION	
xx	xx

Paved Shoulder at Guardrail

PCC Shoulder Jointing:
 Longitudinal joint: BT-1 or BT-5
 Transverse joints: C at mainline spacing
 HMA Shoulder Jointing:
 Longitudinal joint: B

2_P_Guard_10-17-17		ⓐ
STATION TO STATION		
xx	xx	11.1
xx	xx	11.1-9.6
xx	xx	9.6

Refer to Design Detail 7156.



Paved Shoulder at Guardrail

PCC Shoulder Jointing:
 Longitudinal joint: BT-1 or BT-5
 Transverse joints: C at mainline spacing
 HMA Shoulder Jointing:
 Longitudinal joint: B

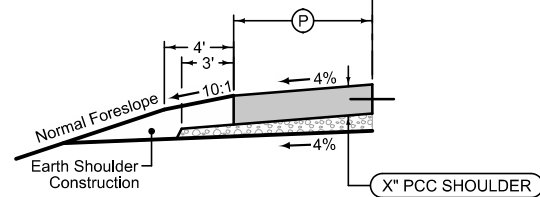
2_P_Guard_10-17-17		ⓐ
STATION TO STATION		
xx	xx	11.1
xx	xx	11.1-9.6
xx	xx	9.6

Refer to Design Detail 7156.

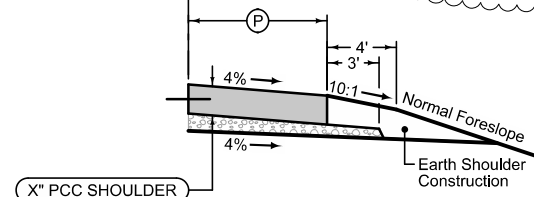
Full Depth PCC Shoulder

Shoulder Jointing:
 Longitudinal joint: L-2 or KT-2
 Transverse joints: C at 17' spacing

2_P_FullPCC_MODIFIED		ⓐ
STATION TO STATION		
xx	xx	9.6



Use full-depth shoulders adjacent to approach pavement.



Full Depth PCC Shoulder

Shoulder Jointing:
 Longitudinal joint: L-2 or KT-2
 Transverse joints: C at 17' spacing

2_P_FullPCC_MODIFIED		ⓐ
STATION TO STATION		
xx	xx	9.6

See Tab 100-24 or 100-25 for pavement quantities.
 See Tab 112-9 for shoulder quantities.

US 59

SURVEY SYMBOLS

	TL1 Underground Telephone Co. 1
	RET Retaining Walls
	GDL Guard Rail Steel
	FW Wire Fence
	EW Edge of Water
	SNP Unpaved Shoulder
	EP Edge of Paved Roads (ML or SR)
	ENU Edge Unpaved Entrance & Parking
	EB Edge of Bank
	D Centerline Draw or Stream (Down)
	BL Break Line
	CUL Culvert Structure Line
	CON Concrete Slab
	CUL Culvert Pipe
	PPA Power Pole Co. 1
	TPD Telephone Pedestal
	SI Sign
	TRD Tree Deciduous
	SC Section Corner

UTILITY LEGEND

	MidAmerican
	MidAmerican
	CenturyLink

PLAN VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK		Design Color No.	
Green	(2)		Existing Topographic Features and Labels
Blue	(1)		Proposed Alignment, Stationing, Tic Marks, and Alignment Annotation
Magenta	(5)		Existing Utilities
SHADING		Design Color No.	
Yellow	(4)		Highlight for Critical Notes or Features
Red	(3)		Delineates Restricted Areas
Lavender	(9)		Temporary Pavement Shading
Gray, Light	(48)		Proposed Pavement Shading
Gray, Med	(80)		Proposed Granular Shading
Gray, Dark	(112)		Proposed Grade and Pave Shading "In conjunction with a paving project"
Brown, Light	(236)		Grading Shading
Tan	(8)		Proposed Sidewalk Shading
Blue, Light	(230)		Proposed Sidewalk Landing Shading
Pink	(11)		Proposed Sidewalk Ramp Shading

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK		Design Color No.	
Green	(2)		Existing Ground Line Profile
Blue	(1)		Proposed Profile and Annotation
Magenta	(5)		Existing Utilities
Blue, Light	(230)		Proposed Ditch Grades, Left
Black	(0)		Proposed Ditch Grades, Median
Rust	(14)		Proposed Ditch Grades, Right

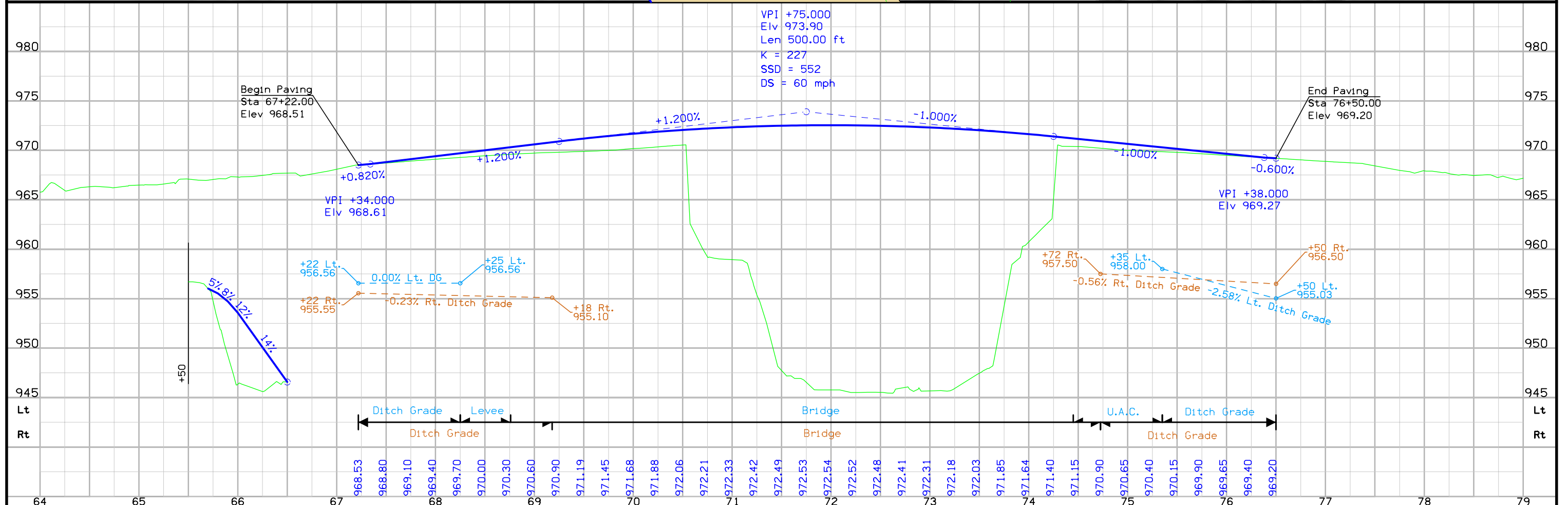
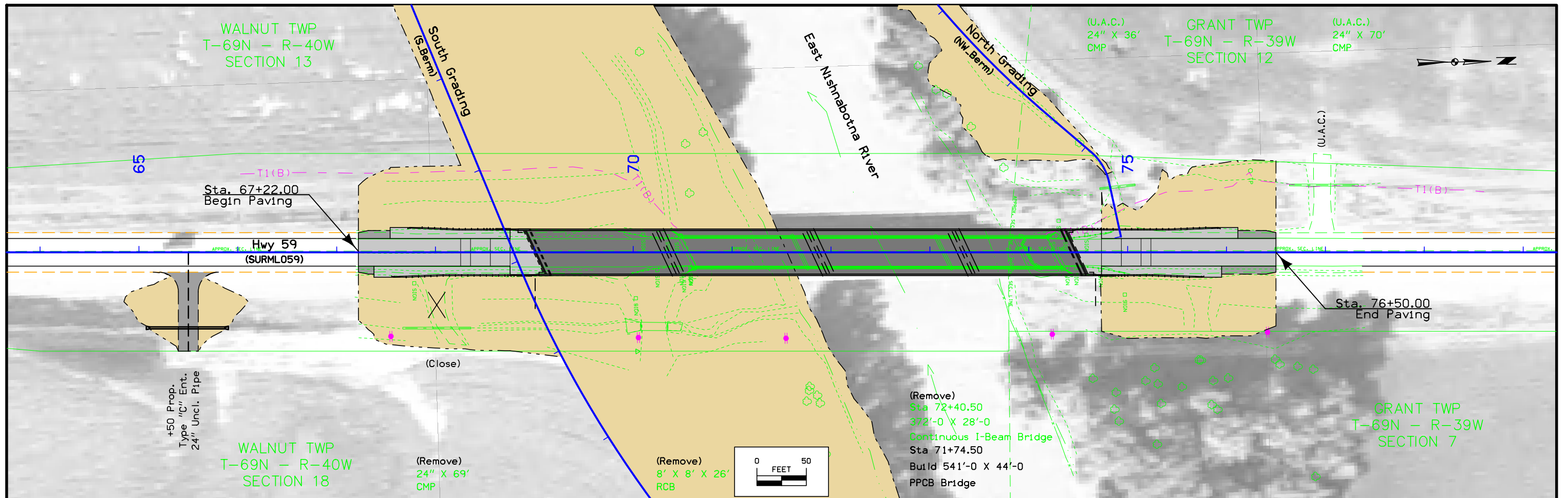
	Reference Point
	Station
	Survey Line
	Section Corner
	Ground Line Intercept
	Saw Cut
	Guardrail
	Trench Drain
	HighTension Cable Guardrail
	Sheet Pile
	Pavement Removal
	Clearing & Grubbing Area

RIGHT-OF-WAY LEGEND

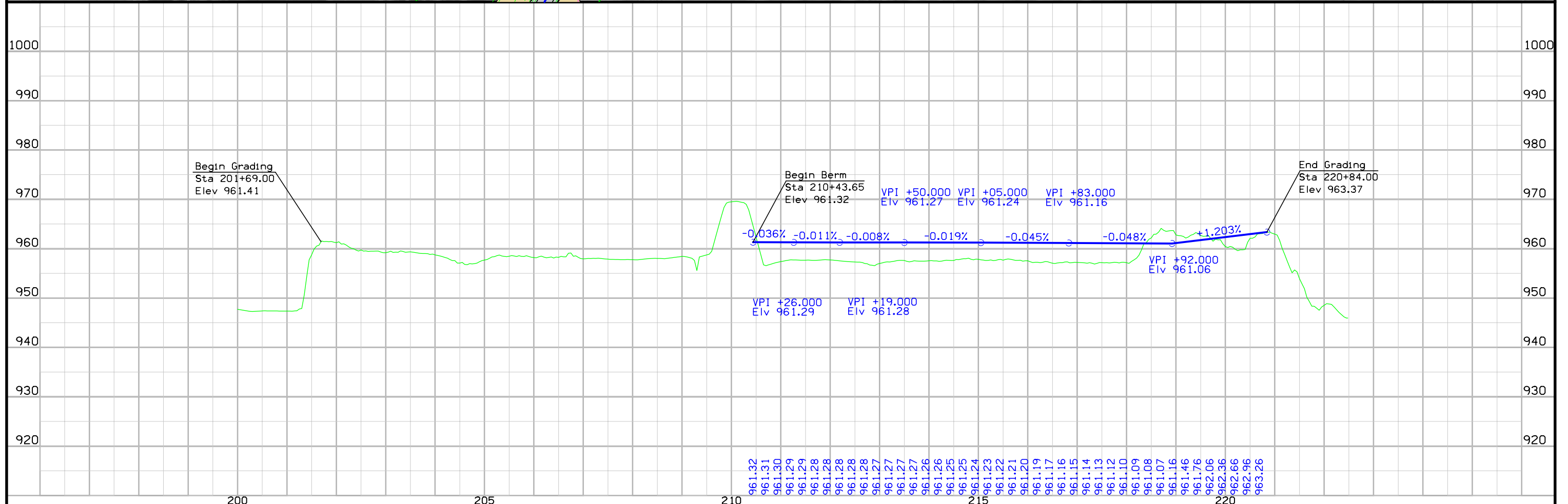
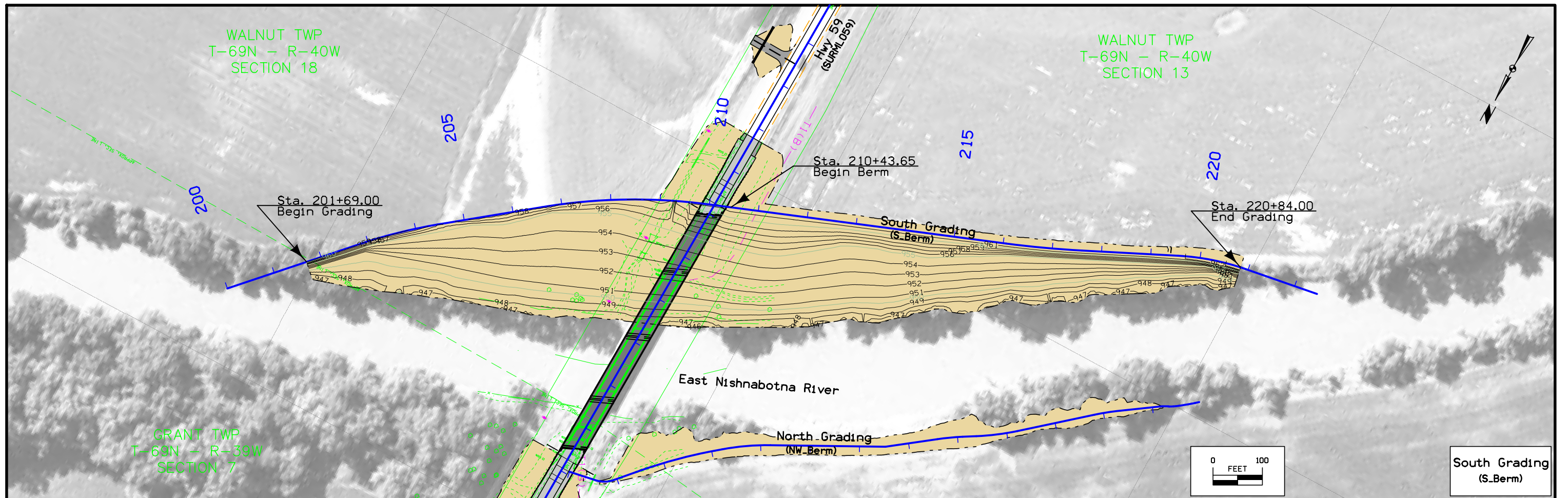
	Proposed Right-of-Way
	Existing Right of Way
	Existing and Proposed Right-of-Way
	Easement and Existing Right-of-Way
	Easement (Temporary)
	Easement
	Access Control
	Property Line

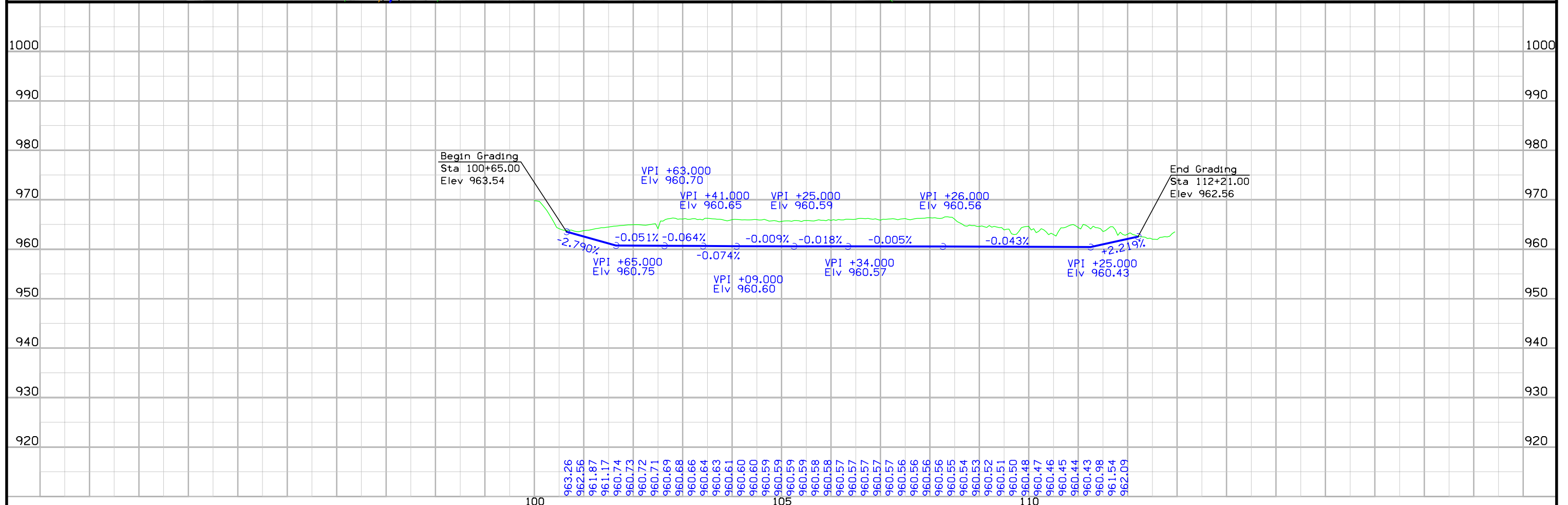
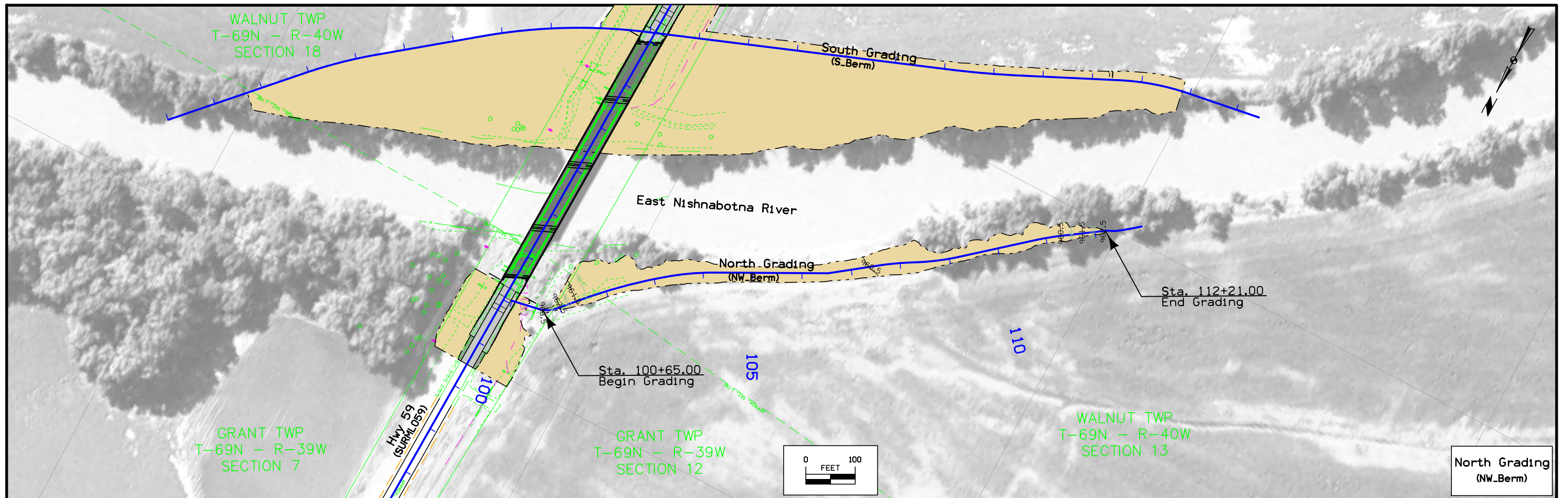
PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

(COVERS SHEET SERIES D, E, F, & K)









FILE NO. 31409	ENGLISH	DESIGN TEAM Holst \ Dudley	COUNTY	PROJECT NUMBER BRF-059-1(31)--38-73	SHEET NUMBER E.2
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Survey Information

Page and Fremont County
BRF-059-1(31) - -38-73
US 59 Page County
Hydraulic Modeling and Bridge Survey
For the East Nishnabotna River
Bridge Maintenance Number 7314.2S059
PIN 16-73-059-010

Party Personnel

HDR Engineering
Brian Jensen- Party Chief
Lucas Chmela – CTA
David Rupiper – Mapping

Date(s) of Survey

Begin Date 06/26/2017
End Date 07/14/2017

General Information

Measurement units for this survey are US Survey Feet. This survey is for the proposed bridge replacement of the US Highway 59 Bridge over the East Nishnabotna River one mile North of IA 48 near Shenandoah Iowa.

Vertical Control

This survey is relative to NAVD 88 vertical datum. Three Primary Control points were provided by the Iowa Department of Transportation with Elevations included for these control points (Refer to Adjusted Points Table below shown with the Horizontal Control Section). Two Additional Secondary Control Points were set and established for the topographic Survey and the elevations were derived from the Three Primary Control Points (Refer to Secondary Control Points Table below shown with the Horizontal Control Section).

Vertical Equations to the Project Datum Bench Marks and Other Benches along this Survey are as Follows:

NGS BM # SDA-A this survey Elev. = 972.10 (NAVD 88 English).
= NGS BM # SDA-A Elev. = 971.90 (NAVD 88 English) Published Elevation

Horizontal Control

A 2016-2017 GPS network for Project BRF-059-1(31) - - 38-73 was provided by the Iowa Department of Transportation. Three Primary Control points were provided by the Iowa Department of Transportation (Refer to Primary Control Points Table shown below). Datum is IaRCS Zone 12 (US Survey Feet). Two Additional Secondary Control Points were set and established for the topographic Survey (Refer to Secondary Control Points Table shown below).

Alignment Information

Mainline Alignment (US 59)

From 1964 PCC Paving F Project No. 442(8).
The mainline alignment for this survey is a retrace of PCC Paving F Project No. 442(8). The mainline alignment was created in centerline of median. Stationing was obtained at PI Sta. 2001+60.36 and carried ahead to PI Sta. 3100+53.44 without equation. The following PI and PT points were used to create this CL alignment.

PT Sta. 44+09.30 Paving F Project No. 442(8) (found)
PI Sta. 126+88.30 Paving F Project No. 442(8) (found)

This Mainline survey relates to the mainline plan stationing as follows:

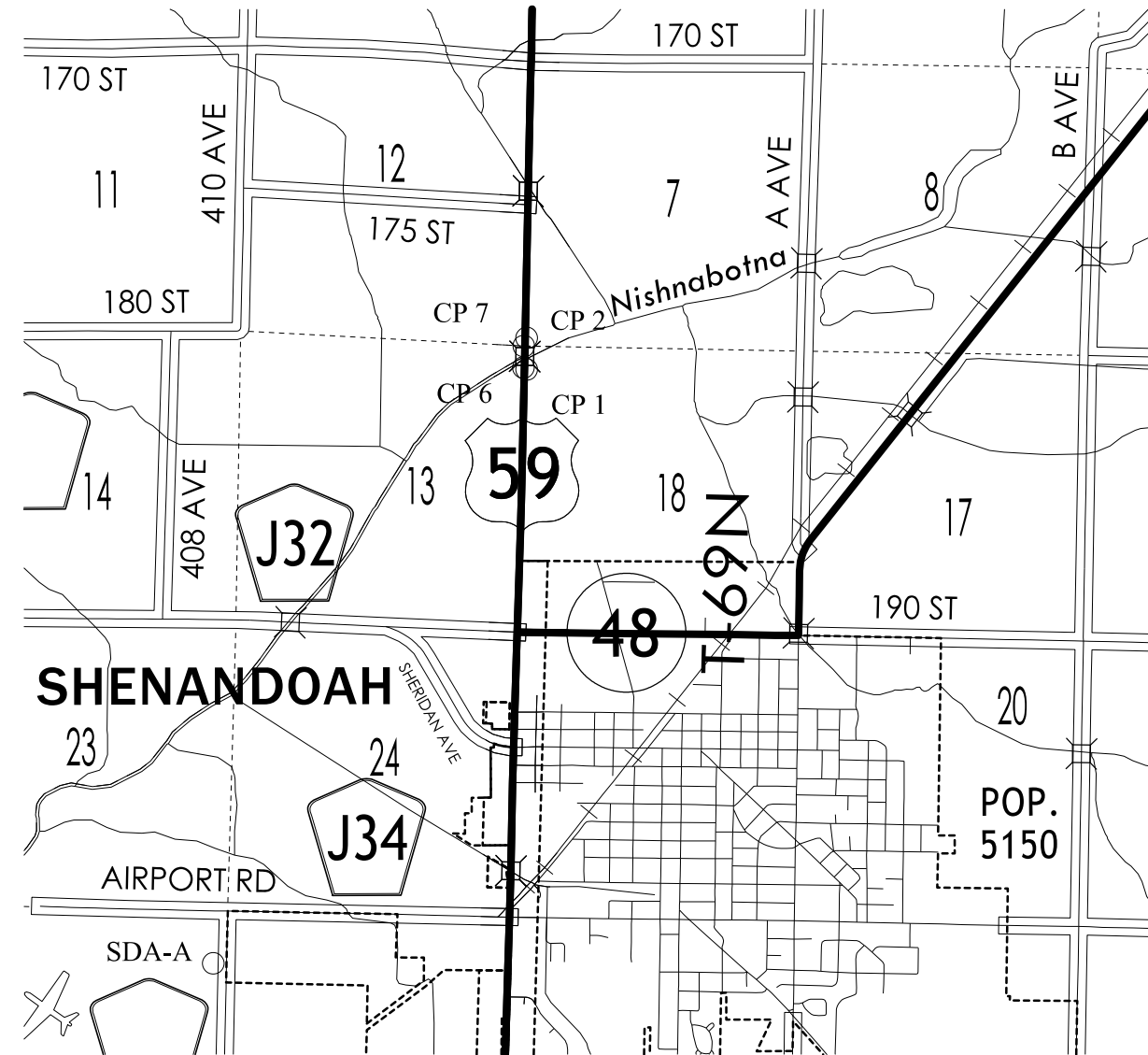
PI Sta. 21+26.57 this survey
= PT Sta. 21+30.00 Paving F Project No. 442(8)

PI Sta. 41+09.30 this survey
=PI Sta. 41+09.30 Paving F Project No. 442(8)

PI Sta. 126+88.30 this survey
=PI Sta. 126+89.77 Paving F Project No. 442(8)

CONTROL POINT VICINITY MAP

This map is a guide to the vicinity of the primary project control points
 Primary control is for use with RTK base stations and for RTN validation.
 Future surveys will use primary project control to establish temporary control as needed for construction or other surveying applications.



HORIZ. DATUM: NAD83(2011) EPOCH 2010.00

VERT. DATUM: NAVD88

1a. Regional Coordinate System Zone 12

Coordinate listing from next sheet will be used with 1aRTN for monument recovery. No other reference ties are given.

HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00

VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 12

Primary Control				
Name	Northing (USft)	Easting (USft)	Elevation (USft)	Code
1	6156281.990	22047323.568	967.334	
2	6156867.075	22047323.121	967.490	
SDA-A	6145278.562	22041515.848	972.102	

Secondary Control				
Name	Northing (USft)	Easting (USft)	Elevation (USft)	Code
6	6156317.406	22047264.619	970.01	
7	6156715.741	22047271.863	969.56	

ALIGNMENT COORDINATES

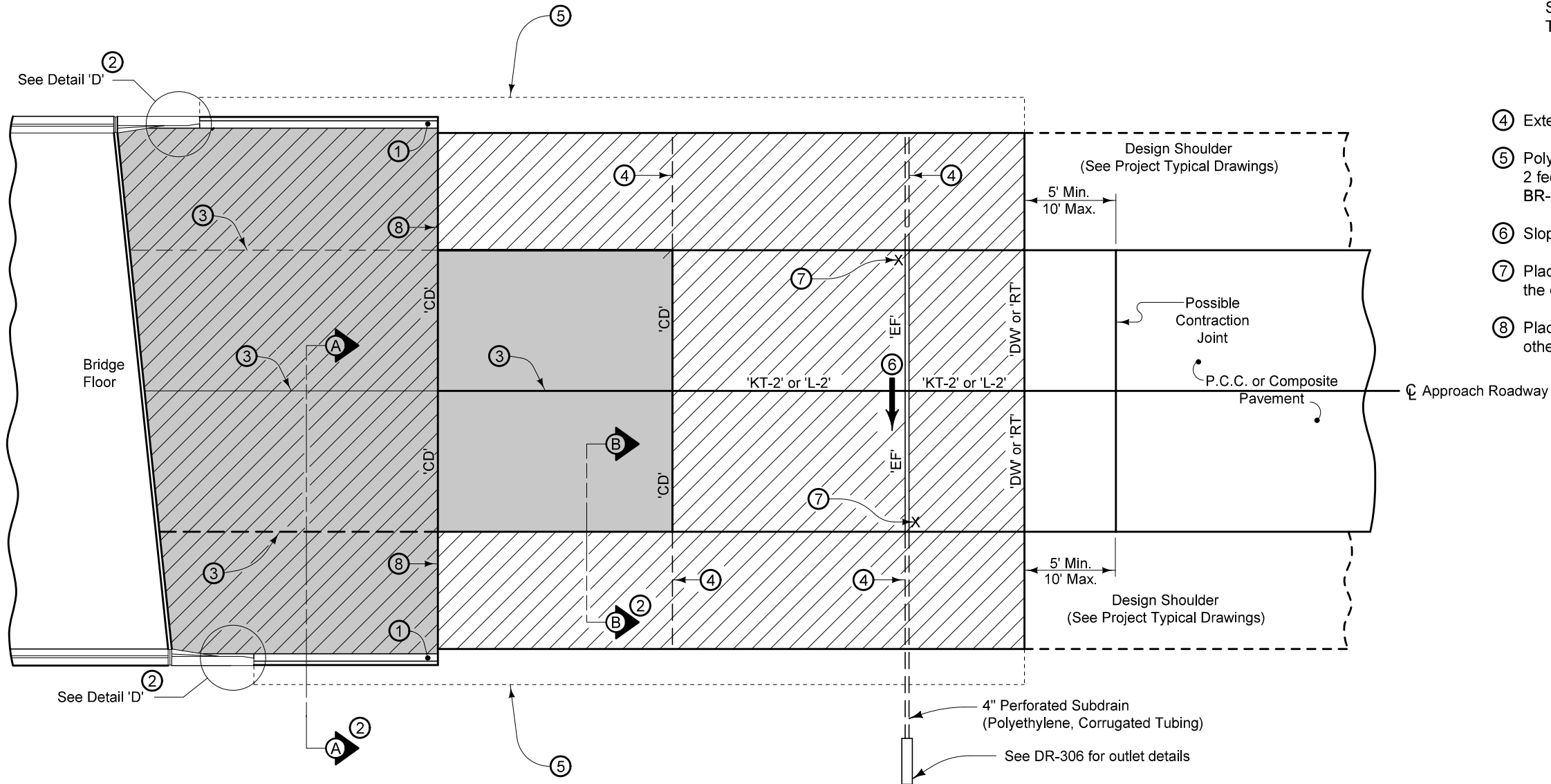
Name	Location	Point on Tangent			Begin Spiral			Begin Curve			Simple Curve PI or Master PI of SCS			End Curve			End Spiral		
		Station	Coordinates		Station	Coordinates		Station	Coordinates		Station	Coordinates		Station	Coordinates		Station	Coordinates	
			Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)		Y (Northing)	X (Easting)
1	SURML059	21+26.57 R1	6151408.46	22047149.66															
2	SURML059						38+09.30 R1	6153090.20	22047207.30	41+09.30 R1	6153390.03	22047217.58	44+09.30 R1	6153689.96	22047224.19				
3	SURML059	126+89.77 R1	6161968.42	22047406.74															
1	S_BERM	200+00.00 R1	6156781.09	22048062.08															
2	S_BERM						202+87.77 R1	6156569.83	22047866.69	203+66.55 R1	6156511.99	22047813.19	204+45.01 R1	6156463.24	22047751.30				
4	S_BERM						206+59.79 R1	6156330.34	22047582.58	208+29.35 R1	6156225.42	22047449.38	209+96.43 R1	6156164.01	22047291.32				
6	S_BERM						216+06.01 R1	6155943.25	22046723.12	216+83.06 R1	6155915.35	22046651.30	217+60.03 R1	6155882.00	22046581.84				
8	S_BERM						219+54.79 R1	6155797.71	22046406.27	220+25.55 R1	6155767.09	22046342.48	220+95.37 R1	6155755.36	22046272.70				
9	S_BERM	222+47.93 R1	6155730.09	22046122.25															
1	NW_BERM	100+00.00 R1	6156773.37	22047276.28															
2	NW_BERM						100+56.65 R1	6156762.57	22047220.67	100+75.15 R1	6156759.04	22047202.51	100+92.35 R1	6156745.25	22047190.17				
4	NW_BERM						101+50.31 R1	6156702.06	22047151.52	102+28.55 R1	6156643.75	22047099.35	103+06.48 R1	6156594.26	22047038.74				
6	NW_BERM						103+21.62 R1	6156584.68	22047027.01	103+70.82 R1	6156553.56	22046988.90	104+19.71 R1	6156530.47	22046945.46				
8	NW_BERM	106+52.72 R1	6156421.11	22046739.71															
9	NW_BERM						107+58.61 R1	6156357.32	22046655.18	107+84.50 R1	6156341.73	22046634.51	108+10.35 R1	6156328.35	22046612.34				
11	NW_BERM						108+38.02 R1	6156314.06	22046588.65	108+79.79 R1	6156292.47	22046552.88	109+21.38 R1	6156265.25	22046521.19				
13	NW_BERM						110+81.78 R1	6156160.74	22046399.52	111+07.99 R1	6156143.66	22046379.63	111+34.15 R1	6156128.75	22046358.07				
15	NW_BERM						112+17.96 R1	6156081.10	22046289.14	112+24.90 R1	6156077.15	22046283.43	112+31.80 R1	6156074.32	22046277.09				
17	NW_BERM						112+33.90 R1	6156073.46	22046275.17	112+38.46 R1	6156071.60	22046271.01	112+42.99 R1	6156069.02	22046267.26				
19	NW_BERM						112+47.20 R1	6156066.64	22046263.79	112+67.23 R1	6156054.91	22046247.54	112+87.25 R1	6156041.92	22046232.29				
20	NW_BERM	112+95.36 R1	6156036.66	22046226.11															

SPIRAL OR CIRCULAR CURVE DATA

Name	Location	ΔSCS	Horizontal Alignment Data												Remarks			
			Spiral Data						Curve Data									
			θS	Ls	Ts	Es	Xc	Yc	L.T.	S.T.	ΔC	T	L	R		E		
C1	S_BERM												9°00'33.5"	78.783	157.242	1000.000	3.099	
C2	S_BERM												16°59'38.1"	169.565	336.641	1135.000	12.596	
C3	S_BERM												4°24'44.9"	77.050	154.024	2000.000	1.484	
C4	S_BERM												16°06'33.5"	70.757	140.580	500.000	4.982	
C1	NW_BERM												37°11'19.9"	18.504	35.699	55.000	3.029	
C2	NW_BERM												8°56'51.2"	78.241	156.164	1000.000	3.056	
C3	NW_BERM												11°14'23.5"	49.201	98.086	500.000	2.415	
C4	NW_BERM												5°55'42.1"	25.890	51.735	500.000	0.670	
C5	NW_BERM												9°33'06.2"	41.774	83.355	500.000	1.742	
C6	NW_BERM												6°00'07.0"	26.212	52.377	500.000	0.687	
C7	NW_BERM												10°34'22.4"	6.940	13.840	75.000	0.320	
C8	NW_BERM												10°24'36.5"	4.555	9.085	50.000	0.207	
C9	NW_BERM												4°35'22.6"	20.037	40.052	500.000	0.401	

For joint details, see PV-101.

- ① Build 4 inch Sloped Curb to end of Double Reinforced Section.
- ② See BR-201, BR-202, BR-203, or BR-204.
- ③ Longitudinal Joint (PV-101):
Single Pour - Saw cut joint per Detail B.
Two Pours - Use 'KS-1' joint (Single Reinforced Section).
Use 'KS-2' joint (Double Reinforced Section).
- ④ Extend 'CD' and 'EF' joints where PCC Shoulder.
- ⑤ Polymer Grid and excavation limits of Modified Subbase 2 feet outside of pavement edge. See BR-201, BR-202, BR-203, or BR-204.
- ⑥ Slope subdrain to drain.
- ⑦ Place an "X" in the plastic concrete near the 'EF' joint at the outside edge of pavement.
- ⑧ Place 'RD' Joint where PCC shoulder. Place 'B' joint otherwise.



PLAN VIEW

Pay limits for contract item include the following areas:

- Double Reinforced Section
- Single Reinforced Section
- Non-Reinforced Section

MODIFIED STANDARD ROAD PLAN	REVISION	
	1	10-17-17
	BR-211	
SHEET 1 of 1		
MODIFICATIONS: Included shoulder area adjacent to standard single and non-reinforced paving as non-reinforced approach paving.		
BRIDGE APPROACH (ABUTTING PCC OR COMPOSITE PAVEMENT)		

- NOTES:
- PROPOSED PROFILE GRADE RAISE TO MEET 3' MINIMUM FREEBOARD.
 - STUB ABUTMENTS/ 3' WIDE T-PIERS
 - TO MEET IOWA DNR PERMIT REQUIREMENTS
 - RELOCATE SOUTH, DOWNSTREAM AGRICULTURAL BERM.
 - ADJUST SOUTH AND NORTH DOWNSTREAM TOP OF AGRICULTURAL BERM PROFILES.
 - AGRICULTURAL BERM RECONSTRUCTION SHALL BE A MINIMUM TOP WIDTH OF 10' AND 3:1 SIDE SLOPES.
 - CHANNEL OVERBANK AREA GRADING IS PROPOSED ON THE SOUTH SIDE OF THE CHANNEL.
 - THE CONDITION AND POSSIBLE NEED FOR REPLACEMENT FOR THE EXISTING 24 INCH PIPE THROUGH THE NORTH AG BERM SHALL BE REVIEWED IN PRELIMINARY DESIGN.

UTILITIES LEGEND:

T - TELEPHONE LINE - COMPANY NAME

HYDRAULIC DATA

DRAINAGE AREA = 1022 SQ. MI.
 STREAM SLOPE = 2.97 FT./MI.
 AVG. LOW WATER STAGE = 948.2

Q₁₅ (OVERTOP) = 26,900 CFS
 STAGE 962.8
 ROADWAY OVERTOP 963.3
 STA. 34+44.5

Q₂₅ = 32,000 CFS
 STAGE = 963.1

Q₅₀ = 37,900 CFS
 STAGE = 962.86
 REGULATORY LOW BEAM = TBD

Q₁₀₀ = 44,000 CFS
 STAGE = 963.7
 OPERATIONAL LOW BEAM = 964.02
 BACKWATER = 1.65 FT. (LOW DAMAGE POTENTIAL AREAS)
 BACKWATER = 0.96 FT. (HIGH DAMAGE POTENTIAL AREAS)
 AVG. BRIDGE VELOCITY = 5.9 FPS

Q₂₀₀ = 50,300 CFS
 STAGE = 964.0
 CALCULATED DESIGN SCOUR = 924.5

Q₅₀₀ = 59,200 CFS
 STAGE = 964.5
 CALCULATED CHECK SCOUR = 923.6

EXTREME HW STAGE = 964.3 NAVD 88 (60,500 CFS)
 DATE = JUNE 1998
 (REF: USGS OPEN FILE REPORT 1999-70)

LOCATION

US 59 OVER THE EAST NISHNABOTNA RIVER
 SECTION 13, T-69N, R-40W
 WALNUT TOWNSHIP, FREMONT COUNTY
 SECTION 18, T-69N, R-39W
 GRANT TOWNSHIP, PAGE COUNTY
 FHWA NO. ?
 BRIDGE MAINT. NO. 7314.2S059
 LATITUDE ??.123456°
 LONGITUDE -???.123456°

PRELIMINARY

DESIGN FOR 25° SKEW (R.A.)

541'-0 x 44'-0 PRETENSIONED PRESTRESSED CONCRETE BEAM BRIDGE

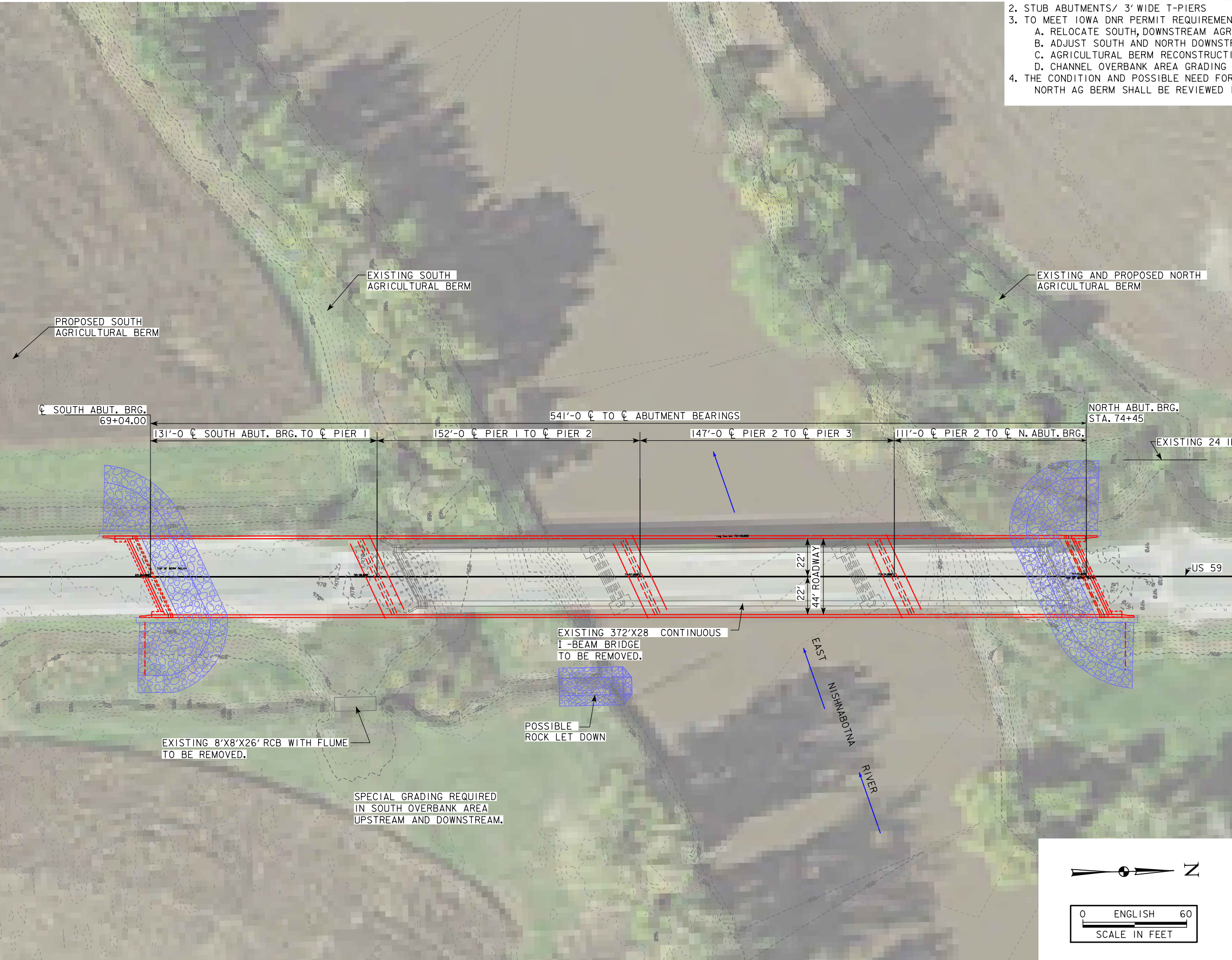
131'-0, 111'-0 END SPANS BTE BEAMS 152'-0, 147' INTERIOR SPANS

SITUATION PLAN

STATION 71+74.5 (US 59) MAY 2019

PAGE COUNTY

IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 1 OF 1 FILE NO. 31409 DESIGN NO. ?



SITUATION PLAN

LINE STYLE LEGEND OF CROSS SECTION SHEETS (ROAD)

- - - - - - Existing Ground Line
- Proposed Template
- Proposed Topsoil Placement
- - - - - Additional Topsoil Removal
- Subgrade Treatment
- - - - - Granular Shoulder
- Pavement
- - - - - Existing Pipe\R/CB
- Proposed Pipe\R/CB
- Proposed Dike
- All Elements Associated with Proposed Entrances

LINE STYLE LEGEND OF CROSS SECTION SHEETS (SOILS)

- TOPSOIL — Topsoil (Class 10)
- Slope Dressing Only
- CL 10 — Class 10 Materials
- SEL LO — Select Loams And Clay-Loams
- SEL SA — Select Sand
- UNS A — Unsuitable Type A Disposal
- UNS B — Unsuitable Type B Disposal
- UNS C — Unsuitable Type C Disposal
- SHALE — Shale
- WASTE — Waste
- B&W LS — Broken and Weathered Rock
- ROCK — Solid Rock
- BLDRS — Boulders

Note: All layer lines and descriptions identify layers above the line.

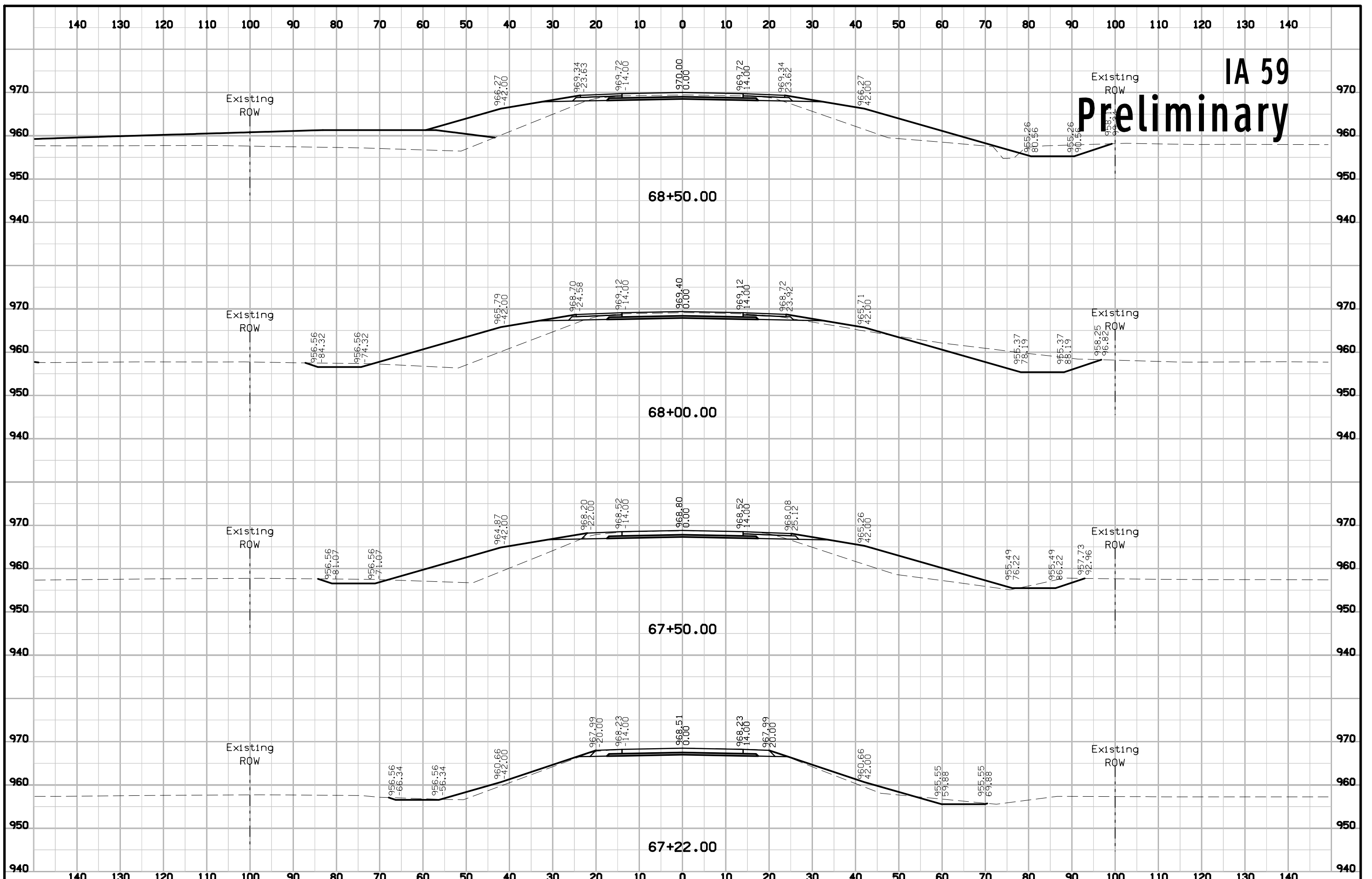
Note: Vertical or near vertical lines connecting soil layers at edges of cross sections are only for the purpose of calculating template quantities and do not depict soil stratification.

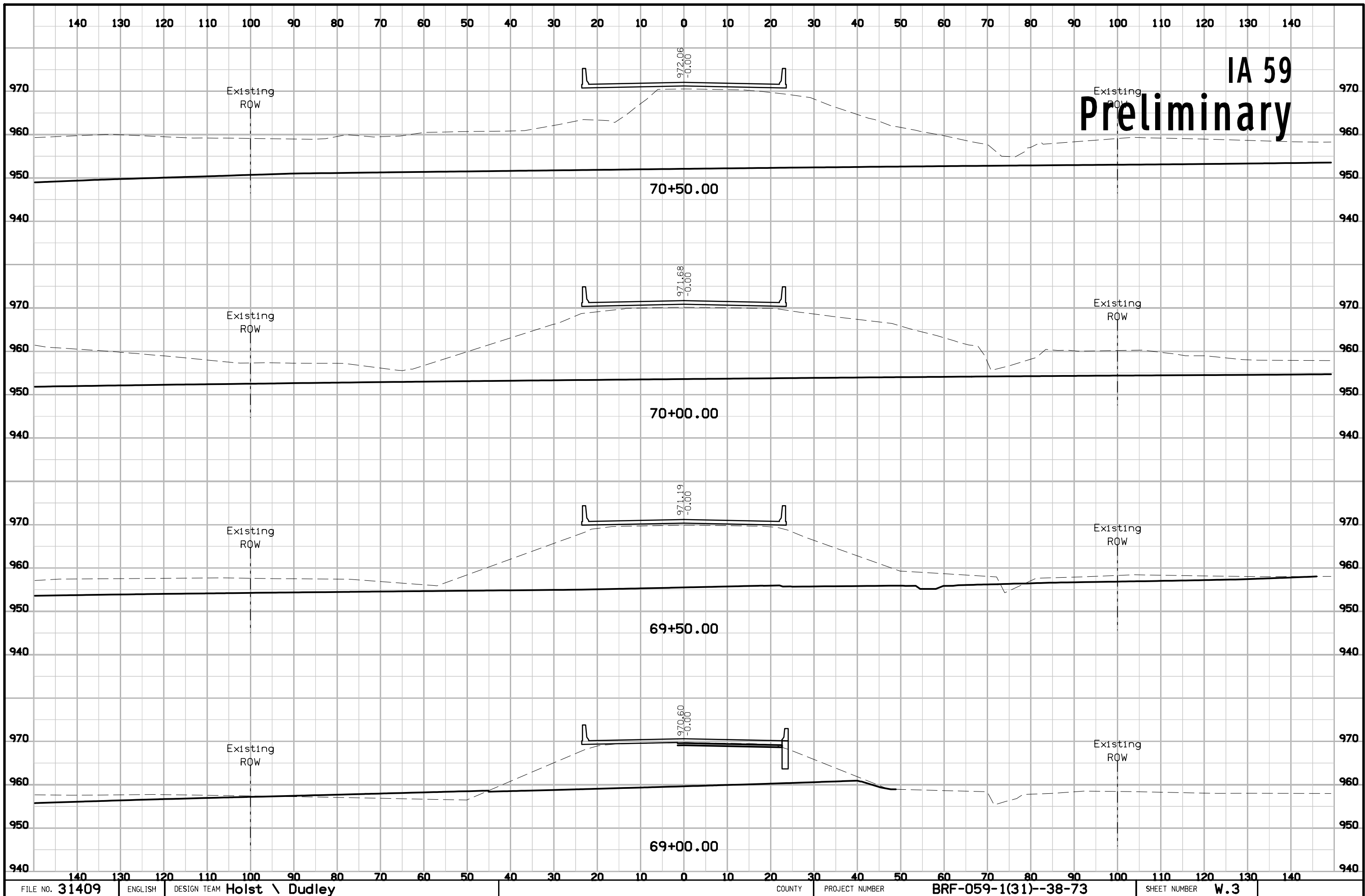
SYMBOL LEGEND OF CROSS SECTION SHEETS

- Existing ROW
|
Existing Right-of-Way Limit
- Proposed ROW
|
Proposed Right-of-Way Limit
- Temporary ROW
|
Temporary Right-of-Way Limit

**CROSS SECTION
LEGEND AND SYMBOL
INFORMATION SHEET
(COVERS SHEET SERIES W, X, Y, & Z)**

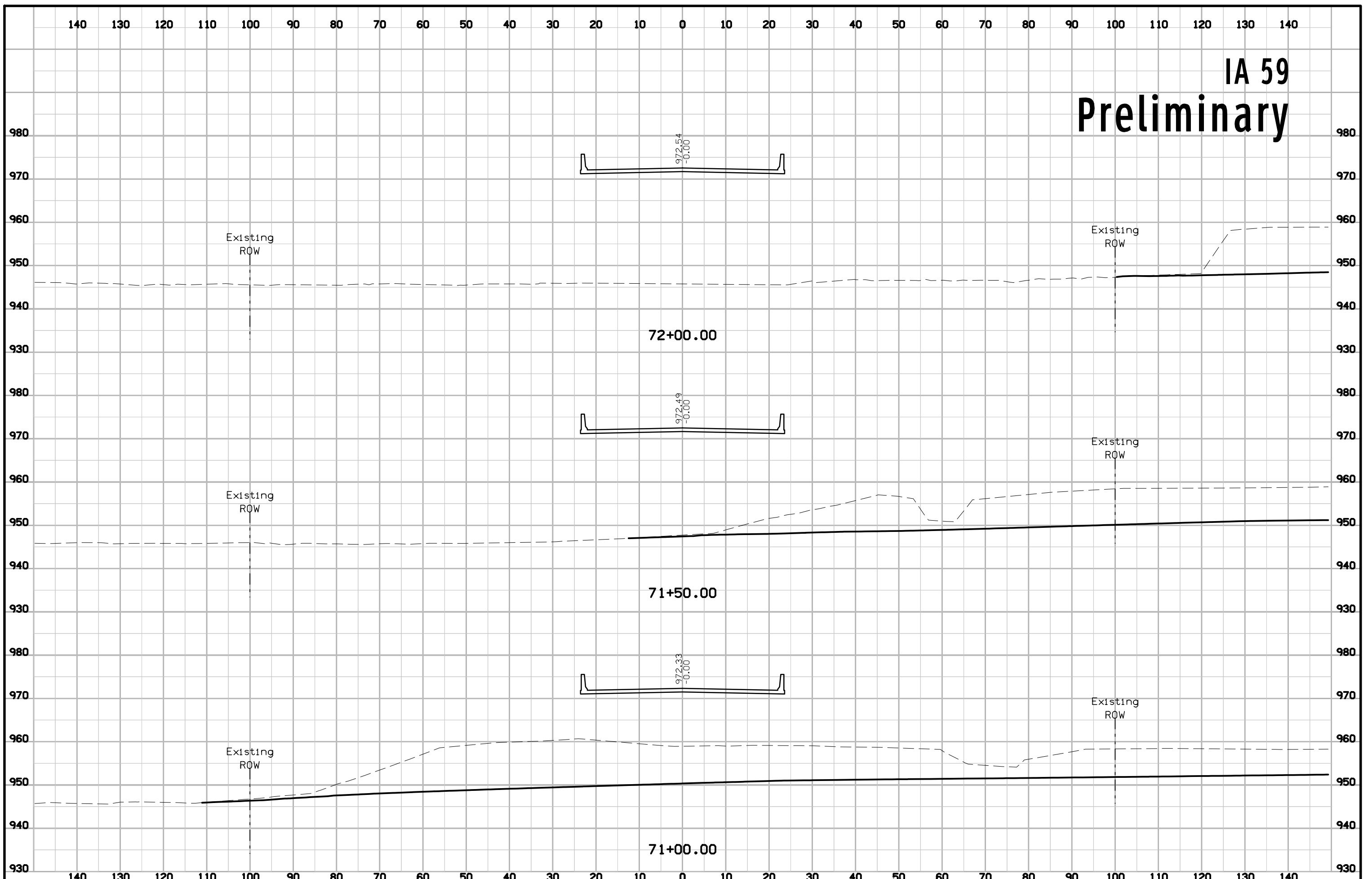
IA 59 Preliminary



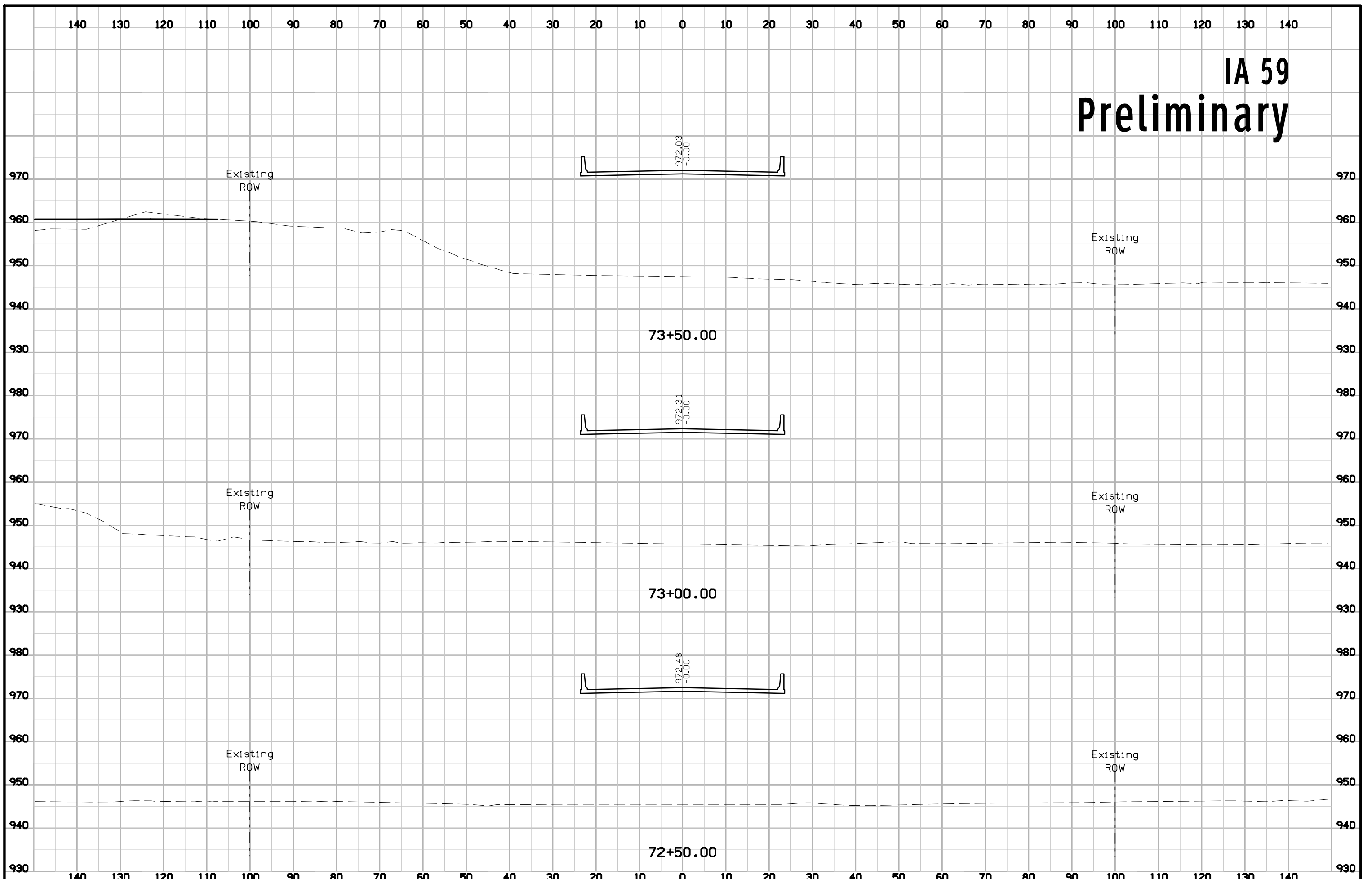


IA 59
Preliminary

IA 59 Preliminary

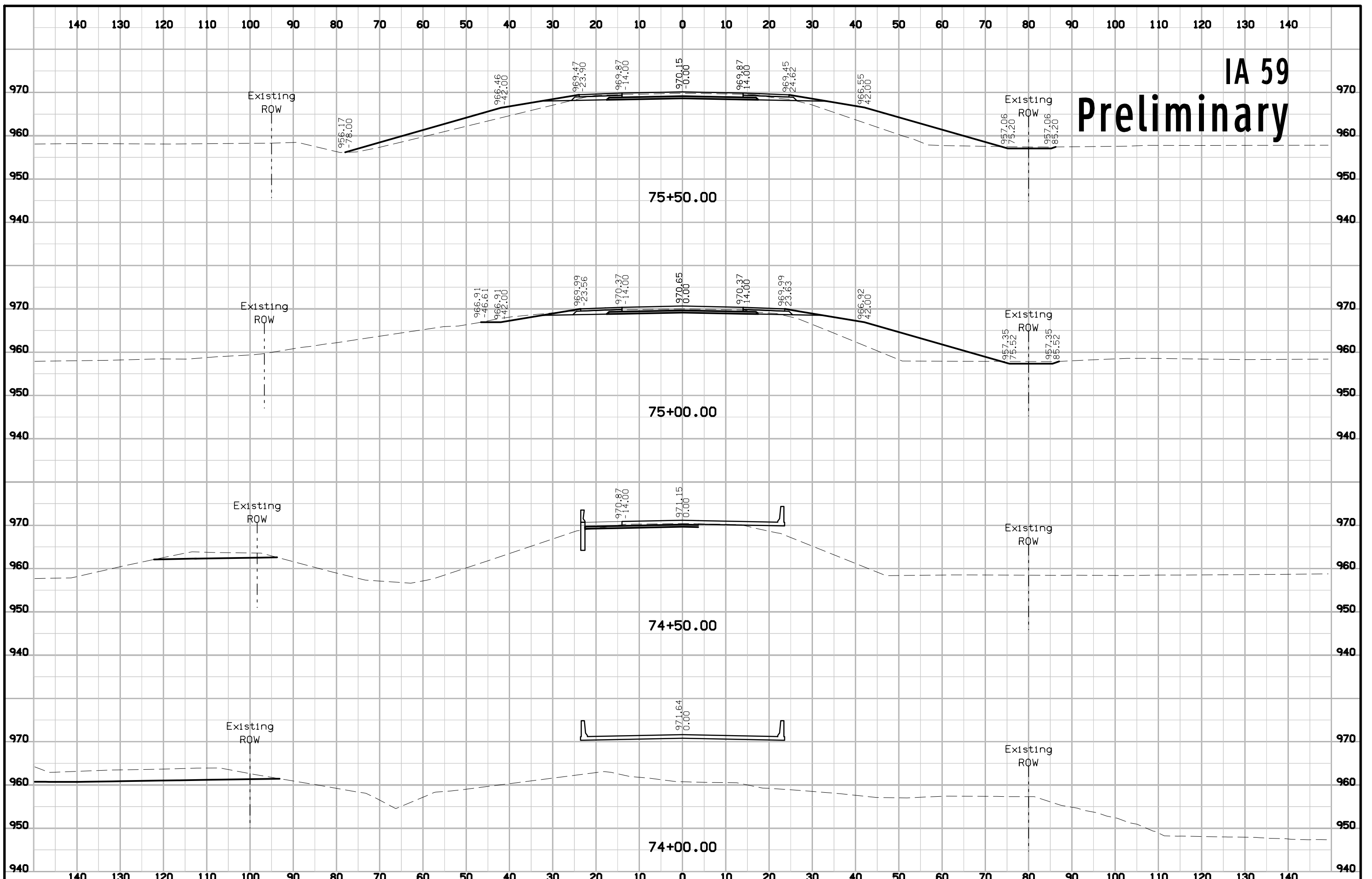


IA 59 Preliminary

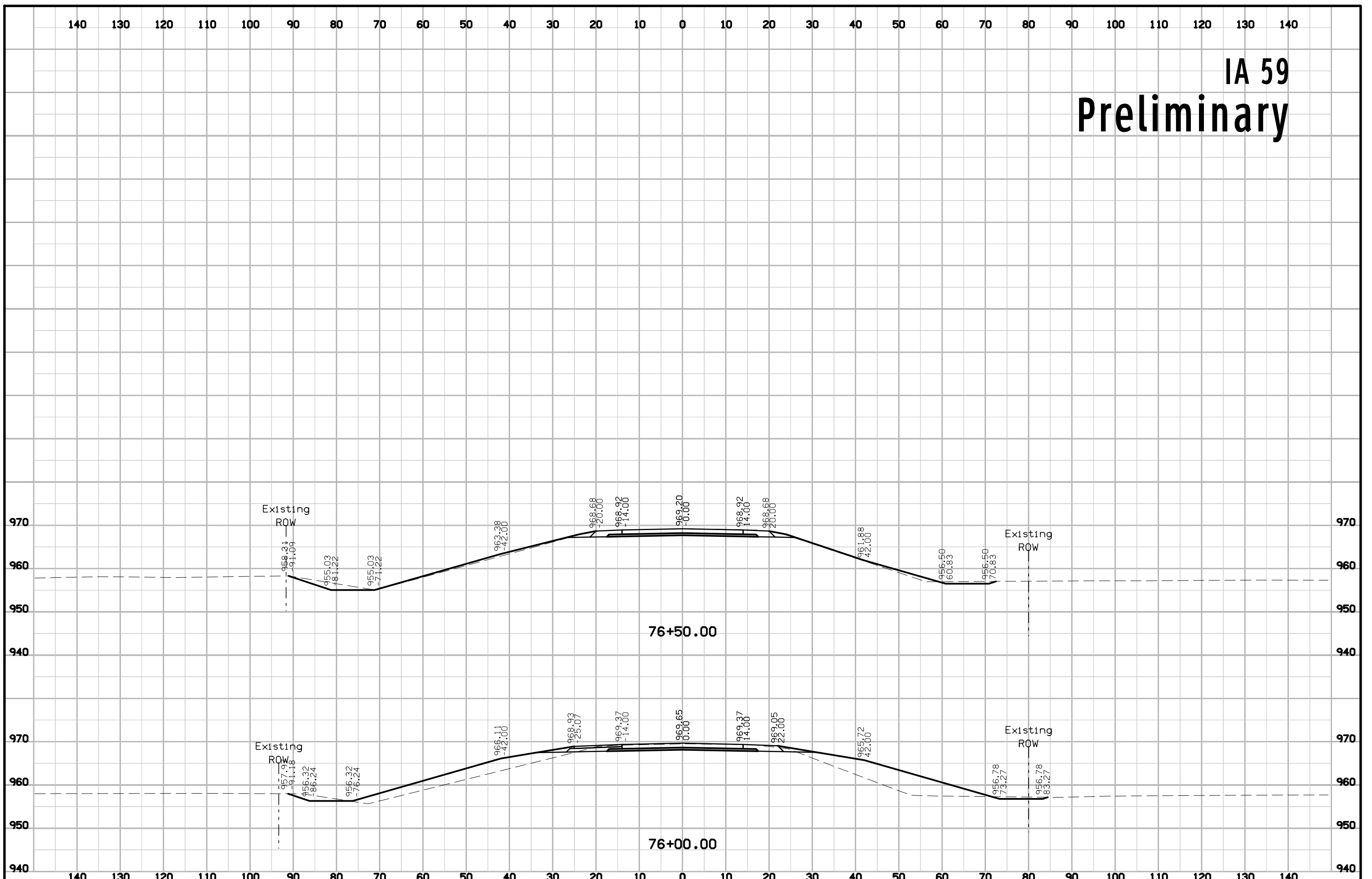


IA 59

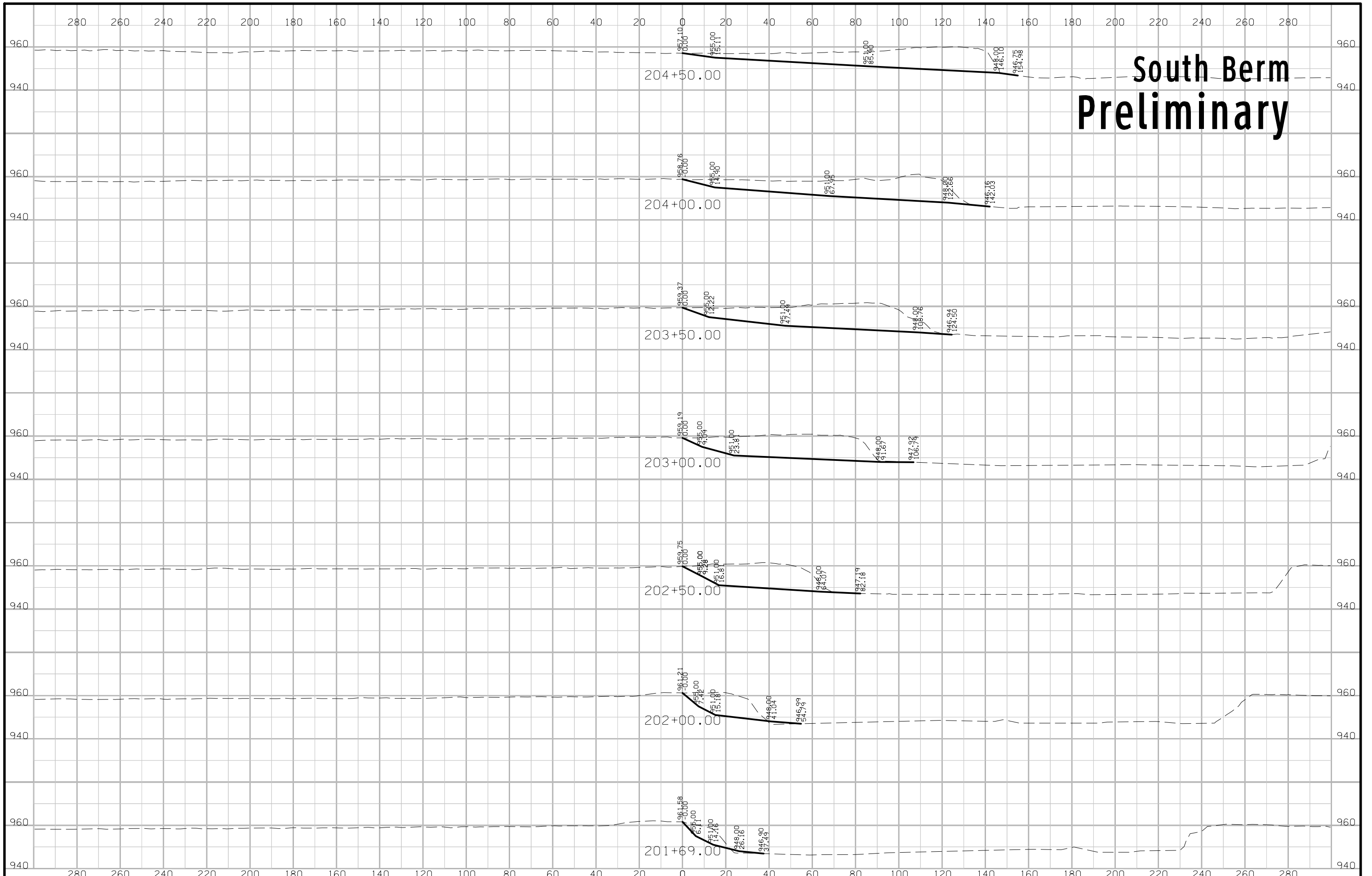
Preliminary



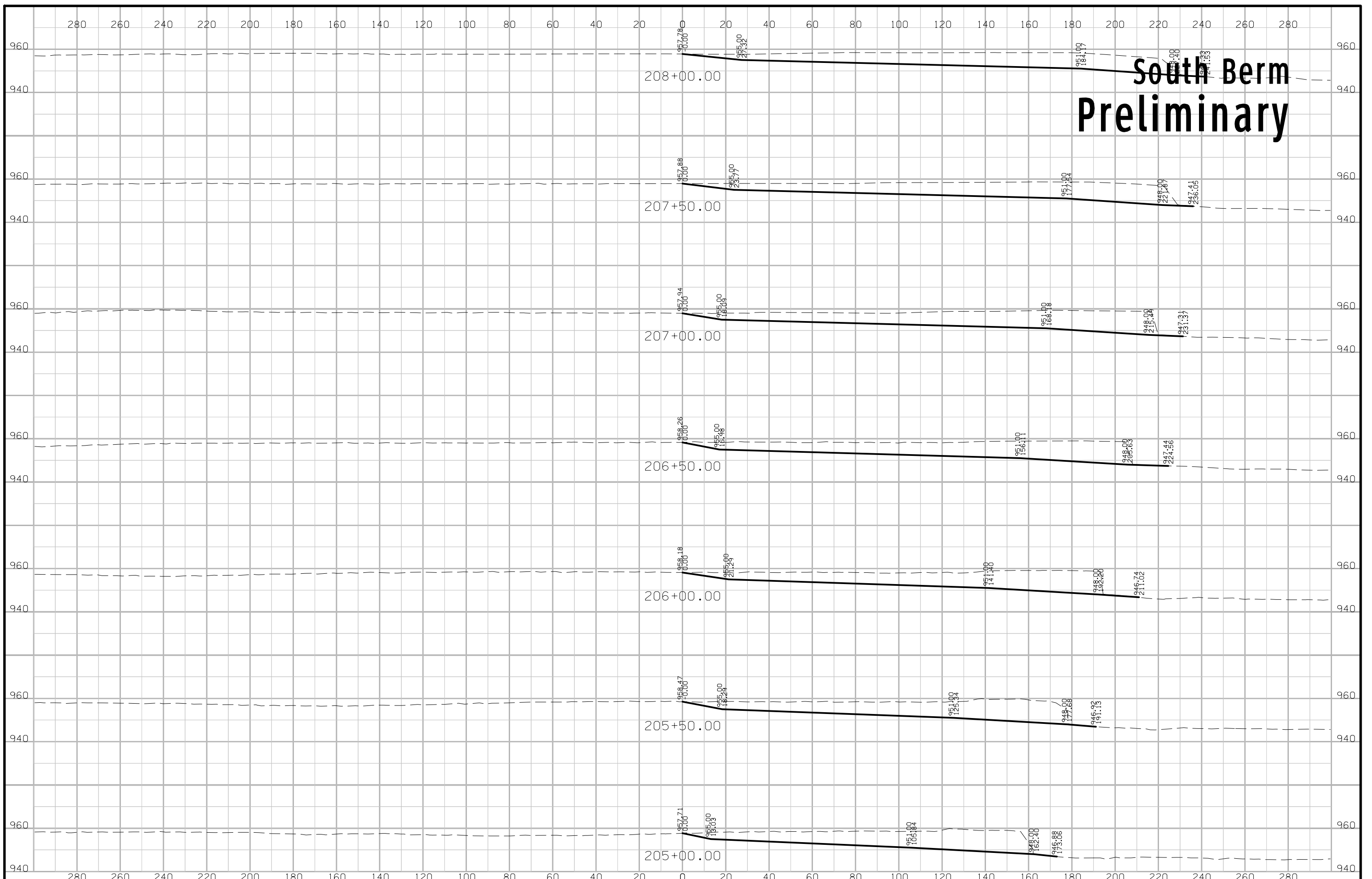
IA 59 Preliminary



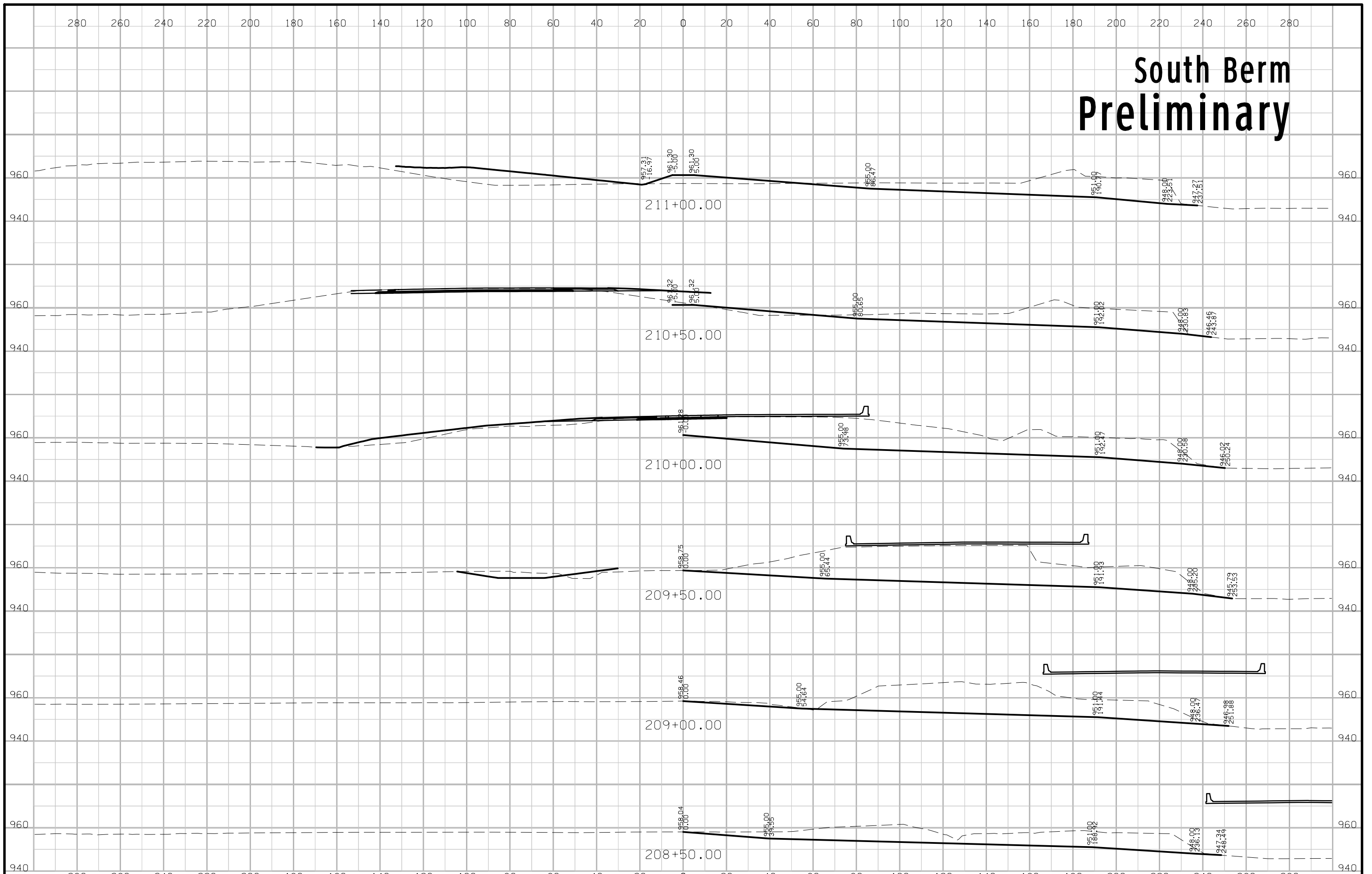
South Berm Preliminary



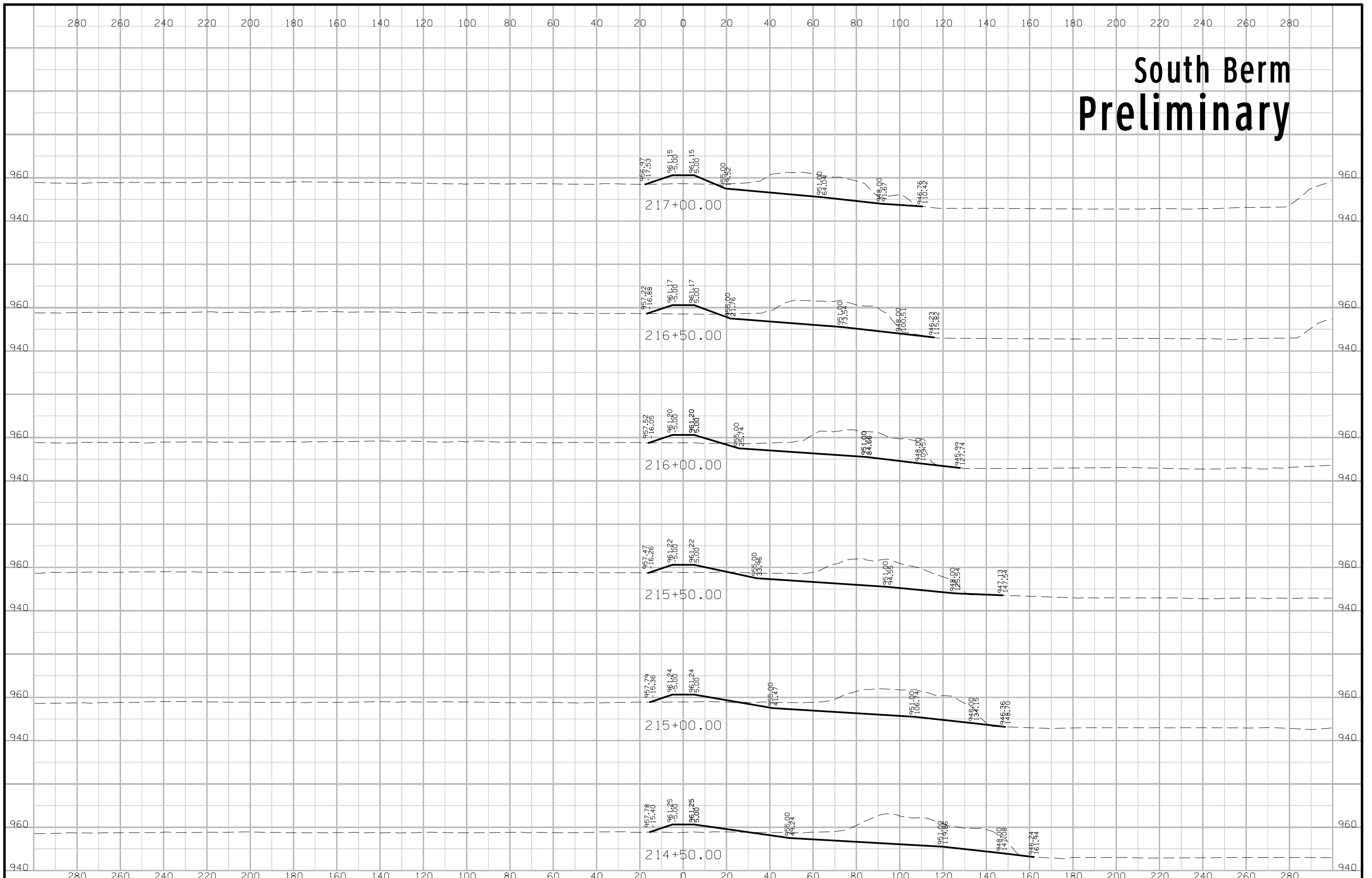
South Berm Preliminary



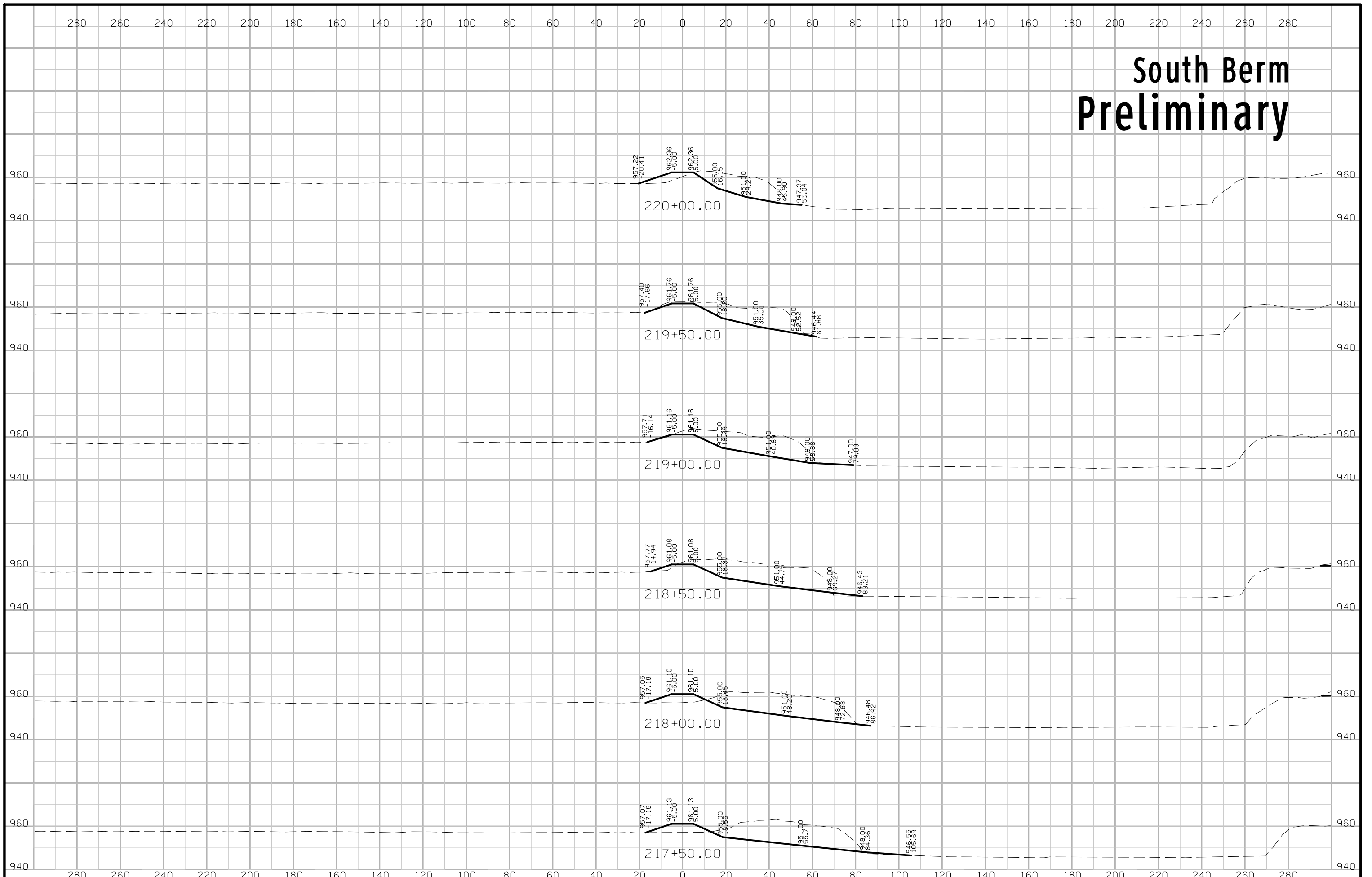
South Berm Preliminary



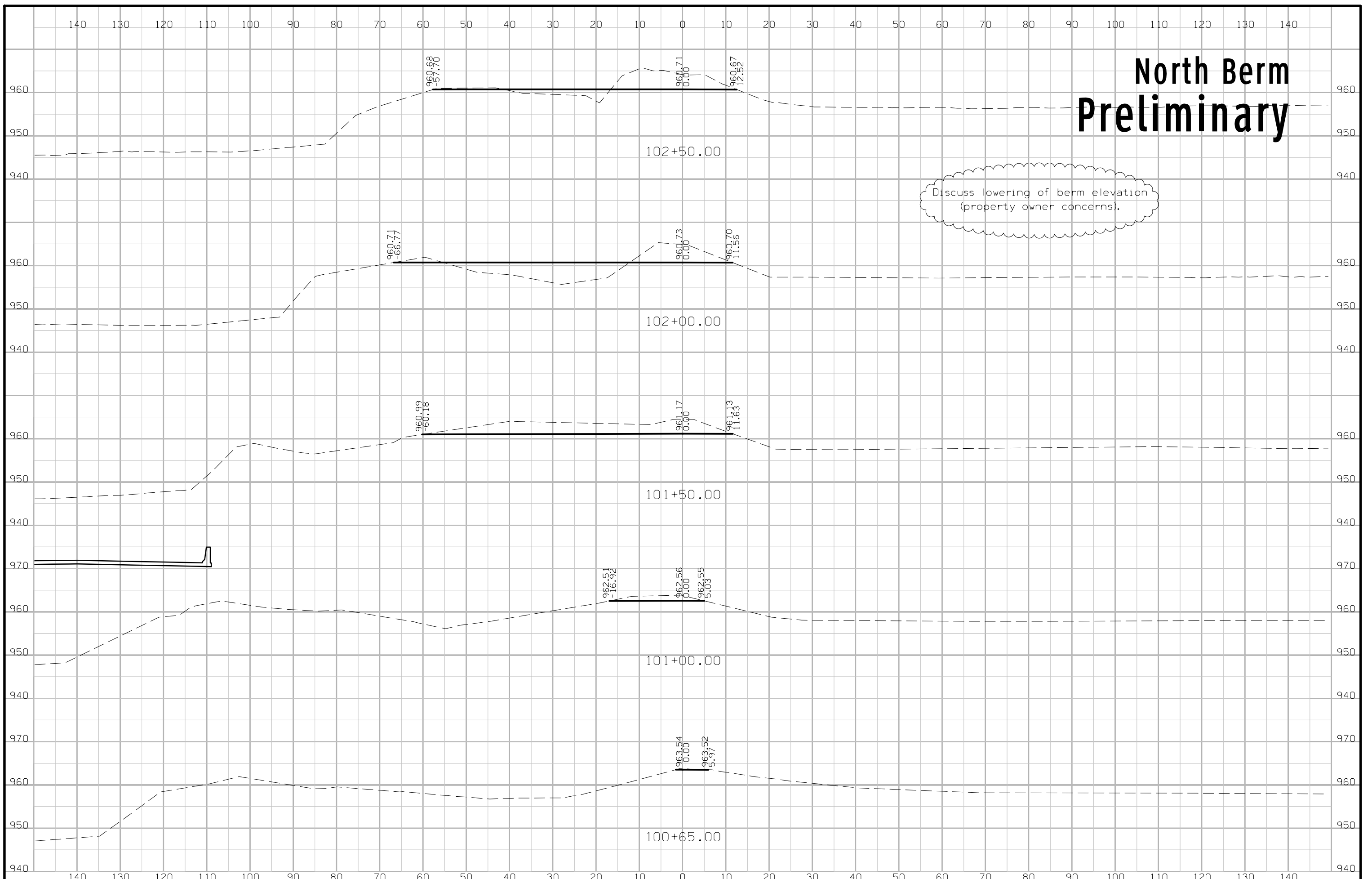
South Berm Preliminary



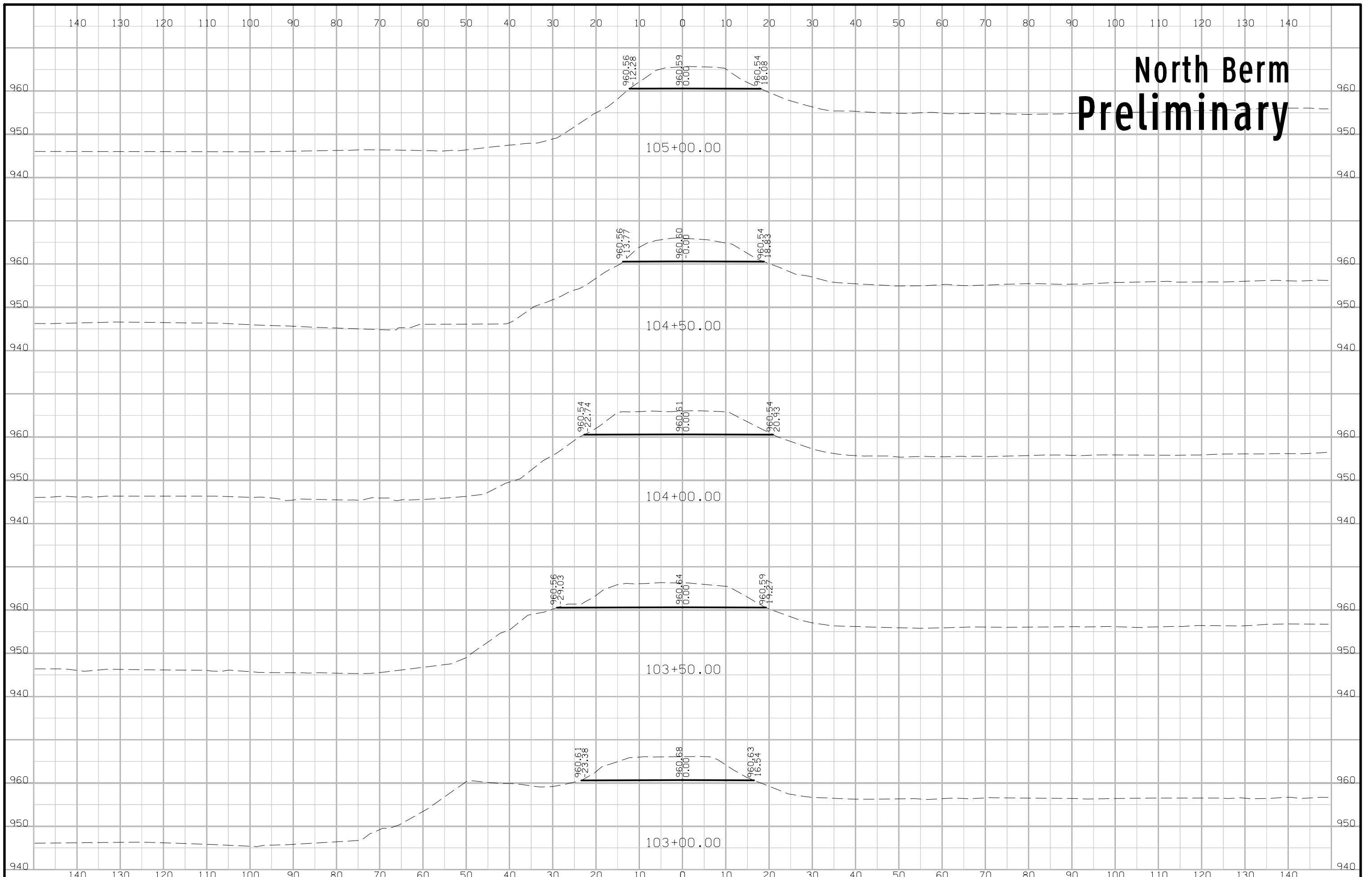
South Berm Preliminary



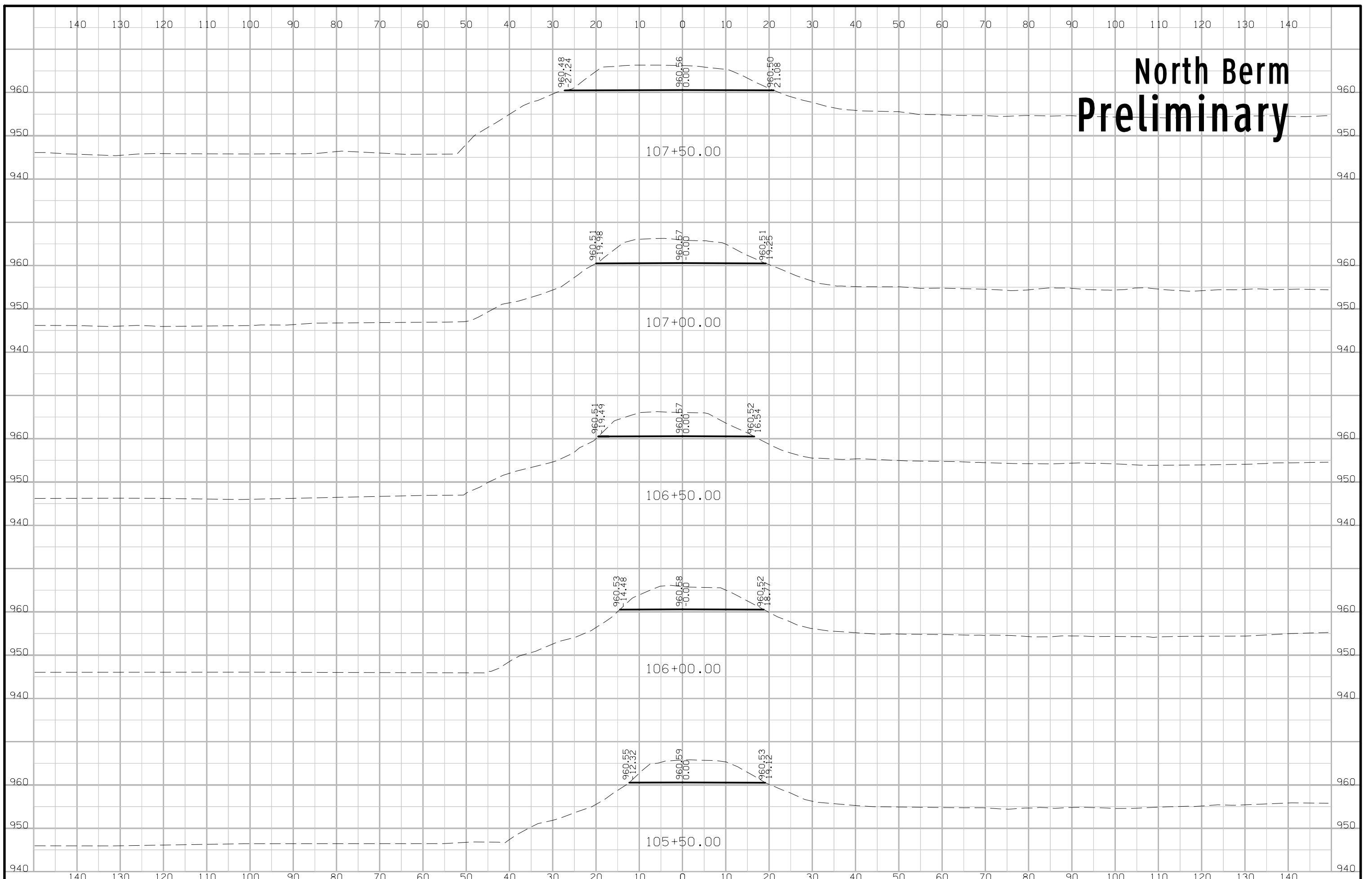
North Berm Preliminary



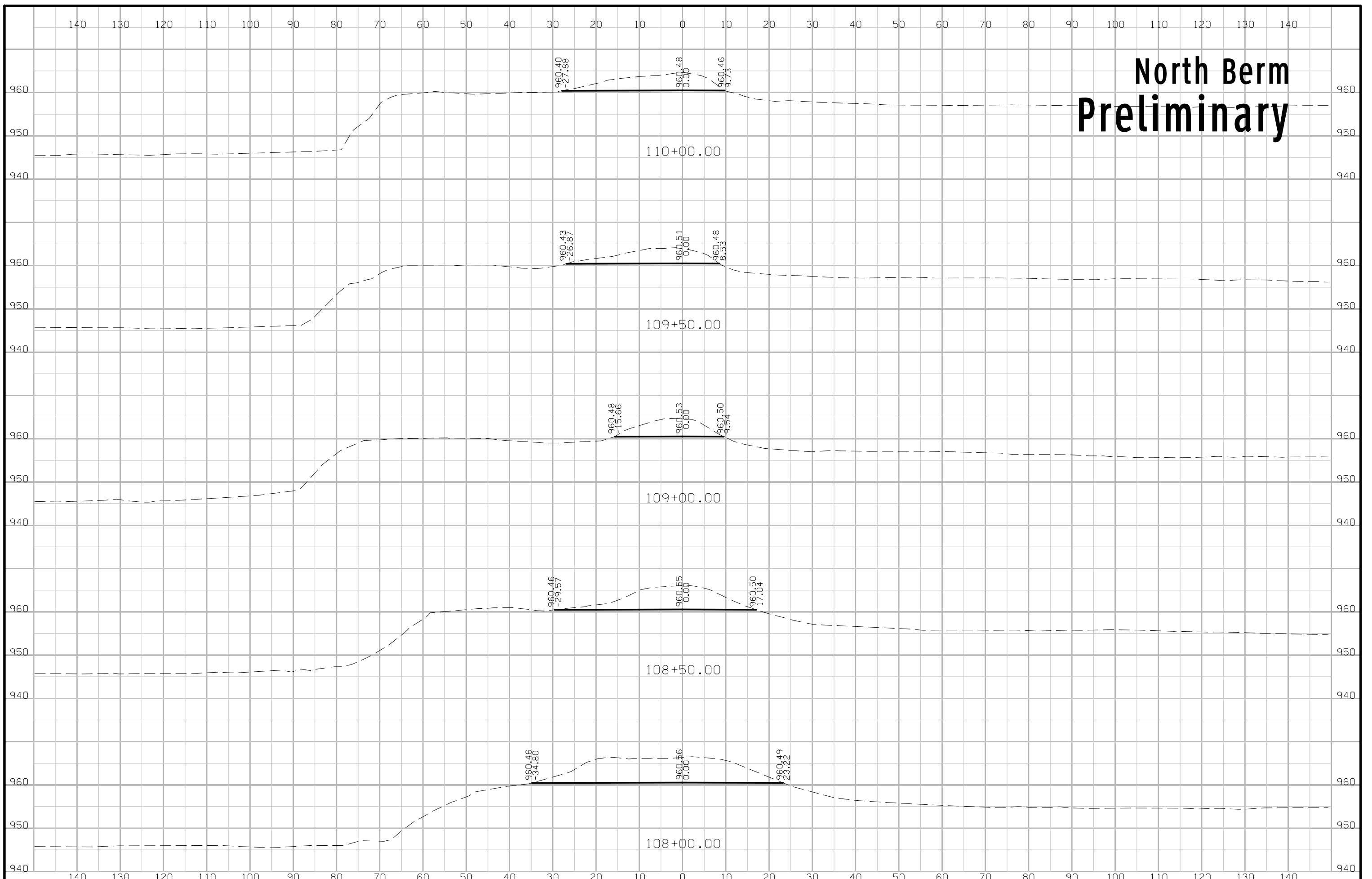
North Berm Preliminary



North Berm Preliminary



North Berm Preliminary



North Berm Preliminary

