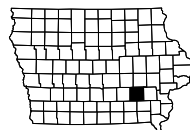


KEOKUK COUNTY

Bridge-Unspecified
BRF-078-1(26)--38-54

LETTING DATE
11/18/2025



INDEX OF SHEETS	
No.	DESCRIPTION
A Sheets	Title Sheets
A.1	Title Sheet
A.2	Location Map Sheet
B Sheets	Typical Cross Sections and Details
B.1	Typical Cross Sections and Details
D Sheets	Mainline Plan and Profile Sheets
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2 - 3	Iowa Highway 78
G Sheets	Survey Sheets
G.1 - 3	Reference Ties and Bench Marks
J Sheets	Traffic Control and Staging Sheets
J.1	Traffic Control Plan
V Sheets	Bridge and Culvert Situation Plans
V.1 - 3	Bridge and Culvert Situation Plan Sta. 613+08.00
W Sheets	Mainline Cross Sections
W.1	Cross Sections Legend & Symbol Information Sheet
W.2 - 11	Mainline Cross Sections
	* Color Plan Sheets



PLANS OF PROPOSED IMPROVEMENT ON THE
PRIMARY ROAD SYSTEM
KEOKUK COUNTY
 Bridge-Unspecified
 Stream 3.4 mi W of IA 1

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.14 of the Specifications.



REVISIONS

TOTAL

PROJECT IDENTIFICATION NUMBER

21-54-078-010

PROJECT NUMBER

BRF-078-1(26)--38-54

R.O.W. PROJECT NUMBER

INDEX OF SEALS

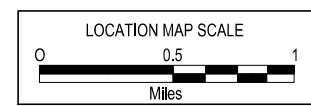
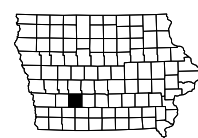
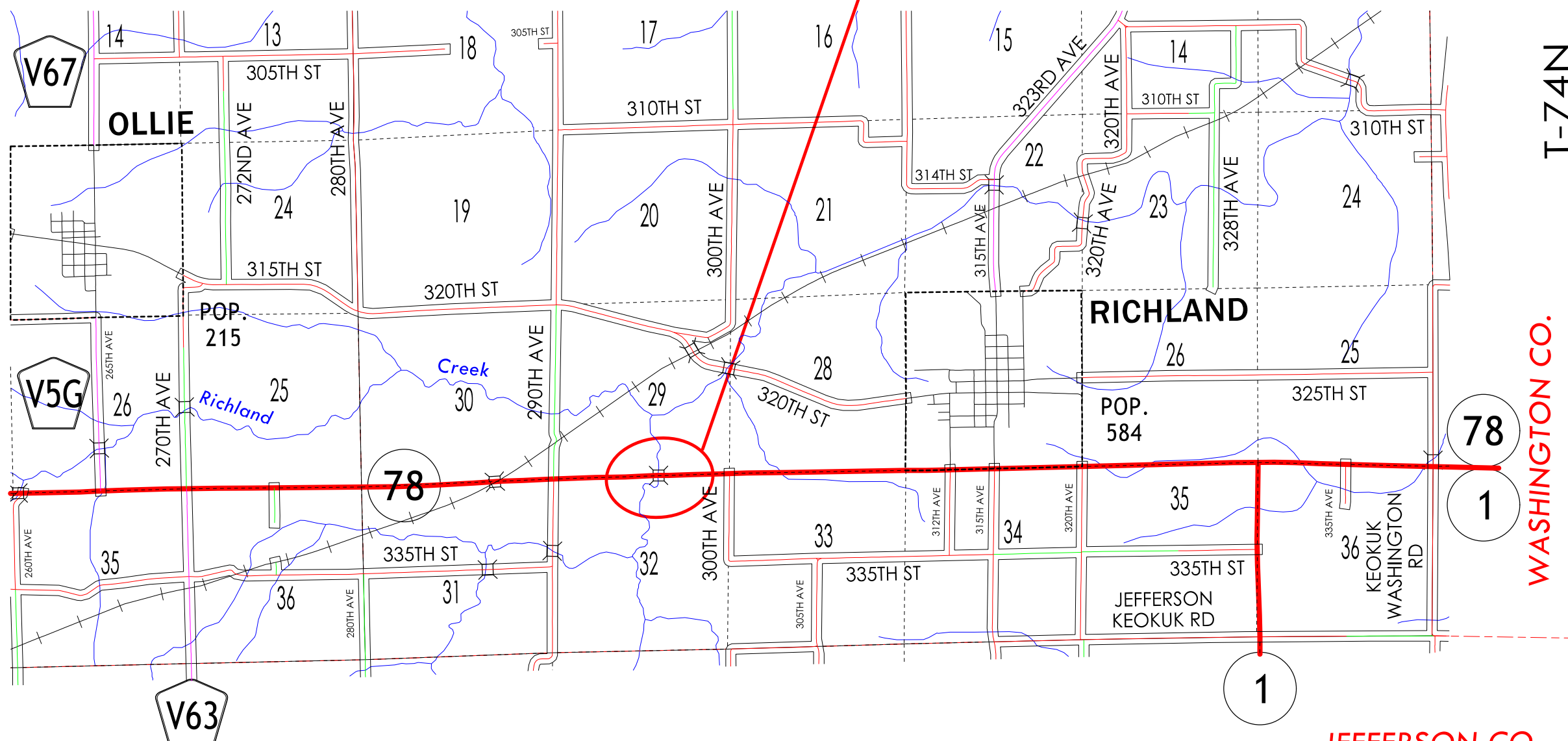
SHEET NO.	NAME	TYPE	BID QUANTITY SHEETS
A.1	Paul Flattery	Primary Signature Block	X

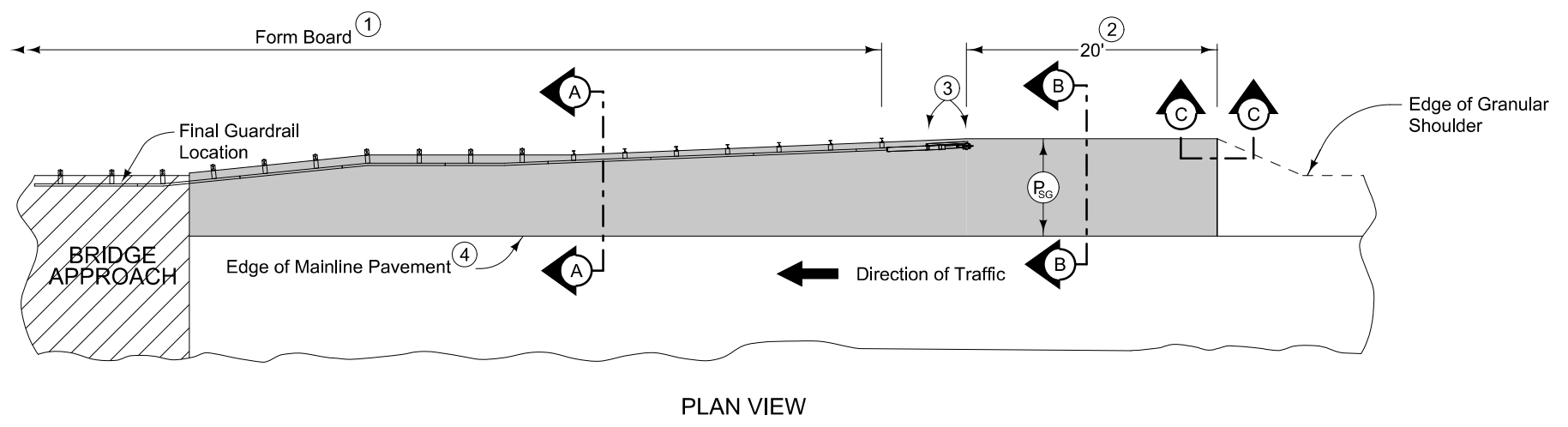
PRELIMINARY PLANS

Subject to change by final design.

D5 PLAN: 01/04/2024

EX FHWA# 32700
EX: MAINT. NO. 5409.7S078
PROP FHWA#: 32701
PROP MAINT. NO. :



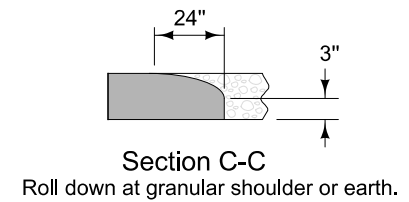
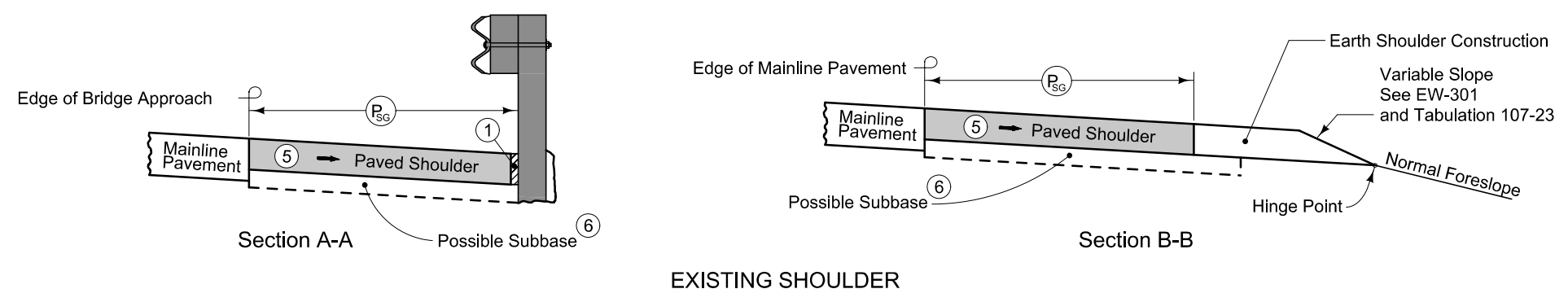
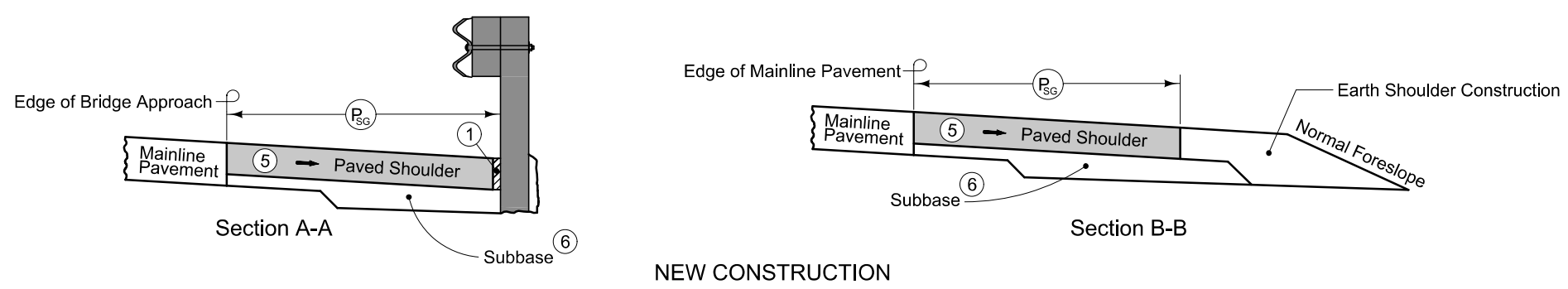


8" PCC Paved Shoulder at guardrail with the following jointing layout:

Match mainline pavement joint spacing. When mainline pavement is 8" or greater in thickness, place additional transverse 'C' joints in shoulder at mid-panel of the mainline pavement. Place longitudinal 'C' joint at P/2 from edge of mainline pavement when P is greater than 10' wide. Terminate longitudinal joint at transverse joint less than 10' in length.

Refer to Tabulation 112-9 for shoulder quantities.

- ① When guardrail posts are installed prior to construction of PCC paved shoulder, fasten form board to the face of guardrail posts for the length shown.
- ② Continue paved shoulder 20 feet beyond the center of the first post.
- ③ Shoulder may be notched for first 2 posts or post sleeves may be installed through pavement. Do not drive posts through pavement.
- ④ 'KT' joint (per PV-101) for PCC shoulder.
- ⑤ Design shoulder slope.
- ⑥ Refer to other details in the plan.



PAVED SHOULDER AT GUARDRAIL
(GRANULAR SHOULDER ADJACENT TO MAINLINE)

SURVEY SYMBOLS

- | | | | |
|--|-----------------------------------|--|------------------------------|
| | Interstate Highway Symbol | | Septic Tank |
| | U.S. Highway Symbol | | Cistern |
| | Iowa Highway Symbol | | L.P. Gas Tank (No Footing) |
| | County Road Highway Symbol | | Underground Storage Tank |
| | Evergreen Tree | | Latrine |
| | Deciduous Tree | | Satellite TV Dish |
| | Fruit Tree | | Water Hook Up |
| | Shrub (Bushes) | | Radio Tower |
| | Timber | | Tower Anchor |
| | Hedge | | Guardrail (Beam or Cable) |
| | Stump | | Guard Post (one or two) |
| | Swamp | | Guard Post (over two) |
| | Rock Outcrop | | Filler Pipe |
| | Broken Concrete | | Gas Valve |
| | Revetment (Rip Rap) | | Water Valve |
| | Cemetery | | Speed Limit Sign |
| | Grave | | Mile Marker Post |
| | Cave | | Sign |
| | Sink Hole | | Traffic Signal Control Box |
| | Board Fence | | Rail Road Signal Control Box |
| | Chain Link or Security Fence | | Telephone Switch Box |
| | Wire Fence | | Electric Box |
| | Terrace | | |
| | Earth Dam or Dike (Existing) | | |
| | Tile Outlet | | |
| | Edge of Water | | |
| | Existing Drainage | | |
| | Right of Way Rail or Lot Corner | | |
| | Concrete Monument | | |
| | Well | | |
| | Windmill | | |
| | Beehive Intake | | |
| | Existing Intake | | |
| | Existing Utility Access (Manhole) | | |
| | Fire Hydrant | | |
| | Water Hydrant (Rural) | | |

UTILITY LEGEND

Sub-Surface Utility Mapping Quality Level is in accordance with C/ASCE 38-02 Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data.

Remark Abbreviations

QLA Quality Level A Highest guideline quality level
QLD Quality Level D Lowest guideline quality level

- | | | |
|--|-----|--|
| | FO | FO1D, Farmers & Merchants Mutual Telephone - Quality D |
| | W | WL1D, Wapello Rural Water Association - Quality D |
| | FO2 | FO2D, Windstream Communications - Quality D |
| | T1 | TL1D, Windstream Communications - Quality D |

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.
Lavender	(9)	Temporary Pavement Shading
Yellow	(4)	Proposed Pavement Shading
Orange	(6)	Proposed Granular Shading
Orange	(70)	Proposed Shoulder Granular Shading
Yellow	(68)	Proposed Shoulder Paved Full Depth Shading
Yellow	(132)	Proposed Shoulder Paved Partial Depth Shading
Gray, Dark	(112)	Proposed Grade and Pave Shading "In conjunction with a paving project"
Brown, Light	(236)	Grading Shading
Orange, Light	(134)	Proposed Granular Entrance Shading
Yellow	(220)	Proposed Paved Entrance Shading
Tan	(8)	Proposed Sidewalk Shading
Blue, Light	(230)	Proposed Sidewalk Landing Shading
Pink	(11)	Proposed Sidewalk Ramp Shading
Green, Light	(225)	Existing Pavement Shading
Red	(3)	Proposed Structure Shading
Red	(3)	Delineates Restricted Areas

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK		Design Color No.
Green	(10)	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 | | Survey Line |
| | Station | | Section Corner |
| | Ground Line Intercept | | Saw Cut |
| | Guardrail | | Trench Drain |
| | HighTension Cable Guardrail | | Sheet Pile |
| | Pavement Removal | | Clearing & Grubbing Area |

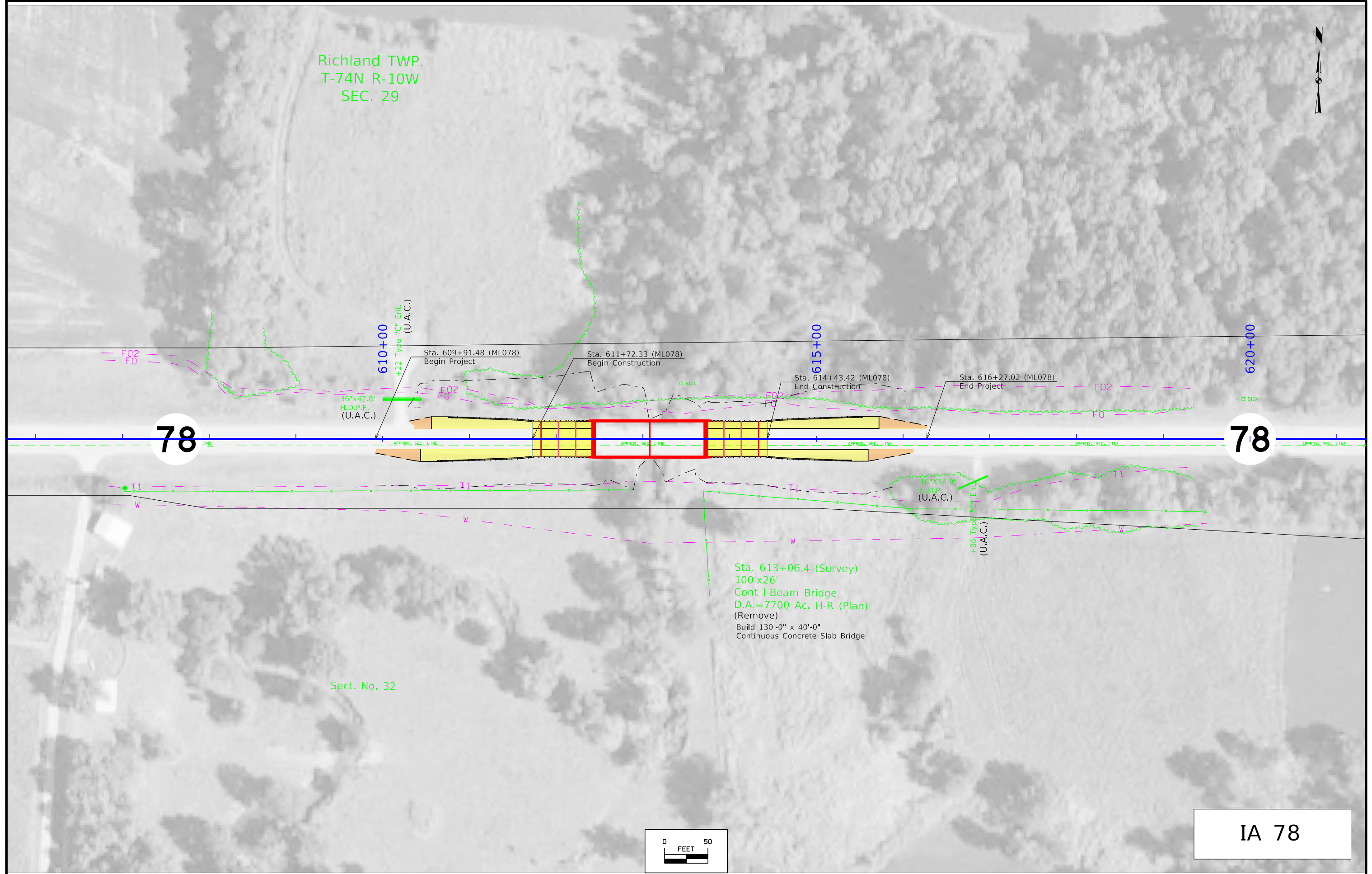
RIGHT-OF-WAY LEGEND

- | | |
|--|------------------------------------|
| | 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)

Richland TWP.
T-74N R-10W
SEC. 29

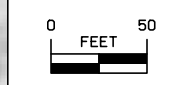


78

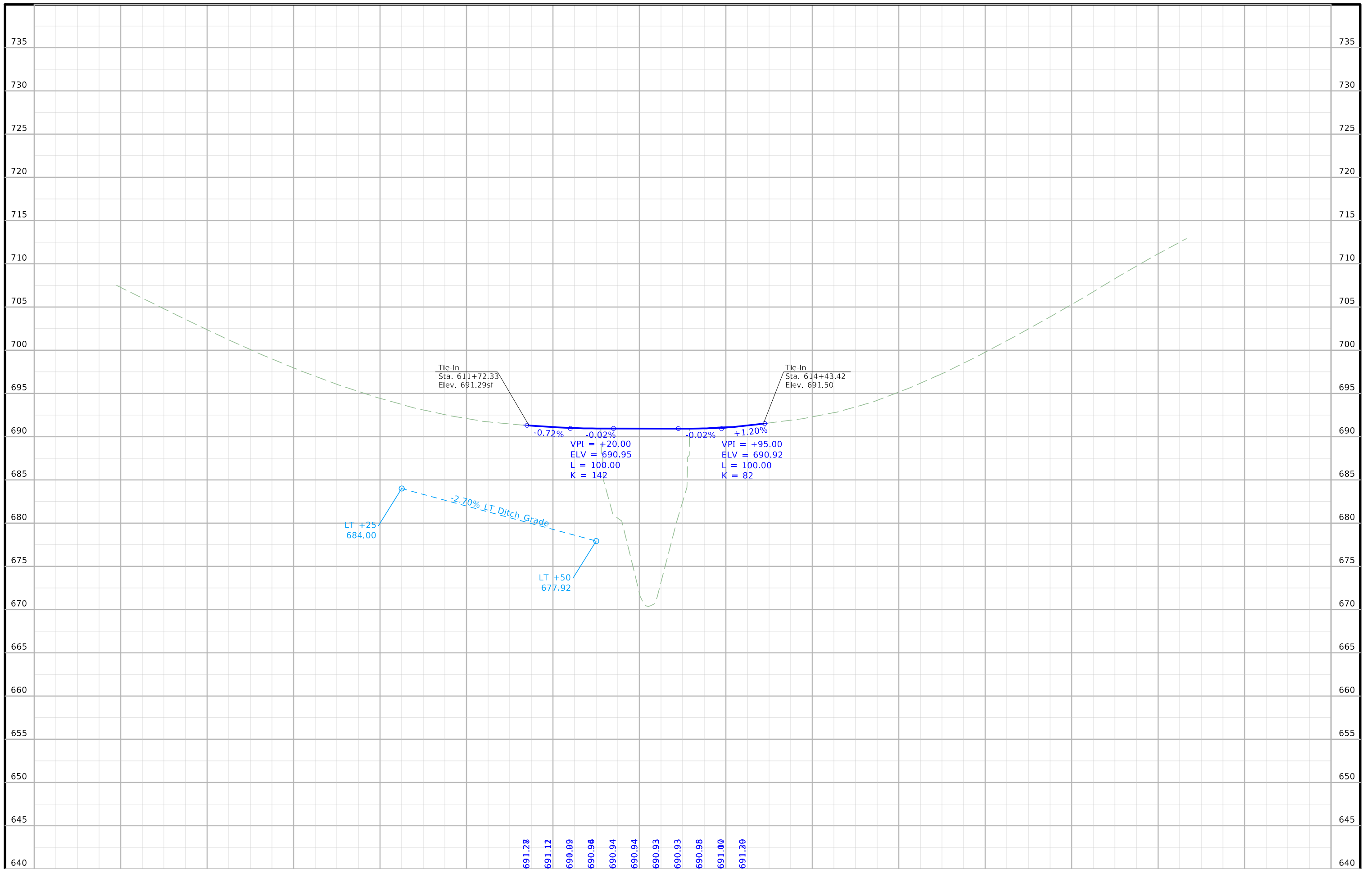
78

Sta. 613+06.4 (Survey)
100'x26'
Cont I-Beam Bridge
D.A.=7700 Ac. H-R (Plan)
(Remove)
Build 130'-0" x 40'-0"
Continuous Concrete Slab Bridge

Sect. No. 32



IA 78



FILE NO.	ENGLISH	DESIGN TEAM	Flattery\Bell\Carlson	KEOKUK COUNTY	PROJECT NUMBER	BRF-078-1(26)--38-54	SHEET NUMBER	D.3
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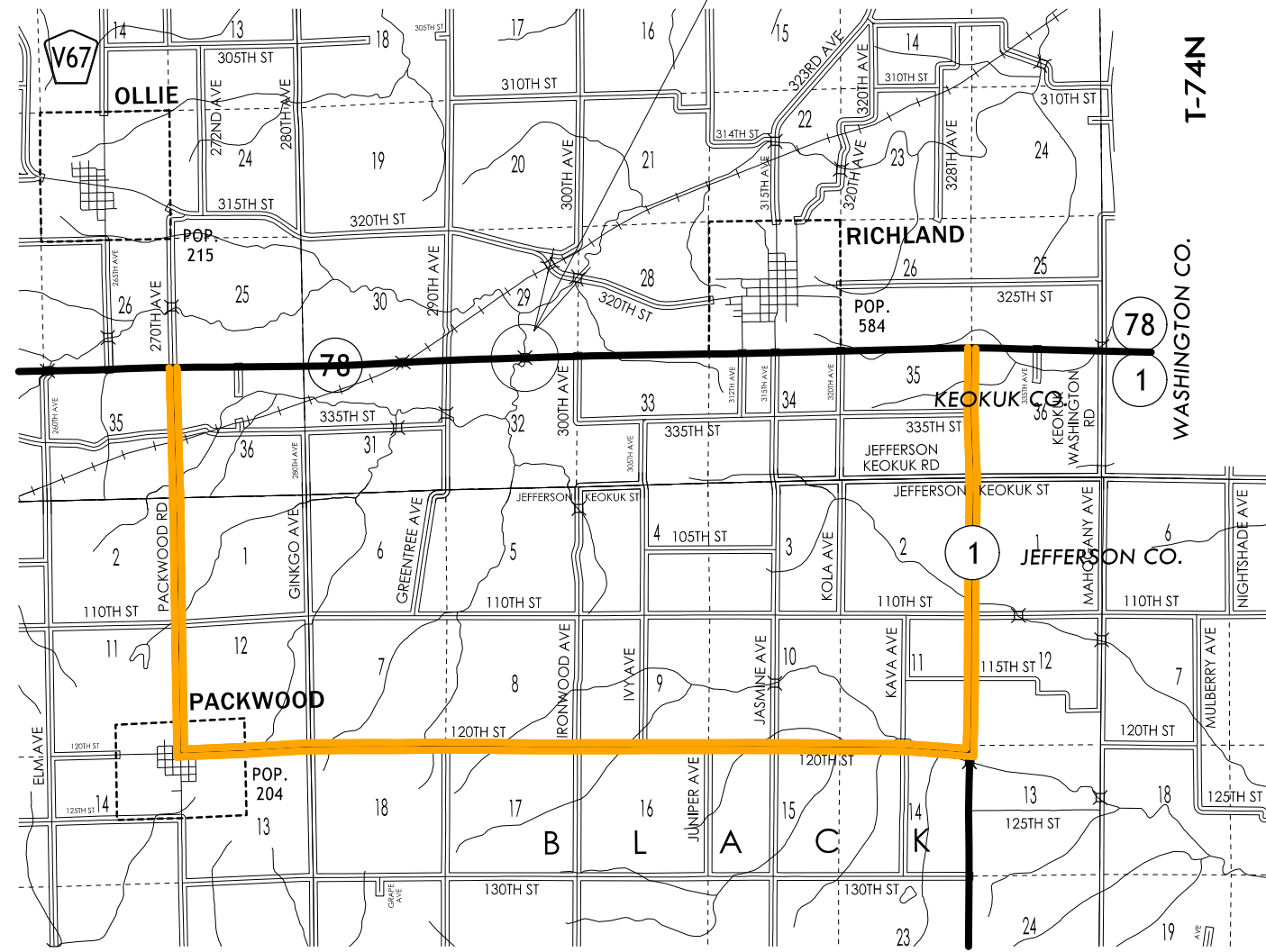
108-23A 08-01-08	<h3>TRAFFIC CONTROL PLAN</h3>
Traffic on IA 78 shall be maintained at all times via offsite detour Detour to be placed and maintained by ?	

111-01 04-17-12	<h3>COORDINATED OPERATIONS</h3>
Other work in progress during the same period of time will include the construction of the projects listed. Coordinate operations with those of other contractors working within the same area.	
Project	Type of Work
None Provided	

108-25 10-21-14	<h3>511 TRAVEL RESTRICTIONS</h3>
---------------------------	----------------------------------

Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
			None Anticipated									

PROJECT LOCATION



R-10W

LEGEND	
DETOUR ROUTE	

Control Point 300: 6738084.04N, 23470804.57E, CP 5/8" x 42" rebar from the intersection of Hwy. 78 and 300th Ave. proceed S 85', point is E 47' from the CL of 300th Ave. 4" below surface, Elev. = 747.70.

Hydraulic Data

RIDB: RicklandC_Wash_Trib11_0.51
 Drainage Area = 11.7 Sq. Mi.
 Stream Slope (HGL) = 7.39 Ft./Mi.
 Avg. Low Water Stage = 671.55

Q₅₀ = 3,780 cfs
 Stage = 683.39
 Channel Low Beam = 688.73
 Avg. Bridge Velocity = 4.55 fps

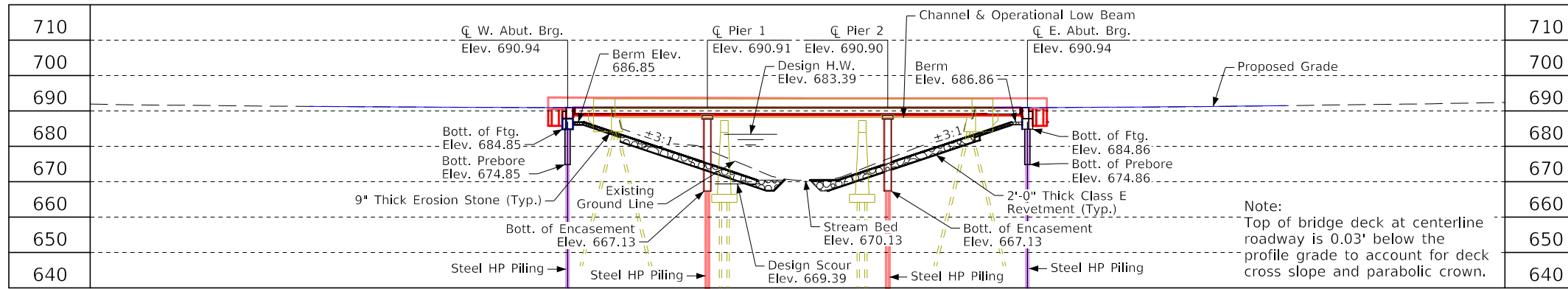
Q₁₀₀ = 4,600 cfs
 Stage = 683.86
 Backwater = 0.17 Ft.
 Avg. Bridge Velocity = 5.19 fps

Q₂₀₀ = 5,440 cfs
 Stage = 684.28
 Calculated Design Scour = 669.39

Q₅₀₀ = 6,580 cfs
 Stage = 684.79
 Avg. Bridge Velocity = 6.57 fps
 Calculated Check Scour = 669.20

Roadway Overtop 690.90
 Sta. 613+46.30

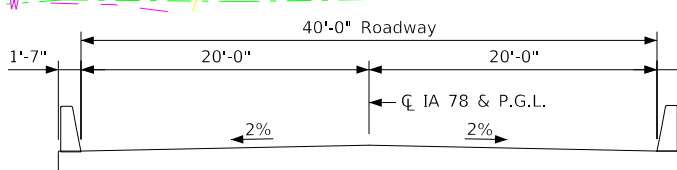
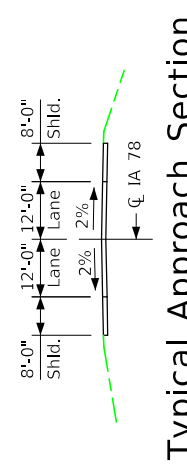
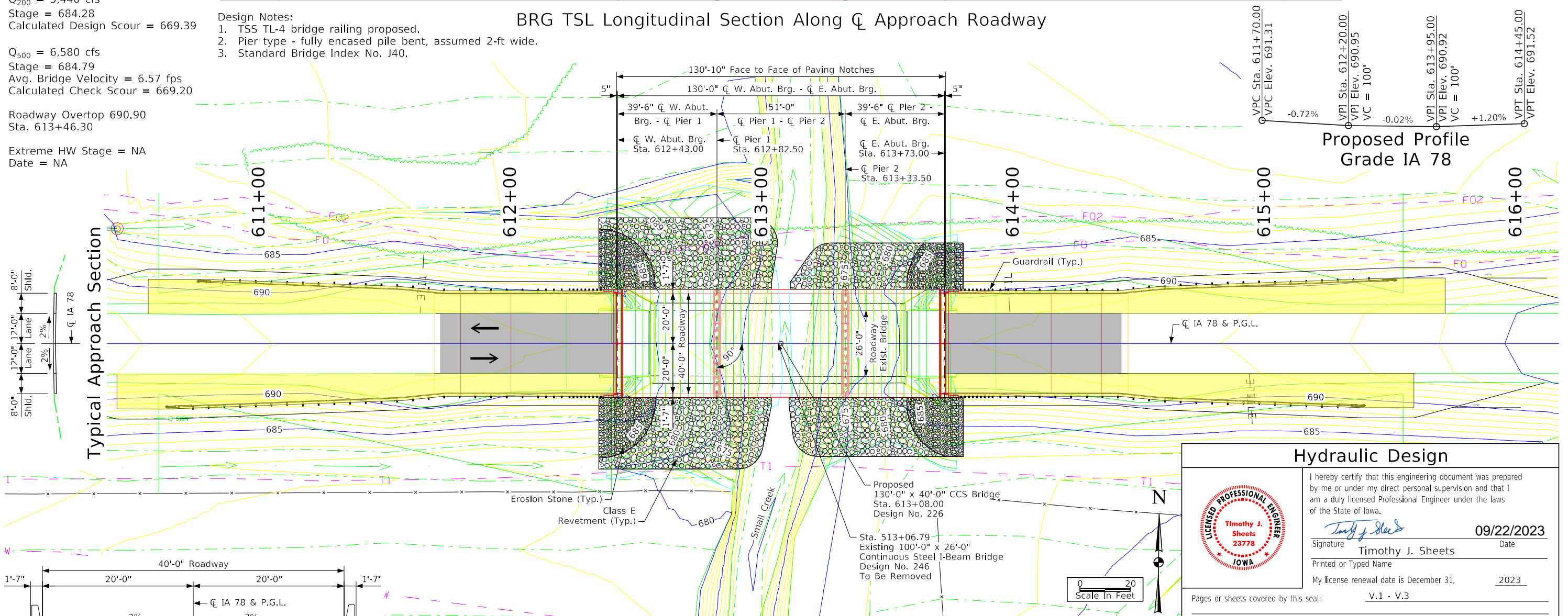
Extreme HW Stage = NA
 Date = NA



Design Notes:

1. TSS TL-4 bridge railing proposed.
2. Pier type - fully encased pile bent, assumed 2-ft wide.
3. Standard Bridge Index No. J40.

BRG TSL Longitudinal Section Along Centerline Approach Roadway



General Utility Symbols:

- T1 - Windstream Communications
- W - Wapello Rural Water
- FO - Farmers & Merchants Mutual Telephone
- F02 - Windstream Communications

Utilities Note:

Utilities shown on this sheet are for information only. See Road Design sheets for utility information.

Note:
 This design is for the replacement of the existing 100' x 26' continuous I-Beam bridge, Keokuk Design No. 246, FHWA No. 32700, Maint. No. 5409.7S078.

Traffic Estimate

2026 AADT	1600 V.P.D.
2046 AADT	1700 V.P.D.
20?? DHV	?? V.P.H.
TRUCKS	16 %
Total Design ESALS	???

Location

IA 78 Over Small Creek
 T-74N R-10W
 Sections 29 & 32
 Richland Township
 Keokuk County
 FHWA No. 32701
 Bridge Maint. No. 5409.7S078
 Latitude 41.178076°
 Longitude -92.030900°

Hydraulic Design



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signature: *Timothy J. Sheets* Date: 09/22/2023

Printed or Typed Name: Timothy J. Sheets

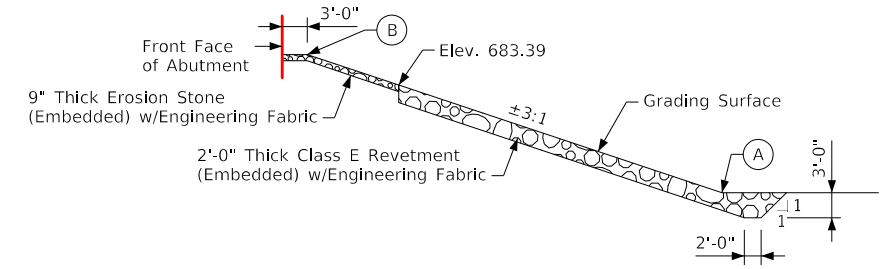
My license renewal date is December 31, 2023

Pages or sheets covered by this seal: V.1 - V.3

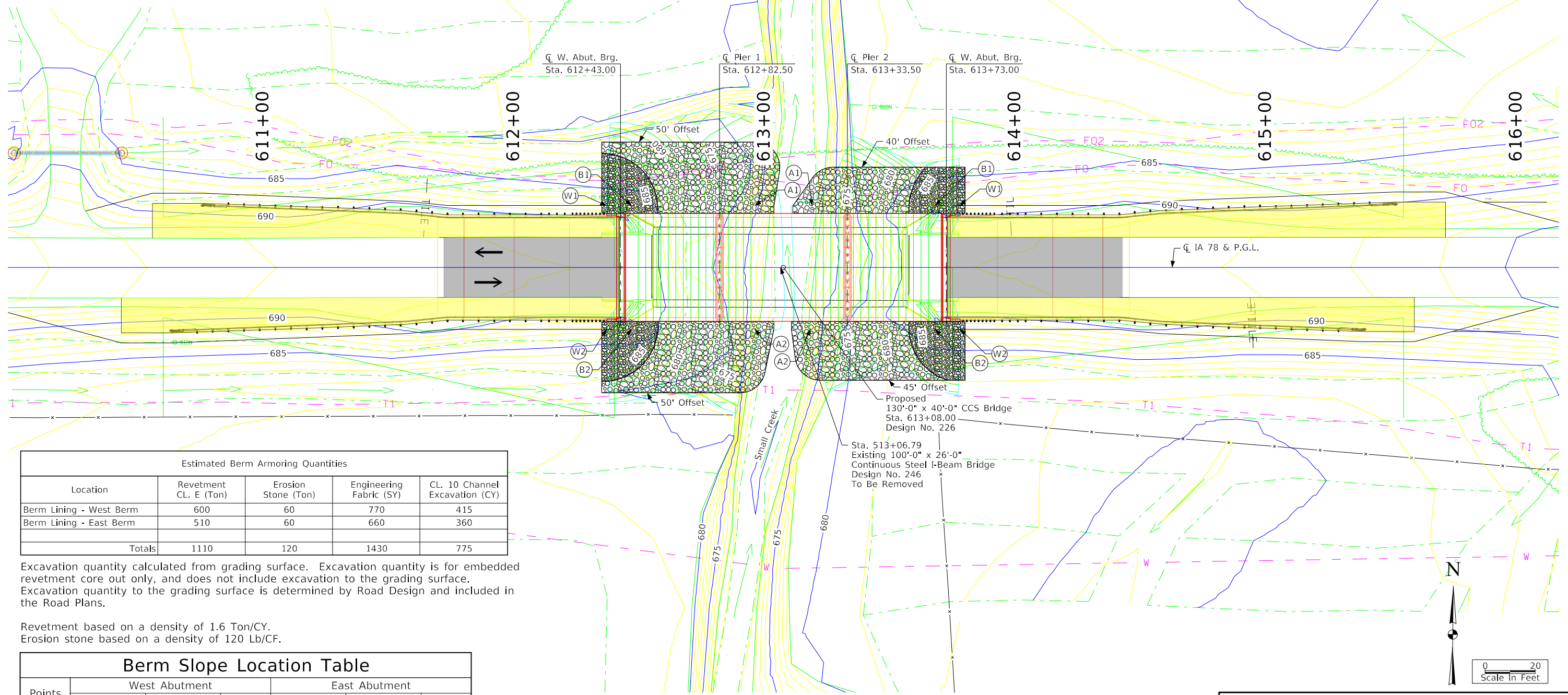
Situation Plan

Design For 0 Degree
130'-0" x 40'-0" Continuous Concrete Slab Bridge
 39'-6" End Spans 51'-0" Interior Span
Situation Plan
 STA. 613+08.00 (IA 78) Turn-in Date: Sep 2023
Keokuk County
 IOWA DEPARTMENT OF TRANSPORTATION
 Design No. 226 Design Sheet No. 1 of 3 FHWA No. 32701

Control Point 300: 6738084.04N, 23470804.57E, CP 5/8" x 42" rebar from the intersection of Hwy. 78 and 300th Ave. proceed S 85', point is E 47' from the CL of 300th Ave. 4" below surface, Elev. = 747.70.



Section Thru Embedded Revetment Berm



Site Plan

Estimated Berm Armoring Quantities				
Location	Revetment CL. E (Ton)	Erosion Stone (Ton)	Engineering Fabric (SY)	CL. 10 Channel Excavation (CY)
Berm Lining - West Berm	600	60	770	415
Berm Lining - East Berm	510	60	660	360
Totals	1110	120	1430	775

Excavation quantity calculated from grading surface. Excavation quantity is for embedded revetment core out only, and does not include excavation to the grading surface. Excavation quantity to the grading surface is determined by Road Design and included in the Road Plans.

Revetment based on a density of 1.6 Ton/CY.
Erosion stone based on a density of 120 Lb/CF.

Berm Slope Location Table						
Points	West Abutment			East Abutment		
	Station	Offset	Elev.	Station	Offset	Elev.
A1	612+96.54	24.58' Lt.	670.13	613+19.43	24.58' Lt.	670.13
A2	612+96.54	24.58' Rt.	670.13	613+18.84	24.58' Rt.	670.13
B1	612+47.50	24.58' Lt.	686.85	613+68.50	24.58' Lt.	686.86
B2	612+47.50	24.58' Rt.	686.85	613+68.50	24.58' Rt.	686.86
W1	612+37.50	24.58' Lt.	690.46	613+78.50	24.58' Lt.	690.47
W2	612+37.50	24.58' Rt.	690.46	613+78.50	24.58' Rt.	690.47

Berm slope elevations reflect the grading surface.
All points are 3'-0" from the edge of the deck.

Design For 0 Degree
130'-0" x 40'-0" Continuous Concrete Slab Bridge
 39'-6" End Spans 51'-0" Interior Span
Situation Plan - Site
 STA. 613+08.00 (IA 78) Turn-in Date: Sep 2023
Keokuk County
 IOWA DEPARTMENT OF TRANSPORTATION
 Design No. 226 Design Sheet No. 2 of 3 FHWA No. 32701

PRELIMINARY BRIDGE TSL DEVELOPMENT REPORT
 IA 78 over Small Creek
 Project No. BRF-078-1(026)--38-54
 PIN: 21-54-078-010
 File No. 32298
 Keokuk County - Design No. 226
 130'-0" x 40'-0" Continuous Concrete Slab (CCS) Bridge
 Location: 3.4 mi. W of IA 1
 Station 613+08.00 (CL IA 78)
 Maintenance No. 5409.75078
 FHWA No. 32701
 Work Description: Bridge New - CCS
 Prepared for: Iowa DOT
 Prepared by: Foth IE

September 22, 2023

TSL DEVELOPMENT DETAILS

1. BDM 3.2.2.4 - Freeboard
 - a. Q_{50} design elevation is 683.39 on the downstream edge of the proposed bridge.
 - b. Channel low beam at Sta. 613+46.30 and is 688.73
 Freeboard for the proposed bridge is 5.34', which is greater than the DNR requirement of 3'. Calculation is below:
 Profile grade at Sta. 613+46.30: 690.93
 Profile grade to edge of deck: -0.40'
 Deck Edge thickness: -1'-9 5/8" = -1.80'
 Low Beam Elevation = 688.73
 Freeboard = 688.73 - 683.39 = 5.34'
2. BDM 3.2.2.7 - Scour
 - a. Design scour does not extend below the proposed bottom of encased piers.
3. BDM 3.6.1.1 - Superstructures - CCS J-Series
 - a. A 130' x 40' CCS Bridge with a 1'-9 1/4" deck thickness is proposed.
4. BDM 3.6.2.1 - Width - Highway
 - a. The width of the bridge was set by adding together the proposed lane widths and effective shoulder widths. IA 78 is not on the NHS and has an estimated traffic count below 3000 VPD, therefore, 8' effective shoulders are allowed.
5. BDM 3.6.2.2 - Sidewalk, Shared Use Path, and Bicycle Lane
 - a. No pedestrian or bicycle facilities are included in the proposed bridge.
6. BDM 3.6.6 - Deck Drainage
 - a. The proposed bridge is located on a sag vertical curve. Deck drains will be required at the profile low points.
7. BDM 3.6.8 - Barrier Rails
 - a. TL-4 barrier rails conform with the BDM requirements for a mainline non-interstate bridge.
 - b. Barrier rails for this project will be the TSS TL-4 rails.
8. BDM 3.7.1 - Substructures - Skew
 - a. The bridge abutments and piers will be placed at a 0 degree skew to match the channel flow direction.
9. BDM 3.7.2 - Abutments
 - a. Integral abutments with 10' prebored HP piling are proposed.
10. BDM 3.7.3.5 - Slope Protection
 - a. Embedded Class E revetment is proposed to an elevation equal to the Design Q_{50} water surface elevation.
 - b. Embedded erosion stone is proposed above the Class E revetment to the face of the abutment.
11. BDM 3.7.4 - Piers and Pier Footings
 - a. Encased piling are proposed for the piers.
12. BDM 3.7.6 - Foundation Conflicts
 - a. The bridge abutments and piers will be placed behind the existing abutments and piers. There are no known foundation conflicts.

Design For 0 Degree
**130'-0" x 40'-0" Continuous
 Concrete Slab Bridge**
 39'-6" End Spans 51'-0" Interior Span
TSL Development Report
 STA. 613+08.00 (IA 78) Turn-in Date: Sep 2023
Keokuk County
 IOWA DEPARTMENT OF TRANSPORTATION
 Design No. 226 Design Sheet No. 3 of 3 FHWA No. 32701

CROSS SECTION VIEW COLOR LEGEND

Design Color No.	Feature	Design Color No.	Feature
Aggregate			
(64)	Choke Stone	(112)	Noise Wall
(42)	Engineering Fabric	(112)	Noise Wall Footing
(8)	Flooded Backfill	(112)	Retaining Wall Back
(92)	Macadam Stone	(112)	Retaining Wall Back Excavate
(20)	Modified	(112)	Retaining Wall Face
(12)	Plowing Shaping	(112)	Retaining Wall Front Excavate
(14)	Porous Backfill	(112)	Retaining Wall Front Footing
(8)	Revetment Class A	(112)	Retaining Wall MSE Gutter
(6)	Revetment Class B	(112)	Retaining Wall Reinforced Earth
(62)	Revetment Class C	Grading	
(188)	Revetment Class D	(8)	Behind Curb Cut
(28)	Revetment Class E	(6)	Granular
(12)	Shoulder Special Backfill	(13)	Granular Back Fill
(12)	Special Backfill	(48)	Rock Undercut
(20)	Subbase	(8)	Shoulder Earth Fill
(20)	Subbase Lower	(2)	Side Slopes
(20)	Subbase Upper	(226)	Side Slopes Dressing
(118)	Subgrade Treatment	Substrata	
Asphalt			
(207)	HMA Base Course	(128)	Boulder Substrata
(207)	HMA Interim Course	(48)	Broken Weathered Substrata
(207)	HMA Surface Course	(3)	Core Out Substrata
Concrete			
(0)	Barrier Concrete	(203)	Existing Pavement Substrata
(0)	Barrier Concrete Footing	(6)	Loam Substrata
(0)	Curb Gutter	(80)	Rock Substrata
(48)	Flowable Mortar	(4)	Select Sand Substrata
(0)	Median Concrete	(3)	Shale Substrata
(0)	PCC Pavement	(10)	Topsoil Substrata
(0)	Sidewalk	Unsuitable / Waste	
Shoulder			
(209)	Shoulder HMA	(3)	Unsuitable Type A
(0)	Shoulder PCC	(13)	Unsuitable Type B
(6)	Shoulder Granular	(11)	Unsuitable Type C
(0)	Shoulder	(3)	Waste
Existing			
(0)	Existing Pavement		

NOTES:

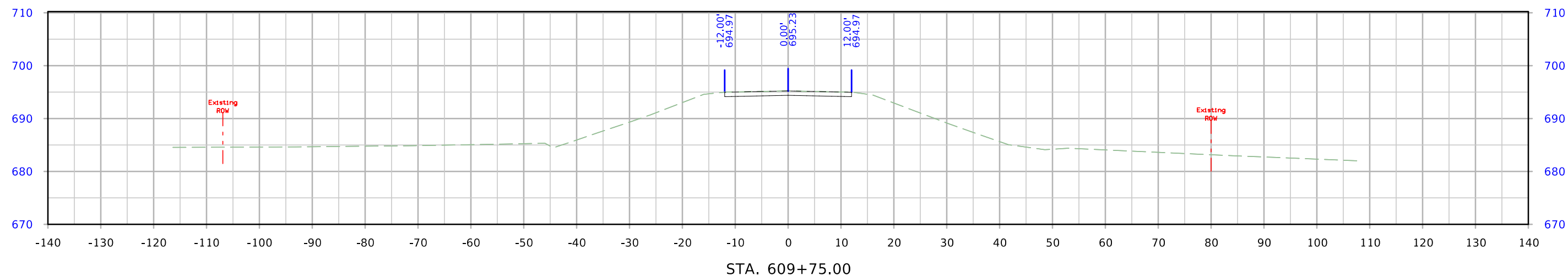
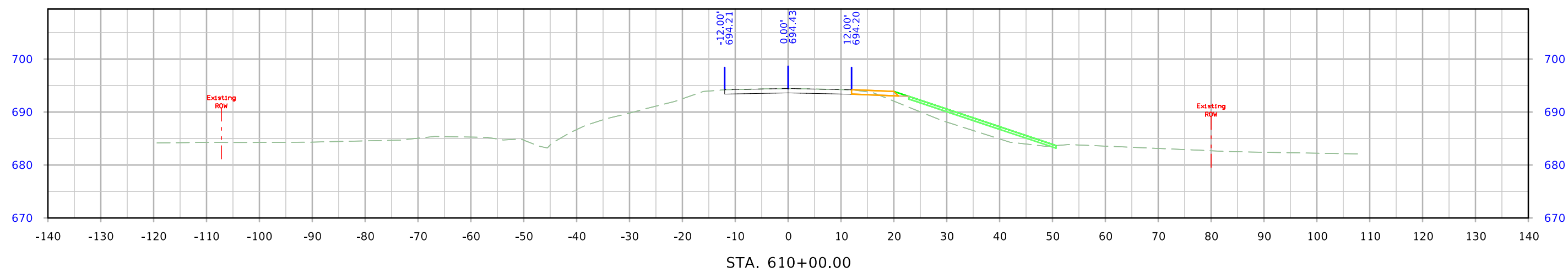
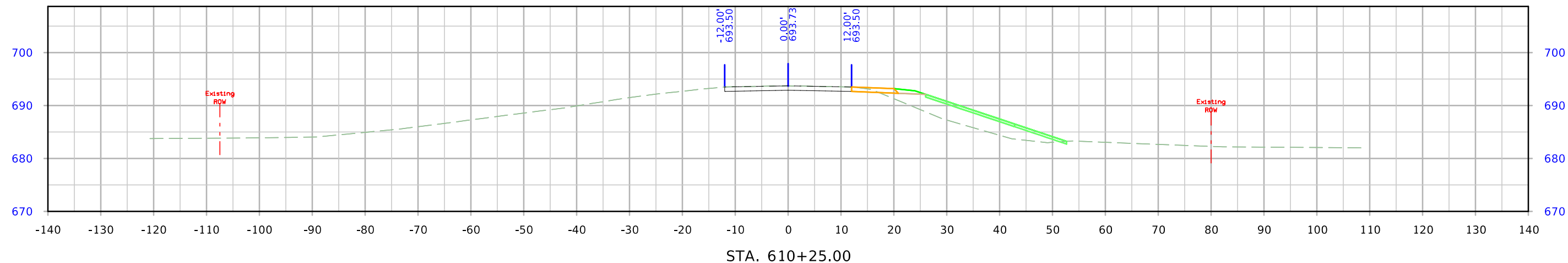
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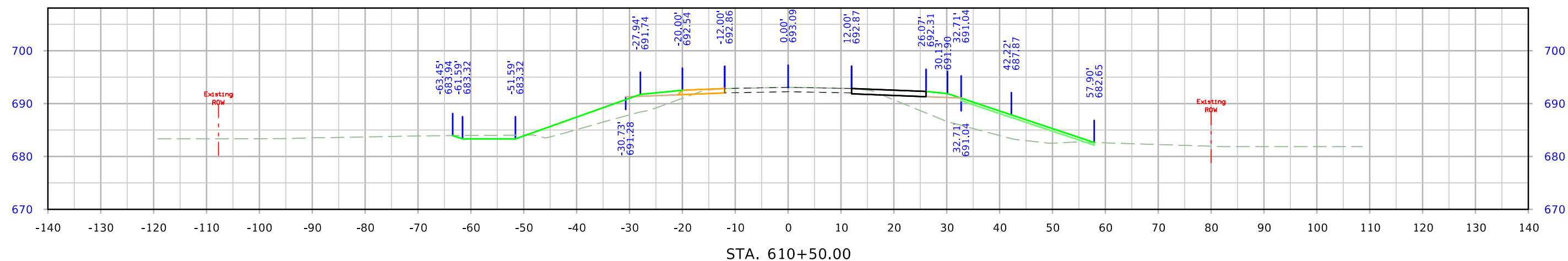
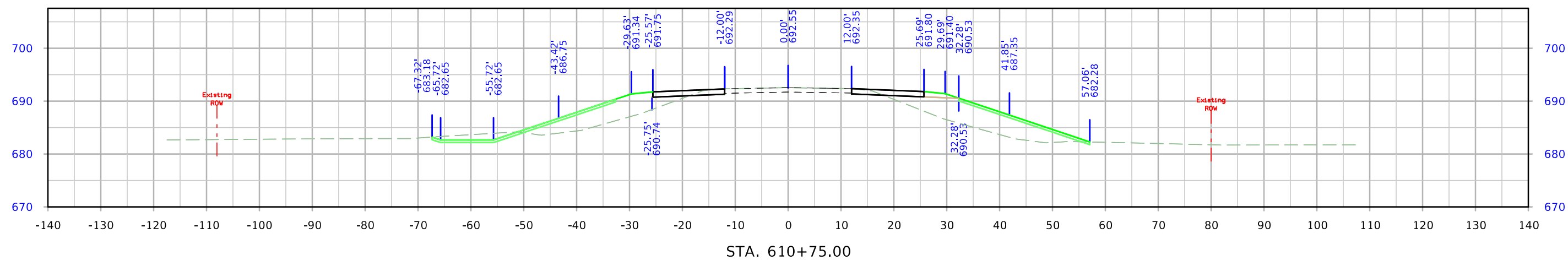
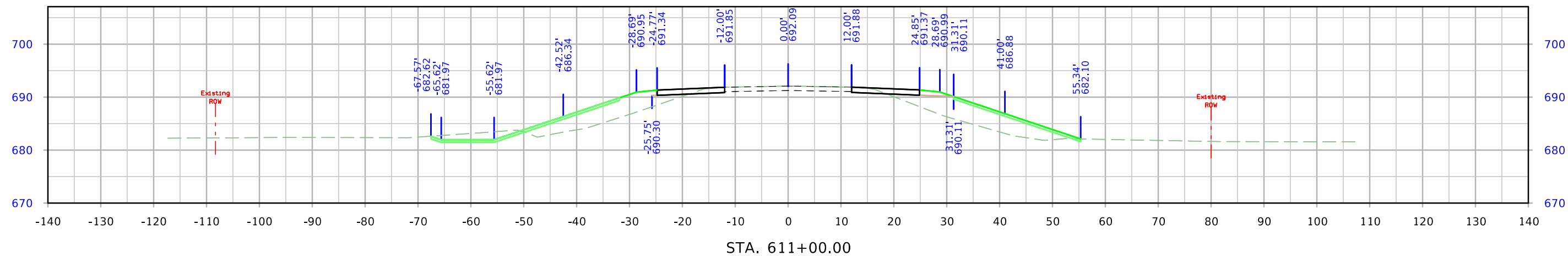
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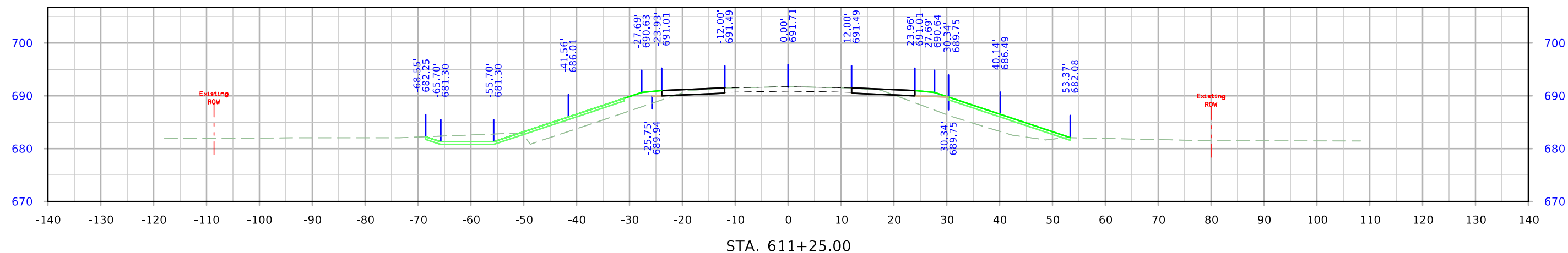
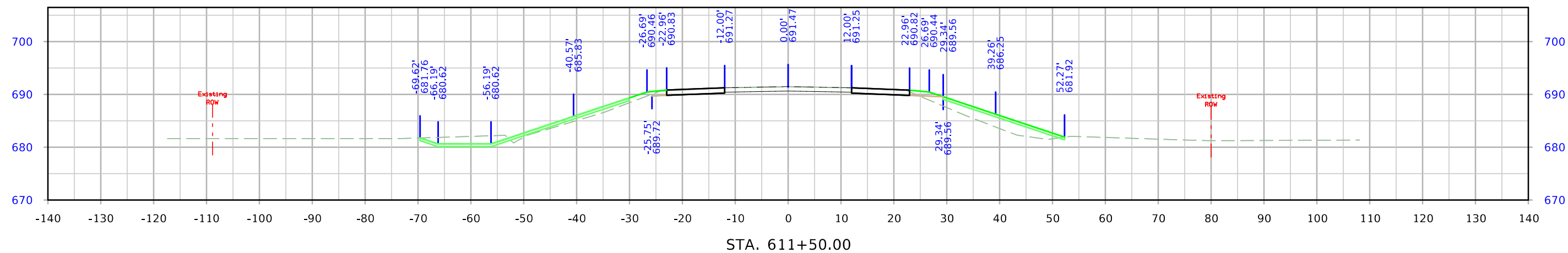
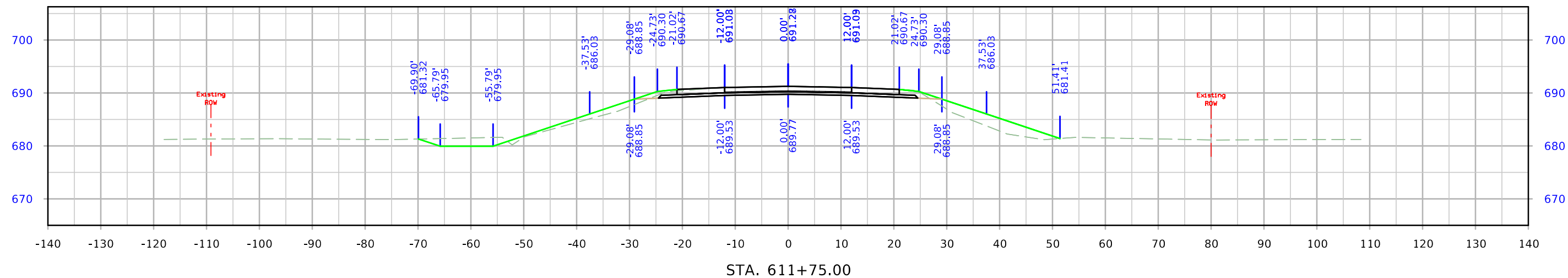
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CROSS SECTIONS LEGEND AND INFORMATION SHEET

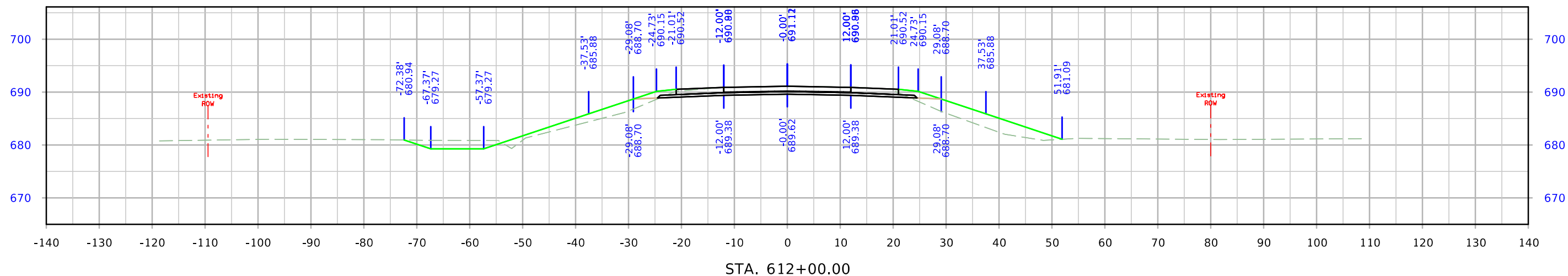
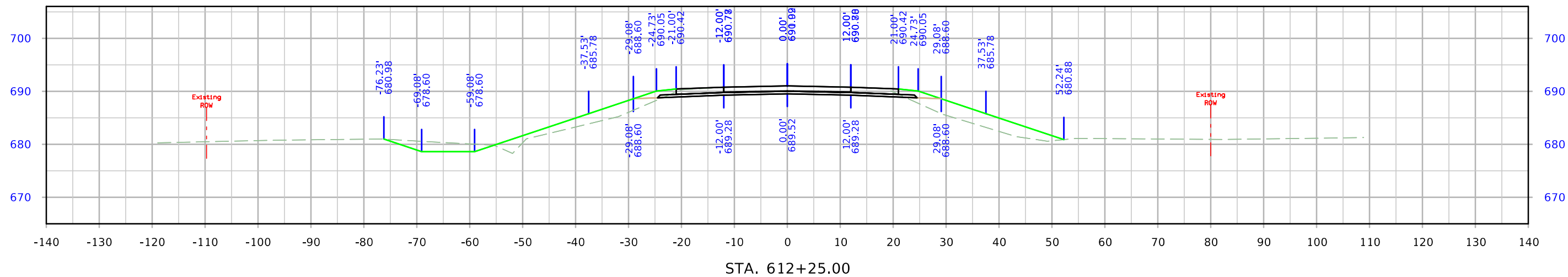
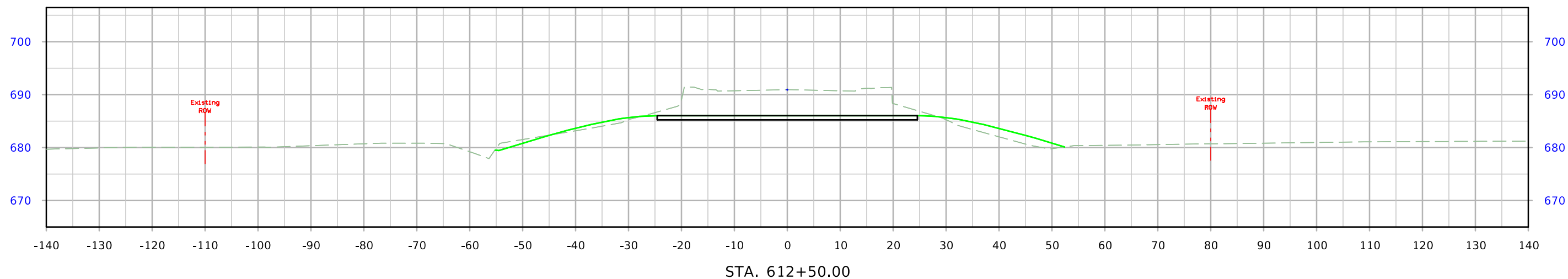
(COVERS SHEET SERIES W, X, Y, & Z)

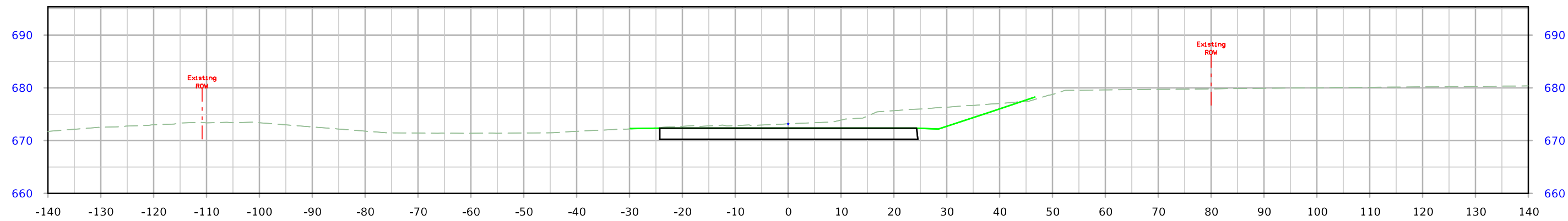




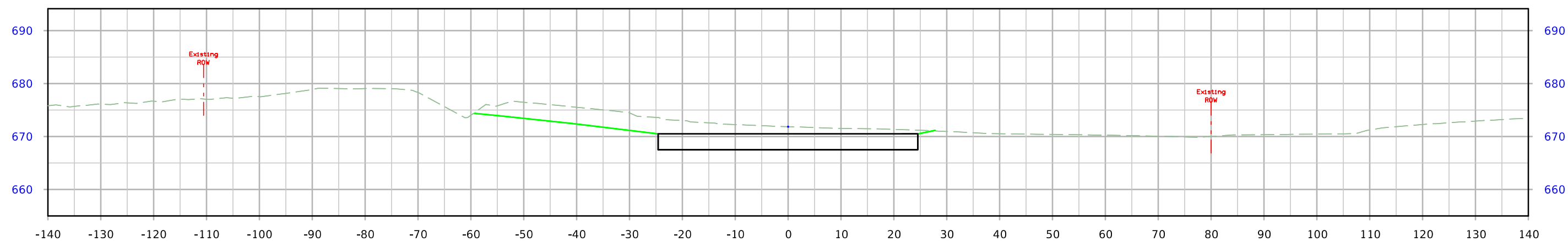


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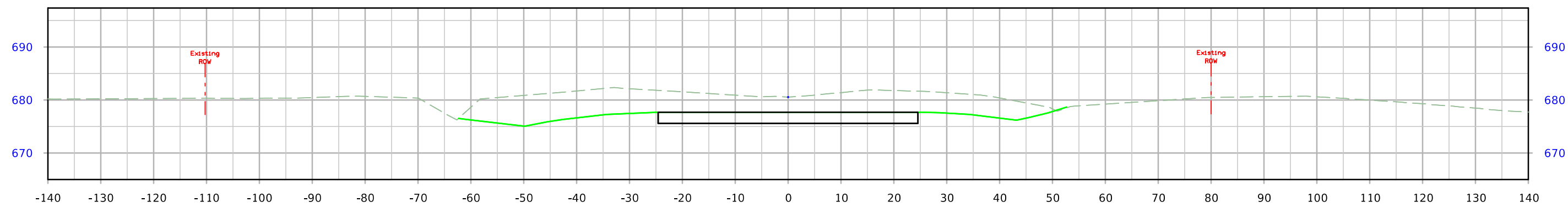




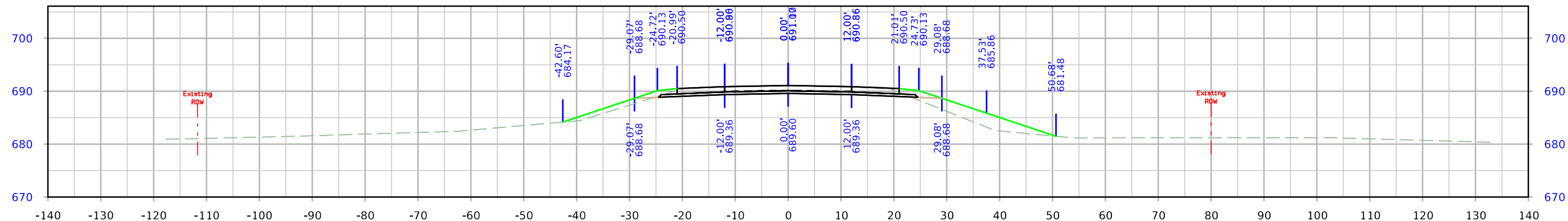
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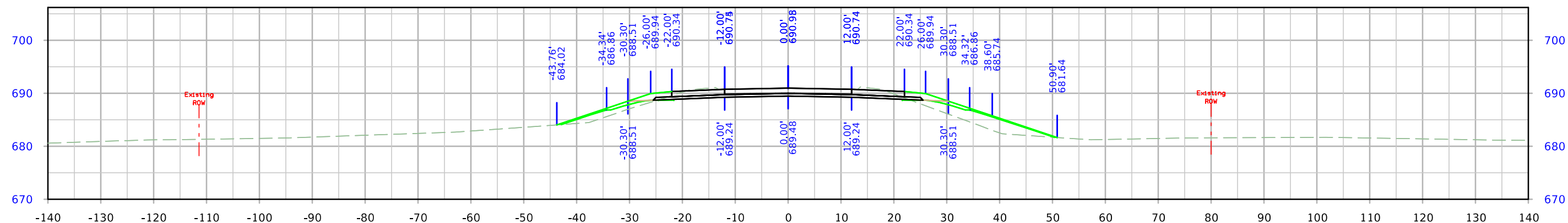
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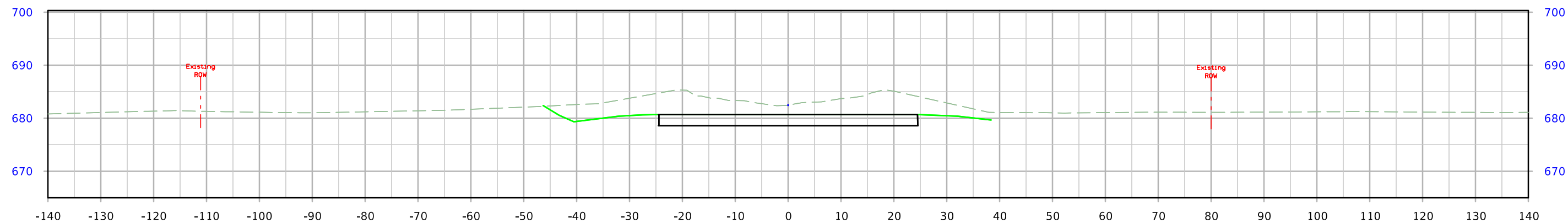
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STA. 614+00.00



STA. 613+75.00



STA. 613+50.00

