



Memorandum

Date: April 20, 2016
To: Matt Griggs and Rosa Griggs – Dokken Engineering
From: Han-Bin Liang and Wana Chiu – WRECO
Project: 5th Street over Feather River Bridge Replacement Project, Sutter and Yuba Counties, California. Federal-Aid Project No. BRLS-5163(027). Existing Bridge No. 18C0012.
Subject: Supplemental Hydraulic Analysis to Document USACE Design Flow Results and to Assess Potential Impacts Resulting from Temporary Construction Staging

1. INTRODUCTION

The purpose of this study was to revise the hydraulic model of the 5th Street over Feather River Bridge Replacement Project (Project) to document the USACE design flow and to assess the potential impacts resulting from the various stages of construction. Also, while the actual construction will occur during the summer months, portions of the temporary structures that will be utilized for the construction of the bridge will remain in the creek during and through the winter. The Location Hydraulic Study report identified the USACE 1957 floodwater surface elevation, as represented in USACE maps, but did not analyze the design flow to confirm required freeboard is met by this Project. The supplemental analysis is discussed in this study.

Based on a preliminary construction working-day schedule, it is anticipated that all the columns will be built during the normal permitted season, April 16 through October 31. This study assumes that the contractor will erect falsework in preparation to complete a portion of the superstructure during the designated flood season, November 1 through April 15, when work within the flood channel is restricted. In order to limit the obstruction to the flood channel, the Project will limit the extent of falsework erected during the flood season to Frame 2 (see Figure 2).

The basis of the hydraulic modeling utilized the existing and proposed bridge conditions as described in the Location Hydraulic Study for the subject project. This supplemental analysis utilized that hydraulic model as the basis of modeling, and only discusses the changes to the hydraulic model that are pertinent to the construction staging and USACE design flow. The Project's background information is discussed in the Location Hydraulic Study report. The construction staging was modeled as three stages:

1. With the existing 5th Street bridge and the new piers for the proposed bridge
2. Same as Stage 1 but with the addition of the temporary construction access trestle in the main channel (see Figure 1)
3. Same as Stage 2 but with the addition of the falsework in Frame 2 (see Figure 2)



The Project references the North American Vertical Datum of 1988 (NAVD 88). All elevations presented herein are based on NAVD 88.

2. HYDRAULIC MODELING

Modeling Assumptions Pertaining to the Construction Staging

Vegetation Removal

During construction, the trees along the channel will be cleared from the location of the proposed bridge to the location of the existing bridge. For all stages of construction, the roughness coefficient of the main channel was reduced from 0.04 to 0.03 to represent the removal of the vegetation. The modification to the roughness coefficient was applied to the cross sections from River Station (RS) 27.996 (proposed bridge upstream cross section) through RS 27.963 (existing bridge downstream cross section).

Stage 1

The existing condition hydraulic model was used as a starting point. The roughness coefficient of the main channel was reduced from 0.04 to 0.03 to represent the removal of the vegetation. The new bridge was added to the model, upstream of the existing bridge. Although the deck of the bridge will not yet be constructed, the hydraulic model will not compute if the bridge deck is not defined.

Stage 2

The Stage 1 hydraulic model was used as a starting point. The bottom of the trestle was modeled to be at elevation 62.7 feet, which is approximately 10 feet higher than the creek bank. The structural depth was modeled to be 2.3 feet. The trestle piles were modeled to be 22 inches wide. The widths of the piers were tripled to account for potential debris.

Stage 3

The Stage 2 hydraulic model was used as a starting point. The falsework within Frame 2 was represented in the hydraulic model by increasing the roughness coefficient from 0.06 to 0.1. The modification to the roughness coefficient was applied to the cross sections at RS 27.996 (proposed bridge upstream cross section) and RS 27.971 (proposed bridge downstream cross section). The bridge cannot be geometrically modeled with diagonal bracing in HEC-RAS. The intent of increasing the roughness coefficient is to represent the debris that collects against the falsework. The water would be impeded by the blockage but would still be able to pass through the gaps between the debris and falsework. Our assessment is that this situation would have a roughness coefficient comparable to a weedy reach with heavy timber and brush.

A “worst case” situation was also evaluated by modeling the location of the falsework, within Frame 2, as completely blocked. This would assume that if the water gets as high as the falsework, that



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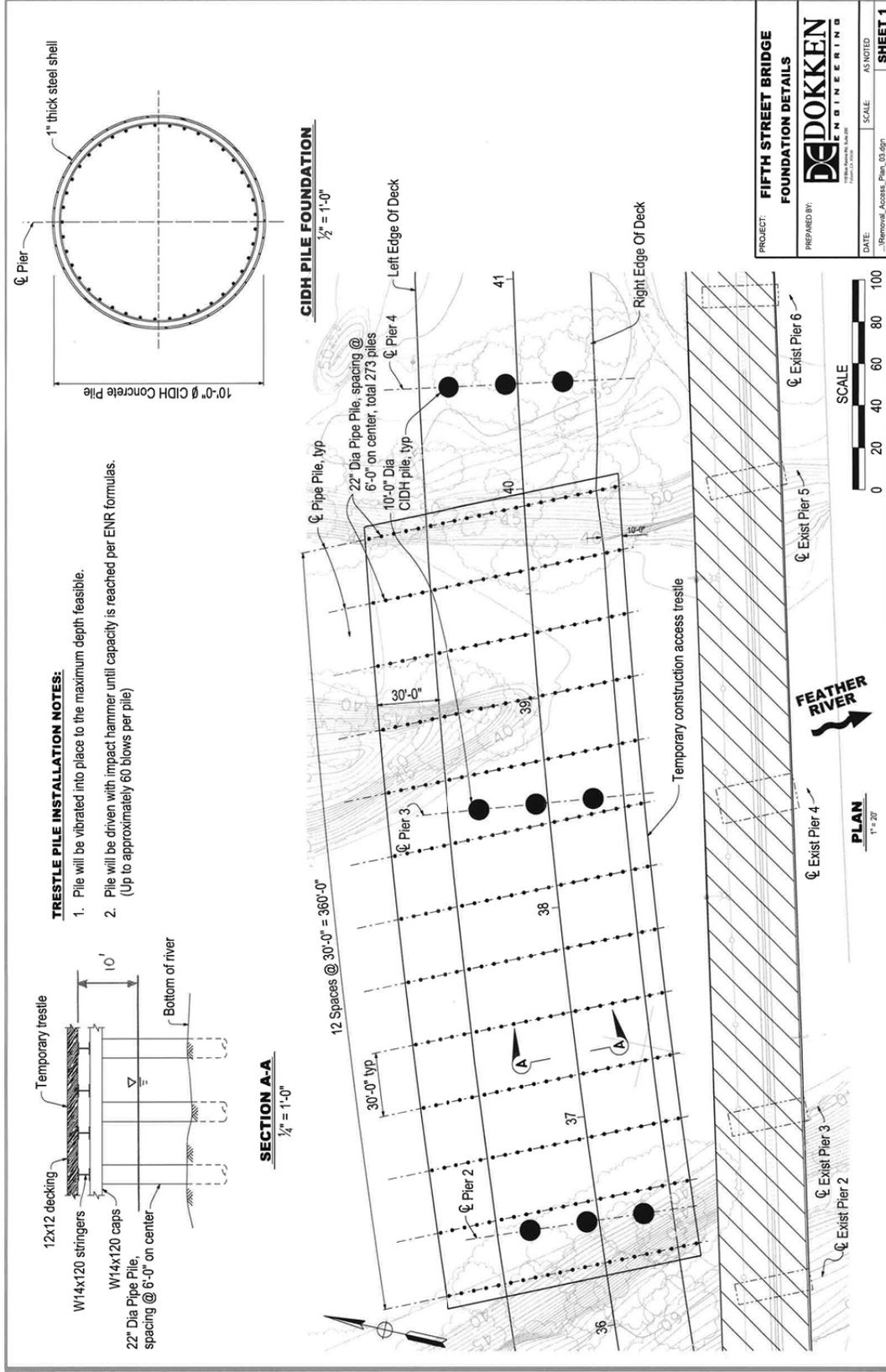


Figure 1. Temporary Construction Access Trestle Configuration



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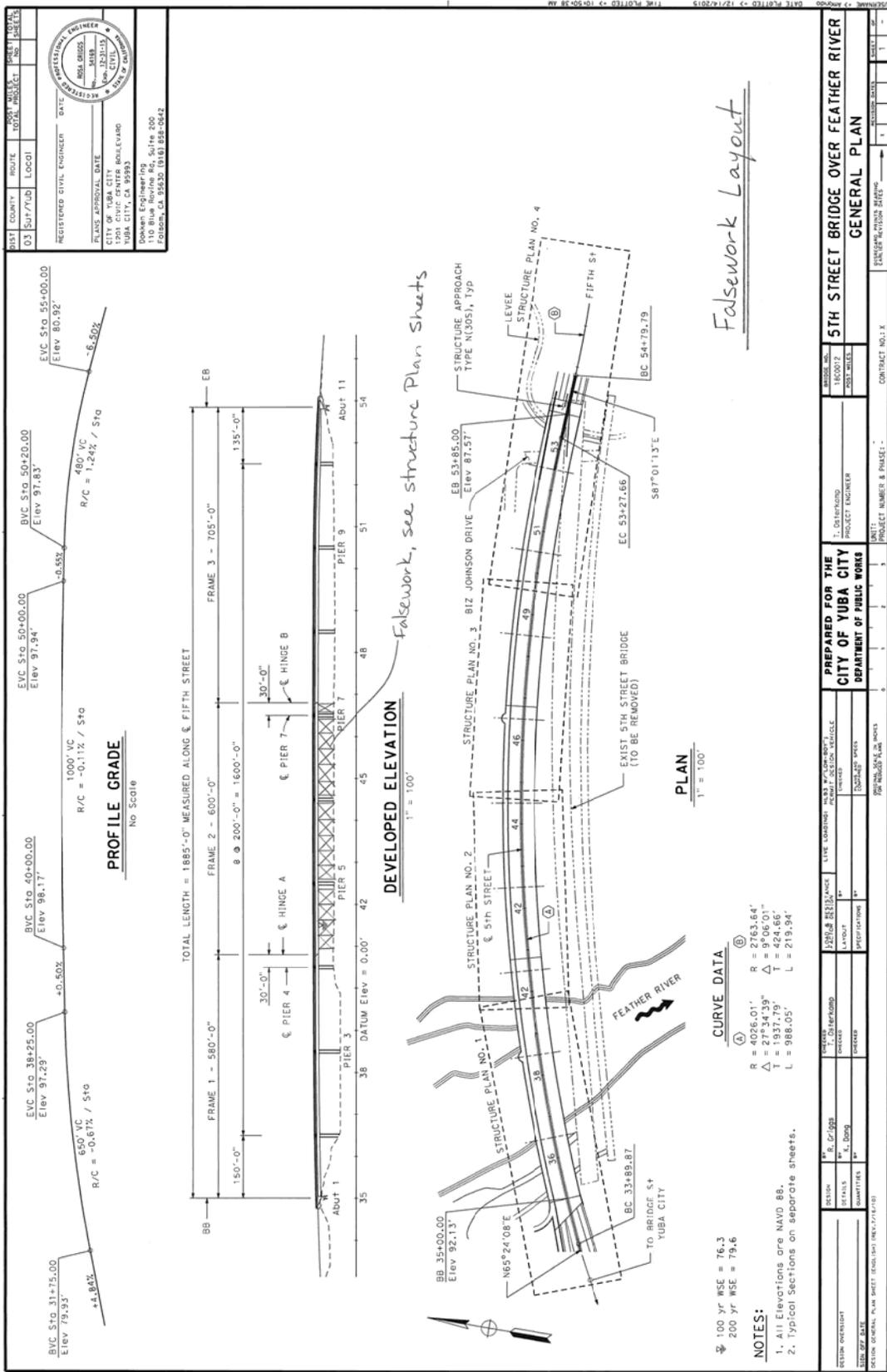


Figure 2. Falsework in Frame 2



there would be sufficient debris to effectively block the open areas of the falsework, and water would not be able to pass through the openings.

Peak Design Flow and Boundary Condition

The 200-year and 100-year peak flow rates were evaluated to assess the impacts of the construction staging on the hydraulic characteristics at the Project site (see Table 1). The Location Hydraulic Study also includes the 1957 profile water surface elevations as a historical reference point for comparison purposes only. For this supplemental analysis, the United States Army Corps of Engineers' (USACE) design flow of 210,000 cfs was also evaluated. The hydraulic model was evaluated using the steady state flow analysis with a downstream water surface elevation as the boundary condition (see Table 2).

Table 1. Feather River Flow Rates at 5th Street Bridge

Return Period (years)	Flow Rate (cfs)
USACE Design Flow	210,000
200	169,250
100	149,058

Table 2. Downstream Boundary Condition

Return Period (years)	Water Surface Elevation (feet)
USACE Design Flow	78.83
200	77.03
100	73.88

3. HYDRAULIC MODELING RESULTS

For this supplemental analysis, the hydraulic modeling was updated to evaluate the USACE design flow. The water surface elevations at the upstream sides of the existing and proposed bridges are presented in Table 3. Because the upstream face of the proposed bridge will be located just upstream of the existing bridge, the water surface elevation at the proposed bridge would be higher than the water surface elevation at the existing bridge. However, the model shows no relative increases in water surface elevation for each cross section in the proposed condition when compared to existing conditions.

Table 3. Water Surface Elevations at Upstream Side of Existing and Proposed 5th Street Bridge

Bridge Condition	Water Surface Elevation (feet)		
	USACE Design Flow	200-Year	100-Year
Existing RS 27.971	79.95	77.89	74.79
Proposed RS 27.996	79.95	77.90	74.80

The following bridge freeboard criteria are applicable to the Project:

- The bridge should pass the 200-year design flow with 3 feet of freeboard.
- The bridge should pass the USACE design flow with 2 feet of freeboard.

The minimum soffit elevation for the proposed bridge is 82.6 feet. Based on the results of the hydraulic analysis, the proposed bridge will meet applicable freeboard criteria. The available freeboard heights for the proposed bridge are presented in Table 4.

Table 4. Available Freeboard for the Proposed 5th Street Bridge

Bridge Condition	Freeboard (feet)		
	USACE Design Flow	200-Year	100-Year
Proposed	2.7	4.7	7.8

The hydraulic modeling also indicated that the construction staging would result in rises in water surface elevation relative to existing conditions. Relative to the existing condition, Stage 1 would result in a rise in water surface elevation of up to 0.03 feet for the 200- and 100-year storm events and 0.05 feet for the USACE design flow. Relative to the existing condition, Stage 2 would result in a rise in water surface elevation of up to 0.11 feet for the 200-year storm, 0.12 feet for the 100-year storm, and 0.15 feet for the USACE design flow. Relative to the existing condition, Stage 3 (with the increased roughness coefficient within Frame 2) would result in a rise in water surface elevation of up to 0.19 feet for the 200- and 100-year storm events and 0.25 feet for the USACE design flow. Relative to the existing condition, Stage 3 (with Frame 2 entirely blocked) would result in a rise in water surface elevation of up to 0.37 feet for the 200-year storm, 0.36 feet for the 100-year storm, and 0.50 feet for the USACE design flow. Modeling Frame 2 as entirely blocked rather than increasing the roughness coefficient would result in the highest increase in water surface elevation, the worst case situation.

During the various construction stages, the proposed bridge would still meet the applicable freeboard criteria. Table 5 presents the design water surface elevations at the upstream side of the proposed bridge during the stages of construction and Table 6 presents the associated available freeboard heights.



Table 5. Water Surface Elevations at Upstream Side of 5th Street Bridge During Construction

Construction Stage	Water Surface Elevation (feet)		
	USACE Design Flow	200-Year	100-Year
Stage 1	79.88	77.84	74.74
Stage 2	79.98	77.92	74.83
Stage 3 (with increased roughness coefficient within Frame 2)	79.98	77.92	74.83
Stage 3 (Frame 2 entirely blocked)	79.82	77.80	74.72

Table 6. Available Freeboard for the 5th Street Bridge During Construction

Construction Stage	Freeboard (feet)		
	USACE Design Flow	200-Year	100-Year
Stage 1	2.7	4.8	7.9
Stage 2	2.6	4.7	7.8
Stage 3 (with increased roughness coefficient within Frame 2)	2.6	4.7	7.8
Stage 3 (Frame 2 entirely blocked)	2.8	4.8	7.9

A comparison of the water surface profiles for the study reach is shown in Figure 3 for the USACE design flow, Figure 4 for the 200-year storm, and Figure 5 for the 100-year storm. Summaries of the water surface elevations and their respective differences when compared to the existing conditions are included in Table 7 and Table 8 for the USACE design flow, Table 9 and Table 10 for the 200-year storm, and Table 11 and Table 12 for the 100-year storm. The water surface profiles, hydraulic summary tables, and cross sections for the existing condition, proposed condition, construction Stage 1, construction Stage 2, and construction Stage 3 (with the increased roughness coefficient within Frame 2), and construction Stage 3 (with Frame 2 entirely blocked) are respectively included in Appendix A, Appendix B, Appendix C, Appendix D, Appendix E, and Appendix F.

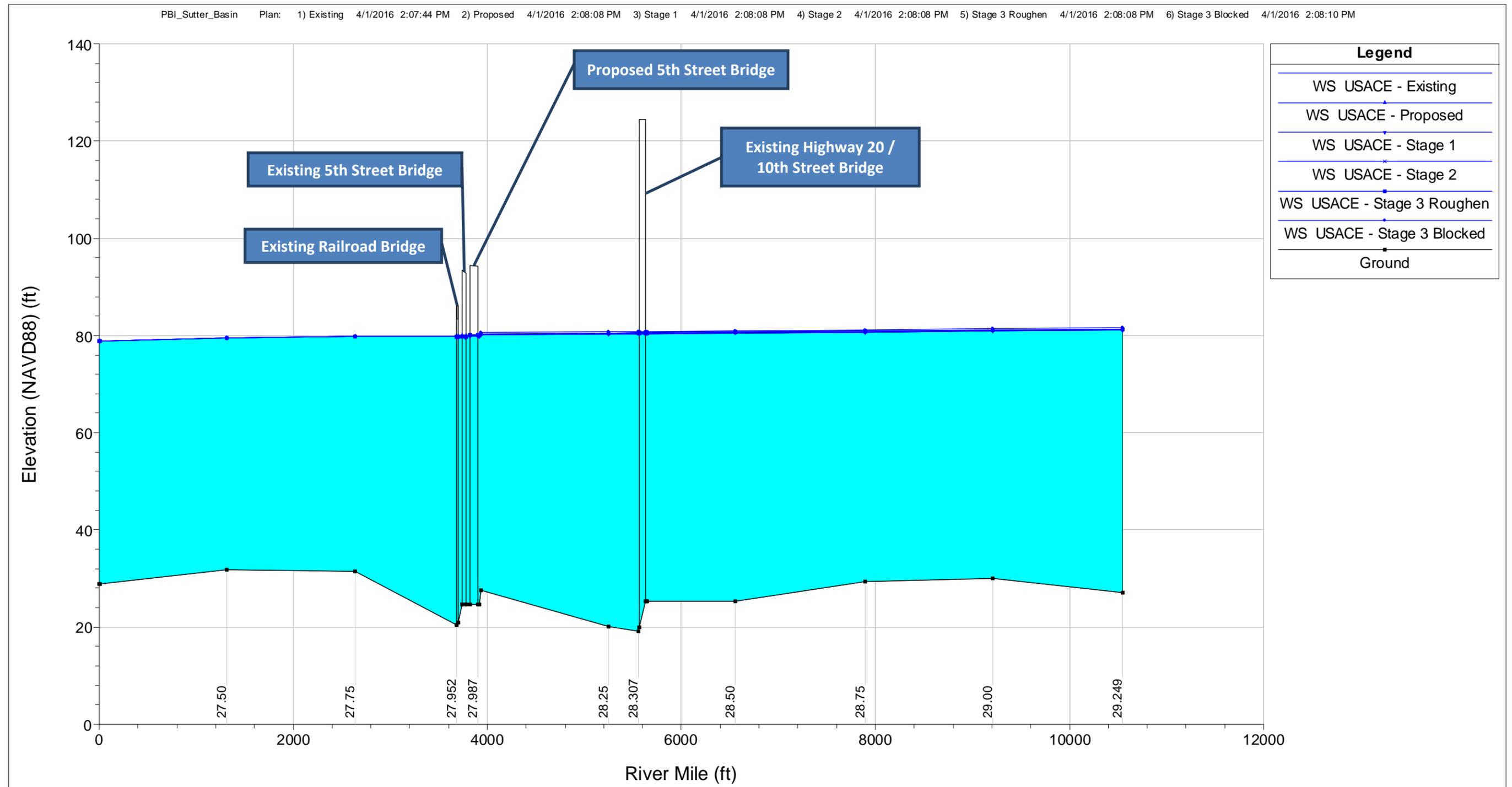


Figure 3. USACE Design Flow Water Surface Profile Comparison (Flow Direction is Towards the Left Side)

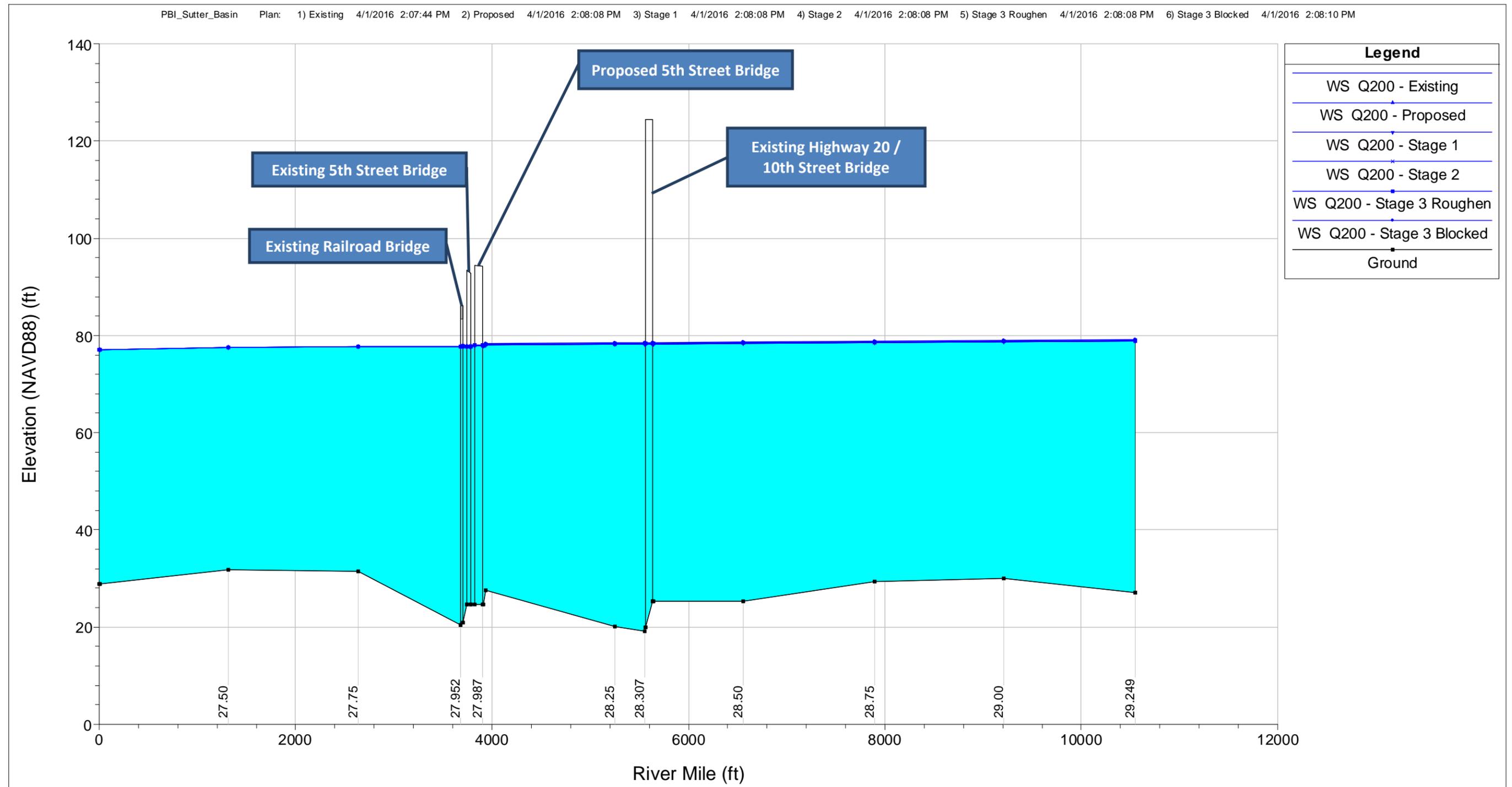


Figure 4. 200-Year Water Surface Profile Comparison (Flow Direction is Towards the Left Side)

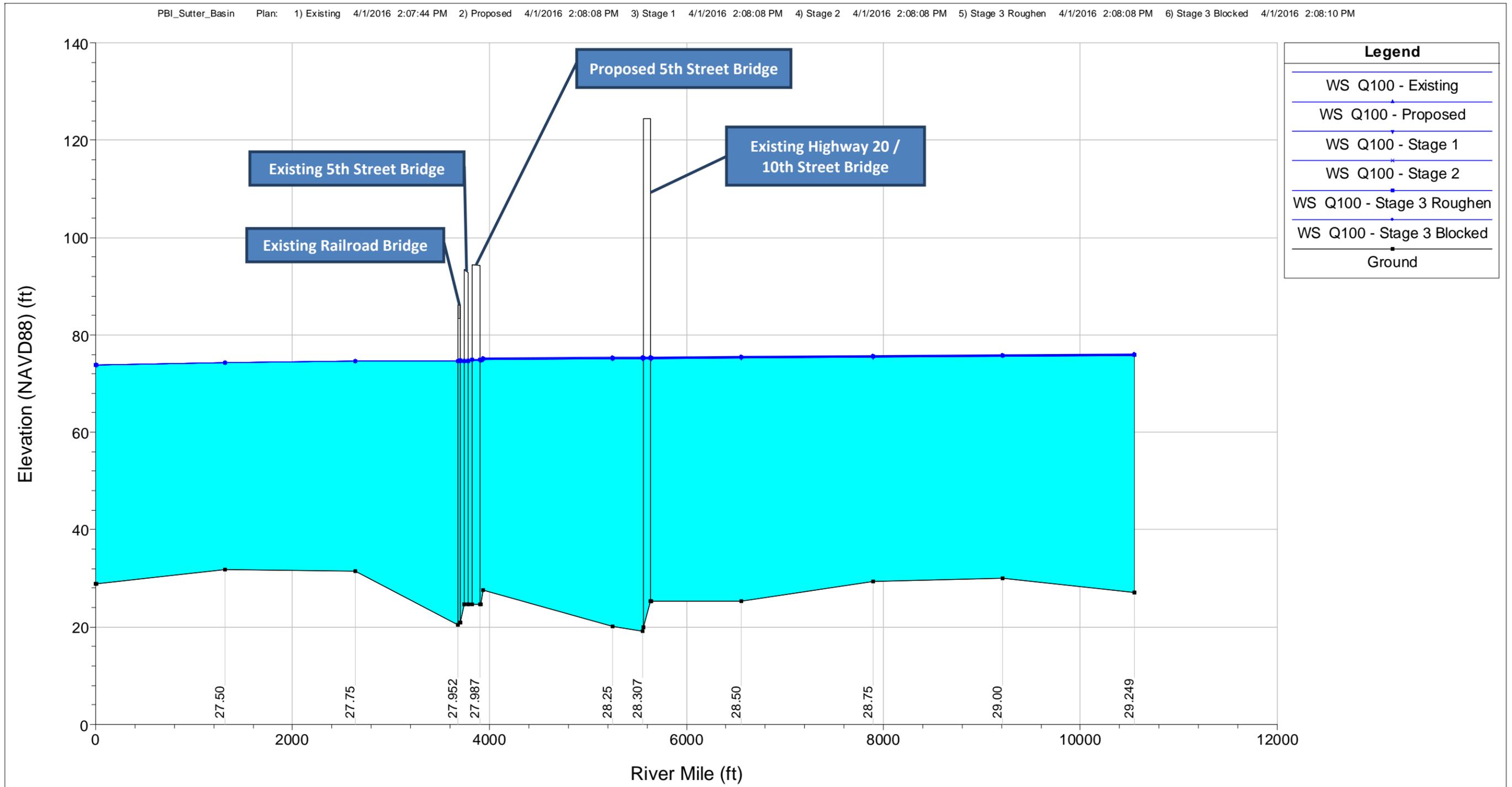


Figure 5. 100-Year Water Surface Profile Comparison (Flow Direction is Towards the Left Side)

Table 7. USACE Design Flow Water Surface Elevations Along Study Reach

River Station	Description	Existing	Proposed	Stage 1 Existing and Proposed Bridge Piers	Stage 2 Existing and Proposed Bridge Piers with Trestles in Main Channel	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Increased Roughness Coefficient)	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Blocked)
29.25	Upstream End of Model	81.09	81.08	81.13	81.22	81.31	81.55
29.249		81.09	81.08	81.13	81.22	81.31	81.55
29		80.93	80.91	80.97	81.06	81.15	81.39
28.75		80.66	80.65	80.70	80.80	80.90	81.14
28.5		80.51	80.50	80.55	80.65	80.75	80.99
28.324		80.37	80.36	80.42	80.51	80.61	80.86
28.322		80.37	80.36	80.41	80.51	80.61	80.86
28.321 BR U	10th Street Bridge	80.36	80.34	80.40	80.50	80.59	80.84
28.321 BR D	10th Street Bridge	80.34	80.33	80.39	80.48	80.58	80.83
28.309		80.35	80.34	80.39	80.49	80.59	80.84
28.307		80.35	80.33	80.39	80.49	80.59	80.84
28.25		80.29	80.27	80.33	80.43	80.53	80.78
28		80.12	80.11	80.17	80.27	80.37	80.62
27.996	New Cross Section	79.97	79.95	79.88	79.98	79.98	79.82
27.987 BR U	Proposed 5th Street Bridge	79.97 ¹	79.94	79.86	80.11	80.17	79.99
27.987 BR D	Proposed 5th Street Bridge	79.96 ¹	79.91	79.84	80.07	80.11	79.91
27.971		79.95	79.91	79.85	79.85	79.79	79.55
27.970 BR U	Existing 5th Street Bridge	79.88	—	79.75	79.75	79.67	79.35
27.970 BR D	Existing 5th Street Bridge	79.86	—	79.74	79.74	79.74	79.74
27.963		79.90	79.90	79.80	79.80	79.80	79.80
27.956		79.85	79.85	79.85	79.85	79.85	79.85
27.955 BR U	Railroad Bridge	79.66	79.66	79.66	79.66	79.66	79.66
27.955 BR D	Railroad Bridge	79.64	79.64	79.64	79.64	79.64	79.64
27.952		79.76	79.76	79.76	79.76	79.76	79.76
27.75		79.79	79.79	79.79	79.79	79.79	79.79
27.5		79.42	79.42	79.42	79.42	79.42	79.42
27.251		78.83	78.83	78.83	78.83	78.83	78.83
27.25	Downstream End of Model	78.83	78.83	78.83	78.83	78.83	78.83

Note: ¹ Value was interpolated using water surface elevations from bounding cross sections



Table 8. Differences in USACE Design Flow Water Surface Elevation Compared to Existing Condition

River Station	Description	Proposed	Stage 1 Existing and Proposed Bridge Piers	Stage 2 Existing and Proposed Bridge Piers with Trestles in Main Channel	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Increased Roughness Coefficient)	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Blocked)
29.25	Upstream End of Model	-0.01	0.04	0.13	0.22	0.46
29.249		-0.01	0.04	0.13	0.22	0.46
29		-0.02	0.04	0.13	0.22	0.46
28.75		-0.01	0.04	0.14	0.24	0.48
28.5		-0.01	0.04	0.14	0.24	0.48
28.324		-0.01	0.05	0.14	0.24	0.49
28.322		-0.01	0.04	0.14	0.24	0.49
28.321 BR U	10th Street Bridge	-0.02	0.04	0.14	0.23	0.48
28.321 BR D	10th Street Bridge	-0.01	0.05	0.14	0.24	0.49
28.309		-0.01	0.04	0.14	0.24	0.49
28.307		-0.02	0.04	0.14	0.24	0.49
28.25		-0.02	0.04	0.14	0.24	0.49
28		-0.01	0.05	0.15	0.25	0.50
27.996	New Cross Section	-0.02	-0.09	0.01	0.01	-0.15
27.987 BR U	Proposed 5th Street Bridge	—	-0.11	0.14	0.20	0.02
27.987 BR D	Proposed 5th Street Bridge	—	-0.12	0.11	0.15	-0.05
27.971		-0.04	-0.10	-0.10	-0.16	-0.40
27.970 BR U	Existing 5th Street Bridge	—	-0.13	-0.13	-0.21	-0.53
27.970 BR D	Existing 5th Street Bridge	—	-0.12	-0.12	-0.12	-0.12
27.963		0.00	-0.10	-0.10	-0.10	-0.10
27.956		0.00	0.00	0.00	0.00	0.00
27.955 BR U	Railroad Bridge	0.00	0.00	0.00	0.00	0.00
27.955 BR D	Railroad Bridge	0.00	0.00	0.00	0.00	0.00
27.952		0.00	0.00	0.00	0.00	0.00
27.75		0.00	0.00	0.00	0.00	0.00
27.5		0.00	0.00	0.00	0.00	0.00
27.251		0.00	0.00	0.00	0.00	0.00
27.25	Downstream End of Model	0.00	0.00	0.00	0.00	0.00



Table 9. 200-Year Water Surface Elevations Along Study Reach

River Station	Description	Existing	Proposed	Stage 1 Existing and Proposed Bridge Piers	Stage 2 Existing and Proposed Bridge Piers with Trestles in Main Channel	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Increased Roughness Coefficient)	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Blocked)
29.25	Upstream End of Model	78.82	78.81	78.85	78.92	78.99	79.16
29.249		78.82	78.81	78.85	78.92	78.99	79.16
29		78.68	78.67	78.71	78.78	78.85	79.02
28.75		78.46	78.45	78.49	78.57	78.64	78.81
28.5		78.34	78.33	78.37	78.45	78.52	78.70
28.324		78.23	78.21	78.26	78.33	78.41	78.59
28.322		78.22	78.21	78.25	78.33	78.40	78.58
28.321 BR U	10th Street Bridge	78.21	78.20	78.24	78.32	78.39	78.57
28.321 BR D	10th Street Bridge	78.20	78.19	78.23	78.31	78.38	78.56
28.309		78.21	78.20	78.24	78.31	78.39	78.57
28.307		78.20	78.19	78.23	78.31	78.39	78.56
28.25		78.15	78.14	78.18	78.26	78.34	78.52
28		78.02	78.01	78.05	78.13	78.21	78.39
27.996	New Cross Section	77.91	77.90	77.84	77.92	77.92	77.80
27.987 BR U	Proposed 5th Street Bridge	77.91 ¹	77.88	77.82	78.01	78.06	77.92
27.987 BR D	Proposed 5th Street Bridge	77.90 ¹	77.86	77.81	77.98	78.01	77.86
27.971		77.89	77.86	77.81	77.81	77.77	77.60
27.970 BR U	Existing 5th Street Bridge	77.84	—	77.74	77.74	77.68	77.45
27.970 BR D	Existing 5th Street Bridge	77.82	—	77.74	77.74	77.74	77.74
27.963		77.86	77.86	77.78	77.78	77.78	77.78
27.956		77.81	77.81	77.81	77.81	77.81	77.81
27.955 BR U	Railroad Bridge	77.68	77.68	77.68	77.68	77.68	77.68
27.955 BR D	Railroad Bridge	77.66	77.66	77.66	77.66	77.66	77.66
27.952		77.75	77.75	77.75	77.75	77.75	77.75
27.75		77.77	77.77	77.77	77.77	77.77	77.77
27.5		77.48	77.48	77.48	77.48	77.48	77.48
27.251		77.03	77.03	77.03	77.03	77.03	77.03
27.25	Downstream End of Model	77.03	77.03	77.03	77.03	77.03	77.03

Note: ¹ Value was interpolated using water surface elevations from bounding cross sections

Table 10. Differences in 200-Year Water Surface Elevation Compared to Existing Condition

River Station	Description	Proposed	Stage 1 Existing and Proposed Bridge Piers	Stage 2 Existing and Proposed Bridge Piers with Trestles in Main Channel	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Increased Roughness Coefficient)	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Blocked)
29.25	Upstream End of Model	-0.01	0.03	0.10	0.17	0.34
29.249		-0.01	0.03	0.10	0.17	0.34
29		-0.01	0.03	0.10	0.17	0.34
28.75		-0.01	0.03	0.11	0.18	0.35
28.5		-0.01	0.03	0.11	0.18	0.36
28.324		-0.02	0.03	0.10	0.18	0.36
28.322		-0.01	0.03	0.11	0.18	0.36
28.321 BR U	10th Street Bridge	-0.01	0.03	0.11	0.18	0.36
28.321 BR D	10th Street Bridge	-0.01	0.03	0.11	0.18	0.36
28.309		-0.01	0.03	0.10	0.18	0.36
28.307		-0.01	0.03	0.11	0.19	0.36
28.25		-0.01	0.03	0.11	0.19	0.37
28		-0.01	0.03	0.11	0.19	0.37
27.996	New Cross Section	-0.01	-0.07	0.01	0.01	-0.11
27.987 BR U	Proposed 5th Street Bridge	—	-0.09	0.10	0.15	0.01
27.987 BR D	Proposed 5th Street Bridge	—	-0.09	0.08	0.11	-0.04
27.971		-0.03	-0.08	-0.08	-0.12	-0.29
27.970 BR U	Existing 5th Street Bridge	—	-0.10	-0.10	-0.16	-0.39
27.970 BR D	Existing 5th Street Bridge	—	-0.08	-0.08	-0.08	-0.08
27.963		0.00	-0.08	-0.08	-0.08	-0.08
27.956		0.00	0.00	0.00	0.00	0.00
27.955 BR U	Railroad Bridge	0.00	0.00	0.00	0.00	0.00
27.955 BR D	Railroad Bridge	0.00	0.00	0.00	0.00	0.00
27.952		0.00	0.00	0.00	0.00	0.00
27.75		0.00	0.00	0.00	0.00	0.00
27.5		0.00	0.00	0.00	0.00	0.00
27.251		0.00	0.00	0.00	0.00	0.00
27.25	Downstream End of Model	0.00	0.00	0.00	0.00	0.00

Table 11. 100-Year Water Surface Elevations Along Study Reach

River Station	Description	Existing	Proposed	Stage 1 Existing and Proposed Bridge Piers	Stage 2 Existing and Proposed Bridge Piers with Trestles in Main Channel	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Increased Roughness Coefficient)	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Blocked)
29.25	Upstream End of Model	75.82	75.81	75.85	75.92	75.99	76.14
29.249		75.82	75.81	75.85	75.92	75.99	76.14
29		75.67	75.66	75.69	75.77	75.84	75.99
28.75		75.42	75.41	75.44	75.52	75.59	75.75
28.5		75.28	75.28	75.31	75.39	75.46	75.63
28.324		75.15	75.14	75.18	75.26	75.33	75.50
28.322		75.15	75.14	75.18	75.26	75.33	75.50
28.321 BR U	10th Street Bridge	75.14	75.13	75.16	75.25	75.32	75.48
28.321 BR D	10th Street Bridge	75.12	75.11	75.15	75.23	75.31	75.47
28.309		75.13	75.12	75.16	75.24	75.31	75.48
28.307		75.13	75.12	75.15	75.23	75.31	75.47
28.25		75.07	75.06	75.10	75.18	75.25	75.42
28		74.92	74.92	74.95	75.04	75.11	75.28
27.996	New Cross Section	74.81	74.80	74.74	74.83	74.83	74.72
27.987 BR U	Proposed 5th Street Bridge	74.81 ¹	74.78	74.72	74.92	74.97	74.82
27.987 BR D	Proposed 5th Street Bridge	74.80 ¹	74.76	74.71	74.89	74.91	74.76
27.971		74.79	74.76	74.72	74.72	74.67	74.52
27.970 BR U	Existing 5th Street Bridge	74.74	—	74.65	74.65	74.59	74.38
27.970 BR D	Existing 5th Street Bridge	74.73	—	74.64	74.64	74.64	74.64
27.963		74.76	74.76	74.68	74.68	74.68	74.68
27.956		74.71	74.71	74.71	74.71	74.71	74.71
27.955 BR U	Railroad Bridge	74.59	74.59	74.59	74.59	74.59	74.59
27.955 BR D	Railroad Bridge	74.57	74.57	74.57	74.57	74.57	74.57
27.952		74.65	74.65	74.65	74.65	74.65	74.65
27.75		74.68	74.68	74.68	74.68	74.68	74.68
27.5		74.37	74.37	74.37	74.37	74.37	74.37
27.251		73.88	73.88	73.88	73.88	73.88	73.88
27.25	Downstream End of Model	73.88	73.88	73.88	73.88	73.88	73.88

Note: ¹ Value was interpolated using water surface elevations from bounding cross sections

Table 12. Differences in 100-Year Water Surface Elevation Compared to Existing Condition

River Station	Description	Proposed	Stage 1 Existing and Proposed Bridge Piers	Stage 2 Existing and Proposed Bridge Piers with Trestles in Main Channel	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Increased Roughness Coefficient)	Stage 3 Existing and Proposed Bridge Piers with Trestles and Falsework in Frame 2 (Blocked)
29.25	Upstream End of Model	-0.01	0.03	0.10	0.17	0.32
29.249		-0.01	0.03	0.10	0.17	0.32
29		-0.01	0.02	0.10	0.17	0.32
28.75		-0.01	0.02	0.10	0.17	0.33
28.5		0.00	0.03	0.11	0.18	0.35
28.324		-0.01	0.03	0.11	0.18	0.35
28.322		-0.01	0.03	0.11	0.18	0.35
28.321 BR U	10th Street Bridge	-0.01	0.02	0.11	0.18	0.34
28.321 BR D	10th Street Bridge	-0.01	0.03	0.11	0.19	0.35
28.309		-0.01	0.03	0.11	0.18	0.35
28.307		-0.01	0.02	0.10	0.18	0.34
28.25		-0.01	0.03	0.11	0.18	0.35
28		0.00	0.03	0.12	0.19	0.36
27.996	New Cross Section	-0.01	-0.07	0.02	0.02	-0.09
27.987 BR U	Proposed 5th Street Bridge	—	-0.09	0.11	0.16	0.01
27.987 BR D	Proposed 5th Street Bridge	—	-0.09	0.09	0.11	-0.04
27.971		-0.03	-0.07	-0.07	-0.12	-0.27
27.970 BR U	Existing 5th Street Bridge	—	-0.09	-0.09	-0.15	-0.36
27.970 BR D	Existing 5th Street Bridge	—	-0.09	-0.09	-0.09	-0.09
27.963		0.00	-0.08	-0.08	-0.08	-0.08
27.956		0.00	0.00	0.00	0.00	0.00
27.955 BR U	Railroad Bridge	0.00	0.00	0.00	0.00	0.00
27.955 BR D	Railroad Bridge	0.00	0.00	0.00	0.00	0.00
27.952		0.00	0.00	0.00	0.00	0.00
27.75		0.00	0.00	0.00	0.00	0.00
27.5		0.00	0.00	0.00	0.00	0.00
27.251		0.00	0.00	0.00	0.00	0.00
27.25	Downstream End of Model	0.00	0.00	0.00	0.00	0.00