
Appendix F4
Erosion Control Rock-Fortified
Work Area Hydrology Memo

Memorandum

To: Sarah Lozano, Dudek
From: Wayne W. Chang
Re: SDSU Fenton Parkway Bridge – Temporary Rock Work Area
Date: July 15, 2024



The contractor requires a temporary, elevated, and rockered work area across the San Diego River to construct the Fenton Parkway Bridge. The work area will be used by construction vehicles and heavy equipment. It will be approximately 5-feet above the channel bed under the proposed bridge and extend from the north to south river bank. The work area will be created with riprap sized to withstand river flow and confined by perimeter K-rail. The riprap will be covered with dirt to create a smooth travel surface. A haul bridge will be installed within the work area to span the river's existing low flow channel. The bridge will allow the San Diego River low flow to continue uninterrupted through the work area. The maximum vertical clearance from the bridge soffit to low flow channel will be over 2 feet. This facility is currently estimated to be needed from the beginning of 2026 to early 2027. The riprap, K-rail, and bridge will be removed after this period.

Hydraulic and sediment transport analyses have been performed to assess the temporary work area. The analyses model the completed portions of the SDSU Mission Valley Campus. HEC-RAS analyses (attached) were performed first to assess the low flow capacity of the proposed work area with the bridge. Figure 1 contains post-project San Diego River 1-, 2-, and 5-year water surface profiles. The work area is in grey between cross-sections 42650 and 42702. Figure 1 shows that the 1- and 2-year flows will not overtop the work area while the 5-year flow does overtop. Since the elevated work area will be in place for slightly more than a year, the facility will convey the flow frequencies associated with its operational timeframe.

Pre- and post-project HEC-RAS analyses were performed to assess the temporary work area impacts during low probability, high flow events. The HEC-RAS results and work map are attached. Table 1 summarizes the pre- and post-project 20-, 50-, and 100-year water surface elevations from Qualcomm Way downstream of the project (cross-section 38125) to Interstate 15 upstream of the project (cross-section 46618). Table 1 shows that the project will not change the downstream water surface elevations. This is consistent with San Diego River's subcritical flow regime where water surface elevations are controlled by downstream, not upstream, conditions. Table 1 shows minor increases in water surface elevations above the project. The largest increase is 0.34 feet at cross-section 42754 just upstream of the work area. The increases diminish before Interstate 15. The HEC-RAS cross-section plots (the cross-sections are looking in the downstream direction) show that the minor increases are contained within the southerly San Diego River bank. Therefore, the temporary work area will convey large flows up to the 100-year design storm without adversely impacting adjacent properties.

Memorandum

To: Sarah Lozano, Dudek
From: Wayne W. Chang
Re: Fenton Parkway Bridge – Temporary Rock Work Area
Date: July 25, 2024



The contractor requires a temporary, elevated work area across the San Diego River to construct the Fenton Parkway Bridge “erosion control rock-fortified work area” or “work area”. The work area will be used by construction vehicles and heavy equipment. The top of the work area will be approximately 5 feet above the channel bed and will extend from the north river bank to the south river bank. The work area will be constructed of riprap sized to withstand the river flow and confined by perimeter K-rail. The interstitial spaces in the riprap will be filled with smaller crushed stone to create a smooth travel surface. A haul bridge will be installed within the work area to span the river’s existing low flow channel. This haul bridge will allow the San Diego River low flow to continue through the work area. The maximum vertical clearance from the haul bridge soffit to low flow channel will be more than 2 feet. This facility is expected to be needed from the beginning of 2026 to early 2027. The riprap, K-rail, and haul bridge will be removed after this period.

Hydraulic and sediment transport analyses have been performed to assess the temporary work area. The analyses model the completed portions of the SDSU Mission Valley Site. HEC-RAS analyses (attached) were performed first to assess the low flow capacity of the proposed work area with the temporary haul bridge. Figure 1 contains post-project San Diego River 1-, 2-, and 5-year water surface profiles. The work area is indicated in grey between cross-sections 42650 and 42702. Figure 1 shows that the 1- and 2-year flows will not overtop the work area while the 5-year flow does overtop. Since the elevated work area will be in place for slightly more than a year, the facility can be expected to convey the flow frequencies associated with its operational timeframe.

Pre- and post-work area HEC-RAS analyses were performed to assess the temporary work area impacts during low-probability, high-flow events. The HEC-RAS results and work map are attached. Table 1 summarizes the pre- and post-project 20-, 50-, and 100-year water surface elevations from Qualcomm Way downstream of the project (cross-section 38125) to Interstate 15 upstream of the project (cross-section 46618). Table 1 shows that the project will not change the downstream water surface elevations. This is consistent with San Diego River’s subcritical flow regime where water surface elevations are controlled by downstream, not upstream, conditions. Table 1 shows minor increases in water surface elevations above the project. The largest increase is 0.34 feet at cross-section 42754 just upstream of the work area. The increases diminish before Interstate 15. The HEC-RAS cross-section plots (the cross-sections are looking in the downstream direction) show that the minor increases are contained within the southerly San Diego River bank. Therefore, the temporary work area will convey large flows up to the 100-year design storm without adversely impacting adjacent properties.

The 100-year HEC-RAS post-work area flow velocity at the temporary work area is 6 feet per second. The riprap will be sized to withstand and remain in place under this velocity.

A natural stream such as the San Diego River will transport sediment. The watershed tributary to the temporary work area below the El Capitan and San Vicente Reservoirs covers approximately 140 square miles, so there is a large sediment source. The project footprint is a minor fraction of the watershed area, so the temporary work area will not impact sediment supply. Sediment transport will not be impacted during the lesser 1- and 2-year events since the bridge will allow these flows to continue to be conveyed along the low flow channel.

Pre- and post-work area FLUVIAL-12 sediment transport analyses were performed to assess sediment transport impacts by larger overtopping flows. FLUVIAL-12 simulates inter-related changes in channel-bed profile and channel width based upon a stream's tendency to seek uniformities in sediment discharge and power expenditure. A river channel may not have a uniform power expenditure or linear water-surface profile, but it is constantly adjusting itself toward that direction. FLUVIAL-12 was developed and calibrated by Dr. Howard Chang of Chang Consultants, and has been used on dozens of local streams including several other projects along the San Diego River.

Figure 2 presents the pre-work area sediment delivery results graphically at the peak and near the end of the overtopping flow event. An increasing curve to the left indicates that sediment is being removed from the channel as flow continues downstream, i.e., erosion is occurring. A decreasing curve to the left indicates that sediment is being stored in the channel as flow continues downstream, i.e., deposition is occurring. A horizontal curve indicates that sediment is transported near equilibrium. The sediment inflow is minimized to account for sediment capture in the historic instream mines above the study reach. Sediment transport along the SDSU Mission Valley site is generally horizontal, so near equilibrium.

Figure 3 presents the post-work area sediment delivery results graphically at the peak and near the end of the overtopping flow event. The sediment delivery curves are nearly identical to Figure 3. Therefore, the temporary work area will not significantly capture nor alter sediment transport during larger overtopping flows.

In summary, HEC-RAS hydraulic analyses show that the temporary work area with haul bridge will continue to convey the 1- and 2-year flows along the existing low flow channel. Overtopping flow will occur as the flood frequency approaches the 5-year flow. The work area will cause minor upstream increases in water surface elevations up to the 100-year design storm. The increases will not impact adjacent properties, including the City's Stadium Wetland Mitigation Site. The likelihood of a 100-year or other large storm is remote over the 1-plus year duration of the temporary work area. The work area will not alter downstream water surface elevations. The pre-project work area footprint is a negligible sediment source compared to the overall watershed. Post-project sediment delivery will be conveyed along the existing low flow channel during the 1- and 2-year events similar to pre-project condition delivery. The temporary work area essentially maintains pre-project sediment delivery during larger overtopping flows.

Cross-Section	Event	Flow Rate, cfs	Pre-Project WSE, ft	Post-Project WSE, ft	Post- – Pre-Project WSE, ft
46618	20-Year	7,300	55.19	55.19	0.00
46618	50-Year	17,000	59.30	59.31	0.01
46618	100-Year	36,000	64.44	64.44	0.00
46403	20-Year	7,300	54.66	54.66	0.00
46403	50-Year	17,000	59.02	59.02	0.00
46403	100-Year	36,000	64.36	64.37	0.01
46128	20-Year	7,300	54.19	54.19	0.00
46128	50-Year	17,000	58.46	58.47	0.01
46128	100-Year	36,000	63.48	63.48	0.00
45853	20-Year	7,300	53.83	53.83	0.00
45853	50-Year	17,000	58.24	58.25	0.01
45853	100-Year	36,000	63.36	63.36	0.00
45523	20-Year	7,300	53.42	53.42	0.00
45523	50-Year	17,000	57.80	57.80	0.00
45523	100-Year	36,000	62.97	62.97	0.00
45193	20-Year	7,300	52.72	52.73	0.01
45193	50-Year	17,000	56.86	56.87	0.01
45193	100-Year	36,000	61.59	61.60	0.01
44853	20-Year	7,300	51.16	51.18	0.02
44853	50-Year	17,000	55.09	55.10	0.01
44853	100-Year	36,000	59.23	59.25	0.02
44513	20-Year	7,300	48.85	48.92	0.07
44513	50-Year	17,000	52.61	52.66	0.05
44513	100-Year	36,000	56.19	56.29	0.10
44233	20-Year	7,300	47.98	48.10	0.12
44233	50-Year	17,000	51.58	51.67	0.09
44233	100-Year	36,000	55.76	55.90	0.14
43953	20-Year	7,300	47.52	47.66	0.14
43953	50-Year	17,000	51.08	51.20	0.12
43953	100-Year	36,000	55.41	55.58	0.17
43703	20-Year	7,300	47.35	47.50	0.15

Cross-Section	Event	Flow Rate, cfs	Pre-Project WSE, ft	Post-Project WSE, ft	Post- – Pre-Project WSE, ft
43703	50-Year	17,000	50.93	51.06	0.13
43703	100-Year	36,000	55.35	55.52	0.17
43452	20-Year	7,300	47.05	47.23	0.18
43452	50-Year	17,000	50.65	50.79	0.14
43452	100-Year	36,000	55.20	55.38	0.18
43163	20-Year	7,300	46.39	46.63	0.24
43163	50-Year	17,000	49.95	50.15	0.20
43163	100-Year	36,000	54.74	54.95	0.21
43000	20-Year	7,300	46.10	46.38	0.28
43000	50-Year	17,000	49.58	49.81	0.23
43000	100-Year	36,000	54.30	54.54	0.24
42873	20-Year	7,300	45.85	46.16	0.31
42873	50-Year	17,000	49.20	49.46	0.26
42873	100-Year	36,000	53.78	54.05	0.27
42754	20-Year	7,300	45.71	46.05	0.34
42754	50-Year	17,000	49.00	49.28	0.28
42754	100-Year	36,000	53.55	53.83	0.28
42702	Temporary Work Area				
42650	20-Year	7,300	45.63	45.63	0.00
42650	50-Year	17,000	48.90	48.90	0.00
42650	100-Year	36,000	53.44	53.44	0.00
42583	20-Year	7,300	45.33	45.33	0.00
42583	50-Year	17,000	48.43	48.43	0.00
42583	100-Year	36,000	52.83	52.83	0.00
42319	20-Year	7,300	45.01	45.01	0.00
42319	50-Year	17,000	48.04	48.04	0.00
42319	100-Year	36,000	52.55	52.55	0.00
42001	20-Year	7,300	44.28	44.28	0.00
42001	50-Year	17,000	47.13	47.13	0.00
42001	100-Year	36,000	51.69	51.69	0.00

Cross-Section	Event	Flow Rate, cfs	Pre-Project WSE, ft	Post-Project WSE, ft	Post- – Pre-Project WSE, ft
41710	20-Year	7,300	42.88	42.88	0.00
41710	50-Year	17,000	45.73	45.73	0.00
41710	100-Year	36,000	50.78	50.78	0.00
41416	20-Year	7,300	41.21	41.21	0.00
41416	50-Year	17,000	44.80	44.80	0.00
41416	100-Year	36,000	50.34	50.34	0.00
41116	20-Year	7,300	40.20	40.20	0.00
41116	50-Year	17,000	44.35	44.35	0.00
41116	100-Year	36,000	50.03	50.03	0.00
40815	20-Year	7,300	39.75	39.75	0.00
40815	50-Year	17,000	44.04	44.04	0.00
40815	100-Year	36,000	49.73	49.73	0.00
40514	20-Year	7,300	39.53	39.53	0.00
40514	50-Year	17,000	43.84	43.84	0.00
40514	100-Year	36,000	49.53	49.53	0.00
40225	20-Year	7,300	38.86	38.86	0.00
40225	50-Year	17,000	42.91	42.91	0.00
40225	100-Year	36,000	48.35	48.35	0.00
39925	20-Year	7,300	37.52	37.52	0.00
39925	50-Year	17,000	41.93	41.93	0.00
39925	100-Year	36,000	47.85	47.85	0.00
39625	20-Year	7,300	37.25	37.25	0.00
39625	50-Year	17,000	41.71	41.71	0.00
39625	100-Year	36,000	47.59	47.59	0.00
39325	20-Year	7,300	37.04	37.04	0.00
39325	50-Year	17,000	41.46	41.46	0.00
39325	100-Year	36,000	47.29	47.29	0.00
39025	20-Year	7,300	36.78	36.78	0.00
39025	50-Year	17,000	41.17	41.17	0.00
39025	100-Year	36,000	46.92	46.92	0.00
38725	20-Year	7,300	36.44	36.44	0.00

Cross-Section	Event	Flow Rate, cfs	Pre-Project WSE, ft	Post-Project WSE, ft	Post- – Pre-Project WSE, ft
38725	50-Year	17,000	40.80	40.80	0.00
38725	100-Year	36,000	46.49	46.49	0.00
38425	20-Year	7,300	36.03	36.03	0.00
38425	50-Year	17,000	40.31	40.31	0.00
38425	100-Year	36,000	45.85	45.85	0.00
38125	20-Year	7,300	35.52	35.52	0.00
38125	50-Year	17,000	39.75	39.75	0.00
38125	100-Year	36,000	45.29	45.29	0.00

WSE = water surface elevation

Table 1. Comparison of Pre- and Post-Project Water Surface Elevations

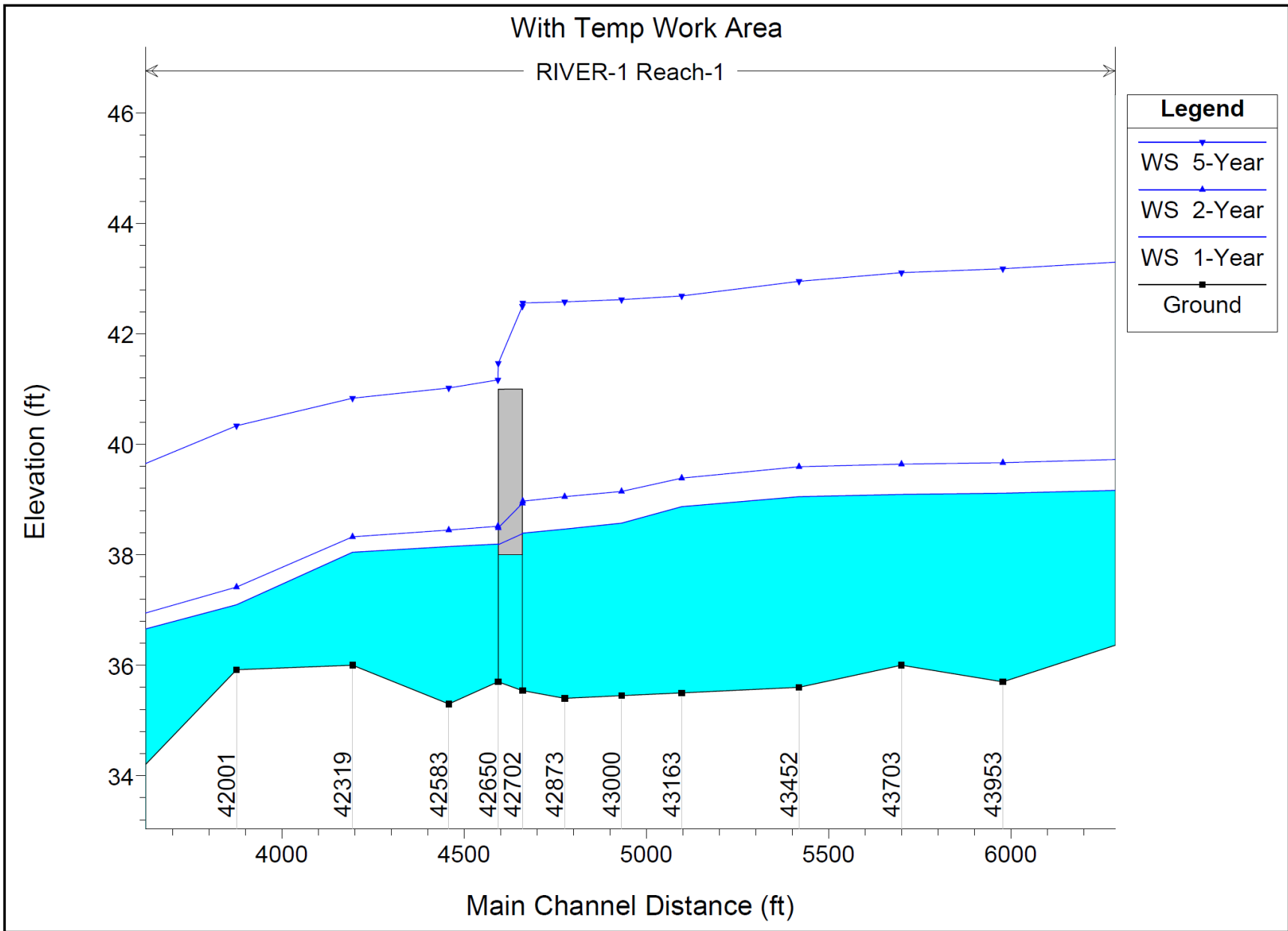


Figure 1. Post-Project San Diego River 1-, 2-, And 5-Year Water Surface Profiles

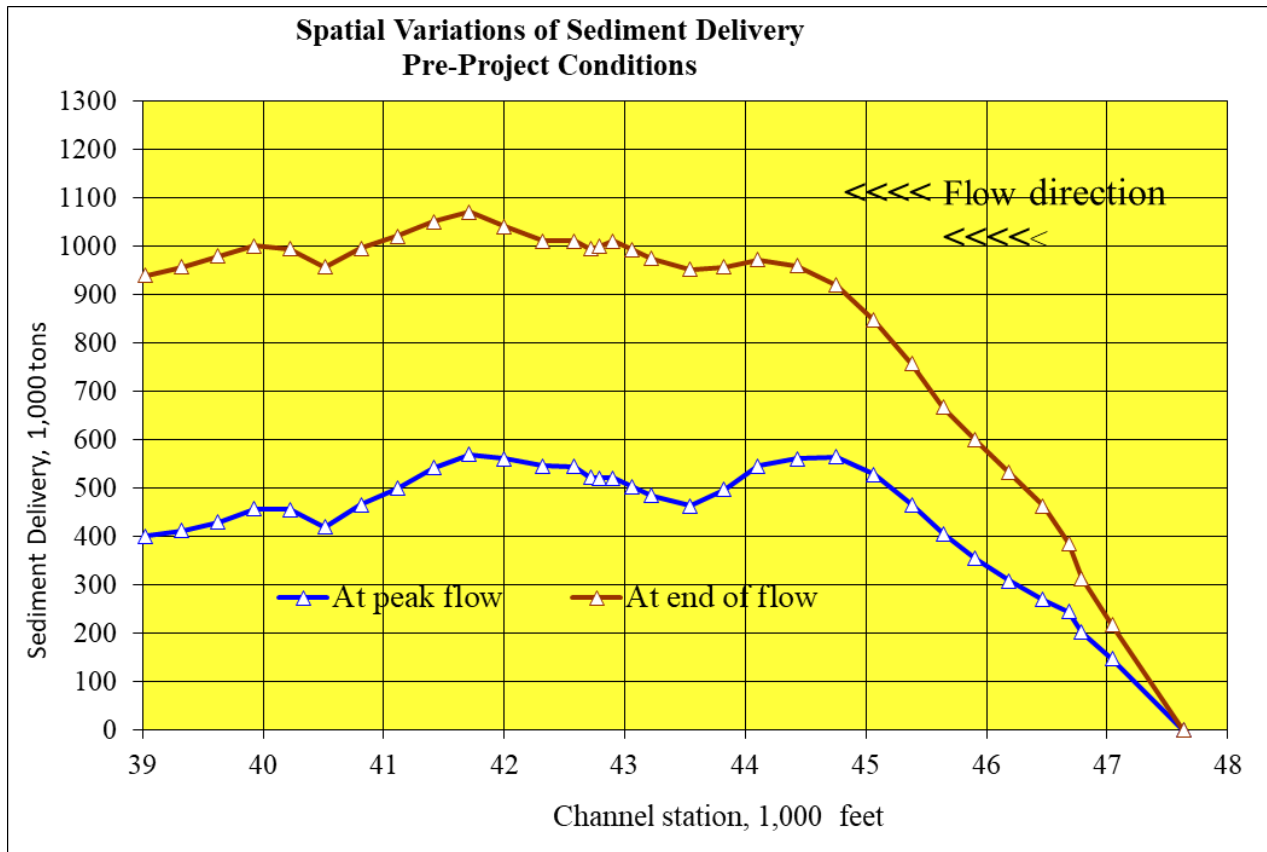


Figure 2. Pre-Project Sediment Delivery

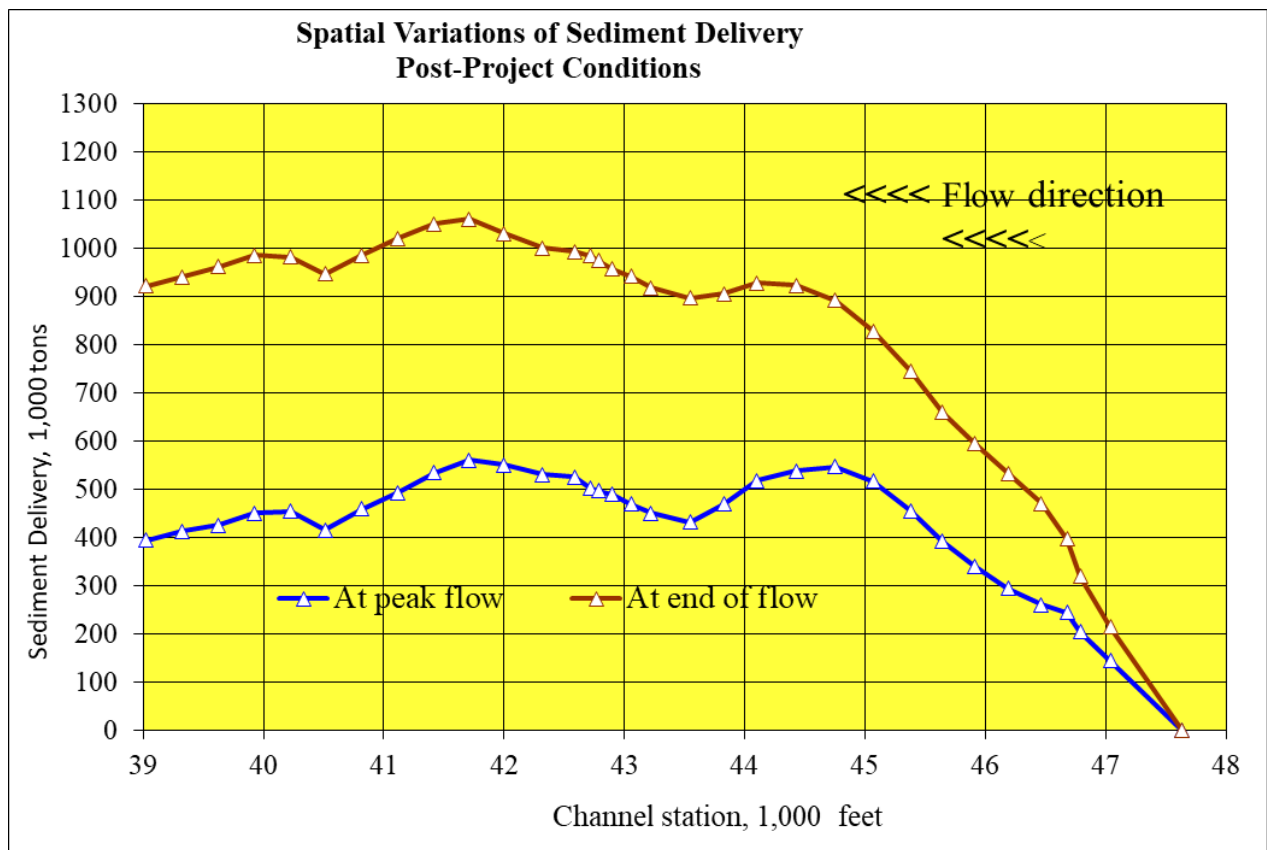


Figure 3. Post-Project Sediment Delivery

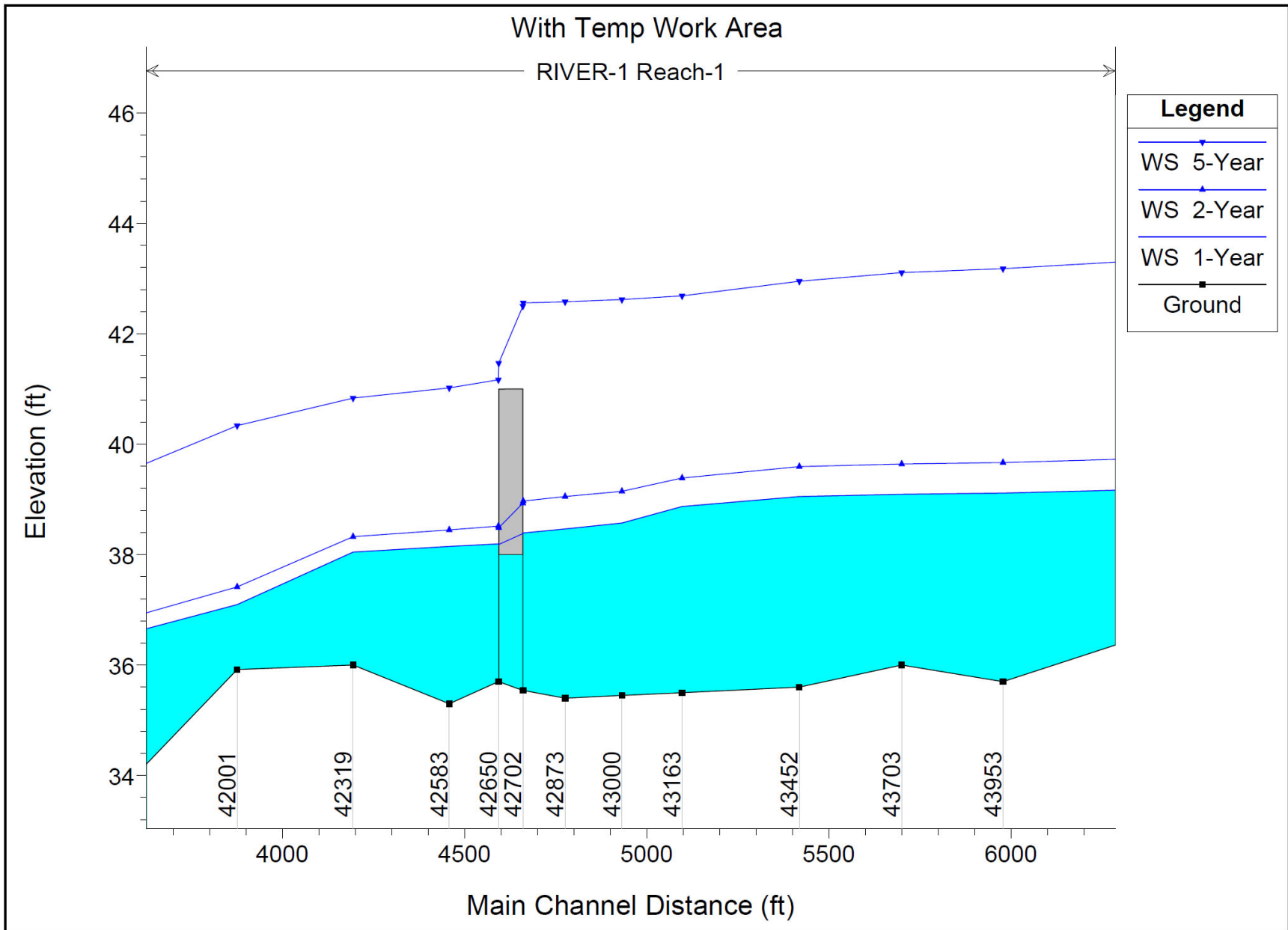


Figure 1. Post-Project San Diego River 1-, 2-, And 5-Year Water Surface Profiles

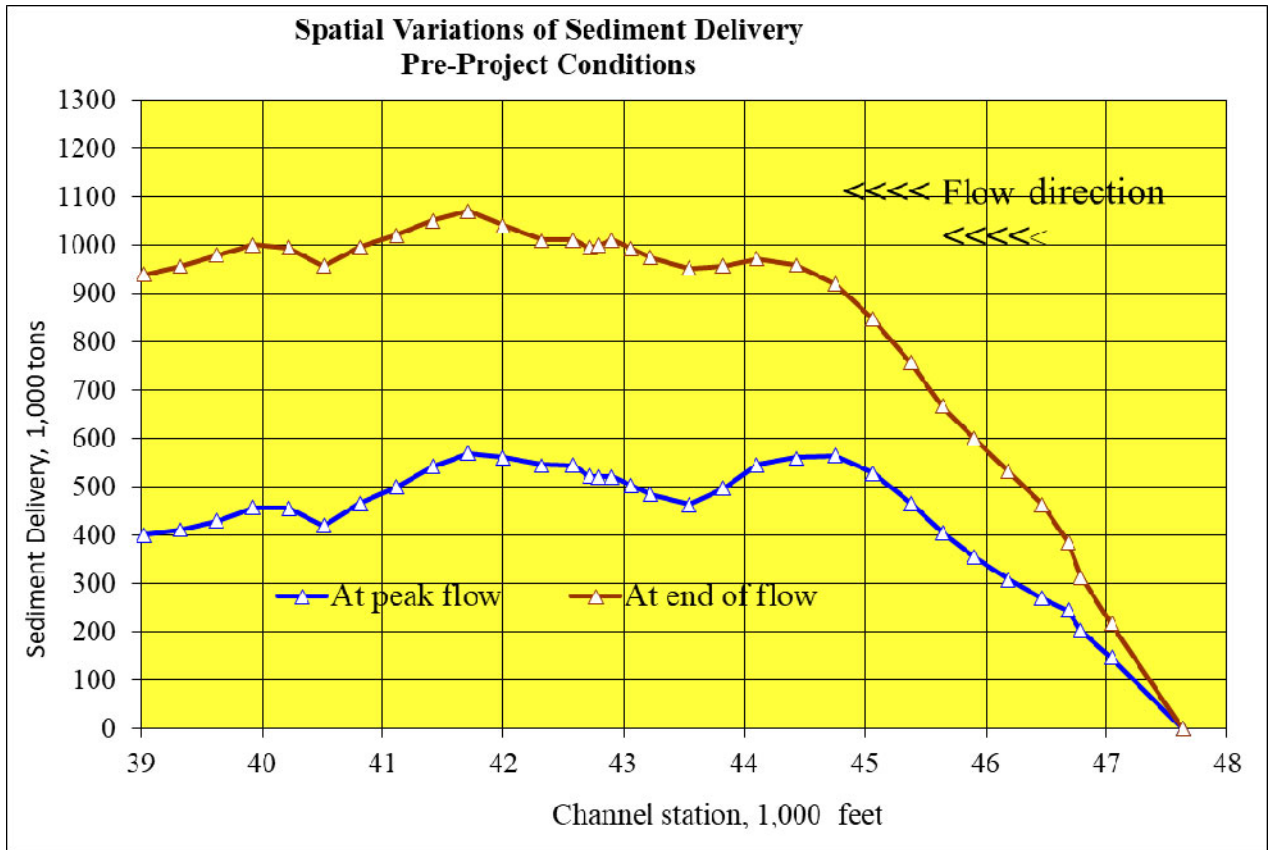


Figure 2. Pre-Project Sediment Delivery

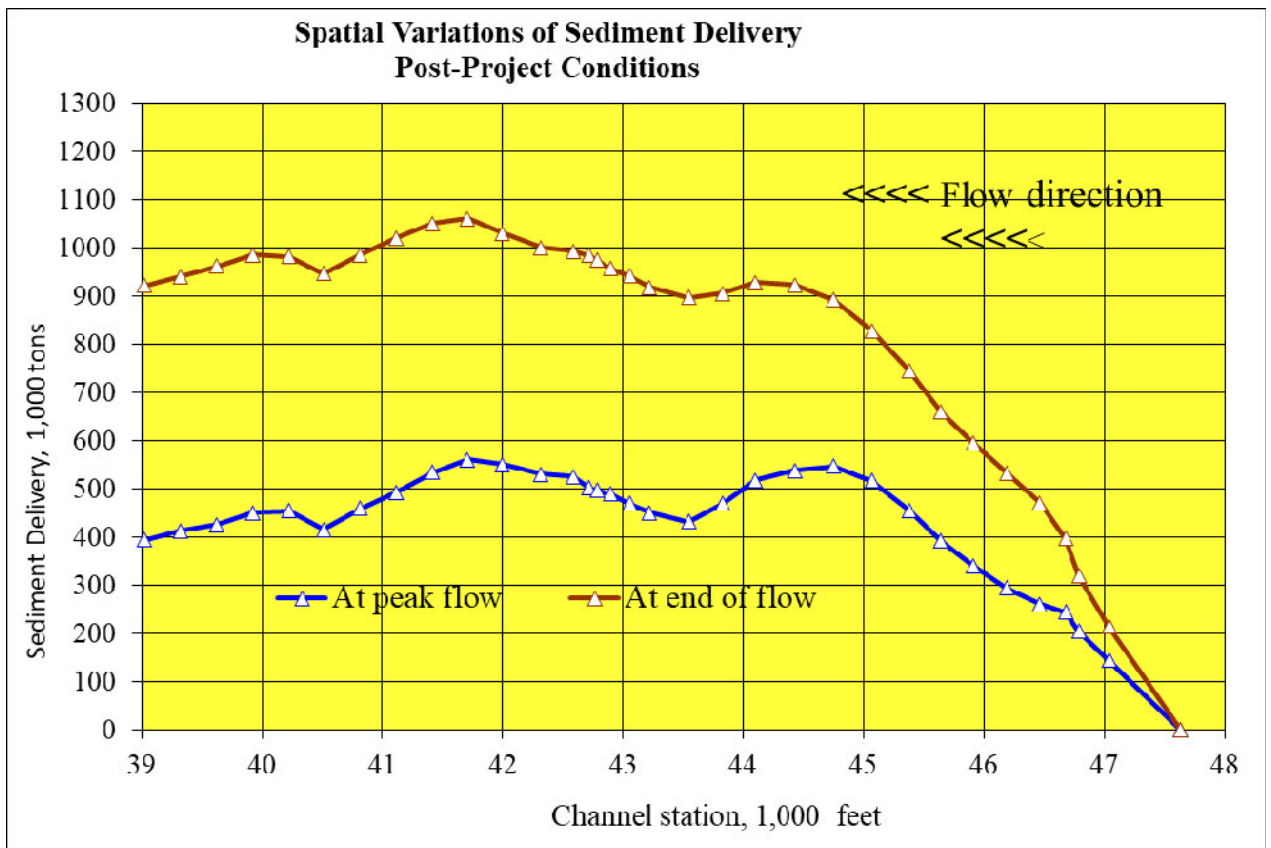


Figure 3. Post-Project Sediment Delivery

Post-Project 1-, 2-, and 5-Year Results

HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	46618	1-Year	100.00	44.50	46.26	45.13	46.29	0.003217	1.39	71.86	51.68	0.21
Reach-1	46618	2-Year	150.00	44.50	46.66	45.31	46.70	0.003758	1.59	94.36	62.52	0.23
Reach-1	46618	5-Year	1100.00	44.50	49.55	47.36	49.66	0.005575	2.70	407.99	165.02	0.30
Reach-1	46403	1-Year	100.00	44.30	45.99	44.76	46.00	0.000743	0.67	149.24	107.75	0.10
Reach-1	46403	2-Year	150.00	44.30	46.32	44.87	46.33	0.000921	0.80	187.85	122.59	0.11
Reach-1	46403	5-Year	1100.00	44.30	49.03	46.11	49.08	0.001521	1.64	671.13	216.82	0.16
Reach-1	46128	1-Year	100.00	43.90	45.57	44.76	45.59	0.004082	1.17	85.46	96.10	0.22
Reach-1	46128	2-Year	150.00	43.90	45.82	44.93	45.85	0.004544	1.35	111.22	109.52	0.24
Reach-1	46128	5-Year	1100.00	43.90	48.42	46.31	48.49	0.003138	2.08	528.22	205.26	0.23
Reach-1	45853	1-Year	100.00	43.40	44.48	43.85	44.50	0.003717	1.06	94.54	115.31	0.21
Reach-1	45853	2-Year	150.00	43.40	44.82	43.97	44.84	0.002911	1.11	135.40	128.27	0.19
Reach-1	45853	5-Year	1100.00	43.40	47.84	45.11	47.88	0.001555	1.58	696.62	242.23	0.16
Reach-1	45523	1-Year	100.00	42.80	44.11	43.09	44.11	0.000770	0.62	162.53	137.13	0.10
Reach-1	45523	2-Year	150.00	42.80	44.48	43.18	44.48	0.000757	0.70	215.37	148.96	0.10
Reach-1	45523	5-Year	1100.00	42.80	47.55	44.19	47.57	0.000868	1.36	806.95	225.63	0.13
Reach-1	45193	1-Year	100.00	42.10	43.60	42.86	43.65	0.007328	1.74	57.47	55.16	0.30
Reach-1	45193	2-Year	150.00	42.10	43.98	43.06	44.03	0.006657	1.88	79.88	63.63	0.30
Reach-1	45193	5-Year	1100.00	42.10	47.02	44.90	47.12	0.004728	2.50	439.27	175.90	0.28
Reach-1	44853	1-Year	100.00	39.90	41.76		41.80	0.004871	1.60	62.38	49.77	0.25
Reach-1	44853	2-Year	150.00	39.90	42.10		42.16	0.005481	1.87	80.28	55.59	0.27
Reach-1	44853	5-Year	1100.00	39.90	45.38		45.52	0.005569	3.03	363.31	123.39	0.31
Reach-1	44513	1-Year	100.00	37.90	39.64	38.90	39.71	0.009767	2.11	47.35	42.07	0.35
Reach-1	44513	2-Year	150.00	37.90	40.17	39.15	40.24	0.006972	2.07	72.32	51.25	0.31
Reach-1	44513	5-Year	1100.00	37.90	43.70	41.26	43.84	0.005189	2.97	370.26	122.64	0.30
Reach-1	44233	1-Year	100.00	36.40	39.17	37.03	39.18	0.000617	0.70	143.44	84.63	0.09
Reach-1	44233	2-Year	150.00	36.40	39.73	37.22	39.74	0.000633	0.77	195.62	102.10	0.10
Reach-1	44233	5-Year	1100.00	36.40	43.30	39.22	43.33	0.000690	1.18	929.68	270.35	0.11
Reach-1	43953	1-Year	100.00	35.70	39.11	36.34	39.12	0.000085	0.30	329.48	154.19	0.04
Reach-1	43953	2-Year	150.00	35.70	39.67	36.50	39.67	0.000097	0.36	418.80	168.73	0.04

HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

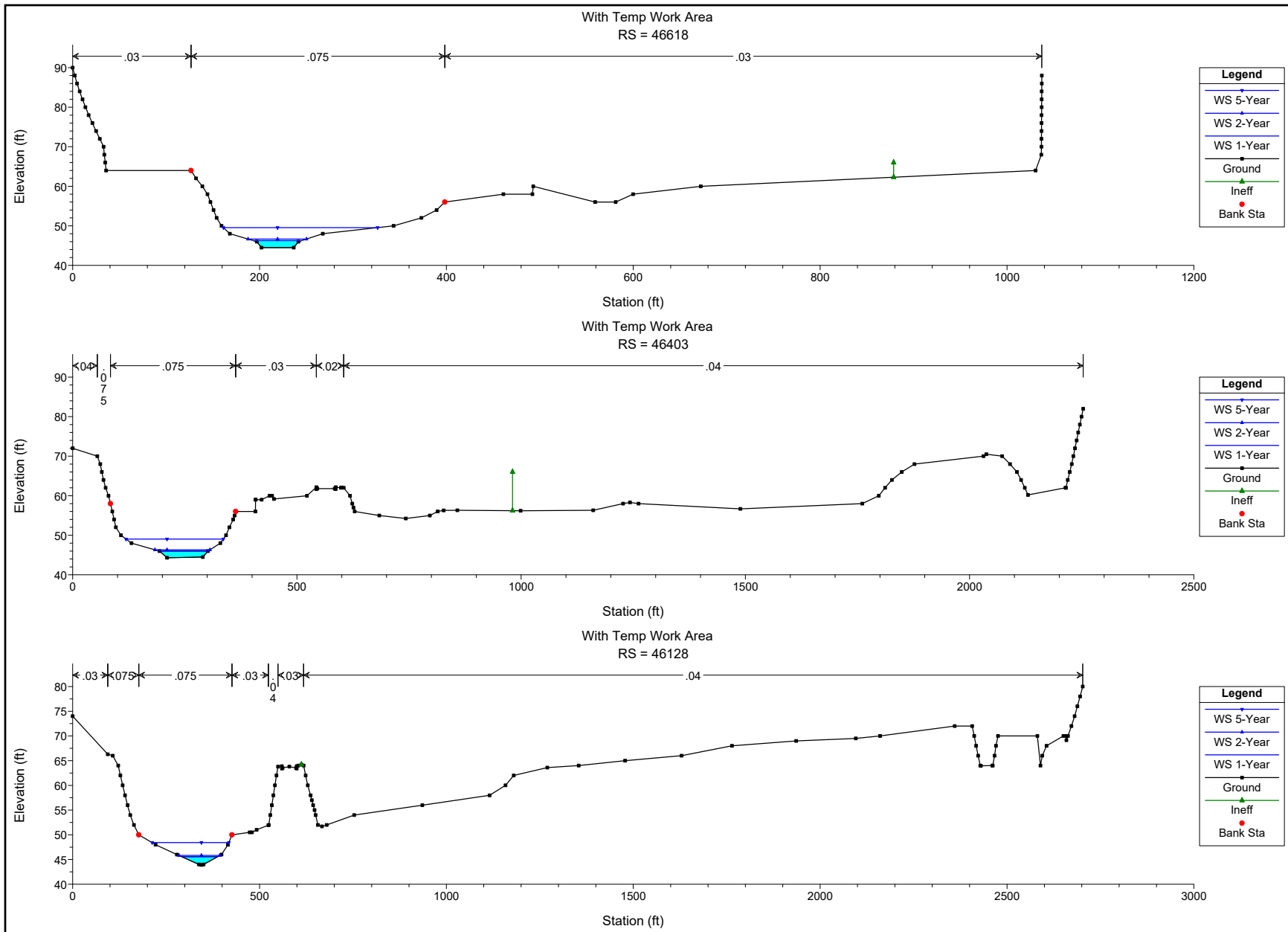
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	43953	5-Year	1100.00	35.70	43.18	37.94	43.19	0.000267	0.86	1276.99	293.79	0.07
Reach-1	43703	1-Year	100.00	36.00	39.09		39.09	0.000076	0.30	336.02	148.15	0.03
Reach-1	43703	2-Year	150.00	36.00	39.64		39.64	0.000088	0.36	419.94	157.10	0.04
Reach-1	43703	5-Year	1100.00	36.00	43.11		43.12	0.000264	0.74	1502.00	523.60	0.07
Reach-1	43452	1-Year	100.00	35.60	39.05	36.34	39.06	0.000251	0.55	181.28	77.29	0.06
Reach-1	43452	2-Year	150.00	35.60	39.59	36.54	39.60	0.000306	0.67	224.89	83.70	0.07
Reach-1	43452	5-Year	1100.00	35.60	42.95	38.47	42.97	0.001290	1.21	908.11	407.68	0.14
Reach-1	43163	1-Year	100.00	35.50	38.87		38.89	0.001719	0.98	102.06	77.73	0.15
Reach-1	43163	2-Year	150.00	35.50	39.39		39.40	0.001773	1.00	149.28	112.28	0.15
Reach-1	43163	5-Year	1100.00	35.50	42.69		42.70	0.000580	1.05	1049.07	321.10	0.10
Reach-1	43000	1-Year	100.00	35.45	38.57	36.42	38.58	0.001959	0.87	115.42	116.94	0.15
Reach-1	43000	2-Year	150.00	35.45	39.15	36.68	39.15	0.001284	0.73	204.99	195.29	0.13
Reach-1	43000	5-Year	1100.00	35.45	42.62	39.07	42.63	0.000313	0.88	1260.54	327.17	0.08
Reach-1	42873	1-Year	100.00	35.40	38.46		38.47	0.000374	0.49	202.87	138.72	0.07
Reach-1	42873	2-Year	150.00	35.40	39.05		39.06	0.000363	0.50	302.78	201.14	0.07
Reach-1	42873	5-Year	1100.00	35.40	42.58		42.59	0.000253	0.82	1343.34	319.78	0.07
Reach-1	42754	1-Year	100.00	35.54	38.39	36.43	38.41	0.000670	1.09	91.76	199.64	0.13
Reach-1	42754	2-Year	150.00	35.54	38.97	36.64	39.00	0.000706	1.30	115.19	238.28	0.14
Reach-1	42754	5-Year	1100.00	35.54	42.56	38.96	42.57	0.000129	0.77	1432.61	323.77	0.06
Reach-1	42702		Bridge									
Reach-1	42650	1-Year	100.00	35.70	38.19	36.50	38.20	0.000661	0.80	124.69	87.26	0.12
Reach-1	42650	2-Year	150.00	35.70	38.52	36.67	38.53	0.001057	0.95	158.18	122.78	0.15
Reach-1	42650	5-Year	1100.00	35.70	41.16	38.62	41.19	0.000760	1.29	851.67	331.16	0.14
Reach-1	42583	1-Year	100.00	35.30	38.15		38.15	0.000231	0.46	215.82	115.03	0.06
Reach-1	42583	2-Year	150.00	35.30	38.45		38.45	0.000340	0.60	251.78	126.36	0.07
Reach-1	42583	5-Year	1100.00	35.30	41.02		41.06	0.001270	1.63	699.38	218.14	0.15
Reach-1	42319	1-Year	100.00	36.00	38.05		38.05	0.000798	0.47	212.26	275.34	0.09
Reach-1	42319	2-Year	150.00	36.00	38.33		38.33	0.000664	0.51	291.87	292.25	0.09

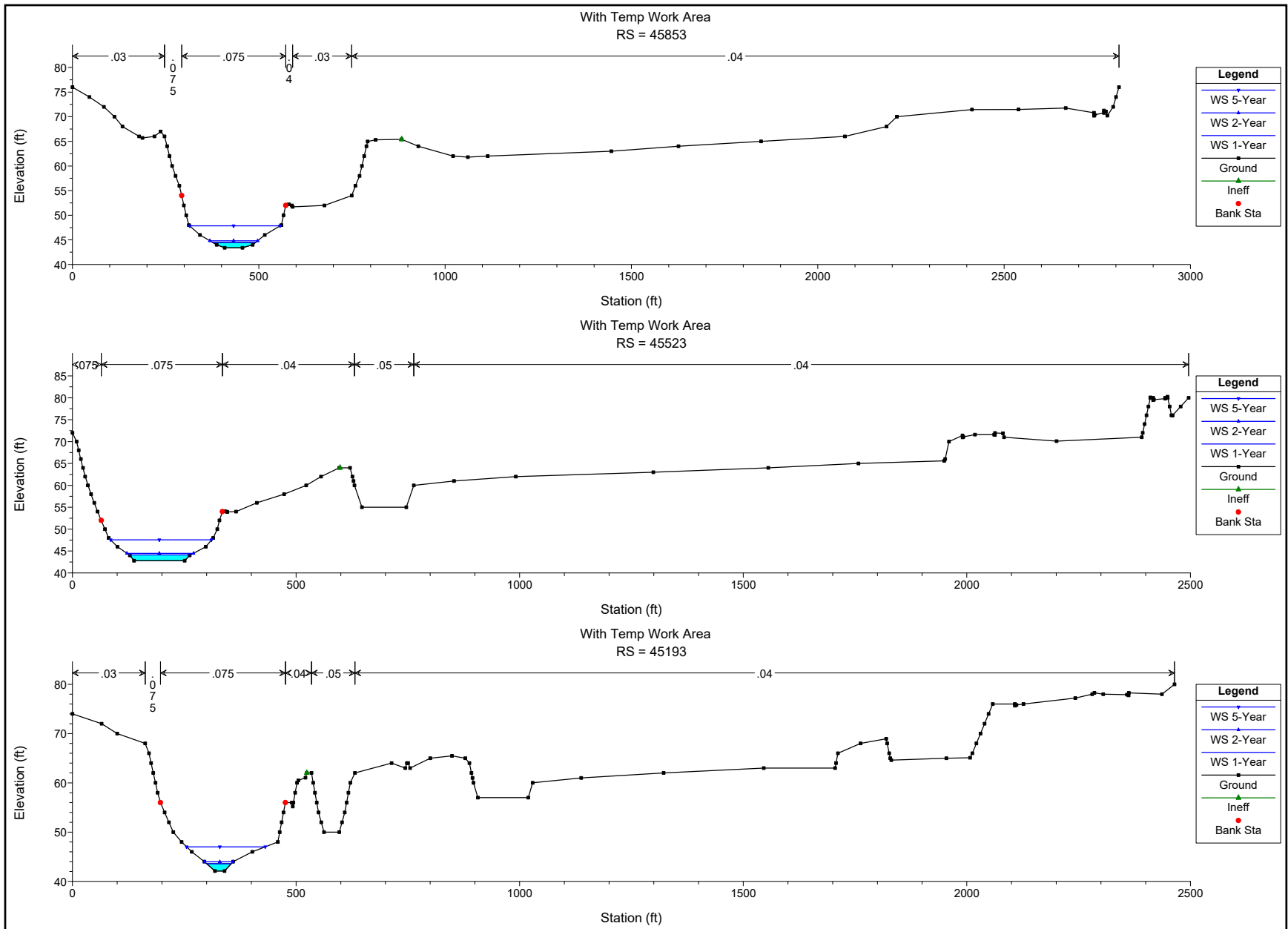
HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

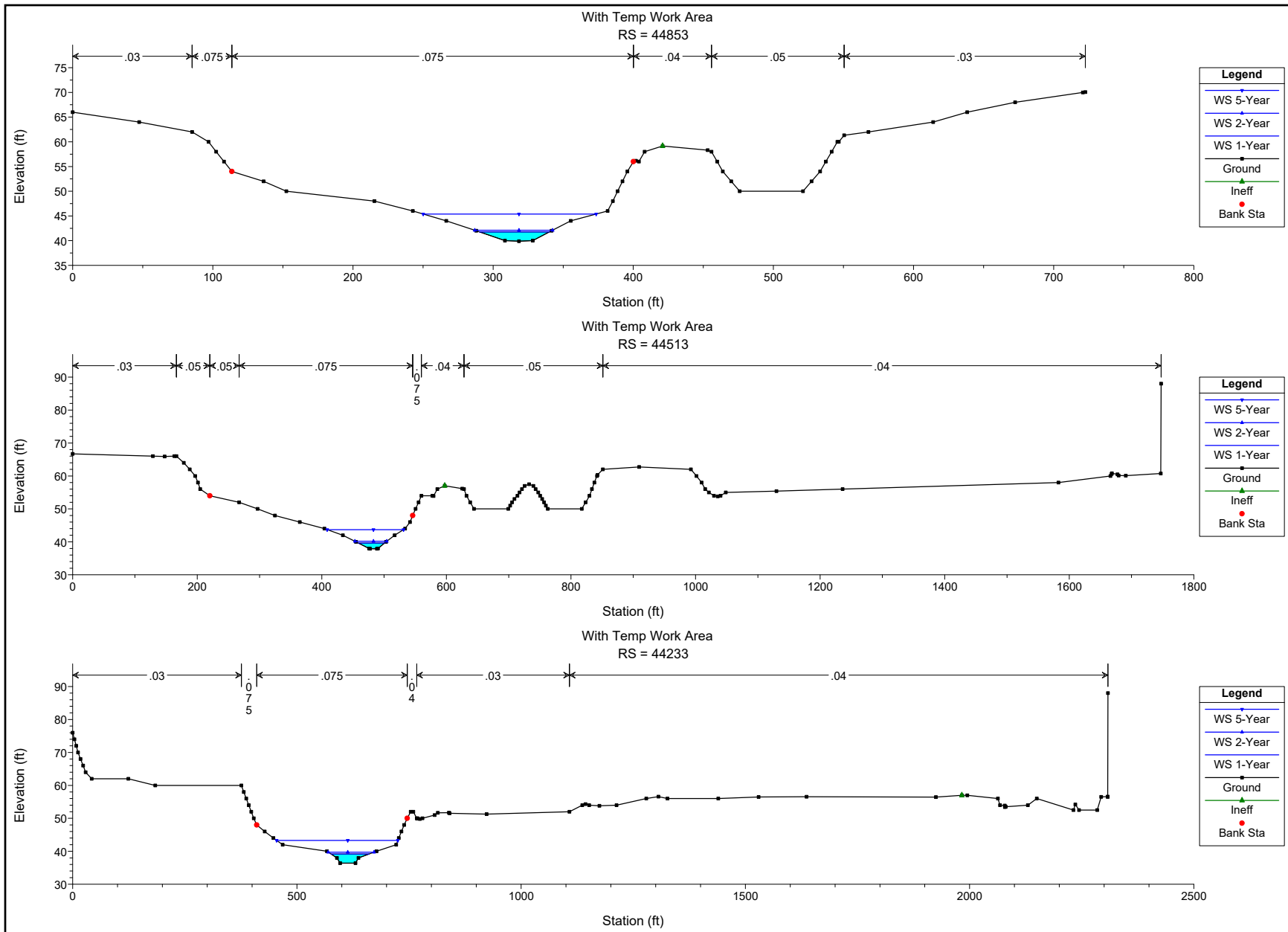
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	42319	5-Year	1100.00	36.00	40.83		40.85	0.000518	0.90	1236.13	460.66	0.09
Reach-1	42001	1-Year	100.00	35.92	37.09		37.28	0.028640	3.48	28.73	26.55	0.59
Reach-1	42001	2-Year	150.00	35.92	37.42		37.67	0.028395	4.01	37.44	27.69	0.61
Reach-1	42001	5-Year	1100.00	35.92	40.33		40.43	0.006675	2.52	437.46	230.41	0.32
Reach-1	41710	1-Year	100.00	33.92	36.58		36.59	0.000739	0.61	163.25	133.98	0.10
Reach-1	41710	2-Year	150.00	33.92	36.87		36.88	0.000846	0.74	201.78	137.03	0.11
Reach-1	41710	5-Year	1100.00	33.92	39.54		39.57	0.001602	1.51	728.82	276.50	0.16
Reach-1	41416	1-Year	100.00	33.92	36.40		36.41	0.000515	0.73	137.42	66.12	0.09
Reach-1	41416	2-Year	150.00	33.92	36.61		36.62	0.000872	0.99	151.29	67.93	0.12
Reach-1	41416	5-Year	1100.00	33.92	38.69		38.74	0.006242	1.88	588.00	457.30	0.29
Reach-1	41116	1-Year	100.00	33.92	36.13	34.54	36.13	0.002043	0.46	217.47	592.64	0.13
Reach-1	41116	2-Year	150.00	33.92	36.23	34.73	36.23	0.002153	0.55	274.03	598.69	0.14
Reach-1	41116	5-Year	1100.00	33.92	36.90	36.23	36.94	0.005688	1.59	694.13	641.86	0.27
Reach-1	40815	1-Year	100.00	33.92	34.03	34.03	34.09	0.214247	2.05	48.68	459.32	1.11
Reach-1	40815	2-Year	150.00	33.92	34.07	34.07	34.14	0.154095	2.18	68.72	462.41	1.00
Reach-1	40815	5-Year	1100.00	33.92	35.27		35.31	0.005162	1.64	672.00	547.23	0.26
Reach-1	40514	1-Year	100.00	31.92	32.89		32.89	0.000362	0.32	315.13	408.27	0.06
Reach-1	40514	2-Year	150.00	31.92	33.13		33.13	0.000363	0.36	416.96	449.08	0.07
Reach-1	40514	5-Year	1100.00	31.92	34.97		34.98	0.000444	0.75	1474.57	619.93	0.09
Reach-1	40225	1-Year	100.00	31.92	32.65		32.66	0.002907	0.83	120.47	176.07	0.18
Reach-1	40225	2-Year	150.00	31.92	32.89		32.91	0.002488	0.92	163.69	183.60	0.17
Reach-1	40225	5-Year	1100.00	31.92	34.62		34.69	0.003579	2.08	531.04	232.29	0.24
Reach-1	39925	1-Year	100.00	29.92	31.03		31.07	0.012482	1.56	64.04	108.07	0.36
Reach-1	39925	2-Year	150.00	29.92	31.03		31.11	0.028986	2.37	63.29	107.44	0.54
Reach-1	39925	5-Year	1100.00	29.92	32.72		32.87	0.012332	3.10	354.50	211.54	0.42
Reach-1	39625	1-Year	100.00	27.92	30.21		30.21	0.001203	0.44	228.24	450.65	0.11
Reach-1	39625	2-Year	150.00	27.92	30.47		30.48	0.000680	0.43	346.43	455.93	0.09
Reach-1	39625	5-Year	1100.00	27.92	32.36		32.37	0.000555	0.89	1240.64	487.29	0.10

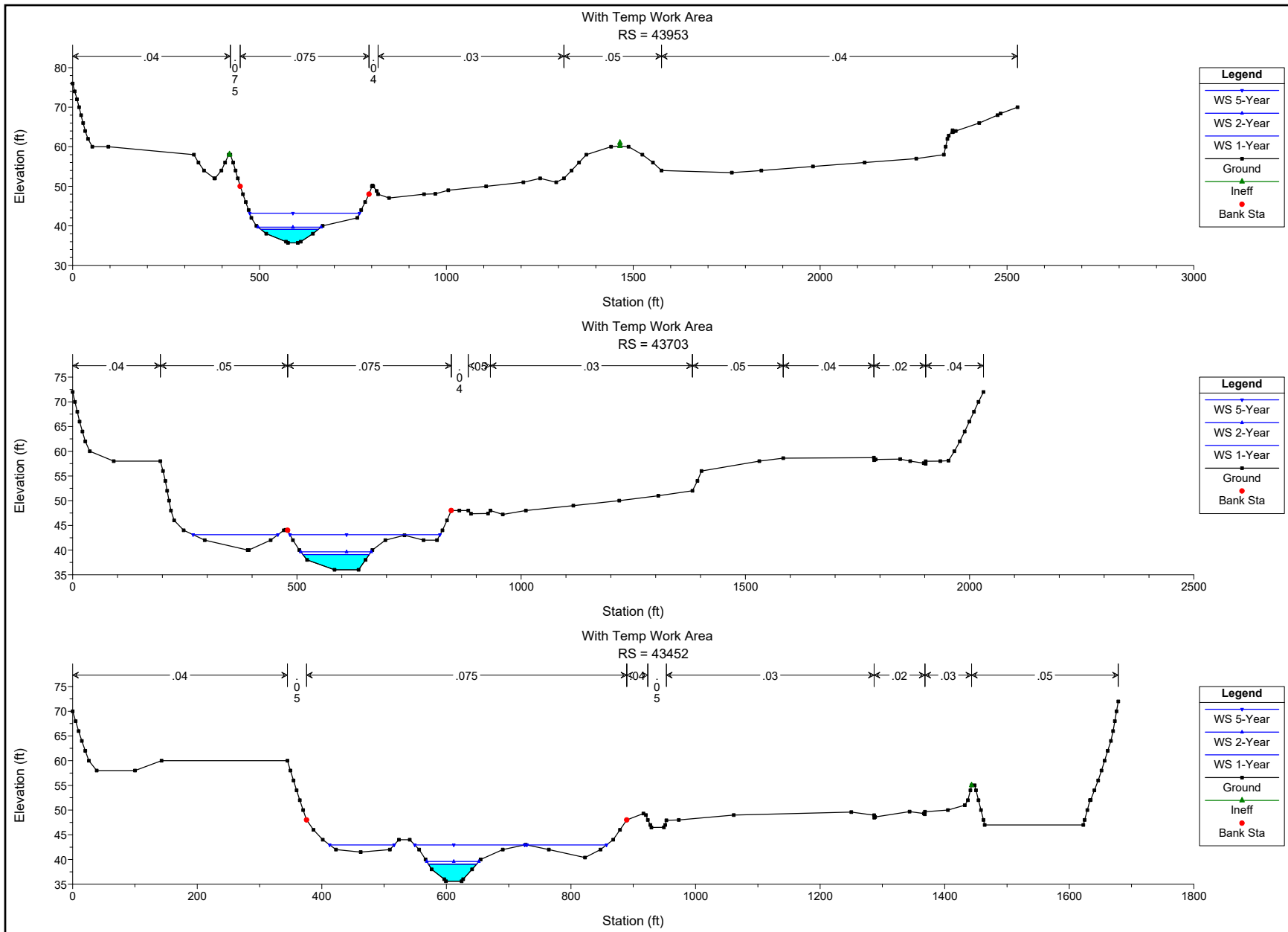
HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

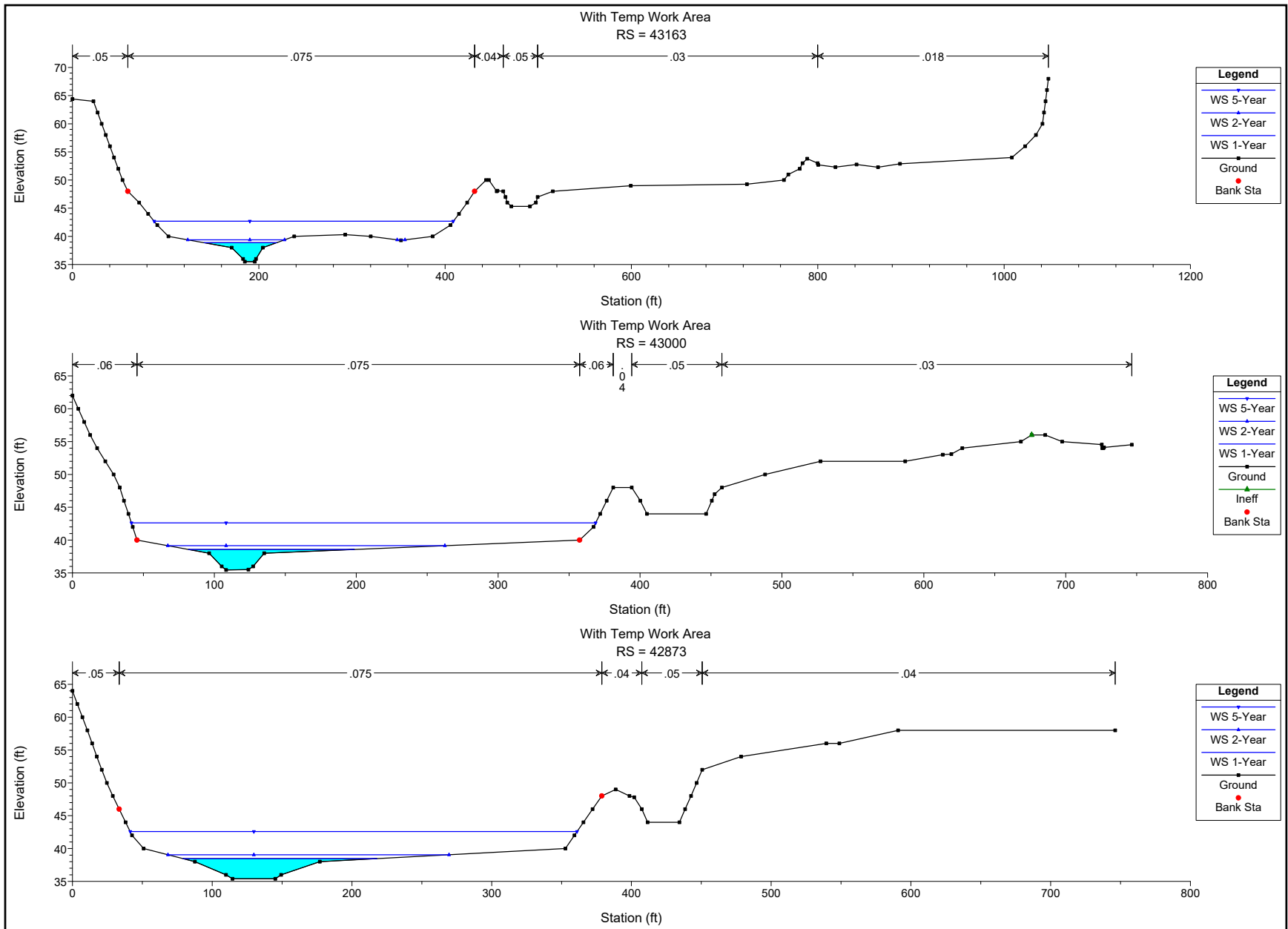
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	39325	1-Year	100.00	27.92	30.00		30.00	0.000481	0.33	293.87	436.38	0.07
Reach-1	39325	2-Year	150.00	27.92	30.35		30.35	0.000268	0.33	449.45	439.21	0.06
Reach-1	39325	5-Year	1100.00	27.92	32.21		32.22	0.000463	0.86	1278.30	454.28	0.09
Reach-1	39025	1-Year	100.00	27.92	29.86		29.86	0.000438	0.46	216.07	183.16	0.08
Reach-1	39025	2-Year	150.00	27.92	30.24		30.24	0.000536	0.42	359.55	414.69	0.08
Reach-1	39025	5-Year	1100.00	27.92	32.04		32.05	0.000687	0.98	1129.61	441.27	0.11
Reach-1	38725	1-Year	100.00	27.92	29.40		29.48	0.013454	2.20	45.43	48.27	0.40
Reach-1	38725	2-Year	150.00	27.92	29.68		29.78	0.014407	2.51	59.76	54.88	0.42
Reach-1	38725	5-Year	1100.00	27.92	31.70		31.73	0.001849	1.33	827.62	428.07	0.17
Reach-1	38425	1-Year	100.00	27.92	29.15		29.15	0.000341	0.37	272.99	274.53	0.06
Reach-1	38425	2-Year	150.00	27.92	29.41		29.41	0.000384	0.43	346.34	296.54	0.07
Reach-1	38425	5-Year	1100.00	27.92	31.39		31.41	0.000699	1.08	1022.91	351.92	0.11
Reach-1	38125	1-Year	100.00	27.92	28.94	28.24	28.94	0.002001	0.73	136.26	180.36	0.15
Reach-1	38125	2-Year	150.00	27.92	29.17	28.33	29.18	0.002000	0.82	181.90	202.04	0.15
Reach-1	38125	5-Year	1100.00	27.92	31.04	29.25	31.07	0.002001	1.48	743.32	348.30	0.18

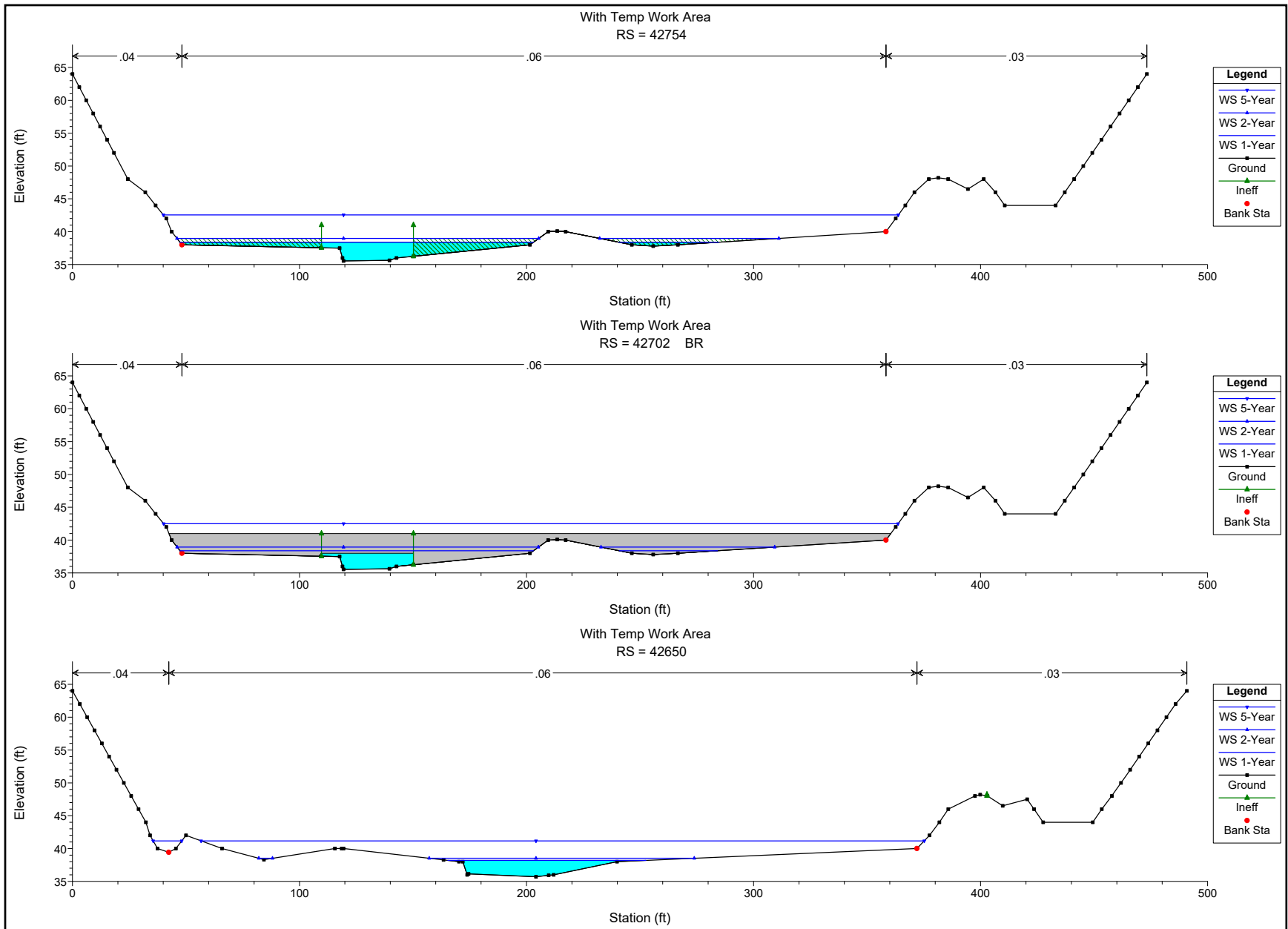


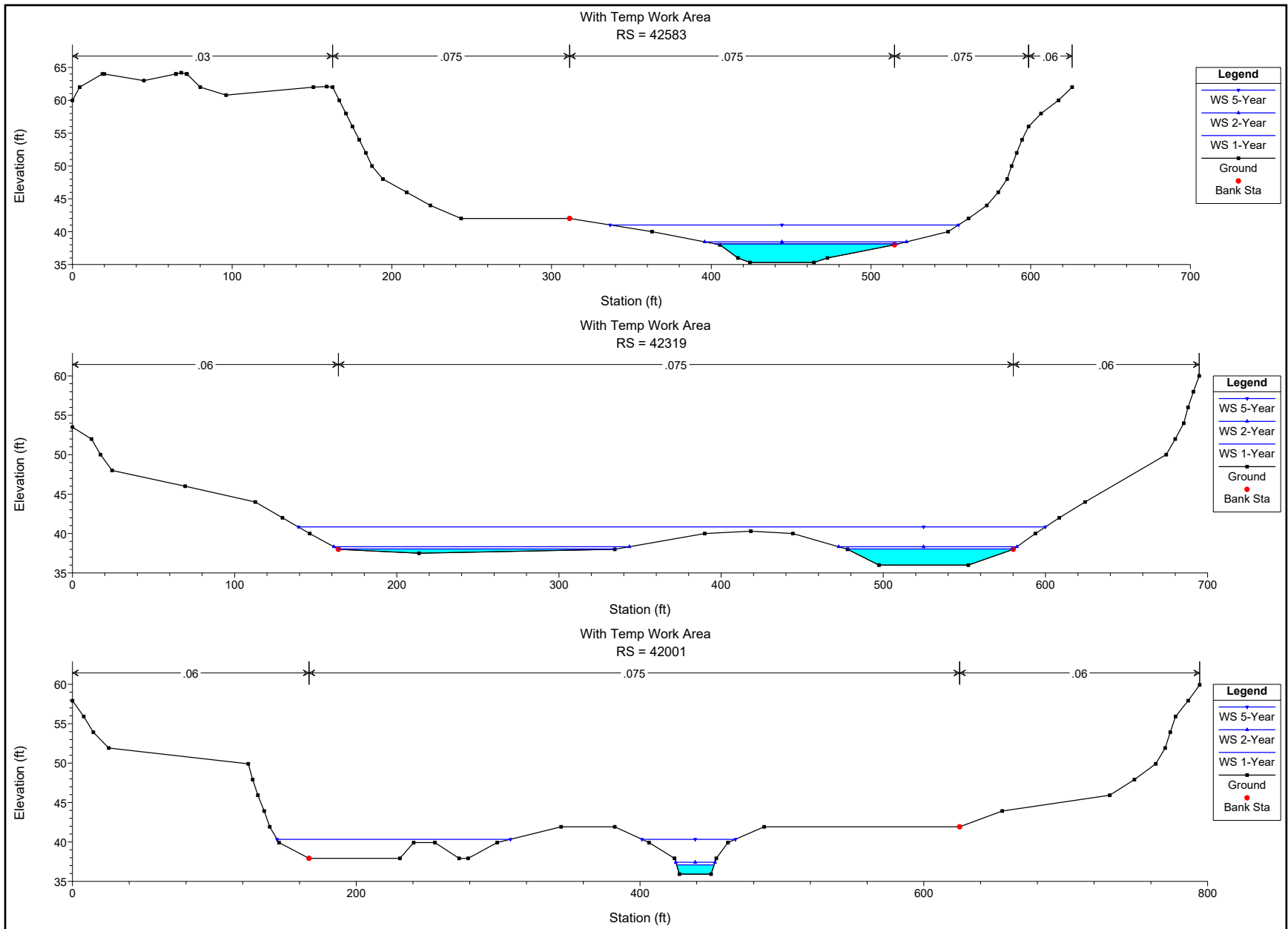


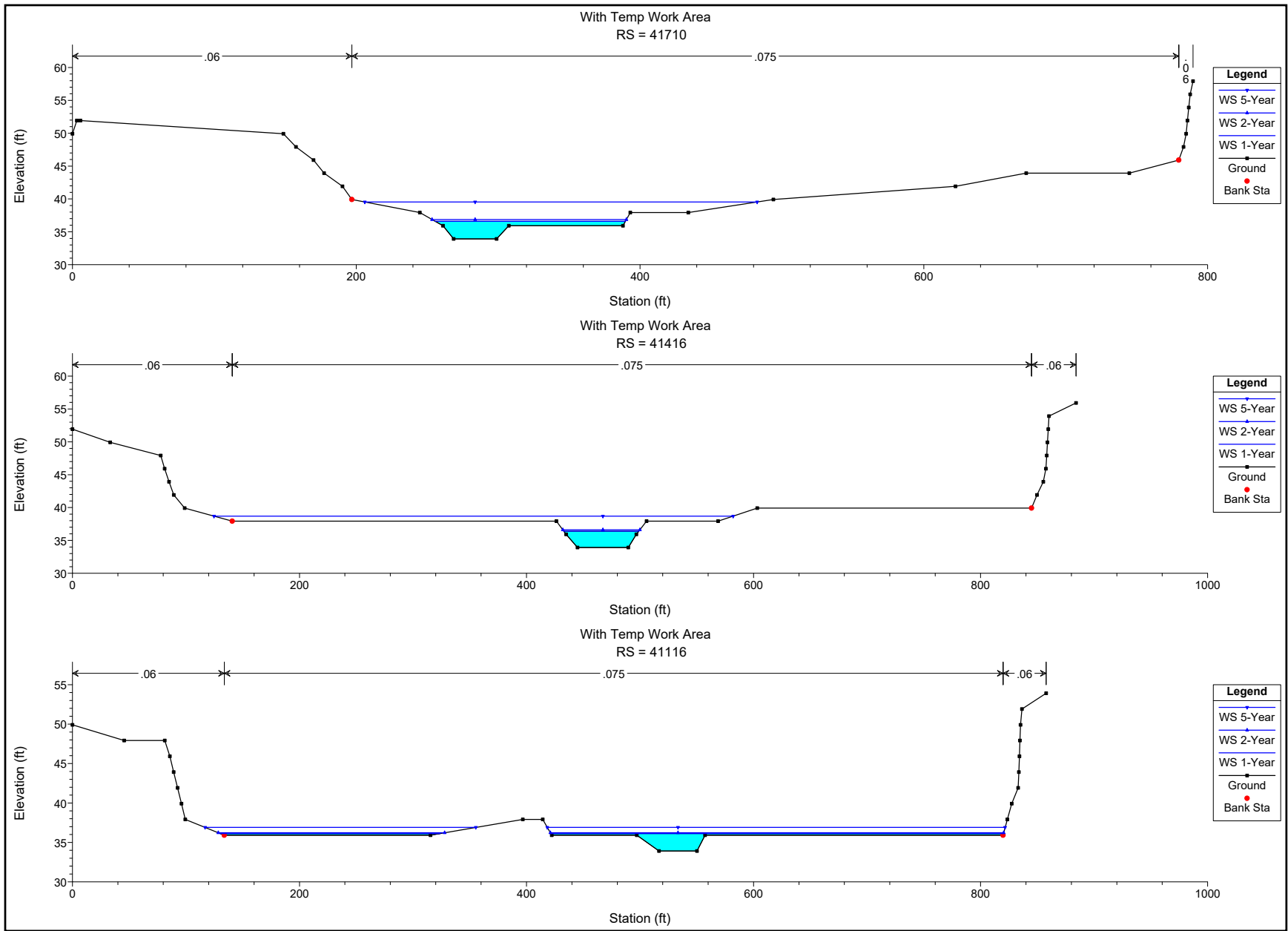


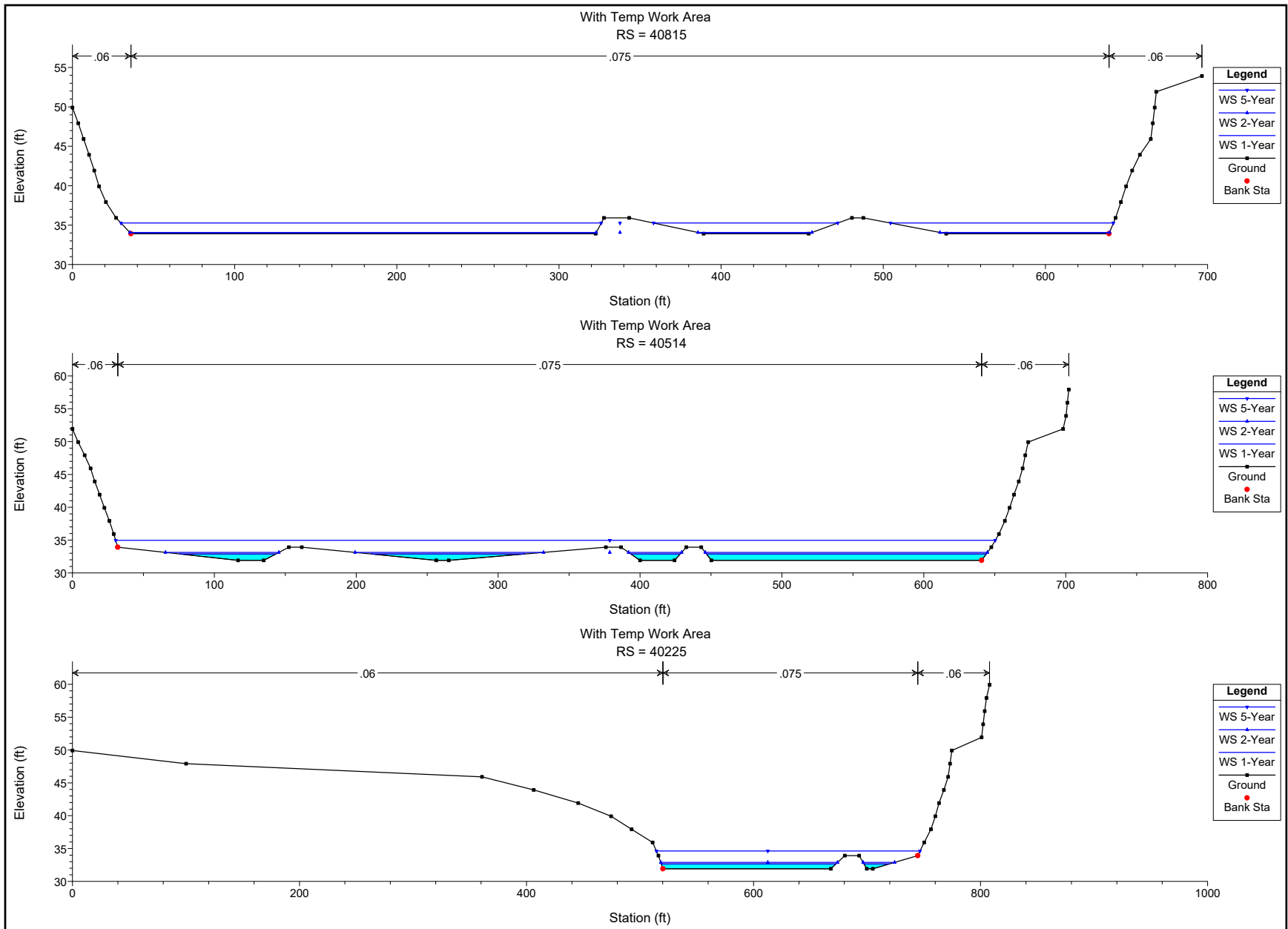


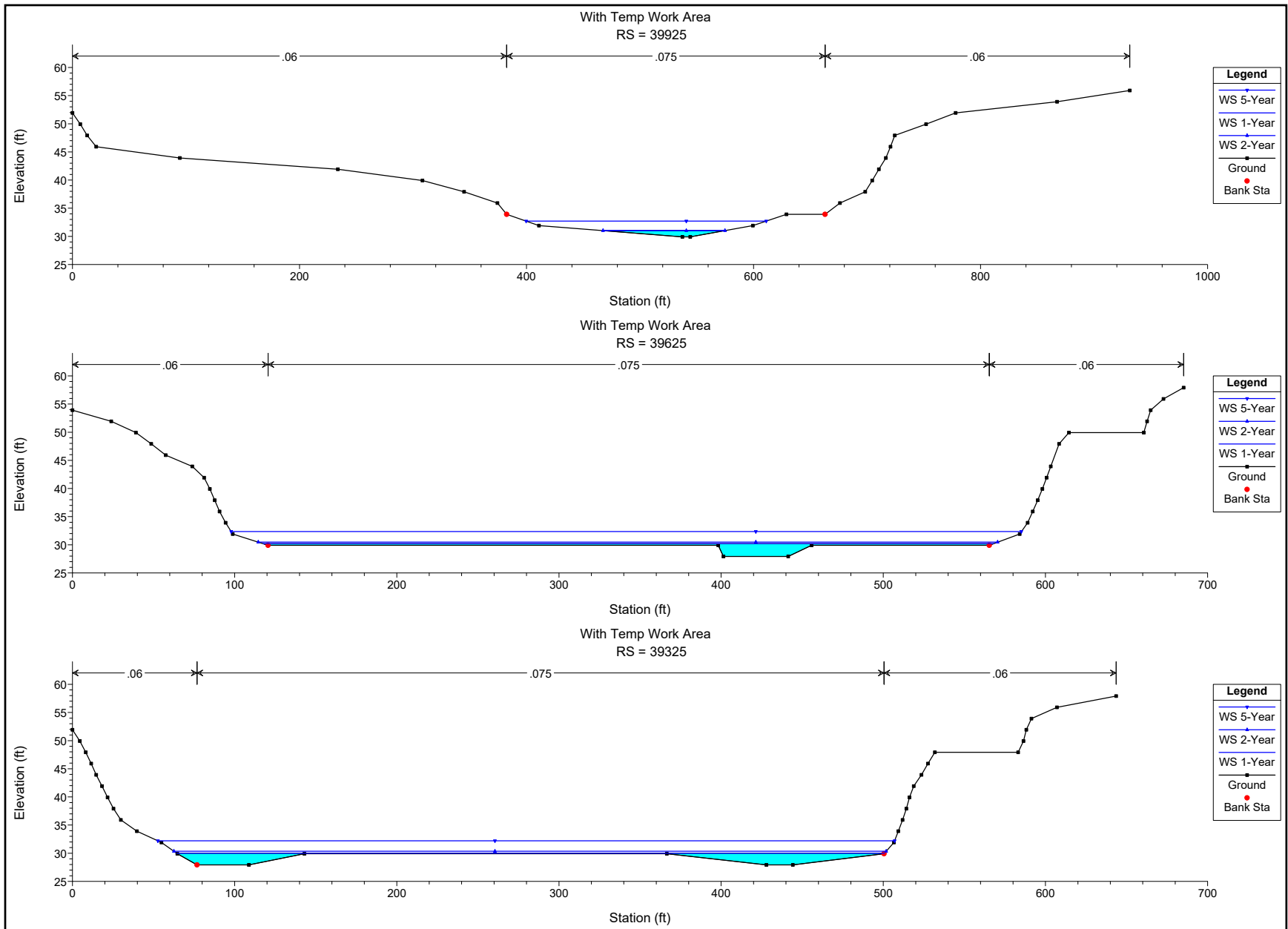


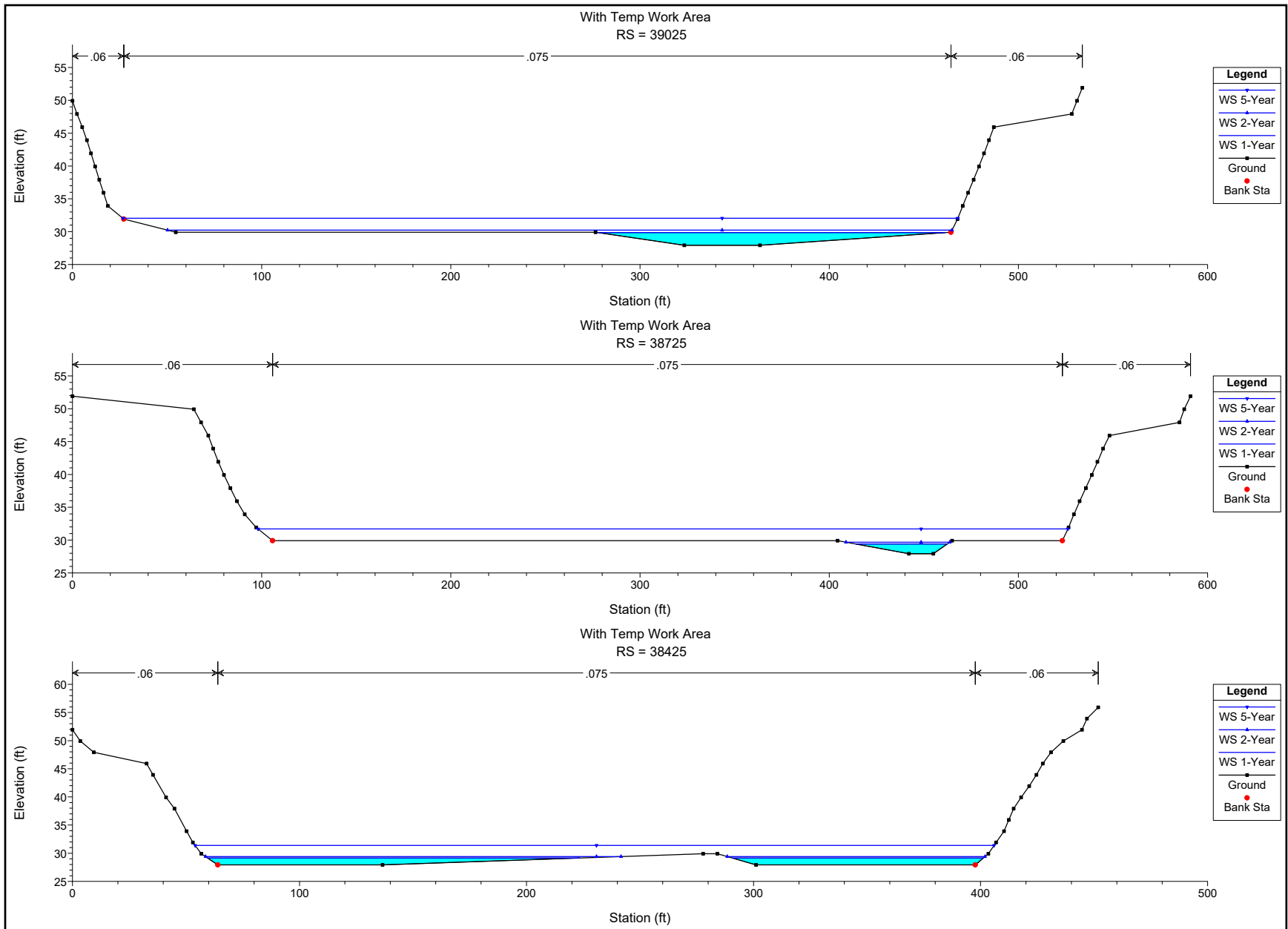




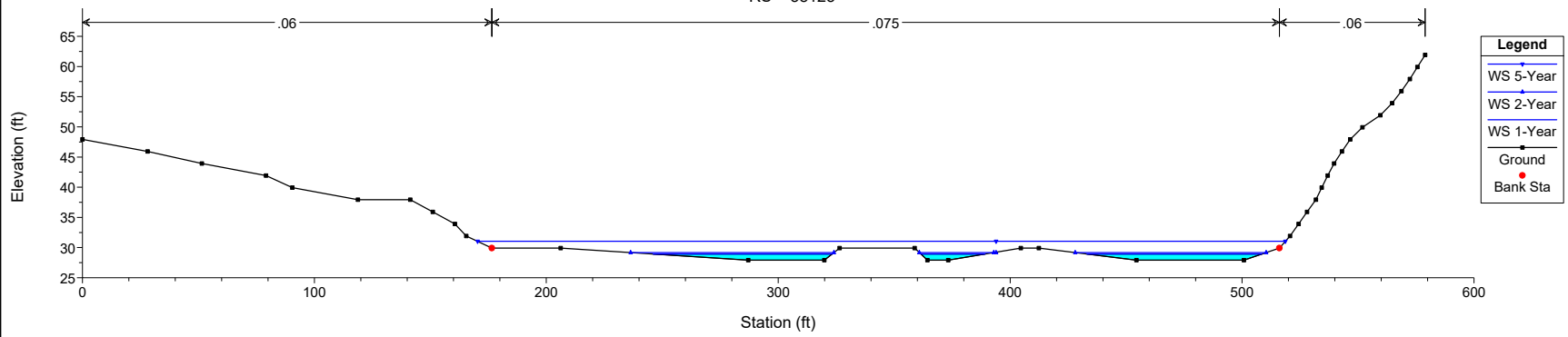








With Temp Work Area
RS = 38125



Pre-Project 20-, 50-, and 100-Year Results

HEC-RAS Plan: Without Temp Work Area River: RIVER-1 Reach: Reach-1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	46618	20-Year	7300.00	44.50	55.19	51.08	55.50	0.004101	4.46	1636.81	245.96	0.30
Reach-1	46618	50-Year	17000.00	44.50	59.30	53.73	59.78	0.003669	5.66	3096.49	494.32	0.31
Reach-1	46618	100-Year	36000.00	44.50	64.44	58.33	64.92	0.001797	5.03	6570.77	995.71	0.23
Reach-1	46403	20-Year	7300.00	44.30	54.66	49.23	54.85	0.002094	3.52	2085.80	332.31	0.22
Reach-1	46403	50-Year	17000.00	44.30	59.02	51.74	59.23	0.001436	3.85	4633.61	1498.35	0.20
Reach-1	46403	100-Year	36000.00	44.30	64.36	56.24	64.61	0.000775	3.63	9171.59	1869.31	0.15
Reach-1	46128	20-Year	7300.00	43.90	54.19	49.33	54.36	0.001473	2.98	2331.23	496.98	0.19
Reach-1	46128	50-Year	17000.00	43.90	58.46	51.87	58.83	0.001300	3.74	3986.86	890.07	0.19
Reach-1	46128	100-Year	36000.00	43.90	63.48	54.39	64.26	0.001465	5.01	6054.85	1070.99	0.21
Reach-1	45853	20-Year	7300.00	43.40	53.83	48.03	53.95	0.001335	2.93	2545.81	449.48	0.18
Reach-1	45853	50-Year	17000.00	43.40	58.24	50.33	58.47	0.000979	3.34	4640.06	495.60	0.17
Reach-1	45853	100-Year	36000.00	43.40	63.36	54.15	63.84	0.000965	4.16	7269.72	1083.39	0.17
Reach-1	45523	20-Year	7300.00	42.80	53.42	47.12	53.58	0.001502	3.19	2293.56	274.88	0.19
Reach-1	45523	50-Year	17000.00	42.80	57.80	49.64	58.12	0.001835	4.63	3836.01	542.78	0.23
Reach-1	45523	100-Year	36000.00	42.80	62.97	53.14	63.48	0.001931	5.95	6380.05	1214.81	0.25
Reach-1	45193	20-Year	7300.00	42.10	52.72	48.38	52.99	0.003415	4.15	1757.90	307.79	0.28
Reach-1	45193	50-Year	17000.00	42.10	56.86	50.89	57.40	0.003998	5.89	2896.99	371.77	0.32
Reach-1	45193	100-Year	36000.00	42.10	61.59	54.45	62.66	0.004863	8.36	4389.26	787.86	0.38
Reach-1	44853	20-Year	7300.00	39.90	51.16		51.56	0.006301	5.06	1442.85	300.10	0.37
Reach-1	44853	50-Year	17000.00	39.90	55.09		55.81	0.006593	6.80	2502.18	361.47	0.40
Reach-1	44853	100-Year	36000.00	39.90	59.23		60.69	0.008102	9.71	3763.98	444.99	0.48
Reach-1	44513	20-Year	7300.00	37.90	48.85	45.65	49.33	0.008106	5.60	1304.80	235.04	0.42
Reach-1	44513	50-Year	17000.00	37.90	52.61	48.73	53.46	0.008585	7.41	2308.27	445.46	0.47
Reach-1	44513	100-Year	36000.00	37.90	56.19	52.60	57.81	0.010477	10.28	3569.39	826.29	0.56
Reach-1	44233	20-Year	7300.00	36.40	47.98	42.66	48.13	0.001841	3.13	2333.14	328.59	0.21
Reach-1	44233	50-Year	17000.00	36.40	51.58	44.90	51.93	0.002511	4.75	3645.68	567.57	0.26
Reach-1	44233	100-Year	36000.00	36.40	55.76	48.08	56.19	0.001992	5.29	6866.19	1103.29	0.24
Reach-1	43953	20-Year	7300.00	35.70	47.52	41.25	47.64	0.001243	2.76	2651.94	394.83	0.17
Reach-1	43953	50-Year	17000.00	35.70	51.08	43.55	51.28	0.001419	3.72	4737.81	770.08	0.20

HEC-RAS Plan: Without Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

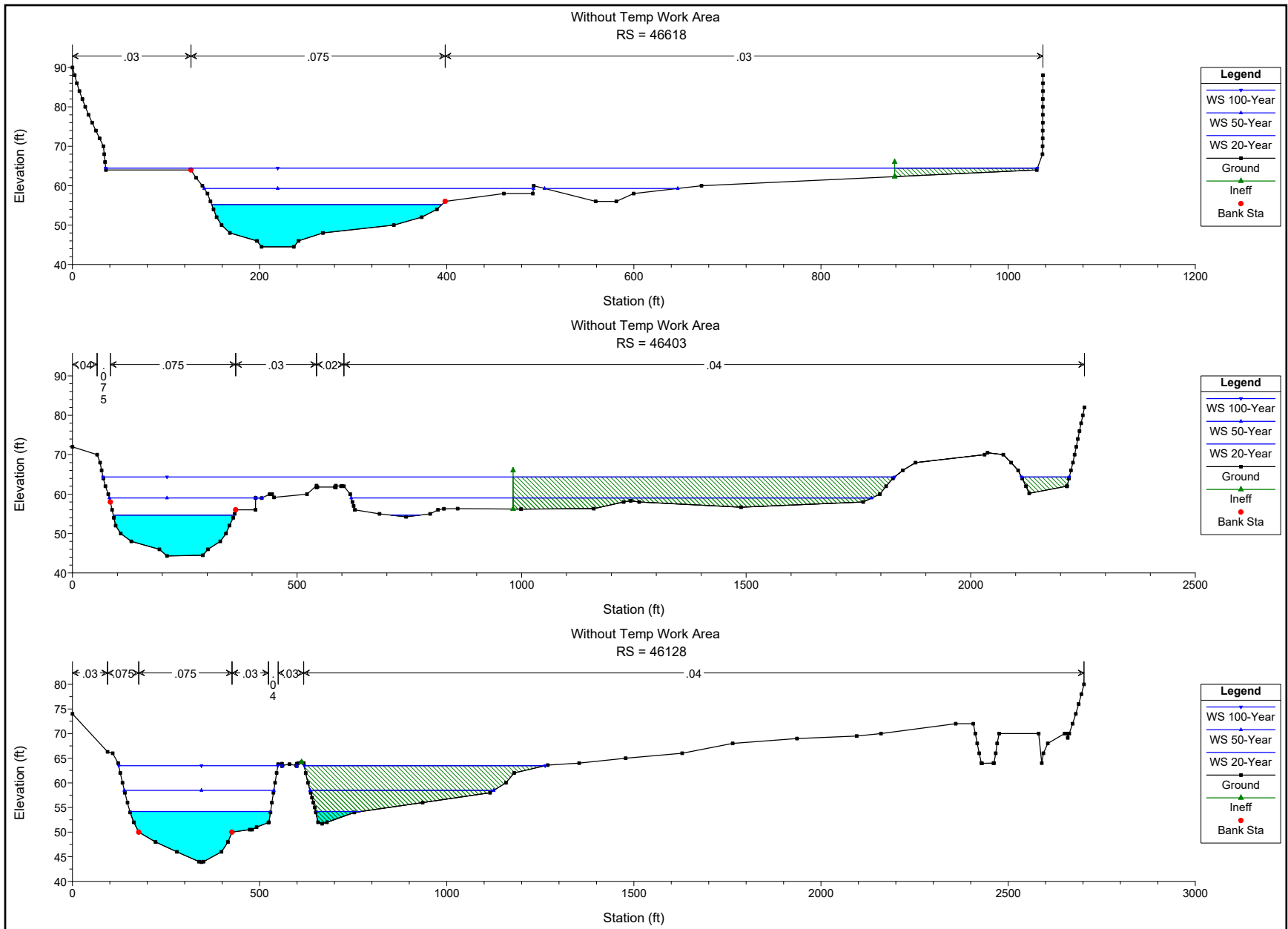
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	43953	100-Year	36000.00	35.70	55.41	46.67	55.71	0.000969	3.82	8549.53	1460.47	0.17
Reach-1	43703	20-Year	7300.00	36.00	47.35		47.40	0.000525	1.71	4003.39	632.70	0.11
Reach-1	43703	50-Year	17000.00	36.00	50.93		51.03	0.000524	2.22	7237.86	1087.04	0.12
Reach-1	43703	100-Year	36000.00	36.00	55.35		55.49	0.000423	2.50	12410.42	1196.19	0.11
Reach-1	43452	20-Year	7300.00	35.60	47.05	42.85	47.15	0.001680	2.57	2853.00	686.31	0.19
Reach-1	43452	50-Year	17000.00	35.60	50.65	44.55	50.79	0.001328	3.14	5576.63	1227.84	0.18
Reach-1	43452	100-Year	36000.00	35.60	55.20	46.85	55.35	0.000555	2.66	11917.51	1287.48	0.13
Reach-1	43163	20-Year	7300.00	35.50	46.39		46.54	0.002121	3.16	2330.96	388.19	0.22
Reach-1	43163	50-Year	17000.00	35.50	49.95		50.23	0.002327	4.33	4084.86	703.38	0.25
Reach-1	43163	100-Year	36000.00	35.50	54.74		55.07	0.001320	4.26	7953.30	970.67	0.20
Reach-1	43000	20-Year	7300.00	35.45	46.10	41.23	46.24	0.001554	2.98	2520.48	391.49	0.19
Reach-1	43000	50-Year	17000.00	35.45	49.58	43.16	49.87	0.002049	4.41	3971.29	451.74	0.24
Reach-1	43000	100-Year	36000.00	35.45	54.30	46.14	54.78	0.002102	5.68	6494.60	633.60	0.25
Reach-1	42873	20-Year	7300.00	35.40	45.85		45.99	0.001660	2.98	2467.77	368.24	0.20
Reach-1	42873	50-Year	17000.00	35.40	49.20		49.52	0.002386	4.57	3774.82	418.73	0.25
Reach-1	42873	100-Year	36000.00	35.40	53.78		54.40	0.002795	6.32	5753.95	457.66	0.29
Reach-1	42754	20-Year	7300.00	35.54	45.71		45.84	0.000924	2.92	2520.34	366.88	0.19
Reach-1	42754	50-Year	17000.00	35.54	49.00		49.31	0.001369	4.51	3819.12	420.34	0.24
Reach-1	42754	100-Year	36000.00	35.54	53.55		54.16	0.001597	6.14	5764.83	436.38	0.27
Reach-1	42650	20-Year	7300.00	35.70	45.63	41.06	45.77	0.001131	3.04	2400.52	383.69	0.20
Reach-1	42650	50-Year	17000.00	35.70	48.90	42.95	49.22	0.001503	4.52	3786.69	435.23	0.25
Reach-1	42650	100-Year	36000.00	35.70	53.44	45.71	54.05	0.001659	6.06	5798.30	451.66	0.28
Reach-1	42583	20-Year	7300.00	35.30	45.33		45.54	0.002753	3.92	2067.34	362.98	0.26
Reach-1	42583	50-Year	17000.00	35.30	48.43		48.90	0.003851	5.87	3244.76	392.91	0.32
Reach-1	42583	100-Year	36000.00	35.30	52.83		53.68	0.004474	7.99	5015.13	410.67	0.37
Reach-1	42319	20-Year	7300.00	36.00	45.01		45.09	0.000989	2.28	3309.02	542.04	0.15
Reach-1	42319	50-Year	17000.00	36.00	48.04		48.22	0.001472	3.53	5086.25	633.83	0.20
Reach-1	42319	100-Year	36000.00	36.00	52.55		52.87	0.001579	4.69	8047.23	674.02	0.22

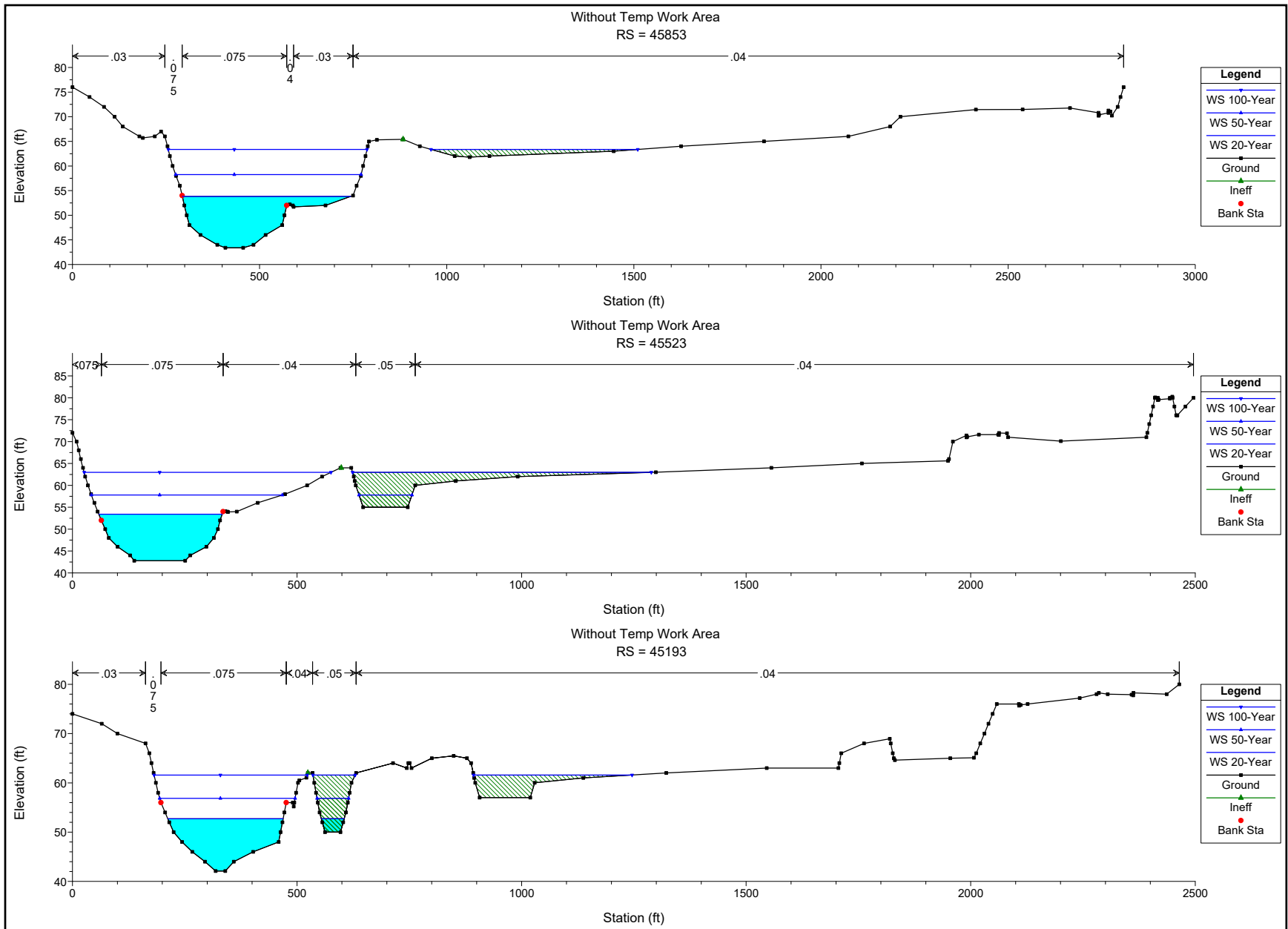
HEC-RAS Plan: Without Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

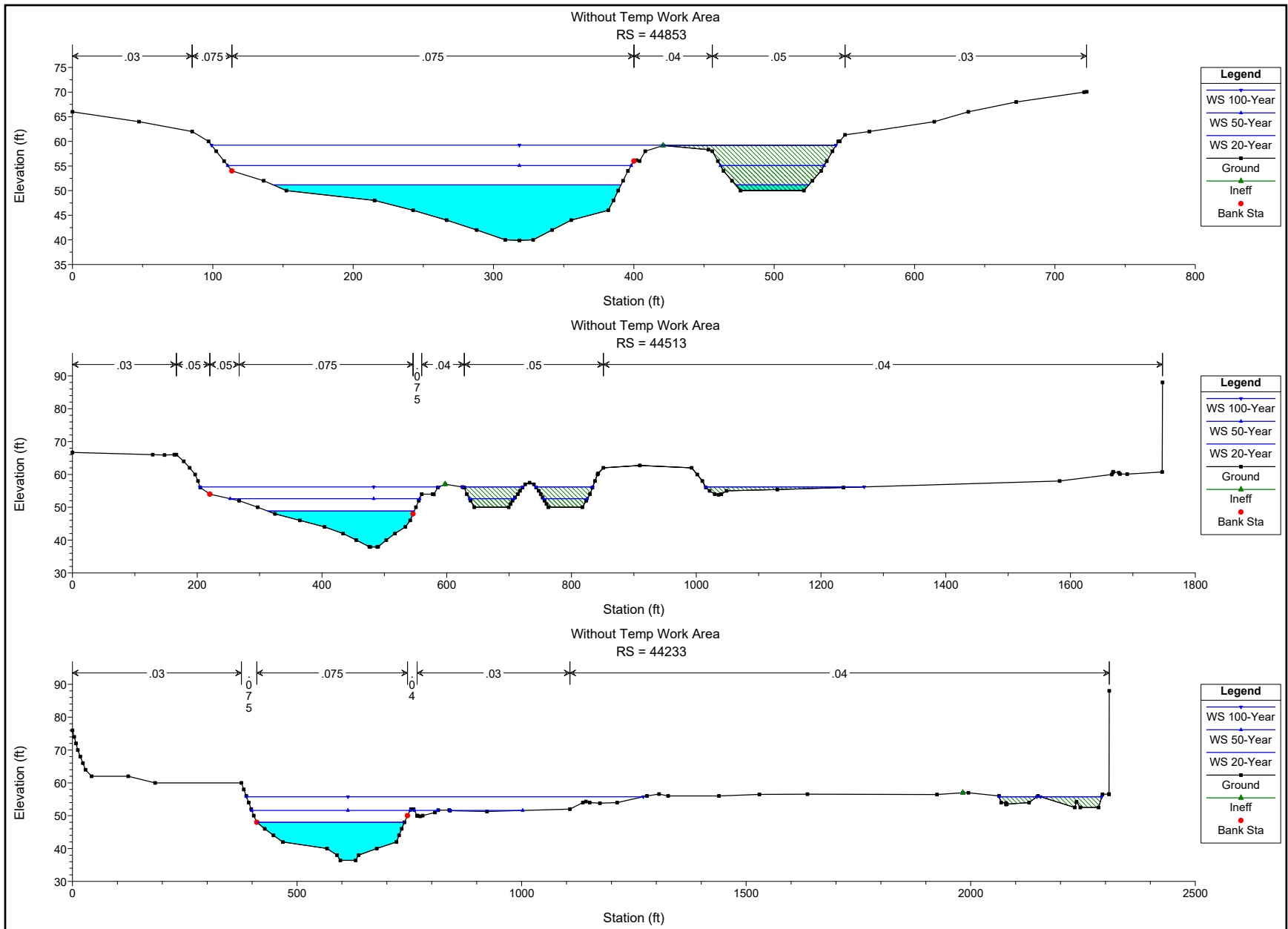
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	42001	20-Year	7300.00	35.92	44.28		44.48	0.004808	3.51	2063.74	534.71	0.31
Reach-1	42001	50-Year	17000.00	35.92	47.13		47.47	0.004175	4.65	3728.32	613.07	0.31
Reach-1	42001	100-Year	36000.00	35.92	51.69		52.16	0.003179	5.68	6691.50	732.47	0.30
Reach-1	41710	20-Year	7300.00	33.92	42.88		43.09	0.004764	3.67	1996.53	462.20	0.31
Reach-1	41710	50-Year	17000.00	33.92	45.73		46.09	0.005406	4.81	3555.28	605.71	0.35
Reach-1	41710	100-Year	36000.00	33.92	50.78		51.24	0.003113	5.47	6745.49	699.77	0.29
Reach-1	41416	20-Year	7300.00	33.92	41.21		41.39	0.007082	3.40	2151.37	755.42	0.35
Reach-1	41416	50-Year	17000.00	33.92	44.80		44.98	0.002538	3.47	4893.46	772.86	0.24
Reach-1	41416	100-Year	36000.00	33.92	50.34		50.57	0.001450	3.96	9271.64	832.74	0.20
Reach-1	41116	20-Year	7300.00	33.92	40.20		40.29	0.002146	2.40	3043.45	732.71	0.21
Reach-1	41116	50-Year	17000.00	33.92	44.35		44.47	0.001164	2.79	6109.87	745.34	0.17
Reach-1	41116	100-Year	36000.00	33.92	50.03		50.21	0.000935	3.53	10498.64	835.27	0.17
Reach-1	40815	20-Year	7300.00	33.92	39.75		39.82	0.001183	2.13	3438.79	632.72	0.16
Reach-1	40815	50-Year	17000.00	33.92	44.04		44.15	0.000930	2.77	6183.81	648.56	0.16
Reach-1	40815	100-Year	36000.00	33.92	49.73		49.94	0.000884	3.66	9939.50	666.92	0.16
Reach-1	40514	20-Year	7300.00	31.92	39.53		39.58	0.000547	1.69	4344.34	636.62	0.11
Reach-1	40514	50-Year	17000.00	31.92	43.84		43.93	0.000586	2.41	7114.58	650.90	0.13
Reach-1	40514	100-Year	36000.00	31.92	49.53		49.70	0.000658	3.35	10865.46	668.21	0.14
Reach-1	40225	20-Year	7300.00	31.92	38.86		39.20	0.004615	4.71	1593.38	274.06	0.32
Reach-1	40225	50-Year	17000.00	31.92	42.91		43.51	0.004491	6.40	2818.59	339.41	0.35
Reach-1	40225	100-Year	36000.00	31.92	48.35		49.24	0.004156	8.12	5323.47	695.02	0.36
Reach-1	39925	20-Year	7300.00	29.92	37.52		37.81	0.004550	4.34	1728.83	343.07	0.32
Reach-1	39925	50-Year	17000.00	29.92	41.93		42.33	0.003140	5.24	3496.96	477.64	0.29
Reach-1	39925	100-Year	36000.00	29.92	47.85		48.27	0.001981	5.64	7269.55	711.06	0.25
Reach-1	39625	20-Year	7300.00	27.92	37.25		37.31	0.000687	2.00	3673.88	505.47	0.13
Reach-1	39625	50-Year	17000.00	27.92	41.71		41.84	0.000766	2.87	5958.15	518.87	0.15
Reach-1	39625	100-Year	36000.00	27.92	47.59		47.83	0.000890	4.04	9114.33	557.91	0.17
Reach-1	39325	20-Year	7300.00	27.92	37.04		37.10	0.000717	2.07	3561.55	485.87	0.13
Reach-1	39325	50-Year	17000.00	27.92	41.46		41.60	0.000817	2.99	5742.45	499.20	0.15

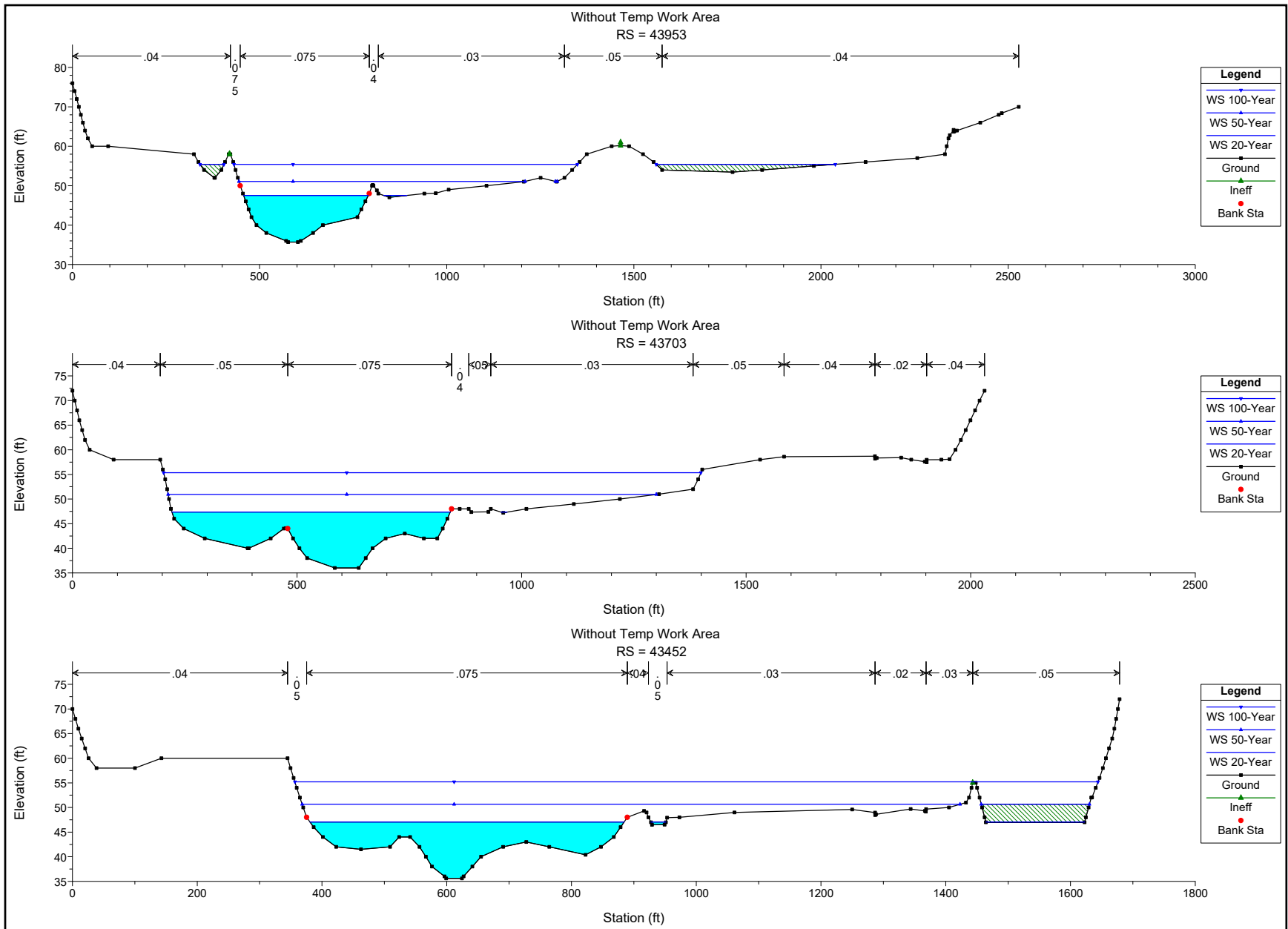
HEC-RAS Plan: Without Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

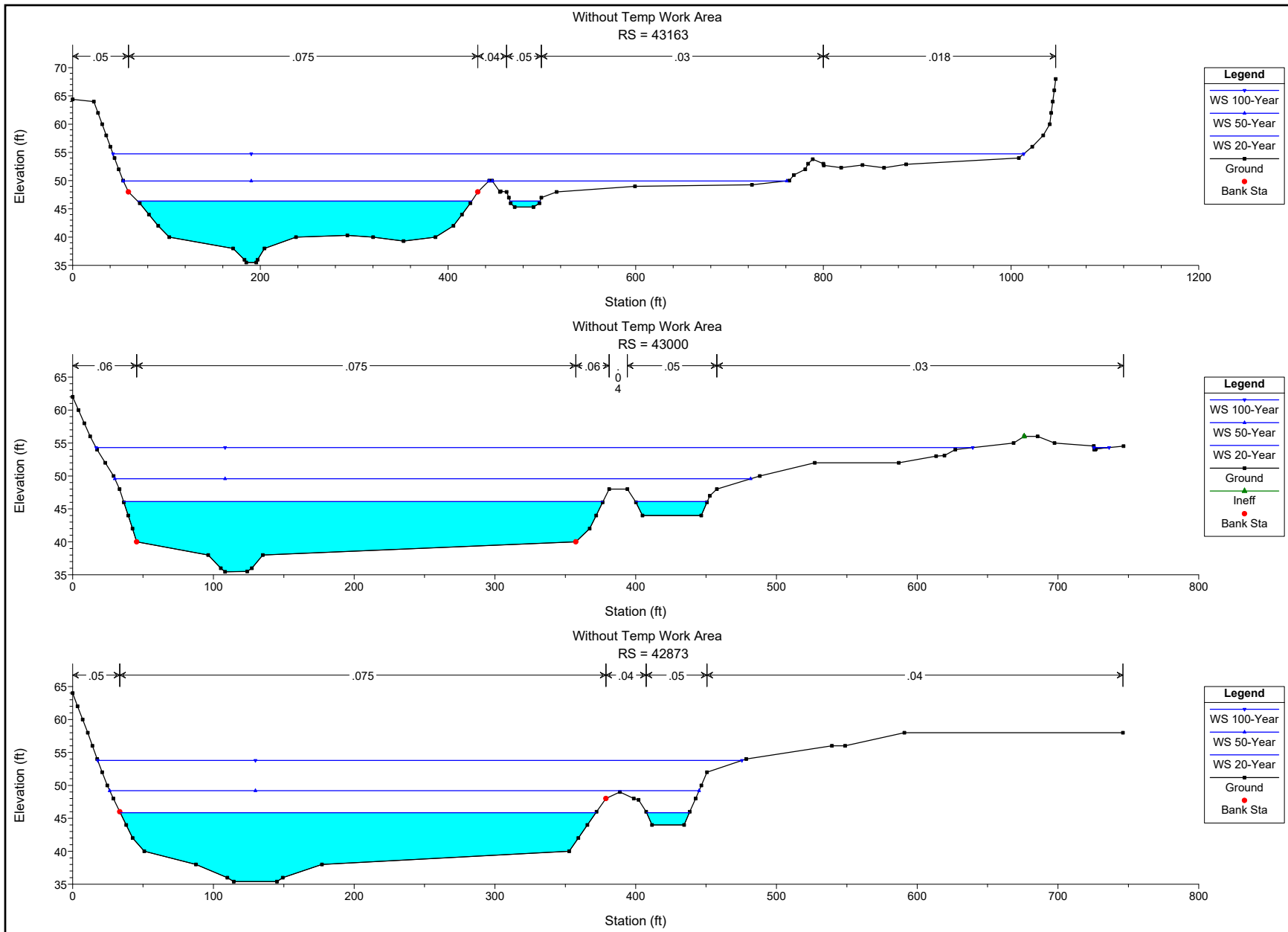
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	39325	100-Year	36000.00	27.92	47.29		47.55	0.000952	4.19	8713.01	521.20	0.17
Reach-1	39025	20-Year	7300.00	27.92	36.78		36.86	0.000904	2.25	3275.00	459.23	0.15
Reach-1	39025	50-Year	17000.00	27.92	41.17		41.33	0.001004	3.24	5312.61	470.19	0.17
Reach-1	39025	100-Year	36000.00	27.92	46.92		47.23	0.001170	4.56	8065.47	503.73	0.19
Reach-1	38725	20-Year	7300.00	27.92	36.44		36.54	0.001299	2.54	2902.42	447.18	0.17
Reach-1	38725	50-Year	17000.00	27.92	40.80		40.99	0.001285	3.52	4882.82	461.33	0.19
Reach-1	38725	100-Year	36000.00	27.92	46.49		46.84	0.001406	4.86	7558.08	487.91	0.21
Reach-1	38425	20-Year	7300.00	27.92	36.03		36.15	0.001277	2.74	2690.21	365.11	0.17
Reach-1	38425	50-Year	17000.00	27.92	40.31		40.56	0.001529	4.03	4277.51	377.89	0.21
Reach-1	38425	100-Year	36000.00	27.92	45.85		46.35	0.001853	5.73	6419.03	394.60	0.24
Reach-1	38125	20-Year	7300.00	27.92	35.52	31.30	35.67	0.002001	3.13	2362.57	374.31	0.21
Reach-1	38125	50-Year	17000.00	27.92	39.75	33.12	40.03	0.002000	4.34	4061.87	441.27	0.23
Reach-1	38125	100-Year	36000.00	27.92	45.29	35.80	45.77	0.002001	5.72	6665.57	506.53	0.25

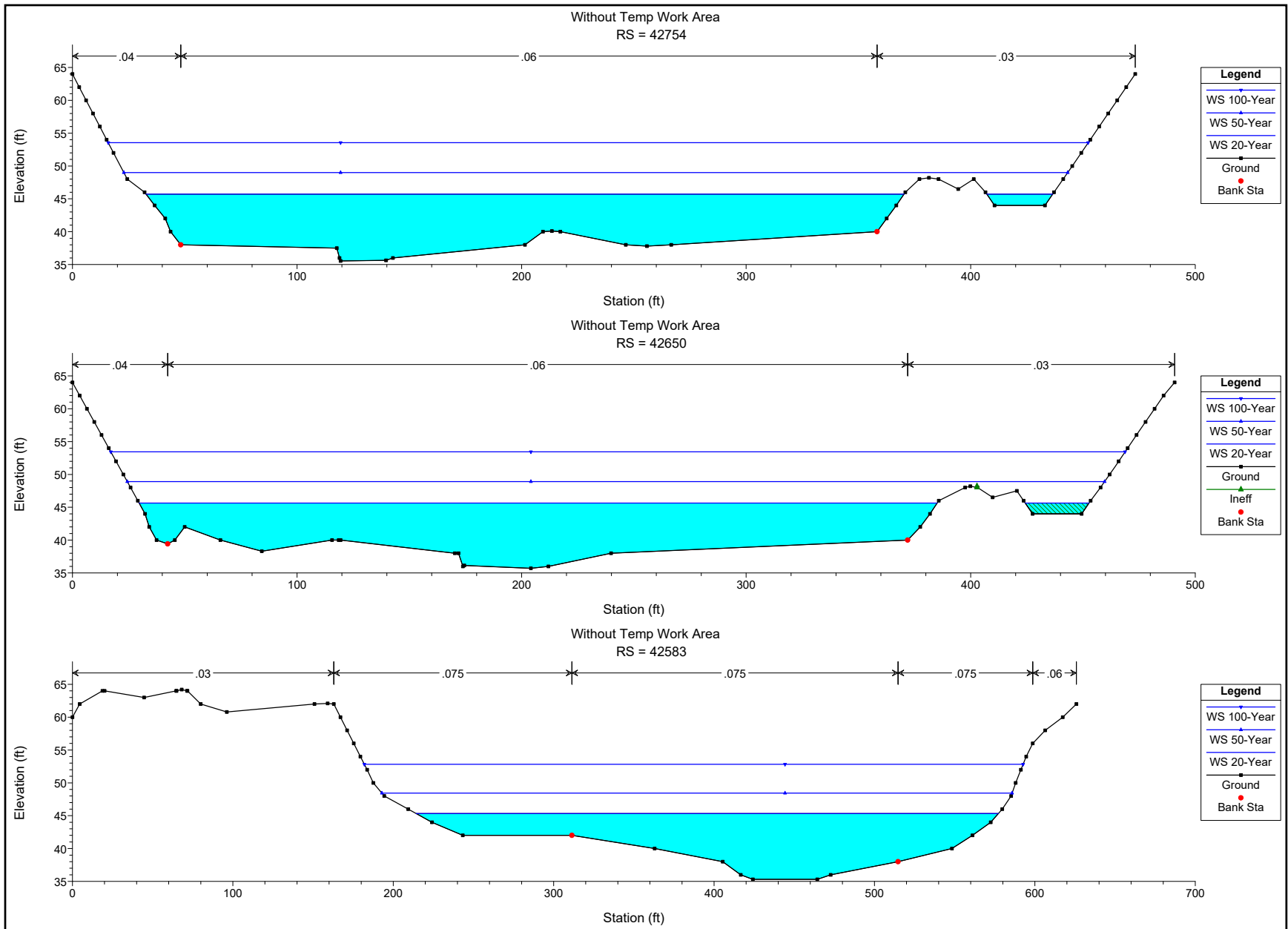


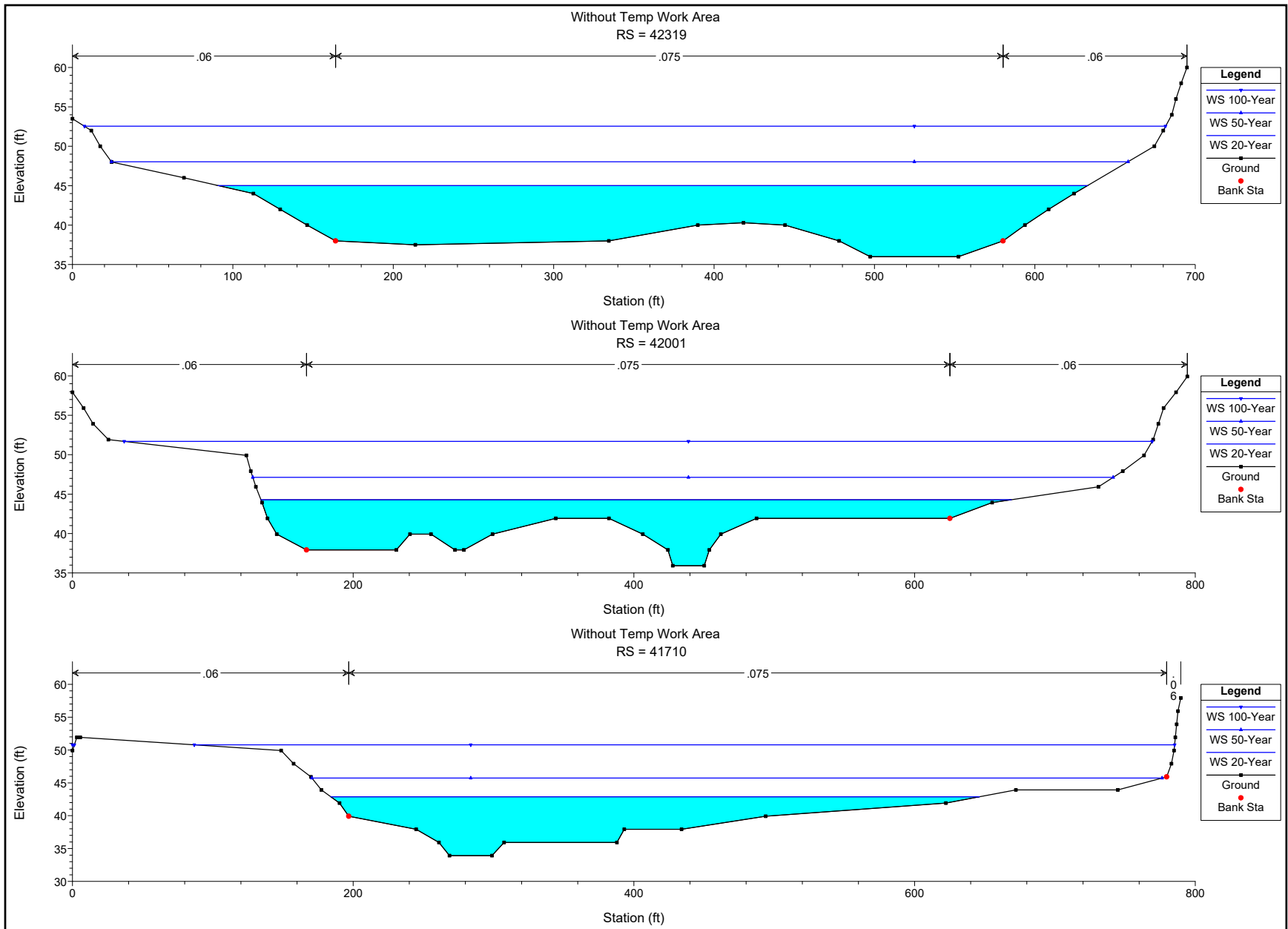


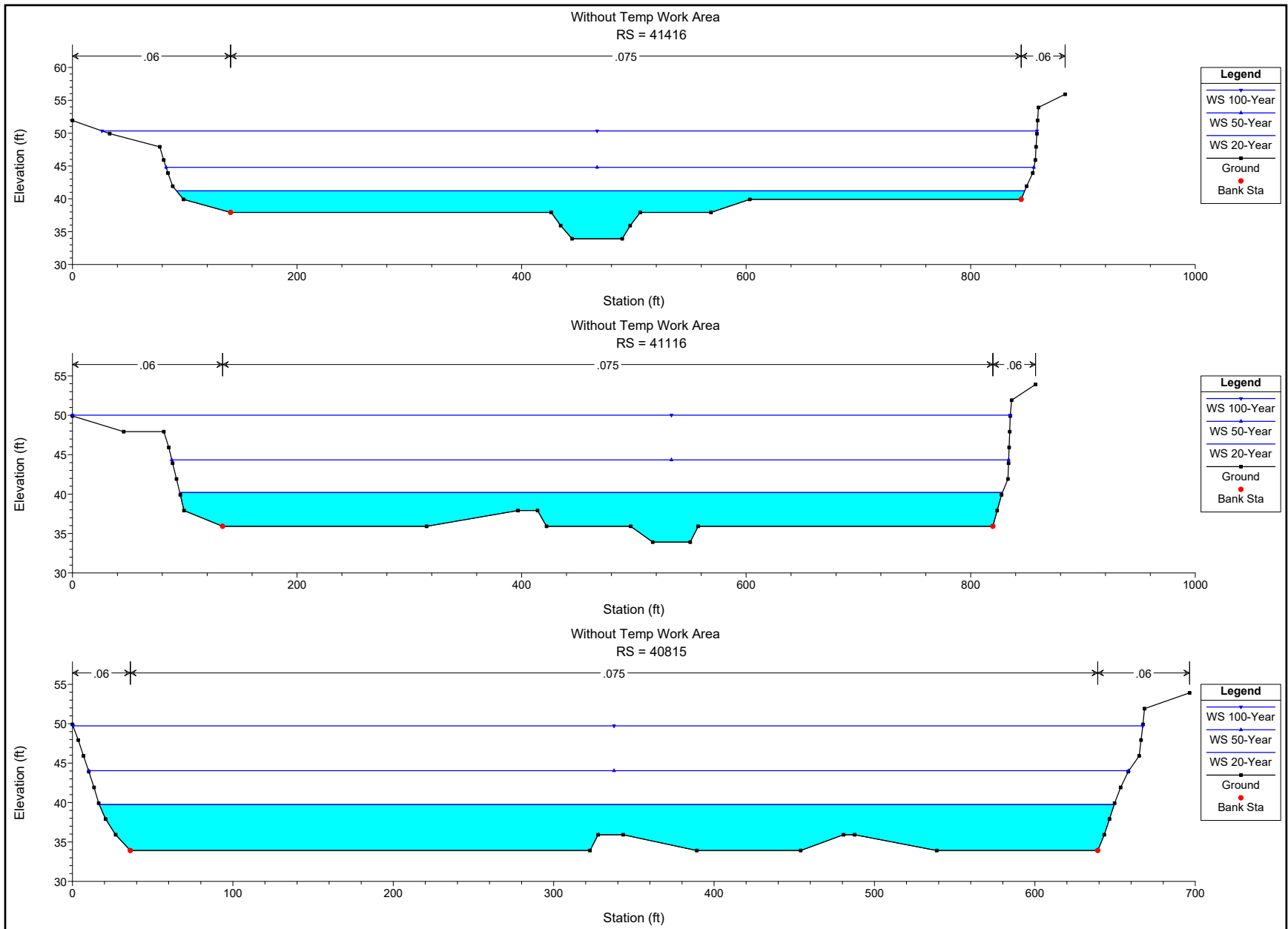


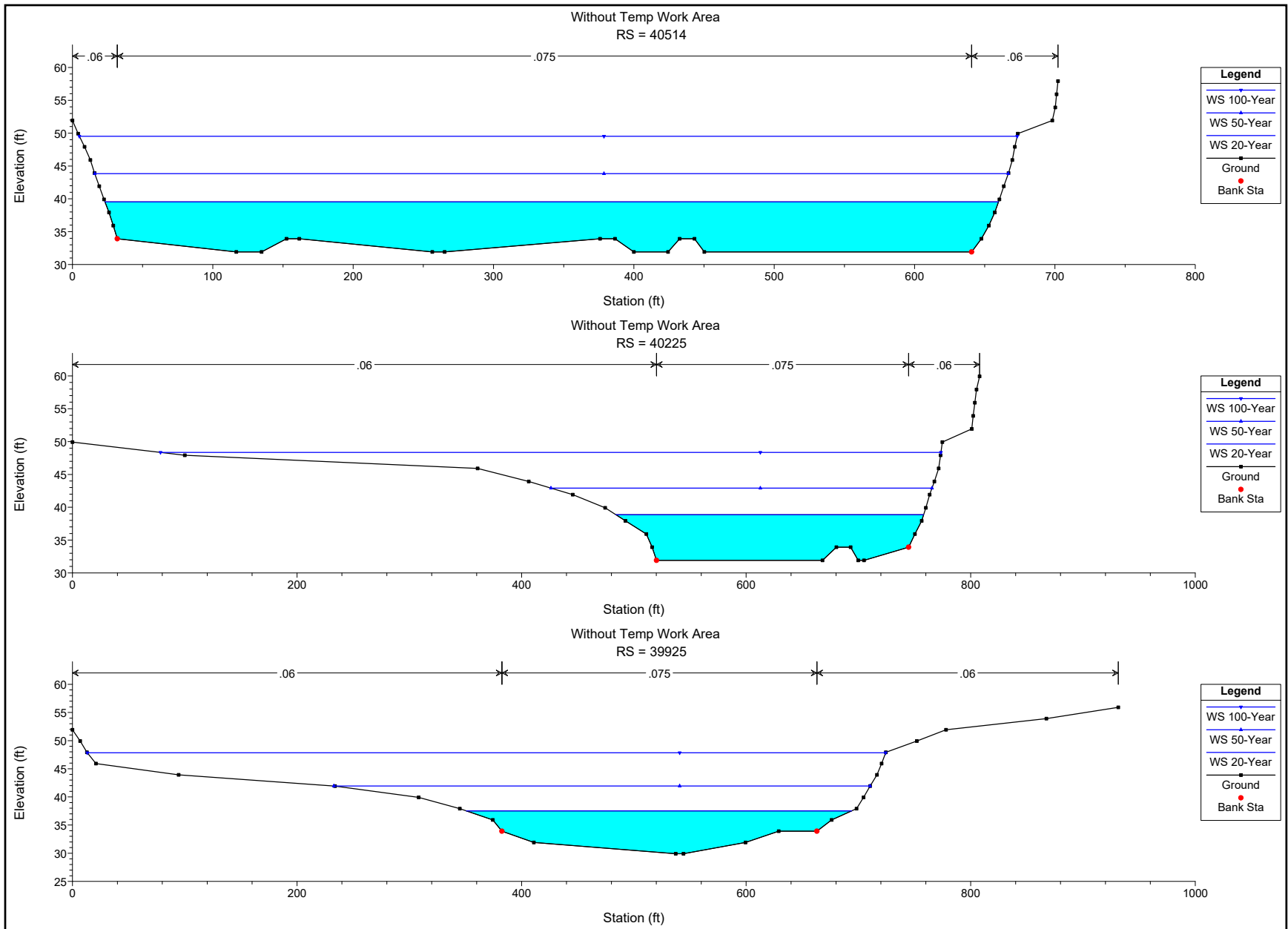


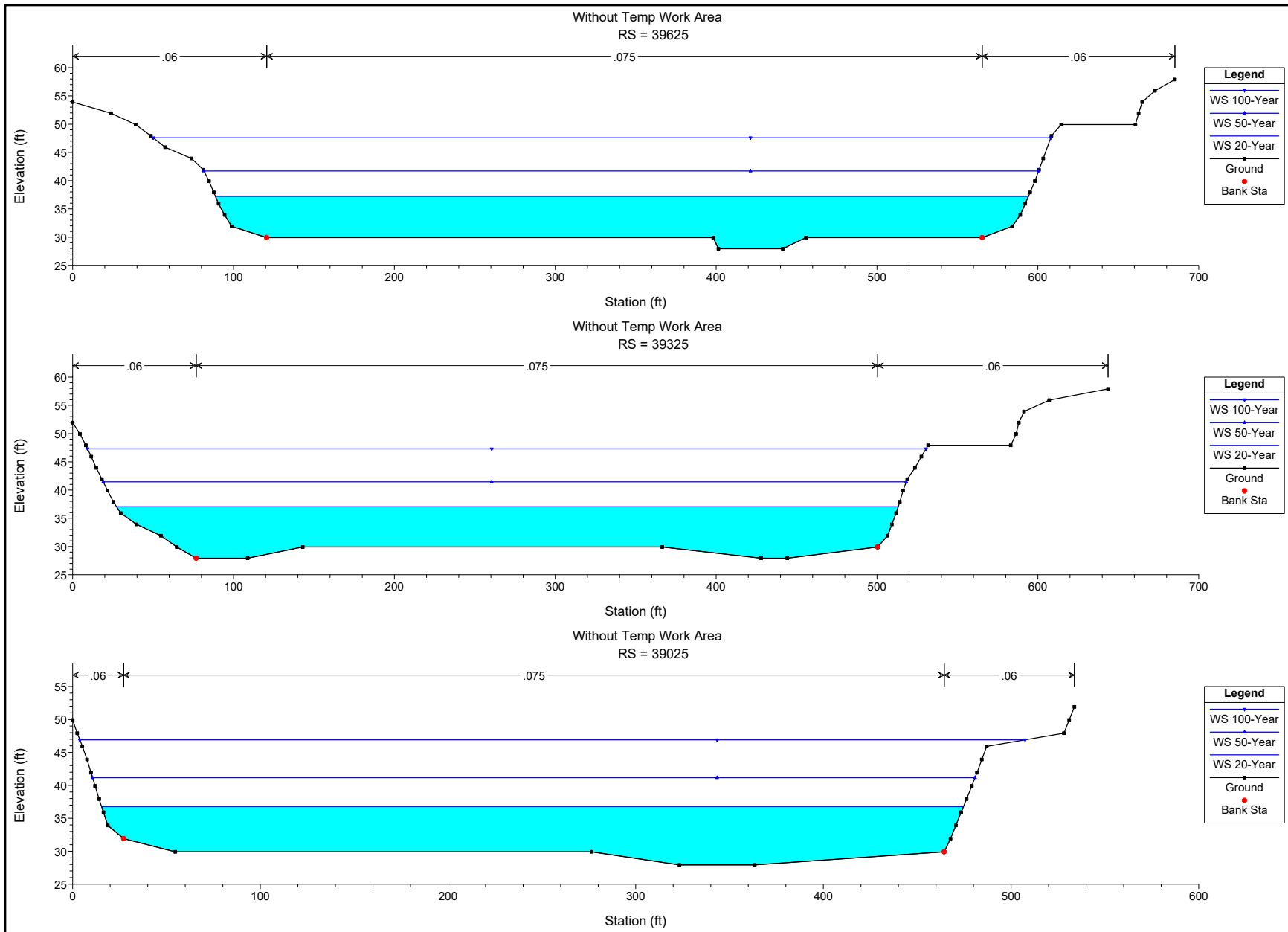


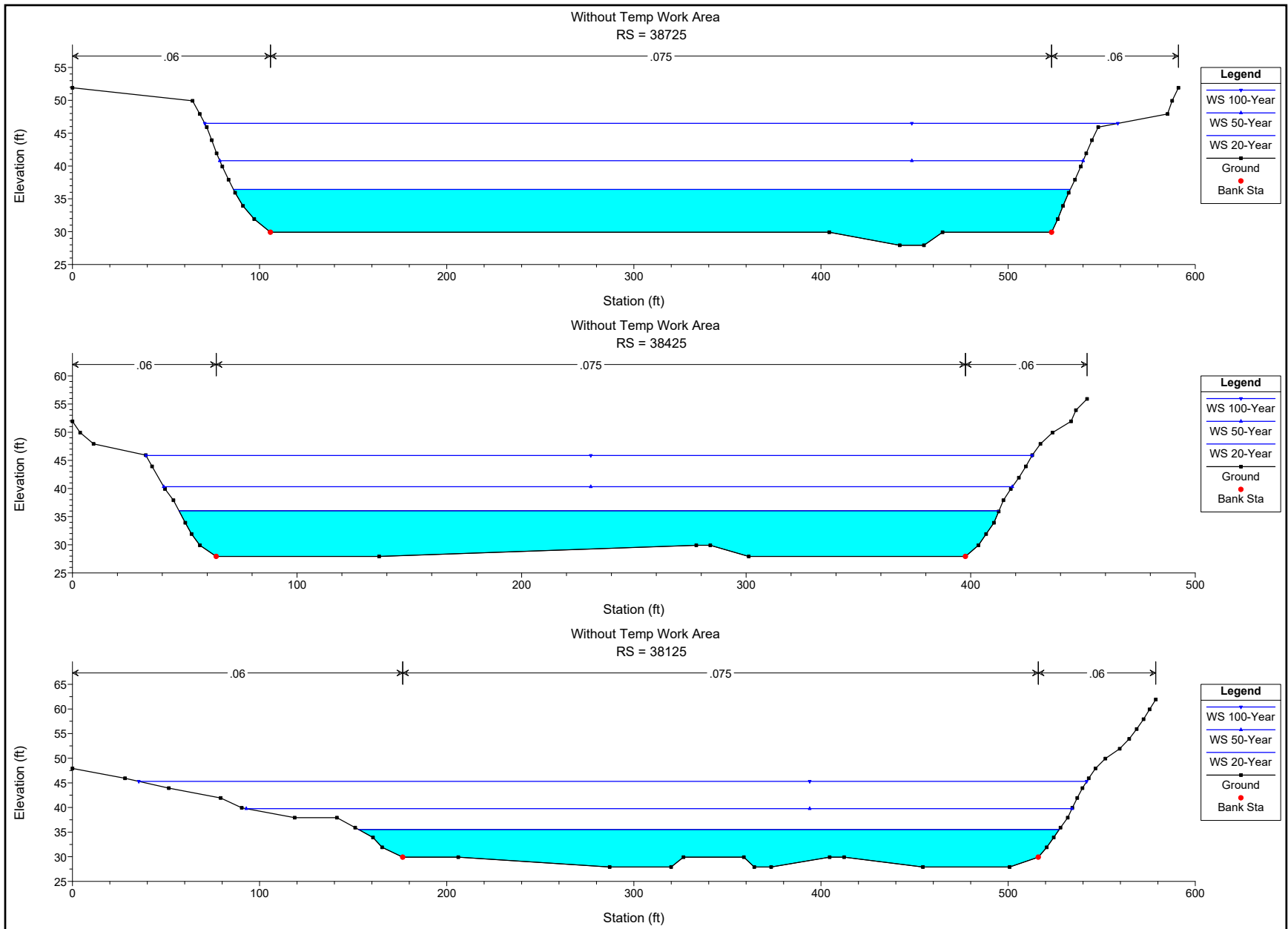












Post-Project 20-, 50-, and 100-Year Results

HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	46618	20-Year	7300.00	44.50	55.19	51.08	55.50	0.004099	4.46	1637.17	245.96	0.30
Reach-1	46618	50-Year	17000.00	44.50	59.31	53.73	59.78	0.003658	5.65	3099.89	494.70	0.31
Reach-1	46618	100-Year	36000.00	44.50	64.44	58.33	64.93	0.001795	5.02	6574.02	995.72	0.23
Reach-1	46403	20-Year	7300.00	44.30	54.66	49.23	54.86	0.002093	3.52	2086.42	332.59	0.22
Reach-1	46403	50-Year	17000.00	44.30	59.02	51.74	59.24	0.001446	3.87	4636.44	1498.53	0.20
Reach-1	46403	100-Year	36000.00	44.30	64.37	56.24	64.61	0.000774	3.63	9175.30	1869.39	0.15
Reach-1	46128	20-Year	7300.00	43.90	54.19	49.33	54.36	0.001471	2.97	2332.13	497.22	0.19
Reach-1	46128	50-Year	17000.00	43.90	58.47	51.87	58.84	0.001298	3.74	3988.33	890.18	0.19
Reach-1	46128	100-Year	36000.00	43.90	63.48	54.39	64.27	0.001463	5.01	6056.88	1071.42	0.21
Reach-1	45853	20-Year	7300.00	43.40	53.83	48.03	53.96	0.001333	2.93	2547.14	449.60	0.18
Reach-1	45853	50-Year	17000.00	43.40	58.25	50.33	58.48	0.000978	3.34	4642.07	495.64	0.17
Reach-1	45853	100-Year	36000.00	43.40	63.36	54.15	63.84	0.000963	4.16	7272.38	1084.56	0.17
Reach-1	45523	20-Year	7300.00	42.80	53.42	47.12	53.58	0.001500	3.19	2294.52	274.91	0.19
Reach-1	45523	50-Year	17000.00	42.80	57.80	49.64	58.12	0.001832	4.63	3838.02	542.98	0.23
Reach-1	45523	100-Year	36000.00	42.80	62.97	53.14	63.49	0.001928	5.95	6383.18	1216.71	0.25
Reach-1	45193	20-Year	7300.00	42.10	52.73	48.38	52.99	0.003408	4.15	1759.10	307.85	0.28
Reach-1	45193	50-Year	17000.00	42.10	56.87	50.89	57.41	0.003990	5.89	2898.90	371.83	0.32
Reach-1	45193	100-Year	36000.00	42.10	61.60	54.45	62.66	0.004854	8.35	4391.92	789.41	0.38
Reach-1	44853	20-Year	7300.00	39.90	51.18		51.57	0.006264	5.05	1445.61	300.27	0.37
Reach-1	44853	50-Year	17000.00	39.90	55.10		55.82	0.006562	6.79	2505.95	361.59	0.40
Reach-1	44853	100-Year	36000.00	39.90	59.25		60.70	0.008062	9.70	3771.84	445.07	0.48
Reach-1	44513	20-Year	7300.00	37.90	48.92	45.65	49.39	0.007818	5.53	1321.34	236.18	0.41
Reach-1	44513	50-Year	17000.00	37.90	52.66	48.73	53.50	0.008395	7.36	2324.73	447.57	0.46
Reach-1	44513	100-Year	36000.00	37.90	56.29	52.60	57.87	0.010156	10.18	3606.76	848.88	0.55
Reach-1	44233	20-Year	7300.00	36.40	48.10	42.66	48.24	0.001749	3.08	2370.98	329.46	0.20
Reach-1	44233	50-Year	17000.00	36.40	51.67	44.90	52.01	0.002432	4.70	3697.70	596.34	0.25
Reach-1	44233	100-Year	36000.00	36.40	55.90	48.08	56.32	0.001882	5.17	6995.10	1114.01	0.24
Reach-1	43953	20-Year	7300.00	35.70	47.66	41.25	47.77	0.001175	2.71	2708.72	413.87	0.17
Reach-1	43953	50-Year	17000.00	35.70	51.20	43.55	51.39	0.001343	3.64	4828.33	783.11	0.19

HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

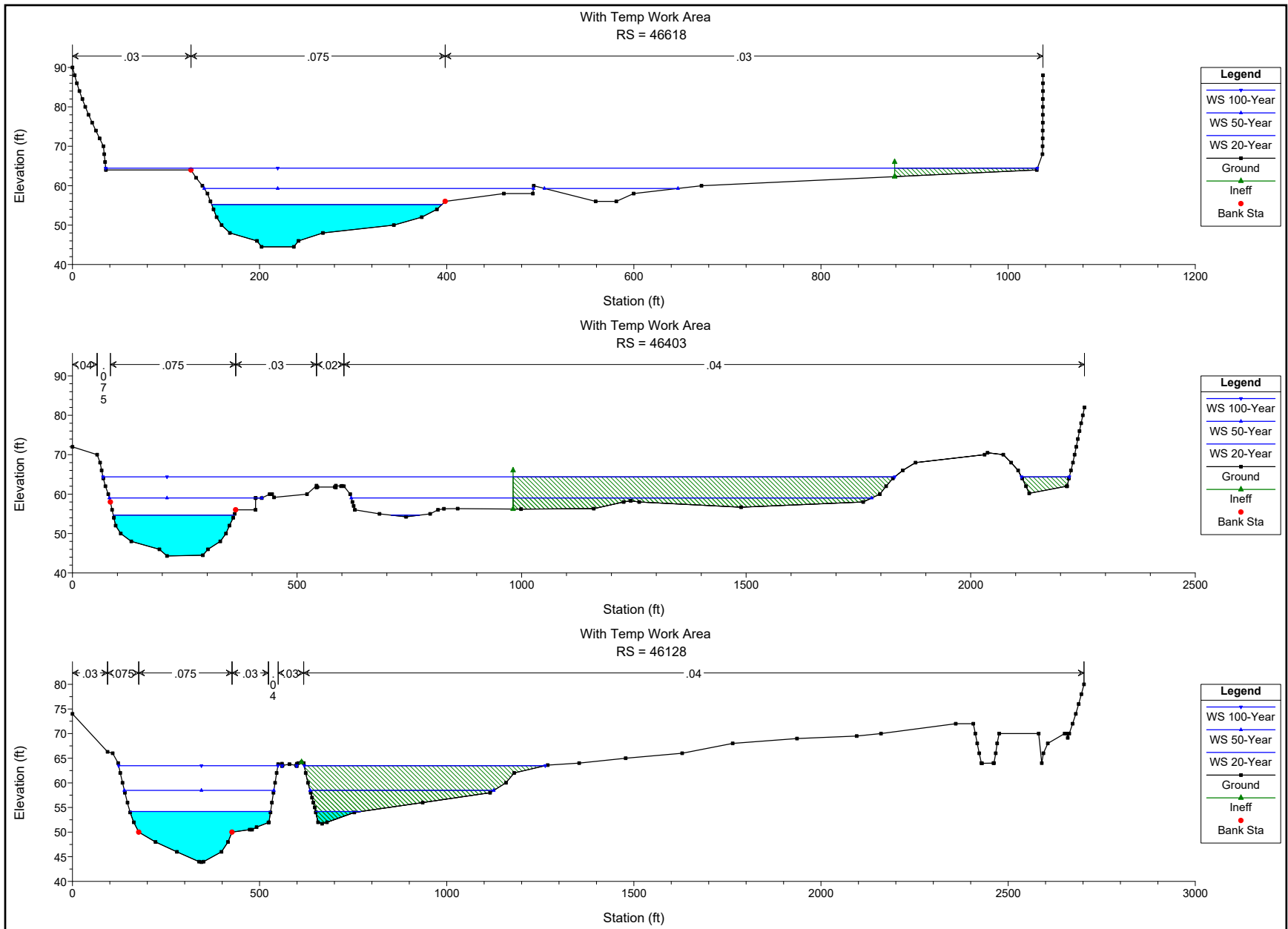
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	43953	100-Year	36000.00	35.70	55.58	46.67	55.86	0.000912	3.73	8702.06	1489.53	0.17
Reach-1	43703	20-Year	7300.00	36.00	47.50		47.55	0.000486	1.67	4106.38	689.79	0.11
Reach-1	43703	50-Year	17000.00	36.00	51.06		51.15	0.000497	2.18	7374.94	1097.58	0.12
Reach-1	43703	100-Year	36000.00	36.00	55.52		55.66	0.000400	2.45	12616.66	1197.43	0.11
Reach-1	43452	20-Year	7300.00	35.60	47.23	42.85	47.32	0.001521	2.49	2947.02	690.07	0.18
Reach-1	43452	50-Year	17000.00	35.60	50.79	44.55	50.93	0.001222	3.05	5729.99	1232.75	0.18
Reach-1	43452	100-Year	36000.00	35.60	55.38	46.85	55.53	0.000519	2.59	12151.21	1288.48	0.12
Reach-1	43163	20-Year	7300.00	35.50	46.63		46.77	0.001882	3.03	2427.01	391.64	0.21
Reach-1	43163	50-Year	17000.00	35.50	50.15		50.41	0.002111	4.19	4230.35	711.07	0.23
Reach-1	43163	100-Year	36000.00	35.50	54.95		55.27	0.001210	4.12	8158.22	972.64	0.19
Reach-1	43000	20-Year	7300.00	35.45	46.38	41.23	46.51	0.001359	2.85	2630.99	393.99	0.18
Reach-1	43000	50-Year	17000.00	35.45	49.81	43.16	50.08	0.001890	4.30	4075.86	455.75	0.23
Reach-1	43000	100-Year	36000.00	35.45	54.54	46.14	55.00	0.001965	5.54	6644.78	654.48	0.25
Reach-1	42873	20-Year	7300.00	35.40	46.16		46.29	0.001438	2.85	2584.27	371.46	0.18
Reach-1	42873	50-Year	17000.00	35.40	49.46		49.76	0.002181	4.44	3884.53	419.81	0.24
Reach-1	42873	100-Year	36000.00	35.40	54.05		54.64	0.002615	6.18	5876.93	462.70	0.28
Reach-1	42754	20-Year	7300.00	35.54	46.05	41.01	46.17	0.000794	2.79	2643.40	369.81	0.17
Reach-1	42754	50-Year	17000.00	35.54	49.28	42.54	49.58	0.001241	4.37	3937.19	421.33	0.23
Reach-1	42754	100-Year	36000.00	35.54	53.83	45.55	54.42	0.001490	6.00	5887.73	437.37	0.27
Reach-1	42702		Bridge									
Reach-1	42650	20-Year	7300.00	35.70	45.63	41.06	45.77	0.001131	3.04	2400.53	383.69	0.20
Reach-1	42650	50-Year	17000.00	35.70	48.90	42.95	49.22	0.001503	4.52	3786.70	435.23	0.25
Reach-1	42650	100-Year	36000.00	35.70	53.44	45.71	54.05	0.001659	6.06	5798.31	451.66	0.28
Reach-1	42583	20-Year	7300.00	35.30	45.33		45.54	0.002753	3.92	2067.34	362.98	0.26
Reach-1	42583	50-Year	17000.00	35.30	48.43		48.90	0.003851	5.87	3244.76	392.91	0.32
Reach-1	42583	100-Year	36000.00	35.30	52.83		53.68	0.004474	7.99	5015.13	410.67	0.37
Reach-1	42319	20-Year	7300.00	36.00	45.01		45.09	0.000989	2.28	3309.02	542.04	0.15
Reach-1	42319	50-Year	17000.00	36.00	48.04		48.22	0.001472	3.53	5086.25	633.83	0.20

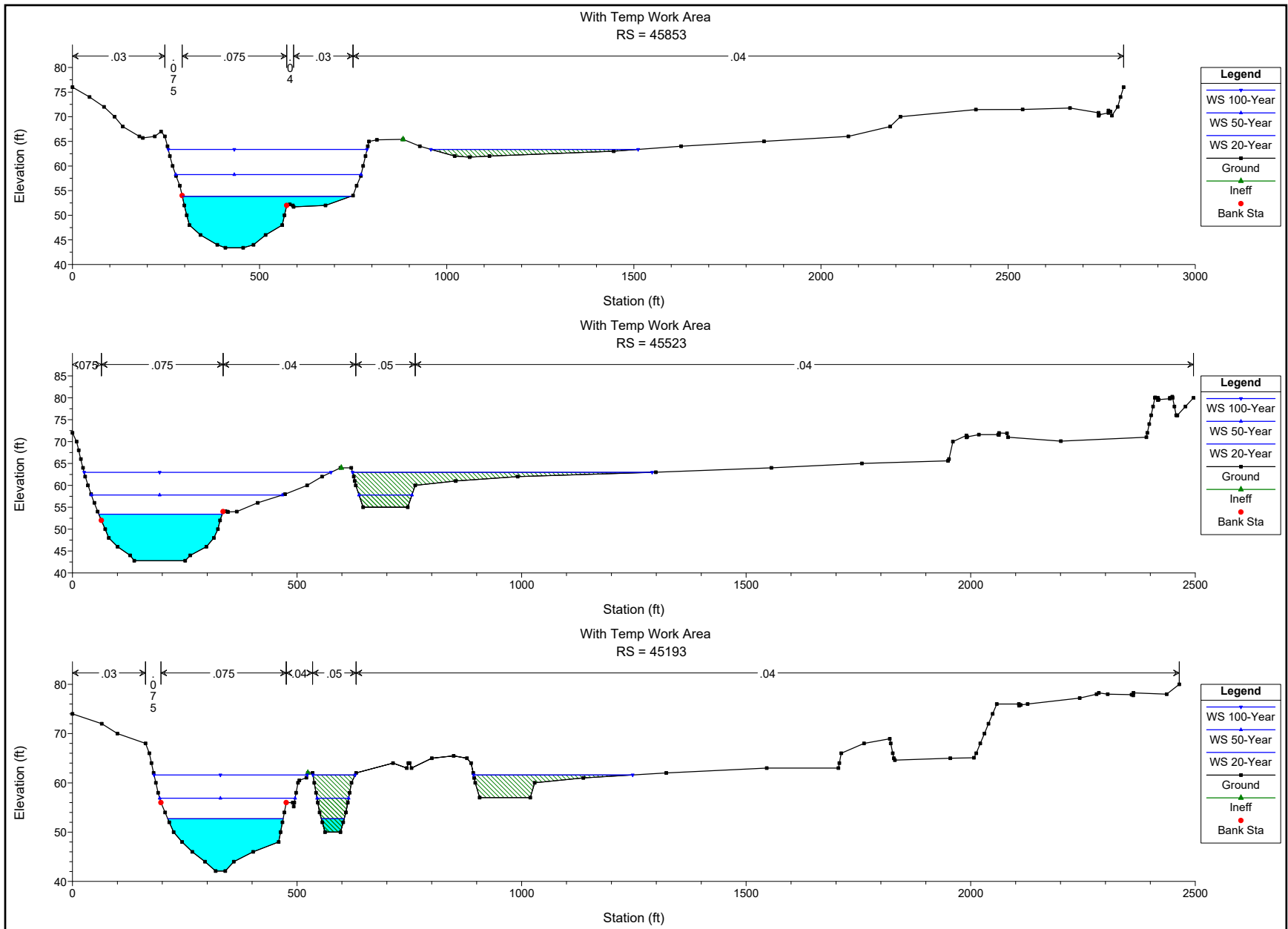
HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

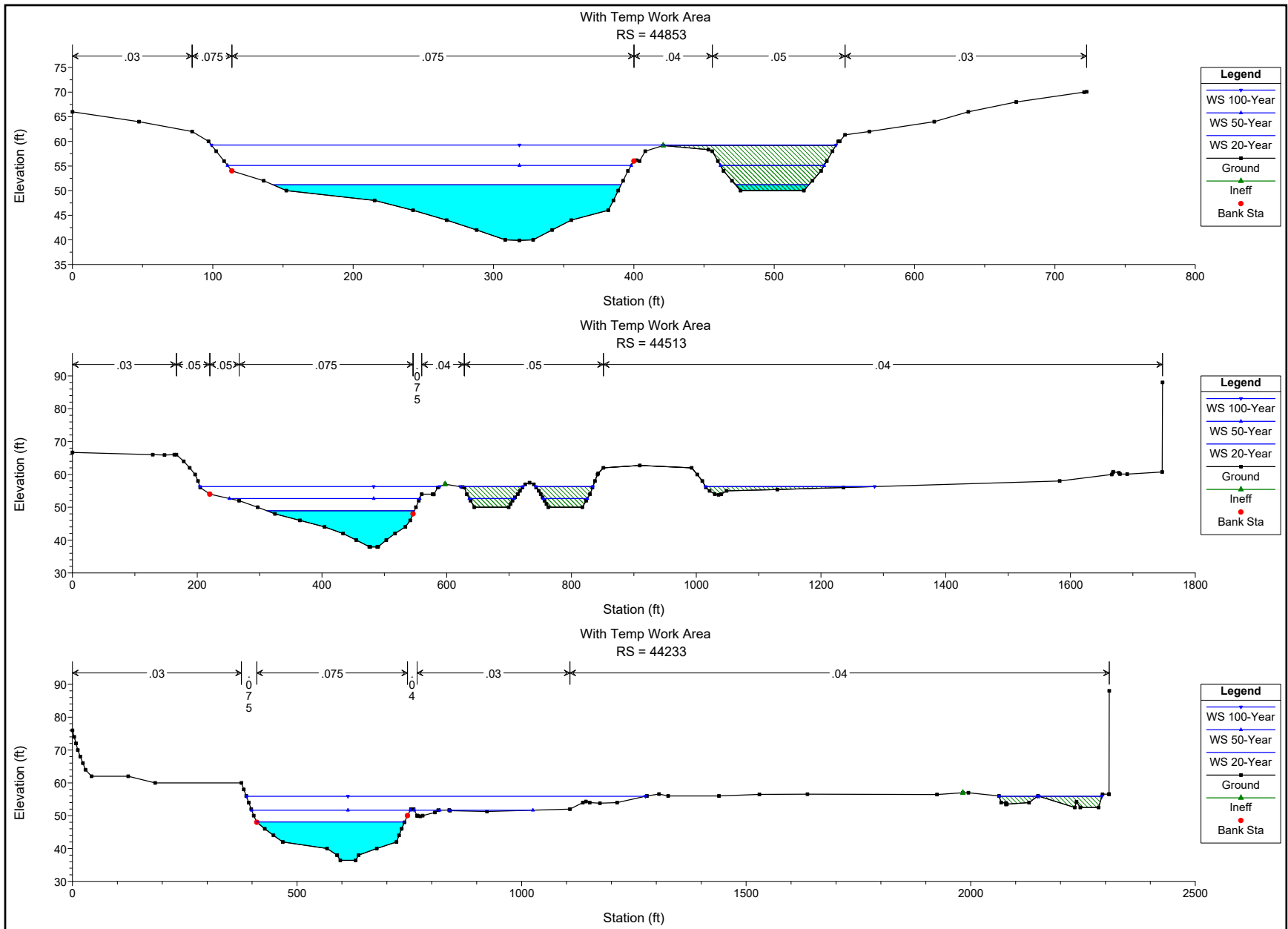
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	42319	100-Year	36000.00	36.00	52.55		52.87	0.001579	4.69	8047.23	674.02	0.22
Reach-1	42001	20-Year	7300.00	35.92	44.28		44.48	0.004808	3.51	2063.74	534.71	0.31
Reach-1	42001	50-Year	17000.00	35.92	47.13		47.47	0.004175	4.65	3728.32	613.07	0.31
Reach-1	42001	100-Year	36000.00	35.92	51.69		52.16	0.003179	5.68	6691.50	732.47	0.30
Reach-1	41710	20-Year	7300.00	33.92	42.88		43.09	0.004764	3.67	1996.53	462.20	0.31
Reach-1	41710	50-Year	17000.00	33.92	45.73		46.09	0.005406	4.81	3555.28	605.71	0.35
Reach-1	41710	100-Year	36000.00	33.92	50.78		51.24	0.003113	5.47	6745.49	699.77	0.29
Reach-1	41416	20-Year	7300.00	33.92	41.21		41.39	0.007082	3.40	2151.37	755.42	0.35
Reach-1	41416	50-Year	17000.00	33.92	44.80		44.98	0.002538	3.47	4893.46	772.86	0.24
Reach-1	41416	100-Year	36000.00	33.92	50.34		50.57	0.001450	3.96	9271.64	832.74	0.20
Reach-1	41116	20-Year	7300.00	33.92	40.20		40.29	0.002146	2.40	3043.45	732.71	0.21
Reach-1	41116	50-Year	17000.00	33.92	44.35		44.47	0.001164	2.79	6109.87	745.34	0.17
Reach-1	41116	100-Year	36000.00	33.92	50.03		50.21	0.000935	3.53	10498.64	835.27	0.17
Reach-1	40815	20-Year	7300.00	33.92	39.75		39.82	0.001183	2.13	3438.79	632.72	0.16
Reach-1	40815	50-Year	17000.00	33.92	44.04		44.15	0.000930	2.77	6183.81	648.56	0.16
Reach-1	40815	100-Year	36000.00	33.92	49.73		49.94	0.000884	3.66	9939.50	666.92	0.16
Reach-1	40514	20-Year	7300.00	31.92	39.53		39.58	0.000547	1.69	4344.34	636.62	0.11
Reach-1	40514	50-Year	17000.00	31.92	43.84		43.93	0.000586	2.41	7114.58	650.90	0.13
Reach-1	40514	100-Year	36000.00	31.92	49.53		49.70	0.000658	3.35	10865.46	668.21	0.14
Reach-1	40225	20-Year	7300.00	31.92	38.86		39.20	0.004615	4.71	1593.38	274.06	0.32
Reach-1	40225	50-Year	17000.00	31.92	42.91		43.51	0.004491	6.40	2818.59	339.41	0.35
Reach-1	40225	100-Year	36000.00	31.92	48.35		49.24	0.004156	8.12	5323.47	695.02	0.36
Reach-1	39925	20-Year	7300.00	29.92	37.52		37.81	0.004550	4.34	1728.83	343.07	0.32
Reach-1	39925	50-Year	17000.00	29.92	41.93		42.33	0.003140	5.24	3496.96	477.64	0.29
Reach-1	39925	100-Year	36000.00	29.92	47.85		48.27	0.001981	5.64	7269.55	711.06	0.25
Reach-1	39625	20-Year	7300.00	27.92	37.25		37.31	0.000687	2.00	3673.88	505.47	0.13
Reach-1	39625	50-Year	17000.00	27.92	41.71		41.84	0.000766	2.87	5958.15	518.87	0.15
Reach-1	39625	100-Year	36000.00	27.92	47.59		47.83	0.000890	4.04	9114.33	557.91	0.17

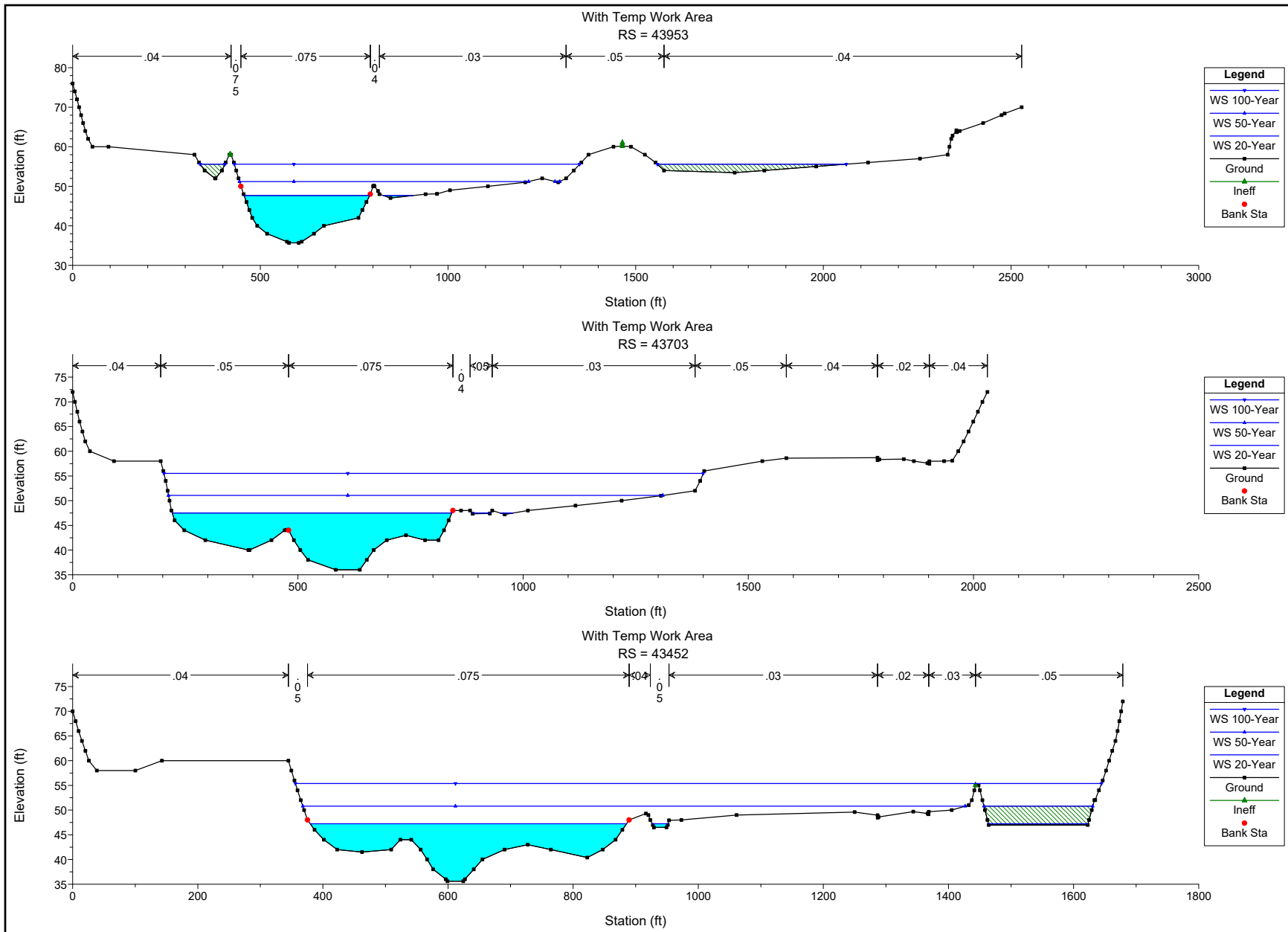
HEC-RAS Plan: With Temp Work Area River: RIVER-1 Reach: Reach-1 (Continued)

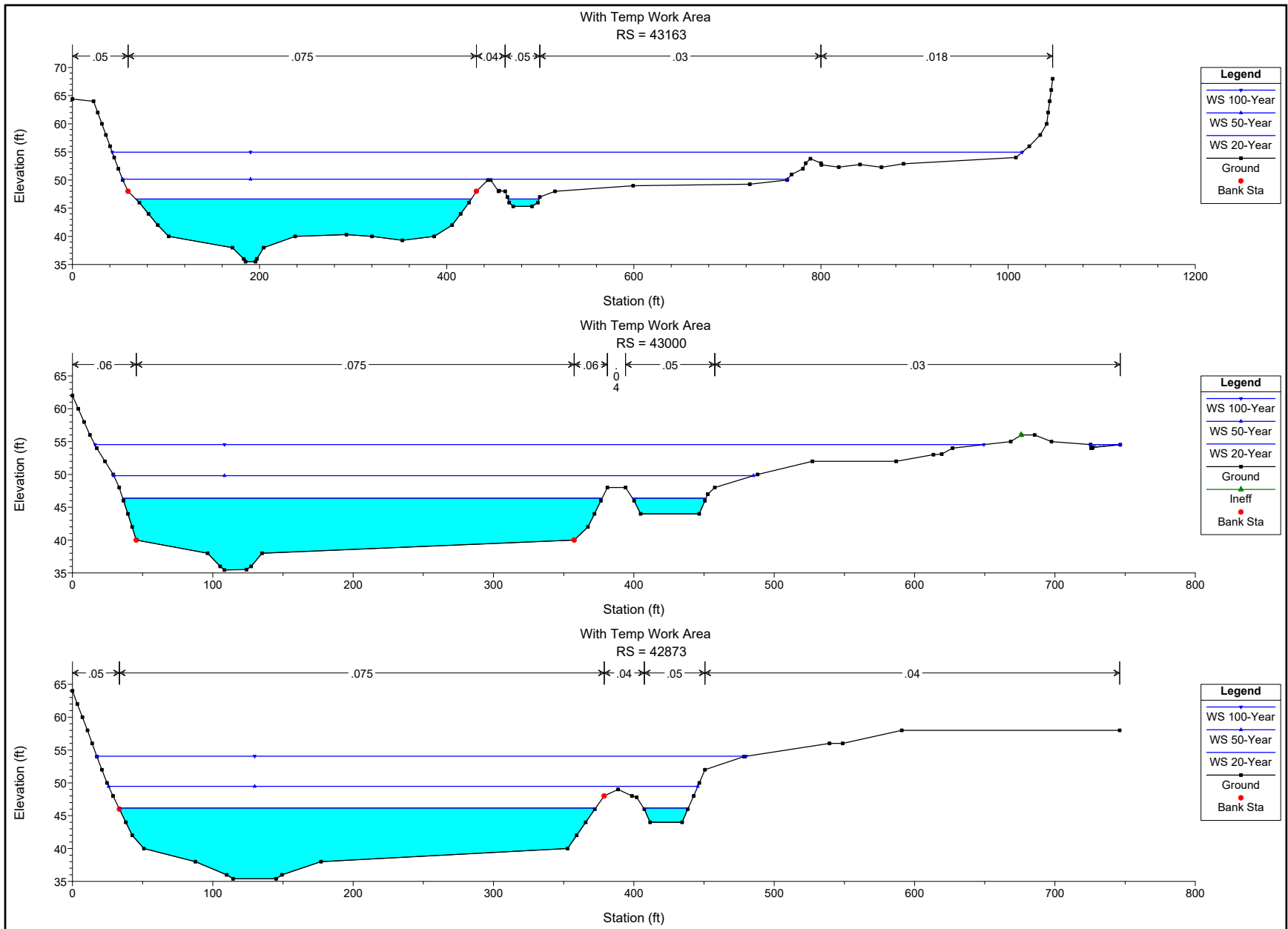
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach-1	39325	20-Year	7300.00	27.92	37.04		37.10	0.000717	2.07	3561.55	485.87	0.13
Reach-1	39325	50-Year	17000.00	27.92	41.46		41.60	0.000817	2.99	5742.45	499.20	0.15
Reach-1	39325	100-Year	36000.00	27.92	47.29		47.55	0.000952	4.19	8713.01	521.20	0.17
Reach-1	39025	20-Year	7300.00	27.92	36.78		36.86	0.000904	2.25	3275.00	459.23	0.15
Reach-1	39025	50-Year	17000.00	27.92	41.17		41.33	0.001004	3.24	5312.61	470.19	0.17
Reach-1	39025	100-Year	36000.00	27.92	46.92		47.23	0.001170	4.56	8065.47	503.73	0.19
Reach-1	38725	20-Year	7300.00	27.92	36.44		36.54	0.001299	2.54	2902.42	447.18	0.17
Reach-1	38725	50-Year	17000.00	27.92	40.80		40.99	0.001285	3.52	4882.82	461.33	0.19
Reach-1	38725	100-Year	36000.00	27.92	46.49		46.84	0.001406	4.86	7558.08	487.91	0.21
Reach-1	38425	20-Year	7300.00	27.92	36.03		36.15	0.001277	2.74	2690.21	365.11	0.17
Reach-1	38425	50-Year	17000.00	27.92	40.31		40.56	0.001529	4.03	4277.51	377.89	0.21
Reach-1	38425	100-Year	36000.00	27.92	45.85		46.35	0.001853	5.73	6419.03	394.60	0.24
Reach-1	38125	20-Year	7300.00	27.92	35.52	31.30	35.67	0.002001	3.13	2362.57	374.31	0.21
Reach-1	38125	50-Year	17000.00	27.92	39.75	33.12	40.03	0.002000	4.34	4061.87	441.27	0.23
Reach-1	38125	100-Year	36000.00	27.92	45.29	35.80	45.77	0.002001	5.72	6665.57	506.53	0.25

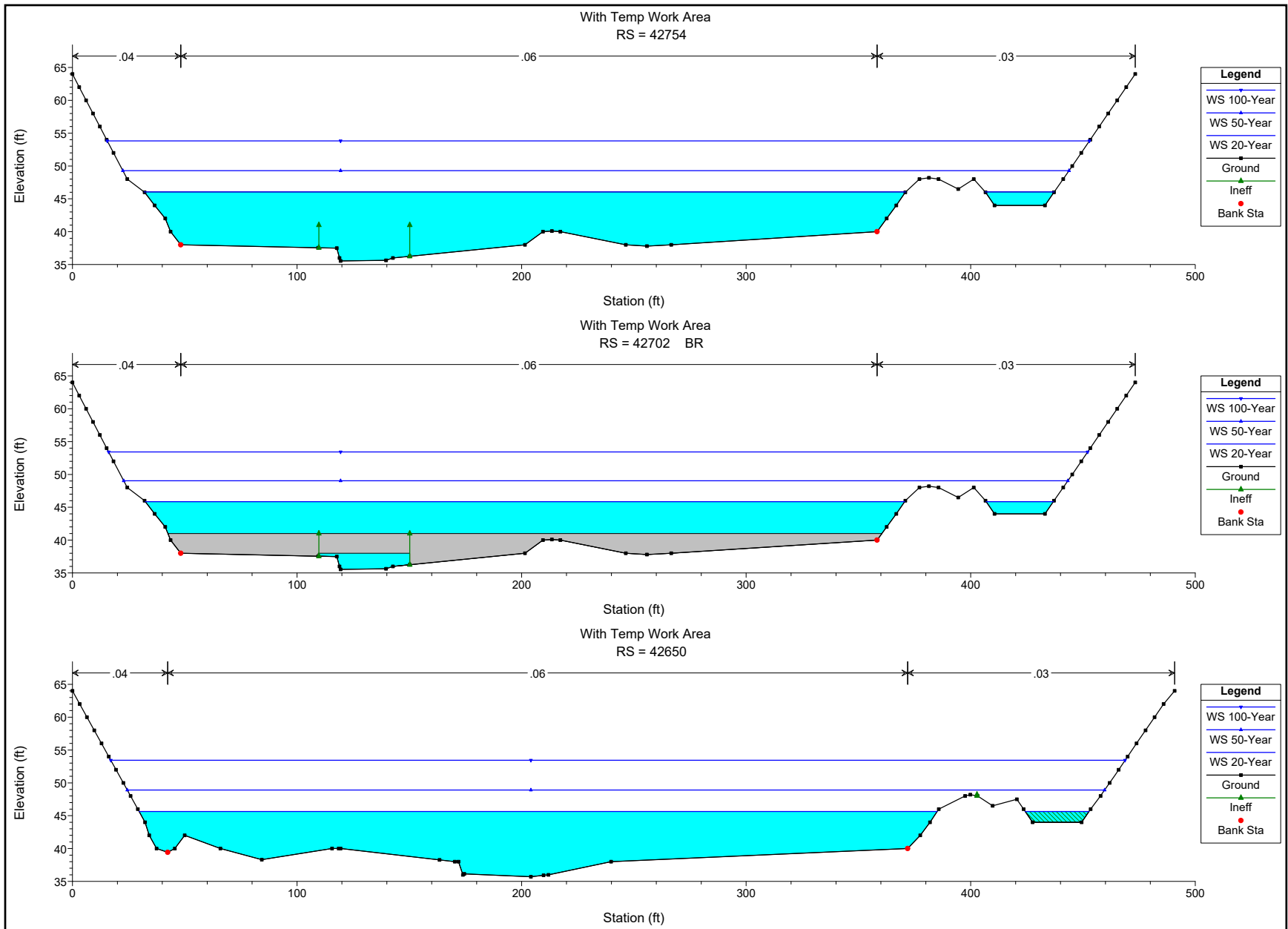


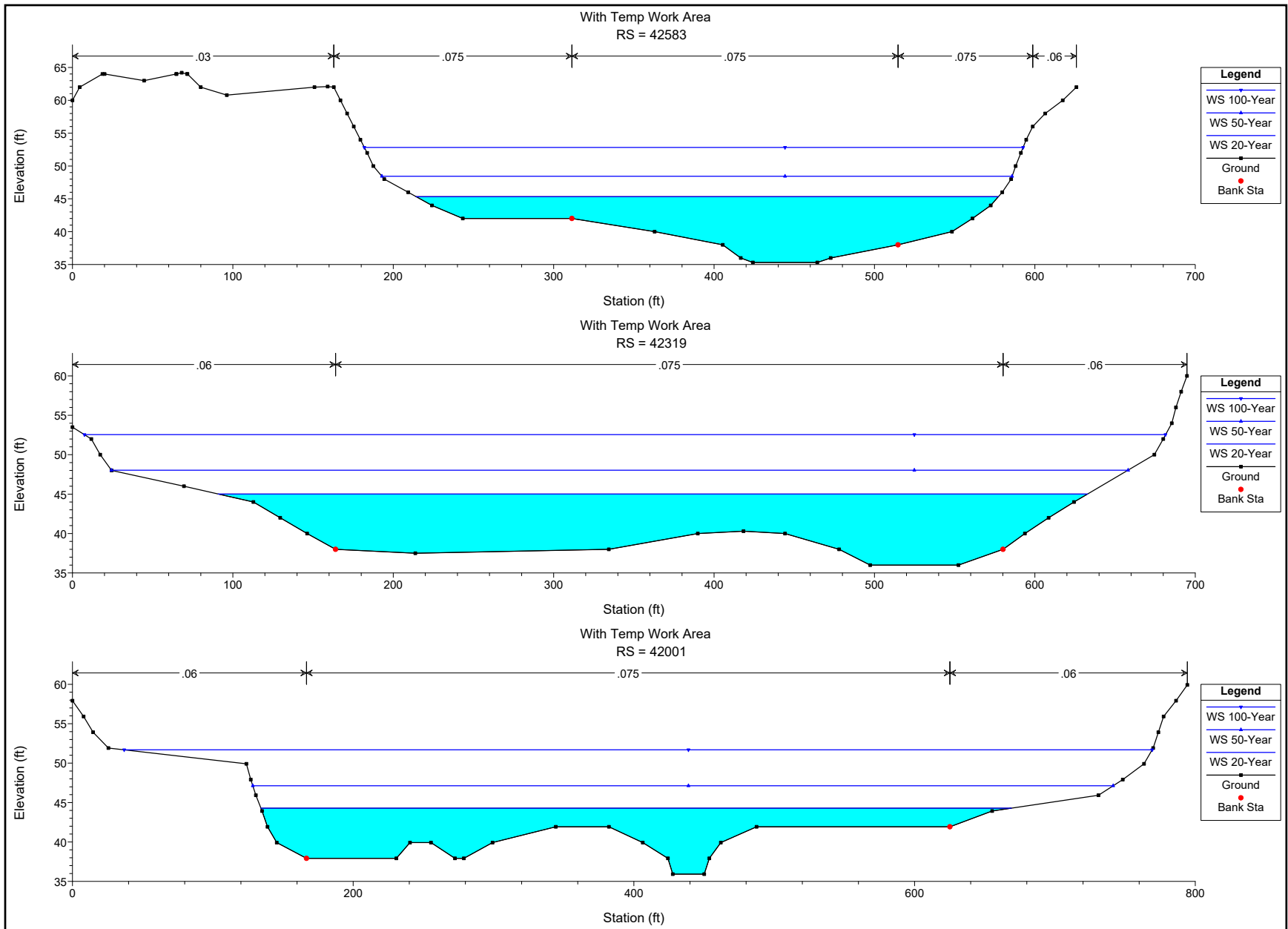


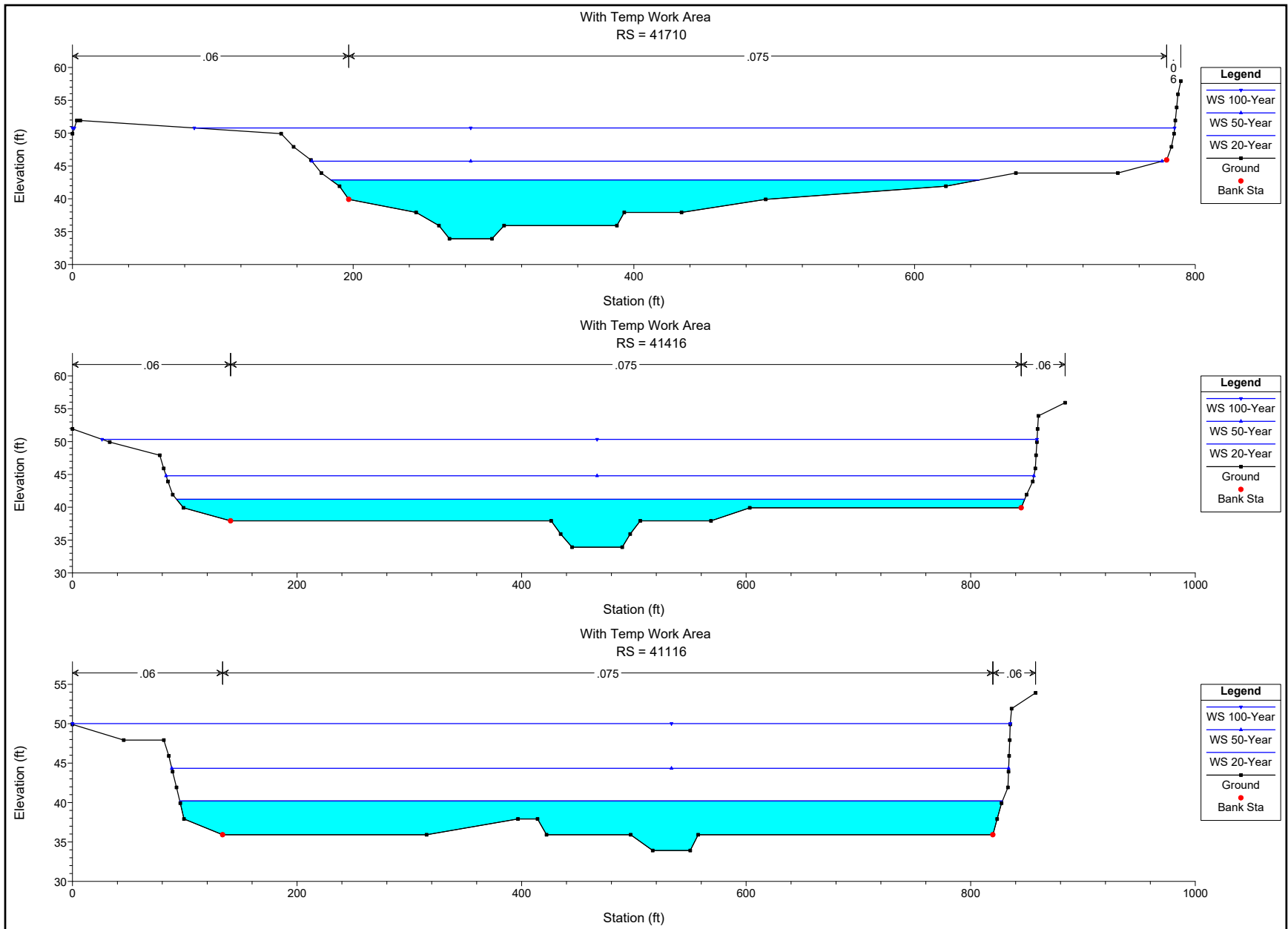


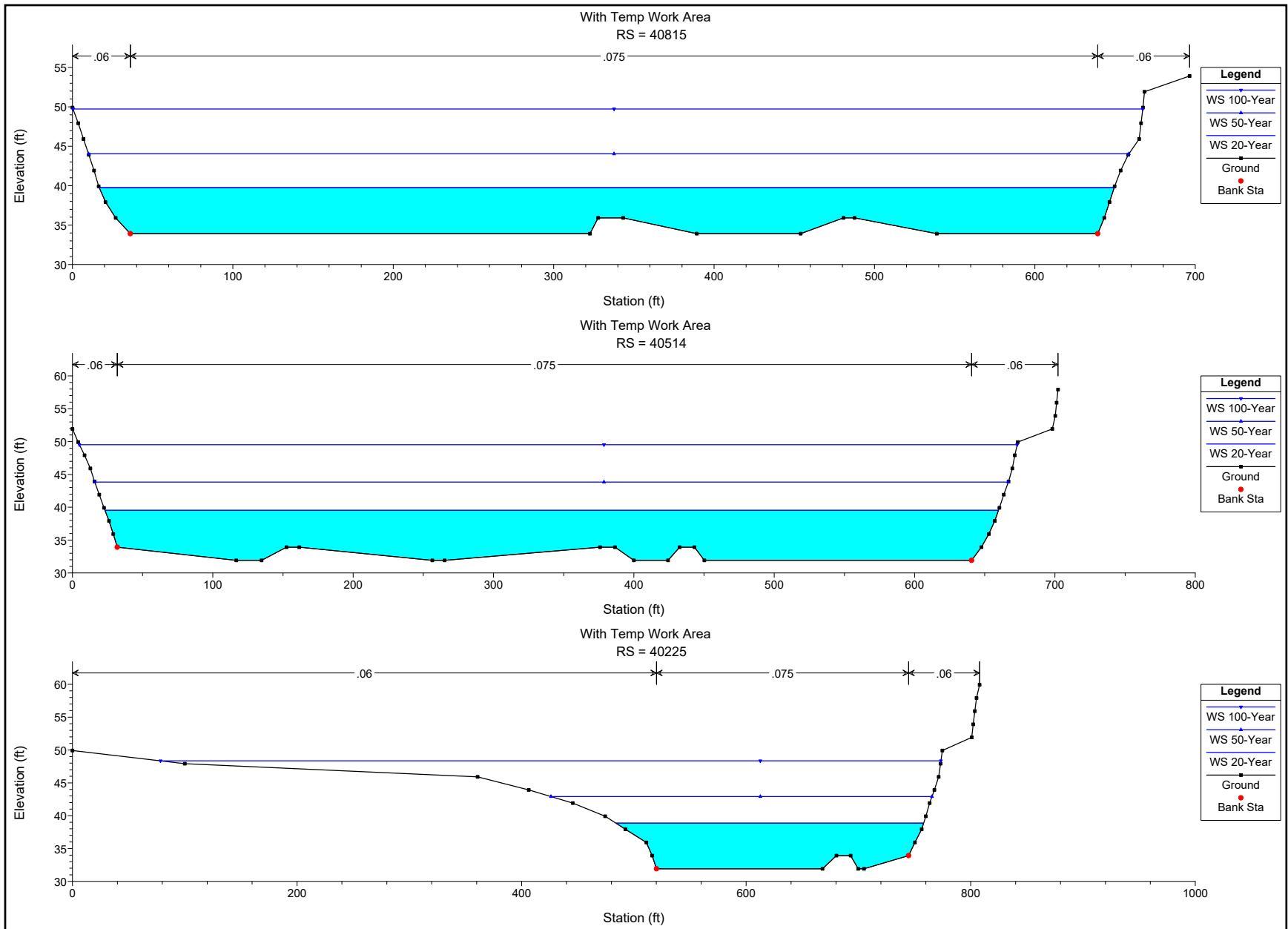


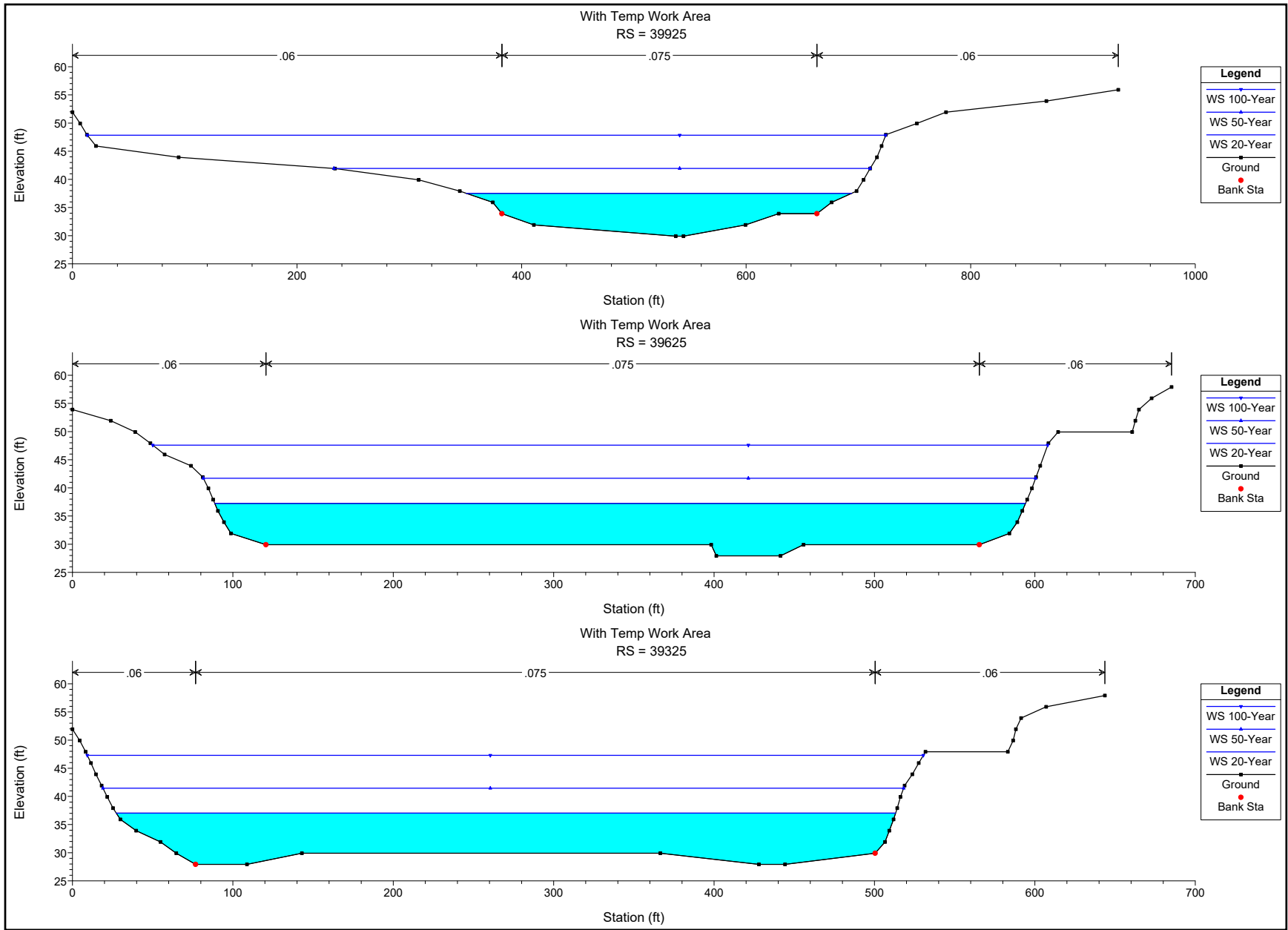


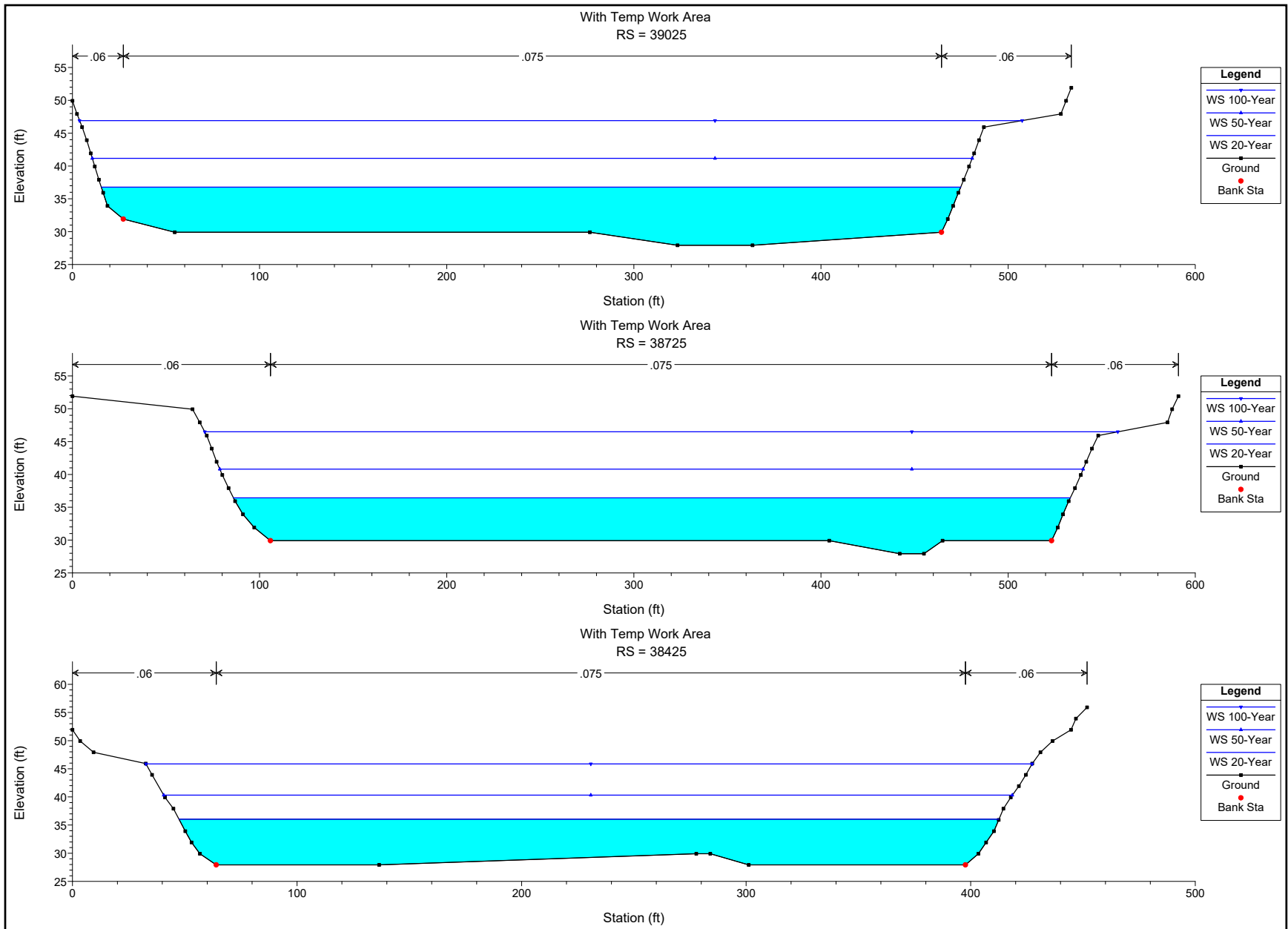




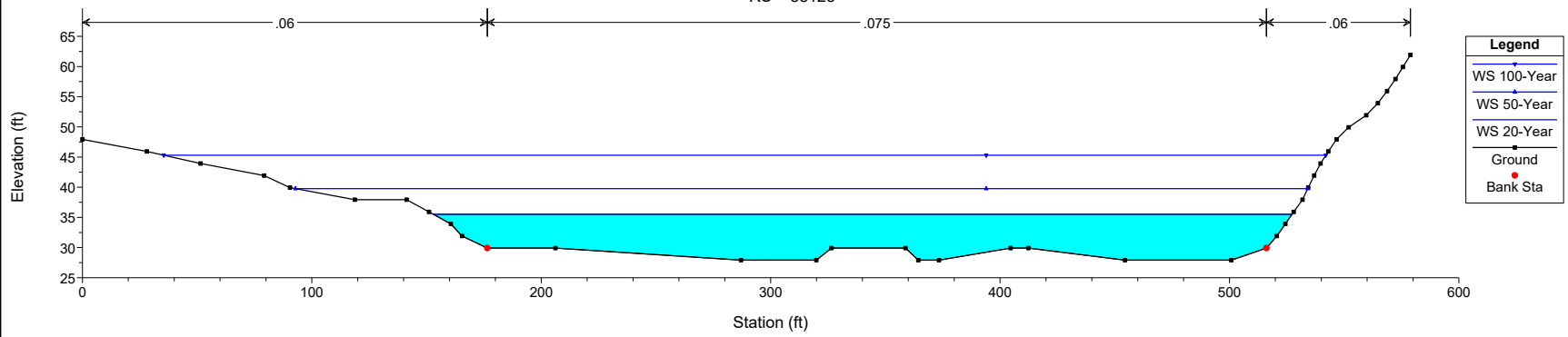


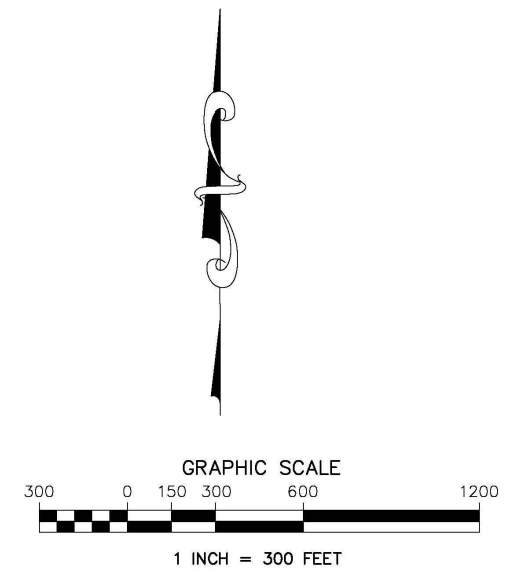






With Temp Work Area
RS = 38125





HEC-RAS WORK MAP

