
Appendix E
HEC-RAS Results

Appendix E – HEC-RAS Results

The following tables show summaries of hydraulic analysis results for Scenarios 2 and 3 models. The 50-yr flood results are shown along with the results for the 74-yr and 100-yr results. Note that the only difference in geometry between Scenario 2 and 3 is that the bridge deck is higher for Scenario 3 (100-yr protection design). Since the 74-yr water surface is not affected by the bridge deck under Scenario 2, the results of this scenario is combined with that of Scenario 3 in Table E-1.

TABLE E-1
Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch EI	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
10100	100-yr	20676	4483.74	4499.66	4493.85	4500.26	6.23	3375.79	628	0.41
10100	50-yr	13684	4483.74	4495.95	4491.82	4496.88	7.73	1771.16	345.82	0.6
10100	74-yr	16400	4483.74	4497.54	4492.66	4498.29	6.92	2370.06	407.65	0.51
10050	Arlington Ave. Bridge									
10000	100-yr	20676	4483.74	4496.74	4493.75	4498.3	10.02	2064.11	368.08	0.75
10000	50-yr	13684	4483.74	4494.6	4491.76	4495.99	9.44	1449.62	168.33	0.57
10000	74-yr	16400	4483.74	4495.68	4492.56	4497.14	9.7	1691.38	331.71	0.76
9500	100-yr	20676	4482.39	4496.15	4494.86	4497.35	8.8	2348.78	433.63	0.67
9500	50-yr	13684	4482.39	4492.4	4491.41	4494.8	12.43	1100.99	152.13	0.81
9500	74-yr	16400	4482.39	4493.55	4492.31	4495.98	12.5	1311.84	248.72	0.96
9000	100-yr	20676	4481.34	4495.63	4491.61	4496.82	8.78	2356.2	241.67	0.5

TABLE E-1
Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
9000	50-yr	13684	4481.34	4492.54	4490.01	4493.64	8.4	1628.86	215	0.54
9000	74-yr	16400	4481.34	4493.65	4490.65	4494.83	8.73	1879.14	240.09	0.55
8968.35	100-yr	20676	4480.5	4495.59	4491.51	4496.81	8.83	2340.53	237.67	0.5
8968.35	50-yr	13684	4480.5	4492.53	4489.83	4493.62	8.37	1634.27	210.92	0.53
8968.35	74-yr	16400	4480.5	4493.62	4490.52	4494.81	8.76	1872.41	234.02	0.55
8500	100-yr	20676	4480.39	4493.18	4491.52	4496.07	13.66	1513.84	151	0.76
8500	50-yr	13684	4480.39	4489.53	4489.53	4492.67	14.2	963.44	151	0.99
8500	74-yr	16400	4480.39	4491.25	4490.34	4494.04	13.41	1223.34	151	0.83
8000	100-yr	20676	4479.33	4493.26	4490.42	4495.85	12.92	1599.83	140	0.67
8000	50-yr	13684	4479.33	4490.49	4488.29	4492.45	11.25	1216.63	135	0.66
8000	74-yr	16400	4479.33	4491.57	4489.16	4493.81	12.03	1363.23	140	0.68
7800	Sierra St.	Bridge								
7500	100-yr	20676	4479.28	4493.08	4490.58	4495.59	12.7	1627.67	160	0.7
7500	50-yr	13684	4479.28	4490.08	4488.56	4492.21	11.65	1174.8	146	0.72
7500	74-yr	16400	4479.28	4491.21	4489.4	4493.56	12.25	1339.2	146	0.71

TABLE E-1
Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
7000	100-yr	20676	4480.08	4492.75	4490.73	4495.38	13.01	1589.49	173.06	0.76
7000	50-yr	13684	4480.08	4489.63	4488.21	4491.97	12.27	1115.51	135	0.75
7000	74-yr	16400	4480.08	4490.69	4489.09	4493.31	12.99	1262.66	152.29	0.79
6500	100-yr	20676	4480.14	4493.57	4489.23	4495.23	10.36	1996.21	175	0.54
6500	50-yr	13684	4480.14	4490.48	4487.26	4491.82	9.3	1471.27	159.25	0.54
6500	74-yr	16400	4480.14	4491.64	4488.06	4493.15	9.86	1663.47	168.55	0.55
6300	Virginia St.	Bridge								
6000	100-yr	20676	4479.71	4492.38	4489.56	4494.89	12.49	1655.32	145	0.65
6000	50-yr	13684	4479.71	4489.44	4487.52	4491.43	11.14	1228.67	145	0.67
6000	74-yr	16400	4479.71	4490.5	4488.3	4492.76	11.87	1381.88	145	0.68
5500	100-yr	20676	4478.85	4492.35	4488.55	4494.25	11.07	1867.91	155	0.56
5500	50-yr	13684	4478.85	4489.25	4486.57	4490.76	9.86	1387.78	155	0.58
5500	74-yr	16400	4478.85	4490.36	4487.37	4492.08	10.51	1560.34	155	0.58
5000	100-yr	20676	4478.35	4492.07	4487.83	4493.71	10.29	2009.57	166	0.52

TABLE E-1
 Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
5000	50-yr	13684	4478.35	4488.74	4485.95	4490.11	9.39	1457.1	166	0.56
5000	74-yr	16400	4478.35	4489.92	4486.7	4491.45	9.92	1652.45	166	0.55
4800	Center St.	Bridge								
4500	100-yr	20676	4478.39	4491.53	4487.33	4493.14	10.18	2031.33	170	0.52
4500	50-yr	13684	4478.39	4488.19	4485.47	4489.56	9.36	1462.73	170	0.56
4500	74-yr	16400	4478.39	4489.42	4486.2	4490.93	9.81	1672.16	170	0.55
4000	100-yr	20676	4476.79	4490.54	4487.24	4492.69	11.76	1757.78	153.63	0.61
4000	50-yr	13684	4476.79	4487.1	4485.07	4489	11.04	1238.95	147.67	0.67
4000	74-yr	16400	4476.79	4488.33	4485.88	4490.4	11.53	1422.09	150.51	0.66
3500	100-yr	20676	4476.06	4490.78	4484.99	4491.98	8.79	2350.95	176	0.42
3500	50-yr	13684	4476.06	4487.54	4483.19	4488.46	7.68	1780.76	176	0.43
3500	74-yr	16400	4476.06	4488.84	4483.88	4489.88	8.16	2008.92	176	0.43
3300	Lake St.	Bridge								
3000	100-yr	20676	4474.37	4489.72	4485.34	4491.57	10.92	1893.85	152.56	0.55

TABLE E-1
Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch EI	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
3000	50-yr	13684	4474.37	4486.77	4483.16	4488.17	9.42	1453.22	146.5	0.53
3000	74-yr	16400	4474.37	4488	4484.02	4489.59	10.03	1634.96	149.03	0.53
2500	100-yr	20676	4473.51	4488.96	4485.73	4491.28	12.22	1691.34	146.88	0.63
2500	50-yr	13684	4473.51	4486.13	4483.32	4487.89	10.64	1286.06	140.06	0.62
2500	74-yr	16400	4473.51	4487.34	4484.37	4489.31	11.25	1457.16	142.99	0.62
2000	100-yr	20676	4473.04	4488	4485.57	4490.84	13.53	1527.89	143.95	0.73
2000	50-yr	13684	4473.04	4485.35	4483.04	4487.49	11.73	1166.43	128.46	0.69
2000	74-yr	16400	4473.04	4486.49	4484.12	4488.9	12.46	1316.34	135.24	0.7
1500	100-yr	20676	4471.82	4487.6	4484.27	4490.08	12.65	1634.25	134.76	0.64
1500	50-yr	13684	4471.82	4485.05	4481.8	4486.77	10.55	1297.54	129.22	0.59
1500	74-yr	16400	4471.82	4486.15	4482.84	4488.16	11.37	1442.24	131.65	0.61
1000	100-yr	20676	4471.94	4487.15	4483.49	4489.29	11.75	1759.54	147.88	0.6
1000	50-yr	13684	4471.94	4484.66	4481.21	4486.15	9.79	1397.84	142.57	0.55
1000	74-yr	16400	4471.94	4485.75	4482.13	4487.48	10.55	1554.95	144.92	0.57
500	100-yr	20676	4472.26	4486.05	4483.85	4488.74	13.16	1571.72	151.45	0.72

TABLE E-1
Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch EI	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
500	50-yr	13684	4472.26	4483.82	4481.42	4485.71	11.02	1241.97	143.36	0.66
500	74-yr	16400	4472.26	4484.84	4482.42	4487	11.79	1390.82	147.31	0.68
400	100-yr	20676	4472	4486.36	4482.36	4488.15	10.74	1926.03	171.58	0.56
400	50-yr	13684	4472	4483.99	4480.22	4485.23	8.94	1530.37	162.09	0.51
400	74-yr	16400	4472	4485.06	4481.07	4486.49	9.61	1706.12	166.48	0.53
375	2nd St.	Bridge								
350	100-yr	20676	4473.2	4485.88		4487.9	11.41	1812.57	169.95	0.62
350	50-yr	13684	4473.2	4483.6		4485.02	9.54	1434.86	161.54	0.56
350	74-yr	16400	4473.2	4484.65		4486.27	10.21	1606.65	165.42	0.58
300	100-yr	20676	4472.4	4485.91	4480.99	4487.05	8.54	2420.43	208.81	0.44
300	50-yr	13684	4472.4	4483.5	4479.37	4484.29	7.13	1918.31	208.02	0.41
300	74-yr	16400	4472.4	4484.62	4480.02	4485.52	7.63	2149.8	208.39	0.42
275	Kuenzli St.	Bridge								
250	100-yr	20676	4472.4	4485.82		4486.88	8.26	2502.89	228.39	0.44

TABLE E-1
 Scenario 2 and 3 - 74-yr and 100-yr Level of Protection

River Sta	Profile	Q Total	Min Ch EI	W.S. Elev	Crit W.S.	E.G. Elev	Vel Chnl	Flow Area	Top Width	Froude #
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/s)	(sq ft)	(ft)	
250	50-yr	13684	4472.4	4483.38		4484.15	7.01	1951.54	224.36	0.42
250	74-yr	16400	4472.4	4484.51		4485.37	7.44	2205.55	226.23	0.42
200	100-yr	20676	4469.86	4485.4	4479.97	4486.54	8.7	2672.38	368.96	0.5
200	50-yr	13684	4469.86	4483	4477.89	4483.87	7.51	1922.58	263.62	0.41
200	74-yr	16400	4469.86	4484.09	4478.74	4485.08	8.04	2225.93	298.49	0.44

Figure E.1 shows a plot of the 50, 74, and 100 year under Scenarios 2 and 3.

