

Appendix H: Proposed Conditions Model

- HEC-RAS Reports
- HEC-RAS Cross-Sections
- HEC-RAS Profiles

HEC-RAS Plan: Prop

River	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 # Cht
Walker Run	1	5862	100 yr	1640.00	675.53	680.72	680.72	681.63	0.022574	10.82	320.74	162.83	0.92
Walker Run	1	5862	100 yr encroachm	1640.00	675.53	681.58	681.58	683.30	0.024616	12.77	206.82	58.12	0.99
Walker Run	1	5862	500 yr	3100.00	675.53	681.72	681.72	682.99	0.026752	13.57	488.34	170.44	1.04
Walker Run	1	5862	10-yr	480.00	675.53	679.13	679.13	679.75	0.020726	7.60	115.65	93.39	0.82
Walker Run	1	5862	50-yr	1180.00	675.53	680.22	680.22	681.07	0.022387	9.93	242.62	147.63	0.90
Walker Run	1												
Walker Run	1	5547	100 yr	1640.00	669.38	676.99		677.09	0.001925	4.50	863.91	217.43	0.31
Walker Run	1	5547	100 yr encroachm	1640.00	669.38	677.59		677.92	0.006418	6.37	395.25	66.17	0.41
Walker Run	1	5547	500 yr	3100.00	669.38	679.69		679.79	0.001368	4.74	1469.00	230.07	0.27
Walker Run	1	5547	10-yr	480.00	669.38	673.94		674.10	0.004911	4.81	236.43	155.81	0.44
Walker Run	1	5547	50-yr	1180.00	669.38	675.99		676.09	0.002297	4.41	650.27	212.27	0.32
Walker Run	1												
Walker Run	1	5282	100 yr	1640.00	667.03	676.03	673.33	676.41	0.003289	6.25	440.99	221.46	0.40
Walker Run	1	5282	100 yr encroachm	1640.00	667.03	676.43	673.30	676.80	0.002979	6.15	439.67	69.00	0.38
Walker Run	1	5282	500 yr	3100.00	667.03	679.31	674.99	679.45	0.001201	4.79	1508.25	300.90	0.25
Walker Run	1	5282	10-yr	480.00	667.03	673.14	671.21	673.29	0.002084	3.63	214.82	73.76	0.29
Walker Run	1	5282	50-yr	1180.00	667.03	675.11	672.64	675.40	0.002900	5.39	368.08	188.50	0.37
Walker Run	1												
Walker Run	1	5250	Bridge										
Walker Run	1												
Walker Run	1	5198	100 yr	1640.00	665.71	671.81	671.47	673.01	0.016321	10.83	252.34	218.53	0.83
Walker Run	1	5198	100 yr encroachm	1640.00	665.71	672.59	671.50	673.42	0.009649	9.13	309.27	73.00	0.65
Walker Run	1	5198	500 yr	3100.00	665.71	673.09	673.09	675.26	0.023463	15.02	345.73	234.24	1.03
Walker Run	1	5198	10-yr	480.00	665.71	669.45	669.25	670.15	0.017404	7.51	91.77	151.46	0.78
Walker Run	1	5198	50-yr	1180.00	665.71	670.98	670.81	672.08	0.017767	10.07	191.37	199.14	0.84
Walker Run	1												
Walker Run	1	5107	100 yr	1640.00	664.59	671.79		671.89	0.001709	3.88	962.24	283.50	0.28
Walker Run	1	5107	100 yr encroachm	1640.00	664.59	672.56		672.66	0.001337	3.72	904.08	185.00	0.26
Walker Run	1	5107	500 yr	3100.00	664.59	672.58		672.80	0.003337	5.90	1187.88	291.92	0.41
Walker Run	1	5107	10-yr	480.00	664.59	668.74		668.95	0.005961	4.39	200.56	169.91	0.47
Walker Run	1	5107	50-yr	1180.00	664.59	670.86		670.96	0.002123	3.84	701.01	273.42	0.31
Walker Run	1												
Walker Run	1	4995	100 yr	1640.00	666.24	671.69		671.76	0.000760	2.42	984.70	269.32	0.19
Walker Run	1	4995	100 yr encroachm	1640.00	666.24	672.46		672.55	0.000671	2.50	746.76	137.00	0.18
Walker Run	1	4995	500 yr	3100.00	666.24	672.34		672.53	0.001719	3.94	1162.71	280.04	0.29
Walker Run	1	4995	10-yr	480.00	666.24	667.99		668.16	0.008077	3.30	150.96	131.98	0.50
Walker Run	1	4995	50-yr	1180.00	666.24	670.74		670.81	0.000870	2.25	736.25	253.58	0.20
Walker Run	1												
Walker Run	1	4810	100 yr	1640.00	662.87	671.62		671.64	0.000461	2.41	1625.52	326.75	0.15
Walker Run	1	4810	100 yr encroachm	1640.00	662.87	672.38		672.43	0.000560	2.83	1238.84	174.33	0.17
Walker Run	1	4810	500 yr	3100.00	662.87	672.16		672.24	0.001204	4.08	1805.73	333.93	0.25
Walker Run	1	4810	10-yr	480.00	662.87	667.44		667.50	0.001932	2.95	396.94	221.70	0.27
Walker Run	1	4810	50-yr	1180.00	662.87	670.66		670.68	0.000445	2.17	1319.14	314.17	0.15
Walker Run	1												
Walker Run	1	4735	100 yr	1640.00	662.26	671.59		671.61	0.000397	2.37	1712.11	329.82	0.14
Walker Run	1	4735	100 yr encroachm	1640.00	662.26	672.37		672.39	0.000278	2.10	1867.17	289.99	0.12
Walker Run	1	4735	500 yr	3100.00	662.26	672.09		672.15	0.001078	4.05	1877.03	334.54	0.24
Walker Run	1	4735	10-yr	480.00	662.26	667.34		667.38	0.001197	2.60	465.61	219.52	0.22
Walker Run	1	4735	50-yr	1180.00	662.26	670.63		670.65	0.000372	2.12	1401.54	320.75	0.14
Walker Run	1												
Walker Run	1	4692	100 yr	1640.00	663.77	671.57		671.59	0.000392	2.29	1734.04	347.88	0.15
Walker Run	1	4692	100 yr encroachm	1640.00	663.77	672.36		672.38	0.000290	2.10	1798.51	264.48	0.13
Walker Run	1	4692	500 yr	3100.00	663.77	672.04		672.10	0.001076	3.95	1899.10	354.85	0.24
Walker Run	1	4692	10-yr	480.00	663.77	667.30		667.32	0.001213	2.35	488.66	223.26	0.22
Walker Run	1	4692	50-yr	1180.00	663.77	670.62		670.64	0.000365	2.02	1412.78	325.94	0.14
Walker Run	1												
Walker Run	1	4495	100 yr	1640.00	663.23	671.50		671.52	0.000374	2.27	1749.20	344.35	0.14
Walker Run	1	4495	100 yr encroachm	1640.00	663.23	672.26		672.30	0.000532	2.88	1184.05	150.65	0.17
Walker Run	1	4495	500 yr	3100.00	663.23	671.82		671.89	0.001117	4.03	1862.35	350.63	0.25
Walker Run	1	4495	10-yr	480.00	663.23	667.06		667.09	0.001244	2.38	454.70	214.39	0.23
Walker Run	1	4495	50-yr	1180.00	663.23	670.55		670.57	0.000343	1.99	1431.57	326.06	0.13
Walker Run	1												
Walker Run	1	4414	100 yr	1640.00	662.97	671.47		671.49	0.000298	2.03	1828.00	347.54	0.13
Walker Run	1	4414	100 yr encroachm	1640.00	662.97	672.23		672.26	0.000358	2.37	1356.38	168.58	0.14
Walker Run	1	4414	500 yr	3100.00	662.97	671.75		671.81	0.000921	3.65	1923.19	352.12	0.22
Walker Run	1	4414	10-yr	480.00	662.97	666.98		667.01	0.000891	2.01	500.85	214.05	0.19
Walker Run	1	4414	50-yr	1180.00	662.97	670.53		670.54	0.000267	1.77	1507.09	331.63	0.12
Walker Run	1												
Walker Run	1	4295	100 yr	1640.00	662.82	671.45		671.46	0.000189	1.70	2348.50	421.23	0.10
Walker Run	1	4295	100 yr encroachm	1640.00	662.82	672.22		672.23	0.000172	1.72	2154.53	268.22	0.10
Walker Run	1	4295	500 yr	3100.00	662.82	671.68		671.72	0.000600	3.09	2445.08	423.59	0.18
Walker Run	1	4295	10-yr	480.00	662.82	666.92		666.93	0.000416	1.53	737.48	274.18	0.13
Walker Run	1	4295	50-yr	1180.00	662.82	670.51		670.52	0.000164	1.47	1955.80	411.49	0.09
Walker Run	1												
Walker Run	1	4130	100 yr	1640.00	662.26	671.42		671.43	0.000176	1.68	2348.81	437.36	0.10
Walker Run	1	4130	100 yr encroachm	1640.00	662.26	672.17		672.19	0.000268	2.19	1612.36	203.36	0.12
Walker Run	1	4130	500 yr	3100.00	662.26	671.58		671.62	0.000579	3.08	2418.19	443.10	0.18
Walker Run	1	4130	10-yr	480.00	662.26	666.83		666.85	0.000574	1.85	627.81	323.40	0.16
Walker Run	1	4130	50-yr	1180.00	662.26	670.48		670.49	0.000155	1.46	1954.05	403.16	0.09
Walker Run	1												
Walker Run	1	4043	100 yr	1640.00	662.24	671.40		671.41	0.000301	2.15	2097.08	533.11	0.13
Walker Run	1	4043	100 yr encroachm	1640.00	662.24	672.11		672.16	0.000528	3.00	1173.86	155.00	0.17
Walker Run	1	4043	500 yr	3100.00	662.24	671.49		671.56	0.001007	3.96	2149.79	537.54	0.24
Walker Run	1	4043	10-yr	480.00	662.24	666.69		666.77	0.001916	3.20	337.29	171.09	0.29
Walker Run	1	4043	50-yr	1180.00	662.24	670.46		670.47	0.000306	2.01	1615.80	490.89	0.13
Walker Run	1												
Walker Run	1	3972	100 yr	1640.00	661.21	671.39	664.72	671.40	0.000099	1.28	2677.34	606.41	0.07
Walker Run	1	3972	100 yr encroachm	1640.00	661.21	672.12	664.72	672.14	0.000089	1.28	2311.63	352.25	0.07
Walker Run	1	3972	500 yr	3100.00	661.21	671.46	666.20	671.51	0.000339	2.39	2721.99	607.90	0.14
Walker Run	1	3972	10-yr	480.00	661.21	666.67	663.19	666.70	0.000317	1.42	386.00	282.44	0.12

HEC-RAS Plan: Prop (Continued)

River	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
Walker Run	1	3972	50-yr	1180.00	661.21	670.45	664.20	670.46	0.000090	1.14	2110.26	584.86	0.07
Walker Run	1	3914	Bridge										
Walker Run	1	3860	100 yr	1640.00	660.73	667.11	667.11	668.87	0.019139	11.20	177.55	88.38	0.83
Walker Run	1	3860	100 yr encroachm	1640.00	660.73	667.85	667.11	670.15	0.027591	12.72	132.96	21.00	0.88
Walker Run	1	3860	500 yr	3100.00	660.73	669.10	669.10	671.50	0.018935	13.62	289.53	110.97	0.87
Walker Run	1	3860	10-yr	480.00	660.73	664.66	663.83	665.31	0.013534	6.46	77.05	28.92	0.64
Walker Run	1	3860	50-yr	1180.00	660.73	666.17	665.89	667.76	0.020937	10.37	127.74	78.39	0.84
Walker Run	1	3785	100 yr	1640.00	660.24	665.21	665.10	666.50	0.027449	9.12	182.10	76.65	0.93
Walker Run	1	3785	100 yr encroachm	1640.00	660.24	665.77	665.77	667.62	0.031083	10.94	153.41	47.75	0.97
Walker Run	1	3785	500 yr	3100.00	660.24	667.19	667.19	668.08	0.011474	8.30	490.03	294.27	0.66
Walker Run	1	3785	10-yr	480.00	660.24	663.86		664.19	0.011735	4.64	103.39	50.89	0.57
Walker Run	1	3785	50-yr	1180.00	660.24	664.95		665.75	0.019164	7.20	163.95	60.31	0.77
Walker Run	1	3735	100 yr	1640.00	660.36	665.10		665.37	0.008758	6.73	523.26	241.04	0.57
Walker Run	1	3735	100 yr encroachm	1640.00	660.36	665.98		666.23	0.005905	6.24	557.06	147.43	0.48
Walker Run	1	3735	500 yr	3100.00	660.36	666.30		666.62	0.007784	7.46	835.56	298.85	0.56
Walker Run	1	3735	10-yr	480.00	660.36	663.44		663.60	0.007895	4.64	207.42	108.51	0.50
Walker Run	1	3735	50-yr	1180.00	660.36	664.60		664.86	0.009173	6.35	404.01	235.39	0.57
Walker Run	1	3532	100 yr	1640.00	658.87	663.74		663.88	0.006219	4.83	638.14	254.48	0.43
Walker Run	1	3532	100 yr encroachm	1640.00	658.87	664.71		664.98	0.006758	5.83	464.04	112.15	0.46
Walker Run	1	3532	500 yr	3100.00	658.87	664.93		665.15	0.006773	6.01	949.40	268.43	0.47
Walker Run	1	3532	10-yr	480.00	658.87	662.24		662.31	0.005270	3.25	290.41	206.26	0.36
Walker Run	1	3532	50-yr	1180.00	658.87	663.25		663.37	0.005935	4.33	516.29	248.81	0.41
Walker Run	1	3410	100 yr	1640.00	658.92	662.82		663.00	0.008221	6.02	594.26	254.07	0.58
Walker Run	1	3410	100 yr encroachm	1640.00	658.92	663.74		664.05	0.008161	7.05	453.69	119.96	0.60
Walker Run	1	3410	500 yr	3100.00	658.92	663.92		664.19	0.008803	7.52	881.95	265.73	0.63
Walker Run	1	3410	10-yr	480.00	658.92	661.52		661.60	0.006221	3.80	279.35	212.73	0.46
Walker Run	1	3410	50-yr	1180.00	658.92	662.38		662.53	0.007800	5.36	484.90	251.41	0.55
Walker Run	1	3375	100 yr	1640.00	657.97	662.38		662.64	0.011758	7.25	531.65	255.90	0.67
Walker Run	1	3375	100 yr encroachm	1640.00	657.97	663.36		663.73	0.009599	7.68	425.30	120.52	0.63
Walker Run	1	3375	500 yr	3100.00	657.97	663.49		663.83	0.011213	8.47	820.51	269.46	0.69
Walker Run	1	3375	10-yr	480.00	657.97	661.04		661.26	0.014095	5.82	200.33	225.46	0.68
Walker Run	1	3375	50-yr	1180.00	657.97	661.94		662.18	0.012231	6.77	418.82	252.92	0.67
Walker Run	1	3278	100 yr	1640.00	657.99	661.78		661.90	0.004811	4.54	649.70	264.05	0.44
Walker Run	1	3278	100 yr encroachm	1640.00	657.99	662.57		662.89	0.007640	6.59	404.86	113.78	0.57
Walker Run	1	3278	500 yr	3100.00	657.99	662.87		663.07	0.005201	5.71	945.74	286.17	0.48
Walker Run	1	3278	10-yr	480.00	657.99	660.51		660.56	0.003929	2.97	318.08	255.41	0.37
Walker Run	1	3278	50-yr	1180.00	657.99	661.35		661.45	0.004587	4.04	536.76	261.78	0.42
Walker Run	1	3065	100 yr	1640.00	656.75	660.71		660.83	0.005870	5.08	644.44	304.16	0.48
Walker Run	1	3065	100 yr encroachm	1640.00	656.75	661.59		661.73	0.004096	4.93	596.41	182.62	0.42
Walker Run	1	3065	500 yr	3100.00	656.75	661.84		662.01	0.005233	5.79	1006.99	327.92	0.48
Walker Run	1	3065	10-yr	480.00	656.75	659.45	659.09	659.53	0.006839	4.05	277.45	282.74	0.48
Walker Run	1	3065	50-yr	1180.00	656.75	660.27		660.38	0.006179	4.76	514.17	292.94	0.48
Walker Run	1	2949	100 yr	1640.00	656.74	660.19		660.28	0.003365	3.84	782.64	349.99	0.37
Walker Run	1	2949	100 yr encroachm	1640.00	656.74	660.96		661.18	0.004615	5.17	500.29	144.61	0.45
Walker Run	1	2949	500 yr	3100.00	656.74	661.38		661.50	0.003125	4.54	1201.31	355.34	0.38
Walker Run	1	2949	10-yr	480.00	656.74	658.76		658.82	0.004753	3.14	304.60	313.62	0.40
Walker Run	1	2949	50-yr	1180.00	656.74	659.72		659.80	0.003548	3.56	619.31	340.68	0.37
Walker Run	1	2730	100 yr	1640.00	655.66	659.73	657.87	659.77	0.001630	2.97	1012.83	370.56	0.26
Walker Run	1	2730	100 yr encroachm	1640.00	655.66	660.09	658.22	660.25	0.003919	4.89	547.76	153.71	0.42
Walker Run	1	2730	500 yr	3100.00	655.66	660.90	658.39	660.98	0.001847	3.77	1449.71	376.10	0.29
Walker Run	1	2730	10-yr	480.00	655.66	658.33	657.28	658.35	0.001193	1.90	502.31	347.92	0.21
Walker Run	1	2730	50-yr	1180.00	655.66	659.27	657.66	659.31	0.001500	2.63	843.83	368.40	0.25
Walker Run	1	2620	Bridge										
Walker Run	1	2497	100 yr	1640.00	654.75	658.40		658.48	0.004215	4.04	771.98	367.48	0.40
Walker Run	1	2497	100 yr encroachm	1640.00	654.75	659.24		659.31	0.002374	3.54	812.92	251.55	0.31
Walker Run	1	2497	500 yr	3100.00	654.75	659.54		659.65	0.003710	4.64	1200.52	391.13	0.39
Walker Run	1	2497	10-yr	480.00	654.75	657.07		657.12	0.006392	3.49	307.10	323.67	0.45
Walker Run	1	2497	50-yr	1180.00	654.75	657.97		658.04	0.004461	3.78	614.93	359.81	0.40
Walker Run	1	2462	100 yr	1640.00	654.61	658.29		658.36	0.002697	3.54	837.74	383.31	0.33
Walker Run	1	2462	100 yr encroachm	1640.00	654.61	659.16		659.23	0.001898	3.45	787.07	200.00	0.29
Walker Run	1	2462	500 yr	3100.00	654.61	659.44		659.53	0.002628	4.23	1332.17	466.30	0.35
Walker Run	1	2462	10-yr	480.00	654.61	656.97		657.00	0.001837	2.13	415.90	287.60	0.25
Walker Run	1	2462	50-yr	1180.00	654.61	657.86		657.92	0.002467	3.10	687.57	322.81	0.31
Walker Run	1	2339	100 yr	1640.00	654.38	657.82		657.91	0.005265	4.54	716.76	445.14	0.45
Walker Run	1	2339	100 yr encroachm	1640.00	654.38	658.49		658.77	0.009362	6.90	424.10	150.07	0.63
Walker Run	1	2339	500 yr	3100.00	654.38	659.11		659.19	0.002991	4.31	1394.75	611.28	0.36
Walker Run	1	2339	10-yr	480.00	654.38	656.57		656.63	0.006061	3.45	274.98	244.36	0.45
Walker Run	1	2339	50-yr	1180.00	654.38	657.37		657.46	0.006232	4.45	526.45	401.24	0.48
Walker Run	1	2274	100 yr	1640.00	653.90	657.40		657.54	0.006722	5.18	598.41	281.13	0.51
Walker Run	1	2274	100 yr encroachm	1640.00	653.90	658.39		658.46	0.002185	3.53	828.66	252.44	0.30
Walker Run	1	2274	500 yr	3100.00	653.90	658.82		658.96	0.004320	5.29	1085.47	436.52	0.43
Walker Run	1	2274	10-yr	480.00	653.90	656.06		656.15	0.009769	4.36	239.08	253.91	0.56
Walker Run	1	2274	50-yr	1180.00	653.90	656.89		657.02	0.008073	5.06	457.04	271.65	0.54

HEC-RAS Plan: Prop (Continued)

River	Reach	River Sta	Profile	Q Total (cfs)	Min Chl 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
Walker Run	1	2139	100 yr	1640.00	653.31	657.22		657.24	0.000942	2.11	1338.11	561.08	0.20
Walker Run	1	2139	100 yr encroachment	1640.00	653.31	658.21		658.25	0.001170	2.76	1035.62	279.75	0.23
Walker Run	1	2139	500 yr	3100.00	653.31	658.72		658.75	0.000653	2.22	2322.60	752.74	0.17
Walker Run	1	2139	10-yr	480.00	653.31	655.69		655.71	0.001532	1.85	526.02	500.73	0.23
Walker Run	1	2139	50-yr	1180.00	653.31	656.64		656.66	0.001148	2.07	1024.69	540.05	0.21
Walker Run	1	2010	100 yr	1640.00	652.70	657.14		657.15	0.000515	1.76	1915.81	1020.09	0.15
Walker Run	1	2010	100 yr encroachment	1640.00	652.70	658.13		658.15	0.000486	1.97	1435.23	353.62	0.15
Walker Run	1	2010	500 yr	3100.00	652.70	658.68		658.69	0.000276	1.59	3682.80	1269.11	0.12
Walker Run	1	2010	10-yr	480.00	652.70	655.55		655.56	0.000909	1.71	592.92	486.07	0.19
Walker Run	1	2010	50-yr	1180.00	652.70	656.53		656.54	0.000757	1.93	1316.69	959.10	0.18
Walker Run	1	1925	100 yr	1640.00	652.07	657.10		657.11	0.000410	1.64	1921.32	845.15	0.14
Walker Run	1	1925	100 yr encroachment	1640.00	652.07	658.04		658.09	0.000984	2.88	963.20	199.27	0.22
Walker Run	1	1925	500 yr	3100.00	652.07	658.65		658.67	0.000279	1.64	3289.12	903.45	0.12
Walker Run	1	1925	10-yr	480.00	652.07	655.49		655.50	0.000595	1.48	682.71	633.04	0.15
Walker Run	1	1925	50-yr	1180.00	652.07	656.46		656.49	0.000529	1.69	1406.43	805.96	0.15
Walker Run	1	1602	100 yr	1860.00	650.67	656.97		656.98	0.000461	1.47	2501.63	1079.73	0.11
Walker Run	1	1602	100 yr encroachment	1860.00	650.67	657.86		657.88	0.000507	1.72	1854.68	515.00	0.12
Walker Run	1	1602	500 yr	3600.00	650.67	658.57		658.58	0.000317	1.46	4342.97	1187.88	0.10
Walker Run	1	1602	10-yr	550.00	650.67	655.18		655.20	0.001764	2.18	702.89	884.86	0.21
Walker Run	1	1602	50-yr	1320.00	650.67	656.30		656.31	0.000643	1.59	1797.41	1037.52	0.13
Walker Run	1	1402	100 yr	1860.00	649.80	656.86		656.88	0.000512	1.60	2013.36	686.27	0.11
Walker Run	1	1402	100 yr encroachment	1860.00	649.80	657.75		657.77	0.000560	1.83	1605.43	381.35	0.12
Walker Run	1	1402	500 yr	3600.00	649.80	658.48		658.50	0.000477	1.80	3159.88	731.05	0.11
Walker Run	1	1402	10-yr	550.00	649.80	654.96		654.97	0.000738	1.51	788.84	592.35	0.13
Walker Run	1	1402	50-yr	1320.00	649.80	656.18		656.19	0.000572	1.58	1550.75	659.53	0.12
Walker Run	1	1208	100 yr	1860.00	650.74	656.72		656.75	0.000860	2.31	1435.61	455.67	0.17
Walker Run	1	1208	100 yr encroachment	1860.00	650.74	657.57		657.63	0.000935	2.64	999.38	174.97	0.18
Walker Run	1	1208	500 yr	3600.00	650.74	658.32		658.37	0.000987	2.92	2254.15	567.60	0.19
Walker Run	1	1208	10-yr	550.00	650.74	654.85		654.86	0.000488	1.33	705.05	324.67	0.12
Walker Run	1	1208	50-yr	1320.00	650.74	656.03		656.06	0.000793	2.04	1139.94	407.76	0.16
Walker Run	1	990	100 yr	1860.00	649.47	656.52		656.55	0.000981	2.30	1444.98	511.16	0.17
Walker Run	1	990	100 yr encroachment	1860.00	649.47	657.45		657.47	0.000491	1.80	1668.02	395.00	0.12
Walker Run	1	990	500 yr	3600.00	649.47	658.12		658.16	0.000909	2.60	2285.68	540.36	0.17
Walker Run	1	990	10-yr	550.00	649.47	654.68		654.71	0.001079	1.86	577.77	415.79	0.17
Walker Run	1	990	50-yr	1320.00	649.47	655.83		655.86	0.001105	2.24	1096.41	489.79	0.18
Walker Run	1	933	100 yr	1860.00	649.74	656.22		656.44	0.003361	5.64	717.40	280.88	0.41
Walker Run	1	933	100 yr encroachment	1860.00	649.74	657.16		657.40	0.002563	5.43	616.28	115.00	0.36
Walker Run	1	933	500 yr	3600.00	649.74	657.79		658.05	0.003412	6.64	1248.04	396.20	0.43
Walker Run	1	933	10-yr	550.00	649.74	654.53		654.62	0.001771	3.27	344.32	160.80	0.28
Walker Run	1	933	50-yr	1320.00	649.74	655.55		655.74	0.003227	5.10	544.46	232.85	0.39
Walker Run	1	884	100 yr	1860.00	648.62	656.01	654.99	656.23	0.006033	6.34	678.17	290.30	0.47
Walker Run	1	884	100 yr encroachment	1860.00	648.62	656.95	655.15	657.23	0.005037	6.41	545.13	126.77	0.44
Walker Run	1	884	500 yr	3600.00	648.62	657.63	655.84	657.84	0.004843	6.71	1210.15	366.36	0.44
Walker Run	1	884	10-yr	550.00	648.62	654.25	653.89	654.46	0.006581	5.17	247.74	198.84	0.46
Walker Run	1	884	50-yr	1320.00	648.62	655.26	654.63	655.51	0.007691	6.50	473.08	250.91	0.52
Walker Run	1	875		Culvert									
Walker Run	1	863	100 yr	1860.00	648.96	656.02	654.48	656.17	0.002977	4.94	831.30	301.91	0.37
Walker Run	1	863	100 yr encroachment	1860.00	648.96	656.89	654.67	657.14	0.003241	5.67	597.90	126.77	0.39
Walker Run	1	863	500 yr	3600.00	648.96	657.59	655.35	657.78	0.003036	5.88	1356.18	367.22	0.39
Walker Run	1	863	10-yr	550.00	648.96	654.04	653.30	654.16	0.003194	3.81	314.00	220.70	0.35
Walker Run	1	863	50-yr	1320.00	648.96	655.36	654.10	655.50	0.002981	4.54	641.32	274.47	0.36
Walker Run	1	715	100 yr	1860.00	647.90	655.75		655.82	0.001472	3.87	1100.65	356.91	0.25
Walker Run	1	715	100 yr encroachment	1860.00	647.90	656.61		656.73	0.001589	4.33	834.22	154.14	0.27
Walker Run	1	715	500 yr	3600.00	647.90	657.29		657.39	0.001712	4.75	1716.41	431.49	0.28
Walker Run	1	715	10-yr	550.00	647.90	653.83		653.87	0.000920	2.49	516.05	258.39	0.19
Walker Run	1	715	50-yr	1320.00	647.90	655.11		655.17	0.001315	3.43	884.12	320.99	0.24
Walker Run	1	536	100 yr	1860.00	646.97	655.50		655.57	0.001317	3.81	1088.97	304.97	0.24
Walker Run	1	536	100 yr encroachment	1860.00	646.97	656.34		656.44	0.001588	3.65	837.48	147.46	0.22
Walker Run	1	536	500 yr	3600.00	646.97	656.95		657.07	0.001824	5.03	1569.63	355.07	0.29
Walker Run	1	536	10-yr	550.00	646.97	653.71		653.74	0.000580	2.12	598.59	246.41	0.15
Walker Run	1	536	50-yr	1320.00	646.97	654.90		654.95	0.001077	3.26	912.20	284.07	0.22
Walker Run	1	428	100 yr	1860.00	647.24	655.34		655.45	0.001184	3.71	1049.06	318.66	0.25
Walker Run	1	428	100 yr encroachment	1860.00	647.24	656.12		656.29	0.001316	4.20	725.81	115.65	0.27
Walker Run	1	428	500 yr	3600.00	647.24	656.73		656.90	0.001687	4.99	1527.60	368.20	0.30
Walker Run	1	428	10-yr	550.00	647.24	653.66		653.69	0.000426	1.85	584.02	234.62	0.14
Walker Run	1	428	50-yr	1320.00	647.24	654.78		654.85	0.000930	3.11	876.59	290.27	0.22
Walker Run	1	350	100 yr	1860.00	647.08	655.28		655.34	0.000874	3.12	1233.20	300.57	0.20
Walker Run	1	350	100 yr encroachment	1860.00	647.08	656.07		656.16	0.000973	3.53	986.42	163.73	0.22
Walker Run	1	350	500 yr	3600.00	647.08	656.63		656.74	0.001403	4.43	1655.66	318.17	0.27
Walker Run	1	350	10-yr	550.00	647.08	653.64		653.65	0.000291	1.52	769.79	263.62	0.11
Walker Run	1	350	50-yr	1320.00	647.08	654.73		654.77	0.000659	2.57	1070.73	287.64	0.17
Walker Run	1	185	100 yr	1860.00	646.40	655.10		655.17	0.000989	3.49	1114.61	263.65	0.22
Walker Run	1	185	100 yr encroachment	1860.00	646.40	655.87		655.96	0.001250	3.40	887.15	144.00	0.20
Walker Run	1	185	500 yr	3600.00	646.40	656.31		656.46	0.001775	5.14	1449.38	284.47	0.30
Walker Run	1	185	10-yr	550.00	646.40	653.59		653.60	0.000271	1.59	741.69	231.07	0.11

HEC-RAS Plan: Prop (Continued)

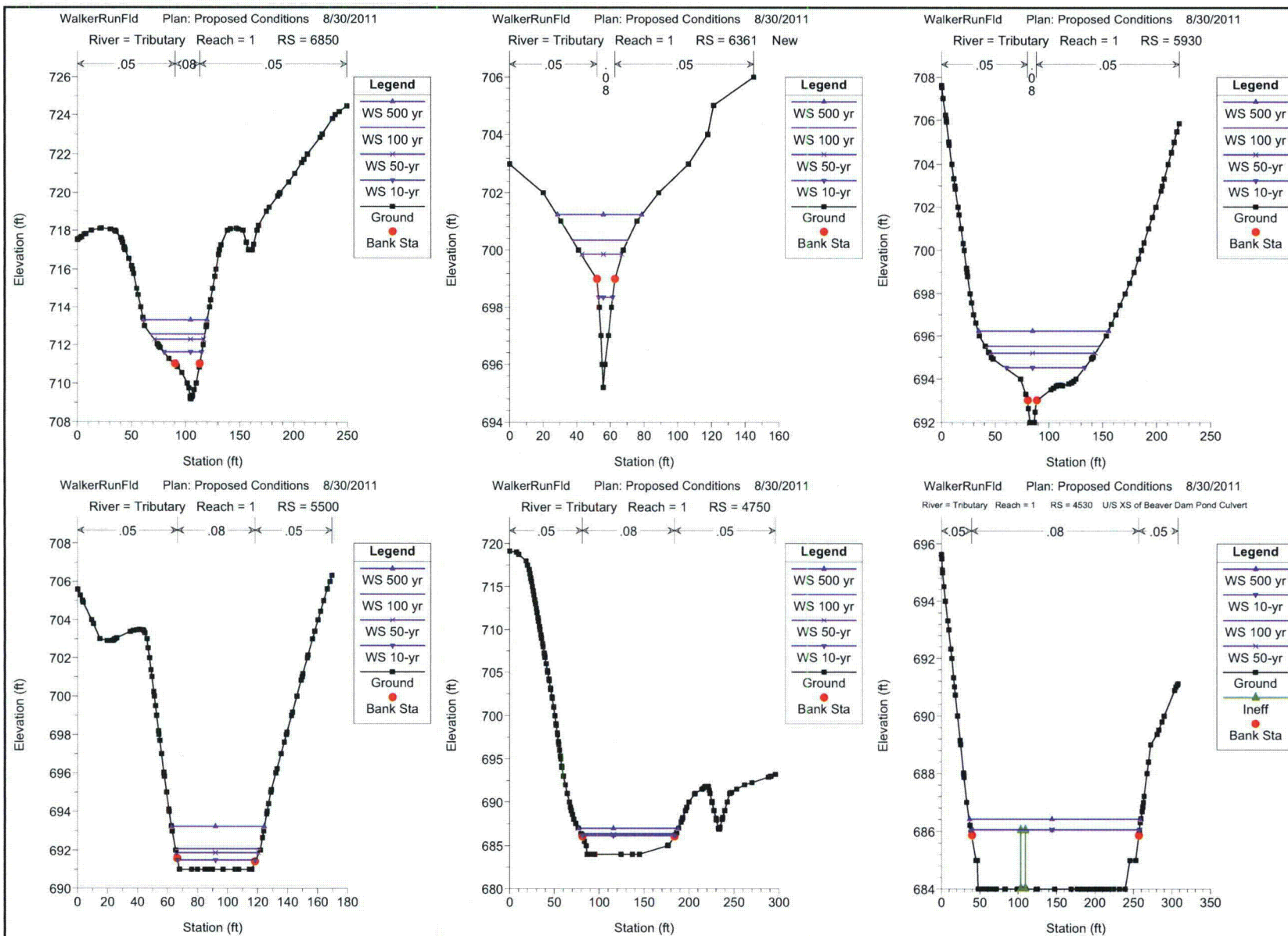
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Walker Run	1	185	50-yr	1320.00	646.40	654.60		654.65	0.000705	2.82	985.59	251.03	0.18
Walker Run	1	147	100 yr	1860.00	646.74	654.79		655.08	0.003377	6.01	620.10	189.92	0.41
Walker Run	1	147	100 yr encroachment	1860.00	646.74	655.59		655.86	0.002538	5.62	588.14	110.00	0.36
Walker Run	1	147	500 yr	3600.00	646.74	655.68		656.28	0.006587	9.12	817.74	258.52	0.58
Walker Run	1	147	10-yr	550.00	646.74	653.52		653.58	0.000846	2.62	402.56	153.11	0.20
Walker Run	1	147	50-yr	1320.00	646.74	654.39		654.58	0.002305	4.77	547.52	177.32	0.33
Walker Run	1	011	100 yr	1860.00	645.71	654.67	652.69	654.75	0.001192	3.89	1149.74	380.16	0.24
Walker Run	1	011	100 yr encroachment	1860.00	645.71	655.54	652.68	655.61	0.000861	3.54	1114.92	207.00	0.21
Walker Run	1	011	500 yr	3600.00	645.71	655.44	653.02	655.61	0.002518	6.01	1484.61	441.92	0.35
Walker Run	1	011	10-yr	550.00	645.71	653.48	650.23	653.50	0.000286	1.72	754.81	282.23	0.11
Walker Run	1	011	50-yr	1320.00	645.71	654.31	651.84	654.36	0.000803	3.10	1017.14	350.92	0.20
Walker Run	1	-10	Bridge										
Walker Run	1	-30	100 yr	1860.00	644.46	652.96	652.28	653.77	0.007942	9.03	410.25	223.83	0.60
Walker Run	1	-30	100 yr encroachment	1860.00	644.46	653.95	652.28	654.44	0.004231	7.20	482.18	134.28	0.45
Walker Run	1	-30	500 yr	3600.00	644.46	654.46	654.09	655.27	0.008004	10.32	820.41	342.52	0.62
Walker Run	1	-30	10-yr	550.00	644.46	651.15	649.16	651.48	0.003532	4.95	144.71	62.75	0.38
Walker Run	1	-30	50-yr	1320.00	644.46	652.30	651.23	653.34	0.009101	9.06	198.30	187.62	0.63
Walker Run	1	-78	100 yr	1860.00	645.43	652.96		653.12	0.002643	4.76	831.07	309.34	0.35
Walker Run	1	-78	100 yr encroachment	1860.00	645.43	653.92		654.10	0.001984	4.57	713.35	147.00	0.31
Walker Run	1	-78	500 yr	3600.00	645.43	654.43		654.64	0.002923	5.82	1290.59	314.50	0.38
Walker Run	1	-78	10-yr	550.00	645.43	651.11		651.21	0.001979	3.20	316.39	200.24	0.28
Walker Run	1	-78	50-yr	1320.00	645.43	652.38		652.53	0.002413	4.25	655.02	303.74	0.33
Walker Run	1	-154	100 yr	1860.00	644.90	652.70		652.89	0.003359	5.45	715.54	212.18	0.37
Walker Run	1	-154	100 yr encroachment	1860.00	644.90	653.88		653.91	0.002922	5.58	621.98	125.27	0.35
Walker Run	1	-154	500 yr	3600.00	644.90	654.04		654.36	0.004626	7.21	1004.66	218.08	0.45
Walker Run	1	-154	10-yr	550.00	644.90	650.97		651.06	0.001902	3.37	361.19	196.50	0.26
Walker Run	1	-154	50-yr	1320.00	644.90	652.19		652.33	0.002704	4.64	607.30	207.53	0.33
Walker Run	1	-255	100 yr	1860.00	645.74	652.54	650.73	652.63	0.002892	4.78	894.50	286.08	0.35
Walker Run	1	-255	100 yr encroachment	1860.00	645.74	653.54	651.02	653.64	0.003170	3.76	736.35	165.00	0.25
Walker Run	1	-255	500 yr	3600.00	645.74	653.85	651.43	654.00	0.003642	6.13	1284.40	309.20	0.40
Walker Run	1	-255	10-yr	550.00	645.74	650.85	649.92	650.90	0.002179	3.30	436.23	256.25	0.29
Walker Run	1	-255	50-yr	1320.00	645.74	652.05	650.46	652.12	0.002417	4.12	756.44	277.43	0.31
Tributary	1	6850	100 yr	300.00	709.19	712.52	711.94	712.77	0.015944	4.07	75.34	49.89	0.47
Tributary	1	6850	100 yr encroachment	300.00	709.19	713.41		713.67	0.013347	4.08	73.55	22.87	0.40
Tributary	1	6850	500 yr	606.00	709.19	713.28	712.70	713.70	0.017491	5.15	117.26	58.92	0.52
Tributary	1	6850	10-yr	84.00	709.19	711.59		711.67	0.011452	2.45	35.54	34.70	0.37
Tributary	1	6850	50-yr	213.00	709.19	712.24	711.64	712.43	0.014270	3.54	62.07	45.58	0.44
Tributary	1	6361	100 yr	300.00	695.20	700.31	700.31	700.99	0.043607	7.04	46.38	32.43	0.71
Tributary	1	6361	100 yr encroachment	300.00	695.20	700.43	700.43	701.44	0.066815	8.25	37.45	18.18	0.80
Tributary	1	6361	500 yr	606.00	695.20	701.21	701.21	702.04	0.037087	7.70	83.09	50.21	0.68
Tributary	1	6361	10-yr	84.00	695.20	698.33	698.33	699.07	0.113477	6.86	12.24	8.37	1.00
Tributary	1	6361	50-yr	213.00	695.20	699.83	699.83	700.54	0.054318	7.00	32.89	23.87	0.77
Tributary	1	5930	100 yr	300.00	692.00	695.48		695.54	0.002368	1.90	154.46	105.46	0.19
Tributary	1	5930	100 yr encroachment	300.00	692.00	696.45		696.55	0.002007	2.09	121.46	37.00	0.18
Tributary	1	5930	500 yr	606.00	692.00	696.19		696.30	0.002826	2.37	235.56	120.79	0.21
Tributary	1	5930	10-yr	84.00	692.00	694.49	693.72	694.52	0.002139	1.42	64.11	72.76	0.17
Tributary	1	5930	50-yr	213.00	692.00	695.17	694.18	695.21	0.002326	1.76	122.63	98.23	0.18
Tributary	1	5500	100 yr	300.00	691.00	692.03	692.03	692.51	0.088747	5.58	54.10	56.46	0.98
Tributary	1	5500	100 yr encroachment	300.00	691.00	692.91	692.91	693.87	0.096138	7.85	38.21	20.00	1.00
Tributary	1	5500	500 yr	606.00	691.00	693.18		693.57	0.025311	4.94	122.22	61.93	0.59
Tributary	1	5500	10-yr	84.00	691.00	691.45	691.45	691.67	0.124231	3.75	22.41	51.87	1.00
Tributary	1	5500	50-yr	213.00	691.00	691.83	691.83	692.22	0.097457	5.03	42.58	54.90	0.98
Tributary	1	4750	100 yr	300.00	684.00	686.27		686.31	0.002741	1.51	199.39	105.15	0.19
Tributary	1	4750	100 yr encroachment	300.00	684.00	687.22		687.26	0.001696	1.56	191.95	60.00	0.15
Tributary	1	4750	500 yr	606.00	684.00	686.88		686.97	0.004422	2.30	265.43	110.81	0.25
Tributary	1	4750	10-yr	84.00	684.00	686.05		686.05	0.000322	0.48	176.32	103.09	0.06
Tributary	1	4750	50-yr	213.00	684.00	686.16		686.18	0.001693	1.14	187.42	104.08	0.15
Tributary	1	4530	100 yr	300.00	684.00	686.03	686.03	686.04	0.000644	0.72	414.95	219.51	0.09
Tributary	1	4530	100 yr encroachment	300.00	684.00	686.86	686.03	686.89	0.001547	1.40	214.20	75.00	0.15
Tributary	1	4530	500 yr	606.00	684.00	686.39	686.03	686.41	0.001468	1.23	495.11	223.27	0.14
Tributary	1	4530	10-yr	84.00	684.00	686.03	685.83	686.03	0.000050	0.20	415.50	219.53	0.03
Tributary	1	4530	50-yr	213.00	684.00	686.03	686.03	686.03	0.000325	0.51	414.95	219.51	0.07
Tributary	1	4528	Culvert										
Tributary	1	4500	100 yr	300.00	683.30	684.79	684.79	685.51	0.076821	6.56	44.75	145.99	0.96
Tributary	1	4500	100 yr encroachment	300.00	683.30	685.10	685.10	685.98	0.092363	7.49	40.04	22.79	1.00
Tributary	1	4500	500 yr	606.00	683.30	685.00	685.00	685.12	0.003934	1.63	226.99	148.77	0.22
Tributary	1	4500	10-yr	84.00	683.30	683.97	683.97	684.28	0.108219	4.43	18.88	123.12	0.99
Tributary	1	4500	50-yr	213.00	683.30	684.49	684.49	685.07	0.085122	5.92	35.37	143.27	0.98
Tributary	1	4400	100 yr	300.00	675.78	679.51		679.60	0.003404	1.84	126.60	81.92	0.18
Tributary	1	4400	100 yr encroachment	300.00	675.78	680.31		680.40	0.002070	1.66	124.48	45.00	0.15
Tributary	1	4400	500 yr	606.00	675.78	680.29		680.44	0.003779	2.24	195.97	97.88	0.20
Tributary	1	4400	10-yr	84.00	675.78	678.55		678.59	0.003503	1.47	54.62	67.28	0.17
Tributary	1	4400	50-yr	213.00	675.78	679.20		679.26	0.003369	1.71	101.40	77.18	0.18

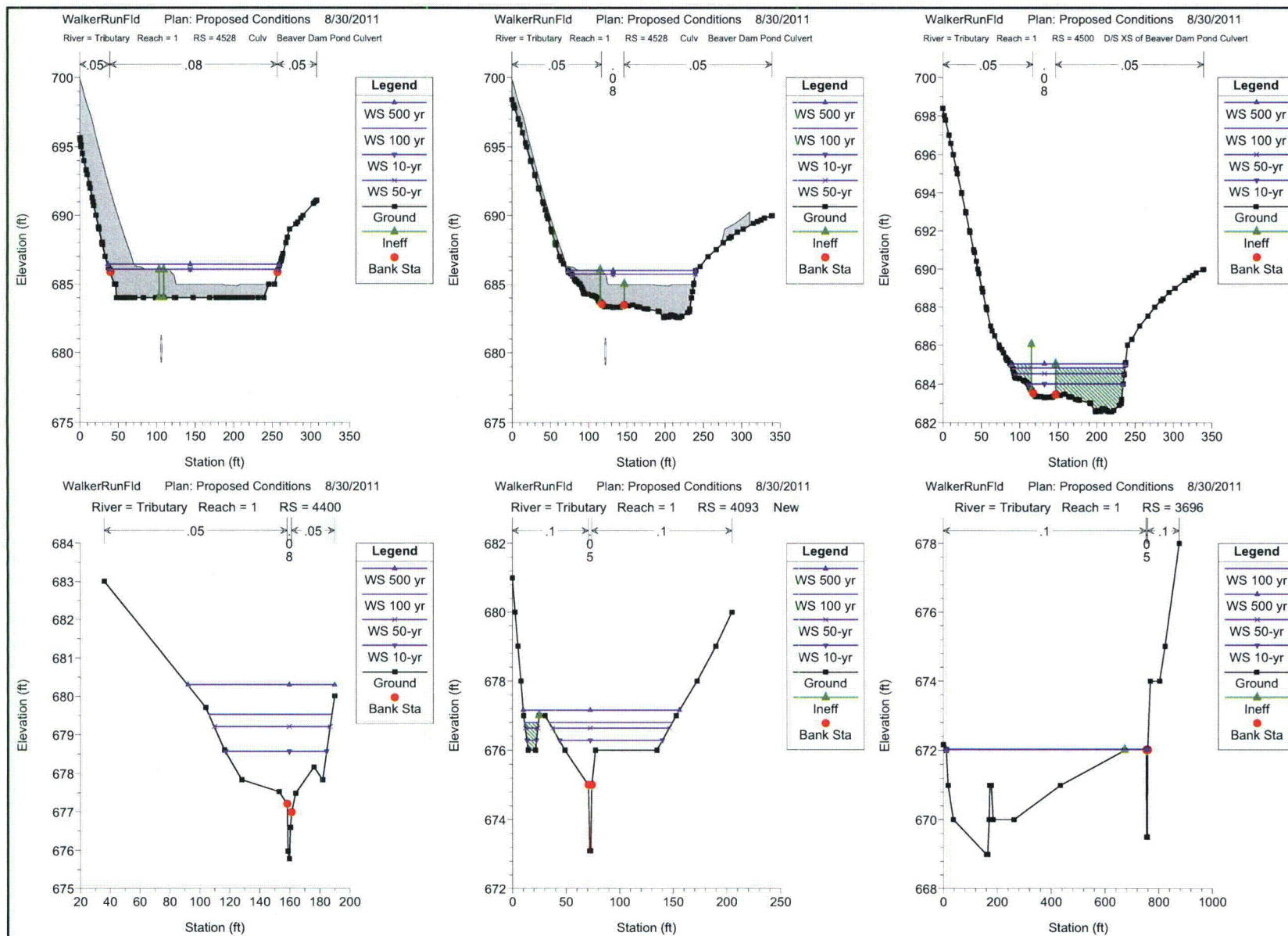
HEC-RAS Plan: Prop (Continued)

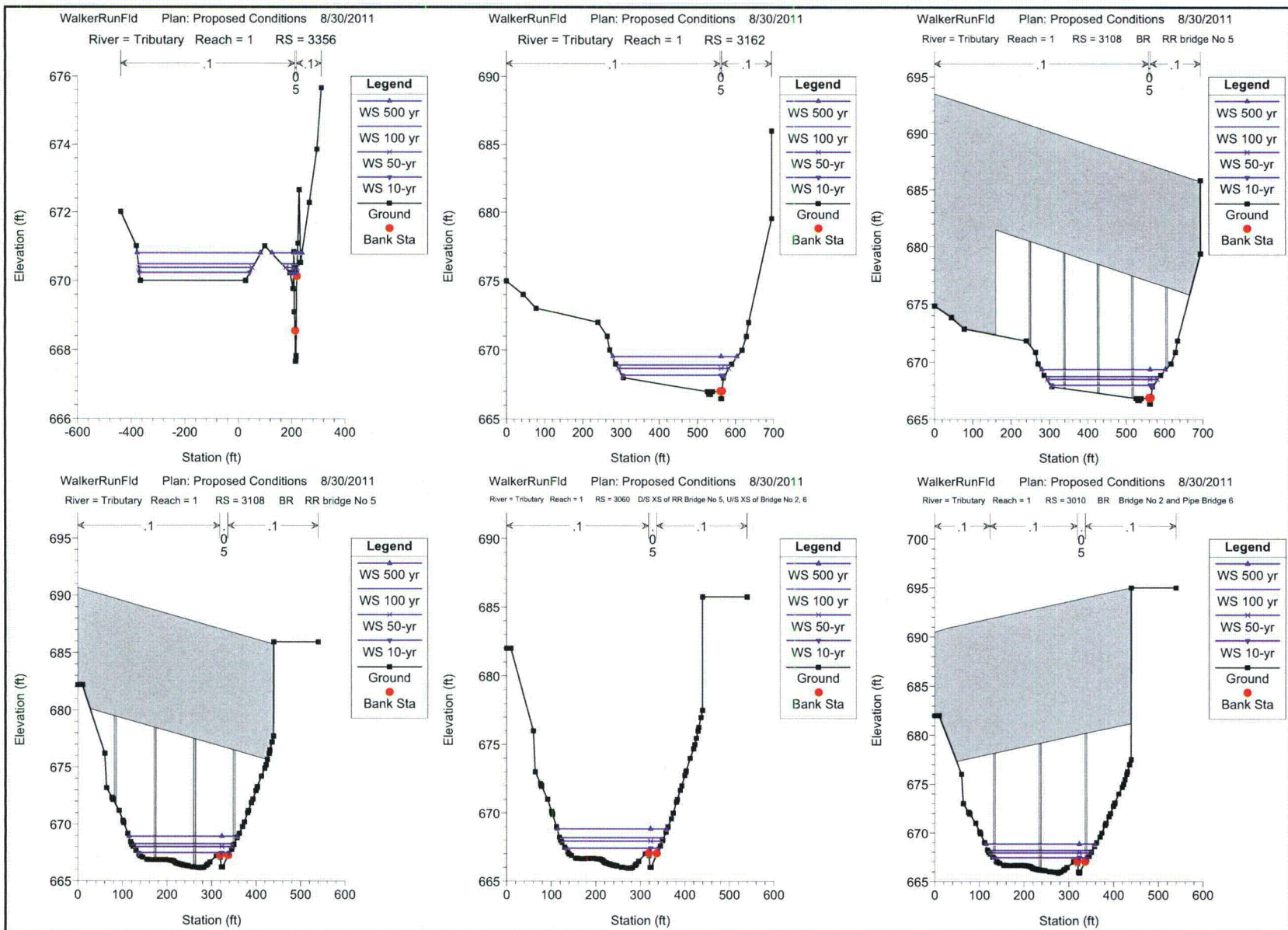
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Tributary	1	4093	100 yr	300.00	673.10	676.78	676.78	677.10	0.034829	7.98	97.48	127.18	0.81
Tributary	1	4093	100 yr encroachm	300.00	673.10	677.62	677.62	678.47	0.043242	10.46	54.66	26.83	0.93
Tributary	1	4093	500 yr	606.00	673.10	677.14	677.14	677.55	0.046087	9.89	154.16	145.51	0.94
Tributary	1	4093	10-yr	84.00	673.10	676.27	676.27	676.46	0.017947	5.06	43.63	104.52	0.56
Tributary	1	4093	50-yr	213.00	673.10	676.62	676.62	676.90	0.029220	7.05	79.89	120.21	0.73
Tributary	1	3696	100 yr	300.00	669.50	672.01	672.01	672.01	0.000215	0.49	935.25	749.55	0.07
Tributary	1	3696	100 yr encroachm	300.00	669.50	672.72	672.04	672.74	0.002336	1.94	364.52	325.50	0.22
Tributary	1	3696	500 yr	606.00	669.50	672.01	672.01	672.01	0.000878	0.99	935.25	749.55	0.14
Tributary	1	3696	10-yr	84.00	669.50	672.00	672.00	672.00	0.000017	0.14	929.67	749.00	0.02
Tributary	1	3696	50-yr	213.00	669.50	672.01	672.01	672.01	0.000108	0.35	935.25	749.55	0.05
Tributary	1	3356	100 yr	300.00	667.67	670.46	670.46	670.60	0.016207	5.61	215.11	486.39	0.67
Tributary	1	3356	100 yr encroachm	300.00	667.67	671.46		671.55	0.005629	4.24	213.13	205.40	0.42
Tributary	1	3356	500 yr	606.00	667.67	670.79		670.88	0.013715	5.65	384.86	561.93	0.63
Tributary	1	3356	10-yr	84.00	667.67	670.22	670.22	670.31	0.006971	3.40	103.06	434.87	0.43
Tributary	1	3356	50-yr	213.00	667.67	670.36	670.36	670.51	0.016005	5.39	164.61	463.42	0.66
Tributary	1	3162	100 yr	300.00	666.50	668.87	667.83	668.88	0.001514	1.91	396.93	298.81	0.23
Tributary	1	3162	100 yr encroachm	300.00	666.50	669.31	668.13	669.44	0.007634	4.85	122.77	52.07	0.52
Tributary	1	3162	500 yr	606.00	666.50	669.49	668.11	669.51	0.001806	2.46	592.16	325.26	0.26
Tributary	1	3162	10-yr	84.00	666.50	668.12	667.47	668.13	0.001215	1.31	185.90	267.35	0.19
Tributary	1	3162	50-yr	213.00	666.50	668.62	667.72	668.63	0.001406	1.71	325.31	288.51	0.21
Tributary	1	3108	Bridge										
Tributary	1	3060	100 yr	300.00	666.00	668.13	666.85	668.15	0.001394	1.57	353.92	232.54	0.21
Tributary	1	3060	100 yr encroachm	300.00	666.00	668.80	667.10	668.84	0.002060	2.38	205.80	85.00	0.27
Tributary	1	3060	500 yr	606.00	666.00	668.79	667.13	668.82	0.001816	2.23	512.11	246.18	0.26
Tributary	1	3060	10-yr	84.00	666.00	667.36	666.45	667.36	0.000834	0.81	182.12	209.58	0.15
Tributary	1	3060	50-yr	213.00	666.00	667.87	666.75	667.89	0.001229	1.32	295.09	225.80	0.19
Tributary	1	3010	Bridge										
Tributary	1	2834	100 yr	300.00	664.89	665.69	665.69	665.93	0.128132	7.07	83.11	176.43	1.64
Tributary	1	2834	100 yr encroachm	300.00	664.89	666.36	666.36	666.78	0.075105	8.54	71.00	80.00	1.40
Tributary	1	2834	500 yr	606.00	664.89	665.99	665.99	666.31	0.115951	8.27	142.21	216.71	1.63
Tributary	1	2834	10-yr	84.00	664.89	665.34	665.34	665.47	0.154641	5.41	31.37	119.20	1.66
Tributary	1	2834	50-yr	213.00	664.89	665.57	665.57	665.78	0.132442	6.55	64.02	157.76	1.63
Tributary	1	2326	100 yr	300.00	659.90	663.75	662.27	663.76	0.000666	1.64	458.46	273.29	0.16
Tributary	1	2326	100 yr encroachm	300.00	659.90	664.40	662.42	664.42	0.000532	1.65	443.06	220.72	0.14
Tributary	1	2326	500 yr	606.00	659.90	664.58	662.59	664.60	0.000818	2.11	710.47	332.36	0.18
Tributary	1	2326	10-yr	84.00	659.90	662.72	661.86	662.72	0.000435	1.04	218.12	207.34	0.12
Tributary	1	2326	50-yr	213.00	659.90	663.42	662.14	663.43	0.000597	1.45	373.96	236.52	0.15
Tributary	1	1790	Bridge										
Tributary	1	1658	100 yr	300.00	657.96	661.32		661.42	0.004289	3.75	200.85	186.43	0.39
Tributary	1	1658	100 yr encroachm	300.00	657.96	662.30		662.33	0.000961	2.16	301.95	125.00	0.19
Tributary	1	1658	500 yr	606.00	657.96	662.06		662.17	0.004291	4.37	346.90	206.47	0.41
Tributary	1	1658	10-yr	84.00	657.96	660.35		660.43	0.004004	2.75	60.90	100.50	0.35
Tributary	1	1658	50-yr	213.00	657.96	661.02		661.12	0.004214	3.45	148.67	159.89	0.38
Tributary	1	1360	100 yr	300.00	657.83	660.61	659.66	660.65	0.001675	2.11	230.92	193.50	0.24
Tributary	1	1360	100 yr encroachm	300.00	657.83	660.63	660.28	661.46	0.024403	7.30	41.08	16.00	0.80
Tributary	1	1360	500 yr	606.00	657.83	661.28	660.13	661.34	0.001910	2.66	373.12	232.53	0.27
Tributary	1	1360	10-yr	84.00	657.83	659.77	659.07	659.79	0.001279	1.36	92.94	127.15	0.20
Tributary	1	1360	50-yr	213.00	657.83	660.35	659.48	660.38	0.001563	1.88	182.22	176.03	0.23
Tributary	1	1281	Bridge										
Tributary	1	1252	100 yr	300.00	656.64	659.02		659.05	0.003665	1.62	231.64	254.98	0.22
Tributary	1	1252	100 yr encroachm	300.00	656.64	660.02		660.08	0.003127	2.02	157.02	70.00	0.21
Tributary	1	1252	500 yr	606.00	656.64	659.54		659.58	0.003692	1.93	370.60	282.41	0.23
Tributary	1	1252	10-yr	84.00	656.64	658.40		658.42	0.004164	1.29	86.50	188.91	0.21
Tributary	1	1252	50-yr	213.00	656.64	658.82		658.85	0.003715	1.50	182.39	244.51	0.21
Tributary	1	1105	100 yr	300.00	655.65	658.41		658.44	0.004849	1.99	224.78	248.88	0.25
Tributary	1	1105	100 yr encroachm	300.00	655.65	659.27		659.40	0.007358	3.13	106.63	43.94	0.33
Tributary	1	1105	500 yr	606.00	655.65	658.89		658.94	0.005365	2.43	352.16	278.28	0.27
Tributary	1	1105	10-yr	84.00	655.65	657.79		657.81	0.004353	1.47	90.50	176.74	0.22
Tributary	1	1105	50-yr	213.00	655.65	658.21		658.24	0.004677	1.83	178.07	231.97	0.24
Tributary	1	810	100 yr	300.00	653.84	657.34		657.36	0.002850	1.65	337.94	491.41	0.19
Tributary	1	810	100 yr encroachm	300.00	653.84	658.16		658.20	0.002473	1.87	199.06	94.19	0.18
Tributary	1	810	500 yr	606.00	653.84	657.73		657.75	0.003103	1.90	540.90	556.11	0.20
Tributary	1	810	10-yr	84.00	653.84	656.87		656.89	0.002319	1.30	126.74	413.48	0.16
Tributary	1	810	50-yr	213.00	653.84	657.19		657.21	0.002710	1.55	267.09	466.72	0.18
Tributary	1	587	100 yr	300.00	653.78	656.09		656.15	0.013760	2.87	176.52	292.25	0.40
Tributary	1	587	100 yr encroachm	300.00	653.78	656.98		657.14	0.012115	3.61	94.69	45.89	0.40
Tributary	1	587	500 yr	606.00	653.78	656.51		656.57	0.010588	2.94	316.99	389.54	0.36
Tributary	1	587	10-yr	84.00	653.78	655.53		655.62	0.029074	3.13	45.27	154.83	0.54
Tributary	1	587	50-yr	213.00	653.78	655.91		655.97	0.016458	2.90	127.43	256.98	0.43
Tributary	1	463	100 yr	300.00	653.23	655.56		655.57	0.002222	1.08	363.62	449.19	0.16
Tributary	1	463	100 yr encroachm	300.00	653.23	656.48		656.51	0.002511	1.60	203.67	97.83	0.18
Tributary	1	463	500 yr	606.00	653.23	655.90		655.92	0.002991	1.45	536.34	550.94	0.19
Tributary	1	463	10-yr	84.00	653.23	655.08		655.08	0.001535	0.68	172.21	353.27	0.12

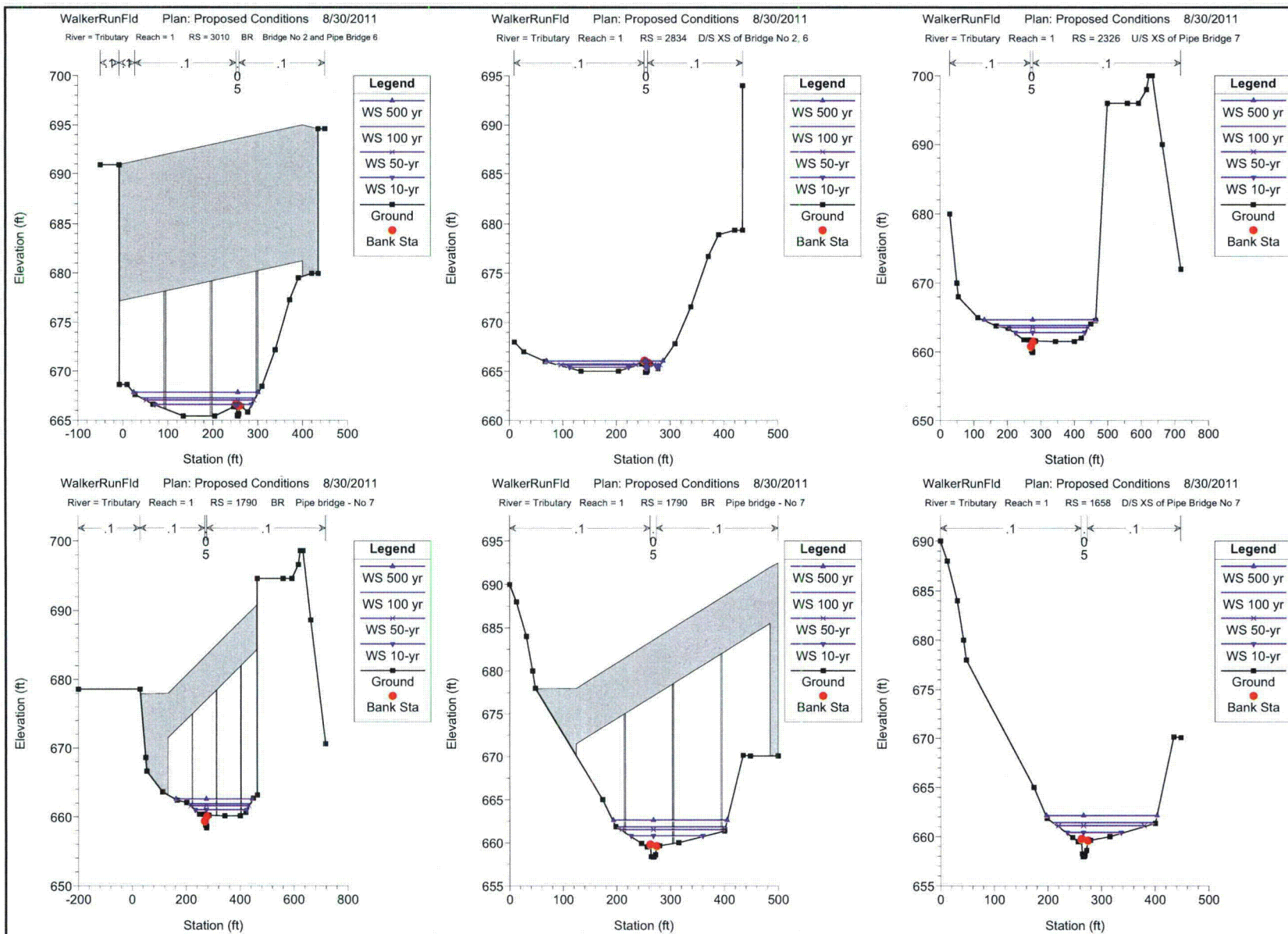
HEC-RAS Plan: Prop (Continued)

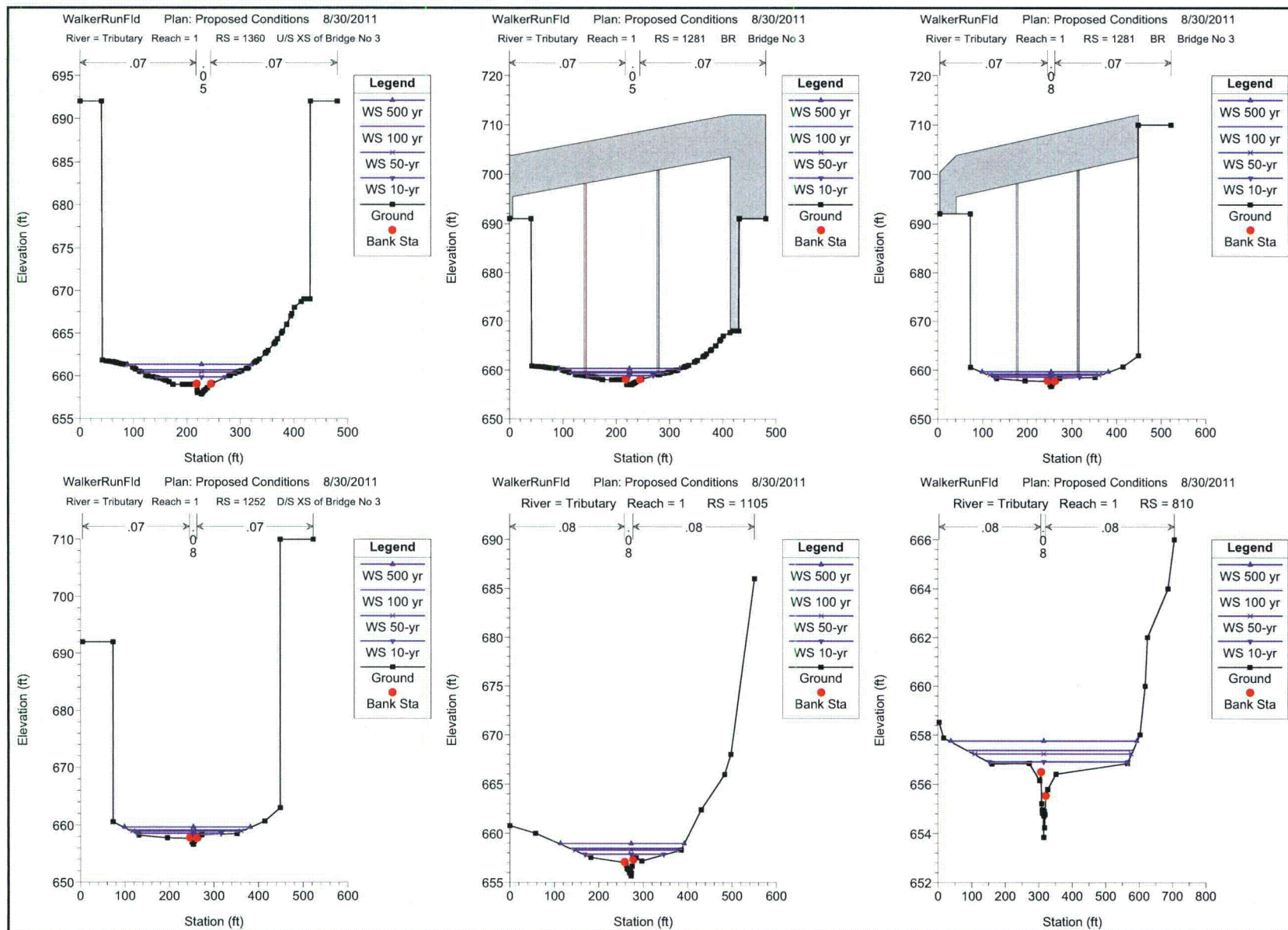
River	Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Tributary	1	463	50-yr	213.00	653.23	655.42		655.43	0.001883	0.93	303.57	421.45	0.14
Tributary	1	357	100 yr	300.00	652.40	655.29		655.30	0.002865	1.65	412.49	910.16	0.19
Tributary	1	357	100 yr encroachm	300.00	652.40	656.17		656.22	0.003042	2.10	175.96	80.29	0.21
Tributary	1	357	500 yr	606.00	652.40	655.63		655.64	0.002452	1.66	730.08	1004.25	0.18
Tributary	1	357	10-yr	84.00	652.40	654.86		654.87	0.002852	1.43	116.93	283.02	0.18
Tributary	1	357	50-yr	213.00	652.40	655.17		655.18	0.003080	1.64	300.72	874.64	0.20
Tributary	1	183	100 yr	300.00	652.14	654.94	654.43	654.95	0.001501	1.06	522.99	838.75	0.14
Tributary	1	183	100 yr encroachm	300.00	652.14	655.94	654.72	655.95	0.000853	1.06	401.20	261.38	0.11
Tributary	1	183	500 yr	606.00	652.14	655.30	654.57	655.31	0.001501	1.19	843.10	951.71	0.14
Tributary	1	183	10-yr	84.00	652.14	654.51	654.20	654.51	0.001501	0.88	206.34	607.95	0.13
Tributary	1	183	50-yr	213.00	652.14	654.80	654.38	654.81	0.001503	1.00	409.26	771.12	0.14

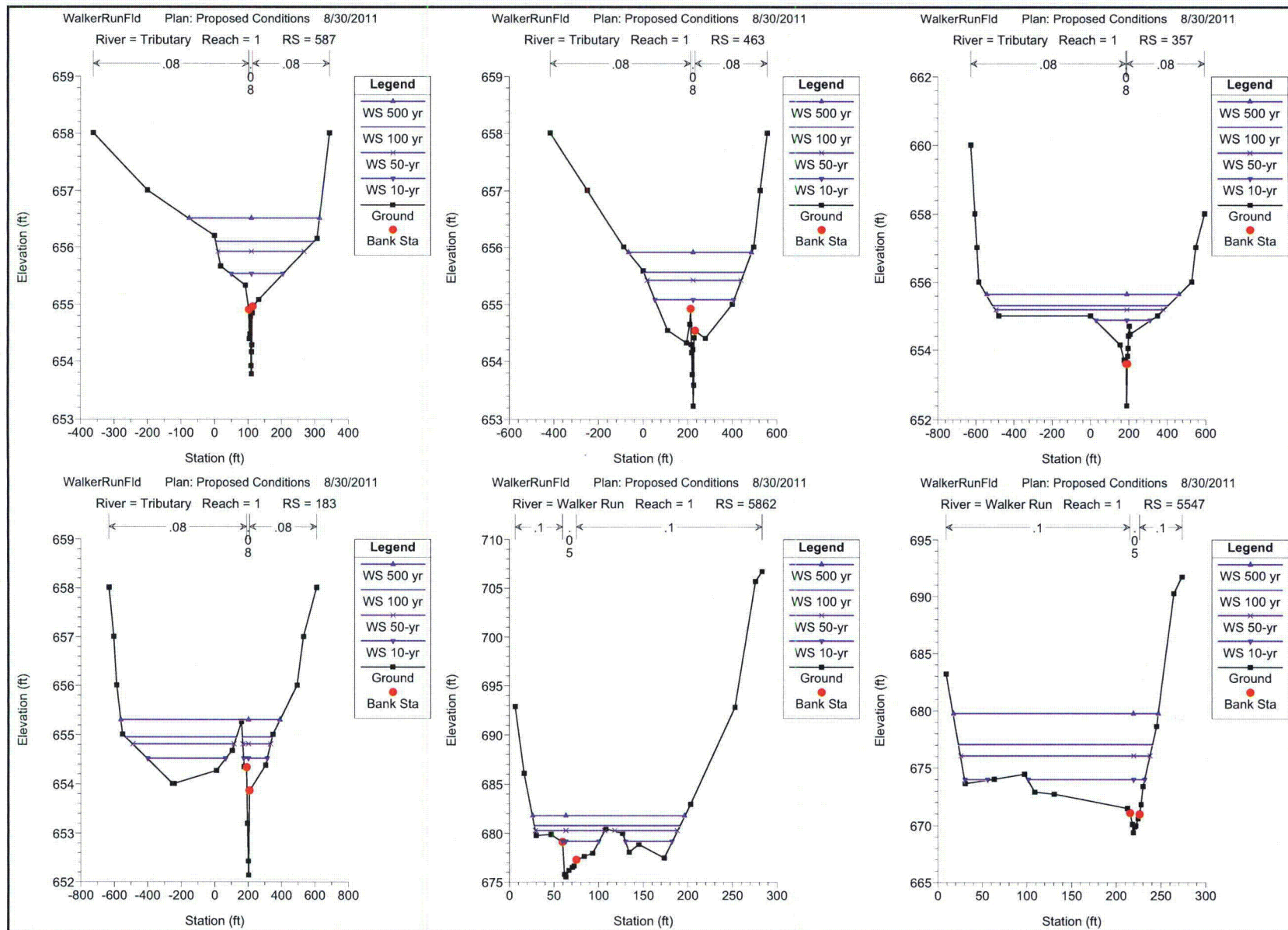


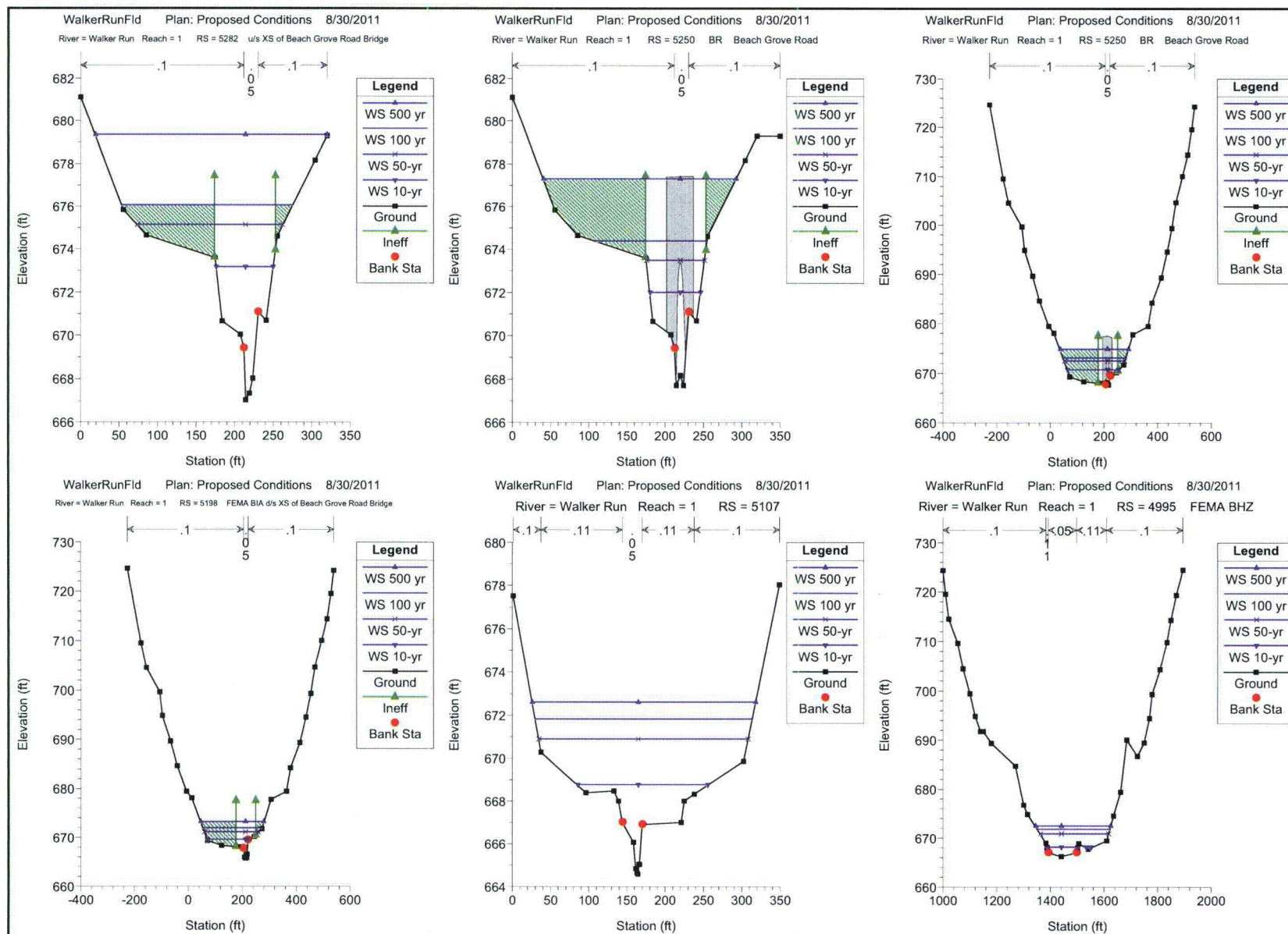


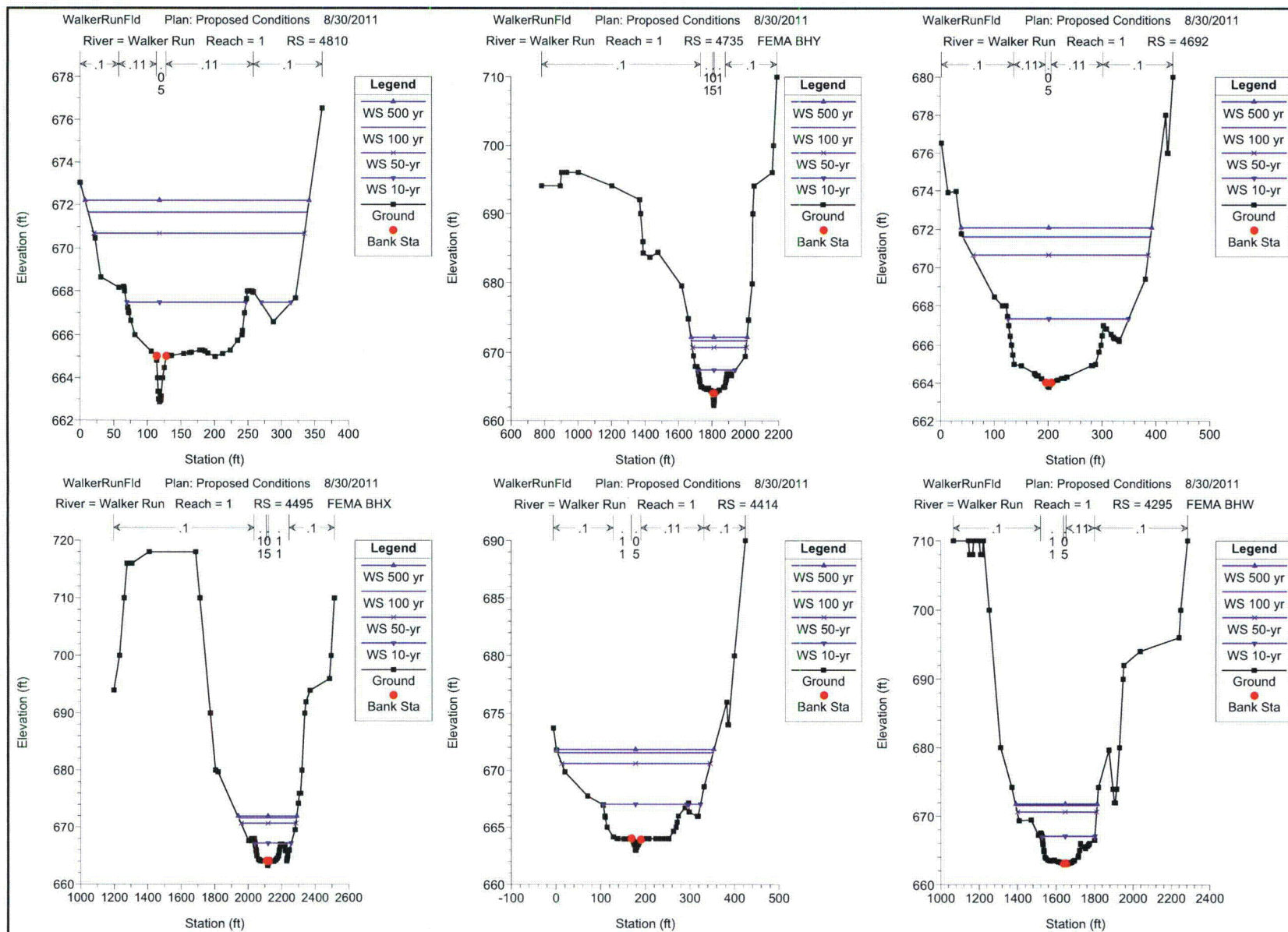


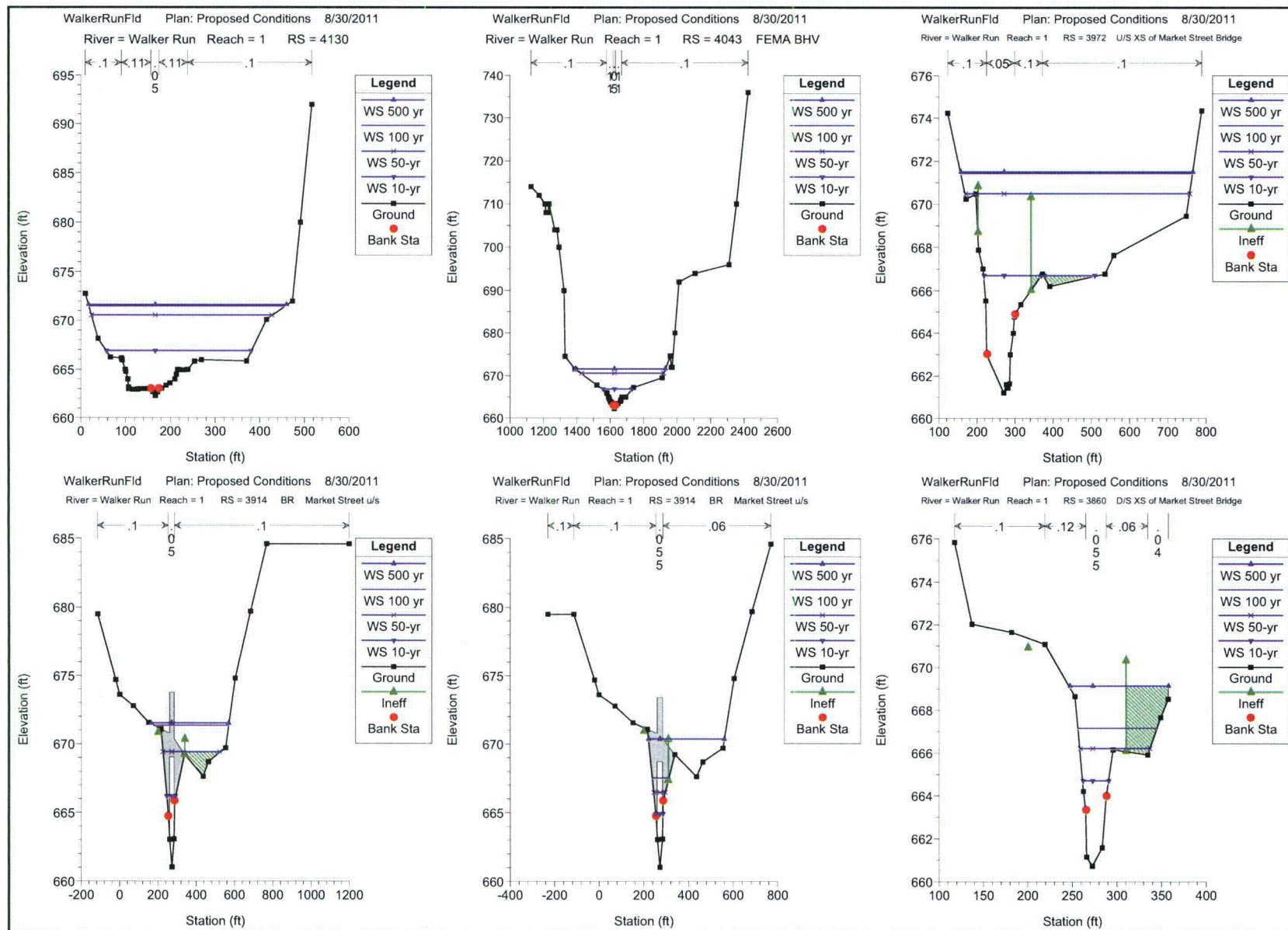


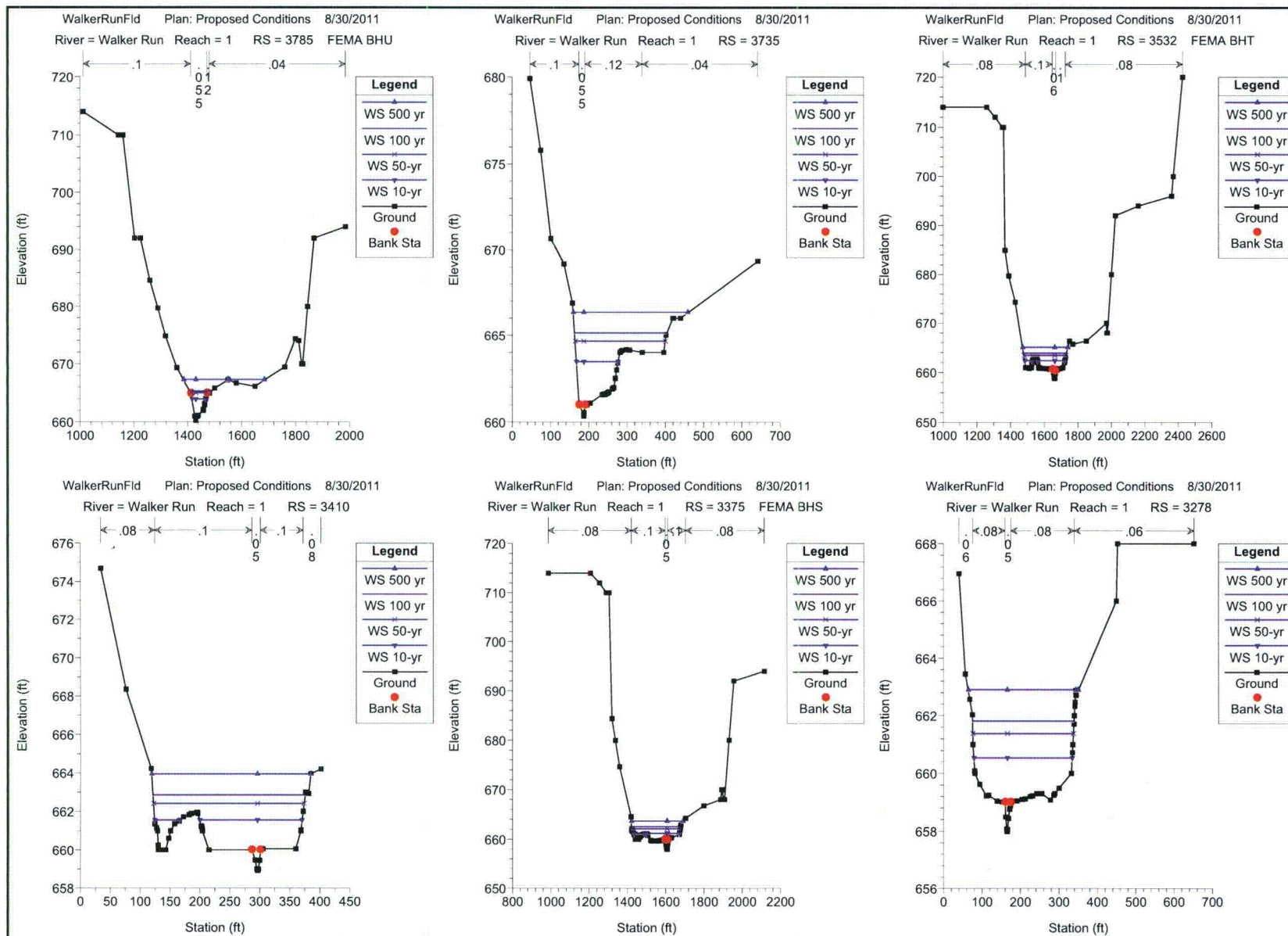


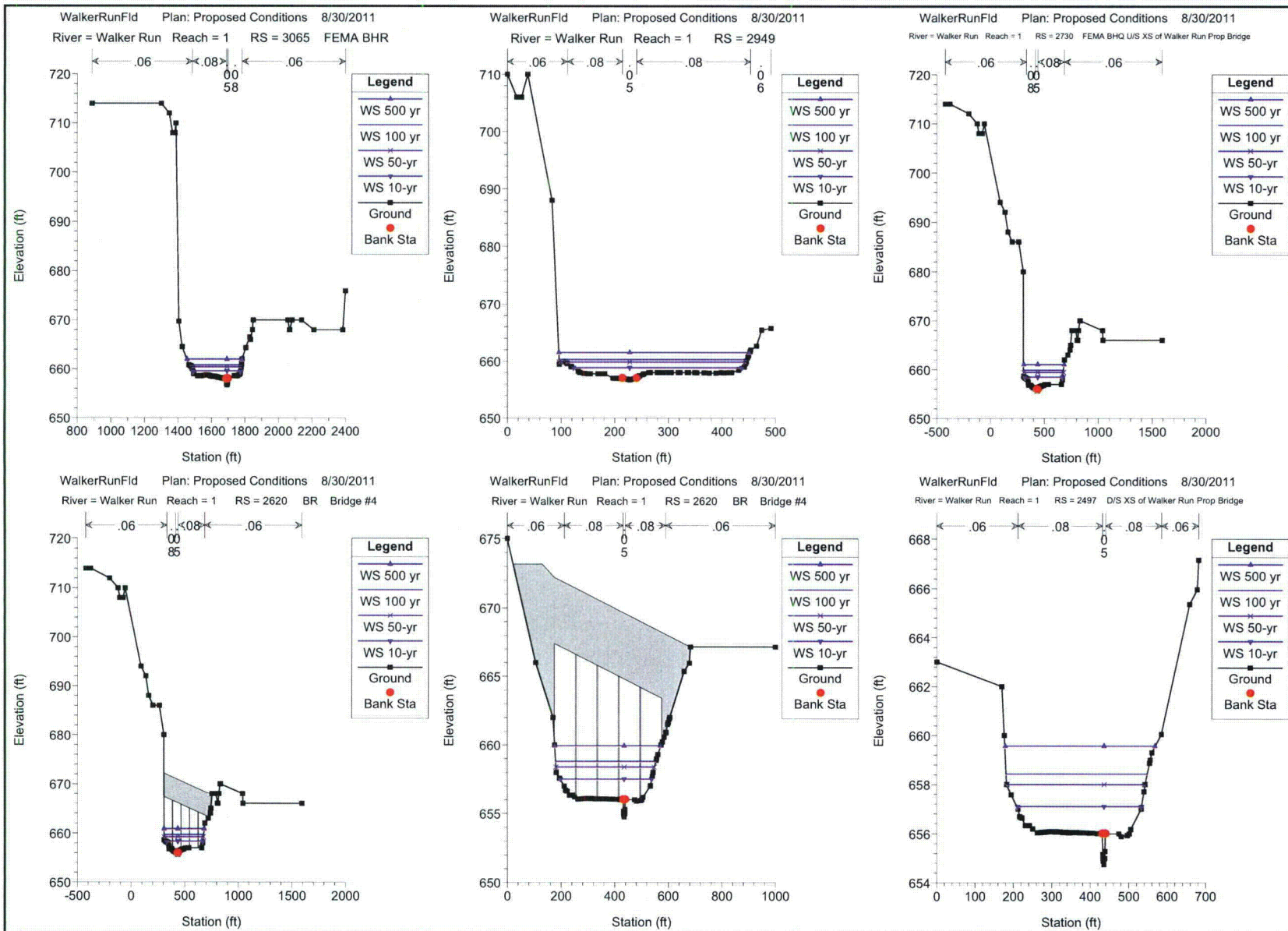


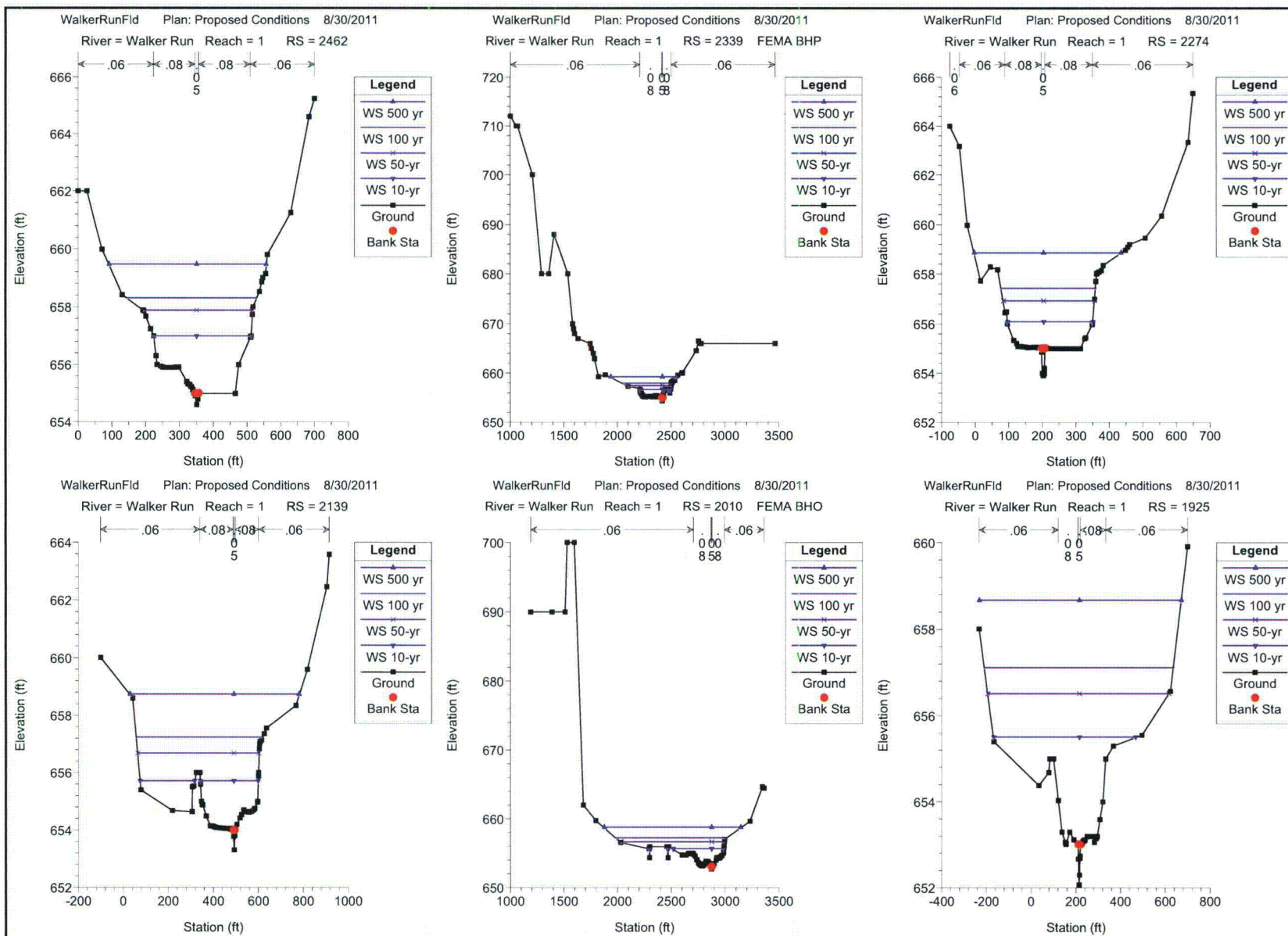


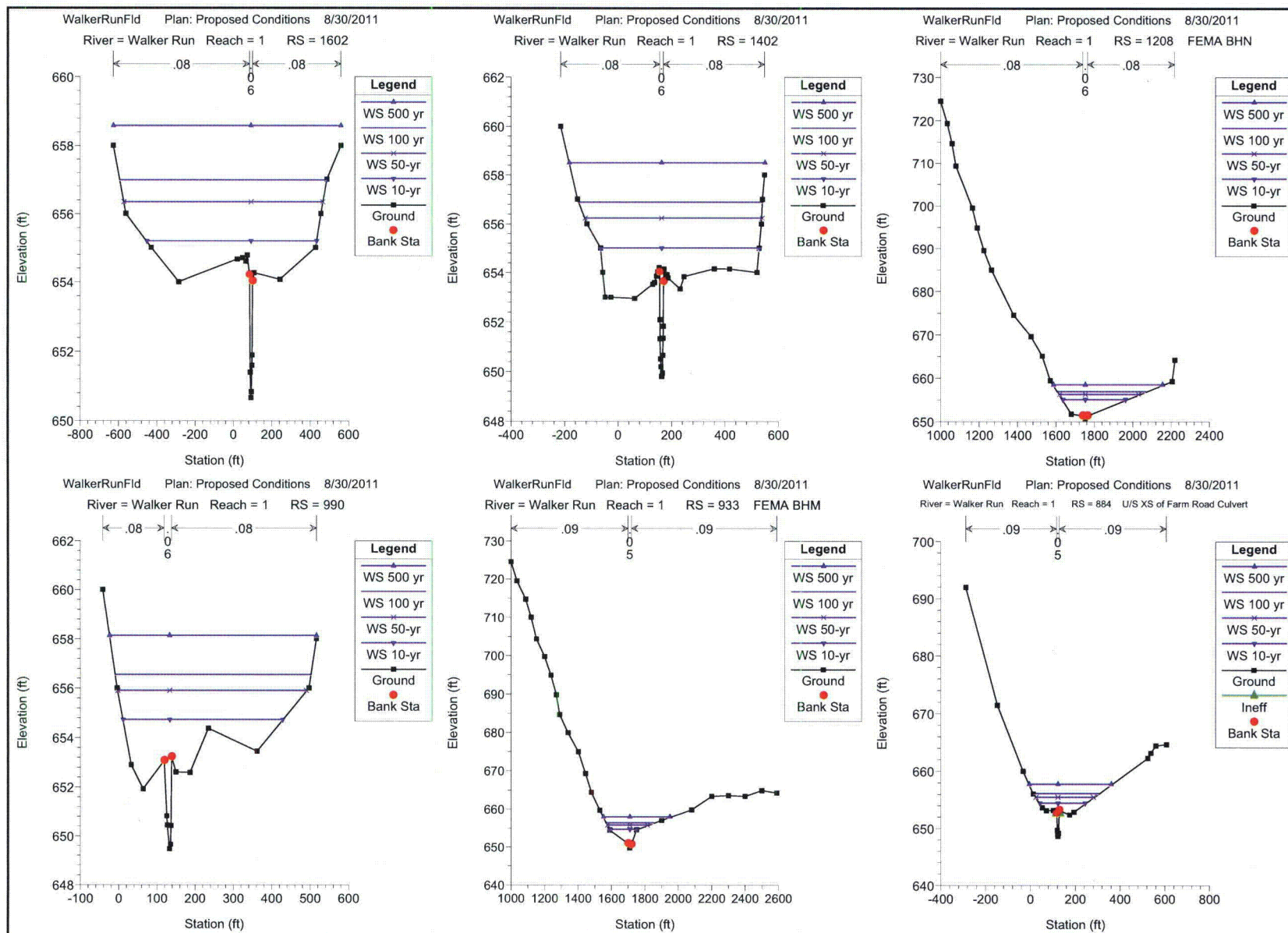


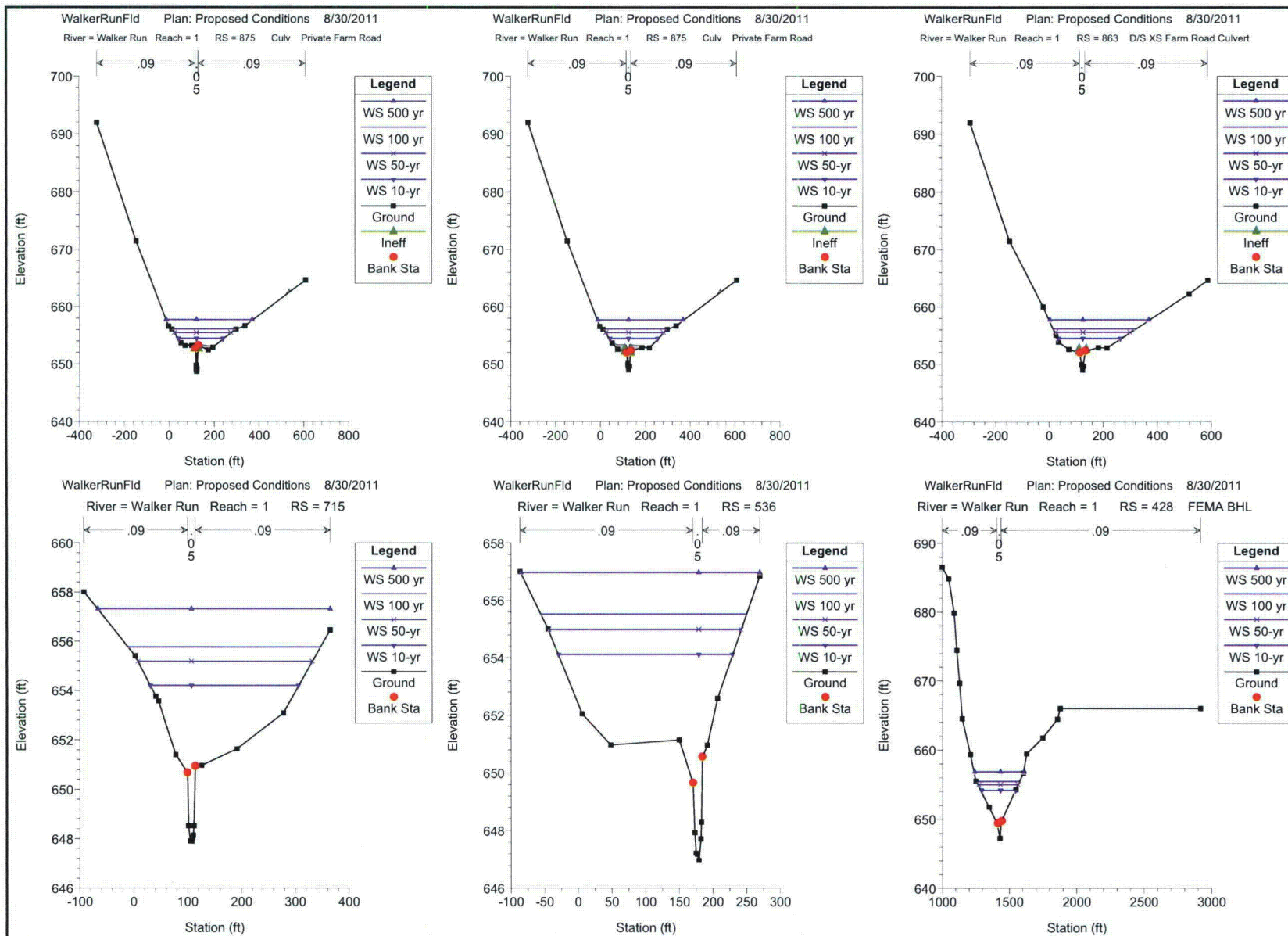


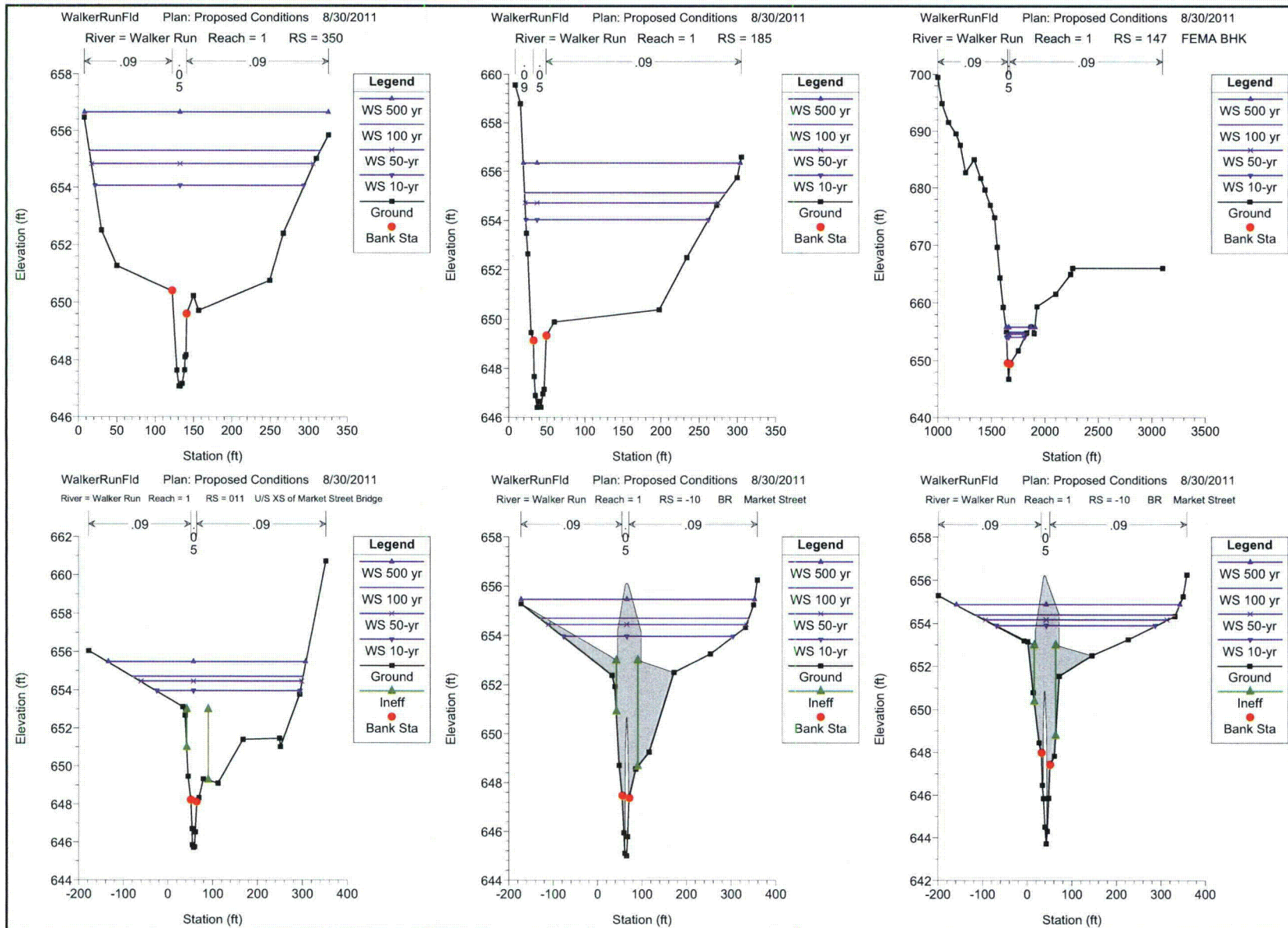


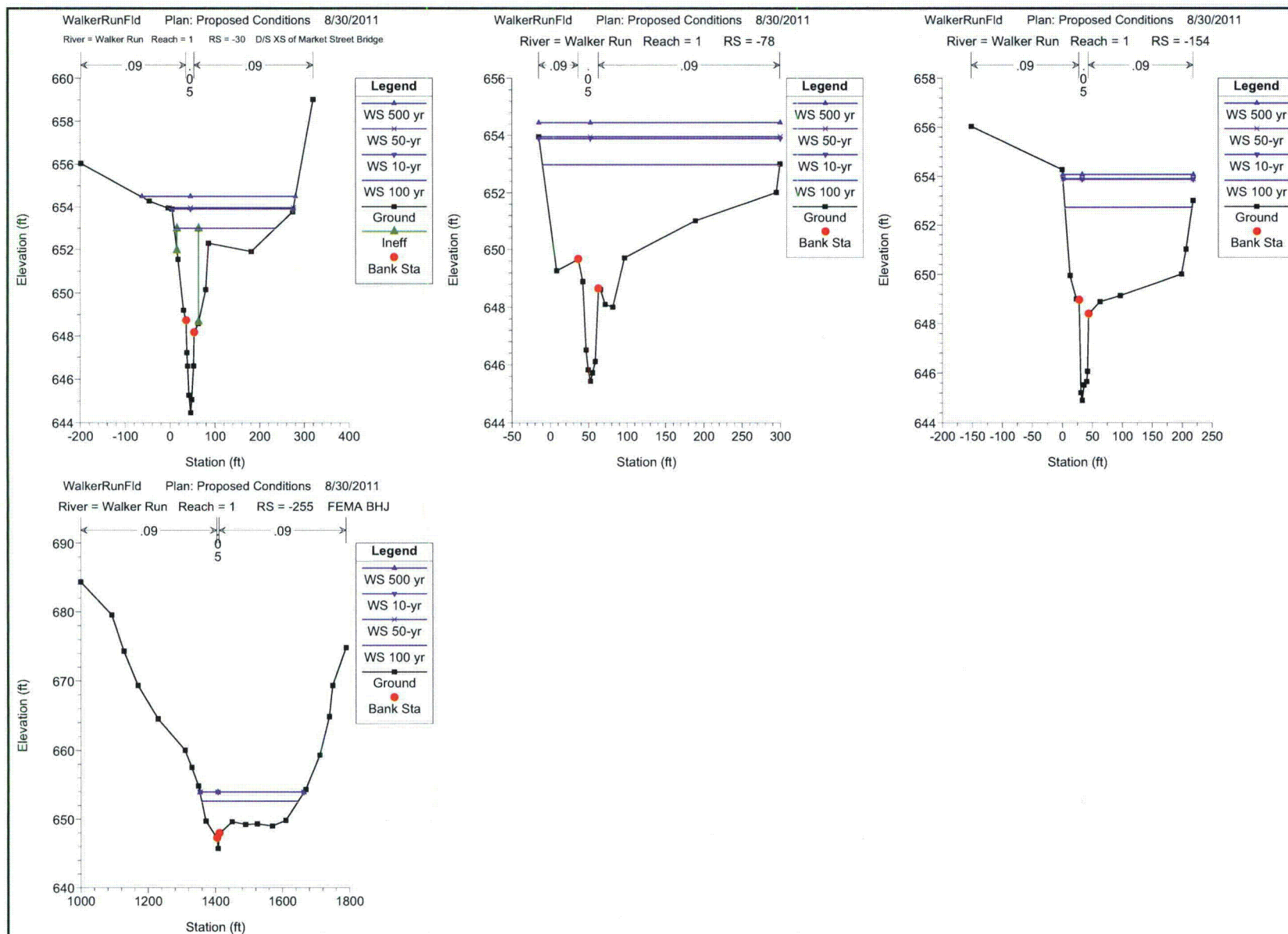






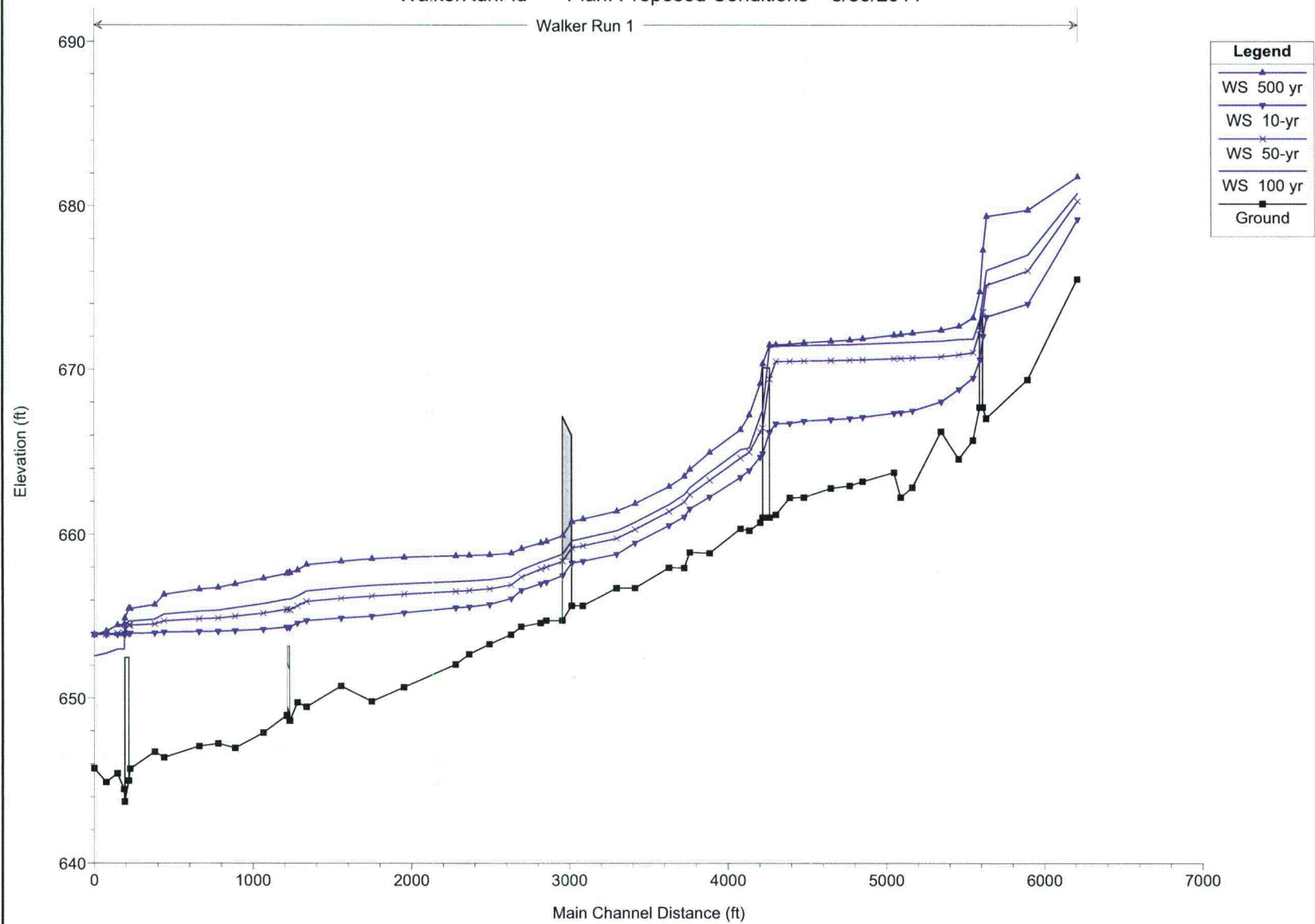




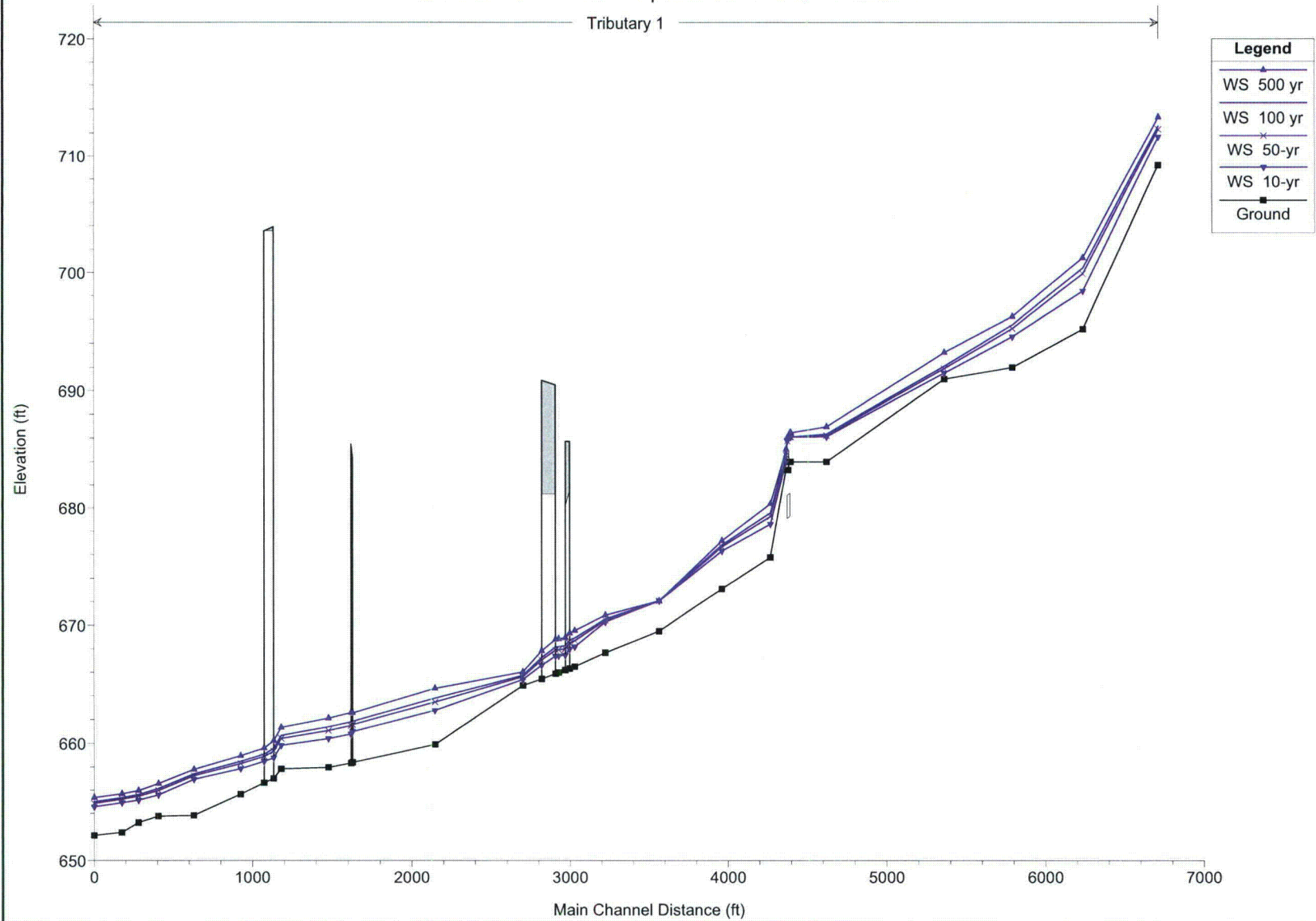


WalkerRunFld Plan: Proposed Conditions 8/30/2011

Walker Run 1



Tributary 1



walkerRunFld.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```

X      X  XXXXXX      XXXX      XXXX      XX      XXXX
X      X  X          X  X      X  X      X  X      X
X      X  X          X          X  X      X  X      X
XXXXXXXX XXXX      X          XXX XXXX      XXXXXX      XXXX
X      X  X          X          X  X      X  X      X
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PROJECT DATA

Project Title: walkerRunFld
Project File : walkerRunFld.prj
Run Date and Time: 9/1/2011 9:23:48 AM

Project in English units

PLAN DATA

Plan Title: Proposed Conditions

Plan File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversight
E-726-L8\TASKS\Task 10 - Floodplain\walker Run HEC-RAS\FEMA REV DATA\REV 3
HEC-RAS\walkerRunFld.p09

Geometry Title: Proposed Conditions

Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting
Oversite E-726-L8\TASKS\Task 10 - Floodplain\walker Run HEC-RAS\FEMA REV DATA\REV 3
HEC-RAS\walkerRunFld.g07

Flow Title : Existing Conditions

Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting
Oversite E-726-L8\TASKS\Task 10 - Floodplain\walker Run HEC-RAS\FEMA REV DATA\REV 3
HEC-RAS\walkerRunFld.f03

Plan Summary Information:

Number of: Cross Sections	=	74	Multiple Openings	=	0
Culverts	=	2	Inline Structures	=	0
Bridges	=	8	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only where necessary
Conveyance Calculation Method: Between every coordinate point (HEC2 Style)
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

walkerRunFld.rep

Encroachment Data

Equal Conveyance = True
Left Offset = 0
Right Offset = 0

River = Walker Run			Reach = 1		
RS	Profile	Method	value1	value2	
5862	100 yr encroachment	1	50	108.12	
5547	100 yr encroachment	1	160	226.17	
5282	100 yr encroachment	1	179	248	
5198	100 yr encroachment	1	176.89	249.89	
5107	100 yr encroachment	1	75	260	
4995	100 yr encroachment	1	1383	1520	
4810	100 yr encroachment	1	70.73	245.06	
4735	100 yr encroachment	1	1700.14	1990.13	
4692	100 yr encroachment	1	100.41	364.89	
4495	100 yr encroachment	1	2041.17	2191.82	
4414	100 yr encroachment	1	105.71	274.29	
4295	100 yr encroachment	1	1531.78	1800	
4130	100 yr encroachment	1	65.97	269.33	
4043	100 yr encroachment	1	1565	1720	
3972	100 yr encroachment	1	197.75	550	
3860	100 yr encroachment	1	264	285	
3785	100 yr encroachment	1	1400	1450	
3735	100 yr encroachment	1	167.57	315	
3532	100 yr encroachment	1	1577.02	1689.17	
3410	100 yr encroachment	1	235.04	355	
3375	100 yr encroachment	1	1528.63	1649.15	
3278	100 yr encroachment	1	117.52	231.3	
3065	100 yr encroachment	1	1567.38	1750	
2949	100 yr encroachment	1	155	299.61	
2730	100 yr encroachment	1	374.49	528.2	
2497	100 yr encroachment	1	250	501.55	
2462	100 yr encroachment	1	275	475	
2339	100 yr encroachment	1	2325	2475.07	
2274	100 yr encroachment	1	96.48	348.92	
2139	100 yr encroachment	1	324.93	604.68	
2010	100 yr encroachment	1	2600	2953.62	
1925	100 yr encroachment	1	121.59	320.86	
1602	100 yr encroachment	1	-285.48	229.52	
1402	100 yr encroachment	1	10.08	391.43	
1208	100 yr encroachment	1	1689.95	1864.92	
990	100 yr encroachment	1	15	410	
933	100 yr encroachment	1	1620	1735	
884	100 yr encroachment	1	81.4	208.17	
863	100 yr encroachment	1	81.31	208.08	
715	100 yr encroachment	1	83.8	237.94	
536	100 yr encroachment	1	36.84	184.3	
428	100 yr encroachment	1	1358.97	1474.62	
350	100 yr encroachment	1	74.21	237.94	
185	100 yr encroachment	1	32.38	176.38	
147	100 yr encroachment	1	1640	1750	
011	100 yr encroachment	1	42	249	
-30	100 yr encroachment	1	15.72	150	
-78	100 yr encroachment	1	3	150	
-154	100 yr encroachment	1	13.15	138.42	
-255	100 yr encroachment	1	1405	1570	

River = Tributary			Reach = 1		
RS	Profile	Method	value1	value2	
6850	100 yr encroachment	1	90.32	113.19	
6361	100 yr encroachment	1	53	610	
5930	100 yr encroachment	1	75	112	

			walkerRunFld.rep	
5500	100 yr encroachment	1	90	110
4750	100 yr encroachment	1	85	145
4530	100 yr encroachment	1	75	150
4500	100 yr encroachment	1	117.21	140
4400	100 yr encroachment	1	125	170
4093	100 yr encroachment	1	68.09	94.92
3696	100 yr encroachment	1	434.5	760
3356	100 yr encroachment	1	20	229.11
3162	100 yr encroachment	1	513.93	566
3060	100 yr encroachment	1	255	340
2834	100 yr encroachment	1	205	285
2326	100 yr encroachment	1	125	360
1658	100 yr encroachment	1	225	350
1360	100 yr encroachment	1	220	236
1252	100 yr encroachment	1	218	288
1105	100 yr encroachment	1	240	283.94
810	100 yr encroachment	1	285	379.19
587	100 yr encroachment	1	95	140.89
463	100 yr encroachment	1	169.65	267.48
357	100 yr encroachment	1	114.71	195
183	100 yr encroachment	1	-6	255.38

FLOW DATA

Flow Title: Existing Conditions

Flow File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversight
 E-726-L8\TASKS\Task 10 - Floodplain\Walker Run HEC-RAS\FEMA REV DATA\REV 3
 HEC-RAS\walkerRunFld.f03

Flow Data (cfs)

River	Reach	RS	100 yr	100 yr encroachment
500 yr	10-yr	50-yr		
Tributary	1	6850	300	300
606	84	213		
Tributary	1	4400	300	300
606	84	213		
Tributary	1	1252	300	300
606	84	213		
walker Run	1	5862	1640	1640
3100	480	1180		
walker Run	1	5198	1640	1640
3100	480	1180		
walker Run	1	1602	1860	1860
3600	550	1320		

Boundary Conditions

River	Reach	Profile	Upstream
Downstream			
Tributary	1	100 yr	Critical
Normal S = 0.0015			
Tributary	1	100 yr encroachment	Critical
Known WS = 655.94			

Tributary	1	walkerRunFld.rep	
Normal S = 0.0015		500 yr	Critical
Tributary	1	10-yr	Critical
Normal S = 0.0015			
Tributary	1	50-yr	Critical
Normal S = 0.0015			
Walker Run	1	100 yr	Critical
Known WS = 652.54			
Walker Run	1	100 yr encroachment	Critical
Known WS = 653.54			
Walker Run	1	500 yr	Critical
Known WS = 653.85			
Walker Run	1	10-yr	Critical
Known WS = 650.85			
Walker Run	1	50-yr	Critical
Known WS = 652.05			

GEOMETRY DATA

Geometry Title: Proposed Conditions
 Geometry File : p:\PROJECTS\Environmental\PPL - Wetland Permitting Oversight
 E-726-L8\TASKS\Task 10 - Floodplain\walker Run HEC-RAS\FEMA REV DATA\REV 3
 HEC-RAS\walkerRunFld.g07

CROSS SECTION

RIVER: Tributary
 REACH: 1 RS: 6850

INPUT

Description:

Station Elevation Data		num=	98								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	717.52	.35	717.54	2.18	717.61	3.78	717.66	6.3	717.8		
7.85	717.82	12.81	718	20.71	718.1	21.89	718.12	30.23	718.06		
30.44	718.06	34.3	718	34.95	717.97	35.49	717.93	40.01	717.62		
40.91	717.52	41.61	717.38	43.04	717.13	43.18	717.1	43.68	717.04		
43.98	717	47.48	716.55	50.04	716.18	50.95	716	52.04	715.78		
54.81	715	56.01	714.66	58.49	714	60.5	713.45	61.8	713		
73.57	712.06	74.45	712	75.39	711.91	76.44	711.85	84.53	711.28		
90.32	711	91.39	710.93	91.8	710.91	92.02	710.89	92.48	710.85		
96.49	710.55	101.47	710	102.88	709.75	104.15	709.32	104.25	709.26		
104.43	709.22	104.66	709.19	104.87	709.2	105.86	709.3	106.32	709.38		
107.84	709.67	109.84	710	112.63	710.84	113.19	711	113.34	711.06		
116.12	712	118.92	712.94	119.09	713	119.23	713.05	122.01	714		
123.04	714.38	124.97	715	126.95	715.63	128.05	716	130.39	716.75		
131.16	717	132.68	717.25	138.64	718	141.42	718.08	146.9	718.11		
148.71	718.06	153.13	718	156.17	717.38	157.97	717	159.64	716.99		
159.72	716.99	161.24	717	161.76	717	162.96	717.28	166.09	718		
167.49	718.26	174.81	719	177.43	719.22	185.26	719.81	186.71	719.92		
187.13	719.95	187.68	720	195.49	720.55	201.16	721	207.47	721.56		
209.54	721.73	212.78	722	224.62	722.84	226.57	723	236.08	723.8		
238.51	724	242.33	724.16	249.45	724.46						

Manning's n Values		num=	3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.05	90.32	.08	113.19	.05

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Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
90.32	113.19	460	476	490	.1		.3

CROSS SECTION

RIVER: Tributary
 REACH: 1 RS: 6361

INPUT

Description: New
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	703	20	702	30.5	701	41	700	52	699
53.4	698	54.4	697	55.1	696	55.7	695.2	56.8	696
58.9	697	60.6	698	62.7	699	67.6	700	75.9	701
88.7	702	106.3	703	117.8	704	121.2	705	145	706

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	52	.08	62.7	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
52	62.7	438	444	454	.1		.3

CROSS SECTION

RIVER: Tributary
 REACH: 1 RS: 5930

INPUT

Description:
 Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	707.61	.21	707.52	1.49	707	3.75	706.23	4.35	706.04
4.46	706	4.67	705.91	6.78	705	7.13	704.87	9.64	704
11.48	703.34	12.46	703	12.85	702.86	15.32	702	16.31	701.64
18.18	701	20.11	700.31	21	700	23.24	699.19	23.8	699
24.33	698.81	26.66	698	27.99	697.57	29.87	697	31.89	696.61
35.21	696	40.81	695.52	43.76	695.24	46.22	695	47.88	694.93
73.56	694	78.44	693.3	80.01	693	80.83	692.64	82.4	692
83.33	692	84.28	692	84.3	692	84.31	692	86.28	692
87.21	692.48	88.27	693	101.79	693.51	104.21	693.59	106.79	693.68
108.18	693.72	110.29	693.73	112.58	693.7	112.72	693.69	118.36	693.78
120.92	693.83	122.97	693.9	125.05	694	139.58	694.93	140.72	695
141.28	695.05	153.31	696	158.07	696.55	162.09	697	166	697.45
170.75	698	174.95	698.5	179.08	699	183.24	699.61	185.81	700
188.27	700.35	192.66	701	196.14	701.53	199.34	702	204.09	702.76
205.4	703	207.13	703.33	210.72	704	213.77	704.54	216.32	705
218.9	705.47	221.12	705.84						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	80.01	.08	88.27	.05

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
80.01	88.27	448.37	429.25	409.23	.1		.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 5500

INPUT

Description:

Station Elevation Data		num= 96							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	705.59	1.65	705.28	3.11	705	3.68	704.9	9.3	704
10.58	703.79	14.78	703	14.79	703	19.67	702.91	20.62	702.9
22.18	702.9	22.97	702.9	23.58	702.92	24.01	702.94	24.36	702.98
24.87	703	25.93	703.05	26.08	703.05	35.07	703.38	37.21	703.44
39.27	703.47	41.12	703.49	42.58	703.48	43.53	703.46	44.12	703.41
44.76	703.31	46.18	703	46.94	702.52	47.85	702	48.86	701.36
49.48	701	50.69	700.22	51.08	700	51.86	699.5	52.59	699
53.94	698.19	54.24	698	54.73	697.69	55.88	697	57.44	696.04
57.51	696	57.79	695.83	59.23	695	60.7	694.11	60.9	694
62.37	693.25	62.91	693	62.98	692.98	65.37	692	65.4	691.99
66.48	691.55	67.85	691	67.95	691	75.95	691	79.78	691
84.86	691	87.6	691	89.79	691	96.84	691	105.06	691
105.18	691	106.9	691	107.22	691	114.51	691	116.13	691
118.28	691.39	121.68	692	123.18	692.64	124.03	693	126.02	693.87
126.33	694	127.25	694.4	128.76	695	129.16	695.13	132.13	696
132.9	696.22	135.68	697	137.76	697.61	139.16	698	139.62	698.13
142.67	699	143.27	699.17	146.17	700	149.04	700.82	149.66	701
150.18	701.16	153.12	702	153.66	702.15	156.6	703	158.09	703.4
160.27	704	162.03	704.45	164.06	705	166.44	705.61	168.26	706
169.59	706.33								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	66.48	.08	118.28	.05

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	66.48	118.28		758.93	739.98	740.88		.1	.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 4750

INPUT

Description:

Station Elevation Data		num= 130							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	719.11	7.68	719	10.17	718.76	18.45	718	20.03	717.49
21.92	717	22.84	716.49	23.71	716	24.48	715.58	25.43	715
26.3	714.49	27.18	714	28.1	713.46	28.92	713	29.88	712.44
30.65	712	31.64	711.37	32.27	711	33.35	710.38	33.99	710
35.06	709.39	35.7	709	36.83	708.35	37.43	708	38.7	707.26
39.13	707	39.54	706.76	40.87	706	42.26	705.19	42.58	705
43.96	704.19	44.31	704	45.75	703.16	46.03	703	47.5	702.13
47.72	702	49.25	701.01	49.26	701	49.27	700.99	50.71	700
51.78	699.09	51.92	699	52.06	698.89	53.27	698	53.57	697.79
54.58	697	55.07	696.68	55.87	696	56.82	695.31	57.23	695
58.25	694.16	58.5	694	60.18	693.01	60.19	693	60.23	692.98
62.33	692	64.4	691	64.41	691	66.77	690	68.03	689.39
68.88	689	70.28	688.56	71.66	688	73.93	687.54	76.53	687
79.74	686.35	81.27	686	83.57	685.49	85.56	685	86.56	684
89.9	684	94.99	684	124.36	684	137.07	684	144.81	684
176.24	685	176.89	685.09	183.88	686	186.34	686.5	188.39	687
191.16	687.7	192.31	688	193.07	688.2	196.16	689	197.57	689.37
200.05	690	206.17	690.93	206.7	691	214.37	691.48	215.87	691.59
217.4	691.74	217.65	691.76	218.07	691.79	218.54	691.81	219.08	691.82

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219.68	691.82	220.29	691.82	221.04	691.82	221.15	691.82	221.32	691.79
221.59	691.74	222.48	691.36	223.33	691	225.37	690.05	225.47	690
225.68	689.91	227.73	689	229.96	688.11	230.23	688	230.4	687.93
232.65	687	233.17	686.93	233.41	686.89	233.91	686.96	234.15	687
234.42	687.11	236.86	688	237.5	688.24	239.62	689	242.37	690
245.17	691	245.95	691.05	247.15	691.13	252.96	691.51	261.76	692
269.9	692.26	288.24	692.9	290.57	692.98	291.12	693	296.01	693.22

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	81.27	.08	183.88	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

81.27	183.88	238.3	226.5	190.7	.1	.3
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CROSS SECTION

RIVER: Tributary
REACH: 1 RS: 4530

INPUT
Description: U/S XS of Beaver Dam Pond Culvert
Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	695.63	.38	695.48	1.28	695.09	1.48	695	3.09	694.51
5.01	694	8.08	693.32	9.54	693	12.07	692.33	13.44	692
15.74	691.32	16.91	691	18	690.72	20.83	690	24.22	689.15
24.81	689	28.69	688.02	28.78	688	28.95	687.96	29.27	687.87
32.8	687	37.18	686.21	38.3	686	39.25	685.85	44.98	685
46.66	685	47.66	684	49.21	684	50.78	684	51.95	684
53.56	684	58.64	684	62.64	684	65.43	684	71.47	684
82.7	684	83.09	684	98.62	684	101.48	684	107.38	684
109.3	684	123.54	684	124.7	684	147.47	684	168.98	684
177.3	684	180.32	684	182.51	684	188.98	684	190.4	684
193.03	684	193.27	684	193.44	684	194.9	684	194.96	684
195.01	684	195.13	684	196.34	684	196.91	684	203.33	684
207.17	684	210.36	684	211.96	684	215.52	684	218.11	684
220.77	684	224.16	684	231.87	684	239.24	684	245.5	685
253.07	685	256.85	685.84	257.54	686	258.89	686.31	259.73	686.43
261.48	686.68	262.26	686.84	263.03	687	264	687.21	267.77	688
269.77	688.4	272.58	689	280.78	689.37	283.12	689.52	287.24	689.8
289.93	690	303.56	690.88	305.27	691	307.07	691.07	307.94	691.11

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.25	.08	256.85	.05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

39.25	256.85	26.8	29.2	29.5	.3	.5
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Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103	686.02	F
109	307.94	686.02	F

CULVERT

RIVER: Tributary
REACH: 1 RS: 4528

INPUT
Description: Beaver Dam Pond Culvert

Distance from Upstream XS = 10.5
Deck/Roadway width = 4
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates

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num=126
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Upstream Bridge Cross Section Data

num= 90

Page 8

walkerRunFld.rep

195.01	684	195.13	684	196.34	684	196.91	684	203.33	684
207.17	684	210.36	684	211.96	684	215.52	684	218.11	684
220.77	684	224.16	684	231.87	684	239.24	684	245.5	685
253.07	685	256.85	685.84	257.54	686	258.89	686.31	259.73	686.43
261.48	686.68	262.26	686.84	263.03	687	264	687.21	267.77	688
269.77	688.4	272.58	689	280.78	689.37	283.12	689.52	287.24	689.8
289.93	690	303.56	690.88	305.27	691	307.07	691.07	307.94	691.11

Manning's n values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.05	39.25	.08	256.85	.05

Bank Sta: Left Right Coeff Contr. Expan.

39.25	256.85	.3	.5
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Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	103	686.02	F
109	307.94	686.02	F

Downstream Deck/Roadway Coordinates

num=	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
126	0	699.94		.08	699.93		.17	699.9	
	.37	699.82		1.81	699.59		4.29	699.12	
	4.86	699		5.91	698.73		7.54	698.44	
	9.65	698		12.65	697.57		15.79	697	
	17.04	696.74		19.94	696		20.51	695.88	
	24.52	695		25.05	694.9		29.34	694	
	29.78	693.91		34.3	693		38.09	692.22	
	39.2	692		43.19	691.18		43.98	691	
	44.34	690.93		44.67	690.88		49.26	690	
	51.11	689.68		55.23	689		60.28	688.18	
	61.36	688		65.16	687.39		67.46	687	
	68.34	686.86		70.96	686.33		80.51	686.24	
	80.67	686.24		84.94	686.05		86.72	686.04	
	89.52	686.04		93.66	686.03		94.45	686.03	
	95.14	686.02		96.47	686.02		97.36	686.02	
	101.68	686.02		102.68	686.02		104.7	686.03	
	105.44	686.03		109.35	686.02		114.19	686.01	
	117.38	686		119.45	685.81		120.95	685.78	
	123.15	685.61		123.97	685.38		125.3	685	
	127.21	685		132.46	685		134.61	685	
	139.57	685		141.83	685		144.59	685	
	147.06	685		149.69	685		153.25	685	
	155	685		158.41	685		163.68	685	
	164.26	685		164.58	685		172.54	685	
	173.23	685		174.29	685		182.66	685	
	183.32	685		185.42	685		189.93	684.94	
	190.82	684.95		198.27	684.93		198.45	684.93	
	205.79	684.9		205.98	684.91		206.25	684.92	
	207.99	685		214.82	685		215.17	685	
	216.22	685		218.29	685		218.85	685	
	220.55	685		221.47	685		221.8	685	
	222.26	685		222.79	685		223.34	685	
	225.66	685		229.27	685		229.91	685	
	232.18	685		233.95	685		235.25	685	
	238.49	685		239.5	685		240.33	685	
	240.63	685		242.95	685		245.9	685	
	246.88	685		249.8	685		250.83	685	
	252.46	685		260.7	685		262.47	685.37	
	265.16	686		268.07	686.63		269.63	687	
	272.57	687.71		273.81	688		274.81	688.23	
	278.02	689		278.88	689.03		292.31	689.45	

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305.41 690 309.17 690.2 310.77 690.28

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	122					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	698.39	2.25	698	3.51	697.78	8.04	697	10.4	696.58
13.75	696	17.58	695.27	19.01	695	24.3	694.01	24.35	694
24.36	694	24.39	693.99	24.56	693.96	29.6	693	29.96	692.93
34.84	692	35.26	691.92	40.08	691	40.93	690.86	43.54	690.41
45.59	690	46.73	689.76	50.78	689	51.85	688.8	56.28	688
56.66	687.94	56.88	687.91	57.21	687.86	62.06	687	64.06	686.74
67.41	686.48	73.1	686	73.58	685.87	76.63	685.77	78.89	685.6
81.72	685.36	82.81	685.28	83.36	685.25	84.22	685.21	84.7	685.21
87.07	685.08	87.43	685.08	88.66	685	90.82	684.79	91.94	684.65
92.9	684.44	93.35	684.38	94.01	684.33	94.9	684.3	99.29	684.28
104.43	684.19	106.71	684.15	109.3	684.08	111.09	684	111.21	683.99
112.38	683.85	113.67	683.78	114.6	683.71	115.76	683.68	117.21	683.5
118.12	683.44	119.46	683.39	121.24	683.35	122.15	683.37	127.52	683.35
131.92	683.3	134.65	683.33	135.14	683.32	139.51	683.33	140.67	683.32
141.87	683.33	142.84	683.34	143.7	683.37	146.54	683.44	152.28	683.42
157.84	683.49	163.36	683.36	165.79	683.33	166.88	683.33	172.36	683.22
173.32	683.21	176.18	683.19	177.33	683.17	190.83	683.03	191.87	683
198.11	682.59	198.65	682.57	200.68	682.65	201.32	682.65	205.33	682.59
206.51	682.67	207.73	682.75	210.04	682.71	210.84	682.68	212.81	682.65
213.82	682.63	213.87	682.6	216.59	682.57	219.18	682.57	222.09	682.65
229.54	682.91	231.92	683	232.46	683.21	234.58	684	235.86	684.47
237.43	685	237.7	685.1	240.19	686	245.86	686.3	256.09	687
266.97	687.52	275.91	688	283.94	688.34	286.47	688.44	294.52	688.78
302.29	689	315.27	689.42	320.65	689.56	325.31	689.67	329.74	689.81
338.75	689.97	339.92	689.99						

Manning's n	Values	num=	3
Sta	n Val	Sta	n Val
0	.05	117.21	.08
		146.54	.05

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	117.21	146.54		.3	.5

Ineffective Flow	num=	2
Sta L	Sta R	Elev
0	115	686.02
146.54	339.92	685

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	2	
FHWA Chart #	55- Circular Culvert		
FHWA Scale #	1 - Smooth tapered inlet throat		
Solution Criteria	= Highest U.S. EG		
Culvert Upstrm Dist	Length	Top n	Bottom n
Exit Loss Coef	4.3	18	.013
			.013
			0
			.9

1
 Upstream Elevation = 679.28
 Centerline Station = 106

Downstream Elevation = 679.1
Centerline Station = 122

CROSS SECTION

RIVER: Tributary
REACH: 1

RS: 4500

INPUT

Description: D/S XS of Beaver Dam Pond Culvert

Station	Elevation	Data	num=	122	Station	Elevation	Data	num=	122	Station	Elevation	Data	num=	122	Station	Elevation	Data	num=	122
0	698.39				3.51	697.78				8.04	697				10.4	696.58			
13.75	696				19.01	695				24.3	694.01				24.35	694			
24.36	694				24.56	693.96				29.6	693				29.96	692.93			
34.84	692				40.08	691				40.93	690.86				43.54	690.41			
45.59	690				50.78	689				51.85	688.8				56.28	688			
56.66	687.94				57.21	687.86				62.06	687				64.06	686.74			
67.41	686.48				73.58	685.87				76.63	685.77				78.89	685.6			
81.72	685.36				83.36	685.25				84.22	685.21				84.7	685.21			
87.07	685.08				88.66	685				90.82	684.79				91.94	684.65			
92.9	684.44				94.01	684.33				94.9	684.3				99.29	684.28			
104.43	684.19				109.3	684.08				111.09	684				111.21	683.99			
112.38	683.85				114.6	683.71				115.76	683.68				117.21	683.5			
118.12	683.44				121.24	683.35				122.15	683.37				127.52	683.35			
131.92	683.3				135.14	683.32				139.51	683.33				140.67	683.32			
141.87	683.33				143.7	683.37				146.54	683.44				152.28	683.42			
157.84	683.49				165.79	683.33				166.88	683.33				172.36	683.22			
173.32	683.21				177.33	683.17				190.83	683.03				191.87	683			
198.11	682.59				200.68	682.65				201.32	682.65				205.33	682.59			
206.51	682.67				210.04	682.71				210.84	682.68				212.81	682.65			
213.82	682.63				216.59	682.57				219.18	682.57				222.09	682.65			
229.54	682.91				232.46	683.21				234.58	684				235.86	684.47			
237.43	685				240.19	686				245.86	686.3				256.09	687			
266.97	687.52				283.94	688.34				286.47	688.44				294.52	688.78			
302.29	689				320.65	689.56				325.31	689.67				329.74	689.81			
338.75	689.97																		

Manning's n	Values	num=	3
Sta	n Val	Sta	n Val
0	.05	117.21	.08
		146.54	.05

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	117.21	146.54		87.5	99.4	102.5		.3	.5
Ineffective Flow			num=	2					
Sta L	Sta R	Elev	Permanent						
0	115	686.02	F						
146.54	339.92	685	F						

CROSS SECTION

RIVER: Tributary
REACH: 1

RS: 4400

INPUT

Description:

Station	Elevation	Data	num=	14	Station	Elevation	Data	num=	14	Station	Elevation	Data	num=	14	Station	Elevation	Data	num=	14
36	683.01				116.53	678.6				128.1	677.84				152.93	677.53			
158.35	677.2				159.72	675.78				160.48	676.59				161.3	676.98			
163.98	677.49				181.98	677.84				190	680.01								

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Manning's n Values
 Sta n Val Sta num= 3
 36 .05 158.35 .08 161.3 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 158.35 161.3 307 307 307 .3 .5

CROSS SECTION

RIVER: Tributary
 REACH: 1 RS: 4093

INPUT

Description: New
 Station Elevation Data num= 20
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 681 2.6 680 5.25 679 8 678 10.5 677
 14.7 676 21.5 676 25 677 30.5 677 49 676
 71 675 72 673.1 73 673.1 74 675 77.5 676
 135 676 153 677 172.5 678 190 679 205 680

Manning's n Values
 Sta n Val Sta num= 3
 0 .1 71 .05 74 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 71 74 397 397 397 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 25 677 F

CROSS SECTION

RIVER: Tributary
 REACH: 1 RS: 3696

INPUT

Description:
 Station Elevation Data num= 21
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
 0 672.16 11 672 18 671 37 670 160 669
 165 669 170 670 172.25 671 178 671 185 670
 263 670 434.5 671 674 672 754 672 756 669.5
 758 669.5 760 672 770 674 805 674 825 675
 878 678

Manning's n Values
 Sta n Val Sta num= 3
 0 .1 754 .05 760 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 754 760 340 340 340 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 0 674 672 F

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 3356

INPUT

Description:

Station Elevation Data			num= 22								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-438.69	672.01	-380.28	671.01	-365.82	670.01	28	670.01	100	671.01		
194.18	670.23	205.77	669.77	208.9	670.84	210.78	669.09	213.43	668.53		
214.16	667.67	215.07	667.67	215.68	667.68	216.52	667.72	217	667.83		
219.51	670.12	224.24	671.09	229.11	672.65	234.42	670.53	267.47	672.28		
295.86	673.86	312.17	675.66								

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
-438.69	.1	213.43	.05	219.51	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	213.43	219.51		366	194		.1	.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 3162

INPUT

Description:

Station Elevation Data			num= 23								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	675	44	674	77.6	673	239.6	672	263.8	671		
270.3	670	285.6	669	305.8	668	525.6	667	530	666.8		
534	666.8	539	667	559.7	667	561	666.5	563	666.5		
564	667	568	668	590	669	617	670	628.5	671		
634.4	672	695	679.55	695.1	686						

Manning's n Values			num= 3		
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	559.7	.05	564	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	559.7	564		110	102		.1	.3

BRIDGE

RIVER: Tributary

REACH: 1

RS: 3108

INPUT

Description: RR bridge No 5

Distance from Upstream XS = 32

Deck/Roadway Width = 28

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 11															
Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord		Sta	Hi Cord	Lo Cord	
-134.4	695	0		160.28	691.73	0		160.29	691.73	681.48					
249.4	690.73	680.48		338.52	689.73	679.48		427.63	688.73	678.48					
516.75	687.74	677.49		605.86	686.74	676.49		695	685.74	675.49					
695	685.74	0		904.29	691.8	0									

Upstream Bridge Cross Section Data

Station Elevation Data num= 23

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Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	674.84	44	673.84	77.6	672.84	239.6	671.84	263.8	670.84
270.3	669.84	285.6	668.84	305.8	667.84	525.6	666.84	530	666.64
534	666.64	539	666.84	559.7	666.84	561	666.34	563	666.34
564	666.84	568	667.84	590	668.84	617	669.84	628.5	670.84
634.4	671.84	695	679.39	695.1	685.84				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	559.7	.05	564	.1

Bank Sta: Left Right Coeff Contr. Expan.

559.7	564	.1	.3
-------	-----	----	----

Downstream Deck/Roadway Coordinates

num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-94.72	691.73	0	-94.71	691.73	681.48	-5.6	690.73	680.48
83.52	689.73	679.48	172.63	688.73	678.48	261.75	687.74	677.49
350.86	686.74	676.49	440	685.74	675.49			

Downstream Bridge Cross Section Data

Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	682.2	10	682.2	60	676.2	64.18	673.2	75.95	672.348
77.44	672.243	78.01	672.2	78.74	672.148	91.82	671.2	100.82	670.331
102.13	670.2	102.99	670.107	111.76	669.2	118.45	668.431	120.59	668.2
124.12	668.015	130.23	667.673	136.79	667.332	138.85	667.2	140.16	667.169
145.2	667.063	154.44	666.88	155.26	666.866	156.3	666.86	158.55	666.854
168.04	666.84	173.87	666.835	180.69	666.847	185.3	666.853	190.3	666.853
194.79	666.85	196.46	666.846	201.96	666.823	205.02	666.814	206.76	666.806
209.03	666.79	211.59	666.765	213.97	666.731	215.69	666.69	218.49	666.59
220.78	666.537	223.52	666.527	226.26	666.477	229.89	666.454	232.73	666.412
234.22	666.404	237.2	666.371	240.44	666.359	242.97	666.338	246.63	666.315
247.3	666.311	257.44	666.22	257.53	666.219	259.69	666.2	269.27	666.169
273.25	666.16	275.98	666.158	277.93	666.162	279.6	666.173	282.51	666.2
288.25	666.362	290.98	666.457	296.08	666.643	311.06	667.2	315.34	667.2
318.74	667.2	319.25	667.057	321.78	666.2	322.5	666.2	323.1	666.2
323.83	666.2	324.35	666.2	336.57	667.147	337.11	667.188	337.27	667.2
344.9	667.768	350.35	668.2	357.48	668.797	362.17	669.2	369.51	669.788
373.99	670.2	381.08	671.009	383.04	671.2	389.62	671.875	393.01	672.2
399.88	672.95	402.18	673.2	402.92	673.296	411.81	674.2	419.61	674.897
422.64	675.2	425.8	675.665	429.64	676.2	431.45	676.482	436.25	677.2
439.62	677.717	440	685.94	540	685.94				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	318.74	.05	337.11	.1

Bank Sta: Left Right Coeff Contr. Expan.

318.74	337.11	.1	.3
--------	--------	----	----

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 weir crest shape = Broad Crested

Number of Piers = 5

Pier Data

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Pier Station	Upstream=	249.39	Downstream=	-5.6
Upstream	num=	2		
width	Elev	width	Elev	
5	0	5	680.48	
Downstream	num=	2		
width	Elev	width	Elev	
5	0	5	680.48	

Pier Data

Pier Station	Upstream=	338.52	Downstream=	83.52
Upstream	num=	2		
width	Elev	width	Elev	
5	0	5	679.48	
Downstream	num=	2		
width	Elev	width	Elev	
5	0	5	679.48	

Pier Data

Pier Station	Upstream=	427.63	Downstream=	172.63
Upstream	num=	2		
width	Elev	width	Elev	
5	0	5	678.48	
Downstream	num=	2		
width	Elev	width	Elev	
5	0	5	678.48	

Pier Data

Pier Station	Upstream=	516.75	Downstream=	261.75
Upstream	num=	2		
width	Elev	width	Elev	
5	0	5	677.49	
Downstream	num=	2		
width	Elev	width	Elev	
5	0	5	677.49	

Pier Data

Pier Station	Upstream=	605.86	Downstream=	350.86
Upstream	num=	2		
width	Elev	width	Elev	
5	0	5	676.49	
Downstream	num=	2		
width	Elev	width	Elev	
5	0	5	676.49	

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Momentum

Cd = 2

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Energy Only

Additional Bridge Parameters

Add Friction component to Momentum

Do not add weight component to Momentum

Class B flow critical depth computations use critical depth
inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

walkerRunFld.rep

RIVER: Tributary
REACH: 1

RS: 3060

INPUT

Description: D/S XS of RR Bridge No 5, U/S XS of Bridge No 2, 6

Station Elevation Data		Data num= 98									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	682	10	682	60	676	64.18	673	75.95	672.148		
77.44	672.043	78.01	672	78.74	671.948	91.82	671	100.82	670.131		
102.13	670	102.99	669.907	111.76	669	118.45	668.231	120.59	668		
124.12	667.815	130.23	667.473	136.79	667.132	138.85	667	140.16	666.969		
145.2	666.863	154.44	666.68	155.26	666.666	156.3	666.66	158.55	666.654		
168.04	666.64	173.87	666.635	180.69	666.647	185.3	666.653	190.3	666.653		
194.79	666.65	196.46	666.646	201.96	666.623	205.02	666.614	206.76	666.606		
209.03	666.59	211.59	666.565	213.97	666.531	215.69	666.49	218.49	666.39		
220.78	666.337	223.52	666.327	226.26	666.277	229.89	666.254	232.73	666.212		
234.22	666.204	237.2	666.171	240.44	666.159	242.97	666.138	246.63	666.115		
247.3	666.111	257.44	666.02	257.53	666.019	259.69	666	269.27	665.969		
273.25	665.96	275.98	665.958	277.93	665.962	279.6	665.973	282.51	666		
288.25	666.162	290.98	666.257	296.08	666.443	311.06	667	315.34	667		
318.74	667	319.25	666.857	321.78	666	322.5	666	323.1	666		
323.83	666	324.35	666	336.57	666.947	337.11	666.988	337.27	667		
344.9	667.568	350.35	668	357.48	668.597	362.17	669	369.51	669.588		
373.99	670	381.08	670.809	383.04	671	389.62	671.675	393.01	672		
399.88	672.75	402.18	673	402.92	673.096	411.81	674	419.61	674.697		
422.64	675	425.8	675.465	429.64	676	431.45	676.282	436.25	677		
439.62	677.517	440	685.74	540	685.74						

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	318.74	.05	337.11	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	318.74	337.11		188	226	141	.1 .3

BRIDGE

RIVER: Tributary
REACH: 1

RS: 3010

INPUT

Description: Bridge No 2 and Pipe Bridge 6

Distance from Upstream XS = 20

Deck/Roadway Width = 87

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 7											
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	690.5	0	31.83	690.94	0	31.84	690.94	677.14			
133.42	691.95	678.15	235.92	692.97	679.17	338.42	694	680.2			
440	695.01	681.21									

Upstream Bridge Cross Section Data

Station Elevation Data		Data num= 98									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	682	10	682	60	676	64.18	673	75.95	672.148		
77.44	672.043	78.01	672	78.74	671.948	91.82	671	100.82	670.131		
102.13	670	102.99	669.907	111.76	669	118.45	668.231	120.59	668		
124.12	667.815	130.23	667.473	136.79	667.132	138.85	667	140.16	666.969		
145.2	666.863	154.44	666.68	155.26	666.666	156.3	666.66	158.55	666.654		
168.04	666.64	173.87	666.635	180.69	666.647	185.3	666.653	190.3	666.653		

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194.79	666.65	196.46	666.646	201.96	666.623	205.02	666.614	206.76	666.606
209.03	666.59	211.59	666.565	213.97	666.531	215.69	666.49	218.49	666.39
220.78	666.337	223.52	666.327	226.26	666.277	229.89	666.254	232.73	666.212
234.22	666.204	237.2	666.171	240.44	666.159	242.97	666.138	246.63	666.115
247.3	666.111	257.44	666.02	257.53	666.019	259.69	666	269.27	665.969
273.25	665.96	275.98	665.87	277.93	665.962	279.6	665.973	282.51	666
288.25	666.162	290.98	666.257	296.08	666.443	311.06	667	315.34	667
318.74	667	319.25	666.857	321.78	666	322.5	665.89	323.1	665.89
323.83	665.89	324.35	666	336.57	666.947	337.11	666.988	337.27	667
344.9	667.568	350.35	668	357.48	668.597	362.17	669	369.51	669.588
373.99	670	381.08	670.809	383.04	671	389.62	671.675	393.01	672
399.88	672.75	402.18	673	402.92	673.096	411.81	674	419.61	674.697
422.64	675	425.8	675.465	429.64	676	431.45	676.282	436.25	677
439.62	677.517	440	695	540	695				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	124.12	.1	318.74	.05	337.11	.1

Bank Sta: Left Right Coeff Contr. Expan.

318.74	337.11	.1	.3
--------	--------	----	----

Downstream Deck/Roadway Coordinates

num= 7

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
-8.16	690.94	677.14	93.42	691.95	678.15	195.92	692.97	679.17
298.42	694	680.2	400	695.01	681.21	400.01	695.01	0
435	694.61	0						

Downstream Bridge Cross Section Data

Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-50	690.9	-8.16	690.9	-8.16	668.62	9.3	668.62	26.89	667.62
67.11	666.62	134	665.44	204	665.44	246.49	666.37	252.14	666.64
254.24	665.51	255.77	665.44	256.85	665.68	257.71	665.64	258.87	666.43
263.61	666.4	277.29	665.84	309.05	668.44	338.85	672.2	371.24	677.29
390.72	679.51	420.6	679.96	435	679.96	435	694.61	450	694.61

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-50	.1	-8.16	.1	26.89	.1	252.14	.05	258.87	.1

Bank Sta: Left Right Coeff Contr. Expan.

252.14	258.87	.1	.3
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Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data

Pier Station Upstream= 133.42 Downstream= 93.42

Upstream	num=	width	Elev	width	Elev
4.5	0	4.5	678.15		

Downstream num= 2

width	Elev	width	Elev
4.5	0	4.5	678.15

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Pier Data
 Pier Station Upstream= 235.92 Downstream= 195.92
 Upstream num= 2
 width Elev width Elev
 4.5 0 4.5 679.17
 Downstream num= 2
 width Elev width Elev
 4.5 0 4.5 679.17

Pier Data
 Pier Station Upstream= 338.42 Downstream= 298.42
 Upstream num= 2
 width Elev width Elev
 4.5 0 4.5 680.2
 Downstream num= 2
 width Elev width Elev
 4.5 0 4.5 680.2

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 2
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Tributary
 REACH: 1 RS: 2834

INPUT

Description: D/S XS of Bridge No 2, 6

Station		Elevation Data		num= 21		Sta		Elev		Sta		Elev	
9.3	668.01	26.89	667.01	67.11	666.01	134	665.01	204	665.01				
246.49	665.76	252.14	666.03	254.24	664.9	255.77	664.89	256.85	665.07				
257.71	665.03	258.87	665.82	263.61	665.79	277.29	665.23	309.05	667.83				
338.85	671.59	371.24	676.68	390.72	678.9	420.6	679.35	435	679.35				
435.1	694												

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9.3	.1	252.14	.05	258.87	.1

Bank	Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
	252.14	258.87	555.48	553.2	557.76	.1		.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 2326

INPUT

Description: U/S XS of Pipe Bridge 7

Station Elevation Data				num=	28
Sta	Elev	Sta	Elev	Sta	Elev
29	680	50	670	54	668
202.29	663.45	249.41	661.77	264.83	661.76
273.33	660.26	274.88	659.9	275.72	660.03
343.16	661.53	399.81	661.53	420.98	662.03
500	696	560	696	593	696
634	700	663	690	718	672

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
29	.1	269.31	.05	277.04	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	269.31	277.04		673.04	669.86	671.65	.1
							.3

BRIDGE

RIVER: Tributary

REACH: 1

RS: 1790

INPUT

Description: Pipe bridge - No 7

Distance from Upstream XS = 519

Deck/Roadway width = 10

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num=				9
Sta	Hi Cord	Lo Cord	Sta	Hi Cord
0	677.93	0	132.99	678
223	681.5	675	313	685
493	692	685.5	493.01	692

Upstream Bridge Cross Section Data

Station Elevation Data				num=	29
Sta	Elev	Sta	Elev	Sta	Elev
-200	678.6	29	678.6	50	668.6
166.8	662.39	202.29	662.05	249.41	660.37
271.41	658.8	273.33	658.86	274.88	658.38
283.76	660.22	343.16	660.13	399.81	660.13
463.58	663.18	463.58	694.6	560	694.6
624	698.6	634	698.6	663	688.6

Manning's n Values			num=	4	
Sta	n Val	Sta	n Val	Sta	n Val
-200	.1	29	.1	269.31	.05
				277.04	.1

Bank Sta:	Left	Right	Coeff Contr.	Expan.
	269.31	277.04	.1	.3

Downstream Deck/Roadway Coordinates

num=				9
Sta	Hi Cord	Lo Cord	Sta	Hi Cord
0	677.93	0	124.77	678
214.78	681.5	675	304.78	685
484.78	692	685.5	484.79	692

Downstream Bridge Cross Section Data

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Station Elevation Data				num=	23				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	690	12.63	688	31.4	684	43	680	48	678
173.75	665.01	198.13	661.86	245.91	659.93	256.45	659.51	262.44	659.72
264.16	658.38	265.67	658.38	267.08	658.32	268.29	658.32	269.24	658.38
271.93	658.6	274.07	659.54	279.61	659.65	315.47	660.02	400.34	661.36
434.93	670.15	448.28	670.08	500	670.08				

Manning's n Values				num=	3
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	262.44	.05	274.07	.1

Bank Sta:	Left	Right	Coeff Contr.	Expan.
	262.44	274.07	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 3

Pier Data				Upstream=	223	Downstream=	214.78
Pier Station	num=	2					
Upstream	width	Elev	width	Elev			
	3	0	3	675			
Downstream	num=	2					
	width	Elev	width	Elev			
	3	0	3	675			

Pier Data				Upstream=	313	Downstream=	304.78
Pier Station	num=	2					
Upstream	width	Elev	width	Elev			
	3	0	3	678.5			
Downstream	num=	2					
	width	Elev	width	Elev			
	3	0	3	678.5			

Pier Data				Upstream=	403	Downstream=	394.78
Pier Station	num=	2					
Upstream	width	Elev	width	Elev			
	3	0	3	682			
Downstream	num=	2					
	width	Elev	width	Elev			
	3	0	3	682			

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 1.2
 Selected Low Flow Methods, = Highest Energy Answer

High Flow Method
 Energy Only

Additional Bridge Parameters

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Add Friction component to Momentum

Do not add Weight component to Momentum

Class B flow critical depth computations use critical depth
inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 1658

INPUT

Description: D/S XS of Pipe Bridge No 7

Station Elevation Data		num= 22		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	690	12.63	688	31.4	684	43	680	48	678		
173.75	665.01	198.13	661.86	245.91	659.93	256.45	659.51	262.44	659.72		
264.16	658.26	265.67	657.96	267.08	657.99	268.29	658.05	269.24	658.2		
271.93	658.6	274.07	659.54	279.61	659.65	315.47	660.02	400.34	661.36		
434.93	670.15	448.28	670.08								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	262.44	.05	274.07	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	262.44	274.07		290.04	297.96	300.96	.1	.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 1360

INPUT

Description: U/S XS of Bridge No 3

Station Elevation Data		num= 105		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	692	40	692	41.37	661.85	48.82	661.755	52.16	661.744		
55.89	661.708	58.08	661.707	59.26	661.703	60.41	661.694	61.58	661.68		
62.81	661.661	65.38	661.618	66.49	661.595	68.85	661.538	72.65	661.501		
75.75	661.436	79.04	661.405	85.46	661.35	98.24	661.027	98.37	661.025		
99.34	661	102.23	660.857	104.38	660.771	111.18	660.526	123.04	660.053		
126.01	660	127.18	659.98	136.22	659.885	136.56	659.877	142.99	659.783		
146.79	659.703	155.28	659.601	159.01	659.499	161.23	659.46	166.49	659.282		
173.2	659	174.09	658.999	174.21	658.999	191.49	658.982	191.85	658.982		
196.28	658.984	198.06	658.985	201.95	658.992	202.85	658.992	204.56	658.995		
206.92	659	210.16	659.002	211.98	659.003	212.84	659.002	214.84	659.001		
216.87	659.001	217.64	659	217.94	658.88	219.24	658.295	219.7	658.07		
219.84	658	220.21	658	226.9	657.83	229.38	658	231.64	658.227		
231.99	658.242	234.8	658.391	238.12	658.584	244.74	659	247.18	659.09		
278.53	660	280.97	660.065	281.4	660.078	290.08	660.31	296.63	660.471		
298.54	660.529	302.43	660.616	311.2	660.867	313.3	660.914	315.27	661		
326.87	661.587	329.7	661.73	331.06	661.792	335.65	662	346.63	662.658		
348.5	662.778	351.83	663	362.64	663.75	364.72	663.894	365.98	664		
369.59	664.346	376.67	665	378.66	665.236	386.46	666	386.77	666.037		
394.3	667	396.29	667.279	400.99	668	413.48	668.692	418.73	669		
419.36	669.003	420.17	669.006	420.4	669.006	426.91	669.016	427.87	669.017		
428.87	669.016	429.6	669.015	429.99	669.014	431	692	481	692		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val

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0 .07 217.64 .05 244.74 .07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
217.64 244.74 110 108 100 .1 .3

BRIDGE

RIVER: Tributary

REACH: 1

RS: 1281

INPUT

Description: Bridge No 3

Distance from Upstream XS = 47

Deck/Roadway width = 60

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 8														
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0	703.91		0	5.92	703.91		0	5.92	703.9		695.4			
141.67	706.62		698.12	278.34	709.35		700.85	414.08	712.06		703.56			
414.08	712.06		0	500	712.06									

Upstream Bridge Cross Section Data

Station Elevation Data num= 104											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	691	40	691	41.37	660.85	48.82	660.755	52.16	660.744		
55.89	660.708	58.08	660.707	59.26	660.703	60.41	660.694	61.58	660.68		
62.81	660.661	65.38	660.618	66.49	660.595	68.85	660.538	72.65	660.501		
75.75	660.436	79.04	660.405	85.46	660.35	98.24	660.027	98.37	660.025		
99.34	660	102.23	659.857	104.38	659.771	111.18	659.526	123.04	659.053		
126.01	659	127.18	658.98	136.22	658.885	136.56	658.877	142.99	658.783		
146.79	658.703	155.28	658.601	159.01	658.499	161.23	658.46	166.49	658.282		
173.2	658	174.09	657.999	174.21	657.999	191.49	657.982	191.85	657.982		
196.28	657.984	198.06	657.985	201.95	657.992	202.85	657.992	204.56	657.995		
206.92	658	210.16	658.002	211.98	658.003	212.84	658.002	214.84	658.001		
216.87	658.001	217.64	658	217.94	657.88	219.24	657.295	219.7	657.07		
219.84	657	220.21	657	229.38	657	231.64	657.227	231.99	657.242		
234.8	657.391	238.12	657.584	244.74	658	247.18	658.09	278.53	659		
280.97	659.065	281.4	659.078	290.08	659.31	296.63	659.471	298.54	659.529		
302.43	659.616	311.2	659.867	313.3	659.914	315.27	660	326.87	660.587		
329.7	660.73	331.06	660.792	335.65	661	346.63	661.658	348.5	661.778		
351.83	662	362.64	662.75	364.72	662.894	365.98	663	369.59	663.346		
376.67	664	378.66	664.236	386.46	665	386.77	665.037	394.3	666		
396.29	666.279	400.99	667	413.48	667.692	418.73	668	419.36	668.003		
420.17	668.006	420.4	668.006	426.91	668.016	427.87	668.017	428.87	668.016		
429.6	668.015	429.99	668.014	431	691	481	691				

Manning's n Values

num= 3			
Sta	n Val	Sta	n Val
0	.07	217.64	.05
		244.74	.07

Bank Sta: Left Right Coeff Contr. Expan.
217.64 244.74 .1 .3

Downstream Deck/Roadway Coordinates

num= 7														
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
0	700		0	41.84	703.9		0	41.84	703.9		695.4			
177.59	706.62		698.12	314.26	709.35		700.85	450	712.06		703.56			
450	712.06		0											

Downstream Bridge Cross Section Data

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Station Elevation Data				num=	19				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4.92	692	73	692	73	660.58	130.71	658.23	195.23	657.77
245.69	657.68	249.14	657.6	250.31	657.05	253.09	656.64	254.08	656.68
256.22	657.22	258.88	657.46	262.11	657.67	272.66	658.28	351.77	658.51
414.17	660.7	449	663	449	710	522.68	710		

Manning's n Values				num=	3
Sta	n Val	Sta	n Val	Sta	n Val
4.92	.07	245.69	.08	262.11	.07

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	245.69	262.11	.1		.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data					
Pier Station	Upstream=	141.67	Downstream=	177.59	
Upstream	num=	2			
width	Elev	width	Elev		
4.5	0	4.5	698.12		
Downstream	num=	2			
width	Elev	width	Elev		
4.5	0	4.5	698.12		

Pier Data					
Pier Station	Upstream=	278.34	Downstream=	314.26	
Upstream	num=	2			
width	Elev	width	Elev		
4.5	0	4.5	700.85		
Downstream	num=	2			
width	Elev	width	Elev		
4.5	0	4.5	700.85		

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
Momentum Cd = 2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
Energy Only

Additional Bridge Parameters

Add Friction component to Momentum
Do not add weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 1252

INPUT

Description: D/S XS of Bridge No 3

Station Elevation Data		num= 19		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
4.92	692	73	692	73	660.58	130.71	658.23	195.23	657.77		
245.69	657.68	249.14	657.6	250.31	657.05	253.09	656.64	254.08	656.68		
256.22	657.22	258.88	657.46	262.11	657.67	272.66	658.28	351.77	658.51		
414.17	660.7	449	663	449	710	522.68	710				

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
4.92	.07	245.69	.08	262.11	.07		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	245.69	262.11		144	147	148.02	.1	.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 1105

INPUT

Description:

Station Elevation Data		num= 21		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	660.79	58	660.01	182.03	657.52	258.26	657.01	261.27	656.79		
263.66	656.39	267.27	656.3	269.06	655.96	270.58	656.29	271.28	656.21		
272.59	655.65	273.38	655.95	275.14	656.65	277.45	657.28	283.91	657.51		
296.89	657.17	385.44	658.29	430.88	662.41	483.44	665.95	498	668		
551	686										

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.08	258.26	.08	277.45	.08		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	258.26	277.45		287	295	303	.1	.3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 810

INPUT

Description:

Station Elevation Data		num= 25		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
3.67	658.53	16.9	657.88	160	656.82	271.95	656.84	302.8	656.15		
307.34	656.47	308.53	655.21	309.94	654.96	311.1	654.83	313.17	654.83		
314.06	654.79	314.94	653.84	315.53	654.71	316.36	654.9	317.37	654.24		
318.8	654.78	320.94	655.51	327.28	655.79	351.67	656.4	565.4	656.84		
602.78	658.01	619	660	626	662	688	664	707	666		

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
3.67	.08	307.34	.08	320.94	.08		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	307.34	320.94		228	224	222	.1	.3

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CROSS SECTION

RIVER: Tributary
REACH: 1

RS: 587

INPUT

Description:

Station Elevation Data				num=	18				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-362	658.01	-200	657.01	0	656.21	18.41	655.67	92.6	655.34
102.91	654.9	103.88	654.39	105.93	654.47	108.13	654.79	109.33	653.92
110.17	653.78	110.56	654.16	111.32	654.28	112.69	654.85	114.18	654.96
132.53	655.09	307.17	656.16	344.29	658.01				

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-362	.08	102.91	.08	114.18	.08

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	102.91	114.18		122	126		.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1

RS: 463

INPUT

Description:

Station Elevation Data				num=	21				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-416	658.01	-250	657.01	-87	656.01	0	655.59	109.8	654.54
194.42	654.32	208.54	654.65	213.7	654.92	215.61	654.29	217.64	654.15
219.79	653.77	223.31	654.2	224.25	653.23	226.46	653.59	227.82	654.41
233.37	654.53	278.57	654.4	400	655.01	496.5	656.01	525.1	657.01
557	658.01								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-416	.08	213.7	.08	233.37	.08

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	213.7	233.37		105	105		.1	.3

CROSS SECTION

RIVER: Tributary
REACH: 1

RS: 357

INPUT

Description:

Station Elevation Data				num=	20				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-626.5	660.01	-604.5	658.01	-594.5	657.01	-584.5	656.01	-479.5	655.01
0	655.01	153.93	654.15	175.05	653.71	185.31	653.59	188.41	652.4
191.14	653.59	193.32	653.82	195.38	654.05	198.28	654.41	202.04	654.7
206.36	654.46	350	655.01	528.59	656.01	549.3	657.01	596.9	658.01

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val

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-626.5 .08 185.31

.08 191.14 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
185.31 191.14 179 175 168 .1 .3

CROSS SECTION

RIVER: Tributary

REACH: 1

RS: 183

INPUT

Description:

Station	Elevation	Data	num=	20	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-631.8	658.01	-603	657.01	-586	656.01	-551	655.01	-252	654.01			
-242	654.01	11.07	654.27	105.3	654.68	160.67	655.27	176.42	654.35			
191.7	654.33	196.59	653.2	201.52	652.43	202.85	652.14	208.19	653.86			
305.72	654.38	349	655.01	494	656.01	531.9	657.01	611	658.01			

Manning's n Values

Sta	n Val	Sta	num=	3	Sta	n Val
-631.8	.08	191.7	.08	208.19	.08	

Bank Sta: Left Right Coeff Contr. Expan.
191.7 208.19 .1 .3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 5862

INPUT

Description:

Station	Elevation	Data	num=	22	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
6.57	692.9	16.52	686.09	30.12	679.79	46.8	679.9	59.74	679.08			
61.77	675.79	63.16	675.53	66.68	676.21	70.59	676.51	72.5	676.66			
75.29	677.24	83.9	677.66	93.4	677.98	108.12	680.46	126.96	680.02			
134.28	678.08	144.98	678.89	173.49	677.49	203.06	682.96	252.93	692.83			
275.94	705.68	283.35	706.71									

Manning's n Values

Sta	n Val	Sta	num=	3	Sta	n Val
6.57	.1	59.74	.05	75.29	.1	

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
59.74 75.29 200.9 314.2 312.6 .1 .3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 5547

INPUT

Description:

Station	Elevation	Data	num=	19	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9.27	683.2	30.72	673.65	63.49	674.03	97.47	674.46	108.85	672.92			
130.75	672.73	212.69	671.49	215.49	671.05	218.29	670.1	219.35	669.38			
220.92	669.9	222.1	669.99	224.66	670.6	226.17	670.93	227.99	671.82			

walkerRunFld.rep

230.09 673.4 245.5 678.64 264.68 690.27 273.75 691.73

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
9.27 .1 215.49 .05 226.17 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
215.49 226.17 266.1 262 254.2 .1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 5282

INPUT

Description: u/s XS of Beach Grove Road Bridge

Station Elevation Data num= 15
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 681.12 55.69 675.84 85.36 674.65 174.96 673.59 184.04 670.66
207.55 670.04 212.26 669.41 214.34 667.03 219.14 667.34 223.57 668.03
230.88 671.08 241.05 670.68 255.44 674.6 304.55 678.17 320 679.29

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .1 212.26 .05 230.88 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
212.26 230.88 82. 83.7 86.2 .3 .5

Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 174 677.42 F
253 320 677.42 F

BRIDGE

RIVER: Walker Run
REACH: 1

RS: 5250

INPUT

Description: Beach Grove Road

Distance from Upstream XS = 22.3

Deck/Roadway width = 19.3

Weir Coefficient = 2.5

Upstream Deck/Roadway Coordinates

num= 13
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
201.96 677.41 0 202.64 677.41 0 214.6 677.42 667.71
216.27 677.42 671.5 217.27 677.42 672.7 218.96 677.42 673.3
219.96 677.43 673.4 220.96 677.43 673.3 222.65 677.43 672.7
224.11 677.43 671.5 226.87 677.43 668.95 226.9 677.43 0
237.26 677.43 0

Upstream Bridge Cross Section Data

Station Elevation Data num= 16
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 681.12 55.69 675.84 85.36 674.65 174.96 673.59 184.04 670.66
207.55 670.04 212.26 669.41 214.61 667.71 220.04 668.18 223.99 667.71
230.88 671.08 241.05 670.68 255.44 674.6 304.55 678.17 320 679.29
350 679.29

Manning's n Values num= 3

walkerRunFld.rep

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	212.26	.05	230.88	.1

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	212.26	230.88		.3	.5

Ineffective Flow	num=	2
Sta L	Sta R	Elev
0	174	677.42
253	350	677.42
		F
		F

Downstream Deck/Roadway Coordinates

num=	13							
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
193.8	677.34	0	194.48	677.4	0	206.44	677.49	0
207.04	677.48	667.76	208.11	677.42	670.88	209.11	677.42	672.08
210.8	677.42	672.68	211.8	677.64	672.78	212.8	677.43	672.68
214.49	677.43	672.08	215.95	677.43	670.88	218.1	677.43	668.66
229.29	677.19	0						

Downstream Bridge Cross Section Data

Station Elevation Data	num=	30							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-226.11	724.65	-176.11	709.54	-156.11	704.54	-106.11	699.65	-96.11	694.84
-66.11	689.65	-41.11	684.65	-6.11	679.45	13.04	678.07	71.2	669.33
123.89	668.34	186.89	668	204.89	667.74	207.05	667.71	212.14	668.18
216.09	667.71	221.89	669.45	244.99	670.15	272.89	671.76	306.75	677.78
363.89	679.45	378.89	684.24	413.89	689.34	435.89	694.54	453.89	699.34
468.89	704.65	493.89	710.04	513.89	714.45	528.89	719.54	538.89	724.24

Manning's n Values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
-226.11	.1	204.89	.05	221.89	.1

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	204.89	221.89		.3	.7

Ineffective Flow	num=	2
Sta L	Sta R	Elev
-226.11	176.89	677.42
249.89	538.89	677.42
		F
		F

Upstream Embankment side slope	=	0 horiz. to 1.0 vertical
Downstream Embankment side slope	=	0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow	=	.98
Elevation at which weir flow begins	=	
Energy head used in spillway design	=	
Spillway height used in design	=	
weir crest shape	=	Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Energy Only

Additional Bridge Parameters

Add Friction component to Momentum

Do not add Weight component to Momentum

Class B flow critical depth computations use critical depth

inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

walkerRunFld.rep

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 5198

INPUT

Description: FEMA BIA d/s XS of Beach Grove Road Bridge

Station Elevation Data

num=

31

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-226.11	724.65	-176.11	709.54	-156.11	704.54	-106.11	699.65	-96.11	694.84
-66.11	689.65	-41.11	684.65	-6.11	679.45	13.04	678.07	71.2	669.33
123.89	668.34	186.89	668	204.89	667.74	207.96	665.96	212.14	665.71
215.99	665.85	217.97	666.58	221.89	669.45	244.99	670.15	272.89	671.76
306.75	677.78	363.89	679.45	378.89	684.24	413.89	689.34	435.89	694.54
453.89	699.34	468.89	704.65	493.89	710.04	513.89	714.45	528.89	719.54
538.89	724.24								

Manning's n Values

num=

3

Sta	n Val	Sta	n Val	Sta	n Val
-226.11	.1	204.89	.05	221.89	.1

Bank Sta: Left

Right

Lengths: Left

Channel

Right

Coeff Contr.

Expan.

204.89 221.89

89.8 90.1

89.3

.3

.7

Ineffective Flow

num=

2

Sta L Sta R

Elev

Permanent

-226.11 176.89 677.42

249.89 538.89 677.42

F

F

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 5107

INPUT

Description:

Station Elevation Data

num=

18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1.11	677.51	37.49	670.27	96.16	668.4	133.14	668.48	139	668
144	667	158.69	666.07	161.58	664.84	163.25	664.65	164.42	664.59
165.79	665.03	166.43	665.04	169.94	666.9	221	667	225	668
238.09	668.33	302.28	669.86	349	678.03				

Manning's n Values

num=

5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1.11	.1	37.49	.11	144	.05	169.94	.11	238.09	.1

Bank Sta: Left

Right

Lengths: Left

Channel

Right

Coeff Contr.

Expan.

144 169.94

112 112

112

.1

.3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 4995

INPUT

Description: FEMA BHZ

Station Elevation Data

num=

34

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.34	1010	719.54	1022	714.54	1055	709.65
						1075	704.45

walkerRunFld.rep

1100	699.45	1120	694.84	1140	691.74	1150	691.74	1180	689.34
1270	684.74	1300	676.74	1315	674.84	1383	669	1387	668
1392	667	1440	666.24	1497	667	1501	668	1505	668.9
1540	667.74	1610	669.45	1635	674.54	1662	679.45	1685	690.04
1725	686.74	1750	689.45	1770	694.45	1780	699.34	1810	704.34
1835	709.84	1850	714.34	1870	719.34	1895	724.45		

Manning's n Values		num= 5		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	1383	.11	1392	.05	1497	.11	1610			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1392	1497		180.8	181.3	177.9	.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 4810

INPUT

Description:

Station Elevation Data		num= 60		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	673.03	22.15	670.47	30.66	668.65	57.63	668.16	64.81	668.208		
65.68	668.122	66.08	668	70.73	667.243	71.83	667.059	72.15	667		
75.4	666.647	81.53	666	105.92	665.242	113.64	665	113.91	664.818		
115.25	664	116.22	663.356	116.96	663	118.18	662.871	119.73	662.932		
120.24	663	120.56	663.14	122.83	664	125.34	664.475	128.1	665		
133.43	665.032	135.86	665.045	154.3	665.142	162.99	665.18	165.61	665.201		
178.31	665.3	180.17	665.3	180.7	665.3	181.83	665.3	185.8	665.25		
190.21	665.165	200.97	665	211.96	665.141	223.37	665.3	234.5	665.753		
241.06	666	241.82	666.19	245.06	667	247.93	667.645	249.2	668		
249.5	668	250	668.001	252.44	668.004	252.46	668.004	252.53	668.004		
255.19	668.001	255.55	668.001	256.08	668	257.45	667.938	257.73	667.957		
257.9	667.966	258.59	667.961	288.1	666.6	321.23	667.68	361.14	676.54		

Manning's n Values		num= 5		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	57.63	.11	113.64	.05	128.1	.11	258.59			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	113.64	128.1		74	73.7	76	.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 4735

INPUT

Description: FEMA BHY

Station Elevation Data		num= 70		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
783	694	895	694	902	696	933	696	1003	696		
1203	694	1369	692	1375	690	1388	686	1390	684.34		
1430	683.74	1478	684.45	1620	679.54	1660	674.84	1690	669.54		
1700.14	668	1706.48	668	1706.71	668	1707.21	668	1708.07	668		
1708.72	668	1709.45	668	1710.13	668	1716.64	667.49	1719.92	667		
1721.48	666.749	1726.83	666	1728.55	665.722	1734.13	665	1739.14	664.952		
1752.79	664.8	1756.71	664.732	1767.42	664.59	1769.17	664.59	1771.11	664.599		
1772.15	664.613	1775.69	664.672	1781.28	664.8	1793.07	664.416	1805.05	664		
1807.11	663.406	1808.61	663	1809.81	662.542	1811.01	662.258	1812.45	662.633		

WalkerRunFld.rep

1813.53	663	1813.83	663.21	1814.96	664	1821.41	664.218	1825.33	664.237
1830.8	664.295	1844.45	664.489	1871.09	664.907	1876.95	665	1882.27	665.608
1885.67	666	1886.97	666.323	1889.7	667	1890.9	667.064	1909.49	666.951
1909.55	666.956	1917.09	666.674	2000	669.45	2020	674.65	2042	679.84
2046	690	2054	694	2163	696	2171	700	2191	710

Manning's n Values		num= 5		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
783	.1	1734.13	.11	1805.05	.05	1814.96	.11	1882.27	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1805.05	1814.96		41.8	43		.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 4692

INPUT

Description:

Station Elevation Data		num= 52		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
2.2	676.54	14.2	673.9	29.44	673.96	39.22	671.77	100.41	668.46		
115.19	668	117.8	668	120.39	668	122.3	668	124.73	667.454		
126.96	667	129.52	666.456	131.99	666	134.43	665.482	136.94	665		
150.39	664.915	174.31	664.51	176.11	664.456	178.71	664.392	181.33	664.388		
187.44	664.226	195.53	664	197.09	663.916	198.85	663.834	200.84	663.787		
201.06	663.773	203.64	663.897	206.14	664	216.1	664.145	218.05	664.16		
224.56	664.251	229.54	664.259	234.53	664.327	280.45	664.929	282.17	664.936		
287.78	665	294.26	665.639	297.98	666	300.25	666.484	302.51	667		
307.96	666.83	316.64	666.554	320.98	666.408	322.95	666.329	329.57	666.282		
329.66	666.29	331.96	666.203	380.91	669.4	419.8	678	423	676		
424	676	433	680								

Manning's n Values		num= 5		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
2.2	.1	136.94	.11	195.53	.05	206.14	.11	302.51	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	195.53	206.14		188.7	197		.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 4495

INPUT

Description: FEMA BHX

Station Elevation Data		num= 86		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1198	694	1232	700	1261	710	1279	716	1307	716		
1411	718	1688	718	1713	710	1774	690	1805	680		
1820	679.74	2003	667.576	2006.92	667.612	2011.35	667.652	2018.97	667.902		
2020.87	667.974	2021.45	667.975	2022.29	667.977	2025.06	667.984	2026.78	667.987		
2027.89	667.99	2029.03	667.99	2032.09	667.994	2033	667.996	2035.46	667.999		
2036.6	668	2039.69	667.326	2041.17	667	2042.52	666.736	2046.49	666		
2047.63	665.765	2051.55	665	2061.5	664.353	2067.59	664.252	2073.17	664.091		
2073.93	664.089	2078.82	664.087	2080.05	664.084	2083.21	664.075	2091.76	664.056		
2097.57	664.038	2101.06	664.028	2109.99	664	2114.37	663.524	2116.41	663.305		
2117.18	663.233	2121.29	663.713	2123.77	664	2124.99	664	2125.39	664		
2138.05	664	2142.26	664	2146.61	664	2149.65	664	2152.42	664		

walkerRunFld.rep

2164.57	664.267	2171.35	664.553	2173.93	664.594	2181.16	665	2184.58	665.607
2186.64	666	2189.87	666.635	2191.82	667	2199.16	667.003	2219.84	666.825
2222.42	665.866	2230	664.079	2231.69	664.473	2232.04	664.556	2235.56	665.015
2242.2	665.926	2242.71	666	2244.28	666	2244.52	666	2244.73	666
2280	669.54	2300	674.24	2306	676	2313	676	2321	680
2338	690	2345	692	2370	694	2486	696	2495	700
2515	710								

Manning's n Values		num= 5		n Val		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1198	.1	2036.6	.11	2109.99	.05	2123.77	.11	2244.73	.1				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2109.99	2123.77		77.5	81		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 4414

INPUT

Description:

Station Elevation Data		num= 68		Sta		Elev		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-5.7	673.7	1.31	671.76	19.96	669.88	70.87	667.77	105.71	667						
105.98	666.94	109.83	666	110.36	665.876	114.28	665	128.45	664.158						
137.09	664.014	137.29	664.006	138.95	664	151.88	663.973	152.23	663.974						
164.32	663.974	164.86	663.977	169.07	663.978	172.77	663.817	173.49	663.764						
174.35	663.649	175.33	663.466	177.51	663.013	177.55	663.014	178.12	663						
178.49	662.971	178.66	663	179.14	663.063	181.06	663.262	181.27	663.281						
183.82	663.485	186.11	663.666	187.66	663.778	188.15	663.78	188.44	663.796						
189.28	663.798	189.93	663.833	190.54	663.877	202.44	664	207.78	664						
207.97	664	208.27	664	223.32	664	224.04	664	226.1	664						
236.4	664	239.7	664	246.89	664	252.71	664	263.16	664.644						
269.13	665	271.32	665.454	274.29	666	289.21	666.75	296.88	667.165						
298.28	666.355	316.64	665.969	317.16	665.968	317.2	666	317.52	666						
318.14	666	318.59	666	331.76	668.59	383	676	385	674						
387	674	400	680	425	690										

Manning's n Values		num= 5		n Val		Sta		n Val		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-5.7	.1	128.45	.11	169.07	.05	190.54	.11	331.76	.1				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	169.07	190.54		114.9	119		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 4295

INPUT

Description: FEMA BHW

Station Elevation Data		num= 88		Sta		Elev		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1067	710	1145	710	1151	708	1167	708	1173	710						
1201	710	1208	708	1218	708	1223	710	1253	700						
1312	680	1370	674.24	1408	669.34	1470	669.45	1507.95	667.187						
1509.22	667.198	1510.67	667.211	1513.14	667.293	1519.31	667.527	1520.9	667.476						
1522.86	667.413	1524.07	667.283	1525.97	667.08	1526.72	667	1528.93	666.464						
1530.85	666	1531.78	665.82	1535.97	665	1537.1	664.796	1541.24	664						

walkerRunFld.rep

1546.87	663.846	1555.86	663.6	1558.07	663.572	1565.76	663.496	1569.64	663.469
1573.24	663.451	1577.76	663.46	1582.84	663.507	1589.02	663.6	1590.11	663.585
1590.4	663.581	1606.93	663.395	1611.2	663.343	1614.72	663.297	1626.09	663.162
1639.19	663	1641.48	662.948	1646.47	662.823	1650.69	662.977	1651.36	663
1651.82	663.016	1652.1	663.018	1652.17	663.02	1654.85	663.027	1658.85	663.056
1659.58	663.044	1660.07	663.041	1660.66	663.046	1669.22	663.127	1672.44	663.169
1680.77	663.278	1689.02	663.437	1695.4	663.554	1714.18	664	1714.51	664.043
1715.85	664.216	1721.6	665	1726.29	665.903	1726.69	666	1744.06	665.521
1753	665.29	1762.02	665.598	1769.22	665.843	1773.58	666	1800	666.45
1820	674.24	1875	679.65	1896	674	1903	672	1908	672
1915	674	1930	680	1949	690	1953	692	2038	694
2241	696	2250	700	2285	710				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1067	.1	1519.31	.11	1639.19	.05	1652.17	.11	1800	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

1639.19	1652.17	160.8	170.5	164.4	.1	.3
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CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 4130

INPUT

Description:

Station	Elevation	Data	num=	51	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9.79	672.78	38.19	668.15	65.97	666.24	90.55	666.158	91.61	666.009			
91.72	666	92.08	665.946	98.82	665	100.19	664.775	105.05	664			
106.39	663.159	106.76	663	107.96	662.985	116.25	662.936	120.19	662.935			
124.72	662.947	127.3	662.968	130.71	663	136.98	663	145.11	663			
151.76	663	154.8	663	156.55	663	160.84	662.674	166.49	662.262			
171.27	662.654	174.9	663	179.99	663.043	180.66	663.04	190	663.361			
198.82	663.597	210.12	664	213.33	664.489	215.93	665	218.2	664.985			
218.74	664.983	220.89	664.961	221.71	664.955	226.08	664.933	227.28	664.933			
229.38	664.933	237.05	664.971	238.12	664.969	239.02	665	253.95	665.83			
269.33	665.98	370.38	665.85	415.17	670.09	473	672	491	680			
517	692											

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9.79	.1	90.55	.11	156.55	.05	174.9	.11	239.02	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

156.55	174.9	87.5	89.5	81.1	.1	.3
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CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 4043

INPUT

Description: FEMA BHV

Station	Elevation	Data	num=	54	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1127	714	1175	712	1211	710	1217	708	1228	708			
1235	710	1269	704	1282	704	1294	700	1324	690			
1330	674.54	1390	671.54	1520	667.84	1580.33	666	1582.28	665.776			
1590.68	665	1594.63	664.551	1600.28	664	1606.73	663.761	1610.6	663.475			

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1618.4	663	1621.16	662.919	1623.52	662.858	1625.01	662.24	1629.53	662.932
1631.2	662.974	1631.53	662.982	1632.7	663	1648.17	663.419	1662.23	664
1664.92	664.369	1670	665	1670.44	665	1673.62	664.991	1673.97	664.99
1676.78	664.988	1680.44	664.98	1680.85	664.98	1681.37	664.978	1682.77	664.977
1689.01	664.975	1692.57	664.975	1693.29	665	1740	667.24	1910	669.54
1960	674.65	1965	672	1971	672	1987	680	2011	692
2107	694	2310	696	2355	710	2425	736		

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1127	.1	1580.33	.11	1618.4	.05	1632.7	.11	1670	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

1618.4	1632.7	67.9	88.3	73.6	.1	.3
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CROSS SECTION

RIVER: walker Run

REACH: 1 RS: 3972

INPUT

Description: U/S XS of Market Street Bridge

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
123.85	674.24	171.83	670.24	197.75	670.47	204.44	667.88	215.91	667.02
223.06	665.53	225.4	663	270.18	661.21	277.41	661.6	281.39	661.43
285.52	661.64	287.4	663	295.4	664	298.04	664.769	299.32	664.863
315.58	665.35	372.3	666.78	391.2	666.21	536	666.78	559	667.64
748.66	669.45	788.66	674.34						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
123.85	.1	225.4	.05	299.32	.1	372.3	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

225.4	299.32	101.2	98.1	100.6	.3	.7
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Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
123.85	202.37	670.8	F
341.4	788.66	670.3	F

BRIDGE

RIVER: walker Run

REACH: 1 RS: 3914

INPUT

Description: Market Street u/s

Distance from Upstream XS = 40.1

Deck/Roadway Width = 43.1

Weir Coefficient = 2.5

Upstream Deck/Roadway Coordinates

num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	673.611	673.611	71.3	672.778	672.278	151.64	671.546	671.546
216.18	671.069	671.069	254.71	670.8	664.72	260.35	670.8	663.3
260.36	673.78	663.04	260.37	673.78	669.04	272.2	673.78	669.04
283.42	673.78	669.04	283.43	673.78	663.08	285	673.78	664.36
285.1	670.45	664.36	287.02	670.3	665.83	339.19	669.234	669.234
435.84	667.629	667.629						

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Upstream Bridge Cross Section Data

Station Elevation Data		num= 19		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-113.65	679.5	-20.65	674.7	0	673.611	71.3	672.778	151.64	671.546
216.18	671.069	254.71	664.72	261	663.04	272.49	661.04	283.42	663.08
287.02	665.83	339.19	669.234	435.84	667.629	464.35	668.7	554.35	669.7
604.35	674.8	684.35	679.7	769.35	684.6	1200	684.6		

Manning's n Values

num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
-113.65	.1	254.71	.05	287.02	.1

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	254.71	287.02		.3	.7

Ineffective Flow		num= 2		Sta L Sta R Elev Permanent	
Sta L	Sta R	Elev	Permanent	Sta L	Sta R
-113.65	202.37	670.8	F		
341.4	1200	670.3	F		

Downstream Deck/Roadway Coordinates

num= 15		Sta Hi Cord Lo Cord		Sta Hi Cord Lo Cord		Sta Hi Cord Lo Cord	
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord
0	673.611	673.611	71.3	672.778	672.278	151.64	671.546
216.18	671.069	671.069	254.71	670.8	664.72	260.35	670.8
260.36	673.42	668.72	272.2	673.42	668.72	283.42	673.42
283.43	673.42	661.35	285	673.42	664.36	285.1	670.45
289.14	670.3	664.78	339.19	669.234	669.234	435.84	667.629

Downstream Bridge Cross Section Data

Station Elevation Data		num= 19		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-230	679.5	-113.65	679.5	-20.65	674.7	0	673.611	71.3	672.778
151.64	671.546	216.18	671.069	254.71	664.72	261	663.04	272.49	661.04
283.42	663.08	287.02	665.83	339.19	669.234	435.84	667.629	464.35	668.7
554.35	669.7	604.35	674.8	684.35	679.7	769.35	684.6		

Manning's n Values

num= 4		Sta n Val		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-230	.1	-113.65	.1	254.71	.055	287.02	.06

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	254.71	287.02		.4	.8

Ineffective Flow		num= 2		Sta L Sta R Elev Permanent	
Sta L	Sta R	Elev	Permanent	Sta L	Sta R
-230	200	670.9	F		
310	769.35	670.3	F		

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 668.7
 Energy head used in spillway design =
 Spillway height used in design =
 weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and weir flow

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Submerged Inlet Cd = 1.5
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord = 670.1

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Walker Run
 REACH: 1

RS: 3860

INPUT

Description: D/S XS of Market Street Bridge

Station Elevation Data			num= 15								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
117.66	675.84	137.05	672.03	181.62	671.65	219.23	671.09	253.06	668.65		
262.64	664.21	265.16	663.32	266.08	661.15	272.52	660.73	283.67	661.59		
288.12	663.96	295.78	666.15	334.66	665.91	349.26	667.65	357.79	668.52		

Manning's n Values			num= 5								
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
117.66	.1	219.23	.12	265.16	.055	288.12	.06	334.66			

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	265.16	288.12		75.5	68.6		.4	.8

Ineffective Flow			num= 2					
Sta L	Sta R	Elev	Permanent					
117.66	200	670.9	F					
310	357.79	670.3	F					

CROSS SECTION

RIVER: Walker Run
 REACH: 1

RS: 3785

INPUT

Description: FEMA BHU

Station Elevation Data			num= 42								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1012	714	1143	710	1160	710	1203	692	1225	692		
1260	684.65	1290	679.74	1318	674.84	1360	669.34	1412	664.95		
1426.79	661	1430.1	660.24	1431.45	660.96	1431.99	661	1435.13	661		
1436.82	661	1439.14	661.16	1457.87	662	1458.82	662.19	1462.77	663		
1463.66	663.18	1467.67	664	1469.67	664.41	1472.57	665	1474.69	665		
1477.84	665	1477.88	665	1477.94	665	1479.92	665	1480.99	665		
1500	665.84	1550	667.24	1580	666.74	1650	666.15	1760	669.45		
1800	674.34	1812	674	1823	670	1827	670	1845	680		
1869	692	1985	694								

Manning's n Values			num= 4								
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1012	.1	1412	.055	1472.57	.12	1480.99			.04		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1412	1472.57		63.5	56.1		.1	.3

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CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 3735

INPUT

Description:

Station Elevation Data				num=	41				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
46.72	679.91	74.63	675.8	101.02	670.65	135.38	669.18	157.56	666.89
174.59	661	186.31	660.48	186.72	660.36	187.27	660.56	190.57	661
193.83	661	195.08	661	203.49	661.11	234.44	661.6	236.03	661.59
238.97	661.63	240.01	661.61	241.57	661.64	242.67	661.63	244.2	661.62
247.27	661.68	250.62	661.71	252.67	661.76	261.64	661.92	262.33	661.94
265.73	662	269.46	662.52	272.84	663	275.62	663.39	281.52	664
284.12	664.07	287.2	664.13	298.4	664.17	306.64	664.14	340	664
396	664	402	665	420	666	422	666	440	666
642.15	669.34								

Manning's n Values				num=	4				
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
46.72	.1	174.59	.055	190.57	.12	340	.04		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
174.59 190.57 208.1 193.9 194.8 .1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 3532

INPUT

Description: FEMA BHT

Station Elevation Data				num=	86				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	714	1260	714	1310	712	1352	710	1360	710
1368	684.95	1390	679.74	1428	674.34	1489.73	661	1490.27	661
1492.15	661	1494.56	661	1497.2	661	1497.87	661	1499.76	661
1502.81	661	1503.38	661	1505.44	661	1508.4	661	1509.25	661
1509.96	660.87	1510.56	660.88	1513.01	661	1523.66	661	1526.48	661.71
1527.55	662	1531.58	662.51	1535.35	663	1540.62	663	1557.67	663
1560.38	662.32	1561.67	662	1566.52	661.07	1567.04	661	1570.41	660.94
1573.77	660.89	1577.02	660.87	1590.62	660.85	1591.26	660.84	1604.01	660.81
1606.68	660.8	1616.06	660.79	1618.17	660.79	1627.35	660.78	1629.71	660.77
1630.88	660.76	1632.64	660.73	1635.02	660.68	1637.73	660.62	1648.78	660.62
1650.3	660.51	1653.61	660.19	1655.15	660	1658.81	659.3	1660.1	659
1661.18	658.94	1662	658.87	1662.85	658.95	1663.54	659	1665.67	659.9
1665.93	660	1665.97	660.02	1666.12	660.03	1668.34	660.42	1674.49	660.46
1677.45	660.63	1678.76	660.71	1689.17	660.75	1696.73	660.82	1710.74	661
1711.27	661.02	1719.48	662	1722.58	662.37	1726.32	663	1750	666.34
1770	665.74	1850	666.34	1970	670	1973	668	1976	668
2000	680	2024	692	2161	694	2360	696	2369	700
2425	720								

Manning's n Values				num=	5				
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
1000	.08	1489.73	.1	1648.78	.06	1668.34	.1	1726.32	.08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
1648.78 1668.34 123.6 125 123.9 .1 .3

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CROSS SECTION

RIVER: walker Run
REACH: 1

RS: 3410

INPUT

Description:

Station Elevation Data			num=	51						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
33.79	674.7	76.45	668.35	118.62	664.23	124.75	661.35	124.85	661.36	
127.56	661.14	129.03	661	130.2	660.26	130.68	660	138.5	660	
142.94	660	147.75	660.61	151	661	157.96	661.36	165.48	661.49	
172.81	661.72	182.05	661.83	185.53	661.89	186.48	661.9	195.32	661.95	
195.65	661.95	195.89	661.95	196.08	661.94	196.17	661.94	196.63	661.89	
202.22	661.25	203.08	661.21	203.57	661.16	203.9	661.1	204.29	661	
215	660	286.94	660	292.1	659.48	292.19	659.47	295.01	659.02	
296.11	658.92	296.16	658.92	297.06	658.95	297.65	659	299.62	659.46	
301.23	660	305.18	660.06	360	660.06	368.41	661	368.55	661.04	
372.42	662	372.5	662.02	376.43	663	381.4	662.93	385.18	663.96	
402.12	664.21									

Manning's n Values			num=	5						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	
33.79	.08	124.75	.1	286.94	.05	301.23	.1	372.42	.08	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	286.94	301.23		36.2	35		.1	.3

CROSS SECTION

RIVER: walker Run
REACH: 1

RS: 3375

INPUT

Description: FEMA BHS

Station Elevation Data			num=	90						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
988	714	1208	714	1255	712	1291	710	1305	710	
1320	684.34	1338	679.95	1360	674.65	1420	664.54	1421.52	661.96	
1421.81	661.99	1423.45	661.86	1424.56	661.76	1424.89	661.79	1426.25	661.7	
1430.45	661.52	1435.64	661	1437.79	661	1438.89	661	1439.66	661	
1440	660.83	1441.57	660	1447.71	660	1451.29	660	1458.24	660	
1464.7	660.48	1468.14	660.71	1468.6	660.73	1469.2	660.75	1470.03	660.75	
1472.79	660.82	1479.61	660.94	1480.67	660.94	1483.28	661	1489.17	661.04	
1489.6	661.05	1495.46	661.07	1499.84	661.05	1502.67	661	1503.12	660.98	
1503.38	660.98	1506.72	660.81	1522.07	659.77	1528.63	659.69	1531.51	659.69	
1537.4	659.65	1538.88	659.65	1545.07	659.65	1546.45	659.64	1554.57	659.67	
1555.42	659.67	1558.24	659.69	1560.46	659.7	1563.93	659.75	1569.61	659.77	
1572.96	659.78	1575.61	659.82	1580.07	659.85	1586.63	659.9	1598.22	660	
1599.68	659.66	1601.63	659	1604.09	658.53	1605.43	658.03	1606.47	657.99	
1606.53	657.97	1607.99	658	1608.43	658.08	1610.14	659	1610.55	659.3	
1611.37	660	1631.33	660.32	1671.63	661	1673.22	661.4	1675.64	662	
1677.17	662.38	1679.64	663	1679.72	663	1680.1	663	1680.34	663	
1705	664.24	1800	666.74	1888	668	1893	670	1897	670	
1901	668	1908	668	1932	680	1957	692	2116	694	

Manning's n Values			num=	5						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	
988	.08	1421.52	.1	1598.22	.05	1611.37	.1	1705	.08	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.

1598.22 1611.37

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92.9 96 103.3

.1

.3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 3278

INPUT

Description:

Station Elevation Data

num=

52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
40.42	666.96	56.89	663.45	68.42	662.57	75.07	662.03	76.37	661
81.04	660.09	81.46	660	94.29	659.62	111.19	659.22	111.85	659.22
111.94	659.22	112.62	659.22	117.52	659.24	139.22	659.04	153.04	659.01
156.74	659.01	160.34	659	161.5	658.49	163.91	658.08	164.9	658
166.03	657.99	166.14	658.05	168.81	658.44	172.27	658.76	173.42	658.88
173.99	658.91	175.26	659	190.83	659.05	204.68	659.1	212.3	659.12
225	659.2	231.3	659.22	242	659.3	255.25	659.3	277.78	659.08
286.69	659.25	289.27	659.3	300.2	659.49	332.26	660	335.19	660.73
336.28	661	339.14	661.71	340.3	662	341.7	662.33	342.25	662.47
343.67	662.84	343.81	662.88	344.38	662.72	345.42	662.71	450	666
453	668	653	668						

Manning's n Values

num=

5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
40.42	.06	76.37	.08	160.34	.05	175.26	.08	340.3	.06

Bank Sta: Left Right
160.34 175.26

Lengths: Left Channel Right
195.6 214 204.6

Coeff Contr. Expan.
.1 .3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: 3065

INPUT

Description: FEMA BHR

Station Elevation Data

num=

102

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
888	714	1301	714	1348	712	1368	708	1382	708
1388	710	1405	669.74	1425	664.54	1465.04	660.87	1473.01	660.71
1474.43	660.71	1475.09	660.7	1475.71	660.68	1476.78	660.64	1478.13	660.59
1479.96	660.54	1481.67	660.42	1483.06	660.33	1484.98	660.2	1486.52	660
1493.71	659.08	1494.24	659	1495.27	658.97	1495.79	658.96	1516.92	658.58
1519.95	658.53	1527.95	658.62	1531.7	658.6	1534.1	658.59	1542.56	658.61
1544.34	658.63	1554.25	658.69	1567.38	658.77	1567.62	658.77	1567.88	658.78
1568.87	658.79	1569.18	658.78	1570.26	658.78	1570.92	658.78	1581.03	658.72
1590.33	658.6	1593.99	658.56	1601.9	658.5	1605.27	658.47	1613.35	658.5
1619.49	658.49	1620.03	658.48	1626.57	658.43	1627.51	658.41	1628.55	658.39
1637.92	658.31	1639.65	658.28	1641.75	658.26	1649.82	658.24	1652.44	658.22
1655.88	658.19	1663.41	658.17	1665.27	658.12	1676.69	658.1	1680.99	658.07
1684.91	658.03	1687.34	658	1689.5	657.5	1690.38	657	1690.5	657
1692.56	656.75	1692.59	656.75	1692.65	656.75	1694.85	657	1695.87	657.33
1697.34	658	1701.15	658.05	1735.89	658.61	1746.13	658.59	1749	658.59
1750.69	658.6	1752.38	658.61	1754.21	658.63	1756.59	658.68	1765.02	658.86
1766.8	658.85	1771.75	659	1773.09	659.33	1775.76	660	1777.05	660.32
1779.76	661	1780.08	661.09	1782.79	662	1805	664.34	1828	666.54
1831	666	1833	666	1844	668	1849	670	2056	670
2066	668	2068	668	2081	670	2138	670	2211	668
2384	668	2400	676						

walkerRunFld.rep

Manning's n values	num=	5							
Sta n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta
888 .06 1486.52	.08 1687.34	.05 1697.34	.08 1782.79	.06					

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
1687.34	1697.34	129.8	116.6	121.4	.1		.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2949

INPUT

Description:

Station Elevation Data	num=	74							
Sta Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta
0 710 17.6	706 26.4	706 38	710 83	688					
96.72 659.48 106.73	659.92 109.72	659.69 111.72	659.53 118.37	659.09					
118.87 659.08 119.65	659 131.83	658.19 134.85	658 141.52	657.88					
145.97 657.82 150.6	657.78 154.47	657.77 168.39	657.77 172.22	657.76					
174.36 657.76 181.6	657.76 196.62	657.02 201.25	657.01 202.88	657.01					
208.06 657 214.52	657 216.28	656.97 220.44	656.88 224.77	656.81					
225.97 656.79 227.96	656.74 235.14	656.86 239.37	656.95 239.92	656.87					
240.15 656.85 241.06	657 244.18	657.21 246.32	657.43 252.53	657.63					
254.33 657.76 263.53	658 266.22	658 266.62	658 279.29	658					
282.15 658 290.8	658 299.61	658 305.47	658 318.22	658					
321.61 658 335.13	658 335.56	658 337.59	658 349.25	658					
353.11 657.96 366.29	657.93 376.49	657.92 388.48	657.92 398.28	658					
403.1 657.96 412.2	658 418.32	658 431	658.44 441.57	659					
444 659.6 445.6	660 448.16	660.63 449.64	661 452.33	661.67					
453.68 662 464.54	662.65 474.11	665.45 491.53	665.76						

Manning's n values	num=	5							
Sta n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta	n Val Sta
0 .06 111.72	.08 214.52	.05 241.06	.08 453.68	.06					

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
214.52	241.06	211	213.4	221.1	.1		.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2730

INPUT

Description: FEMA BHQ U/S XS of walker Run Prop Bridge

Station Elevation Data	num=	83							
Sta Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta	Elev Sta
-421.78 714 -377.17	714 -201.17	712 -122.17	710 -107.17	708					
-75.17 708 -57.17	710 89.83	694 135.83	692 162.83	688					
202.83 686 262.83	686 304.83	680 306	658.64 319.28	658.36					
322.31 658.33 325.72	658.28 329.58	658.24 334	658.18 339.2	658.11					
345.48 658.01 346.25	658 350.92	657.34 352.81	656.8 355.33	656.83					
360.52 656.83 362.38	656.82 367.4	656.8 370.87	656.82 373.25	656.81					
373.85 656.81 374.49	656.86 382.57	656.59 395.38	656.32 409.31	656.27					
412.81 656.25 416.6	656.02 430	656.02 430.27	656 431.42	655.78					
434.92 655.66 436.88	655.83 439.81	656 442.6	656.32 456.04	656.53					
464.73 656.57 466.97	656.61 469.29	656.64 472.01	656.67 474.24	656.69					
476.14 656.72 478.25	656.73 479.98	656.75 481.47	656.75 482.95	656.76					
484.7 656.77 486.72	656.78 490.65	656.79 491.55	656.79 492.37	656.8					
505.42 656.98 515.12	656.98 516.8	656.99 528.2	657 538.29	657					

walkerRunFld.rep

538.41	657	658.42	657	668.42	658	687.12	662	717.97	663
739.24	664	745.24	665	754.54	668	774.2	668	792.47	668
805.47	666	810.47	666	818.47	668	829.47	670	832.47	670
1040.47	668	1043.47	666	1593.22	666				

Manning's n Values		num= 5							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-421.78	.06	334	.08	416.6	.05	439.81	.08	687.12	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	430	439.81		237.4	231.9		.3	.5

BRIDGE

RIVER: Walker Run
REACH: 1

RS: 2620

INPUT

Description: Bridge #4
Distance from Upstream XS = 70
Deck/Roadway Width = 60
Weir Coefficient = 2.5
Upstream Deck/Roadway Coordinates

num= 11									
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta
0	673.19	0	160	673.19	0	304.99	672.23	0	
305	672.23	667.4	385	671.43	666.6	465	670.63	665.8	
545	669.83	665	625	669.03	664.2	705	668.23	663.4	
705.01	668.23	0	754.54	668	0				

Upstream Bridge Cross Section Data

Station Elevation Data		num= 83							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-421.78	714	-377.17	714	-201.17	712	-122.17	710	-107.17	708
-75.17	708	-57.17	710	89.83	694	135.83	692	162.83	688
202.83	686	262.83	686	304.83	680	306	658.64	319.28	658.36
322.31	658.33	325.72	658.28	329.58	658.24	334	658.18	339.2	658.11
345.48	658.01	346.25	658	350.92	657.34	352.81	656.8	355.33	656.83
360.52	656.83	362.38	656.82	367.4	656.8	370.87	656.82	373.25	656.81
373.85	656.81	374.49	656.86	382.57	656.59	395.38	656.32	409.31	656.27
412.81	656.25	416.6	656.02	430	656.02	430.27	656	431.42	655.78
434.92	655.66	436.88	655.83	439.81	656	442.6	656.32	456.04	656.53
464.73	656.57	466.97	656.61	469.29	656.64	472.01	656.67	474.24	656.69
476.14	656.72	478.25	656.73	479.98	656.75	481.47	656.75	482.95	656.76
484.7	656.77	486.72	656.78	490.65	656.79	491.55	656.79	492.37	656.8
505.42	656.98	515.12	656.98	516.8	656.99	528.2	657	538.29	657
538.41	657	658.42	657	668.42	658	687.12	662	717.97	663
739.24	664	745.24	665	754.54	668	774.2	668	792.47	668
805.47	666	810.47	666	818.47	668	829.47	670	832.47	670
1040.47	668	1043.47	666	1593.22	666				

Manning's n Values		num= 5							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-421.78	.06	334	.08	416.6	.05	439.81	.08	687.12	.06

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	430	439.81		.3	.5

Downstream Deck/Roadway Coordinates

num= 11									
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta
0	673.19	0	130	673.19	0	174.99	672.23	0	

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175	672.23	667.4	255	671.43	666.6	335	670.63	665.8
415	669.83	665	495	669.03	664.2	575	668.23	663.4
575.01	668.23	0	682.31	667.16	0			

Downstream Bridge Cross Section Data

Station	Elevation	Data	num=	82	Sta	Elev	Sta	Elev	Sta	Elev
0	675	105	666	169.7	662	176	660	182	658	
194.31	657.58	211.95	657	216.39	656.69	219.45	656.65	222.52	656.63	
231.11	656.33	241.63	656.33	250.53	656.2	262.61	656.04	264.91	656.05	
272.27	656.06	275.1	656.07	279.86	656.07	285.09	656.08	293.79	656.09	
295.78	656.09	306.04	656.09	308.92	656.08	310.65	656.09	312.14	656.09	
319.96	656.08	322.32	656.08	328.92	656.06	333.01	656.06	337.43	656.07	
341.59	656.05	347.14	656.05	350.97	656.06	354.99	656.06	355.25	656.06	
355.57	656.06	356.3	656.06	365.12	656.06	371.78	656.05	378.51	656.05	
383.44	656.04	386.2	656.04	390.9	656.04	397.79	656.03	406.48	656.03	
418.61	656.01	431.55	656	433.09	655.17	433.4	655	433.64	654.95	
433.9	654.9	435.69	654.75	436.92	654.97	437.79	655	438.31	655.29	
439.78	656	442.48	656	474.44	656	480.93	655.89	496.46	655.94	
501.55	656	505.3	656.18	532.81	657	533.28	657.05	540.1	657.71	
542.97	658	554.45	658.87	555.99	659	560.72	659.3	572.87	660	
577.28	660.22	584.19	660.56	590.14	660.86	591.26	660.92	597.54	661.5	
599.58	661.63	603.22	661.88	605.32	662	658.58	665.36	678.36	665.96	
682.31	667.16	1000	667.16							

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.06	211.95	.08	431.55	.05	439.78	.08	590.14	.06

Bank Sta: Left Right Coeff Contr. Expan.
 431.55 439.78 .3 .5

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 659.2
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 4

Pier Data
 Pier Station Upstream= 385 Downstream= 255

Upstream	num=	2	width	Elev	width	Elev
4.5	0	4.5	666.6			

Downstream	num=	2	width	Elev	width	Elev
4.5	0	4.5	666.6			

Pier Data
 Pier Station Upstream= 465 Downstream= 335

Upstream	num=	2	width	Elev	width	Elev
4.5	0	4.5	665.8			

Downstream	num=	2	width	Elev	width	Elev
4.5	0	4.5	665.8			

Pier Data
 Pier Station Upstream= 545 Downstream= 415

Upstream num= 2

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width Elev width Elev
4.5 0 4.5 665
Downstream num= 2
width Elev width Elev
4.5 0 4.5 665

Pier Data
Pier Station Upstream= 625 Downstream= 495
Upstream num= 2
width Elev width Elev
4.5 0 4.5 664.2
Downstream num= 2
width Elev width Elev
4.5 0 4.5 664.2

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
Momentum Cd = 2
Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow
Submerged Inlet Cd = 1.5
Submerged Inlet + Outlet Cd = .8
Max Low Cord = 658.5

Additional Bridge Parameters

Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: walker Run
REACH: 1 RS: 2497

INPUT

Description: D/S XS of walker Run Prop Bridge

Station	Elevation	Data	num=	72	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	663	169.7	662	176	660	182	658	194.31	657.58			
211.95	657	216.39	656.69	219.45	656.65	222.52	656.63	231.11	656.33			
241.63	656.33	250.53	656.2	262.61	656.04	264.91	656.05	272.27	656.06			
275.1	656.07	279.86	656.07	285.09	656.08	293.79	656.09	295.78	656.09			
306.04	656.09	308.92	656.08	310.65	656.09	312.14	656.09	319.96	656.08			
322.32	656.08	328.92	656.06	333.01	656.06	337.43	656.07	341.59	656.05			
347.14	656.05	350.97	656.06	354.99	656.06	355.25	656.06	355.57	656.06			
356.3	656.06	365.12	656.06	371.78	656.05	378.51	656.05	383.44	656.04			
386.2	656.04	390.9	656.04	397.79	656.03	406.48	656.03	418.61	656.01			
431.55	656	433.09	655.17	433.4	655	433.64	654.95	433.9	654.9			
435.69	654.75	436.92	654.97	437.79	655	438.31	655.29	439.78	656			
442.48	656	474.44	656	480.93	655.89	496.46	655.94	501.55	656			
505.3	656.18	532.81	657	533.28	657.05	540.1	657.71	542.97	658			
554.45	658.87	555.99	659	560.72	659.3	585.34	660.05	658.58	665.36			
678.36	665.96	682.31	667.16									

Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta n Val

walkerRunFld.rep

0	.06	211.95	.08	431.55	.05	439.78	.08	585.34	.06
Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.		
431.55	439.78	33.8	35.1	35.9	.3	.5			

CROSS SECTION

RIVER: walker Run
REACH: 1 RS: 2462

INPUT

Description:

Station	Elevation	Data	num=	51						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
0	662	26	662	70.39	659.98	130.3	658.42	191.55	657.89	
194.47	657.86	200.62	657.68	214.06	657.25	223.61	657	230.7	656.3	
233.59	656	244.38	655.94	249.84	655.91	254.12	655.9	258.8	655.9	
262.67	655.9	264.18	655.9	270.27	655.9	276.39	655.9	283.92	655.9	
289.65	655.91	298.05	655.91	321.59	655.41	325.07	655.33	330.35	655.31	
333.33	655.24	335.99	655.23	339.76	655.14	344.9	655.03	345.18	655.02	
345.99	655	347.04	654.92	350.97	654.61	354.06	654.81	357.06	655	
358	655	465	655	475	656	510.01	656.95	510.72	656.94	
512.02	657	515.93	657.74	517.81	658	537.09	658.53	543.64	658.86	
546.52	659	555.06	659.14	560.39	659.8	629.95	661.26	684.19	664.6	
700.62	665.24									

Manning's n	Values	num=	5							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta
0	.06	223.61	.08	345.99	.05	357.06	.08	510.01	.06	
Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.			
345.99	357.06	117	123	126.5	.1	.3				

CROSS SECTION

RIVER: walker Run
REACH: 1 RS: 2339

INPUT

Description: FEMA BHP

Station	Elevation	Data	num=	101						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
1002.3	712	1055.3	710	1070.3	710	1208.3	700	1293.3	680	
1360.3	680	1410.3	688	1538.7	680	1583.6	670	1592.4	669	
1601.8	668	1634.5	667	1747.5	666	1757	665	1776	664	
1787.68	662.91	1824.83	659.26	1888	659.65	2100	657.34	2209.01	656.91	
2212.33	656.29	2214.36	656.48	2216.73	656.27	2220.07	656	2226.21	655.77	
2228.06	655.7	2234.48	655.47	2237.75	655.41	2241.37	655.39	2244.6	655.27	
2250.48	655.26	2254.59	655.31	2257.14	655.25	2262.59	655.21	2264.25	655.23	
2264.33	655.23	2266.6	655.24	2299.05	655.35	2300.54	655.33	2303.12	655.31	
2308.41	655.33	2315.43	655.3	2321.54	655.27	2325.04	655.26	2333.98	655.23	
2337.74	655.21	2341.08	655.21	2343.81	655.21	2345.91	655.23	2347.67	655.25	
2348.65	655.28	2349.76	655.35	2350.65	655.43	2351.77	655.48	2352.92	655.48	
2354.43	655.49	2356.55	655.48	2358.37	655.47	2361.11	655.46	2364	655.44	
2367.03	655.42	2369.84	655.4	2376.71	655.34	2387.47	655.24	2413.3	655.01	
2414.16	655	2414.9	654.86	2415.59	654.76	2417.73	654.4	2417.86	654.38	
2418.2	654.44	2421.13	655	2428.82	655.89	2433.17	656.4	2444.82	656.9	
2450.38	656.73	2463.09	656.67	2475.07	656.57	2488.7	656	2495.47	656.87	
2496.25	657	2496.41	656.97	2498.07	657.31	2501.16	657.84	2502.1	658	
2503.07	658.03	2506.82	658.16	2512.61	658.29	2516.9	658.38	2523.42	658.48	
2528.18	658.55	2530.86	658.57	2534.06	658.59	2563.54	659.61	2599.59	659.96	

2603.04 660.02 2606.09 660.08 walkerRunFld.rep 2735 664.54 2755 666.54 2778 666
3465 666

Manning's n Values num= 5
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
1002.3 .06 2209.01 .08 2413.3 .05 2421.13 .08 2501.16 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
2413.3 2421.13 62.3 64.8 61.8 .1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2274

INPUT

Description:

Station	Elevation	Data	num=	100								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
-75	664	-46.1	663.17	-23	659.97	16.47	657.72	45.83	658.28			
67.54	658.17	89.33	656.46	93.94	656.49	96.48	656	115.41	655.33			
123.78	655.21	127.83	655.09	128.92	655.09	136.61	655.09	138.38	655.08			
145.96	655.07	151.42	655.06	157.67	655.04	158.35	655.04	167.72	655.05			
171.56	655.05	174.69	655.06	177.39	655.06	177.46	655.06	177.55	655.06			
178.01	655.06	178.84	655.06	180.13	655.06	181.79	655.06	183.41	655.05			
185.32	655.05	187.03	655.05	188.39	655.04	190.37	655.03	197.78	655			
198	654.86	199.56	654	201.75	653.95	203.12	653.9	205.3	653.98			
206.05	654	206.47	654.2	208.38	655	216.7	655	220.33	655			
222.84	655	226.47	655	228.67	655	231.37	655	234.06	655			
236.43	655	238.01	655	239.75	655	241.29	655	243.55	655			
249.93	655	253.81	655	256.01	655	257.29	655	258.3	655			
259.56	655	260.69	655	262.07	655	263.95	655	267.98	655			
274.42	655	279.63	655	285.91	655	289.82	655	292.73	655			
297.33	655	299.5	655	301.91	655	303.86	655	306.15	655			
308.81	655	310.99	655	314	655	326.12	655.4	329.29	655.44			
348.92	655.98	349.06	655.98	349.18	655.99	349.26	655.99	349.69	656			
349.83	656.02	356.2	657	360.13	657.7	362.04	658	364.41	658.04			
369.84	658.08	376.37	658.13	382.25	658.34	448.6	658.96	455.12	659.08			
460.9	659.19	507.83	659.46	557.25	660.35	636	663.34	650.4	665.34			

Manning's n Values num= 6
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val
-75 .06 -46.1 .06 89.33 .08 197.78 .05 208.38 .08
349.83 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
197.78 208.38 136.2 136.2 129.1 .1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 2139

INPUT

Description:

Station	Elevation	Data	num=	70								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
-101	660.01	41.82	658.6	77.75	655.4	217.23	654.68	305.8	654.64			
306.47	655.5074	313.91	655.54	324.93	656	334.22	656	336.38	656			
340.14	656	343.15	655.59	347.59	655	350.81	654.89	353.02	654.87			
368.38	654.49	386.15	654.15	388.45	654.14	394.41	654.14	394.86	654.14			

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396.46	654.13	397.8	654.13	405.14	654.11	406.63	654.1	413.09	654.09
414.8	654.09	416.99	654.08	422.83	654.08	425.39	654.08	428.92	654.08
432.95	654.07	441.66	654.07	446.94	654.07	449.97	654.06	460.16	654.06
463.62	654.06	467.64	654.05	471.35	654.05	476.36	654.03	488.21	654
489.58	653.78	492.25	653.31	495.12	653.81	495.94	654	503.87	654.2
518.06	654.42	524.76	654.54	534.26	654.7	548.38	654.64	555.21	654.62
556.53	654.62	558.69	654.62	569.44	654.65	579.37	654.7	583.54	654.76
595.53	654.97	596.52	654.99	597.08	655	600.77	655.89	601.22	656
604.68	656.84	605.35	657	608.39	657.09	614.45	657.14	626.18	657.36
636.66	657.56	767.34	658.35	818.4	659.6	905	662.46	916.1	663.58

Manning's n Values			num=	5						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	
-101	.06	340.14	.08	488.21	.05	495.94	.08	600.77	.06	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	488.21	495.94		126.7	129		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 2010

INPUT

Description: FEMA BHO

Station Elevation Data			num=	96						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
1190	690	1390	690	1512	690	1531	700	1598	700	
1682	662	1798	659.74	2030	656.54	2295	655.65	2298	654.34	
2300	655.95	2460	655.95	2470	654.34	2475	655.95	2600	654.74	
2636.82	654.74	2662.58	654.93	2666	655	2667.83	655	2668.6	655	
2682.97	655	2685.25	655	2690.83	655	2698.43	655	2698.91	655	
2707.11	654.81	2722.01	654.57	2737.58	654.07	2738.89	654.03	2739.78	654	
2753.12	653.59	2760.72	653.46	2761.93	653.44	2767.05	653.33	2777.08	653.22	
2779.62	653.17	2783.13	653.15	2790.43	653.22	2794.01	653.22	2796.97	653.23	
2800.7	653.35	2803.83	653.39	2806.44	653.46	2821.7	653.76	2824.31	653.82	
2825.18	653.85	2832.33	653.8	2832.84	653.8	2833.41	653.81	2833.78	653.81	
2834.88	653.81	2835.73	653.81	2836.34	653.81	2836.82	653.81	2837.31	653.81	
2837.86	653.8	2838.52	653.8	2839.4	653.78	2840.29	653.77	2841.12	653.75	
2842.43	653.72	2849.7	653.54	2860.7	653.33	2870.92	653	2872.72	652.83	
2874.36	652.7	2876.58	652.91	2877.55	653	2879.56	653.08	2880.69	653.09	
2882.28	653.13	2896.3	653.49	2916.66	654	2922.94	654.29	2925.09	654.39	
2926.94	654.39	2929.89	654.32	2931.58	654.29	2933.44	654.27	2935.57	654.26	
2938.69	654.26	2941.81	654.27	2947.37	654.35	2953.62	654.41	2962.72	654.58	
2969.66	654.66	2984.34	655	2984.5	655.03	2985.31	655.19	2988.79	655.86	
2989.51	656	2993.12	656.7	2994.67	657	3230	659.65	3345	664.65	
3360	664.45									

Manning's n Values			num=	5						
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	
1190	.06	2707.11	.08	2870.92	.05	2879.56	.08	2994.67	.06	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2870.92	2879.56		84.1	85.6		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 1925

INPUT

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Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-232.06	658.01	-166.67	655.4	34.55	654.38	78.78	654.68	83.55	655
83.73	655	84.22	655	84.97	655	85.45	655	87.04	655
88.89	655	93.3	655	100.05	655	121.59	654.03	137.98	653.3
152.32	653.06	154.68	653.02	155.34	653.01	155.95	653.02	157.12	653.03
172.47	653.3	191.08	653.12	204.42	653	209.26	653	211.05	652.67
214.31	652.07	215.72	652.3	218.15	652.69	218.56	652.74	219.85	653
232.09	653.08	233.06	653.09	233.24	653.09	236.42	653.1	238.98	653.11
241.45	653.12	250.54	653.19	250.85	653.19	251.07	653.19	252.26	653.2
258.5	653.2	261.07	653.2	268.26	653.2	272.82	653.2	283.33	653.06
291.28	653.15	296.08	653.2	308.29	653.59	320.86	654	334	655
368.74	655.3	496.43	655.55	623.92	656.57	700.01	659.91		

Manning's n Values

Manning's n Values									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
-232.06	.06	121.59	.08	209.26	.05	219.85	.08	334	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	209.26	219.85		282.6	325.9		.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 1602

INPUT

Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-627.1	658.01	-562.09	656.01	-429.8	655.01	-285.4	654.01	20.81	654.67
48.57	654.71	66.44	654.61	72.14	654.79	85.07	654.21	87.82	651.4
91.51	650.67	93.9	650.84	96.86	651.6	98.18	651.9	100.7	654.03
108.02	654.27	243	654.08	428.23	655.01	456.83	656.01	487.78	657.01
560.78	658.01								

Manning's n Values

Manning's n Values					
Sta	n Val	Sta	n Val	Sta	n Val
-627.1	.08	85.07	.06	100.7	.08

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	85.07	100.7		202.2	203.5		.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1 RS: 1402

INPUT

Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-214.73	660.01	-151.73	657.01	-116.53	656.01	-65.33	655.01	-57.33	654.01
-47.9	653.01	-26.6	653.01	61.72	652.96	129.69	653.53	136.69	653.6
143.69	653.86	148.69	654.03	153.69	654.21	156.09	654.04	156.39	652.1
156.89	651.34	158.69	650.52	160.49	650.2	161.99	649.8	163.69	649.82
165.69	649.95	166.99	650.67	168.49	651.36	169.29	651.84	169.89	653.64
172.09	654.15	177.99	653.93	183.69	653.92	187.1	653.79	232.35	653.34
246.57	653.84	359.8	654.16	416.89	654.15	519.9	654.01	527.8	655.01
536.5	656.01	540.2	657.01	548.5	658.01				

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Manning's n Values num= 3
 Sta n Val Sta n Val
 -214.73 .08 156.09 .06 169.89 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 156.09 169.89 183 194 196.3 .1 .3

CROSS SECTION

RIVER: Walker Run
 REACH: 1 RS: 1208

INPUT

Description: FEMA BHN

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.54	1035	719.34	1060	714.65	1080	709.34	1165	699.54
1190	694.84	1225	689.54	1265	684.95	1380	674.54	1470	669.65
1528	665.15	1570	659.45	1680	651.74	1740	651.34	1752	650.74
1765	651.34	2205	659.24	2220	664.24				

Manning's n Values num= 3
 Sta n Val Sta n Val
 1000 .08 1740 .06 1765 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 1740 1765 228.9 218.5 209.9 .1 .3

CROSS SECTION

RIVER: Walker Run
 REACH: 1 RS: 990

INPUT

Description:

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-41.4	660.01	-4.3	656.01	32.63	652.9	63.74	651.93	118.97	653.07
125.76	650.82	126.92	650.45	132.87	649.47	135.28	649.66	136.76	650.43
138.23	653.22	149.36	652.61	186.43	652.59	234.63	654.38	362.19	653.45
497.17	656.01	516.5	658.01						

Manning's n Values num= 3
 Sta n Val Sta n Val
 -41.4 .08 118.97 .06 138.23 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 118.97 138.23 56.8 56.5 58.9 .1 .3

CROSS SECTION

RIVER: Walker Run
 REACH: 1 RS: 933

INPUT

Description: FEMA BHM

Station Elevation Data num= 26

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	724.54	1035	719.54	1088	714.74	1120	710.04
						1152	704.34

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1200	699.74	1238	694.84	1270	689.84	1290	684.65	1340	679.95
1402	674.95	1445	669.34	1480	664.45	1530	659.74	1590	654.45
1700	650.95	1710	649.74	1720	650.65	1750	654.54	1900	657.04
2080	659.84	2200	663.45	2300	663.65	2400	663.45	2500	664.95
2590	664.34								

Manning's	n Values		num=	3					
Sta	n Val	Sta	n Val	Sta	n Val				
1000	.09	1700	.05	1720	.09				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1700	1720		48.7	48.4		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1

RS: 884

INPUT

Description: U/S XS of Farm Road Culvert

Station	Elevation	Data	num=	19					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-288	691.97	-147.11	671.47	-33	660.01	12.49	656.08	52.79	653.68
71.68	653.18	101.89	653.2	117.08	652.72	120.1	649.74	121.4	649.01
123.02	648.62	125.03	649.16	129.44	653.21	174.49	652.41	194.38	652.9
524	662.27	538	663.17	560.8	664.45	607.89	664.67		

Manning's	n Values		num=	3					
Sta	n Val	Sta	n Val	Sta	n Val				
-288	.09	117.08	.05	129.44	.09				

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	117.08	129.44		20.6	19.1		.3	.7

Ineffective Flow	num=	2							
Sta L	Sta R	Elev	Permanent						
-288	112.93	652.53	F						
133.68	607.89	652.53	F						

CULVERT

RIVER: Walker Run
REACH: 1

RS: 875

INPUT

Description: Private Farm Road

Distance from Upstream XS = 1.6

Deck/Roadway Width = 15.1

Weir Coefficient = 2.5

Upstream Deck/Roadway Coordinates

num=	17								
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	
12.14	656.071	656.071	52.52	653.686	653.686	71.38	653.5	653.18	
115.86	653.386	649.74	122.61	652.528	648.62	122.83	652.53	648.66	
124.23	652.54	648.9	130.22	653.444	653.21	173.58	653.2	652.41	
194.42	653.1	652.9	217.91	652.805	652.805	378.6	653.084	653.084	
465.08	656.47	656.47	522.51	662.265	662.265	535.78	663.101	663.101	
535.81	663.177	663.177	535.99	663.037	663.037				

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	20					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

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-322.11	691.97	-147.11	671.47	-2.11	656.57	12.14	656.071	52.52	653.686
71.38	653.18	101.3	653.2	116.89	652.72	120.15	649.74	120.82	648.93
121.18	649.01	122.65	648.62	124.23	648.9	124.43	649.16	129.48	653.21
173.58	652.41	194.42	652.9	297.89	656.07	337.89	656.67	607.89	664.67

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-322.11	.09	116.89	.05	129.48	.09

Bank Sta: Left Right Coeff Contr. Expan.
 116.89 129.48 .3 .7

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-322.11	112.93	652.53	F
133.68	607.89	652.53	F

Downstream Deck/Roadway Coordinates num= 24

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
12.14	656.071	656.071	52.52	653.686	653.686	77.11	653.4	652.55
115.86	653.386	651.91	122.61	652.528	649.92	122.73	652.53	650.54
122.85	652.53	651.24	123.07	652.53	651.64	123.32	652.53	651.8
123.57	652.53	651.64	123.79	652.53	651.24	123.91	652.53	650.54
124.03	652.53	650.11	126.1	652.53	648.93	130.22	653.444	649.62
136.9	653.4	652.21	185.27	653.2	652.86	217.91	652.805	652.8
378.6	653.084	653.084	465.08	656.47	656.47	522.51	662.265	662.265
535.78	663.101	663.101	535.81	663.177	663.177	535.99	663.037	663.037

Downstream Bridge Cross Section Data

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-322.11	691.97	-147.11	671.47	-2.11	656.57	12.14	656.071	52.52	653.686
77.11	652.55	116.71	651.91	123.34	649.92	124.03	650.11	125.51	649.41
126.1	648.93	130.12	649.62	136.9	652.21	185.27	652.86	218.62	652.8
297.89	656.07	337.89	656.67	607.89	664.667				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-322.11	.09	116.71	.05	136.9	.09

Bank Sta: Left Right Coeff Contr. Expan.
 116.71 136.9 .3 .7

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-322.11	109	652.53	F
136	607.89	652.53	F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 654.4
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	2.75	
FHWA Chart # 2 - Corrugated Metal Pipe Culvert			
FHWA Scale # 3 - Pipe projecting from fill			
Solution Criteria = Highest U.S. EG			
Culvert Upstrm Dist	Length	Top n	Bottom n
		Depth Blocked	Entrance Loss Coef

Page 50

walkerRunFld.rep

Exit Loss Coef 2.2 14.9 .023 .023 .1 .9

1
Upstream Elevation = 648.96
Centerline Station = 123.3
Downstream Elevation = 649.411
Centerline Station = 123.2

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 863

INPUT

Description: D/S XS Farm Road Culvert

Station	Elevation	Data	num=	15	Sta	Elev	Sta	Elev	Sta	Elev
-294	691.97	-147.11	671.47	-22.2	660.01	24.99	655.04	34.67	653.86	
72.57	652.55	113.12	651.91	120.43	649.92	123.41	648.96	126.4	649.62	
133.22	652.21	182	652.85	214.18	652.8	518.46	662.27	588	664.67	

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-294	.09	113.12	.05	133.22	.09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
113.12 133.22 157.2 147.1 138.4 .3 .7

Ineffective Flow num= 2
Sta L Sta R Elev Permanent
-294 109 652.53 F
136 588 652.53 F

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 715

INPUT

Description:

Station	Elevation	Data	num=	17	Sta	Elev	Sta	Elev	Sta	Elev
-92.4	658.01	2.21	655.41	40.88	653.76	46.14	653.57	77.95	651.4	
100.08	650.67	101.47	648.52	104.64	647.91	107.47	647.9	108.96	648.04	
110.34	648.14	111.67	648.52	114.47	650.93	126.37	650.97	191.93	651.64	
278.3	653.09	365.34	656.46							

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-92.4	.09	100.08	.05	114.47	.09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
100.08 114.47 172 178.4 188.1 .1 .3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 536

INPUT

Description:

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Station Elevation Data			num=	16					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-86.6	657.01	-45.02	655.01	5.76	652.05	48.16	650.97	149.99	651.14
170.47	649.65	172.89	647.93	174.84	647.22	176.44	647.18	179.25	646.97
182.05	647.71	182.91	648.29	184.3	650.54	191.59	650.96	206.95	652.58
269.71	656.85								

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
-86.6	.09	170.47	.05	184.3	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	170.47	184.3		89.9	107		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 428

INPUT
Description: FEMA BHL

Station Elevation Data			num=	19					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	686.54	1050	684.84	1090	679.84	1110	674.45	1130	669.65
1150	664.54	1210	659.34	1250	655.54	1350	651.74	1410	649.34
1430	647.24	1440	649.65	1550	654.34	1605	656.65	1630	659.45
1750	661.74	1860	664.45	1880	666	2920	666		

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1410	.05	1440	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1410	1440		84.2	119.6		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 350

INPUT
Description:

Station Elevation Data			num=	18					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
7.67	656.47	30.04	652.51	50.26	651.27	122.31	650.39	128.41	647.64
131.05	647.09	132.71	647.08	135.14	647.17	138.64	647.65	139.08	648.11
140.48	648.18	141.29	649.59	150.13	650.23	156.97	649.72	249.39	650.76
267.01	652.4	309.86	655.02	325.84	655.85				

Manning's n Values			num=	3	
Sta	n Val	Sta	n Val	Sta	n Val
7.67	.09	122.31	.05	141.29	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	122.31	141.29		169.4	222.4		.1	.3

CROSS SECTION

RIVER: Walker Run
REACH: 1 RS: 185

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Description:

num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8.8	659.55	15.53	658.78	23.2	653.48	25.13	652.64	29.31	649.46
32.38	649.12	33.4	647.67	34.97	646.89	37.17	646.4	40.26	646.66
42.19	646.41	44.77	646.96	46.4	647.15	49.26	649.32	59.74	649.89
197.88	650.38	234.08	652.49	273.02	654.62	299.87	655.74	305.41	656.59

num= 3

Sta	n	Val	Sta	n	Val	Sta	n	Val
8.8		.09	32.38		.05	49.26		.09

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	32.38	49.26		39.3	58	36.4		.1	.3

CROSS SECTION

REACH: 1

RS: 147

Description: FEMA BHK

num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	699.45	1040	694.84	1100	691.54	1170	689.54	1210	687.54
1260	682.65	1340	684.95	1400	681.65	1440	679.65	1490	676.95
1530	674.84	1555	669.65	1580	664.34	1610	659.24	1640	655.04
1650	649.45	1660	646.74	1670	649.34	1750	651.74	1830	654.84
1870	655.84	1900	654.74	1925	659.34	2100	661.54	2240	664.95
2260	666	3100	666						

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	1650	.05	1670	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	1650	1670		138.5	154.5	134.1	.1 .3

CROSS SECTION

REACH: 1

RS: 011

Description: U/S XS of Market Street Bridge

num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-177.52	656.04	33.24	653.12	38.49	652.67	45.07	649.46	51.29	648.2
53.81	646.7	54.7	645.84	57.12	645.71	59.41	645.74	61.18	646.53
64.38	648.11	69.53	648.34	79.21	649.32	111.92	649.09	167.8	651.4
249.3	651.46	251.06	651.01	293.8	653.77	352.41	660.72		

num= 3

Sta	n	Val	Sta	n	Val	Sta	n	Val
-177.52		.09	51.29		.05	64.38		.09

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	51.29	64.38		39.9	38	43.7		.3	.7

```
Ineffective Flow      num=      2
```

walkerRunFld.rep

Sta L	Sta R	Elev	Permanent
-177.52	42	652.95	F
90	352.41	652.95	F

BRIDGE

RIVER: Walker Run

REACH: 1

RS: -10

INPUT

Description: Market Street

Distance from Upstream XS = 8.5

Deck/Roadway width = 24.9

Weir Coefficient = 2.5

Upstream Deck/Roadway Coordinates

num= 19			
Sta	Hi Cord	Lo Cord	
-172.52	655.288		
44.69	654.155		
62.61	656.065	647.975	
65.9	656.125	650.675	
69.6	656.065	647.975	
98.44	654.145		
253.49	653.245		

Upstream Bridge Cross Section Data

Station Elevation Data num= 17					
Sta	Elev	Sta	Elev	Sta	Elev
-172.52	655.288	32.43	652.375	38.83	651.925
59.2	645.945	61.39	645.095	65.45	644.995
86.15	648.555	116.5	649.245	172.12	652.5
350.6	655.245	358.85	656.245		

Manning's n Values

num= 3			
Sta	n Val	Sta	n Val
-172.52	.09	55.15	.05
		70.85	.09

Bank Sta: Left Right Coeff Contr. Expan.

55.15	70.85	.3	.7
-------	-------	----	----

Ineffective Flow

num= 2			
Sta L	Sta R	Elev	Permanent
-172.52	42	652.95	F
90	358.85	652.95	F

Downstream Deck/Roadway Coordinates

num= 19			
Sta	Hi Cord	Lo Cord	
-199.02	655.288		
18.19	653.665		
36.11	656.095	648.765	
39.4	656.225	650.865	
43.1	656.095	648.765	
71.94	654.415		
226.99	653.245		

Downstream Bridge Cross Section Data

Station Elevation Data num= 20					
Sta	Elev	Sta	Elev	Sta	Elev
-199.02	655.288	-6.99	653.185	1.13	653.145
31.8	647.955	33.72	646.465	36.22	645.845
44.81	644.305	48.1	645.855	51	647.395
145.62	652.5	226.99	653.245	332.2	654.325

walkerRunFld.rep

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -199.02 .09 31.8 .05 51 .09

Bank Sta: Left Right Coeff Contr. Expan.
 31.8 51 .3 .7

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 -199.02 15.72 652.95 F
 63.89 358.85 652.95 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .98
 Elevation at which weir flow begins = 654.4
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow

Submerged Inlet Cd = 1.5
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord = 652.5

Additional Bridge Parameters

Add Friction component to Momentum

Do not add weight component to Momentum

Class B flow critical depth computations use critical depth

inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: -30

INPUT

Description: D/S XS of Market Street Bridge

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-199.02	656.04	-46.68	654.28	-4.4	653.95	4.43	653.9	17.96	651.54
30.08	649.2	35.6	648.71	37.35	647.22	38.98	646.6	41.82	645.27
45.52	644.46	48.05	645.07	52.27	646.61	53.56	648.15	63.11	648.57
79.88	650.16	85.95	652.29	181.4	651.9	273.84	653.77	319.73	659.02

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 -199.02 .09 35.6 .05 53.56 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 35.6 53.56 39.8 41.7 52.9 .3 .7

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 -199.02 15.72 652.95 F

63.89 319.73 652.95

F

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: -78

INPUT

Description:

Station Elevation Data				num=	17				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-15	653.95	8.17	649.27	36.56	649.66	42.24	648.9	46.48	646.51
49.12	645.82	52.33	645.43	54.96	645.72	58.47	646.11	62.68	648.65
65.38	648.62	71.37	648.11	81.36	648.01	96.66	649.71	189	651.01
294.7	652.01	299.5	653.01						

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-15	.09	36.56	.05	62.68	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	36.56	62.68		70.8	80.2		.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: -154

INPUT

Description:

Station Elevation Data				num=	16				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-151.5	656.03	0	654.28	13.15	649.96	23.45	649.01	28.15	648.96
30.73	645.21	33.05	644.9	35.85	645.52	40.46	645.66	41.74	646.07
43.72	648.39	63.07	648.9	97	649.15	199.07	650.01	206.89	651.01
218.8	653.01								

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
-151.5	.09	28.15	.05	43.72	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	28.15	43.72		75	75		.1	.3

CROSS SECTION

RIVER: Walker Run

REACH: 1

RS: -255

INPUT

Description: FEMA BHJ

Station Elevation Data				num=	22				
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	684.34	1092	679.54	1128	674.34	1170	669.34	1230	664.54
1310	660.04	1330	657.54	1350	654.84	1372	649.74	1405	647.24
1408	645.74	1412	647.95	1450	649.65	1490	649.24	1525	649.34
1570	649.04	1610	649.84	1670	654.34	1712	659.34	1740	664.84
1750	669.34	1790	674.84						

Manning's n values

num= 3

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Sta	n	Val	Sta	n	Val	Sta	n	Val
1000		.09	1405		.05	1412		.09

Bank	Sta:	Left	Right	Coeff	Contr.	Expan.
		1405	1412		.1	.3

Appendix I:
Hydrology Data

Walker Run Flood Study Report

PPL Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA

TR-20 Input Data



Tc and Land Use Computations

Time of concentration

Tributary

Tc = 166.4 min

Walker Run

Tc = 128.6 min

Tributary			Walker Run		
Sheet Flow	Shallow Concentrated Flow	Channel	Sheet Flow	Shallow Concentrated Flow	Channel
L = 300 feet	L = 4,100 feet	L = 6,600 feet	L = 300 feet	L = 7,000 feet	L = 10,000 feet
S = 2.5 %	S = 7.3 %	S = 0.7 %	S = 0.8 %	S = 4.5 %	S = 1.4 %
n = 0.24	unpaved	n = 0.08	n = 0.24	unpaved	n = 0.05
		A = 70 ft ²			A = 100 ft ²
		P = 150 ft			P = 80 ft

Land Use

	Tributary	Walker Run
DA	438.4 ac	1557.1 ac
Woods	50% (219.2 ac)	60 % (934.3 ac)
Meadow	50% (219.2 ac)	40% (622.8 ac)
A Soils	20%	10%
B/D Soils	10%	—
C Soils	70%	90%

		CN*A		CN*A
Woods				
A Soils (CN=30)	43.84 ac	1315.2	93.43 ac	2803
B Soils (CN=55)	21.92 ac	1205.6	—	—
C Soils (CN= 70)	153.44 ac	10740.8	840.87 ac	58861
Meadow				
A Soils (CN=30)	43.84 ac	1315.2	62.28 ac	1868
B Soils (CN= 58)	21.92 ac	1271.36	—	—
C Soils (CN= 71)	153.44 ac	10894.24	560.52 ac	39797
Total		26742		103329
Weighted CN		61		66



POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14



BERWICK, PENNSYLVANIA (36-0611) 41.0667 N 76.25 W 587 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Fri May 22 2009

[Confidence Limits](#)
[Seasonality](#)
[Location Maps](#)
[Other Info.](#)
[GIS data](#)
[Maps](#)
[Docs](#)
[Return to State Map](#)

Precipitation Frequency Estimates (inches)																		
ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.34	0.52	0.64	0.84	1.03	1.21	1.32	1.66	2.04	2.41	2.84	3.18	3.75	4.33	5.90	7.34	9.28	11.17
2	0.40	0.62	0.76	1.01	1.25	1.46	1.58	1.98	2.44	2.89	3.40	3.80	4.47	5.14	6.96	8.62	10.83	12.98
5	0.47	0.72	0.89	1.22	1.53	1.80	1.96	2.43	3.01	3.58	4.21	4.65	5.43	6.19	8.14	9.92	12.26	14.58
10	0.52	0.80	0.98	1.36	1.74	2.08	2.27	2.82	3.50	4.20	4.92	5.41	6.28	7.09	9.15	11.02	13.46	15.93
25	0.58	0.89	1.10	1.55	2.01	2.50	2.74	3.40	4.25	5.18	6.07	6.61	7.61	8.48	10.68	12.66	15.23	17.91
50	0.63	0.96	1.19	1.70	2.23	2.85	3.15	3.91	4.92	6.08	7.12	7.72	8.82	9.74	12.02	14.08	16.73	19.59
100	0.69	1.03	1.28	1.85	2.47	3.26	3.63	4.50	5.69	7.16	8.37	9.03	10.24	11.19	13.54	15.64	18.36	21.39
200	0.74	1.10	1.37	2.00	2.72	3.72	4.17	5.17	6.59	8.43	9.87	10.58	11.91	12.86	15.25	17.38	20.13	23.34
500	0.82	1.21	1.50	2.23	3.08	4.42	5.02	6.24	8.01	10.51	12.29	13.08	14.57	15.48	17.86	19.98	22.72	26.17
1000	0.88	1.28	1.61	2.41	3.38	5.05	5.77	7.19	9.29	12.45	14.55	15.39	17.01	17.84	20.14	22.21	24.90	28.53

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.

Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.71	0.94	1.15	1.35	1.48	1.87	2.31	2.69	3.23	3.59	4.23	4.83	6.45	7.99	10.04	11.99
2	0.44	0.69	0.84	1.13	1.38	1.63	1.78	2.24	2.76	3.23	3.88	4.28	5.05	5.74	7.60	9.36	11.71	13.94
5	0.52	0.81	0.99	1.35	1.70	2.01	2.20	2.74	3.40	4.00	4.79	5.24	6.12	6.90	8.87	10.77	13.25	15.65
10	0.57	0.89	1.09	1.51	1.93	2.33	2.54	3.17	3.94	4.67	5.59	6.08	7.06	7.89	9.96	11.96	14.55	17.10
25	0.65	0.99	1.22	1.72	2.23	2.79	3.07	3.82	4.77	5.73	6.86	7.38	8.52	9.41	11.60	13.71	16.45	19.21
50	0.70	1.07	1.32	1.89	2.48	3.19	3.54	4.39	5.52	6.70	8.02	8.59	9.85	10.77	13.02	15.22	18.07	20.97
100	0.76	1.15	1.42	2.06	2.75	3.65	4.07	5.05	6.39	7.85	9.40	10.01	11.41	12.34	14.63	16.89	19.81	22.88
200	0.82	1.23	1.53	2.23	3.03	4.17	4.69	5.83	7.41	9.21	11.03	11.69	13.22	14.14	16.46	18.76	21.70	24.98
500	0.92	1.35	1.68	2.49	3.45	4.98	5.67	7.06	9.05	11.42	13.69	14.39	16.11	17.00	19.23	21.55	24.45	28.03
1000	0.99	1.44	1.80	2.71	3.80	5.72	6.56	8.17	10.56	13.44	16.16	16.88	18.77	19.56	21.68	23.94	26.79	30.57

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.

** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.

Please refer to NOAA Atlas 14 Document for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.30	0.47	0.57	0.76	0.93	1.09	1.19	1.48	1.83	2.18	2.54	2.87	3.38	3.94	5.44	6.82	8.67	10.50
2	0.36	0.56	0.68	0.91	1.12	1.31	1.43	1.78	2.19	2.61	3.04	3.43	4.04	4.68	6.41	7.99	10.11	12.21
5	0.42	0.65	0.80	1.09	1.37	1.61	1.76	2.17	2.70	3.23	3.75	4.19	4.89	5.62	7.48	9.18	11.43	13.70
10	0.47	0.72	0.88	1.23	1.56	1.86	2.03	2.51	3.12	3.77	4.38	4.87	5.63	6.41	8.39	10.18	12.54	14.95
25	0.52	0.80	0.98	1.39	1.80	2.22	2.43	3.00	3.76	4.61	5.36	5.90	6.79	7.63	9.76	11.67	14.16	16.78
50	0.56	0.85	1.06	1.51	1.99	2.52	2.78	3.43	4.32	5.37	6.24	6.85	7.82	8.72	10.95	12.95	15.52	18.31
100	0.61	0.91	1.13	1.64	2.19	2.86	3.17	3.91	4.95	6.27	7.27	7.96	9.02	9.96	12.26	14.32	16.99	19.94
200	0.65	0.97	1.21	1.77	2.40	3.23	3.61	4.46	5.66	7.32	8.49	9.22	10.41	11.36	13.75	15.84	18.57	21.70
500	0.71	1.05	1.31	1.94	2.69	3.80	4.27	5.29	6.76	8.98	10.43	11.26	12.56	13.53	15.97	18.09	20.86	24.23
1000	0.76	1.11	1.39	2.08	2.92	4.28	4.84	6.01	7.73	10.48	12.18	13.10	14.51	15.46	17.89	19.98	22.75	26.30

* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.

WinTR-20: Version 1.11 0 0 1. 0
 Walker Run

SUB-AREA:

Walker RunOutlet	Berwick	2.43	66.	2.14
Trib Outlet	Berwick	.68	61.	2.77

STORM ANALYSIS:

2-yr	Berwick	0.	2.89	Type II	2	2.89
10-yr	Berwick	0.	4.2	Type II	2	2.89
50-yr	Berwick	0.	6.08	Type II	2	2.89
100-yr	Berwick	0.	7.16	Type II	2	2.89
500-yr	Berwick	0.	10.51	Type II	2	2.89

GLOBAL OUTPUT:

10. .08 YYNNN NNNNNN

VERIFICATION:

PROCESSING Y Y

Walker Run

Name of printed page file:

C:\Program Files (x86)\USDA\WinTR-20 version 1.11.11\Walker Run.out

STORM 2-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Walker Run	2.430	Berwick	0.493		13.46	179.1	73.72

Line Start Time (hr)	Flow (cfs)	Values @ time increment of 0.080 hr (cfs)	Flow (cfs)	Values @ time increment of 0.080 hr (cfs)	Flow (cfs)	Values @ time increment of 0.080 hr (cfs)	Flow (cfs)	Values @ time increment of 0.080 hr (cfs)
12.080	10.7	17.0	24.1	33.8	44.6	57.9	72.6	
12.640	88.5	104.1	119.2	132.6	144.5	154.9	162.7	
13.200	169.6	174.3	177.4	178.8	178.6	177.8	175.3	
13.760	172.0	167.4	161.5	155.0	148.6	142.4	136.9	
14.320	131.6	126.5	121.9	117.4	113.3	109.4	105.6	
14.880	102.0	98.4	95.2	92.1	89.2	86.5	83.9	
15.440	81.5	79.2	77.0	75.0	73.1	71.2	69.5	
16.000	67.8	66.3	64.8	63.4	62.0	60.7	59.4	
16.560	58.2	57.0	55.9	54.8	53.7	52.7	51.8	
17.120	50.9	50.0	49.2	48.4	47.6	46.9	46.3	
17.680	45.6	45.0	44.4	43.9	43.3	42.8	42.3	
18.240	41.8	41.3	40.8	40.3	39.8	39.4	39.0	
18.800	38.6	38.2	37.8	37.4	37.1	36.7	36.4	
19.360	36.0	35.6	35.3	34.9	34.6	34.2	33.9	
19.920	33.5	33.2	32.8	32.5	32.2	31.8	31.5	
20.480	31.1	30.8	30.5	30.1	29.8	29.5	29.2	
21.040	28.9	28.6	28.4	28.1	27.9	27.7	27.5	
21.600	27.3	27.1	26.9	26.7	26.6	26.5	26.3	
22.160	26.2	26.1	26.0	25.9	25.8	25.7	25.6	
22.720	25.5	25.4	25.3	25.2	25.1	25.0	25.0	
23.280	24.9	24.8	24.8	24.7	24.6	24.5	24.5	
23.840	24.4	24.3	24.3	24.2	24.1	23.9	23.7	
24.400	23.4	23.0	22.6	22.1	21.4	20.7	19.9	
24.960	18.9	18.0	16.9	15.9	14.8	13.8	12.7	
25.520	11.7	10.7						

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	----- Peak Flow ----- Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	0.322		14.08	23.6	34.72

Line Start Time (hr)	----- (cfs)	Flow Values @ time increment of 0.080 hr ----- (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.880	10.1	11.7	13.2	14.6	16.0	17.2	18.4
13.440	19.4	20.4	21.2	21.9	22.5	22.9	23.2
14.000	23.4	23.6	23.6	23.6	23.4	23.2	22.9
14.560	22.4	22.0	21.5	21.0	20.5	20.0	19.6
15.120	19.1	18.7	18.3	17.9	17.5	17.2	16.8

Walker Run

Line Start Time (hr)	----- (cfs)	Flow (cfs)	Values @ time (cfs)	increment (cfs)	of 0.080 hr (cfs)	----- (cfs)	(cfs)
15.680	16.5	16.2	15.8	15.5	15.2	14.9	14.6
16.240	14.3	14.1	13.8	13.6	13.3	13.1	12.8
16.800	12.6	12.4	12.2	12.0	11.8	11.6	11.4
17.360	11.2	11.1	10.9	10.7	10.6	10.4	10.3
17.920	10.1	10.0					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	3.110		0.455		13.60	199.1	64.01

Line Start Time (hr)	----- (cfs)	Flow (cfs)	Values @ time (cfs)	increment (cfs)	of 0.080 hr (cfs)	----- (cfs)	(cfs)
12.080	11.3	18.1	25.7	36.1	47.6	61.7	77.5
12.640	94.4	111.3	127.9	142.7	156.1	168.0	177.3
13.200	185.6	191.5	195.8	198.2	198.9	199.0	197.2
13.760	194.5	190.2	184.7	178.5	172.1	166.0	160.5
14.320	155.1	149.8	144.7	139.8	135.3	130.9	126.6
14.880	122.5	118.5	114.8	111.2	107.9	104.8	101.8
15.440	99.1	96.4	93.9	91.5	89.2	87.1	85.0
16.000	83.0	81.2	79.4	77.7	76.1	74.5	73.0
16.560	71.5	70.1	68.7	67.4	66.2	64.9	63.8
17.120	62.7	61.6	60.6	59.6	58.7	57.8	57.0
17.680	56.2	55.4	54.7	54.0	53.3	52.7	52.0
18.240	51.4	50.8	50.2	49.6	49.0	48.5	48.0
18.800	47.5	47.0	46.5	46.1	45.6	45.2	44.7
19.360	44.3	43.9	43.4	43.0	42.6	42.1	41.7
19.920	41.3	40.9	40.4	40.0	39.6	39.1	38.7
20.480	38.3	37.9	37.5	37.1	36.7	36.3	35.9
21.040	35.6	35.3	34.9	34.6	34.3	34.0	33.8
21.600	33.5	33.3	33.1	32.9	32.7	32.5	32.3
22.160	32.1	32.0	31.8	31.7	31.6	31.4	31.3
22.720	31.2	31.1	31.0	30.9	30.8	30.7	30.6
23.280	30.5	30.4	30.3	30.2	30.1	30.0	29.9
23.840	29.9	29.8	29.7	29.6	29.4	29.2	29.0
24.400	28.7	28.3	27.8	27.2	26.5	25.6	24.7
24.960	23.7	22.5	21.4	20.2	18.9	17.7	16.5
25.520	15.3	14.2	13.0	12.0	11.0	10.0	

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Walker Run	2.430	Berwick	1.207		13.29	521.3	214.54

Walker Run

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.920	17.0	31.1	47.6	71.2	97.8	129.8	167.8
12.480	209.0	256.3	303.1	348.7	389.5	427.1	455.7
13.040	481.1	498.4	511.2	519.9	520.8	519.2	512.0
13.600	502.4	490.1	473.4	455.2	432.9	410.7	388.9
14.160	369.4	350.9	334.6	318.9	304.4	291.0	278.4
14.720	266.8	255.5	244.8	234.7	225.0	216.4	208.2
15.280	200.6	193.4	186.6	180.3	174.3	168.8	163.6
15.840	158.6	154.0	149.6	145.5	141.6	137.9	134.5
16.400	131.1	128.0	124.9	122.0	119.2	116.5	113.9
16.960	111.5	109.2	107.0	104.9	102.9	101.0	99.3
17.520	97.6	96.1	94.6	93.1	91.7	90.4	89.1
18.080	87.8	86.6	85.4	84.2	83.1	82.0	80.9
18.640	79.9	79.0	78.1	77.3	76.5	75.7	74.9
19.200	74.1	73.3	72.5	71.8	71.0	70.3	69.5
19.760	68.8	68.0	67.3	66.6	65.8	65.1	64.4
20.320	63.6	62.9	62.2	61.5	60.8	60.1	59.4
20.880	58.8	58.2	57.6	57.0	56.5	55.9	55.4
21.440	55.0	54.5	54.1	53.7	53.4	53.0	52.7
22.000	52.4	52.1	51.8	51.6	51.3	51.1	50.9
22.560	50.7	50.4	50.2	50.0	49.9	49.7	49.5
23.120	49.3	49.2	49.0	48.8	48.7	48.5	48.4
23.680	48.2	48.1	47.9	47.8	47.6	47.4	47.1
24.240	46.8	46.3	45.8	45.1	44.2	43.2	41.9
24.800	40.5	38.8	37.0	35.1	33.1	31.0	29.0
25.360	26.9	24.9	22.9	21.0	19.2	17.5	15.8
25.920	14.4	12.9	11.7	10.6			

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	0.914		13.86	84.2	123.88

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
12.320	11.6	15.1	18.7	23.4	28.0	33.8	39.5
12.880	45.4	51.2	56.6	61.7	66.3	70.3	73.9
13.440	76.7	79.3	81.1	82.9	83.5	84.1	84.0
14.000	83.7	83.0	82.0	80.8	79.1	77.3	74.8
14.560	72.3	69.7	67.2	64.8	62.6	60.5	58.5
15.120	56.6	54.8	53.1	51.5	50.0	48.6	47.2
15.680	45.8	44.5	43.2	42.0	40.9	39.8	38.7
16.240	37.8	36.8	35.9	35.0	34.2	33.4	32.6
16.800	31.9	31.2	30.5	29.8	29.2	28.5	28.0
17.360	27.4	26.9	26.4	25.9	25.4	25.0	24.5
17.920	24.1	23.7	23.3	23.0	22.6	22.3	22.0
18.480	21.7	21.4	21.1	20.8	20.5	20.3	20.0
19.040	19.8	19.5	19.3	19.1	18.9	18.6	18.4
19.600	18.2	18.0	17.8	17.6	17.4	17.2	17.0
20.160	16.7	16.5	16.3	16.1	15.9	15.7	15.6

Walker Run

Line Start Time (hr)	----- (cfs)	Flow (cfs)	Values @ time (cfs)	increment (cfs)	of 0.080 hr (cfs)	----- (cfs)	(cfs)
20.720	15.4	15.2	15.0	14.9	14.7	14.6	14.4
21.280	14.3	14.1	14.0	13.8	13.7	13.6	13.5
21.840	13.4	13.3	13.2	13.1	13.0	12.9	12.8
22.400	12.7	12.7	12.6	12.5	12.4	12.4	12.3
22.960	12.3	12.2	12.2	12.1	12.1	12.0	12.0
23.520	11.9	11.9	11.8	11.8	11.7	11.7	11.7
24.080	11.6	11.6	11.5	11.4	11.3	11.2	11.1
24.640	10.9	10.8	10.6	10.4	10.1		

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	3.110		1.143		13.43	596.5	191.81

Line Start Time (hr)	----- (cfs)	Flow (cfs)	Values @ time (cfs)	increment (cfs)	of 0.080 hr (cfs)	----- (cfs)	(cfs)
11.920	18.4	33.8	51.9	77.8	106.8	141.6	183.0
12.480	227.8	279.6	331.4	382.5	429.0	472.5	506.7
13.040	537.7	560.1	577.4	590.2	594.4	595.8	591.0
13.600	583.5	572.8	557.0	539.2	516.7	494.3	471.8
14.160	451.4	431.7	413.7	396.1	379.2	363.3	348.1
14.720	334.1	320.4	307.4	295.2	283.5	273.1	263.0
15.280	253.7	244.9	236.6	228.9	221.5	214.7	208.1
15.840	201.8	196.0	190.4	185.3	180.4	175.7	171.3
16.400	167.0	163.0	159.1	155.3	151.8	148.3	145.1
16.960	141.9	139.0	136.2	133.4	130.9	128.4	126.2
17.520	124.0	121.9	120.0	118.1	116.3	114.5	112.8
18.080	111.2	109.6	108.0	106.5	105.0	103.6	102.2
18.640	101.0	99.8	98.7	97.6	96.5	95.4	94.4
19.200	93.4	92.4	91.4	90.4	89.4	88.5	87.5
19.760	86.6	85.6	84.7	83.7	82.8	81.8	80.9
20.320	80.0	79.0	78.1	77.2	76.3	75.5	74.6
20.880	73.8	73.0	72.3	71.6	70.9	70.2	69.6
21.440	68.9	68.4	67.8	67.3	66.8	66.4	66.0
22.000	65.6	65.2	64.8	64.5	64.1	63.8	63.5
22.560	63.2	63.0	62.7	62.4	62.2	61.9	61.7
23.120	61.5	61.3	61.0	60.8	60.6	60.4	60.2
23.680	60.0	59.8	59.6	59.5	59.3	59.0	58.7
24.240	58.3	57.8	57.1	56.3	55.3	54.2	52.7
24.800	51.0	49.1	47.1	44.9	42.6	40.2	37.8
25.360	35.4	32.9	30.6	28.3	26.1	24.0	22.0
25.920	20.1	18.3	16.8	15.3	14.0	12.8	11.7
26.480	10.7						

STORM 50-yr

Walker Run

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Walker Run	2.430	Berwick	2.499		13.34	1170.3	481.60

Line Start Time (hr)	----- (cfs)	Flow Values @ time (cfs)	increment of 0.080 hr (cfs)	----- (cfs)	----- (cfs)	----- (cfs)	----- (cfs)
11.200	11.5	14.1	17.0	20.3	24.7	29.7	37.0
11.760	48.6	64.3	93.3	127.6	177.0	233.3	298.5
12.320	377.6	462.3	562.3	663.5	766.7	860.0	948.5
12.880	1015.0	1074.1	1116.5	1145.5	1166.0	1169.1	1166.3
13.440	1149.0	1125.7	1097.4	1059.6	1018.5	968.3	916.4
14.000	862.5	813.7	767.1	727.2	689.2	653.8	621.5
14.560	590.7	563.6	537.2	512.2	488.6	465.7	445.6
15.120	426.3	408.8	392.3	376.5	362.2	348.5	336.0
15.680	324.2	313.0	302.6	292.6	283.7	275.1	267.0
16.240	259.5	252.1	245.4	238.9	232.7	226.7	220.9
16.800	215.6	210.5	205.6	201.0	196.6	192.5	188.5
17.360	184.8	181.4	178.1	175.1	172.1	169.3	166.5
17.920	163.9	161.3	158.8	156.4	154.0	151.7	149.4
18.480	147.2	145.3	143.4	141.7	140.1	138.5	137.0
19.040	135.4	133.9	132.5	131.0	129.6	128.2	126.8
19.600	125.4	124.0	122.6	121.3	119.9	118.5	117.2
20.160	115.8	114.5	113.2	111.8	110.5	109.2	108.0
20.720	106.7	105.5	104.3	103.2	102.1	101.1	100.1
21.280	99.1	98.2	97.3	96.5	95.8	95.1	94.4
21.840	93.7	93.1	92.6	92.0	91.5	91.1	90.6
22.400	90.2	89.7	89.3	89.0	88.6	88.2	87.9
22.960	87.5	87.2	86.9	86.5	86.2	85.9	85.6
23.520	85.3	85.0	84.7	84.5	84.2	83.9	83.6
24.080	83.2	82.8	82.1	81.4	80.4	79.1	77.7
24.640	75.7	73.6	71.0	68.0	64.9	61.5	58.0
25.200	54.4	50.8	47.2	43.6	40.1	36.8	33.6
25.760	30.6	27.8	25.1	22.7	20.5	18.6	16.9
26.320	15.3	13.9	12.6	11.4	10.4		

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	2.057		13.76	213.3	313.61

Line Start Time (hr)	----- (cfs)	Flow Values @ time (cfs)	increment of 0.080 hr (cfs)	----- (cfs)	----- (cfs)	----- (cfs)	----- (cfs)
12.000	11.5	17.2	23.4	31.0	39.4	49.1	60.4
12.560	72.3	86.4	100.5	115.8	131.0	144.7	158.2
13.120	169.7	180.2	189.0	196.2	202.5	206.5	210.3
13.680	211.7	213.2	211.8	210.3	207.6	204.5	200.5
14.240	195.8	190.3	183.8	177.1	169.6	162.1	155.5
14.800	148.9	143.1	137.6	132.4	127.4	122.7	118.3
15.360	114.1	110.3	106.6	103.1	99.6	96.3	93.1

Walker Run

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
15.920	90.1	87.2	84.6	82.1	79.6	77.4	75.1
16.480	73.0	71.0	69.1	67.2	65.5	63.8	62.2
17.040	60.6	59.1	57.8	56.4	55.2	53.9	52.8
17.600	51.7	50.6	49.6	48.7	47.7	46.9	46.0
18.160	45.2	44.4	43.7	43.0	42.3	41.6	41.0
18.720	40.4	39.8	39.3	38.7	38.2	37.7	37.2
19.280	36.7	36.3	35.8	35.3	34.9	34.4	34.0
19.840	33.6	33.1	32.7	32.2	31.8	31.4	31.0
20.400	30.5	30.1	29.7	29.4	29.0	28.7	28.3
20.960	28.0	27.7	27.4	27.1	26.8	26.5	26.3
21.520	26.0	25.8	25.5	25.3	25.1	24.9	24.7
22.080	24.5	24.3	24.1	24.0	23.8	23.7	23.5
22.640	23.4	23.3	23.1	23.0	22.9	22.8	22.7
23.200	22.6	22.5	22.4	22.3	22.2	22.1	22.0
23.760	21.9	21.8	21.8	21.7	21.6	21.5	21.3
24.320	21.2	21.0	20.8	20.6	20.3	20.0	19.6
24.880	19.2	18.7	18.2	17.6	17.0	16.3	15.6
25.440	14.9	14.2	13.5	12.8	12.1	11.4	10.7

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	3.110		2.402		13.34	1364.9	438.87

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.200	11.5	14.1	17.0	20.3	25.0	30.6	38.8
11.760	51.6	68.9	101.2	139.3	194.4	257.2	329.8
12.320	417.5	511.4	622.7	736.1	853.1	960.9	1064.2
12.880	1145.4	1218.7	1274.5	1315.2	1346.2	1357.5	1362.2
13.440	1350.7	1332.0	1307.3	1271.3	1231.2	1179.9	1126.3
14.000	1070.0	1017.9	967.6	923.0	879.5	837.6	798.3
14.560	760.3	726.0	692.7	661.2	631.7	603.3	578.1
15.120	553.8	531.6	510.7	490.7	472.6	455.1	439.1
15.680	423.8	409.3	395.8	382.7	370.9	359.7	349.1
16.240	339.1	329.5	320.6	311.9	303.7	295.8	288.2
16.800	281.2	274.3	267.8	261.7	255.8	250.3	244.9
17.360	240.0	235.3	230.9	226.8	222.7	218.9	215.2
17.920	211.6	208.2	204.8	201.6	198.4	195.4	192.4
18.480	189.5	186.9	184.4	182.1	179.9	177.7	175.7
19.040	173.6	171.6	169.7	167.8	165.9	164.0	162.1
19.600	160.3	158.4	156.6	154.8	153.0	151.2	149.4
20.160	147.6	145.9	144.1	142.4	140.7	139.0	137.3
20.720	135.7	134.2	132.7	131.2	129.8	128.5	127.2
21.280	125.9	124.7	123.6	122.6	121.5	120.6	119.7
21.840	118.8	118.0	117.2	116.5	115.9	115.2	114.6
22.400	114.0	113.4	112.9	112.3	111.8	111.3	110.9
22.960	110.4	110.0	109.5	109.1	108.7	108.3	107.9
23.520	107.5	107.1	106.8	106.4	106.0	105.6	105.3

Walker Run

Line Start Time (hr)	----- Flow Values @ time increment of 0.080 hr -----						
(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
24.080	104.8	104.3	103.5	102.5	101.4	99.9	98.3
24.640	96.0	93.5	90.5	87.2	83.6	79.7	75.6
25.200	71.4	67.1	62.8	58.5	54.3	50.3	46.4
25.760	42.7	39.2	35.8	32.7	29.9	27.3	25.0
26.320	22.8	20.9	19.1	17.4	15.9	14.5	13.3
26.880	12.2	11.1	10.2				

STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Walker Run	2.430	Berwick	3.330		13.23	1592.0	655.13

Line Start Time (hr)	----- Flow Values @ time increment of 0.080 hr -----						
(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.560	11.7	13.7	16.0	18.4	21.3	24.3	27.8
11.120	31.6	35.7	40.6	45.9	51.8	58.9	66.6
11.680	78.9	94.9	120.9	159.9	208.8	277.6	353.2
12.240	446.3	551.6	669.4	802.5	939.2	1074.8	1200.3
12.800	1312.3	1401.1	1480.0	1528.1	1566.0	1585.5	1587.8
13.360	1581.5	1552.3	1518.5	1474.9	1422.3	1363.8	1293.4
13.920	1221.5	1148.2	1080.4	1017.5	962.8	910.6	863.4
14.480	819.0	778.0	740.7	704.8	671.4	639.3	609.0
15.040	581.5	555.3	532.2	509.8	489.0	469.7	451.2
15.600	434.7	418.7	404.0	390.1	376.8	364.9	353.5
16.160	342.9	332.8	323.2	314.2	305.6	297.5	289.6
16.720	282.1	275.1	268.3	262.0	255.9	250.2	244.8
17.280	239.6	234.8	230.3	226.1	222.1	218.2	214.6
17.840	211.0	207.5	204.2	200.9	197.8	194.7	191.7
18.400	188.7	185.9	183.4	180.9	178.8	176.7	174.7
18.960	172.7	170.8	168.9	167.0	165.2	163.3	161.5
19.520	159.7	157.9	156.2	154.4	152.7	150.9	149.2
20.080	147.5	145.8	144.1	142.4	140.7	139.0	137.4
20.640	135.8	134.2	132.7	131.2	129.7	128.3	127.0
21.200	125.7	124.5	123.4	122.3	121.3	120.3	119.4
21.760	118.5	117.7	117.0	116.2	115.6	114.9	114.3
22.320	113.7	113.2	112.6	112.1	111.6	111.1	110.7
22.880	110.2	109.8	109.3	108.9	108.5	108.1	107.7
23.440	107.3	107.0	106.6	106.2	105.9	105.5	105.1
24.000	104.7	104.3	103.7	102.9	101.9	100.6	99.1
24.560	97.2	94.8	92.1	88.8	85.2	81.2	77.0
25.120	72.6	68.1	63.6	59.1	54.6	50.2	46.1
25.680	42.1	38.3	34.8	31.4	28.5	25.7	23.3
26.240	21.1	19.1	17.4	15.8	14.4	13.0	11.8
26.800	10.7						

Walker Run

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	2.816		13.79	300.3	441.55

Line Start Time (hr)	Flow (cfs)	Values @ time increment (cfs)	Flow (cfs)	Values @ time increment (cfs)	Flow (cfs)	Values @ time increment (cfs)	Flow (cfs)
11.840	10.7	15.9	22.1	30.0	39.7	50.4	63.2
12.400	76.6	93.3	110.0	130.1	150.3	171.1	192.1
12.960	211.3	229.3	245.6	259.1	271.7	280.4	289.1
13.520	293.6	298.2	299.4	300.0	298.2	295.1	291.0
14.080	285.7	279.8	272.2	264.4	254.5	244.6	234.0
14.640	223.3	213.7	204.4	195.9	188.0	180.5	173.5
15.200	166.7	160.7	154.6	149.3	144.0	139.0	134.2
15.760	129.5	125.0	120.8	116.9	113.1	109.6	106.2
16.320	103.0	99.9	97.0	94.2	91.6	89.0	86.6
16.880	84.3	82.0	79.9	77.8	76.0	74.1	72.4
17.440	70.7	69.1	67.6	66.2	64.8	63.5	62.3
18.000	61.1	60.0	58.8	57.8	56.8	55.8	54.9
18.560	54.0	53.2	52.4	51.6	50.8	50.1	49.4
19.120	48.7	48.1	47.5	46.8	46.2	45.6	45.0
19.680	44.4	43.8	43.2	42.6	42.1	41.5	40.9
20.240	40.3	39.8	39.2	38.7	38.2	37.7	37.2
20.800	36.8	36.4	35.9	35.5	35.1	34.8	34.4
21.360	34.0	33.7	33.3	33.0	32.7	32.4	32.1
21.920	31.9	31.6	31.3	31.1	30.9	30.7	30.5
22.480	30.3	30.1	29.9	29.7	29.6	29.4	29.3
23.040	29.1	29.0	28.9	28.7	28.6	28.5	28.3
23.600	28.2	28.1	28.0	27.9	27.8	27.7	27.5
24.160	27.4	27.2	27.0	26.8	26.6	26.2	25.9
24.720	25.5	25.0	24.4	23.8	23.2	22.4	21.6
25.280	20.8	19.9	19.0	18.1	17.2	16.3	15.4
25.840	14.5	13.6	12.7	11.9	11.1	10.3	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	3.110		3.218		13.36	1862.0	598.72

Line Start Time (hr)	Flow (cfs)	Values @ time increment (cfs)	Flow (cfs)	Values @ time increment (cfs)	Flow (cfs)	Values @ time increment (cfs)	Flow (cfs)
10.560	11.7	13.7	16.0	18.4	21.3	24.5	28.2
11.120	32.5	37.0	42.3	48.0	54.5	62.4	71.0
11.680	84.9	103.0	132.0	175.8	230.9	308.2	393.2
12.240	497.5	615.2	746.6	895.8	1049.5	1205.0	1350.8
12.800	1483.5	1592.5	1691.3	1757.3	1811.6	1844.6	1858.1
13.360	1861.9	1839.7	1812.0	1772.3	1721.7	1663.8	1591.2
13.920	1516.3	1438.7	1365.8	1297.1	1235.1	1174.9	1117.9
14.480	1063.4	1012.0	964.5	918.4	875.9	835.2	797.0
15.040	762.2	728.8	699.2	670.5	643.8	619.0	595.2

Walker Run

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
15.600	573.7	552.9	533.5	515.2	497.6	481.8	466.5
16.160	452.5	439.0	426.2	414.2	402.6	391.7	381.2
16.720	371.2	361.7	352.6	344.1	335.9	328.1	320.8
17.280	313.7	307.2	301.0	295.3	289.8	284.4	279.4
17.840	274.5	269.8	265.3	260.9	256.6	252.5	248.5
18.400	244.6	240.8	237.4	234.2	231.2	228.3	225.5
18.960	222.8	220.2	217.6	215.1	212.6	210.2	207.7
19.520	205.3	202.9	200.6	198.2	195.9	193.6	191.3
20.080	189.0	186.7	184.4	182.2	179.9	177.7	175.6
20.640	173.5	171.5	169.5	167.6	165.7	163.9	162.2
21.200	160.5	158.9	157.4	156.0	154.6	153.3	152.1
21.760	150.9	149.8	148.8	147.8	146.9	146.0	145.2
22.320	144.4	143.6	142.9	142.2	141.5	140.9	140.2
22.880	139.6	139.0	138.5	137.9	137.4	136.8	136.3
23.440	135.8	135.3	134.8	134.3	133.9	133.4	132.9
24.000	132.4	131.8	131.1	130.1	129.0	127.4	125.6
24.560	123.4	120.6	117.6	113.8	109.6	105.1	100.2
25.120	95.1	89.7	84.4	79.0	73.7	68.4	63.3
25.680	58.4	53.7	49.3	45.1	41.2	37.6	34.4
26.240	31.5	28.8	26.3	24.0	22.0	20.1	18.3
26.800	16.8	15.3	14.0	12.8	11.7	10.7	

STORM 500-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
Walker Run	2.430	Berwick	6.142		13.17	2995.8	1232.82

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
8.640	10.1	11.6	13.3	15.2	17.1	19.3	21.6
9.200	24.1	26.7	29.4	32.4	35.5	38.8	42.1
9.760	45.7	49.4	53.2	57.2	61.3	65.6	70.1
10.320	74.8	79.8	85.1	90.7	96.7	103.0	110.0
10.880	117.3	125.5	134.2	143.6	154.1	165.1	178.1
11.440	192.0	207.8	228.0	250.4	289.5	339.4	415.1
12.000	516.8	635.8	790.0	957.0	1156.9	1377.7	1616.9
12.560	1867.6	2115.9	2338.2	2534.7	2701.2	2820.3	2920.5
13.120	2967.3	2995.2	2993.9	2958.8	2909.1	2828.9	2740.5
13.680	2635.0	2513.6	2382.9	2240.5	2100.7	1970.3	1852.1
14.240	1743.1	1646.6	1554.1	1471.3	1394.0	1322.2	1256.1
14.800	1192.0	1132.6	1076.4	1024.2	977.1	932.1	891.7
15.360	852.9	817.0	783.9	752.1	723.8	696.4	670.9
15.920	647.3	624.9	604.7	585.1	567.0	549.8	533.4
16.480	518.3	503.5	489.6	476.3	463.6	451.8	440.3
17.040	429.8	419.7	410.1	401.1	392.4	384.8	377.3
17.600	370.3	363.6	357.1	350.9	344.8	339.0	333.3
18.160	327.7	322.4	317.1	312.1	307.3	302.7	298.7

Walker Run

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
18.720	295.0	291.5	288.0	284.7	281.4	278.2	275.0
19.280	271.9	268.8	265.8	262.7	259.7	256.8	253.8
19.840	250.9	248.0	245.1	242.2	239.4	236.5	233.7
20.400	230.9	228.1	225.4	222.7	220.0	217.5	215.0
20.960	212.6	210.3	208.1	206.0	203.9	202.0	200.2
21.520	198.5	196.9	195.3	193.9	192.5	191.3	190.1
22.080	188.9	187.8	186.8	185.8	184.9	184.0	183.1
22.640	182.3	181.4	180.7	179.9	179.2	178.4	177.7
23.200	177.0	176.3	175.7	175.0	174.4	173.8	173.1
23.760	172.5	171.9	171.3	170.7	169.9	168.9	167.6
24.320	165.9	164.0	161.3	158.2	154.5	149.8	144.7
24.880	138.6	132.2	125.3	118.1	110.8	103.4	96.1
25.440	88.8	81.8	74.9	68.5	62.3	56.5	51.2
26.000	46.1	41.8	37.8	34.3	31.2	28.2	25.7
26.560	23.3	21.2	19.2	17.4	15.8	14.3	13.0
27.120	11.8	10.7					

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow			
				Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Trib	0.680	Berwick	5.452		13.67	606.0	891.16

Line Start Time (hr)	Flow Values @ time increment of 0.080 hr						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.720	10.4	11.5	12.6	13.9	15.3	16.9	18.5
11.280	20.3	22.3	24.5	27.1	30.2	34.3	39.2
11.840	48.4	57.5	73.4	89.5	110.4	132.7	158.9
12.400	187.8	219.7	255.9	293.2	334.3	375.3	413.9
12.960	452.4	484.4	515.2	539.6	560.8	577.4	589.1
13.520	598.5	602.4	605.6	601.2	596.9	587.4	577.5
14.080	564.6	550.6	534.2	515.6	495.9	473.8	451.8
14.640	430.6	409.4	391.5	373.8	357.9	342.5	328.3
15.200	314.9	302.2	290.6	279.3	269.0	258.7	249.2
15.760	239.7	231.0	222.5	214.8	207.4	200.4	193.8
16.320	187.4	181.5	175.7	170.4	165.1	160.3	155.5
16.880	151.1	146.7	142.7	138.8	135.1	131.7	128.3
17.440	125.2	122.1	119.3	116.6	114.1	111.6	109.3
18.000	107.0	104.8	102.8	100.8	99.0	97.1	95.5
18.560	93.8	92.3	90.8	89.3	87.9	86.5	85.3
19.120	84.0	82.9	81.7	80.6	79.4	78.3	77.2
19.680	76.1	75.1	74.0	72.9	71.9	70.9	69.8
20.240	68.8	67.8	66.8	65.8	65.0	64.1	63.3
20.800	62.6	61.8	61.1	60.3	59.7	59.0	58.3
21.360	57.7	57.1	56.5	56.0	55.4	54.9	54.4
21.920	53.9	53.5	53.1	52.7	52.3	51.9	51.5
22.480	51.2	50.9	50.6	50.3	50.0	49.7	49.4
23.040	49.2	48.9	48.7	48.5	48.2	48.0	47.8
23.600	47.6	47.4	47.2	47.0	46.8	46.6	46.4
24.160	46.2	45.9	45.6	45.2	44.7	44.2	43.6

Walker Run

Line Start Time (hr)	----- (cfs)	Flow (cfs)	Values @ time (cfs)	increment of (cfs)	0.080 hr (cfs)	----- (cfs)	(cfs)
24.720	42.9	42.1	41.2	40.1	39.0	37.7	36.4
25.280	35.0	33.5	32.0	30.5	29.0	27.4	25.9
25.840	24.4	22.8	21.4	20.0	18.7	17.3	16.1
26.400	14.9	13.8	12.8	11.8	10.9	10.1	

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	----- Elevation (ft)	Peak Flow Time (hr)	Rate (cfs)	Rate (csm)
OUTLET	3.110		5.991		13.30	3560.5	1144.87

Line Start Time (hr)	----- (cfs)	Flow (cfs)	Values @ time (cfs)	increment of (cfs)	0.080 hr (cfs)	----- (cfs)	(cfs)
8.640	10.1	11.6	13.3	15.2	17.1	19.3	21.6
9.200	24.1	26.8	29.9	33.3	36.8	40.4	44.1
9.760	48.0	52.1	56.3	60.8	65.5	70.4	75.5
10.320	80.8	86.7	92.7	99.2	106.1	113.4	121.5
10.880	129.9	139.4	149.5	160.4	172.7	185.5	200.4
11.440	216.5	234.9	258.5	284.7	330.4	388.2	474.6
12.000	590.1	725.3	900.8	1090.6	1317.0	1566.8	1837.4
12.560	2123.7	2409.1	2672.5	2909.2	3114.9	3270.0	3404.8
13.120	3480.9	3534.8	3554.7	3534.9	3498.1	3425.2	3342.2
13.680	3238.4	3114.8	2979.8	2827.9	2677.4	2534.4	2401.7
14.240	2276.9	2161.9	2050.0	1945.1	1846.1	1752.8	1666.9
14.800	1583.6	1507.0	1434.2	1366.7	1305.6	1247.0	1194.3
15.360	1143.7	1096.7	1052.9	1010.8	973.0	936.3	902.0
15.920	870.1	839.7	812.2	785.5	760.8	737.4	715.0
16.480	694.2	673.9	654.8	636.6	619.2	602.9	587.1
17.040	572.6	558.6	545.3	532.8	520.7	510.0	499.5
17.600	489.7	480.3	471.1	462.5	454.1	446.0	438.1
18.160	430.5	423.2	416.1	409.3	402.8	396.5	391.0
18.720	385.7	380.8	375.9	371.2	366.7	362.2	357.9
19.280	353.6	349.4	345.2	341.1	337.0	332.9	328.9
19.840	324.9	320.9	317.0	313.1	309.2	305.3	301.5
20.400	297.7	294.0	290.4	286.8	283.4	280.1	276.8
20.960	273.7	270.6	267.7	265.0	262.2	259.7	257.3
21.520	255.0	252.8	250.7	248.8	247.0	245.2	243.6
22.080	242.0	240.5	239.1	237.7	236.4	235.2	234.0
22.640	232.8	231.7	230.6	229.6	228.6	227.6	226.7
23.200	225.7	224.8	223.9	223.0	222.2	221.4	220.5
23.760	219.7	218.9	218.1	217.3	216.3	215.0	213.5
24.320	211.4	209.1	206.0	202.4	198.1	192.7	186.8
24.880	179.8	172.3	164.3	155.9	147.3	138.4	129.6
25.440	120.8	112.3	103.8	95.9	88.2	80.9	74.1
26.000	67.5	61.9	56.4	51.7	47.3	43.2	39.5
26.560	36.1	33.0	30.2	27.6	25.2	23.0	21.1
27.120	19.3	17.6	16.2	14.7	13.5	12.3	11.3
27.680	10.3						

Walker Run

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	----- Peak Flow by Storm -----				
			2-yr (cfs)	10-yr (cfs)	50-yr (cfs)	100-yr (cfs)	500-yr (cfs)
Walker Run	2.430		179.1	521.3	1170.3	1592.0	2995.8
Trib	0.680		23.6	84.2	213.3	300.3	606.0
OUTLET	3.110		199.1	596.5	1364.9	1862.0	3560.5

Appendix J:
Manning's Roughness Coefficient Conditions



Walker Run Existing Conditions Manning's "n" Values

Bell Bend Nuclear Power Plant
Salem Township, Luzerne County, PA
December 2010

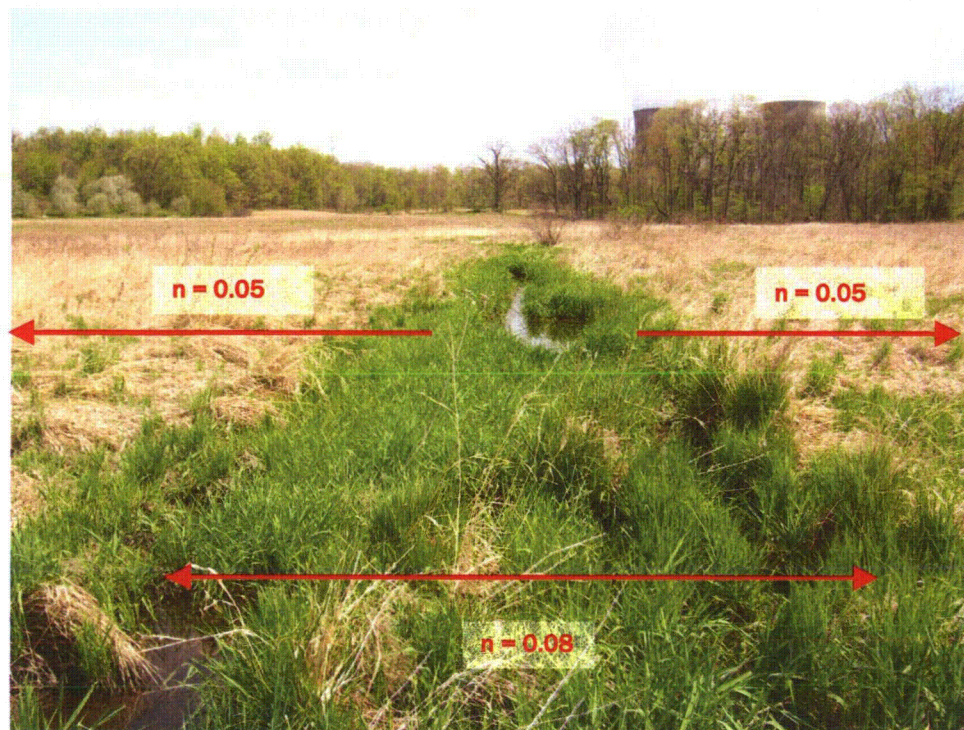


Photo #1: Tributary #1 through open field in lower reach



Photo #2: Tributary #1 through woods in upper reach

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE HYDROLOGY & HYDRAULICS FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 3.25 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Unnamed Tributary #1 to Walker Run
Note: Fill out one form for each flooding source studied

A. HYDROLOGY

1. Reason for New Hydrologic Analysis (check all that apply)

- ☐ Not revised (skip to section B) ☒ No existing analysis ☐ Improved data
☐ Alternative methodology ☐ Proposed Conditions (CLOMR) ☐ Changed physical condition of watershed

2. Comparison of Representative 1%-Annual-Chance Discharges

Location	Drainage Area (Sq. Mi.)	Effective/FIS (cfs)	Revised (cfs)
To XS 6850	0.68	N/A	300

3. Methodology for New Hydrologic Analysis (check all that apply)

- ☐ Statistical Analysis of Gage Records ☒ Precipitation/Runoff Model Win TR-20
☐ Regional Regression Equations ☐ Other (please attach description)

Please enclose all relevant models in digital format, maps, computations (including computation of parameters) and documentation to support the new analysis.

4. Review/Approval of Analysis

If your community requires a regional, state, or federal agency to review the hydrologic analysis, please attach evidence of approval/review.

5. Impacts of Sediment Transport on Hydrology

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport) of Form 3. If No, then attach your explanation for why sediment transport was not considered.

B. HYDRAULICS

1. Reach to be Revised

	Description	Cross Section	Water-Surface Elevations (ft.)	
			Effective	Proposed/Revised
Downstream Limit	Downstream Limit of Flood Model	183	N/A	654.95
Upstream Limit	Upstream Limit of Flood Model	6850	N/A	712.52

2. Hydraulic Method/Model Used

HEC-RAS

B. HYDRAULICS (CONTINUED)

3. Pre-Submittal Review of Hydraulic Models

DHS-FEMA has developed two review programs, CHECK-2 and CHECK-RAS, to aid in the review of HEC-2 and HEC-RAS hydraulic models, respectively. These review programs may help verify that the hydraulic estimates and assumptions in the model data are in accordance with NFIP requirements, and that the data are comparable with the assumptions and limitations of HEC-2/HEC-RAS. CHECK-2 and CHECK-RAS identify areas of potential error or concern. **These tools do not replace engineering judgment.** CHECK-2 and CHECK-RAS can be downloaded from http://www.fema.gov/plan/prevent/fhm/fhm_soft.shtm. We recommend that you review your HEC-2 and HEC-RAS models with CHECK-2 and CHECK-RAS. Review of your submittal and resolution of valid modeling discrepancies may result in reduced review time.

4. Models Submitted

	Natural Run	Floodway Run	Datum
Duplicate Effective Model*	File Name: FEMAFldStudy.prj	Plan Name: FEMA FIS HECRAS	File Name: Plan
Name: <u>NAVD88</u>			
Corrected Effective Model*	File Name: WalkerRunFld.prj	Plan Name: Existing Conditions	File Name: Plan
Name: <u>NAVD88</u>			
Existing or Pre-Project Conditions Model	File Name: Plan Name: File Name: Plan Name:		
Revised or Post-Project Conditions Model	File Name: WalkerRunFld.prj	Plan Name: Proposed Conditions	File Name: WalkerRunFld.prj
Plan Name: Proposed Conditions <u>NAVD88</u>			
Other - (attach description)	File Name: Plan Name: File Name: Plan Name:		

* For details, refer to the corresponding section of the instructions.

☒ Digital Models Submitted? (Required)

C. MAPPING REQUIREMENTS

A **certified topographic map** must be submitted showing the following information (where applicable): the boundaries of the effective, existing, and proposed conditions 1%-annual-chance floodplain (for approximate Zone A revisions) or the boundaries of the 1%- and 0.2%-annual-chance floodplains and regulatory floodway (for detailed Zone AE, AO, and AH revisions); location and alignment of all cross sections with stationing control indicated; stream, road, and other alignments (e.g., dams, levees, etc.); current community easements and boundaries; boundaries of the requester's property; certification of a registered professional engineer registered in the subject State; location and description of reference marks; and the referenced vertical datum (NGVD, NAVD, etc.).

☒ Digital Mapping (GIS/CADD) Data Submitted

Note that the boundaries of the existing or proposed conditions floodplains and regulatory floodway to be shown on the revised FIRM and/or FBFM must tie-in with the effective floodplain and regulatory floodway boundaries. Please attach **a copy of the effective FIRM and/or FBFM**, annotated to show the boundaries of the revised 1%- and 0.2%-annual-chance floodplains and regulatory floodway that tie-in with the boundaries of the effective 1%- and 0.2%-annual-chance floodplain and regulatory floodway at the upstream and downstream limits of the area of revision.

☒ Annotated FIRM and/or FBFM (Required)

D. COMMON REGULATORY REQUIREMENTS*

1. For LOMR/CLOMR requests, do Base Flood Elevations (BFEs) increase? ☐ Yes ☒ No
- a. For CLOMR requests, if either of the following is true, please submit **evidence of compliance with Section 65.12 of the NFIP regulations**:
- The proposed project encroaches upon a regulatory floodway and would result in increases above 0.00 foot.
 - The proposed project encroaches upon a SFHA with or without BFEs established and would result in increases above 1.00 foot.
- b. For LOMR requests, does this request require property owner notification and acceptance of BFE increases? ☐ Yes ☐ No
If Yes, please attach **proof of property owner notification and acceptance (if available)**. Elements of and examples of property owner notification can be found in the MT-2 Form 2 Instructions.
2. Does the request involve the placement or proposed placement of fill? ☒ Yes ☐ No
- If Yes, the community must be able to certify that the area to be removed from the special flood hazard area, to include any structures or proposed structures, meets all of the standards of the local floodplain ordinances, and is reasonably safe from flooding in accordance with the NFIP regulations set forth at 44 CFR 60.3(a)(3), 65.5(a)(4), and 65.6(a)(14). Please see the MT-2 instructions for more information.
3. For LOMR requests, is the regulatory floodway being revised? ☐ Yes ☐ No
- If Yes, attach **evidence of regulatory floodway revision notification**. As per Paragraph 65.7(b)(1) of the NFIP Regulations, notification is required for requests involving revisions to the regulatory floodway. (Not required for revisions to approximate 1%-annual-chance floodplains [studied Zone A designation] unless a regulatory floodway is being added. Elements and examples of regulatory floodway revision notification can be found in the MT-2 Form 2 Instructions.)
4. For LOMR/CLOMR requests, does this request have the potential to impact an endangered species? ☐ Yes ☒ No
- If Yes, please submit documentation to the community to show that you have complied with Sections 9 and 10 of the Endangered Species Act (ESA). Section 9 of the ESA prohibits anyone from "taking" or harming an endangered species. If an action might harm an endangered species, a permit is required from U.S. Fish and Wildlife Service or National Marine Fisheries Service under Section 10 of the ESA.
- For actions authorized, funded, or being carried out by Federal or State agencies, please submit documentation from the agency showing its compliance with Section 7(a)(2) of the ESA.

* Not inclusive of all applicable regulatory requirements. For details, see 44 CFR parts 60 and 65.

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE STRUCTURES FORM

O.M.B No. 1660-0016
Expires: 12/31/2010

PAPERWORK REDUCTION ACT

Public reporting burden for this form is estimated to average 7 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the needed data, and completing, reviewing, and submitting the form. You are not required to respond to this collection of information unless a valid OMB control number appears in the upper right corner of this form. Send comments regarding the accuracy of the burden estimate and any suggestions for reducing this burden to: Information Collections Management, U.S. Department of Homeland Security, Federal Emergency Management Agency, 500 C Street, SW, Washington DC 20472, Paperwork Reduction Project (1660-0016). Submission of the form is required to obtain or retain benefits under the National Flood Insurance Program. **Please do not send your completed survey to the above address.**

Flooding Source: Walker Run, Unnamed Tributary #1 to Walker Run
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization complete Section B
Bridge/Culvert complete Section C
Dam/Basin complete Section D
Levee/Floodwall complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. Name of Structure: Floodplain/ Channel Restoration

Type (check one): ☒ Channelization ☐ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Beach Grove Road, ~3600 ft. south to confluence with unnamed tributary

Downstream Limit/Cross Section: 1602

Upstream Limit/Cross Section: 5198

2. Name of Structure: Bridge # 4

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Access Bridge on Walker Run

Downstream Limit/Cross Section: 2497

Upstream Limit/Cross Section: 2730

3. Name of Structure: Bridge #3

Type (check one) ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Access Bridge on Unnamed Tributary #1 to Walker Run

Downstream Limit/Cross Section: 1252

Upstream Limit/Cross Section: 1360

NOTE: For more structures, attach additional pages as needed.

U.S. DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
RIVERINE STRUCTURES FORM

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Flooding Source: Unnamed Tributary #1 to Walker Run
Note: Fill out one form for each flooding source studied

A. GENERAL

Complete the appropriate section(s) for each Structure listed below:

Channelization complete Section B
Bridge/Culvert complete Section C
Dam/Basin complete Section D
Levee/Floodwall complete Section E
Sediment Transport..... complete Section F (if required)

Description Of Structure

1. Name of Structure: Bridge #7

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Pipe Bridge on Unnamed Tributary #1

Downstream Limit/Cross Section: 1658

Upstream Limit/Cross Section: 2326

2. Name of Structure: Bridge #2/6

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: Access/ Pipe Bridge on Unnamed Tributary #1

Downstream Limit/Cross Section: 2834

Upstream Limit/Cross Section: 3060

3. Name of Structure: Bridge #5

Type (check one): ☐ Channelization ☒ Bridge/Culvert ☐ Levee/Floodwall ☐ Dam/Basin

Location of Structure: RR Crossing on Unnamed Tributary #1

Downstream Limit/Cross Section: 3060

Upstream Limit/Cross Section: 3162

NOTE: For more structures, attach additional pages as needed.

B. CHANNELIZATION

Flooding Source: Walker Run

Name of Structure: Walker Run Restoration

1. Accessory Structures

The channelization includes (check one):

- | | |
|--|--|
| ☐ Levees [Attach Section E (Levee/Floodwall)] | ☐ Drop structures |
| ☐ Superelevated sections | ☐ Transitions in cross sectional geometry |
| ☐ Debris basin/detention basin [Attach Section D (Dam/Basin)] | ☐ Energy dissipator |
| ☒ Other (Describe): Floodplain restoration and channel relocation/ restoration | |

2. Drawing Checklist

Attach the plans of the channelization certified by a registered professional engineer, as described in the instructions.

3. Hydraulic Considerations

The channel was designed to carry 16-35 (cfs) and/or the -year flood.

The design elevation in the channel is based on (check one):

- ☐ Subcritical flow ☒ Critical flow ☐ Supercritical flow ☐ Energy grade line

If there is the potential for a hydraulic jump at the following locations, check all that apply and attach an explanation of how the hydraulic jump is controlled without affecting the stability of the channel.

- ☐ Inlet to channel ☐ Outlet of channel ☐ At Drop Structures ☐ At Transitions
☐ Other locations (specify):

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

C. BRIDGE/CULVERT

Flooding Source: Walker Run

Name of Structure: Bridge #3, #4, #2/6, #5, #7

1. This revision reflects (check one):

- ☒ Bridge/culvert not modeled in the FIS
☐ Modified bridge/culvert previously modeled in the FIS
☐ Revised analysis of bridge/culvert previously modeled in the FIS

2. Hydraulic model used to analyze the structure (e.g., HEC-2 with special bridge routine, WSPRO, HY8): HEC-RAS

If different than hydraulic analysis for the flooding source, justify why the hydraulic analysis used for the flooding source could not analyze the structures. Attach justification.

3. Attach plans of the structures certified by a registered professional engineer. The plan detail and information should include the following (check the information that has been provided):

- | | |
|--|---|
| ☒ Dimensions (height, width, span, radius, length) | ☒ Erosion Protection |
| ☐ Shape (culverts only) | ☒ Low Chord Elevations – Upstream and Downstream |
| ☒ Material | ☒ Top of Road Elevations – Upstream and Downstream |
| ☒ Beveling or Rounding | ☒ Structure Invert Elevations – Upstream and Downstream |
| ☒ Wing Wall Angle | ☒ Stream Invert Elevations – Upstream and Downstream |
| ☒ Skew Angle | ☒ Cross-Section Locations |
| ☒ Distances Between Cross Sections | |

4. Sediment Transport Considerations

Was sediment transport considered? ☐ Yes ☒ No If yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

D. DAM/BASIN

Flooding Source:

Name of Structure:

1. This request is for (check one): ☐ Existing dam ☐ New dam ☐ Modification of existing dam
2. The dam was designed by (check one): ☐ Federal agency ☐ State agency ☐ Local government agency ☐ Private organization

Name of the agency or organization:

3. The Dam was permitted as (check one):

- a. ☐ Federal Dam ☐ State Dam

Provide the permit or identification number (ID) for the dam and the appropriate permitting agency or organization

Permit or ID number Permitting Agency or Organization

- b. ☐ Local Government Dam ☐ Private Dam

Provide related drawings, specification and supporting design information.

4. Does the project involve revised hydrology? ☐ Yes ☐ No

If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2).

Was the dam/basin designed using critical duration storm?

- ☐ Yes, provide supporting documentation with your completed Form 2.
- ☐ No, provide a written explanation and justification for not using the critical duration storm.

5. Does the submittal include debris/sediment yield analysis? ☐ Yes ☐ No

If yes, then fill out Section F (Sediment Transport).

If No, then attach your explanation for why debris/sediment analysis was not considered.

6. Does the Base Flood Elevation behind the dam or downstream of the dam change?

☐ Yes ☐ No If Yes, complete the Riverine Hydrology & Hydraulics Form (Form 2) and complete the table below.

Stillwater Elevation Behind the Dam

FREQUENCY (% annual chance)

FIS

REVISED

10-year (10%)

50-year (2%)

100-year (1%)

500-year (0.2%)

Normal Pool Elevation

7. Please attach a copy of the formal Operation and Maintenance Plan

E. LEVEE/FLOODWALL

1. System Elements

a. This Levee/Floodwall analysis is based on (check one):

- ☐ upgrading of an existing levee/floodwall system
☐ a newly constructed levee/floodwall system
☐ reanalysis of an existing levee/floodwall system

b. Levee elements and locations are (check one):

- ☐ earthen embankment, dike, berm, etc.
☐ structural floodwall
☐ Other (describe):

Station to
Station to
Station to

c. Structural Type (check one):

- ☐ monolithic cast-in place reinforced concrete
☐ reinforced concrete masonry block
☐ sheet piling
☐ Other (describe):

d. Has this levee/floodwall system been certified by a Federal agency to provide protection from the base flood?

☐ Yes ☐ No

If Yes, by which agency?

e. Attach certified drawings containing the following information (indicate drawing sheet numbers):

1. Plan of the levee embankment and floodwall structures. Sheet Numbers:
2. A profile of the levee/floodwall system showing the Base Flood Elevation (BFE), levee and/or wall crest and foundation, and closure locations for the total levee system. Sheet Numbers:
3. A profile of the BFE, closure opening outlet and inlet invert elevations, type and size of opening, and kind of closure. Sheet Numbers:
4. A layout detail for the embankment protection measures. Sheet Numbers:
5. Location, layout, and size and shape of the levee embankment features, foundation treatment, floodwall structure, closure structures, and pump stations. Sheet Numbers:

2. Freeboard

a. The minimum freeboard provided above the BFE is:

Riverine

- 3.0 feet or more at the downstream end and throughout
3.5 feet or more at the upstream end
4.0 feet within 100 feet upstream of all structures and/or constrictions

☐ Yes ☐ No
☐ Yes ☐ No
☐ Yes ☐ No

Coastal

1.0 foot above the height of the one percent wave associated with the 1%-annual-chance stillwater surge elevation or maximum wave runup (whichever is greater).

☐ Yes ☐ No

2.0 feet above the 1%-annual-chance stillwater surge elevation

☐ Yes ☐ No

E. LEVEE/FLOODWALL (CONTINUED)

2. Freeboard (continued)

Please note, occasionally exceptions are made to the minimum freeboard requirement. If an exception is requested, attach documentation addressing Paragraph 65.10(b)(1)(ii) of the NFIP Regulations.

If No is answered to any of the above, please attach an explanation.

- b. Is there an indication from historical records that ice-jamming can affect the BFE? ☐ Yes ☐ No

If Yes, provide ice-jam analysis profile and evidence that the minimum freeboard discussed above still exists.

3. Closures

- a. Openings through the levee system (check one): ☐ exists ☐ does not exist

If opening exists, list all closures:

Channel Station	Left or Right Bank	Opening Type	Highest Elevation for Opening Invert	Type of Closure Device

(Extend table on an added sheet as needed and reference)

Note: Geotechnical and geologic data

In addition to the required detailed analysis reports, data obtained during field and laboratory investigations and used in the design analysis for the following system features should be submitted in a tabulated summary form. (Reference U.S. Army Corps of Engineers [USACE] EM-1110-2-1906 Form 2086.)

4. Embankment Protection

- a. The maximum levee slope landside is:
- b. The maximum levee slope floodside is:
- c. The range of velocities along the levee during the base flood is: (min.) to (max.)
- d. Embankment material is protected by (describe what kind):
- e. Riprap Design Parameters (check one): ☐ Velocity ☐ Tractive stress
Attach references

Reach	Sideslope	Flow Depth	Velocity	Curve or Straight	Stone Riprap			Depth of Toedown
					D ₁₀₀	D ₅₀	Thickness	
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								
Sta to								

(Extend table on an added sheet as needed and reference each entry)

E. LEVEE/FLOODWALL (CONTINUED)

4. Embankment Protection (continued)

- f. Is a bedding/filter analysis and design attached? ☐ Yes ☐ No
- g. Describe the analysis used for other kinds of protection used (include copies of the design analysis):

Attach engineering analysis to support construction plans.

5. Embankment And Foundation Stability

- a. Identify locations and describe the basis for selection of critical location for analysis:
- ☐ Overall height: Sta. ; height ft.
- ☐ Limiting foundation soil strength:
- Sta. , depth to
- strength ϕ = degrees, c = psf
- slope: SS = (h) to (v)
- (Repeat as needed on an added sheet for additional locations)
- b. Specify the embankment stability analysis methodology used (e.g., circular arc, sliding block, infinite slope, etc.):
- c. Summary of stability analysis results:

Case	Loading Conditions	Critical Safety Factor	Criteria (Min.)
I	End of construction		1.3
II	Sudden drawdown		1.0
III	Critical flood stage		1.4
IV	Steady seepage at flood stage		1.4
VI	Earthquake (Case I)		1.0

(Reference: USACE EM-1110-2-1913 Table 6-1)

- d. Was a seepage analysis for the embankment performed? ☐ Yes ☐ No
- If Yes, describe methodology used:
- e. Was a seepage analysis for the foundation performed? ☐ Yes ☐ No
- f. Were uplift pressures at the embankment landside toe checked? ☐ Yes ☐ No
- g. Were seepage exit gradients checked for piping potential? ☐ Yes ☐ No
- h. The duration of the base flood hydrograph against the embankment is hours.

Attach engineering analysis to support construction plans.

E. LEVEE/FLOODWALL (CONTINUED)

6. Floodwall And Foundation Stability

a. Describe analysis submittal based on Code (check one):

☐ UBC (1988) or ☐ Other (specify):

b. Stability analysis submitted provides for:

☐ Overturning ☐ Sliding If not, explain:

c. Loading included in the analyses were:

☐ Lateral earth @ $P_A =$ psf; $P_p =$ psf

☐ Surcharge-Slope @ , ☐ surface psf

☐ Wind @ $P_w =$ psf

☐ Seepage (Uplift); ☐ Earthquake @ $P_{eq} =$ %g

☐ 1%-annual-chance significant wave height: ft.

☐ 1%-annual-chance significant wave period: sec.

d. Summary of Stability Analysis Results: Factors of Safety.

Itemize for each range in site layout dimension and loading condition limitation for each respective reach.

Loading Condition	Criteria (Min)		Sta	To	Sta	To
	Overturn	Sliding	Overturn	Sliding	Overturn	Sliding
Dead & Wind	1.5	1.5				
Dead & Soil	1.5	1.5				
Dead, Soil, Flood, & Impact	1.5	1.5				
Dead, Soil, & Seismic	1.3	1.3				

(Ref: FEMA 114 Sept 1986; USACE EM 1110-2-2502)

(Note: Extend table on an added sheet as needed and reference)

e. Foundation bearing strength for each soil type:

Bearing Pressure	Sustained Load (psf)	Short Term Load (psf)
Computed design maximum		
Maximum allowable		

f. Foundation scour protection ☐ is, ☐ is not provided. If provided, attach explanation and supporting documentation:

Attach engineering analysis to support construction plans.

E. LEVEE/FLOODWALL (CONTINUED)

7. Settlement

- a. Has anticipated potential settlement been determined and incorporated into the specified construction elevations to maintain the established freeboard margin? ☐ Yes ☐ No
- b. The computed range of settlement is ft. to ft.
- c. Settlement of the levee crest is determined to be primarily from :
- ☐ Foundation consolidation
☐ Embankment compression
☐ Other (Describe):
- d. Differential settlement of floodwalls ☐ has ☐ has not been accommodated in the structural design and construction.
- Attach engineering analysis to support construction plans.

8. Interior Drainage

- a. Specify size of each interior watershed:
- Draining to pressure conduit: acres
Draining to ponding area: acres
- b. Relationships Established
- | | | |
|------------------------------------|------------------------------|-----------------------------|
| Ponding elevation vs. storage | ☐ Yes | ☐ No |
| Ponding elevation vs. gravity flow | ☐ Yes | ☐ No |
| Differential head vs. gravity flow | ☐ Yes | ☐ No |
- c. The river flow duration curve is enclosed: ☐ Yes ☐ No
- d. Specify the discharge capacity of the head pressure conduit: cfs
- e. Which flooding conditions were analyzed?
- | | | |
|-------------------------------------|------------------------------|-----------------------------|
| • Gravity flow (Interior Watershed) | ☐ Yes | ☐ No |
| • Common storm (River Watershed) | ☐ Yes | ☐ No |
| • Historical ponding probability | ☐ Yes | ☐ No |
| • Coastal wave overtopping | ☐ Yes | ☐ No |
- If No for any of the above, attach explanation.
- f. Interior drainage has been analyzed based on joint probability of interior and exterior flooding and the capacities of pumping and outlet facilities to provide the established level of flood protection. ☐ Yes ☐ No
- If No, attach explanation.
- g. The rate of seepage through the levee system for the base flood is cfs
- h. The length of levee system used to drive this seepage rate in item g: ft.

E. LEVEE/FLOODWALL (CONTINUED)

8. Interior Drainage (continued)

- i. Will pumping plants be used for interior drainage? ☐ Yes ☐ No

If Yes, include the number of pumping plants:
For each pumping plant, list:

	Plant #1	Plant #2
The number of pumps		
The ponding storage capacity		
The maximum pumping rate		
The maximum pumping head		
The pumping starting elevation		
The pumping stopping elevation		
Is the discharge facility protected?		
Is there a flood warning plan?		
How much time is available between warning and flooding?		

Will the operation be automatic? ☐ Yes ☐ No

If the pumps are electric, are there backup power sources? ☐ Yes ☐ No

(Reference: USACE EM-1110-2-3101, 3102, 3103, 3104, and 3105)

Include a copy of supporting documentation of data and analysis. Provide a map showing the flooded area and maximum ponding elevations for all interior watersheds that result in flooding.

9. Other Design Criteria

- a. The following items have been addressed as stated:

Liquefaction ☐ is ☐ is not a problem

Hydrocompaction ☐ is ☐ is not a problem

Heave differential movement due to soils of high shrink/swell ☐ is ☐ is not a problem

- b. For each of these problems, state the basic facts and corrective action taken:

Attach supporting documentation

- c. If the levee/floodwall is new or enlarged, will the structure adversely impact flood levels and/or flow velocities floodside of the structure?
☐ Yes ☐ No

Attach supporting documentation

- d. Sediment Transport Considerations:

Was sediment transport considered? ☐ Yes ☐ No If Yes, then fill out Section F (Sediment Transport).
If No, then attach your explanation for why sediment transport was not considered.

E. LEVEE/FLOODWALL (CONTINUED)

10. Operational Plan And Criteria

- a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
- b. Does the operation plan incorporate all the provisions for closure devices as required in Paragraph 65.10(c)(1) of the NFIP regulations?
☐ Yes ☐ No
- c. Does the operation plan incorporate all the provisions for interior drainage as required in Paragraph 65.10(c)(2) of the NFIP regulations?
☐ Yes ☐ No

If the answer is No to any of the above, please attach supporting documentation.

11. Maintenance Plan

- a. Are the planned/installed works in full compliance with Part 65.10 of the NFIP Regulations? ☐ Yes ☐ No
If No, please attach supporting documentation.

12. Operations and Maintenance Plan

Please attach a copy of the formal Operations and Maintenance Plan for the levee/floodwall.

F. SEDIMENT TRANSPORT

Flooding Source:

Name of Structure:

If there is any indication from historical records that sediment transport (including scour and deposition) can affect the Base Flood Elevation (BFE); and/or based on the stream morphology, vegetative cover, development of the watershed and bank conditions, there is a potential for debris and sediment transport (including scour and deposition) to affect the BFEs, then provide the following information along with the supporting documentation:

Sediment load associated with the base flood discharge: Volume acre-feet

Debris load associated with the base flood discharge: Volume acre-feet

Sediment transport rate (percent concentration by volume)

Method used to estimate sediment transport:

Most sediment transport formulas are intended for a range of hydraulic conditions and sediment sizes; attach a detailed explanation for using the selected method.

Method used to estimate scour and/or deposition:

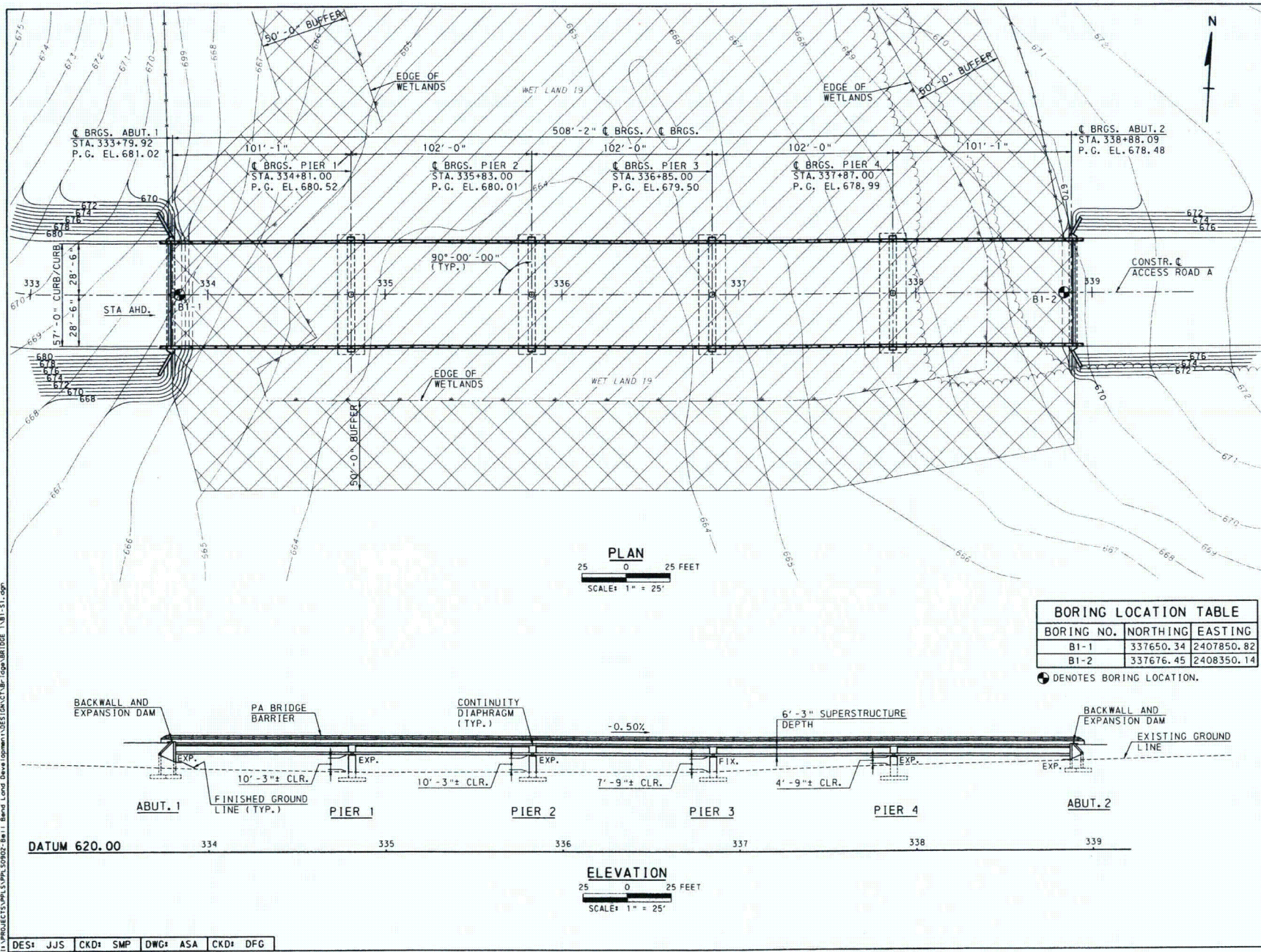
Method used to revise hydraulic or hydrologic analysis (model) to account for sediment transport:

Please note that bulked flows are used to evaluate the performance of a structure during the base flood; however, FEMA does not map BFEs based on bulked flows.

If a sediment analysis has not been performed, an explanation as to why sediment transport (including scour and deposition) will not affect the BFEs or structures must be provided.

A sediment transport analysis in the terms requested above (ac-ft., % by volume) was not performed for individual structures. There is no indication from historical records that sediment transport significantly affects the BFE, and the sediment supply to the upstream limit of the project reach is insignificant. The channel and floodplain restoration design, which employs natural channel design principles, does consider sediment transport in order to create a stable dimension, pattern, and profile. The intent of the design is to minimize shear stresses in the system to avoid mobilization of sediment from within the project reach, correcting the currently unstable banks that are the primary sediment (sand and silt) source under existing conditions.

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Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA 18702

CONCEPTUAL BRIDGE TYPE STUDIES
 BELL LUTHERNE COUNTY, PENNSYLVANIA
 BRIDGE NO. 1 ACCESS ROAD A OVER WETLAND 19
 STATION 336+34.00
 FIVE-SPAN CONTINUOUS COMPOSITE PRESTRESSED
 CONCRETE T-BEAM BRIDGE
 GENERAL PLAN AND ELEVATION

Pennoni

Engineers Surveyors Planners Landscape Architects

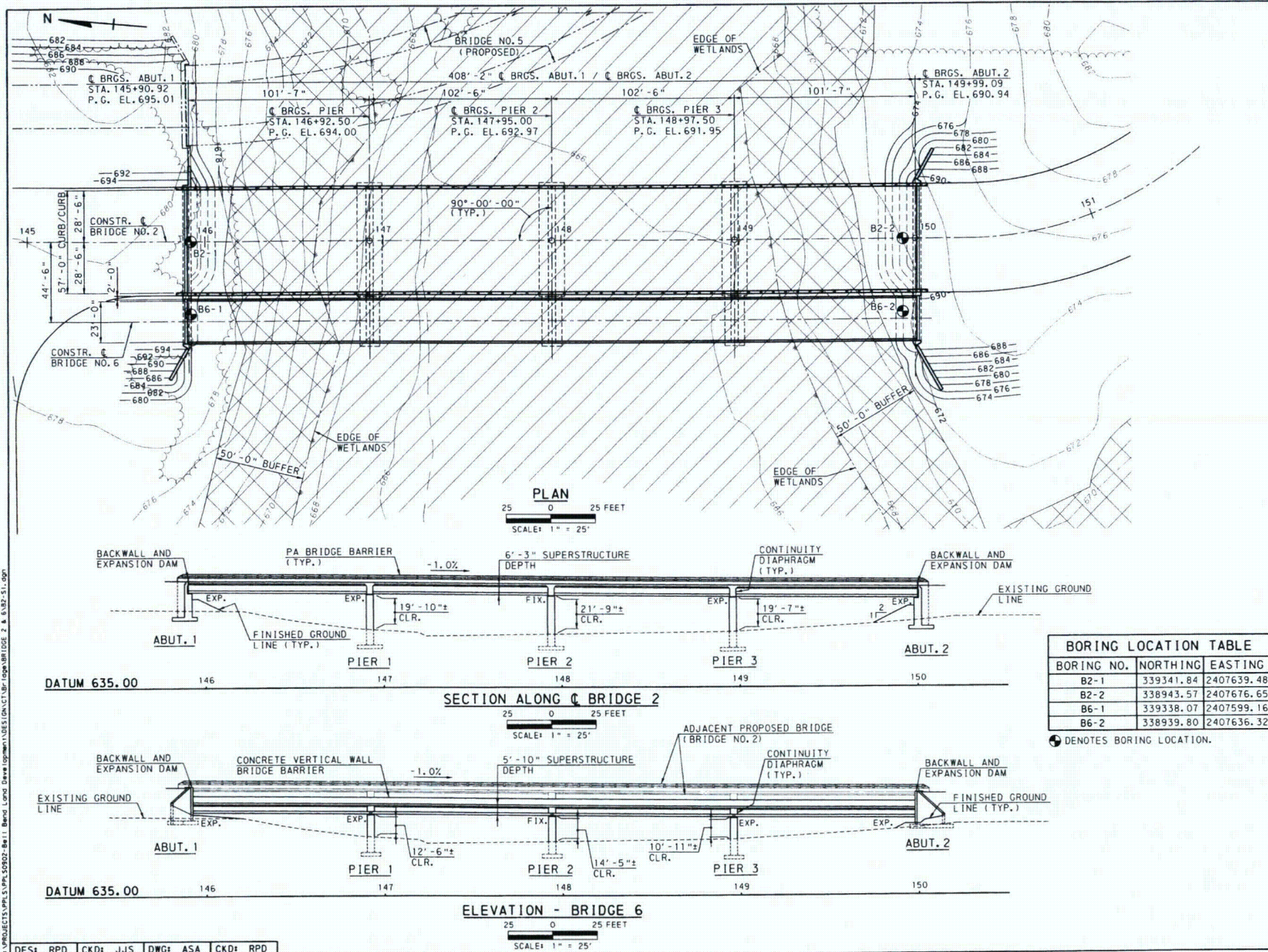
PROFESSIONAL
 DAVID F. CALISMAN
 P.E., P.S., P.L.S.

DATE: 4-19-11
 NO. 1
 ISSUED FOR USE
 BY: DFC

REVISIONS

DES: JJS CKD: SMP DWG: ASA CKD: DFC

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Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA 18702
 Engineers Surveyors Planners Landscape Architects



DATE	NO.	REVISIONS
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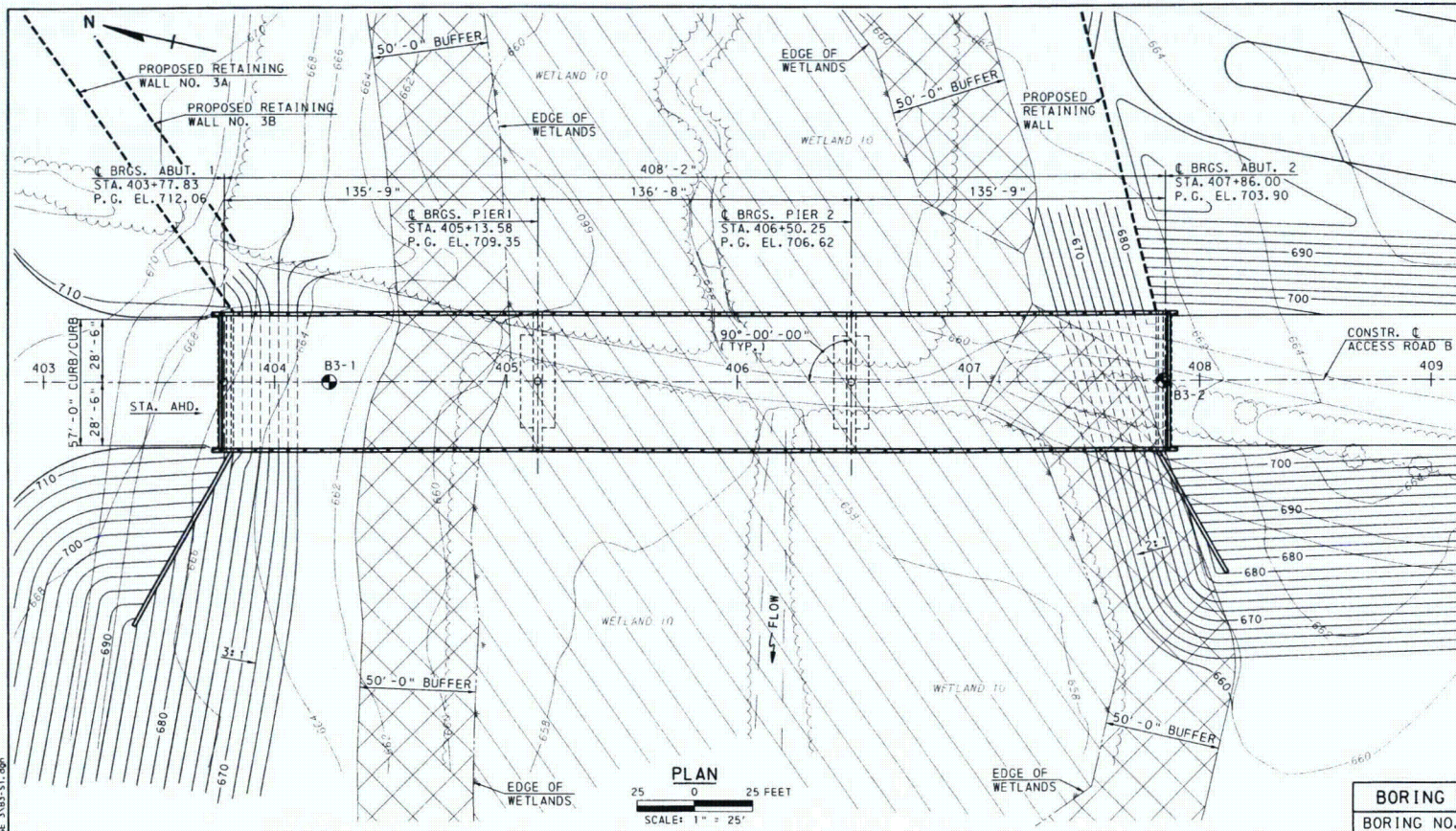


CONCEPTUAL BRIDGE TYPE STUDIES
 BELL BELLEVILLE TOWNSHIP
 BRIDGE NO. 2 (MAIN ACCESS ROAD) & BRIDGE NO. 6
 (UTILITY CROSSING) OVER WETLAND 12 & UNNAMED
 TRIB. TO WALKER RUN, STATION 147+95.00
 FOUR-SPAN CONTINUOUS COMPOSITE PRESTRESSED
 CONCRETE PA BULB-TEE BEAM BRIDGE
 GENERAL PLAN AND ELEVATION

JOB NO.
 PPLS 0902

SHEET 1 OF 2
 SCALE
 1" = 25'
 DRAWN BY
 ASA
 DATE
 1-28-11
 APPROVED
 4-19-11
B2-S1

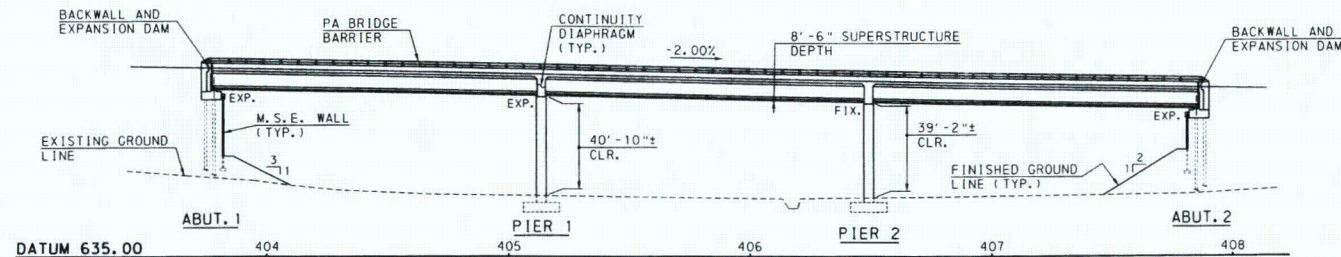
4/19/2011 10:53:42 AM
 I:\PROJECTS\UP-3\PLS\0902-B3-1\B3-1 Land Development\DESIGN\CT\B3-1\B3-1.dgn



PLAN
 25 0 25 FEET
 SCALE: 1" = 25'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B3-1	339107.67	2405952.60
B3-2	338756.32	2406035.35

● DENOTES BORING LOCATION.



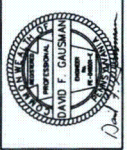
SECTION ALONG CONSTR. C
 25 0 25 FEET
 SCALE: 1" = 25'

DES: JJS CKD: SMP DWG: ASA CKD: DFC

Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA 18702
 Engineers Surveyors Planners Landscape Architects



DATE	NO.	ISSUED FOR USE	BY
4-18-11			DFC



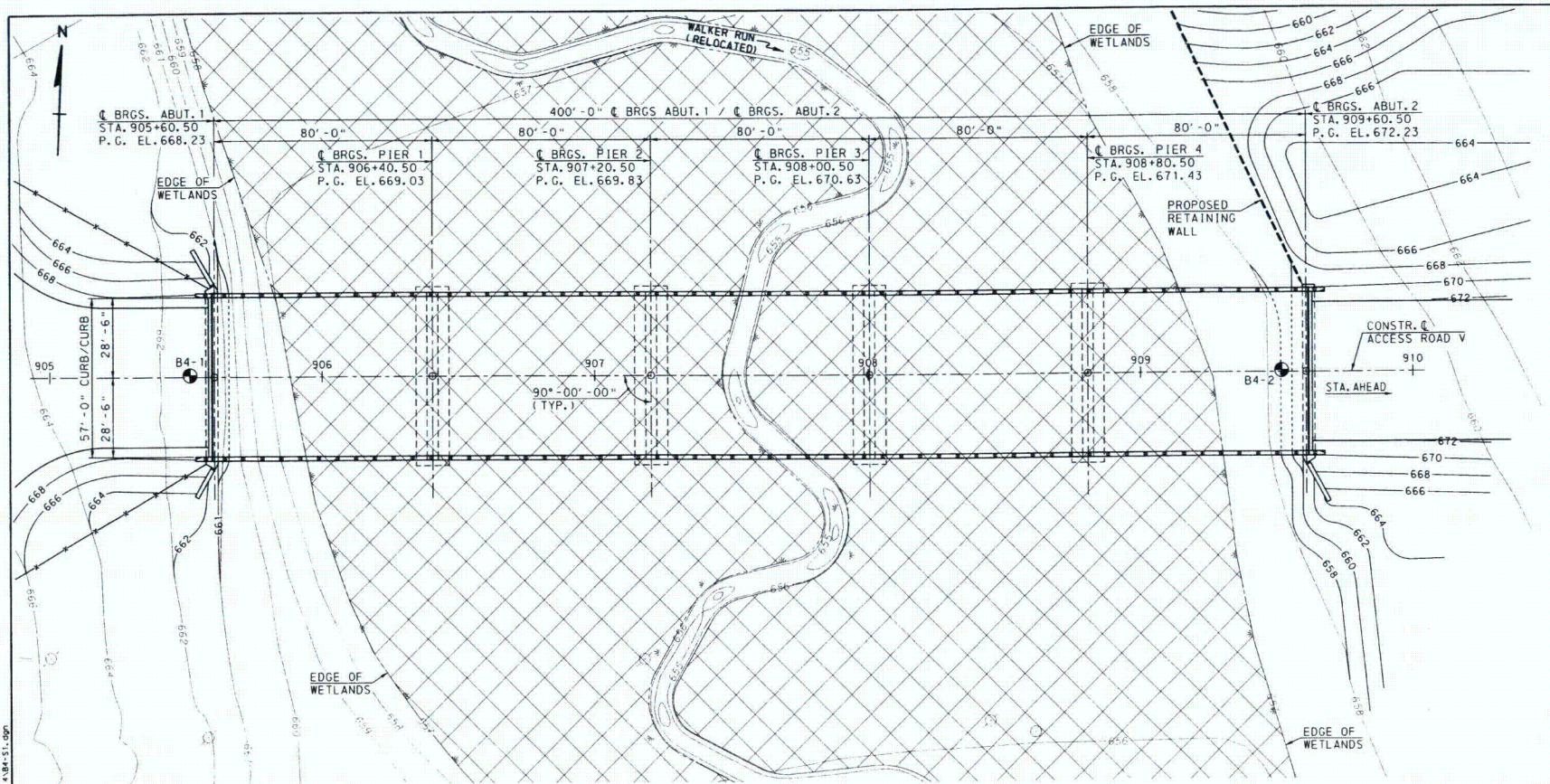
CONCEPTUAL BRIDGE TYPE STUDIES
 BELL BEND NUCLEAR PLANT, SALEM TOWNSHIP
 LUZERNE COUNTY, PENNSYLVANIA
 BRIDGE NO. 3 ACCESS ROAD B OVER WETLAND 10
 STATION 405+81.92
 THREE-SPAN CONTINUOUS COMPOSITE PRESTRESSED
 CONCRETE T-BEAM BRIDGE
 GENERAL PLAN AND ELEVATION

JOB NO.	PPLS 0902
SHEET	1 OF 2

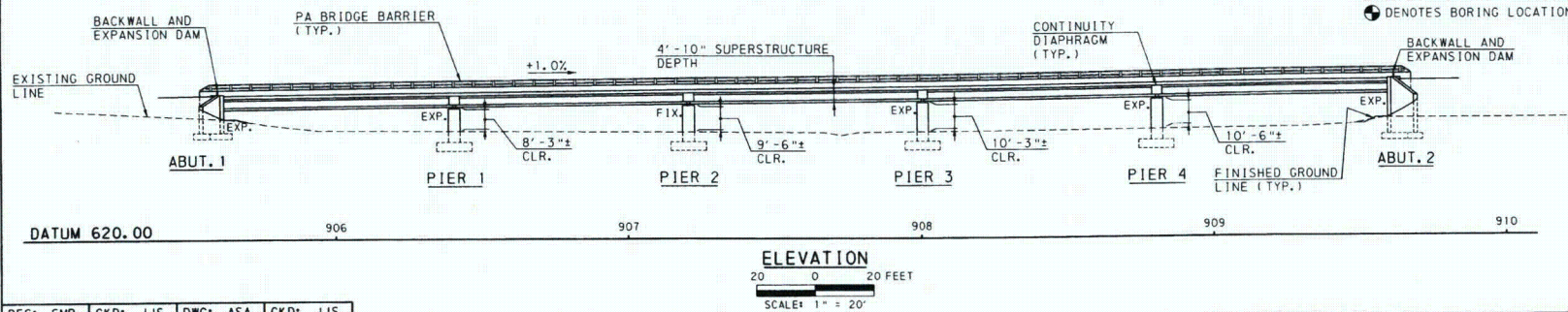
SCALE	1" = 25'
DRAWN BY	ASA
DATE	1-28-11
APPROVED	
4-18-11	

B3-S1

4/19/2011 10:46:08 AM
 I:\PROJECTS\PLANS\PA BRIDGE\DESIGN\CT\Bridges\PA BRIDGE.dwg 4-18-11.dgn



PLAN
 20 0 20 FEET
 SCALE: 1" = 20'



ELEVATION
 20 0 20 FEET
 SCALE: 1" = 20'

BORING LOCATION TABLE		
BORING NO.	NORTHING	EASTING
B4-1	339073.30	2404355.94
B4-2	339090.50	2404755.57

● DENOTES BORING LOCATION.

Pennoni Associates Inc. 100 N. WILKES-BARRE BLVD. WILKES-BARRE, PA 18702
 Engineers Surveyors Planners Landscape Architects



DATE	NO.	REVISIONS
4-19-11	1	ISSUED FOR USE
		BY



CONCEPTUAL BRIDGE TYPE STUDIES
 BELL BELLEVILLE TOWNSHIP
 BRIDGE NO. 4 ACCESS ROAD V OVER WALKER RUN
 STATION 907+60.50
 FIVE-SPAN CONTINUOUS COMPOSITE PRESTRESSED
 CONCRETE I-BEAM BRIDGE
 GENERAL PLAN AND ELEVATION

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JOB NO.
 PPLS 0902

SHEET 1 OF 2

SCALE
 1" = 20'

DRAWING NO.
 B4-S1

DES: SMP CKD: JJS DWG: ASA CKD: JJS

CAD and HEC-RAS files were not ADAMS compatible and are on CDs at the Public Document Room (PDR). A copy of the CD can be requested by contacting the PDR by email: pdr.resource@nrc.gov, phone: 301-415-4737/Toll Free: 800-397-4209 (8am-4pm) or facsimile: 301-415-3548.

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