
Appendix B: *RAFTS* Model Data

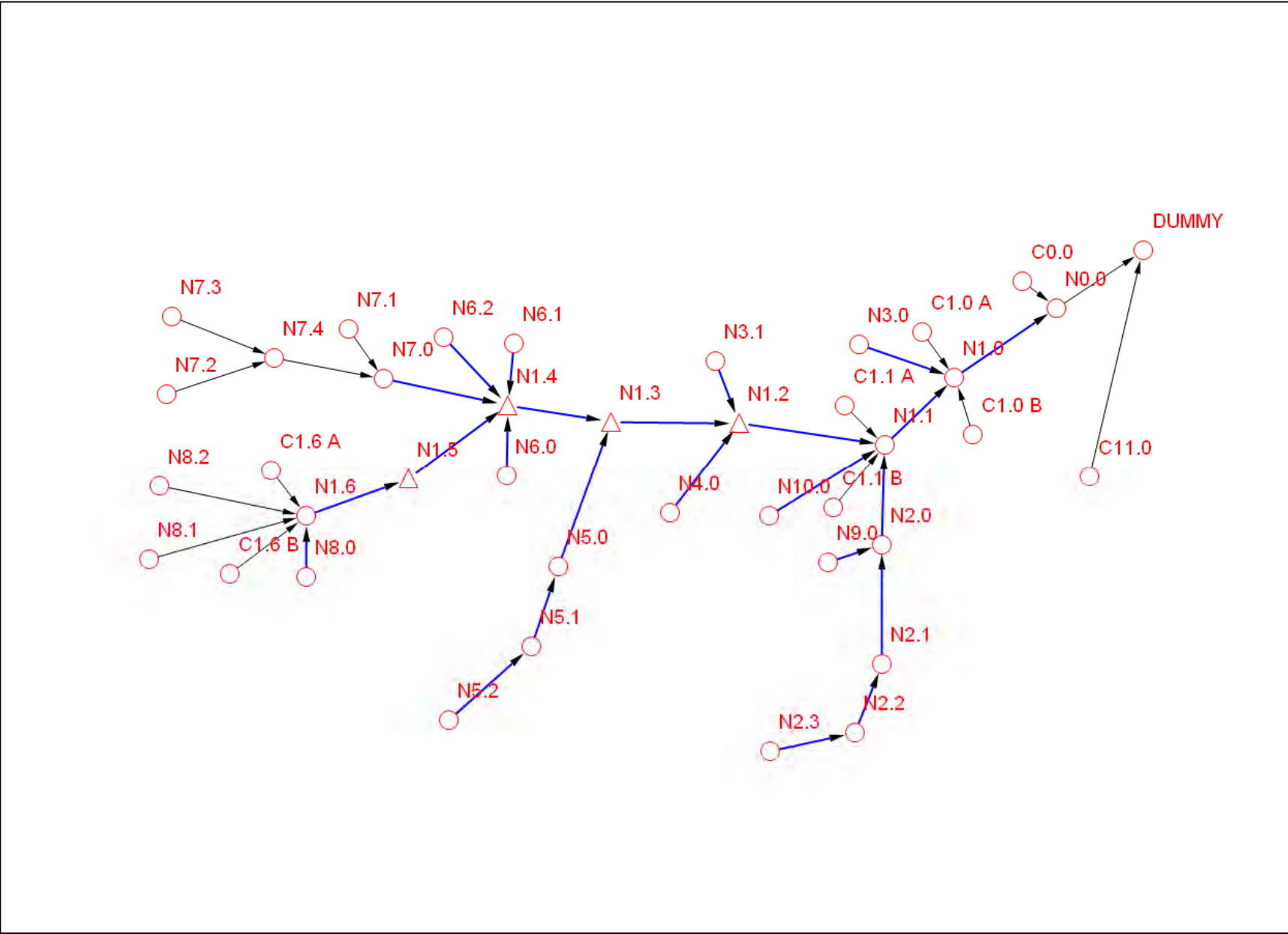
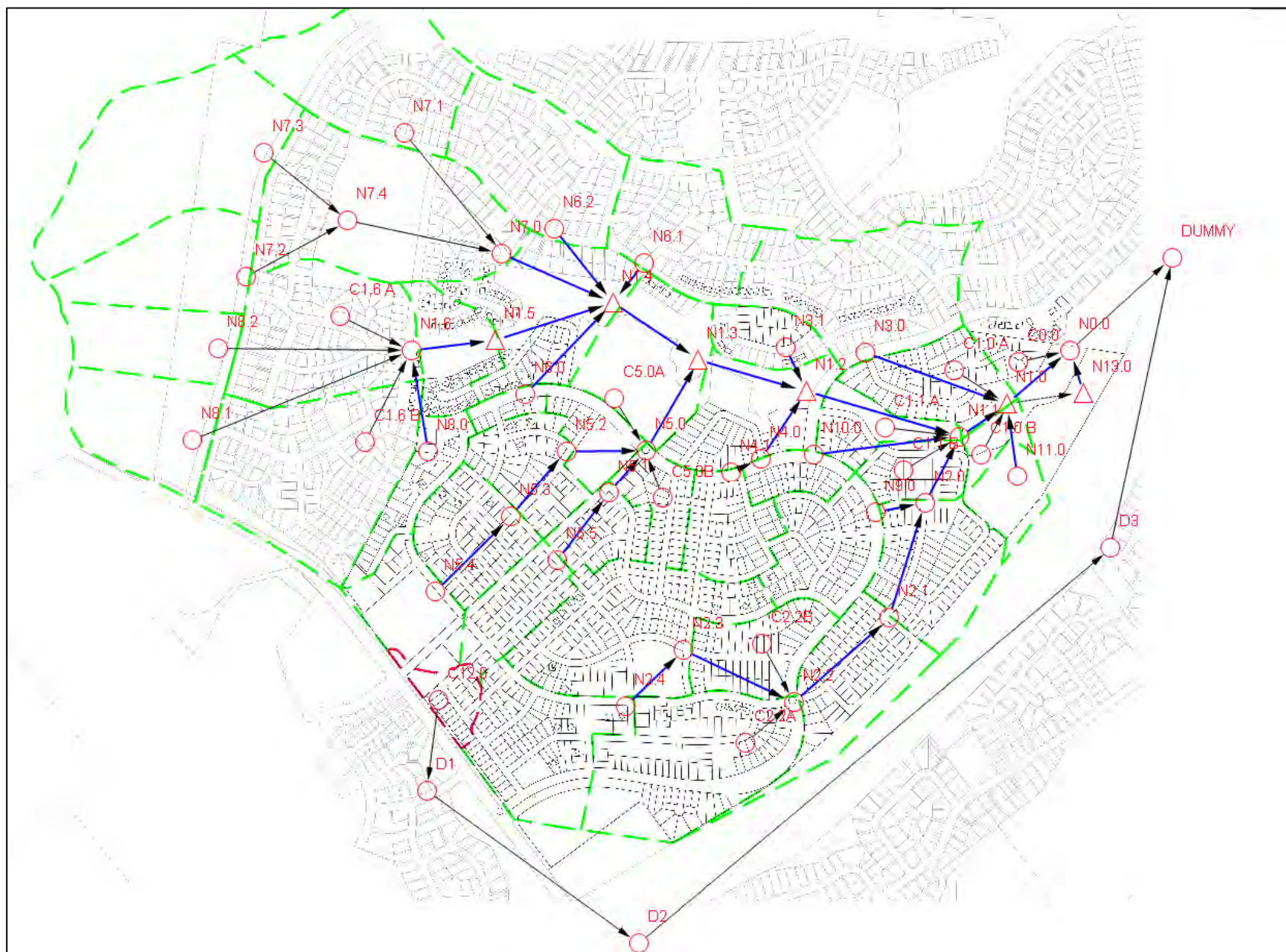


Figure B.1 - Existing RAFTS Model



Time of Concentration

For 100yr

Kinematic Wave Equation

Length of Flow Path L 2628 m
Average Slope S_o 0.03 m/m
Roughness Co-efficient n 0.025

$$t_c I^{0.4} = 244.77$$

$$t_c = 43 \text{ min}$$

Pilgram & McDermott method

Catchment Area A 2300000 m²
A 2.3 km²
 t_c 1.043 hr

$$t_c = 62.6 \text{ min}$$

Bransby Williams formula

Time of concentration $t_c = 71.0 \text{ min}$

Average 59 min
Adopt 43 min

Kinematic
Med Density Res 0.06 10min
Parkland 0.15 20min

Time (min)	Intensity (mm/hr)	$t_c I^{0.4}$
5	223.0	43
6	209.0	51
10	171.0	78
11	164.0	85
15	143.0	109
20	125.0	138
30	102.0	191
45	81.0	261
60	68.9	326
90	53.7	443

Estimation of Impervious Areas.
Claymore - Existing

Catchment	Total Area (Ha)	Percentage Impervious	Area Break-up (Ha)		Slope
			Impervious	Pervious	
C0.0	6.79	22%	1.52	5.27	3.07%
C1.0A	4.21	52%	2.21	2.00	1.80%
C1.0B	2.61	12%	0.32	2.29	3.00%
C1.1A	2.52	20%	0.51	2.01	1.76%
C1.1B	4.09	43%	1.77	2.32	4.19%
C1.2	5.02	31%	1.58	3.44	1.67%
C1.3	7.39	29%	2.18	5.21	4.07%
C1.4	6.49	35%	2.30	4.19	2.67%
C1.5	3.71	53%	1.98	1.73	4.51%
C1.6A	9.34	66%	6.19	3.15	4.15%
C1.6B	14.22	66%	9.36	4.86	2.97%
C2.0	5.64	39%	2.21	3.43	0.96%
C2.1	6.09	32%	1.94	4.15	3.28%
C2.2	13.55	42%	5.74	7.81	4.56%
C2.3	18.59	44%	8.26	10.33	3.39%
C3.0	9.95	73%	7.31	2.64	5.97%
C3.1	2.47	75%	1.85	0.62	4.48%
C4.0	2.5	28%	0.70	1.80	6.69%
C5.0	10.26	50%	5.13	5.13	4.48%
C5.1	5.37	35%	1.89	3.48	3.91%
C5.2	6.09	38%	2.32	3.77	6.13%
C6.0	1.09	43%	0.47	0.62	1.93%
C6.1	6.53	75%	4.90	1.63	8.21%
C6.2	8.38	71%	5.93	2.45	1.78%
C7.0	13.48	56%	7.51	5.97	2.49%
C7.1	9.47	52%	4.92	4.55	4.38%
C7.2	6.39	5%	0.32	6.07	9.46%
C7.3	13.54	5%	0.68	12.86	5.65%
C8.0	1.51	59%	0.89	0.62	4.66%
C8.1	6.15	5%	0.31	5.84	8.03%
C8.2	4.92	5%	0.25	4.67	8.28%
C9.0	5.2	59%	3.07	2.13	2.96%
C10.0	3.89	50%	1.94	1.95	5.54%
C11.0	2.61	5%	0.13	2.48	4.97%
Total	230.1		98.6	131.5	

Estimation of Impervious Areas.
Claymore - Proposed

Catchement	Total Area (Ha)	Percentage Impervious	Area Break-up (Ha)		Slope
			Impervious	Pervious	
C0.0	6.79	22%	1.52	5.27	3.07%
C1.0A	4.50	67%	2.99	1.50	1.80%
C1.0B	1.19	10%	0.12	1.07	3.00%
C1.1A	2.61	39%	1.01	1.60	11.04%
C1.1B	2.51	67%	1.67	0.84	3.34%
C1.2	5.84	48%	2.81	3.03	1.67%
C1.3	6.46	30%	1.94	4.52	4.07%
C1.4	7.67	49%	3.78	3.89	2.67%
C1.5	3.57	53%	1.89	1.68	4.51%
C1.6A	9.34	66%	6.19	3.15	4.15%
C1.6B	12.69	66%	8.35	4.34	2.97%
C2.0	6.21	64%	3.98	2.23	1.56%
C2.1	6.03	55%	3.33	2.70	1.57%
C2.2A	10.26	66%	6.75	3.51	4.04%
C2.2B	4.26	75%	3.19	1.07	2.93%
C2.3	9.81	67%	6.60	3.21	3.24%
C2.4	7.29	68%	4.95	2.33	3.53%
C3.0	9.95	73%	7.31	2.64	5.97%
C3.1	2.47	75%	1.85	0.62	4.48%
C4.1	3.68	75%	2.76	0.92	1.14%
C5.0A	2.52	42%	1.05	1.47	5.37%
C5.0B	2.51	75%	1.88	0.63	3.79%
C5.1	2.56	75%	1.92	0.64	7.64%
C5.2	4.01	75%	3.00	1.00	4.96%
C5.3	4.62	75%	3.46	1.15	4.70%
C5.4	4.12	83%	3.41	0.71	3.89%
C5.5	3.34	75%	2.51	0.84	4.05%
C6.0	0.93	75%	0.70	0.24	1.24%
C6.1	6.53	75%	4.90	1.63	8.21%
C6.2	8.38	71%	5.93	2.45	1.78%
C7.0	13.48	56%	7.51	5.97	2.49%
C7.1	9.47	52%	4.92	4.55	4.38%
C7.2	6.39	5%	0.32	6.07	9.46%
C7.3	13.54	5%	0.68	12.86	5.65%
C8.0	2.70	75%	2.02	0.67	4.43%
C8.1	6.15	5%	0.31	5.84	8.03%
C8.2	4.92	5%	0.25	4.67	8.28%
C9.0	5.09	75%	3.82	1.27	2.42%
C10.0	1.83	75%	1.37	0.46	4.62%
C11.0	2.34	10%	0.23	2.11	2.30%
C12.0	1.61	65%	1.04	0.57	4.97%
Total	230.1		124.2	105.9	

Appendix C: Peak Flows from *RAFTS*

Node	Duration (minutes)									
	15	20	25	30	45	60	90	120	180	MAX
C0.0	0.569	0.591	0.707	0.647	0.592	0.705	0.874	0.784	0.587	<u>0.874</u>
C1.0 A	0.833	0.857	0.877	0.806	0.709	0.802	0.915	0.807	0.526	<u>0.915</u>
C1.0 B	0.123	0.147	0.191	0.208	0.255	0.3	0.304	0.328	0.243	<u>0.328</u>
C1.1 A	0.189	0.189	0.23	0.208	0.214	0.236	0.31	0.271	0.213	<u>0.31</u>
C1.1 B	0.66	0.688	0.765	0.684	0.566	0.734	0.862	0.734	0.538	<u>0.862</u>
C1.6 A	2.291	2.333	2.407	2.213	1.917	2.172	2.399	2.184	1.353	<u>2.407</u>
C1.6 B	3.421	3.516	3.547	3.271	2.914	3.202	3.487	3.243	1.915	<u>3.547</u>
C11.0	0.113	0.183	0.236	0.256	0.3	0.364	0.372	0.412	0.295	<u>0.412</u>
DUMMY	13.731	14.913	16.888	15.586	14.689	17.282	18.659	18.498	14.659	<u>18.659</u>
N0.0	13.649	14.753	16.695	15.411	14.502	16.992	18.298	18.109	14.363	<u>18.298</u>
N1.0	13.927	14.529	16.994	15.593	14.406	16.928	18.092	17.51	14.019	<u>18.092</u>
N1.1	11.308	12.04	14.302	12.818	12.435	14.03	15.008	14.669	12.199	<u>15.008</u>
N1.2	7.675	8.015	8.4	8.604	9.208	9.519	9.554	9.622	9.242	<u>9.622</u>
N1.3	9.174	9.402	10.534	10.091	9.925	10.593	11.702	10.847	9.476	<u>11.702</u>
N1.4	10.361	10.497	12.162	11.556	9.805	11.517	11.993	10.685	8.633	<u>12.162</u>
N1.5	6.5	6.526	6.875	6.334	5.579	6.299	6.872	6.369	4.231	<u>6.875</u>
N1.6	6.004	6.047	6.424	5.923	5.108	5.764	6.406	5.738	3.984	<u>6.424</u>
N2.0	6.776	7.655	8.15	6.552	5.924	6.816	8.091	7.286	5.128	<u>8.15</u>
N2.1	5.752	5.753	6.112	5.516	4.787	5.542	6.553	5.803	4.136	<u>6.553</u>
N2.2	5.121	5.171	5.598	5.134	4.324	5.22	6.01	5.185	3.606	<u>6.01</u>
N2.3	3.02	3.093	3.25	2.987	2.566	3.003	3.423	2.983	2.017	<u>3.423</u>
N3.0	2.701	2.791	2.833	2.613	2.298	2.58	2.857	2.593	1.569	<u>2.857</u>
N3.1	0.69	0.716	0.718	0.66	0.591	0.657	0.753	0.681	0.408	<u>0.753</u>
N4.0	0.269	0.3	0.388	0.352	0.331	0.402	0.52	0.495	0.366	<u>0.52</u>
N5.0	3.488	3.584	3.926	3.589	2.935	3.742	4.434	3.761	2.749	<u>4.434</u>
N5.1	1.576	1.624	1.866	1.702	1.352	1.82	2.229	1.906	1.437	<u>2.229</u>
N5.2	0.872	0.898	1.035	0.939	0.768	1.023	1.267	1.101	0.818	<u>1.267</u>
N6.0	0.175	0.176	0.194	0.178	0.146	0.185	0.213	0.187	0.129	<u>0.213</u>
N6.1	1.833	1.921	1.93	1.778	1.571	1.772	1.977	1.782	1.088	<u>1.977</u>
N6.2	2.167	2.197	2.212	2.035	1.835	1.987	2.145	2.027	1.165	<u>2.212</u>
N7.0	3.887	3.982	4.354	4.097	3.855	4.351	4.506	4.619	3.587	<u>4.619</u>
N7.1	1.832	1.876	1.956	1.809	1.531	1.835	2.095	1.843	1.238	<u>2.095</u>
N7.2	0.279	0.528	0.621	0.7	0.796	0.966	1.063	1.161	0.835	<u>1.161</u>
N7.3	0.387	0.627	0.893	1.052	1.308	1.515	1.549	1.66	1.183	<u>1.66</u>
N7.4	0.666	1.155	1.494	1.684	2.026	2.412	2.445	2.699	1.941	<u>2.699</u>
N8.0	0.33	0.354	0.365	0.332	0.291	0.345	0.42	0.344	0.245	<u>0.42</u>
N8.1	0.257	0.459	0.573	0.644	0.743	0.89	0.952	1.047	0.755	<u>1.047</u>
N8.2	0.229	0.39	0.483	0.542	0.62	0.734	0.809	0.878	0.637	<u>0.878</u>
N9.0	1.139	1.149	1.195	1.095	0.951	1.11	1.227	1.121	0.704	<u>1.227</u>
N10.0	0.726	0.753	0.834	0.752	0.621	0.8	0.938	0.801	0.571	<u>0.938</u>

Node	Duration (minutes)									
	15	20	25	30	45	60	90	120	180	MAX
C0.0	1.126	1.283	1.441	1.351	1.481	1.609	1.946	1.866	1.459	1.946
C1.0 A	1.389	1.327	1.46	1.367	1.149	1.424	1.62	1.435	1.002	1.62
C1.0 B	0.379	0.492	0.551	0.575	0.617	0.687	0.792	0.793	0.614	0.793
C1.1 A	0.384	0.427	0.486	0.465	0.516	0.583	0.663	0.654	0.499	0.663
C1.1 B	1.198	1.19	1.374	1.28	1.068	1.475	1.674	1.471	1.054	1.674
C1.6 A	3.716	3.612	3.929	3.669	3.128	3.818	4.221	3.852	2.43	4.221
C1.6 B	5.492	5.361	5.668	5.308	4.616	5.435	5.989	5.462	3.502	5.989
C11.0	0.535	0.648	0.681	0.645	0.648	0.802	0.901	0.915	0.662	0.915
DUMMY	24.178	26.149	27.442	26.16	24.757	28.207	32.122	31.531	24.721	32.122
N0.0	23.755	25.514	26.772	25.535	24.214	27.405	31.293	30.642	24.142	31.293
N1.0	23.525	24.899	26.373	25.17	23.09	26.522	30.582	29.219	23.192	30.582
N1.1	18.536	20.103	21.229	20.352	19.529	21.424	24.886	23.954	19.477	24.886
N1.2	9.773	10.448	10.892	11.117	11.619	12.018	13.69	14.047	12.58	14.047
N1.3	13.52	14.193	14.643	14.505	14.505	16.607	17.448	17.932	15.063	17.932
N1.4	17.153	17.02	18.601	17.762	16.854	18.074	20.166	19.143	15.729	20.166
N1.5	10.672	10.469	11.255	10.508	9.317	11.24	13.01	11.787	8.957	13.01
N1.6	9.856	9.54	10.421	9.765	8.636	10.468	12.218	10.669	8.432	12.218
N2.0	11.732	11.766	12.533	11.843	10.347	12.762	15.236	13.996	10.354	15.236
N2.1	9.321	9.159	10.32	9.574	8.241	10.684	12.594	11.126	8.286	12.594
N2.2	8.509	8.141	9.291	8.641	7.146	9.426	10.973	9.614	7.064	10.973
N2.3	5.115	4.869	5.537	5.15	4.238	5.515	6.36	5.553	4.072	6.36
N3.0	4.383	4.296	4.612	4.318	3.693	4.459	4.805	4.467	2.655	4.805
N3.1	1.125	1.1	1.193	1.11	0.934	1.139	1.215	1.145	0.663	1.215
N4.0	0.621	0.83	0.903	0.824	0.736	0.964	1.055	0.927	0.66	1.055
N5.0	6.169	5.885	6.523	6.292	5.496	6.887	8.038	7.058	5.479	8.038
N5.1	2.966	3.148	3.645	3.408	2.859	3.893	4.261	3.901	2.909	4.261
N5.2	1.656	1.781	2.05	1.918	1.622	2.203	2.491	2.187	1.586	2.491
N6.0	0.303	0.31	0.368	0.33	0.279	0.373	0.426	0.375	0.274	0.426
N6.1	3.005	2.91	3.233	3.022	2.532	3.083	3.267	3.056	1.754	3.267
N6.2	3.434	3.412	3.447	3.233	2.907	3.274	3.583	3.314	2.028	3.583
N7.0	6.434	6.954	7.326	8.191	8.856	9.763	10.125	10.007	7.745	10.125
N7.1	3.067	2.949	3.402	3.18	2.587	3.449	3.887	3.454	2.394	3.887
N7.2	1.456	1.756	1.85	1.728	1.711	2.137	2.368	2.344	1.653	2.368
N7.3	1.81	2.461	2.793	2.87	3.078	3.456	3.501	3.788	2.941	3.788
N7.4	3.266	4.061	4.347	4.341	4.616	5.265	5.827	6.104	4.594	6.104
N8.0	0.582	0.561	0.672	0.628	0.497	0.66	0.704	0.648	0.403	0.704
N8.1	1.303	1.569	1.649	1.568	1.578	1.955	2.21	2.204	1.572	2.21
N8.2	1.124	1.325	1.405	1.325	1.305	1.614	1.813	1.804	1.273	1.813
N9.0	1.87	1.794	1.978	1.85	1.588	1.974	2.22	1.972	1.326	2.22
N10.0	1.31	1.308	1.526	1.396	1.157	1.574	1.729	1.549	1.03	1.729

Claymore - Proposed 2 year ARI

Node	Duration (Minutes)					
	20	25	45	60	180	MAX
C0.0	0.463	0.466	0.372	0.306	0.38	0.466
C1.0 A	0.889	0.872	0.733	0.598	0.434	0.889
C1.0 B	0.037	0.045	0.077	0.044	0.066	0.077
C1.1 A	0.293	0.299	0.244	0.202	0.17	0.299
C1.1 B	0.514	0.497	0.411	0.338	0.26	0.514
C1.6 A	1.801	1.804	1.501	1.238	0.958	1.804
C1.6 B	2.44	2.443	2.023	1.686	1.246	2.443
C12.0	0.324	0.31	0.264	0.216	0.176	0.324
C2.2A	1.961	1.966	1.636	1.356	1.036	1.966
C2.2B	0.94	0.93	0.779	0.641	0.467	0.94
C5.0A	0.328	0.322	0.267	0.218	0.226	0.328
C5.0B	0.581	0.559	0.466	0.382	0.284	0.581
D1	0.324	0.31	0.264	0.216	0.176	0.324
D2	0.324	0.31	0.264	0.216	0.176	0.324
D3	0.324	0.31	0.264	0.216	0.176	0.324
DUMMY	13.66	15.164	12.838	12.35	12.446	15.164
N0.0	13.449	15.105	12.65	12.263	12.292	15.105
N1.0	15.335	17.717	14.128	13.955	12.869	17.717
N1.1	13.16	15.6	12.202	12.495	11.333	15.6
N1.2	8.384	8.682	8.57	7.772	8.173	8.682
N1.3	9.67	10.895	8.92	8.374	8.471	10.895
N1.4	8.685	10.265	7.854	7.288	6.719	10.265
N1.5	5.07	5.16	4.297	3.5	2.729	5.16
N1.6	4.73	4.905	3.986	3.307	2.614	4.905
N2.0	9.269	9.476	7.86	6.559	4.867	9.476
N2.1	7.08	7.218	5.967	4.983	3.743	7.218
N2.2	6.148	6.252	5.156	4.317	3.251	6.252
N2.3	3.317	3.357	2.752	2.321	1.748	3.357
N2.4	1.452	1.444	1.199	0.995	0.751	1.452
N3.0	2.193	2.151	1.789	1.467	1.122	2.193
N3.1	0.578	0.553	0.462	0.38	0.284	0.578
N4.0	0.816	0.803	0.671	0.549	0.411	0.816
N4.1	0.816	0.803	0.671	0.549	0.411	0.816
N5.0	4.941	5.034	4.126	3.514	2.664	5.034
N5.1	1.365	1.315	1.108	0.918	0.686	1.365
N5.2	2.856	2.878	2.362	1.996	1.467	2.878
N5.3	2.037	2.027	1.67	1.377	1.012	2.037
N5.4	1.003	1.002	0.826	0.683	0.492	1.003
N5.5	0.752	0.739	0.615	0.515	0.377	0.752
N6.0	0.203	0.203	0.169	0.141	0.101	0.203
N6.1	1.503	1.457	1.227	1.015	0.786	1.503
N6.2	1.739	1.724	1.44	1.176	0.842	1.739
N7.0	3.075	3.34	2.662	2.165	2.396	3.34
N7.1	1.439	1.45	1.197	0.982	0.818	1.45
N7.2	0.184	0.289	0.485	0.286	0.421	0.485
N7.3	0.224	0.352	0.79	0.434	0.741	0.79
N7.4	0.408	0.641	1.233	0.708	1.088	1.233
N8.0	0.628	0.6	0.506	0.415	0.309	0.628
N8.1	0.158	0.258	0.447	0.267	0.38	0.447
N8.2	0.142	0.215	0.366	0.223	0.319	0.366
N9.0	1.121	1.114	0.929	0.775	0.55	1.121
N10.0	0.43	0.411	0.345	0.283	0.214	0.43
N11.0	0.068	0.082	0.132	0.065	0.13	0.132
N13.0	3.442	4.276	3.02	2.959	2.579	4.276

NOTE: 15, 30, 90 and 120 minute storms were unable to be run due to unknown internal program errors within RAFTS

Node	Duration (Minutes)									
	15	20	25	30	45	60	90	120	180	MAX
C0.0	0.569	0.591	0.707	0.647	0.592	0.705	0.874	0.784	0.587	0.874
C1.0 A	1.092	1.111	1.129	1.037	0.926	1.014	1.119	1.048	0.624	1.129
C1.0 B	0.047	0.069	0.098	0.117	0.136	0.159	0.169	0.179	0.139	0.179
C1.1 A	0.372	0.381	0.406	0.371	0.312	0.38	0.461	0.379	0.283	0.461
C1.1 B	0.623	0.647	0.654	0.599	0.531	0.596	0.69	0.608	0.394	0.69
C1.6 A	2.291	2.333	2.407	2.213	1.917	2.172	2.399	2.184	1.353	2.407
C1.6 B	3.061	3.137	3.177	2.926	2.596	2.856	3.117	2.884	1.723	3.177
C12.0	0.387	0.413	0.418	0.382	0.338	0.393	0.47	0.392	0.264	0.47
C2.2A	2.477	2.522	2.617	2.409	2.083	2.359	2.62	2.367	1.463	2.62
C2.2B	1.181	1.194	1.214	1.114	0.99	1.085	1.204	1.097	0.667	1.214
C5.0A	0.39	0.417	0.469	0.422	0.342	0.482	0.579	0.481	0.372	0.579
C5.0B	0.7	0.722	0.725	0.667	0.596	0.661	0.752	0.684	0.406	0.752
D1	0.387	0.413	0.418	0.382	0.338	0.393	0.47	0.392	0.264	0.47
D2	0.387	0.413	0.418	0.382	0.338	0.393	0.47	0.392	0.264	0.47
D3	0.387	0.413	0.418	0.382	0.338	0.393	0.47	0.392	0.264	0.47
DUMMY	16.458	16.988	18.604	17.713	15.983	18.335	19.202	18.651	14.652	19.202
N0.0	16.297	16.693	18.497	17.606	15.72	18.127	18.993	18.31	14.528	18.993
N1.0	19.594	19.352	22.191	20.93	17.906	21.305	21.936	21.305	15.237	22.191
N1.1	16.982	16.262	19.36	18.043	15.328	17.928	18.766	18.111	13.37	19.36
N1.2	8.601	9.355	9.892	9.666	9.9	10.11	10.603	10.045	9.669	10.603
N1.3	11.932	11.483	12.901	12.554	10.742	12.975	13.608	12.45	10.648	13.608
N1.4	10.892	10.874	12.711	12.071	10.122	12.011	12.491	11.175	8.789	12.711
N1.5	6.444	6.526	6.824	6.326	5.522	6.287	6.86	6.342	4.204	6.86
N1.6	6.043	6.084	6.466	5.961	5.096	5.795	6.426	5.751	3.976	6.466
N2.0	11.58	11.42	12.155	10.955	9.898	10.743	11.879	10.755	6.86	12.155
N2.1	8.762	8.614	9.231	8.264	7.542	8.127	8.991	8.145	5.278	9.231
N2.2	7.557	7.424	7.969	7.104	6.541	6.995	7.728	7.012	4.568	7.969
N2.3	4.219	4.272	4.372	4.016	3.524	3.952	4.345	3.977	2.438	4.372
N2.4	1.833	1.854	1.899	1.74	1.529	1.741	1.912	1.739	1.058	1.912
N3.0	2.701	2.791	2.833	2.613	2.298	2.58	2.857	2.593	1.569	2.857
N3.1	0.69	0.716	0.718	0.66	0.591	0.657	0.753	0.681	0.408	0.753
N4.0	1.009	1.032	1.047	0.964	0.855	0.945	1.06	0.97	0.593	1.06
N4.1	1.009	1.032	1.047	0.964	0.855	0.945	1.06	0.97	0.593	1.06
N5.0	6.103	6.121	6.477	6.024	5.278	6.082	6.693	6.031	3.85	6.693
N5.1	1.662	1.705	1.722	1.582	1.403	1.607	1.801	1.611	0.981	1.801
N5.2	3.428	3.434	3.561	3.353	3.077	3.332	3.561	3.286	2.091	3.561
N5.3	2.491	2.529	2.603	2.393	2.172	2.369	2.574	2.402	1.433	2.603
N5.4	1.264	1.297	1.29	1.186	1.072	1.158	1.277	1.174	0.684	1.297
N5.5	0.94	0.955	0.962	0.884	0.784	0.876	0.991	0.889	0.546	0.991
N6.0	0.254	0.255	0.263	0.241	0.213	0.236	0.256	0.241	0.139	0.263
N6.1	1.833	1.921	1.93	1.778	1.571	1.772	1.977	1.782	1.088	1.977
N6.2	2.167	2.197	2.212	2.035	1.835	1.987	2.145	2.027	1.165	2.212
N7.0	3.887	3.982	4.354	4.097	3.855	4.351	4.506	4.619	3.587	4.619
N7.1	1.832	1.876	1.956	1.809	1.531	1.835	2.095	1.843	1.238	2.095
N7.2	0.279	0.528	0.621	0.7	0.796	0.966	1.063	1.161	0.835	1.161
N7.3	0.387	0.627	0.893	1.052	1.308	1.515	1.549	1.66	1.183	1.66
N7.4	0.666	1.155	1.494	1.684	2.026	2.412	2.445	2.699	1.941	2.699
N8.0	0.755	0.777	0.781	0.717	0.639	0.718	0.814	0.738	0.448	0.814
N8.1	0.257	0.459	0.573	0.644	0.743	0.89	0.952	1.047	0.755	1.047
N8.2	0.229	0.39	0.483	0.542	0.62	0.734	0.809	0.878	0.637	0.878
N9.0	1.397	1.413	1.434	1.319	1.179	1.284	1.414	1.313	0.775	1.434
N10.0	0.516	0.545	0.532	0.49	0.441	0.489	0.552	0.507	0.302	0.552
N11.0	0.089	0.111	0.149	0.172	0.215	0.244	0.249	0.259	0.196	0.259
N13.0	4.933	4.848	5.842	5.4	4.342	5.532	5.753	5.532	3.408	5.842

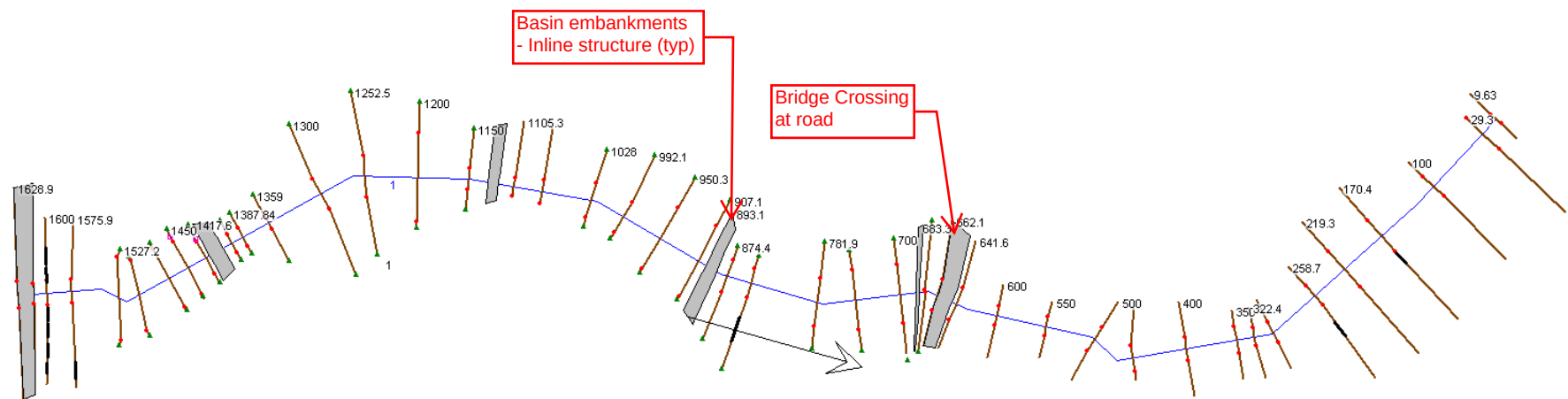
Node	Duration (Minutes)								
	15	20	25	30	45	60	90	120	MAX
C0.0	0.83	0.804	1.046	0.963	0.989	1.116	1.386	1.281	<u>1.386</u>
C1.0 A	1.416	1.42	1.512	1.383	1.191	1.376	1.512	1.383	<u>1.512</u>
C1.0 B	0.125	0.159	0.182	0.189	0.209	0.243	0.273	0.285	<u>0.285</u>
C1.1 A	0.495	0.497	0.59	0.53	0.415	0.564	0.65	0.566	<u>0.65</u>
C1.1 B	0.808	0.821	0.903	0.823	0.68	0.847	0.944	0.855	<u>0.944</u>
C1.6 A	2.973	2.984	3.21	2.961	2.483	2.984	3.358	3.011	<u>3.358</u>
C1.6 B	3.955	3.995	4.214	3.887	3.338	3.837	4.262	3.891	<u>4.262</u>
C12.0	0.511	0.526	0.607	0.554	0.434	0.573	0.632	0.573	<u>0.632</u>
C2.2A	3.238	3.23	3.486	3.214	2.703	3.242	3.631	3.271	<u>3.631</u>
C2.2B	1.514	1.557	1.625	1.499	1.28	1.478	1.623	1.495	<u>1.625</u>
C5.0A	0.546	0.538	0.711	0.645	0.505	0.709	0.843	0.718	<u>0.843</u>
C5.0B	0.905	0.926	0.984	0.898	0.764	0.917	1.006	0.931	<u>1.006</u>
D1	0.511	0.526	0.607	0.554	0.434	0.573	0.632	0.573	<u>0.632</u>
D2	0.511	0.526	0.607	0.554	0.434	0.573	0.632	0.573	<u>0.632</u>
D3	0.511	0.526	0.607	0.554	0.434	0.573	0.632	0.573	<u>0.632</u>
DUMMY	20.479	21.662	22.472	21.797	20.268	22.038	24.039	23.569	<u>24.039</u>
N0.0	20.245	21.212	22.26	21.589	19.859	21.693	23.753	23.272	<u>23.753</u>
N1.0	24.145	24.212	26.61	25.638	22.806	24.713	27.4	25.744	<u>27.4</u>
N1.1	20.077	20.39	21.628	21.129	19.153	20.072	22.437	21.748	<u>22.437</u>
N1.2	9.879	10.606	11.388	11.08	11.079	11.6	12.431	11.624	<u>12.431</u>
N1.3	14.075	14.489	15.358	14.897	13.349	15.55	16.435	15.757	<u>16.435</u>
N1.4	14.398	13.856	16.37	15.41	12.867	15.053	16.415	14.794	<u>16.415</u>
N1.5	8.51	8.452	9.227	8.503	7.287	8.503	9.683	8.84	<u>9.683</u>
N1.6	7.94	7.858	8.585	7.933	6.657	7.936	9.221	8.057	<u>9.221</u>
N2.0	13.563	13.427	14.37	13.517	12.466	13.035	13.981	13.36	<u>14.37</u>
N2.1	10.699	10.651	11.069	10.665	9.709	10.638	10.919	10.641	<u>11.069</u>
N2.2	10.037	9.926	10.673	9.808	8.39	9.684	10.829	9.667	<u>10.829</u>
N2.3	5.452	5.504	5.816	5.351	4.598	5.319	5.878	5.486	<u>5.878</u>
N2.4	2.364	2.411	2.565	2.35	1.986	2.333	2.621	2.36	<u>2.621</u>
N3.0	3.516	3.57	3.778	3.485	2.945	3.519	3.898	3.564	<u>3.898</u>
N3.1	0.893	0.915	0.988	0.903	0.756	0.917	1.004	0.929	<u>1.004</u>
N4.0	1.312	1.314	1.421	1.313	1.098	1.297	1.424	1.316	<u>1.424</u>
N4.1	1.312	1.314	1.421	1.313	1.098	1.297	1.424	1.316	<u>1.424</u>
N5.0	7.655	7.557	8.262	7.794	6.703	7.868	8.353	7.903	<u>8.353</u>
N5.1	2.143	2.208	2.383	2.196	1.826	2.191	2.385	2.211	<u>2.385</u>
N5.2	4.482	4.384	4.79	4.42	3.711	4.289	4.736	4.354	<u>4.79</u>
N5.3	3.271	3.334	3.462	3.182	2.737	3.168	3.504	3.214	<u>3.504</u>
N5.4	1.626	1.679	1.72	1.577	1.38	1.564	1.698	1.581	<u>1.72</u>
N5.5	1.203	1.247	1.316	1.213	1.031	1.205	1.32	1.218	<u>1.32</u>
N6.0	0.328	0.334	0.348	0.32	0.276	0.313	0.343	0.316	<u>0.348</u>
N6.1	2.395	2.455	2.625	2.415	2.033	2.435	2.678	2.453	<u>2.678</u>
N6.2	2.81	2.845	2.923	2.696	2.358	2.635	2.858	2.69	<u>2.923</u>
N7.0	5.096	5.266	5.697	5.361	5.961	6.877	7.274	7.286	<u>7.286</u>
N7.1	2.427	2.424	2.725	2.488	2.001	2.612	2.996	2.631	<u>2.996</u>
N7.2	0.758	1.033	1.184	1.142	1.18	1.502	1.741	1.795	<u>1.795</u>
N7.3	0.936	1.353	1.656	1.833	2.094	2.448	2.493	2.692	<u>2.692</u>
N7.4	1.694	2.363	2.69	2.899	3.244	3.755	4.137	4.353	<u>4.353</u>
N8.0	0.975	1.003	1.074	0.99	0.828	0.99	1.089	1.008	<u>1.089</u>
N8.1	0.656	0.912	1.069	1.055	1.117	1.385	1.565	1.639	<u>1.639</u>
N8.2	0.578	0.776	0.904	0.879	0.907	1.155	1.334	1.372	<u>1.372</u>
N9.0	1.804	1.818	1.915	1.765	1.524	1.732	1.888	1.748	<u>1.915</u>
N10.0	0.665	0.683	0.734	0.671	0.57	0.688	0.754	0.693	<u>0.754</u>
N11.0	0.173	0.224	0.27	0.29	0.337	0.398	0.399	0.436	<u>0.436</u>
N13.0	6.526	6.549	7.389	7.048	6.057	6.725	7.665	7.085	<u>7.665</u>

NOTE: 180 minute storms were unable to be run due to unknown internal program errors within RAFTS

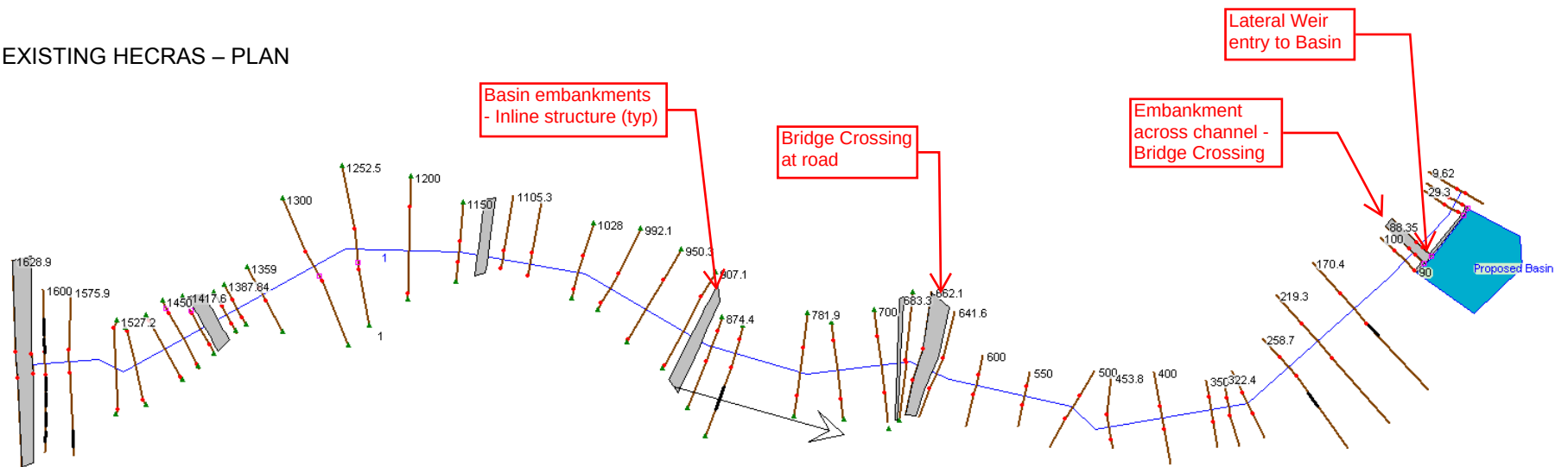
Node	Duration (Minutes)									
	15	20	25	30	45	60	90	120	180	MAX
C0.0	0.974	1.075	1.209	1.118	1.267	1.379	1.672	1.581	1.23	1.672
C1.0 A	1.56	1.544	1.606	1.499	1.316	1.529	1.679	1.533	0.97	1.679
C1.0 B	0.177	0.221	0.238	0.241	0.256	0.297	0.328	0.346	0.256	0.346
C1.1 A	0.563	0.538	0.64	0.59	0.482	0.639	0.743	0.643	0.494	0.743
C1.1 B	0.905	0.888	0.968	0.894	0.76	0.952	1.042	0.958	0.596	1.042
C1.6 A	3.302	3.222	3.441	3.203	2.802	3.386	3.737	3.404	2.162	3.737
C1.6 B	4.387	4.27	4.489	4.186	3.694	4.319	4.738	4.344	2.765	4.738
C12.0	0.579	0.56	0.661	0.612	0.482	0.644	0.693	0.637	0.388	0.693
C2.2A	3.592	3.503	3.741	3.482	3.042	3.656	4.04	3.689	2.356	4.04
C2.2B	1.673	1.673	1.727	1.613	1.416	1.657	1.793	1.665	1.004	1.793
C5.0A	0.665	0.691	0.781	0.731	0.618	0.846	0.973	0.824	0.594	0.973
C5.0B	1.006	1.006	1.052	0.987	0.845	1.021	1.102	1.033	0.604	1.102
D1	0.579	0.56	0.661	0.612	0.482	0.644	0.693	0.637	0.388	0.693
D2	0.579	0.56	0.661	0.612	0.482	0.644	0.693	0.637	0.388	0.693
D3	0.579	0.56	0.661	0.612	0.482	0.644	0.693	0.637	0.388	0.693
DUMMY	22.656	23.492	24.015	23.143	21.738	24.533	26.416	26.471	21.342	26.471
N0.0	22.321	23.155	23.691	22.832	21.379	24.135	26.095	26.161	21.152	26.161
N1.0	26.679	26.743	28.032	27.013	24.398	27.326	29.905	29.141	22.808	29.905
N1.1	21.991	22.18	22.526	21.835	20.029	22.183	24.281	24.498	19.327	24.498
N1.2	10.614	11.424	11.956	11.65	11.879	12.448	13.231	12.818	11.76	13.231
N1.3	15.444	16.015	16.695	15.813	14.933	16.766	18.004	17.461	14.094	18.004
N1.4	16.309	15.767	17.455	16.648	14.992	16.838	18.503	17.065	14.004	18.503
N1.5	9.49	9.34	9.867	9.211	8.177	9.774	11.162	10.213	7.689	11.162
N1.6	8.838	8.546	9.19	8.583	7.469	9.137	10.55	9.295	7.245	10.55
N2.0	14.752	15.129	14.876	14.432	13.122	14.209	15.046	15.242	10.603	15.242
N2.1	11.79	12.153	11.977	11.229	10.548	11.579	12.751	12.181	8.169	12.751
N2.2	11.115	10.933	11.39	10.611	9.255	10.961	12.13	10.933	7.029	12.13
N2.3	6.02	5.953	6.167	5.772	5.09	5.933	6.576	6.051	3.867	6.576
N2.4	2.654	2.593	2.714	2.533	2.209	2.645	2.944	2.653	1.694	2.944
N3.0	3.913	3.868	4.068	3.784	3.303	3.947	4.296	3.974	2.386	4.296
N3.1	0.996	0.993	1.056	0.979	0.836	1.017	1.095	1.025	0.597	1.095
N4.0	1.454	1.431	1.512	1.414	1.218	1.455	1.572	1.456	0.88	1.572
N4.1	1.454	1.431	1.512	1.414	1.218	1.455	1.572	1.456	0.88	1.572
N5.0	8.662	8.187	9.135	8.425	7.417	8.607	9.449	8.57	5.68	9.449
N5.1	2.401	2.371	2.543	2.374	2.006	2.444	2.585	2.45	1.423	2.585
N5.2	5.03	4.864	5.152	4.794	4.15	4.88	5.3	4.914	3.059	5.3
N5.3	3.593	3.606	3.661	3.422	3.035	3.573	3.859	3.64	2.105	3.859
N5.4	1.779	1.803	1.824	1.695	1.512	1.73	1.853	1.752	0.996	1.853
N5.5	1.333	1.332	1.399	1.308	1.13	1.352	1.453	1.357	0.803	1.453
N6.0	0.364	0.36	0.366	0.343	0.307	0.349	0.38	0.348	0.212	0.38
N6.1	2.669	2.609	2.833	2.633	2.247	2.751	2.933	2.724	1.58	2.933
N6.2	3.061	3.087	3.076	2.882	2.608	2.915	3.17	2.955	1.787	3.17
N7.0	5.782	6.132	6.164	6.798	7.582	8.437	8.746	8.723	6.746	8.746
N7.1	2.73	2.631	2.977	2.768	2.282	2.988	3.415	3.009	2.113	3.415
N7.2	1.132	1.406	1.514	1.427	1.445	1.813	2.074	2.089	1.472	2.089
N7.3	1.428	1.992	2.332	2.402	2.629	2.984	3	3.216	2.505	3.216
N7.4	2.56	3.36	3.632	3.714	4.013	4.529	4.974	5.255	3.977	5.255
N8.0	1.087	1.084	1.148	1.072	0.912	1.107	1.188	1.115	0.651	1.188
N8.1	1.009	1.281	1.376	1.323	1.364	1.673	1.878	1.942	1.392	1.942
N8.2	0.864	1.092	1.158	1.095	1.109	1.395	1.561	1.591	1.134	1.591
N9.0	1.988	1.983	2.031	1.897	1.675	1.93	2.084	1.938	1.175	2.084
N10.0	0.739	0.732	0.799	0.748	0.624	0.772	0.825	0.766	0.443	0.825
N11.0	0.245	0.313	0.378	0.385	0.439	0.503	0.498	0.558	0.412	0.558
N13.0	7.413	7.435	7.886	7.53	6.614	7.639	8.542	8.274	6.058	8.542

Node	Duration (Minutes)									
	15	20	25	30	45	60	90	120	180	MAX
C0.0	1.126	1.283	1.441	1.351	1.481	1.609	1.946	1.866	1.459	<u>1.946</u>
C1.0 A	1.747	1.709	1.8	1.686	1.473	1.719	1.895	1.727	1.1	<u>1.895</u>
C1.0 B	0.214	0.264	0.286	0.284	0.293	0.344	0.389	0.402	0.293	<u>0.402</u>
C1.1 A	0.646	0.611	0.732	0.677	0.569	0.742	0.86	0.746	0.574	<u>0.86</u>
C1.1 B	1.024	0.988	1.097	1.019	0.854	1.072	1.166	1.079	0.665	<u>1.166</u>
C1.6 A	3.716	3.612	3.929	3.669	3.128	3.818	4.221	3.852	2.43	<u>4.221</u>
C1.6 B	4.913	4.789	5.087	4.747	4.117	4.854	5.376	4.888	3.141	<u>5.376</u>
C12.0	0.667	0.625	0.753	0.701	0.548	0.727	0.774	0.716	0.431	<u>0.774</u>
C2.2A	4.041	3.927	4.26	3.986	3.405	4.148	4.578	4.178	2.652	<u>4.578</u>
C2.2B	1.881	1.857	1.94	1.817	1.585	1.86	2.011	1.868	1.122	<u>2.011</u>
C5.0A	0.76	0.8	0.933	0.865	0.738	0.997	1.101	0.956	0.663	<u>1.101</u>
C5.0B	1.129	1.114	1.189	1.116	0.944	1.144	1.223	1.152	0.672	<u>1.223</u>
D1	0.667	0.625	0.753	0.701	0.548	0.727	0.774	0.716	0.431	<u>0.774</u>
D2	0.667	0.625	0.753	0.701	0.548	0.727	0.774	0.716	0.431	<u>0.774</u>
D3	0.667	0.625	0.753	0.701	0.548	0.727	0.774	0.716	0.431	<u>0.774</u>
DUMMY	24.406	25.563	26.008	25.136	24.07	27.031	28.901	30.096	23.764	<u>30.096</u>
N0.0	24.014	25.215	25.637	24.779	23.693	26.585	28.549	29.764	23.532	<u>29.764</u>
N1.0	28.917	29.058	29.901	28.857	26.66	30.064	32.593	32.579	25.448	<u>32.593</u>
N1.1	23.477	23.931	23.701	22.891	21.869	24.674	25.995	27.228	21.43	<u>27.228</u>
N1.2	11.275	12.079	12.704	12.438	12.526	15.57	17.067	17.118	14.489	<u>17.118</u>
N1.3	16.77	17.279	18.199	17.679	18	19.854	19.87	20.252	17.446	<u>20.252</u>
N1.4	18.038	17.574	19.422	18.535	16.936	18.837	20.945	19.49	16.003	<u>20.945</u>
N1.5	10.622	10.429	11.176	10.447	9.192	11.17	12.9	11.685	8.866	<u>12.9</u>
N1.6	9.912	9.576	10.453	9.783	8.57	10.443	12.192	10.645	8.392	<u>12.192</u>
N10.0	0.837	0.813	0.899	0.844	0.703	0.864	0.915	0.872	0.491	<u>0.915</u>
N11.0	0.305	0.39	0.449	0.475	0.528	0.58	0.64	0.651	0.502	<u>0.651</u>
N13.0	8.196	8.245	8.54	8.175	7.406	8.597	9.483	9.478	6.982	<u>9.483</u>
N2.0	15.88	16.934	16.15	15.533	14.835	15.732	16.093	17.267	12.125	<u>17.267</u>
N2.1	13.337	13.622	13.699	12.767	11.818	13.491	14.321	14.031	9.365	<u>14.321</u>
N2.2	12.46	12.204	12.91	12.034	10.442	12.481	13.467	12.543	8.042	<u>13.467</u>
N2.3	6.733	6.619	6.954	6.507	5.675	6.742	7.464	6.807	4.37	<u>7.464</u>
N2.4	2.955	2.884	3.071	2.865	2.505	3.032	3.32	3.03	1.899	<u>3.32</u>
N3.0	4.383	4.296	4.612	4.318	3.693	4.459	4.805	4.467	2.655	<u>4.805</u>
N3.1	1.125	1.1	1.193	1.11	0.934	1.139	1.215	1.145	0.663	<u>1.215</u>
N4.0	1.642	1.586	1.705	1.598	1.37	1.638	1.762	1.627	0.981	<u>1.762</u>
N4.1	1.642	1.586	1.705	1.598	1.37	1.638	1.762	1.627	0.981	<u>1.762</u>
N5.0	9.578	9.39	10.181	9.759	8.051	9.914	10.349	9.808	6.31	<u>10.349</u>
N5.1	2.645	2.575	2.785	2.627	2.264	2.681	2.897	2.699	1.582	<u>2.897</u>
N5.2	5.704	5.526	5.867	5.471	4.674	5.605	6.059	5.547	3.394	<u>6.059</u>
N5.3	3.993	3.976	4.129	3.867	3.407	4.001	4.293	4.079	2.332	<u>4.293</u>
N5.4	1.993	2.003	2.043	1.905	1.685	1.931	2.074	1.967	1.106	<u>2.074</u>
N5.5	1.512	1.47	1.577	1.476	1.262	1.519	1.626	1.518	0.893	<u>1.626</u>
N6.0	0.407	0.401	0.411	0.385	0.345	0.39	0.428	0.392	0.239	<u>0.428</u>
N6.1	3.005	2.91	3.233	3.022	2.532	3.083	3.267	3.056	1.754	<u>3.267</u>
N6.2	3.434	3.412	3.447	3.233	2.907	3.274	3.583	3.314	2.028	<u>3.583</u>
N7.0	6.434	6.954	7.326	8.191	8.856	9.763	10.125	10.007	7.745	<u>10.125</u>
N7.1	3.067	2.949	3.402	3.18	2.587	3.449	3.887	3.454	2.394	<u>3.887</u>
N7.2	1.456	1.756	1.85	1.728	1.711	2.137	2.368	2.344	1.653	<u>2.368</u>
N7.3	1.81	2.461	2.793	2.87	3.078	3.456	3.501	3.788	2.941	<u>3.788</u>
N7.4	3.266	4.061	4.347	4.341	4.616	5.265	5.827	6.104	4.594	<u>6.104</u>
N8.0	1.228	1.199	1.298	1.214	1.023	1.241	1.321	1.248	0.723	<u>1.321</u>
N8.1	1.303	1.569	1.649	1.568	1.578	1.955	2.21	2.204	1.572	<u>2.21</u>
N8.2	1.124	1.325	1.405	1.325	1.305	1.614	1.813	1.804	1.273	<u>1.813</u>
N9.0	2.23	2.204	2.278	2.133	1.872	2.164	2.346	2.174	1.321	<u>2.346</u>

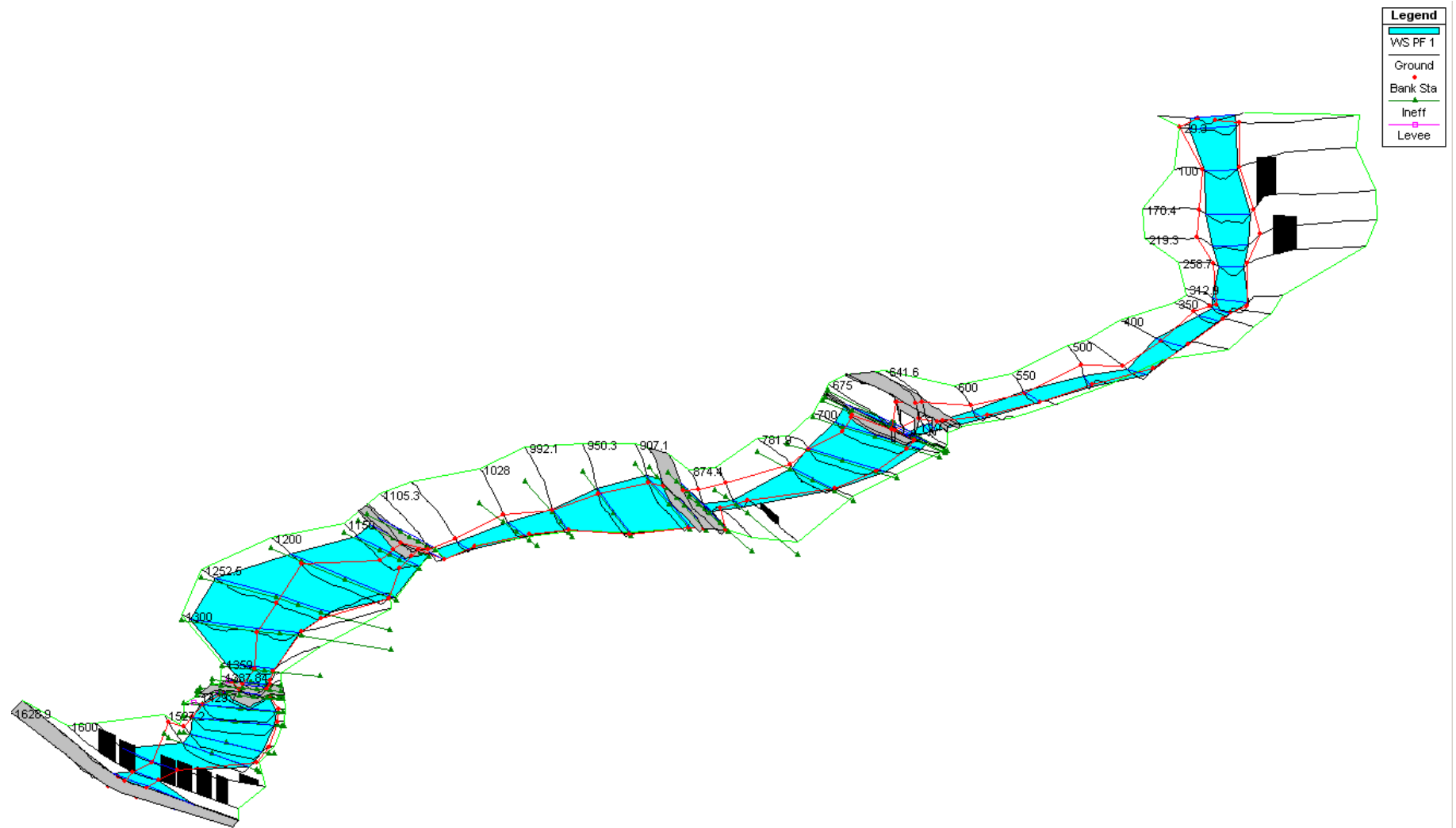
Appendix D: *HEC-RAS* Results



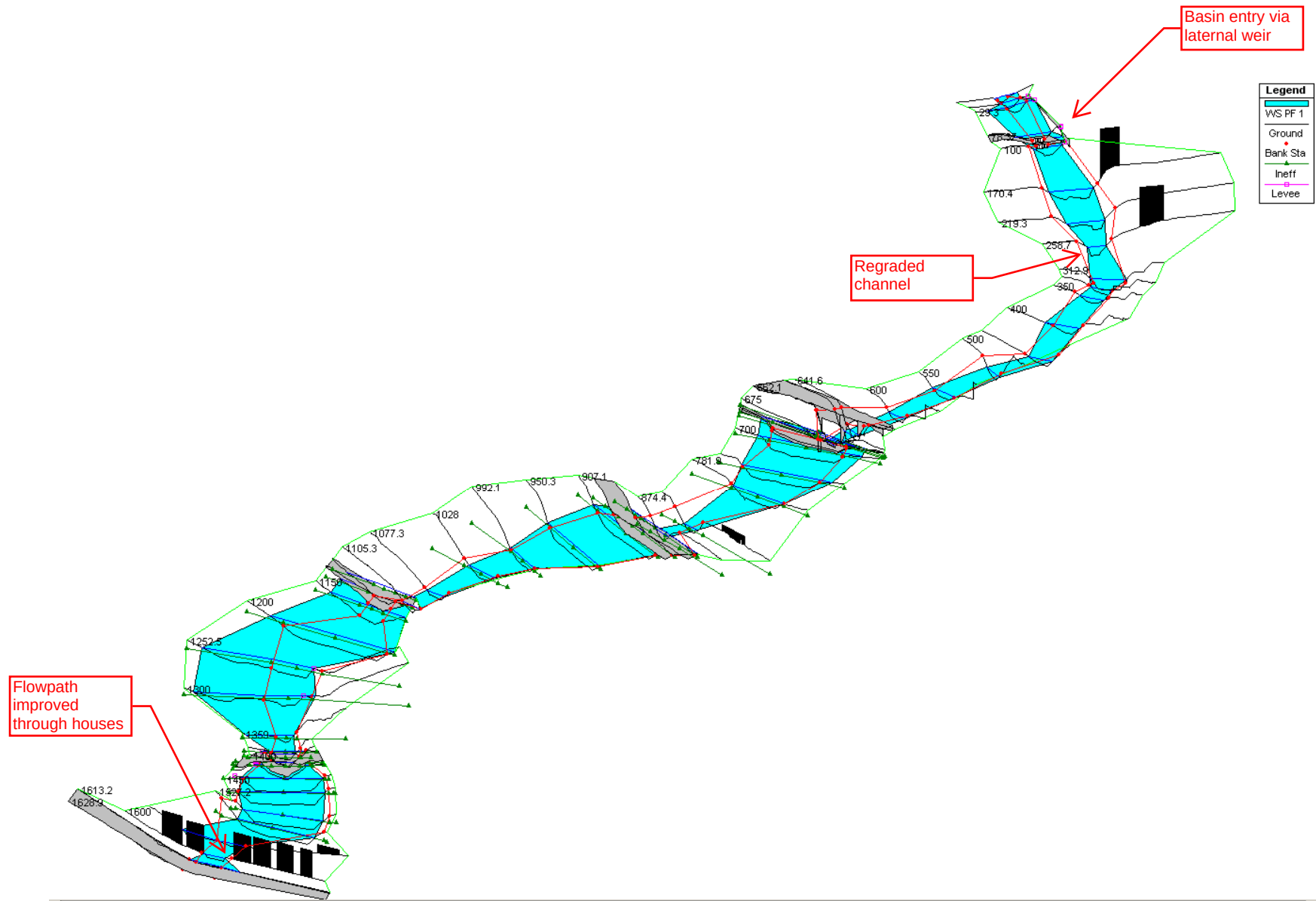
EXISTING HECRAS – PLAN



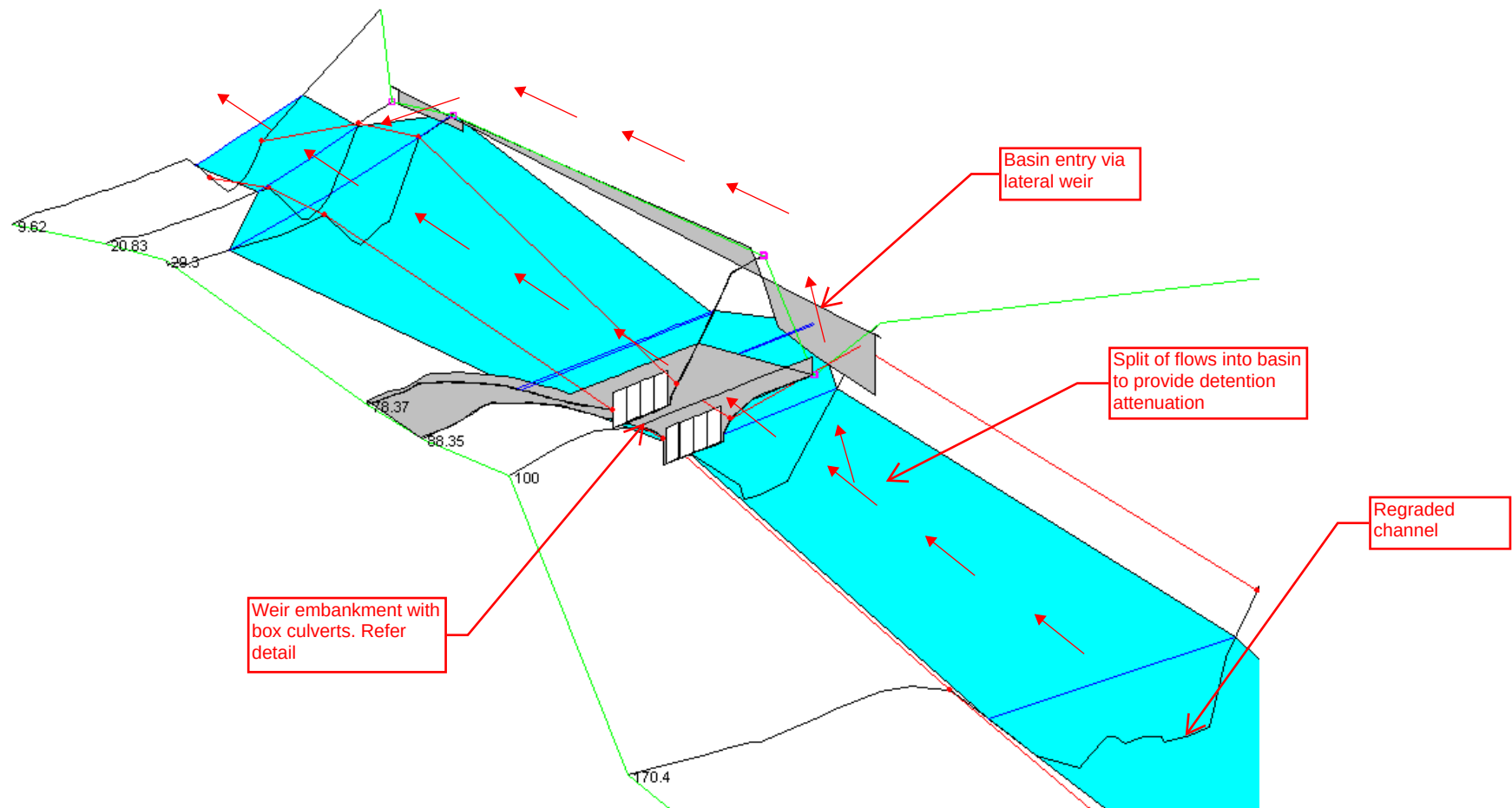
PROPOSED HECRAS – PLAN



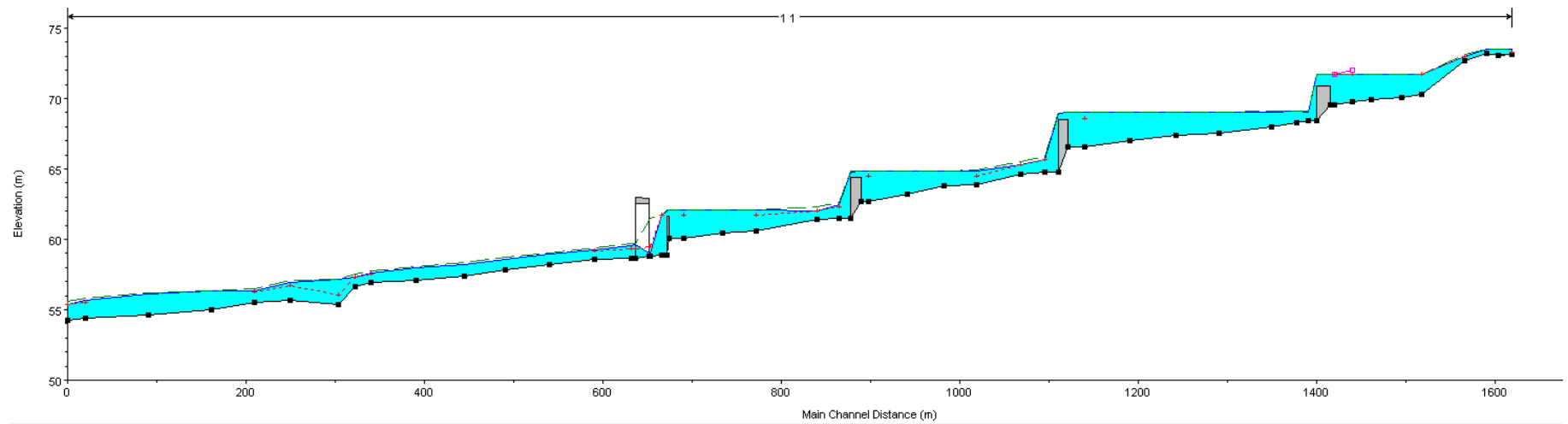
EXISTING HECRAS 100 YEAR ARI – XYZ OUTPUT



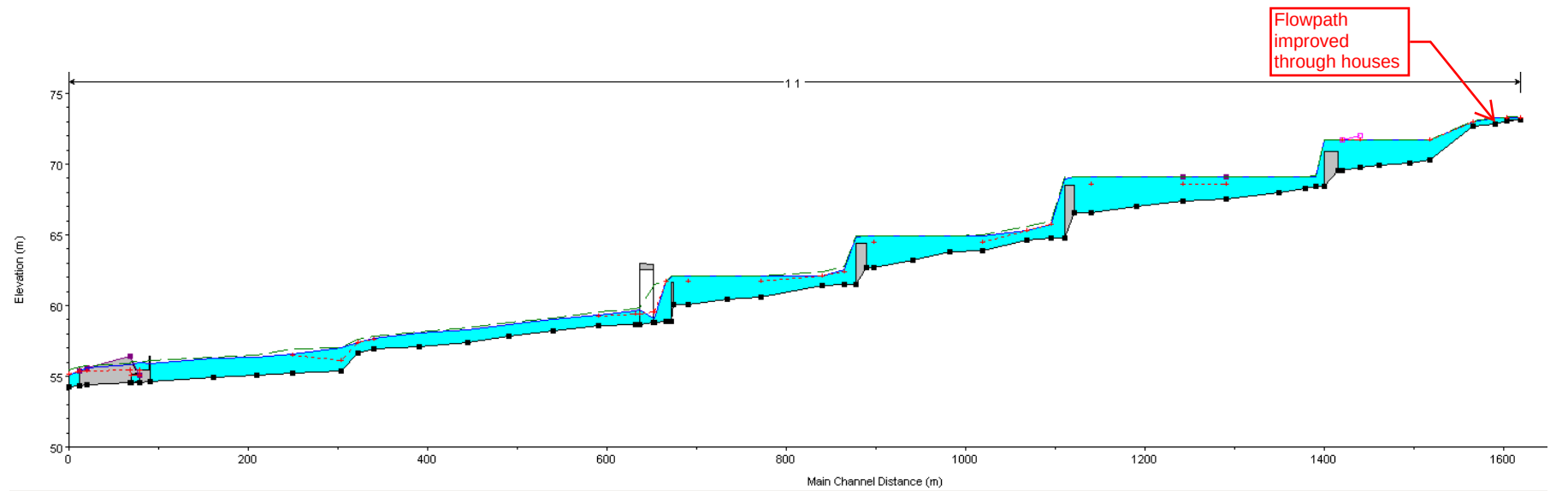
PROPOSED HECRAS 100 YEAR ARI – XYZ OUTPUT



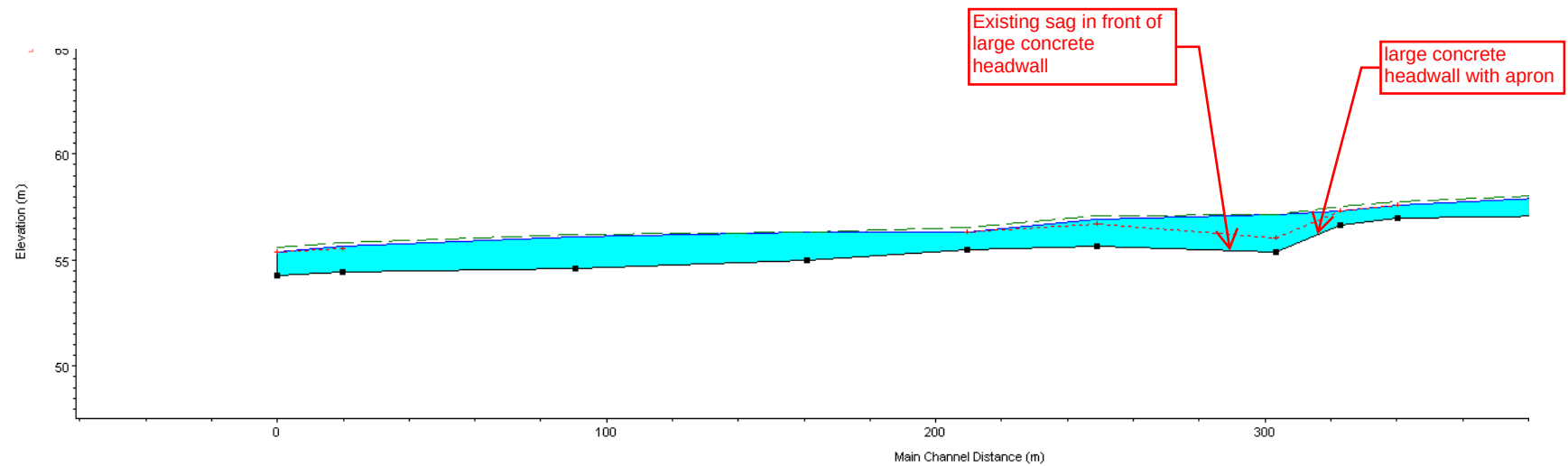
PROPOSED HECRAS 100 YEAR ARI – XYZ OUTPUT
(EMBANKMENT ACROSS CHANNEL AND BASIN ENTRY)



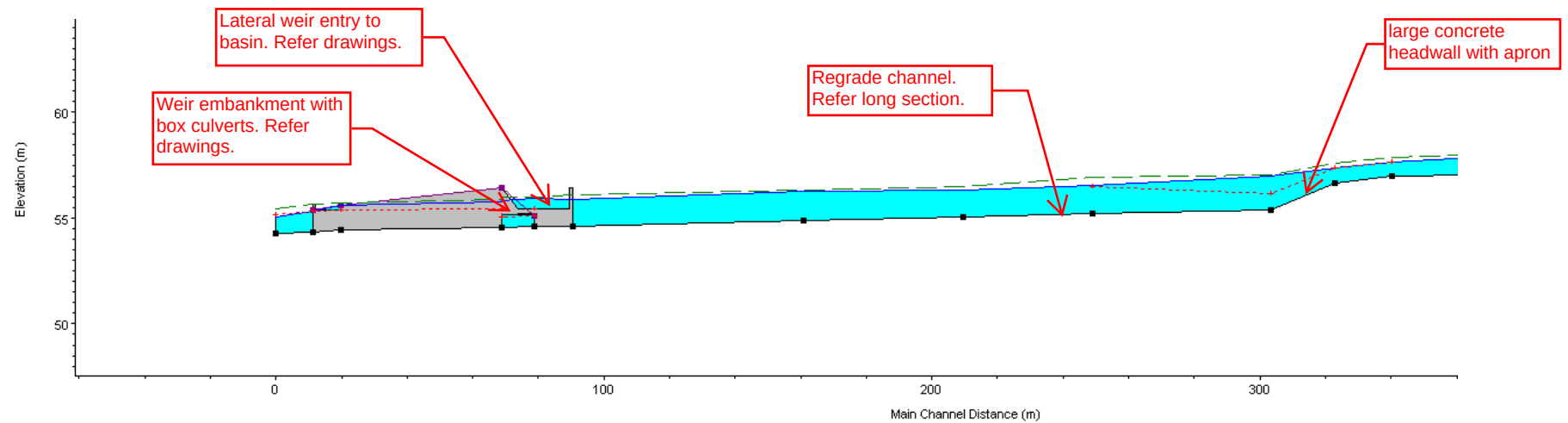
EXISTING HECRAS 100 YEAR ARI – LONG SECTION



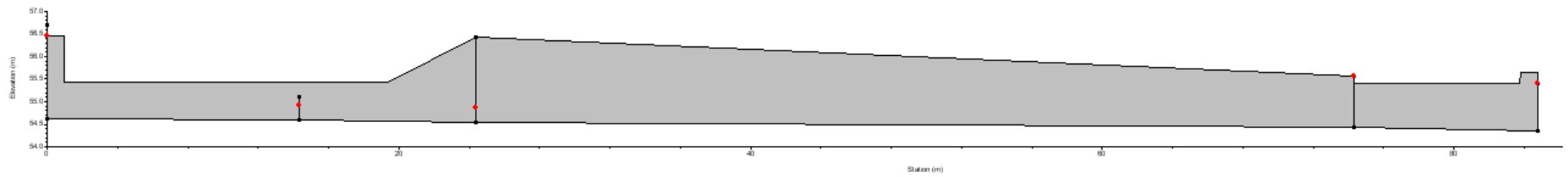
PROPOSED HECRAS 100 YEAR ARI – LONG SECTION



EXISTING HECRAS 100 YEAR ARI – LONG SECTION (NEAR PROPOSED BASIN)



PROPOSED HECRAS 100 YEAR ARI – LONG SECTION (NEAR PROPOSED BASIN)



PROPOSED HECRAS – LATERAL WEIR TO BASIN

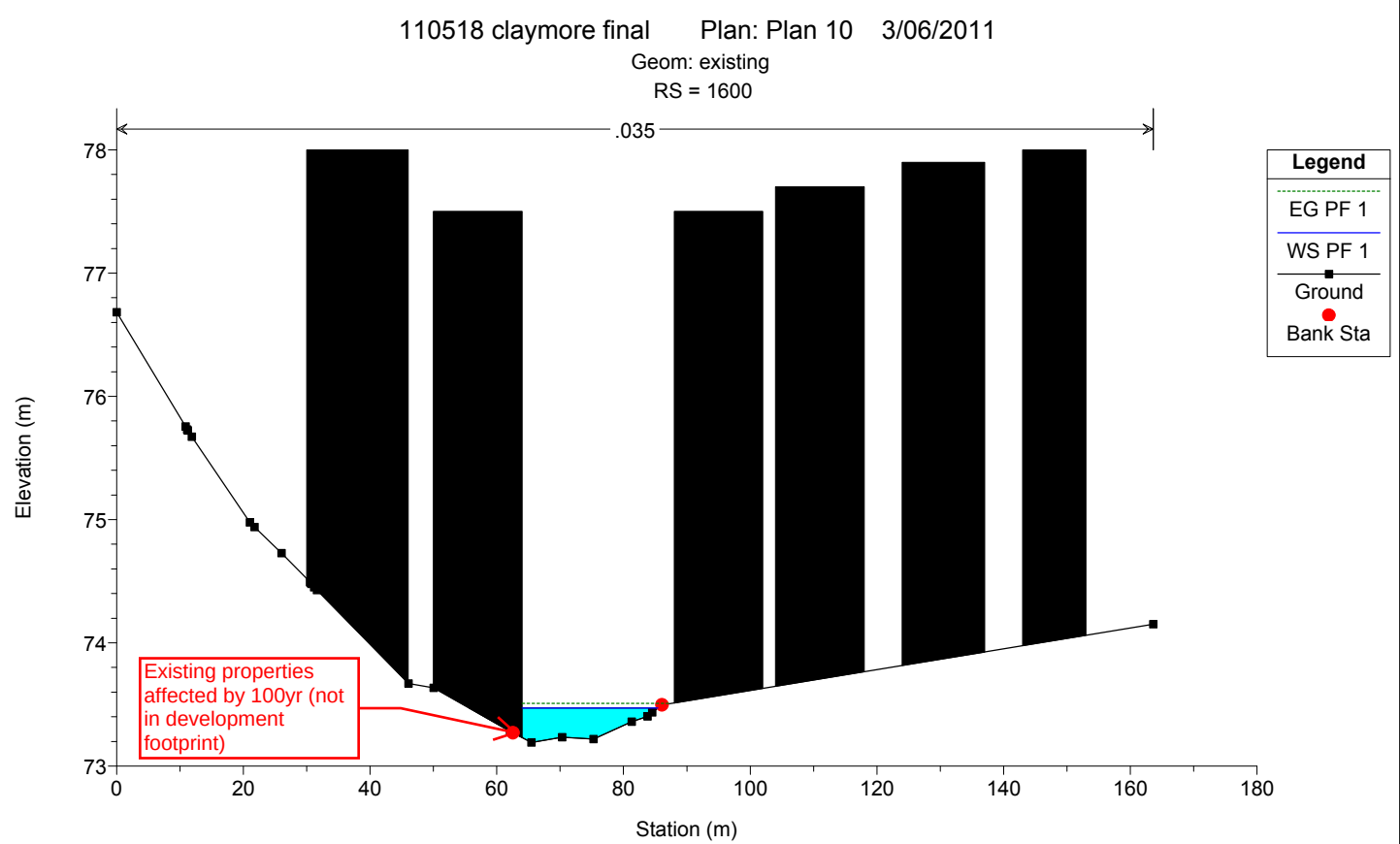
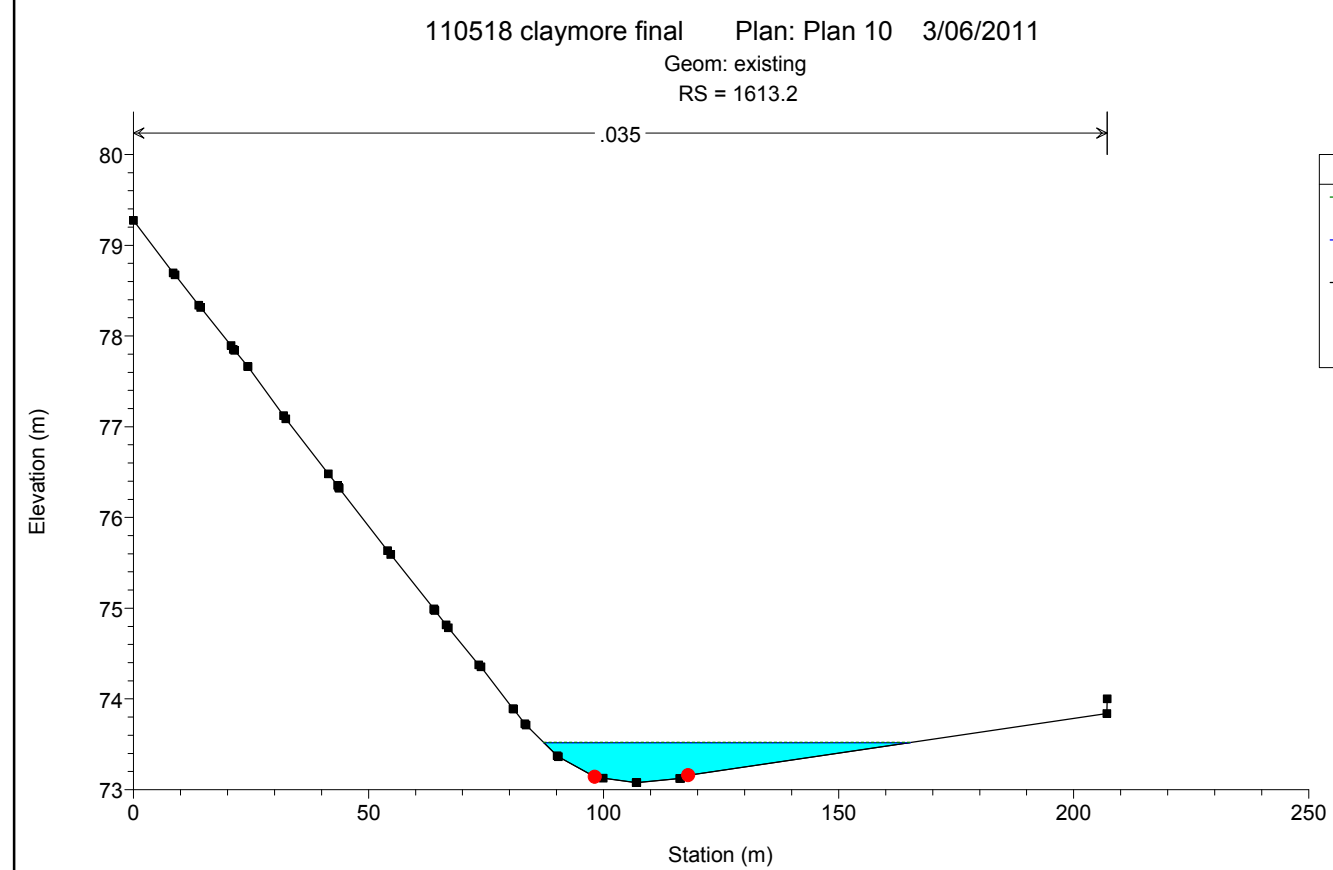
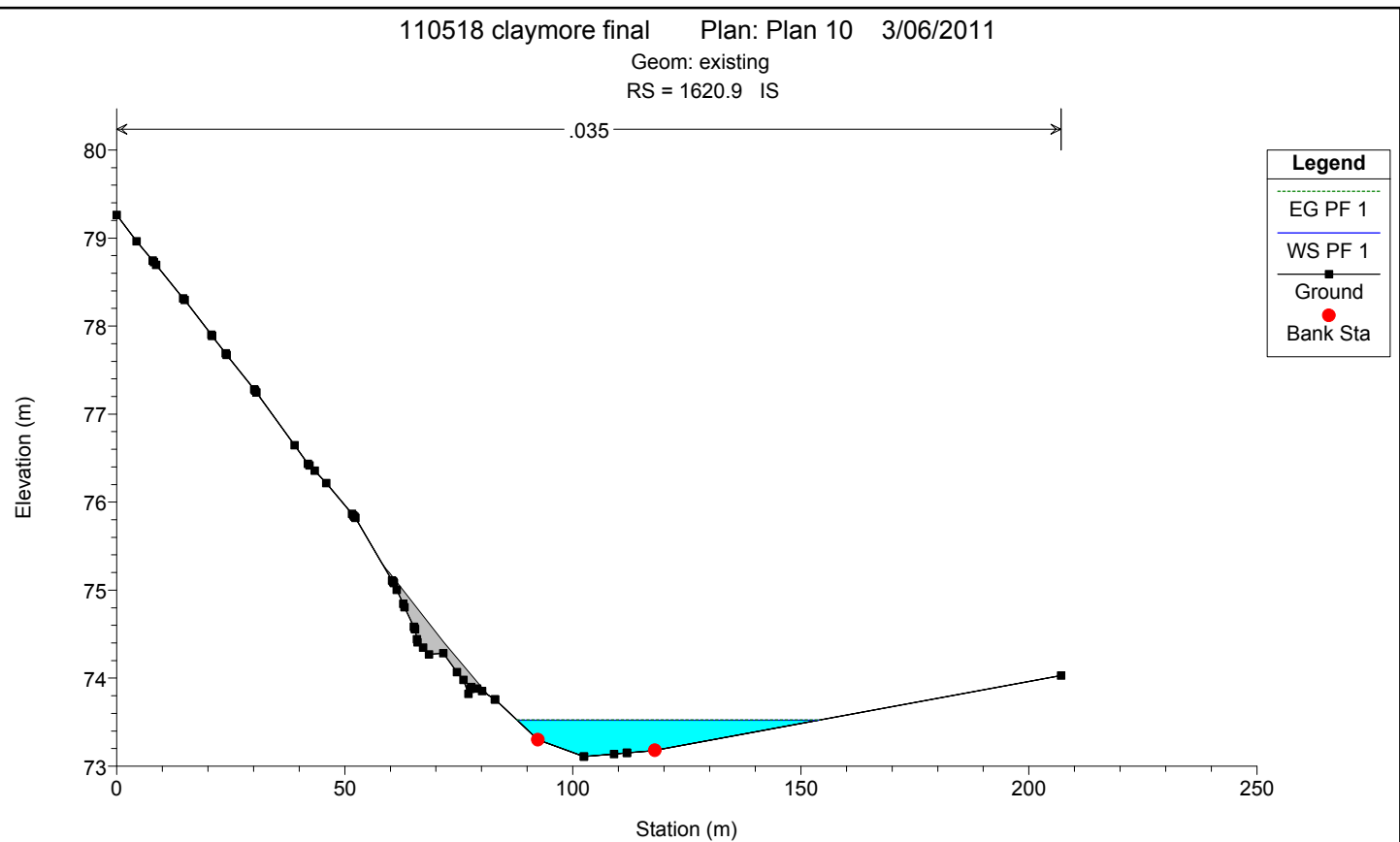
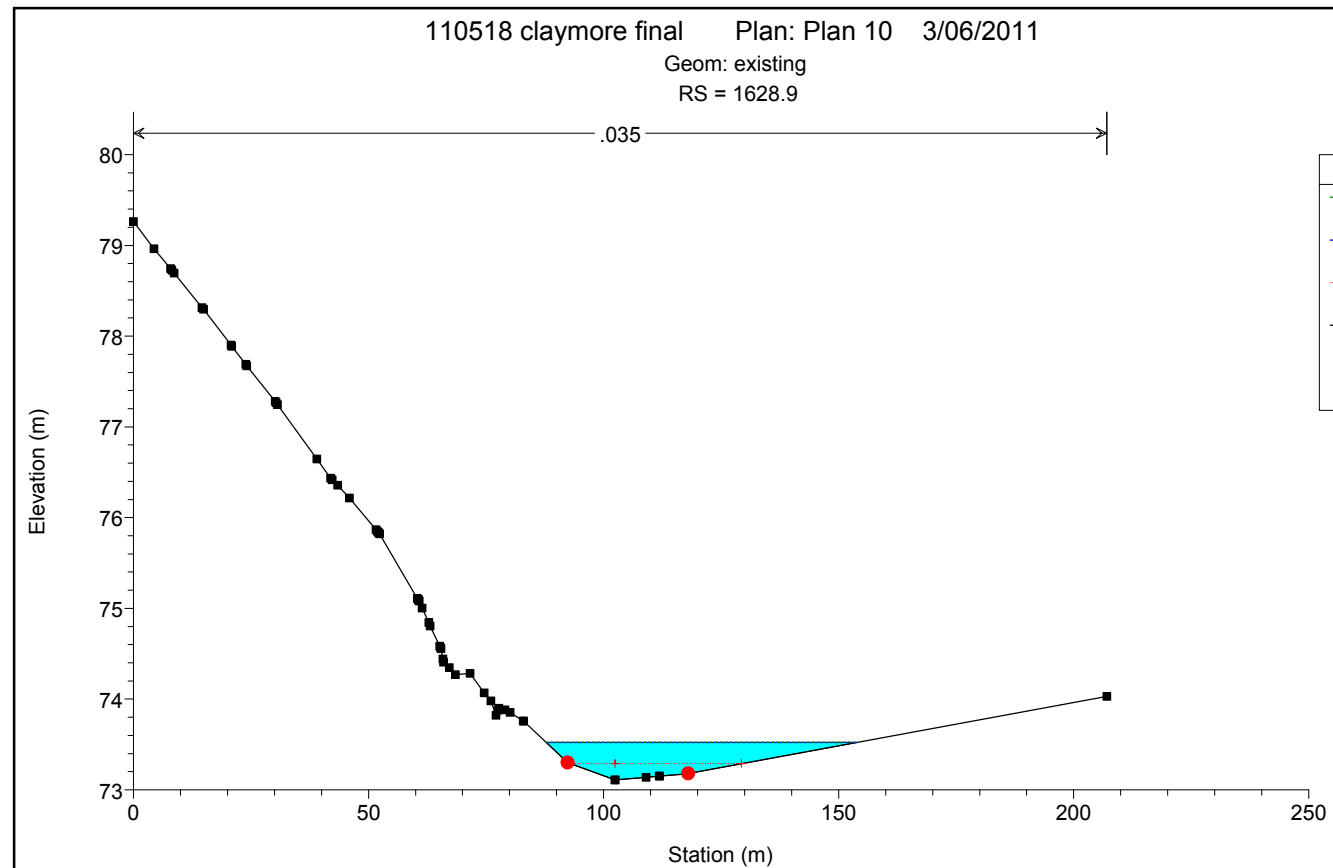
Flow split into basin

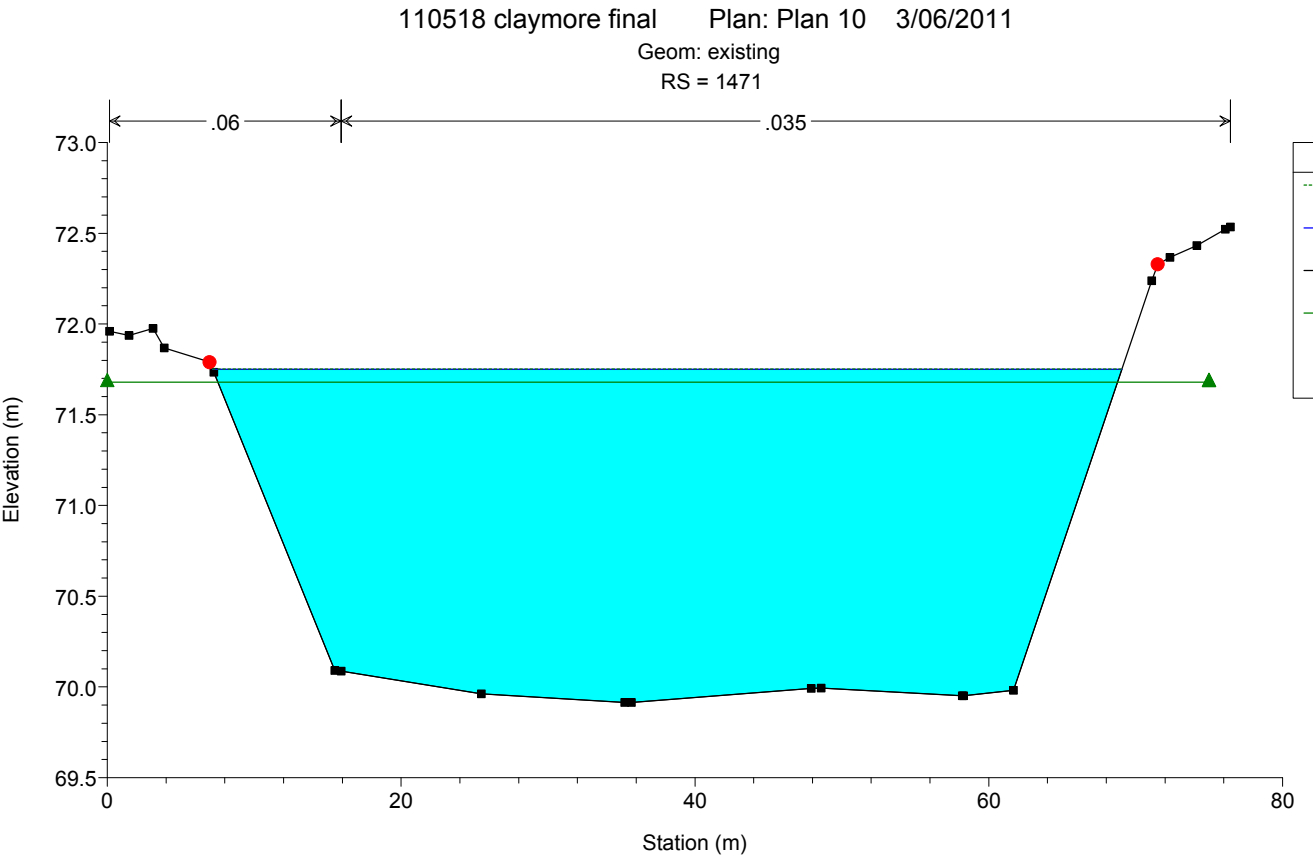
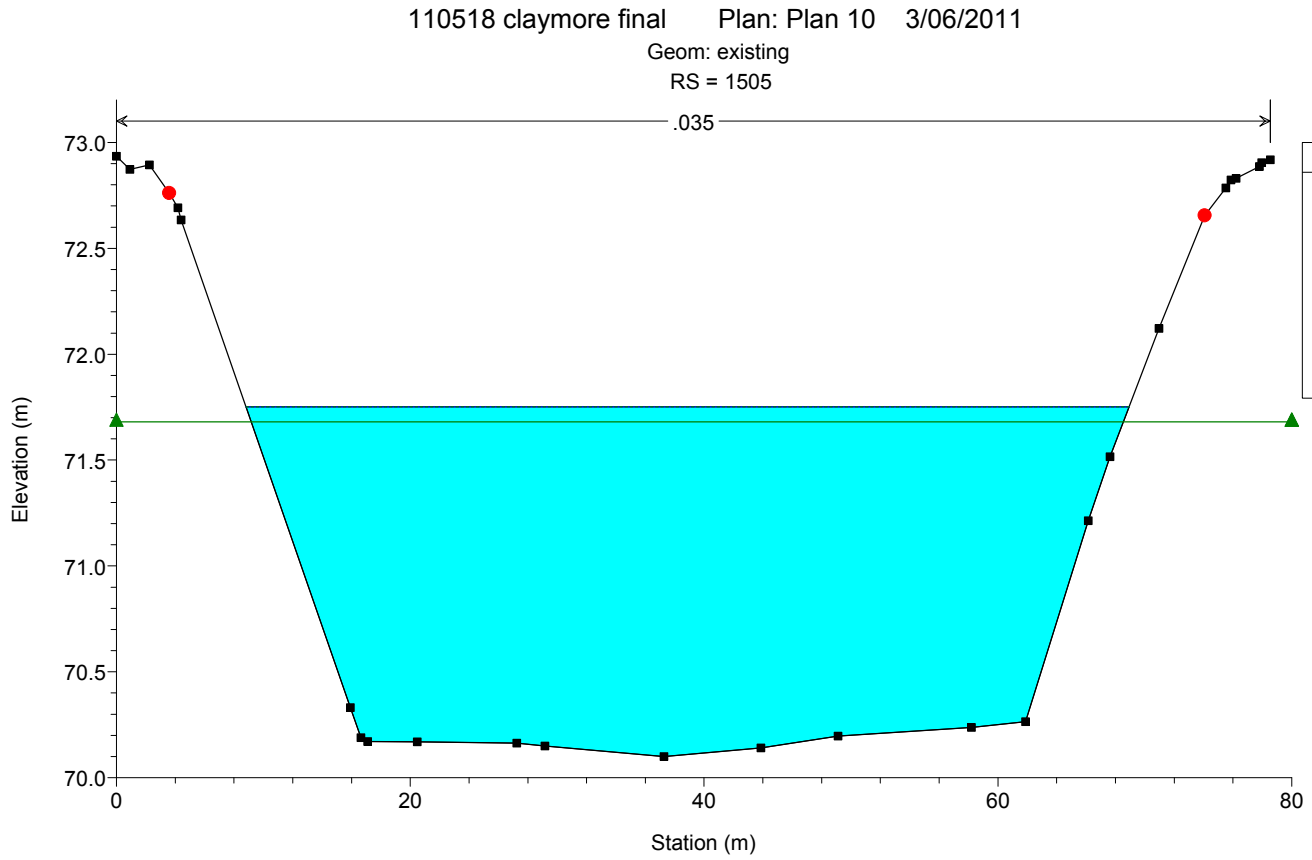
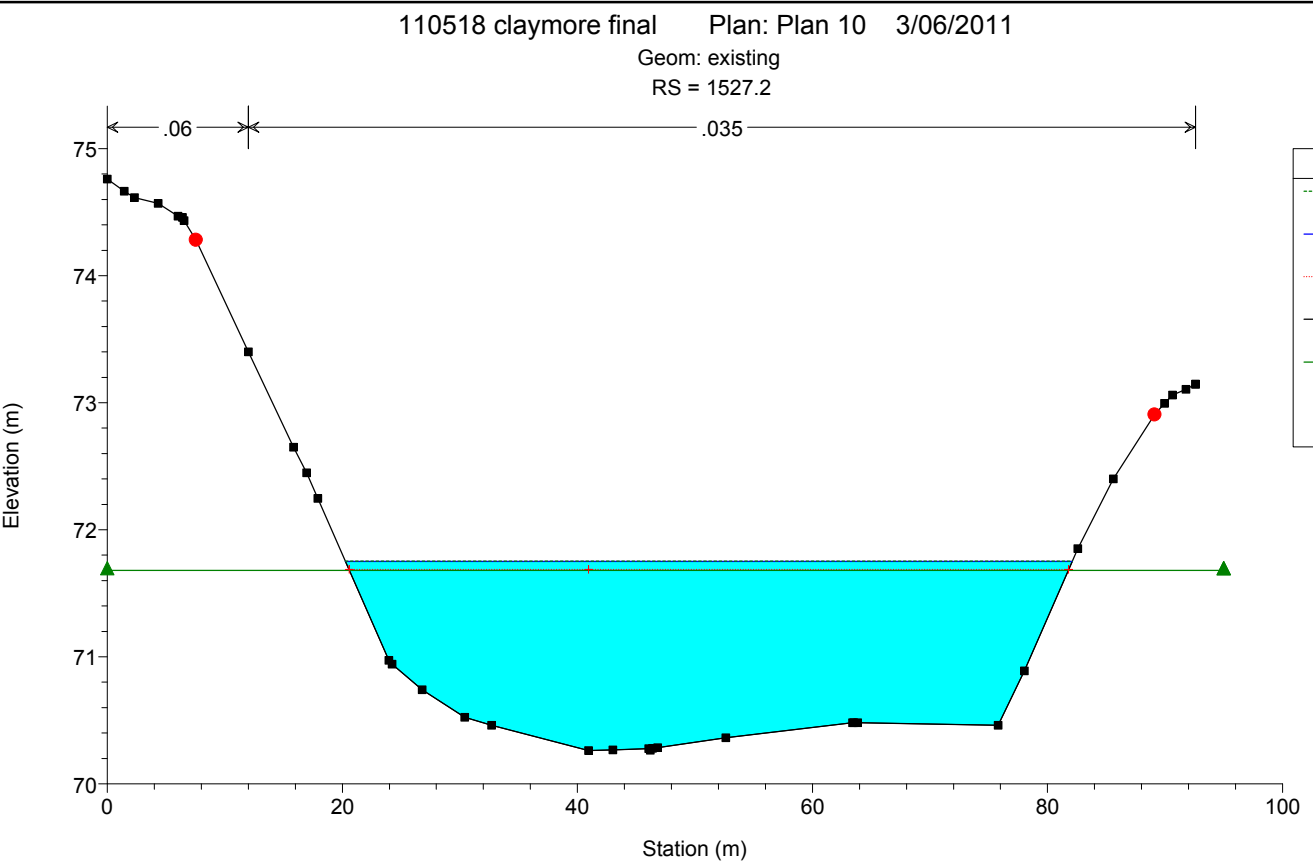
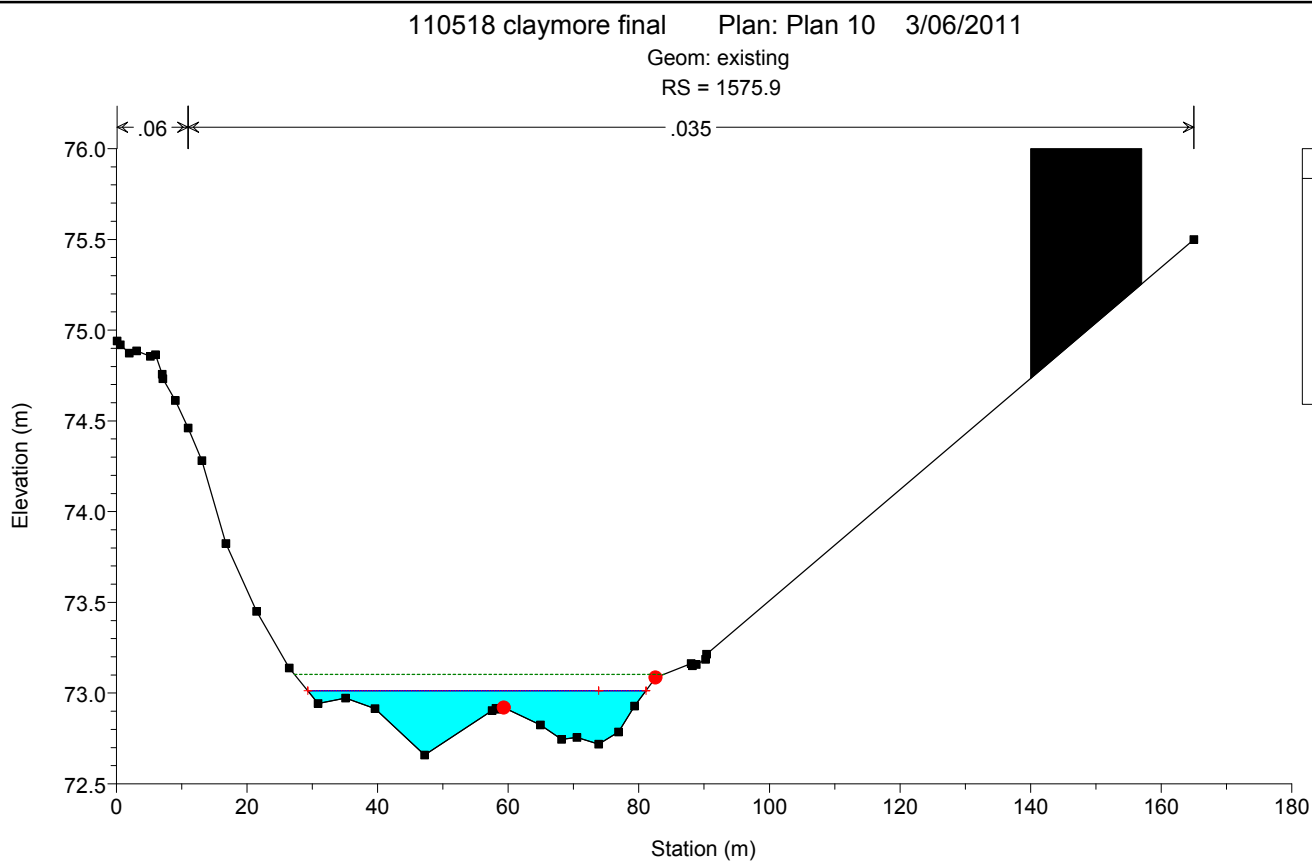
Lateral Structure Output			
File Type Options Help			
River:	1	Profile:	PF 1
Reach:	1	RS:	90
		Plan:	prop 100yr
Plan: prop 100yr 1 1 RS: 90 Lat Struct Profile: PF 1			
E.G. US. (m)	56.10	Weir Sta US (m)	0.99
W.S. US. (m)	55.88	Weir Sta DS (m)	83.76
E.G. DS (m)	55.65	Min El Weir Flow (m)	55.40
W.S. DS (m)	55.35	Wt Top Width (m)	30.47
Q US (m3/s)	32.59	Weir Max Depth (m)	0.52
Q Leaving Total (m3/s)	9.60	Weir Avg Depth (m)	0.34
Q DS (m3/s)	23.15	Weir Flow Area (m2)	10.32
Perc Q Leaving	28.97	Weir Coef	2.540
Q Weir (m3/s)	9.60	Weir Submerg	0.00
Q Gates (m3/s)		Q Gate Group (m3/s)	
Q Culv (m3/s)	0.00	Gate Open Ht (m)	
Q Lat RC (m3/s)		Gate #Open	
		Gate Area (m2)	
Q Breach (m3/s)		Gate Submerg	
Breach Avg Velocity (m/s)		Gate Invert (m)	
Breach Flow Area (m2)		Gate Weir Coef	
Errors, Warnings and Notes			

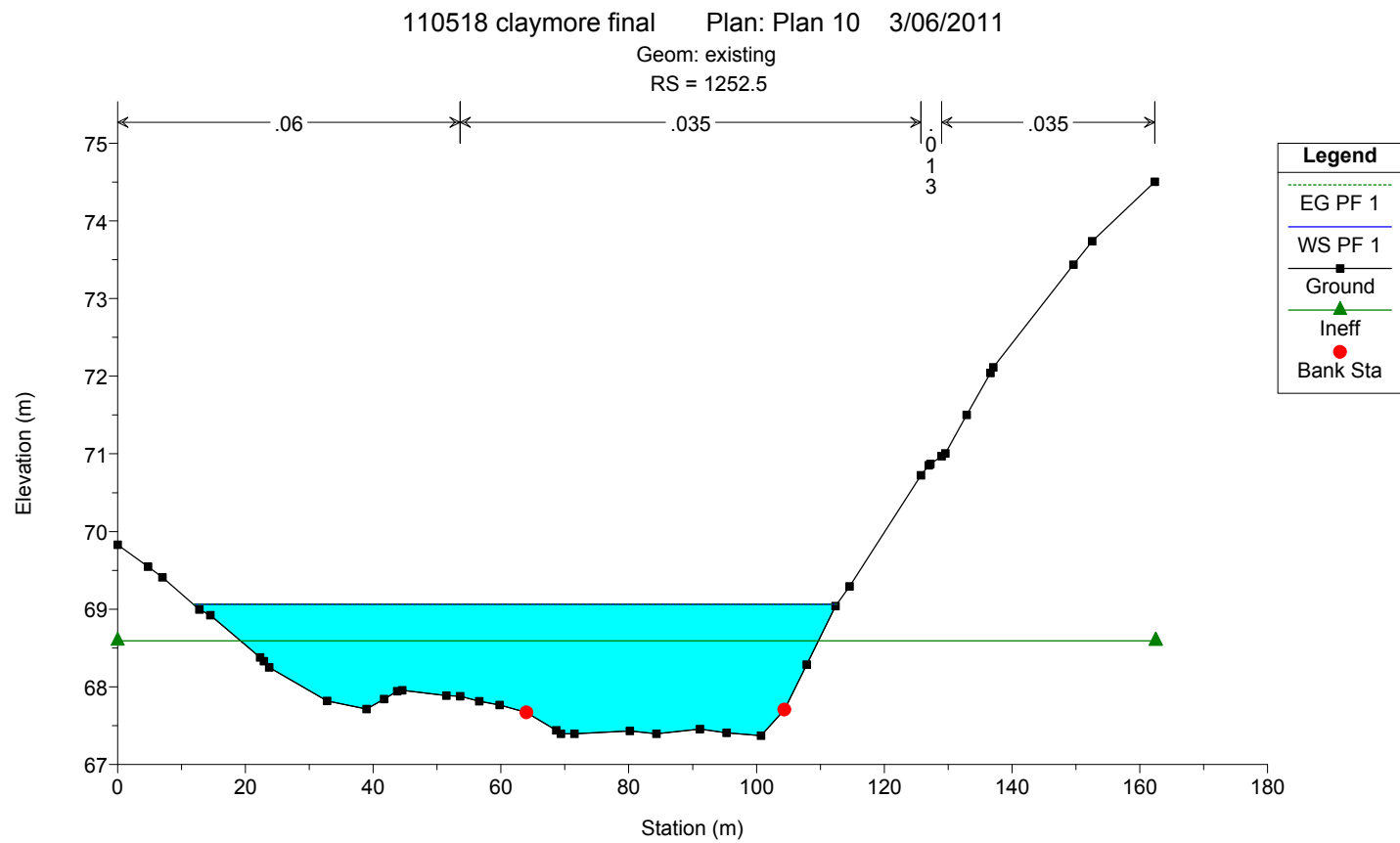
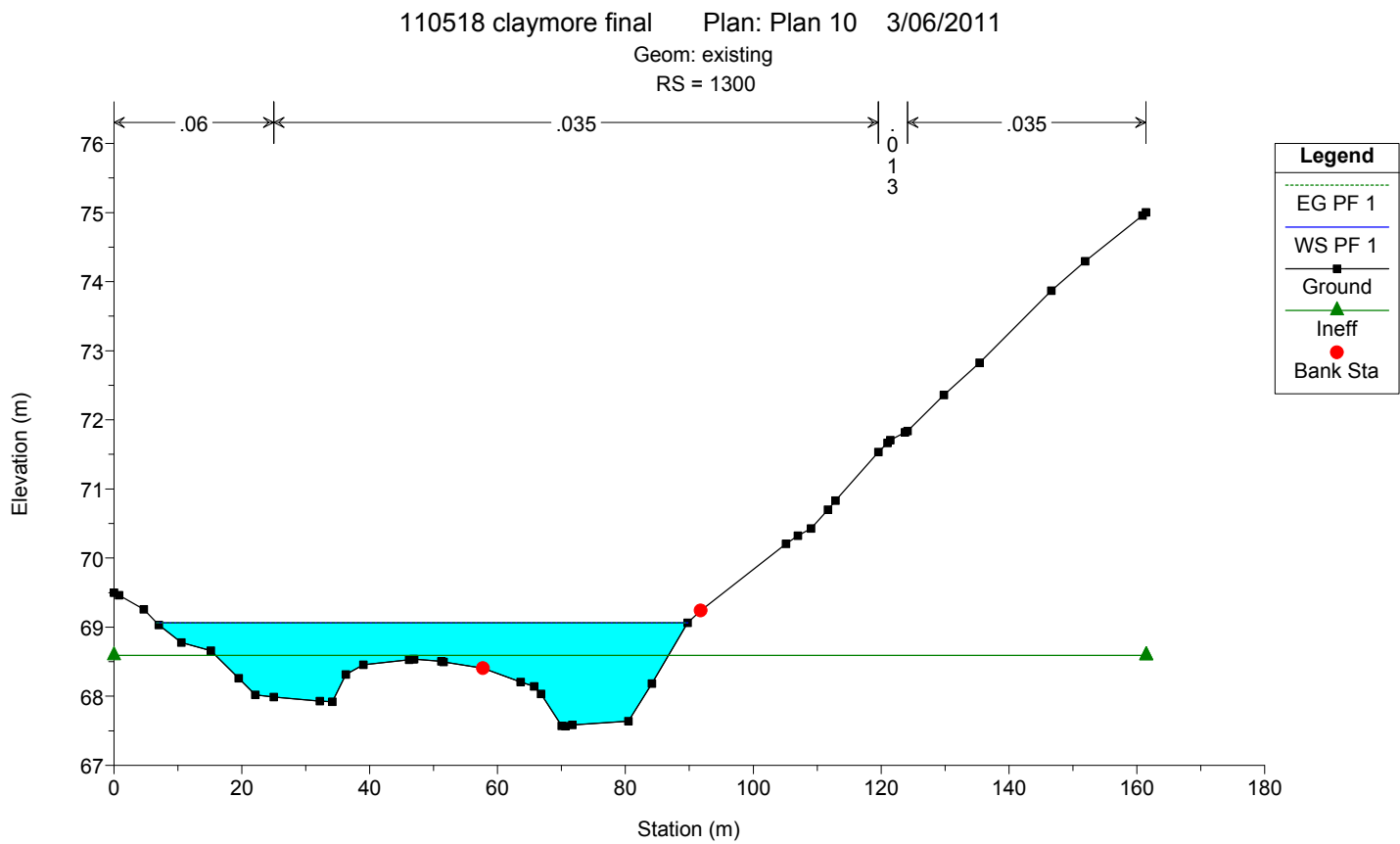
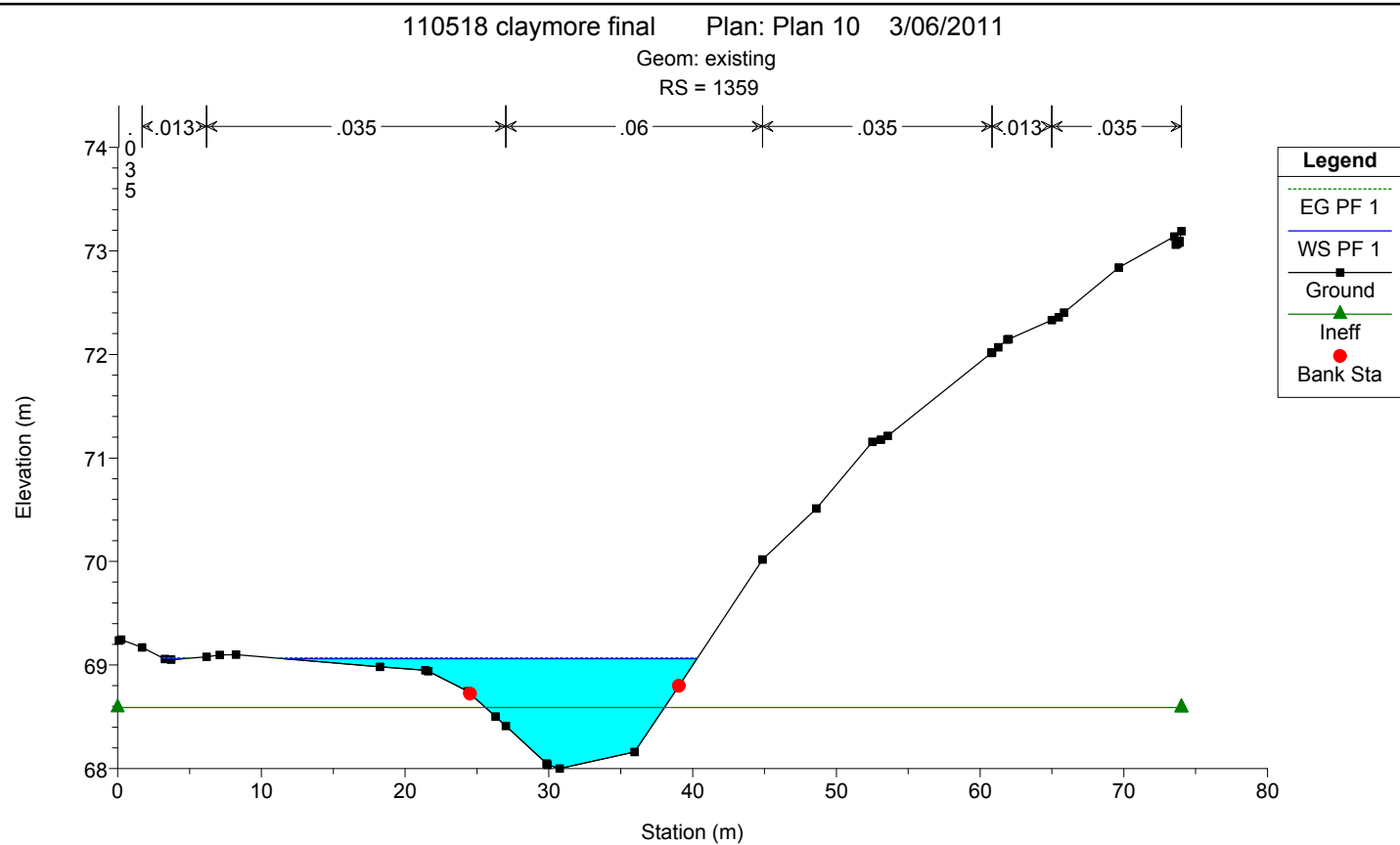
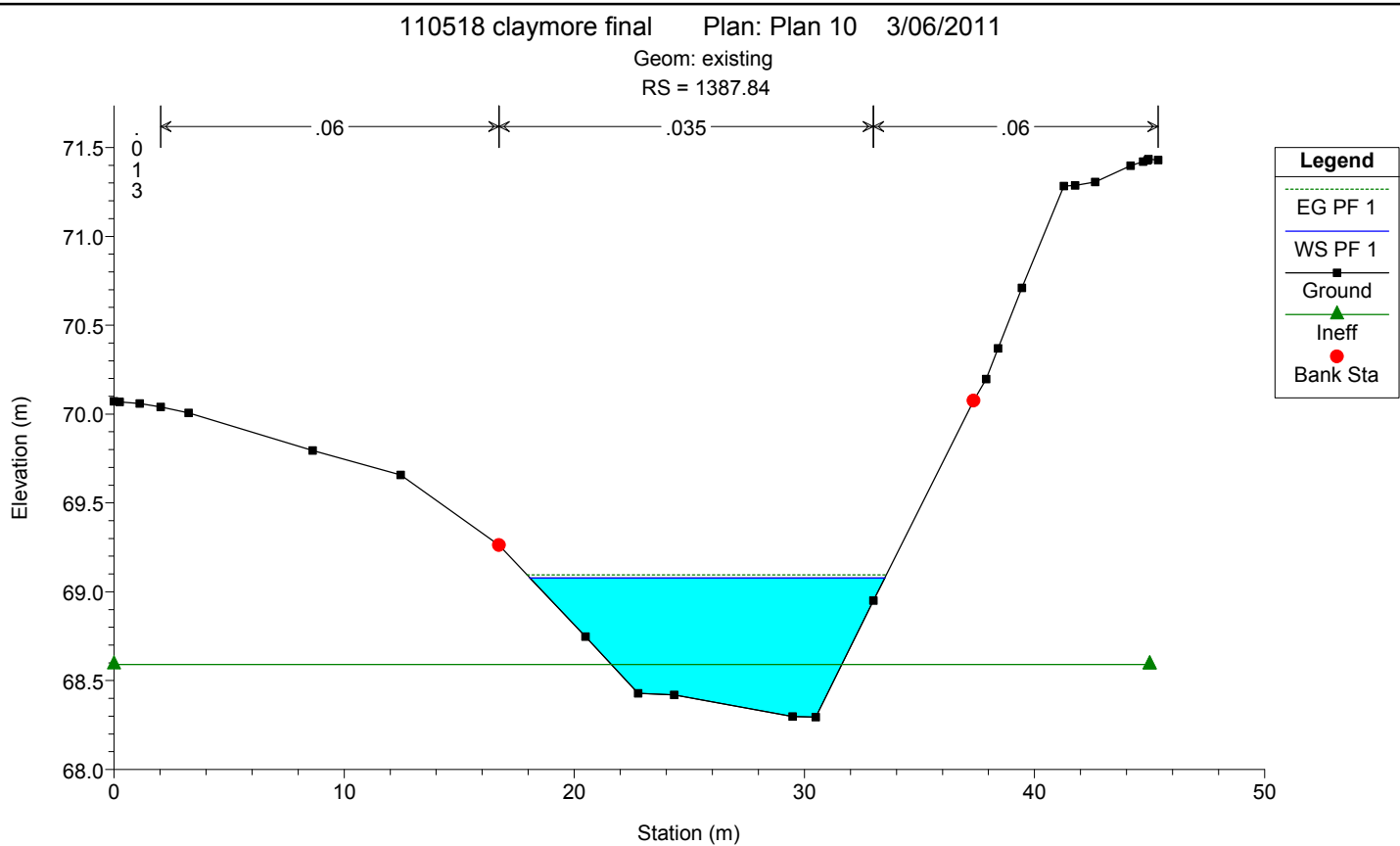
PROPOSED HECRAS – LATERAL WEIR TO BASIN (RESULTS)

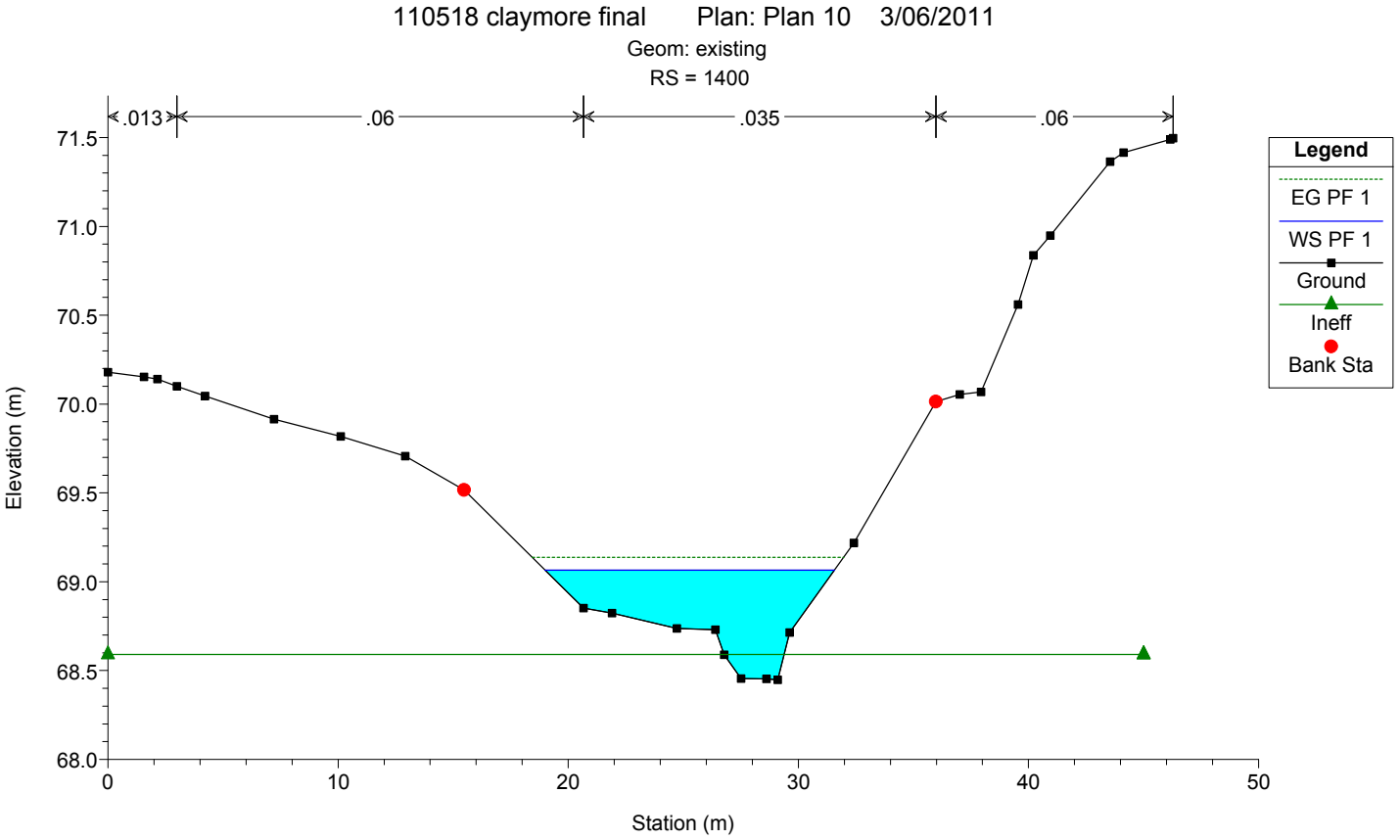
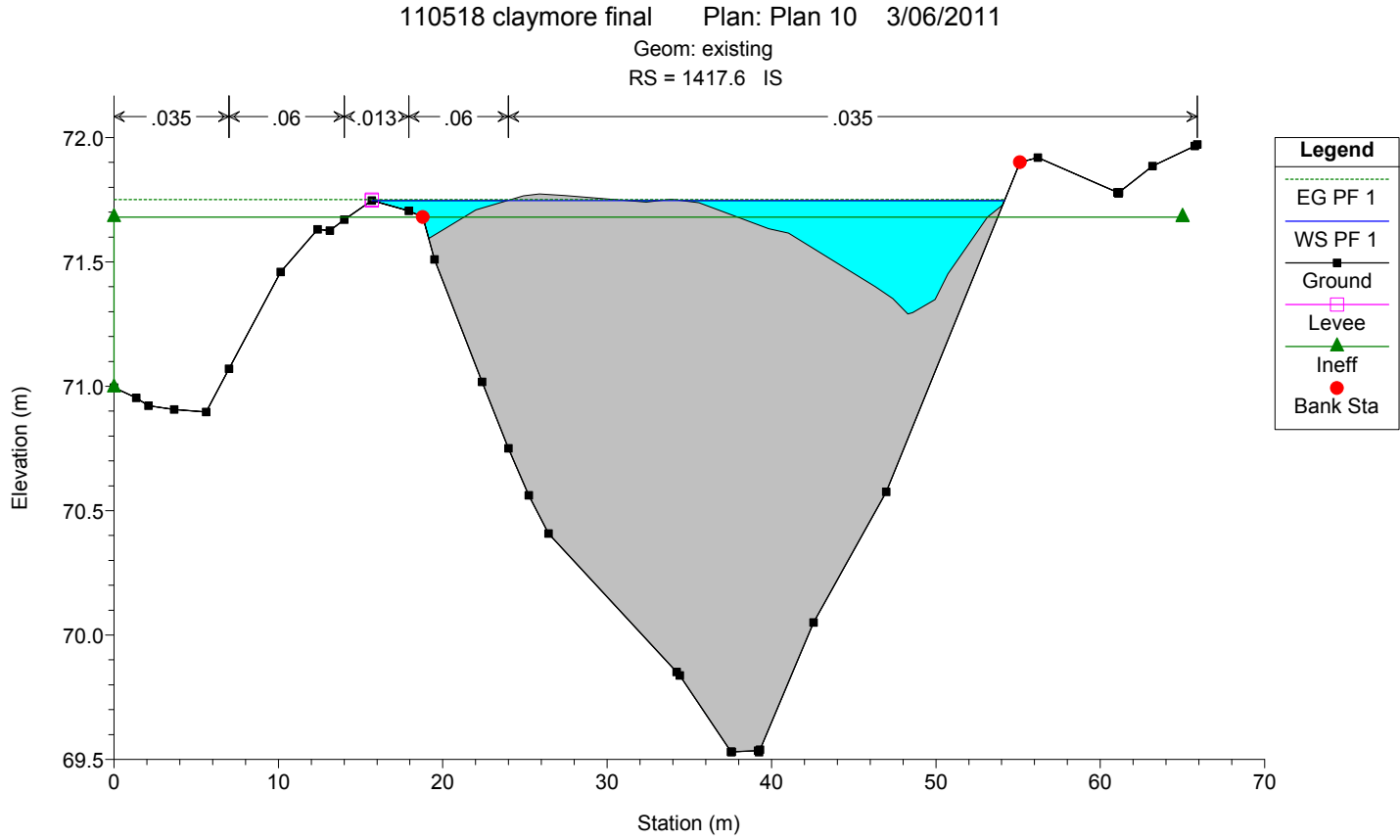
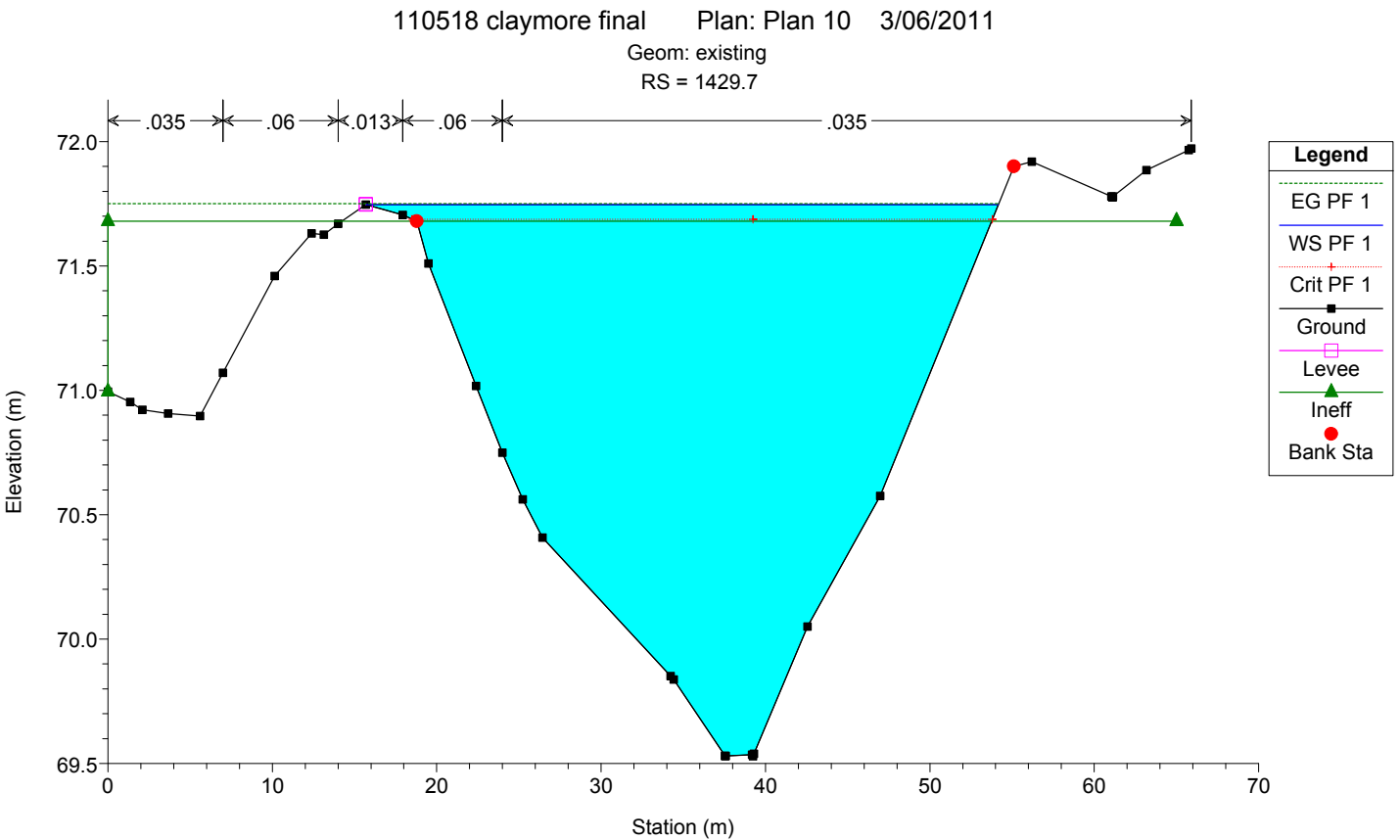
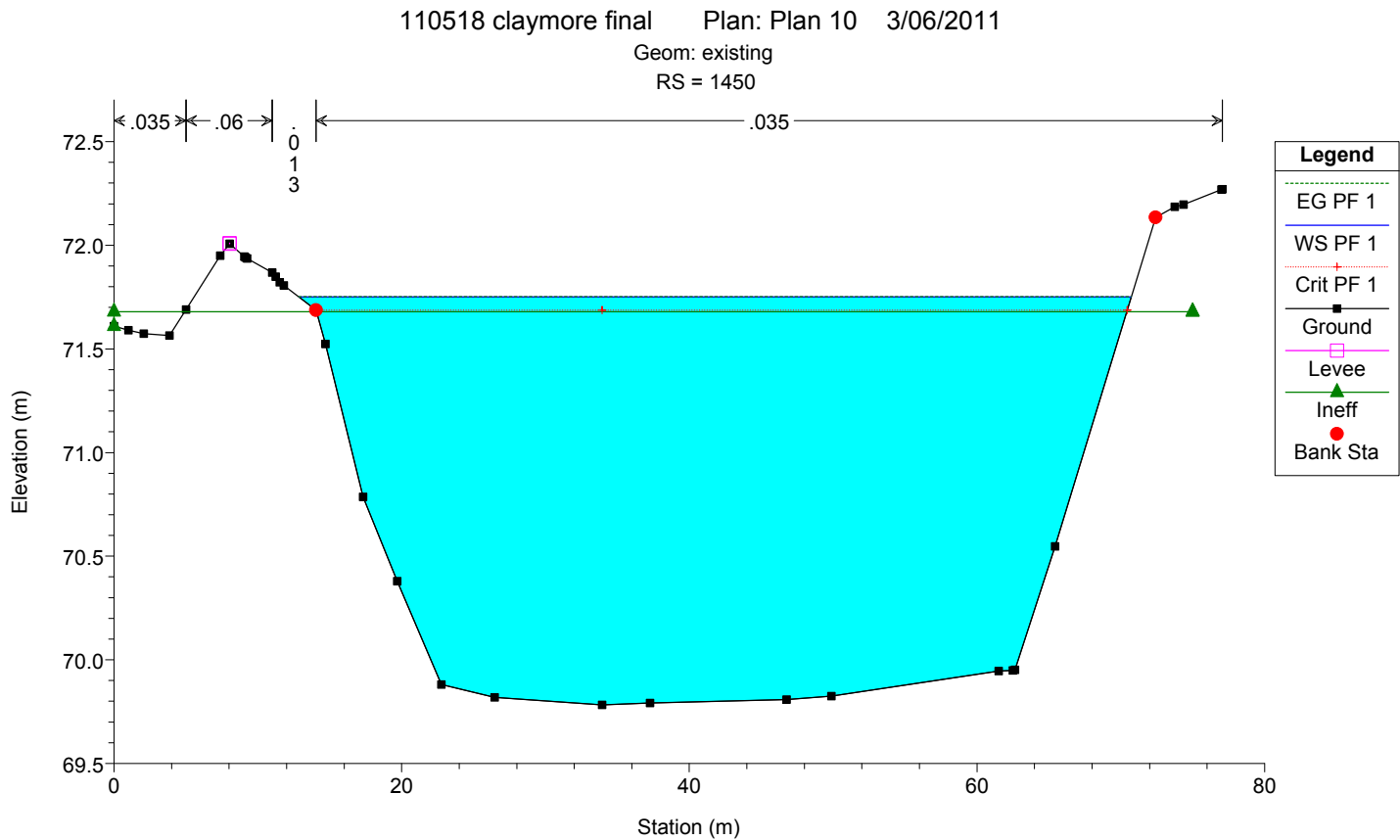
HEC-RAS Plan: ex 100yr River: 1 Reach: 1 Profile: PF 1

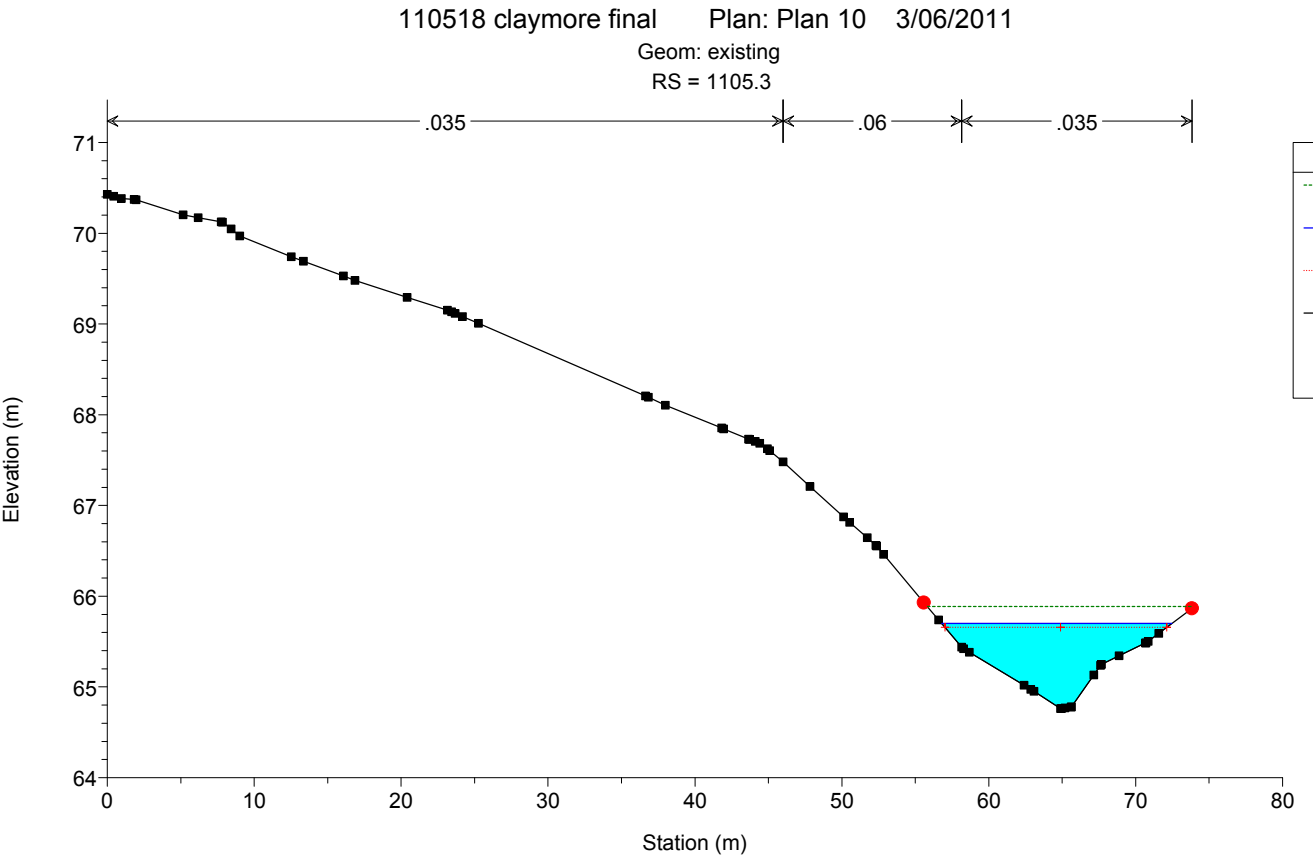
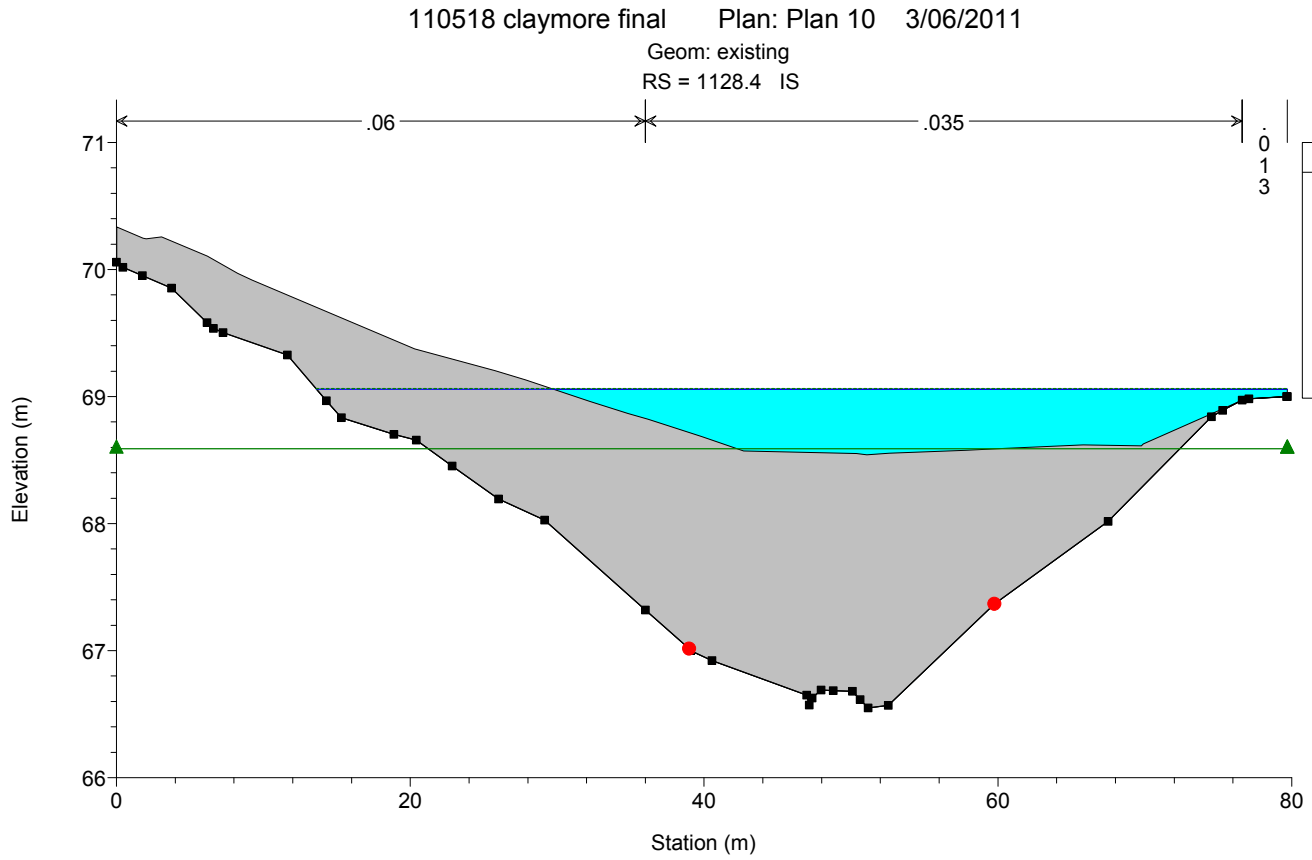
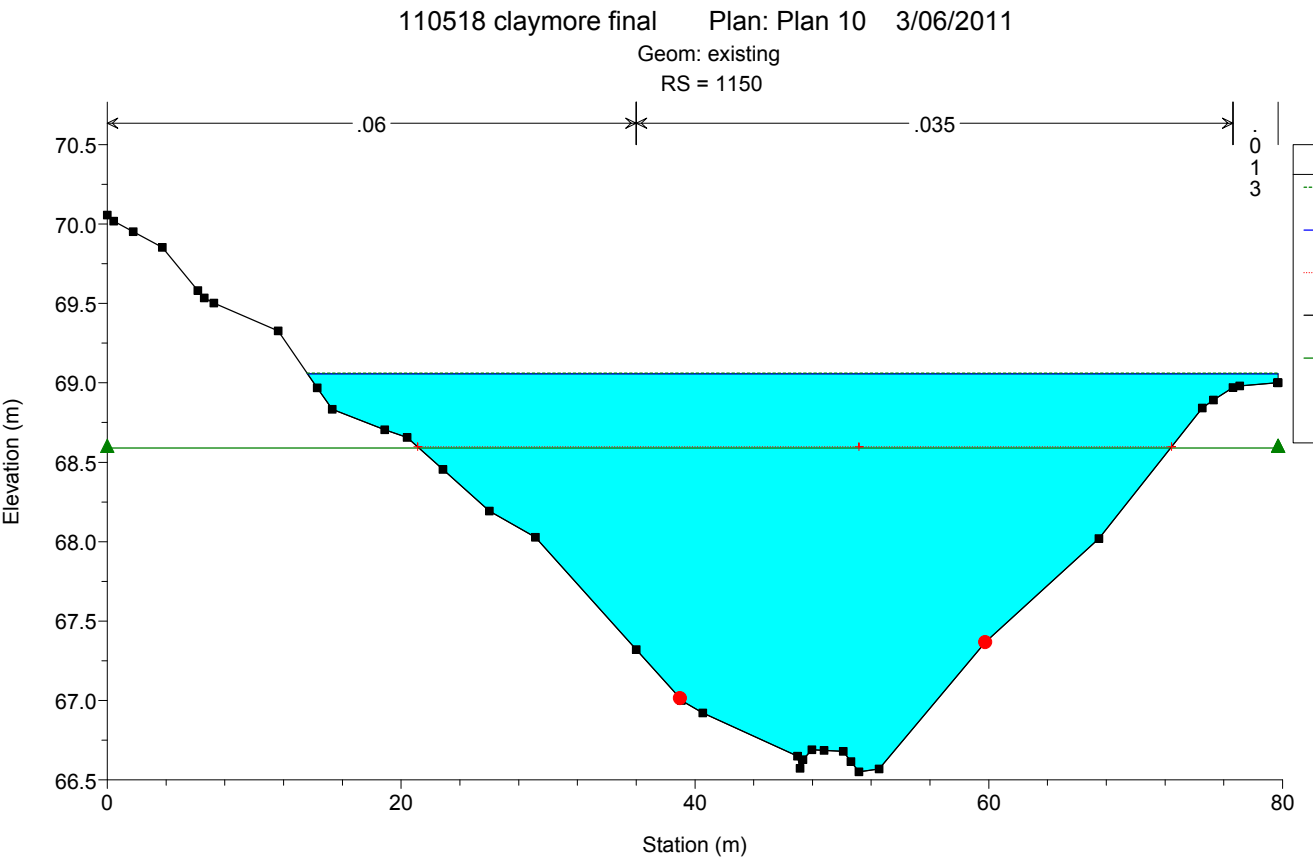
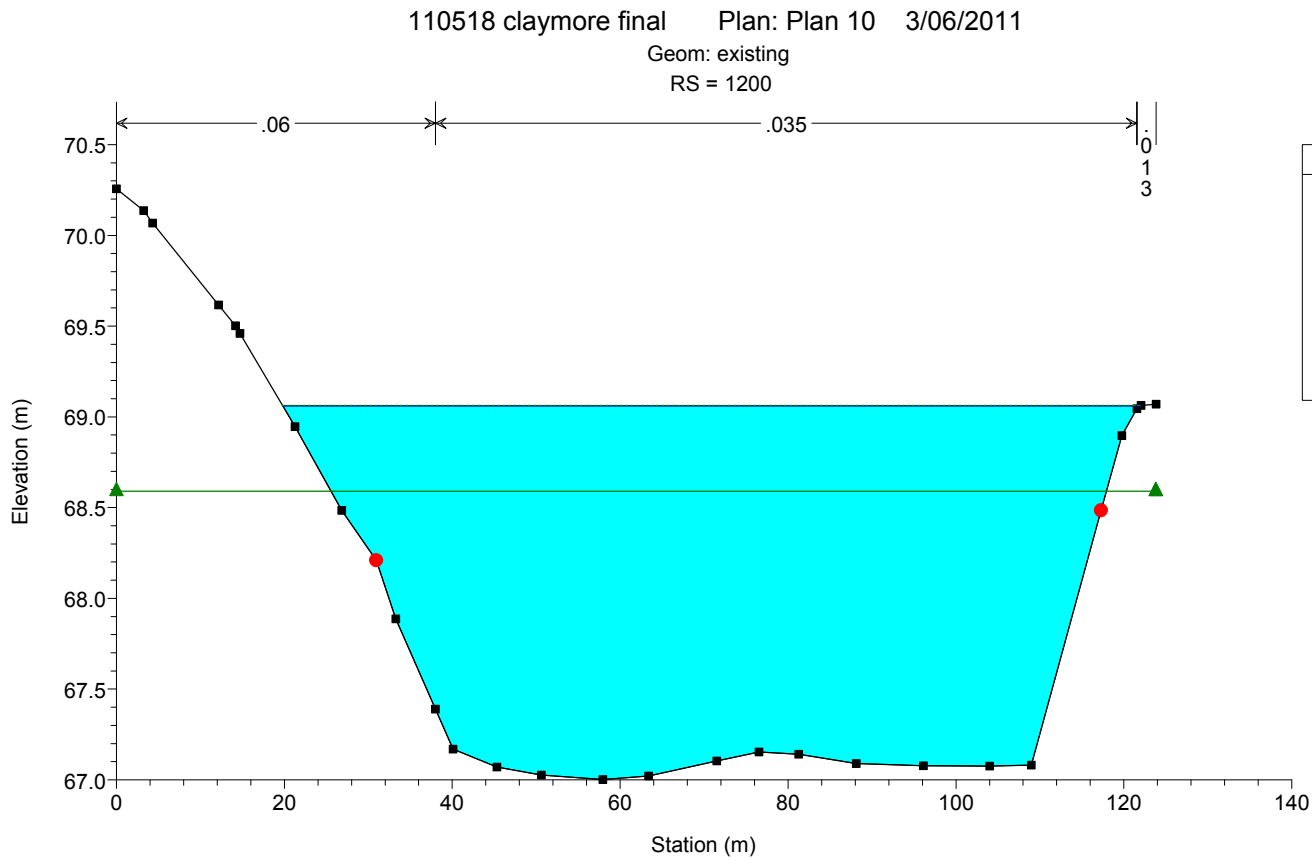
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(m3/s)	(m)	(m)	(m)	(m)	(m/m)	(m/s)	(m2)	(m)	
1	1628.9	PF 1	3.60	73.11	73.52	73.29	73.53	0.000370	0.28	15.72	66.06	0.15
1	1620.9		Inl Struct									
1	1613.2	PF 1	3.60	73.08	73.52		73.52	0.000243	0.25	19.04	77.96	0.12
1	1600	PF 1	3.60	73.19	73.47		73.51	0.008005	0.86	4.20	21.44	0.62
1	1575.9	PF 1	12.22	72.72	73.01	73.01	73.10	0.021496	1.42	9.19	51.80	1.02
1	1527.2	PF 1	12.22	70.26	71.75	71.69	71.75	0.000027	0.17	73.72	61.83	0.05
1	1505	PF 1	12.22	70.10	71.75		71.75	0.000018	0.15	82.71	60.11	0.04
1	1471	PF 1	12.22	69.91	71.75		71.75	0.000011	0.13	95.63	61.89	0.03
1	1450	PF 1	12.22	69.78	71.75	71.69	71.75	0.000011	0.13	93.23	57.85	0.03
1	1429.7	PF 1	12.22	69.53	71.75	71.69	71.75	0.000059	0.27	46.07	38.47	0.07
1	1417.6		Inl Struct									
1	1400	PF 1	4.69	68.45	69.07		69.14	0.007758	1.19	3.95	12.58	0.68
1	1387.84	PF 1	4.69	68.30	69.08		69.09	0.000988	0.57	8.22	15.43	0.25
1	1359	PF 1	4.69	68.00	69.06		69.07	0.000664	0.39	12.86	29.99	0.14
1	1300	PF 1	4.69	67.57	69.06		69.07	0.000008	0.08	68.49	83.08	0.03
1	1252.5	PF 1	20.17	67.37	69.06		69.06	0.000029	0.21	123.38	100.73	0.05
1	1200	PF 1	20.17	67.00	69.06		69.06	0.000009	0.12	166.11	102.25	0.03
1	1150	PF 1	20.17	66.55	69.06	68.60	69.06	0.000040	0.31	85.43	66.07	0.07
1	1128.4		Inl Struct									
1	1105.3	PF 1	14.31	64.76	65.70	65.66	65.89	0.011656	1.92	7.45	15.67	0.89
1	1077.3	PF 1	14.31	64.66	65.27	65.27	65.49	0.017471	2.08	6.88	15.85	1.01
1	1028	PF 1	14.31	63.84	64.87	64.46	64.90	0.001537	0.86	16.68	25.61	0.34
1	992.1	PF 1	14.31	63.79	64.86		64.87	0.000443	0.53	27.28	34.44	0.19
1	950.3	PF 1	14.31	63.22	64.86		64.86	0.000015	0.14	102.43	73.45	0.04
1	907.1	PF 1	14.31	62.66	64.86	64.46	64.86	0.000007	0.10	139.62	87.24	0.03
1	893.1		Inl Struct									
1	874.4	PF 1	13.65	61.48	62.50	62.32	62.63	0.011271	1.64	8.31	13.66	0.67
1	850	PF 1	13.65	61.39	62.04	62.04	62.28	0.018440	2.16	6.33	13.40	1.00
1	781.9	PF 1	13.65	60.57	62.07	61.70	62.08	0.000105	0.30	46.17	45.02	0.09
1	744.1	PF 1	13.65	60.47	62.07		62.07	0.000031	0.17	82.60	68.52	0.05
1	700	PF 1	13.65	60.10	62.07	61.70	62.07	0.000012	0.14	104.06	76.88	0.03
1	683.3		Inl Struct									
1	675	PF 1	13.65	58.90	61.70	61.70	61.71	0.000214	0.48	33.09	38.66	0.09
1	662.1	PF 1	13.65	58.80	59.05	59.45	61.46	0.432876	6.87	1.99	8.87	4.63
1	654		Bridge									
1	641.6	PF 1	13.65	58.65	59.57	59.30	59.69	0.004600	1.58	8.62	11.17	0.58
1	600	PF 1	14.23	58.56	59.24	59.16	59.41	0.010119	1.86	7.67	14.63	0.82
1	550	PF 1	14.23	58.23	58.93		59.02	0.005547	1.35	10.61	20.26	0.58
1	500	PF 1	14.23	57.82	58.59		58.71	0.007023	1.55	9.20	17.61	0.68
1	453.8	PF 1	14.23	57.41	58.22		58.34	0.008979	1.54	9.26	17.24	0.67
1	400	PF 1	14.23	57.08	58.00		58.07	0.002988	1.14	12.78	24.30	0.46
1	350	PF 1	14.23	56.96	57.60	57.57	57.78	0.013552	1.89	7.54	17.59	0.92
1	322.4	PF 1	14.23	56.64	57.29	57.29	57.52	0.016200	2.11	6.75	15.21	1.01
1	312.9	PF 1	24.47	55.38	57.13	56.03	57.15	0.000323	0.68	37.10	27.34	0.17
1	258.7	PF 1	24.47	55.66	56.93	56.69	57.09	0.007389	1.77	13.86	18.51	0.65
1	219.3	PF 1	24.47	55.51	56.31	56.31	56.53	0.036896	2.04	11.97	26.71	0.97
1	170.4	PF 1	24.47	54.97	56.32		56.35	0.000838	0.79	30.93	32.79	0.26
1	100	PF 1	30.21	54.62	56.10		56.22	0.004344	1.48	20.37	24.19	0.52
1	29.3	PF 1	30.21	54.42	55.68	55.53	55.81	0.007720	1.63	18.49	35.01	0.72
1	9.63	PF 1	31.09	54.25	55.37	55.37	55.63	0.010005	2.43	15.19	33.21	0.87

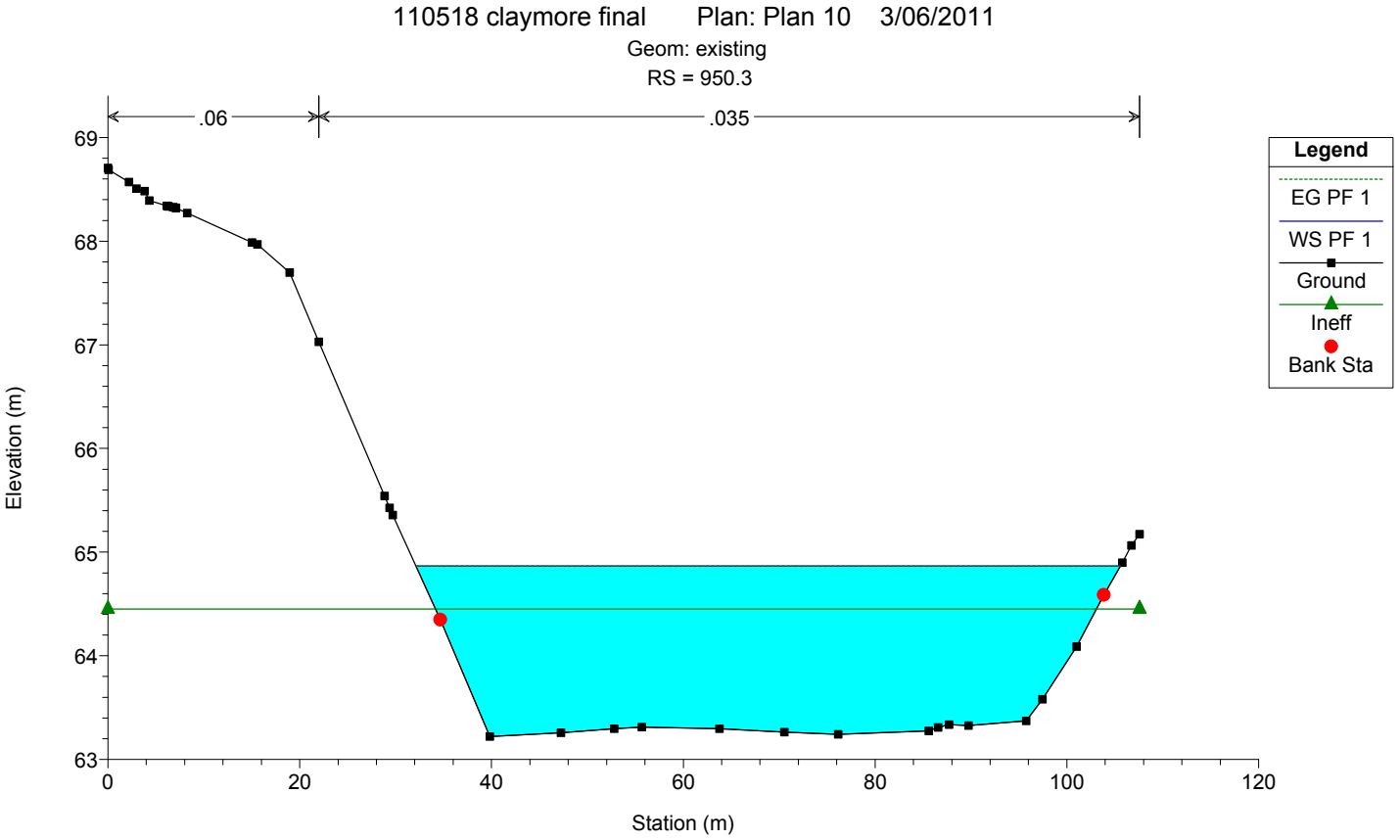
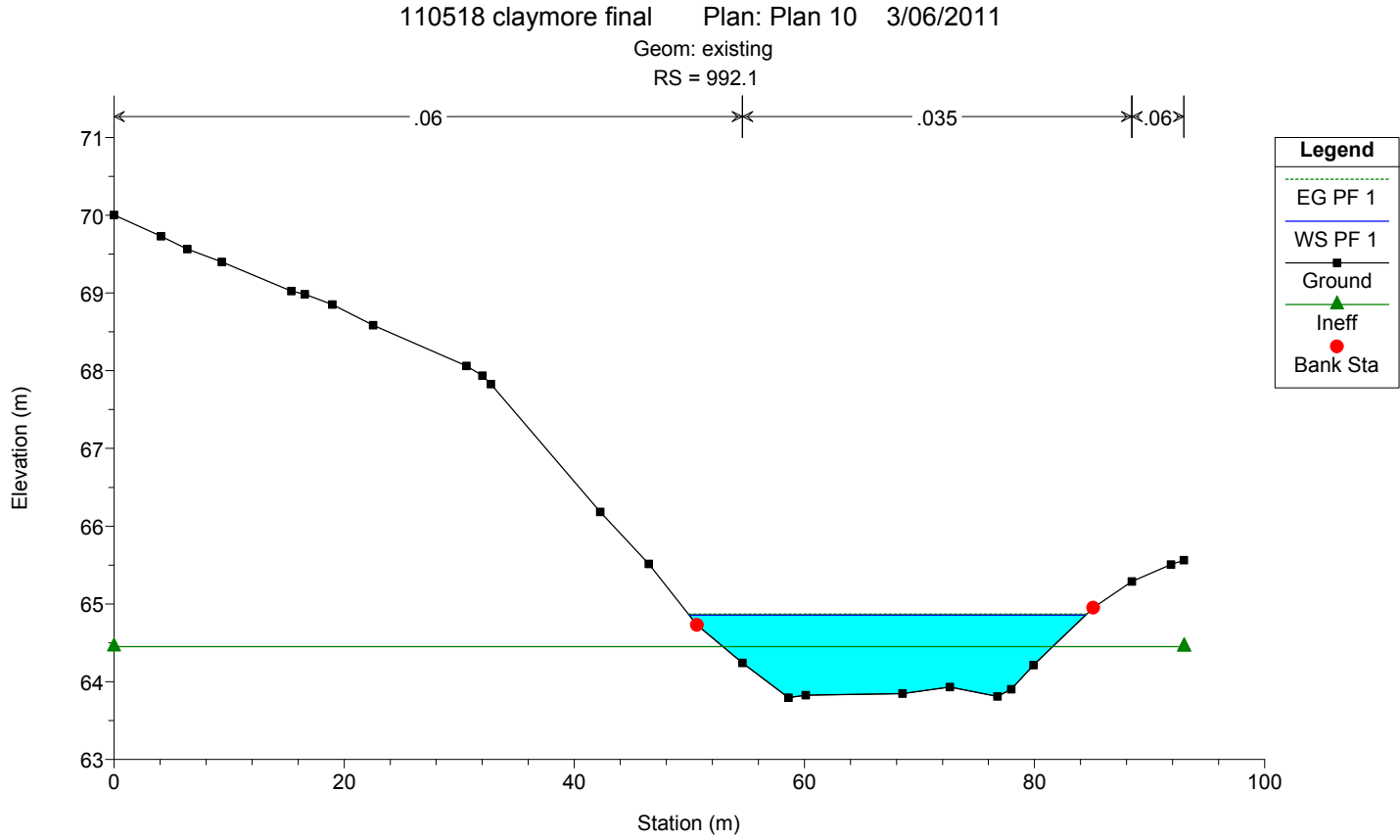
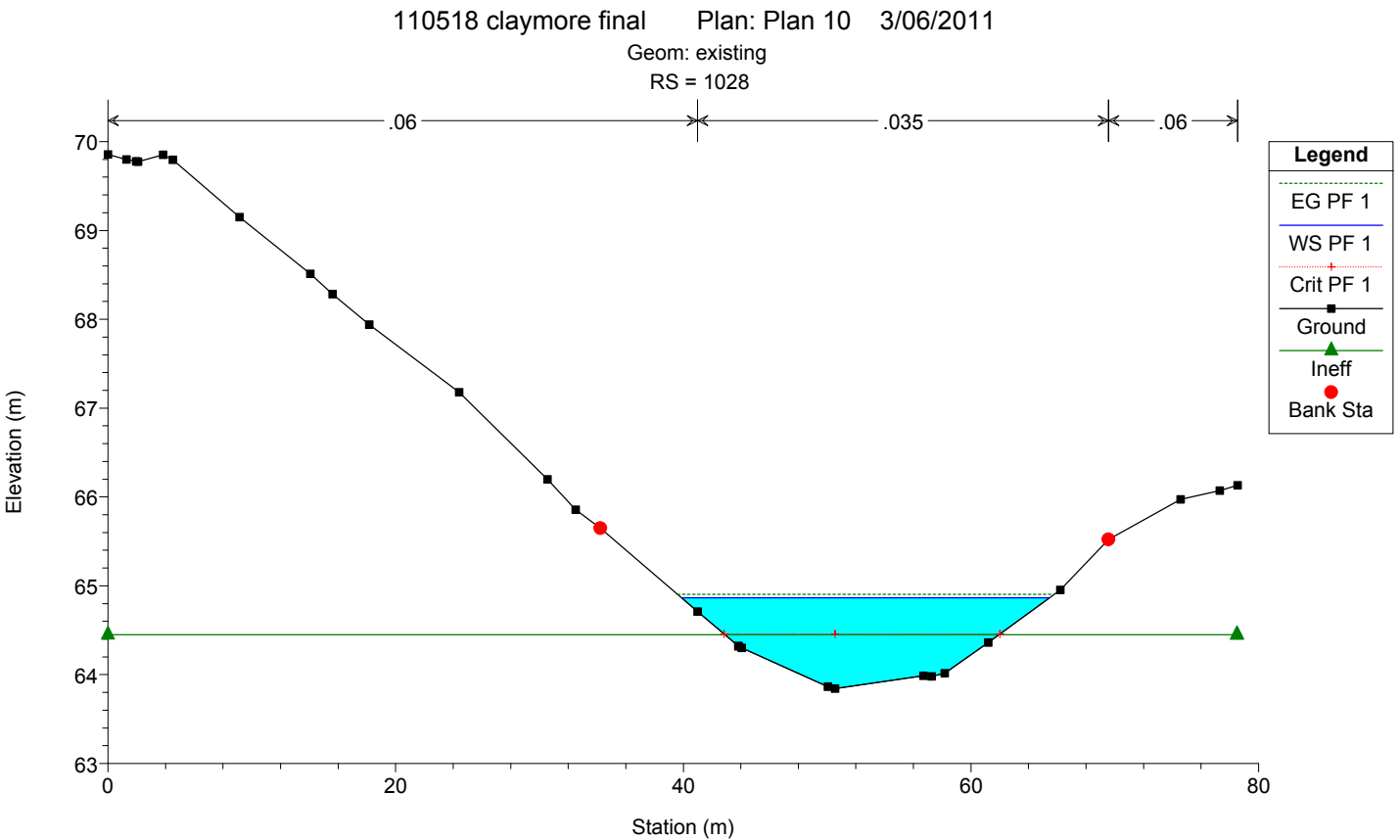
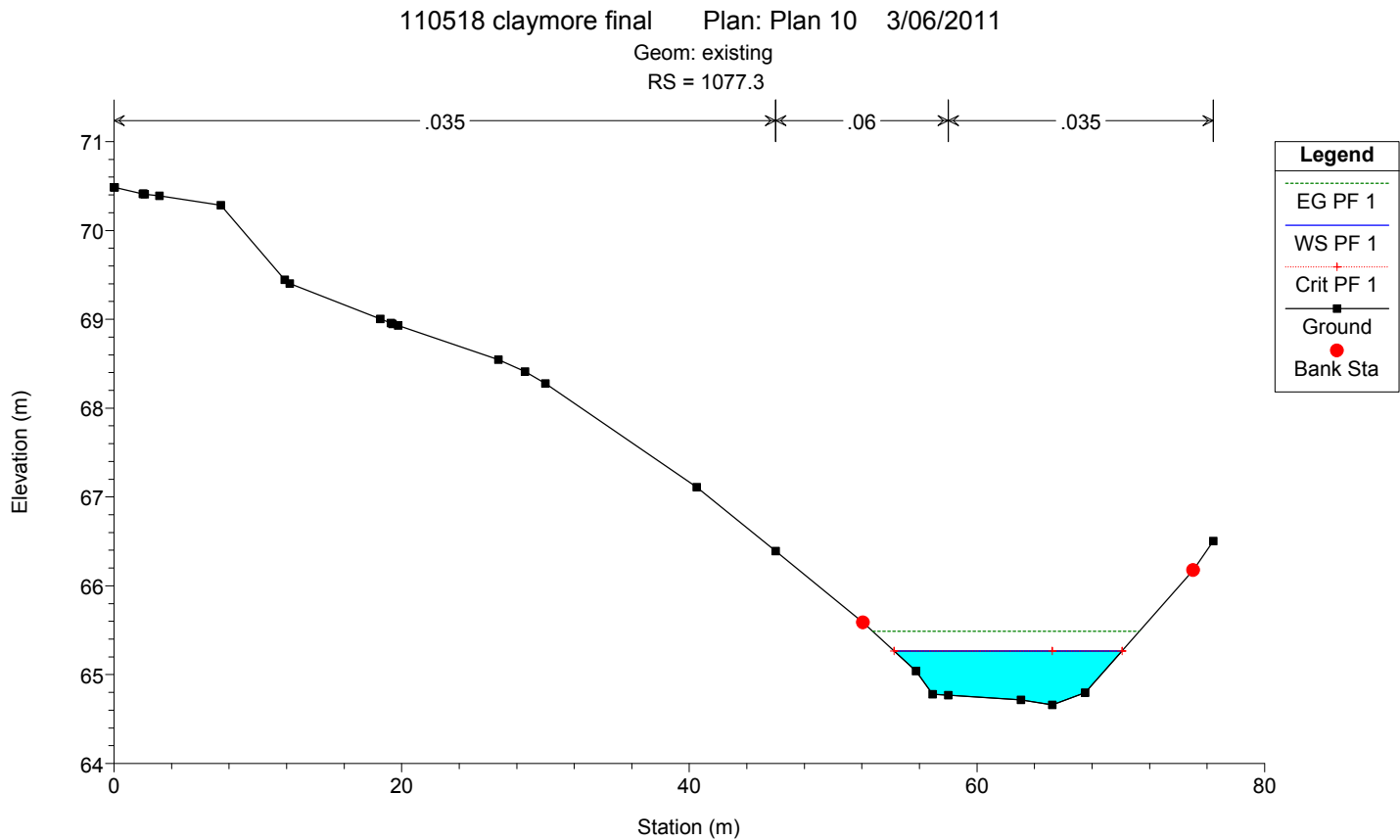


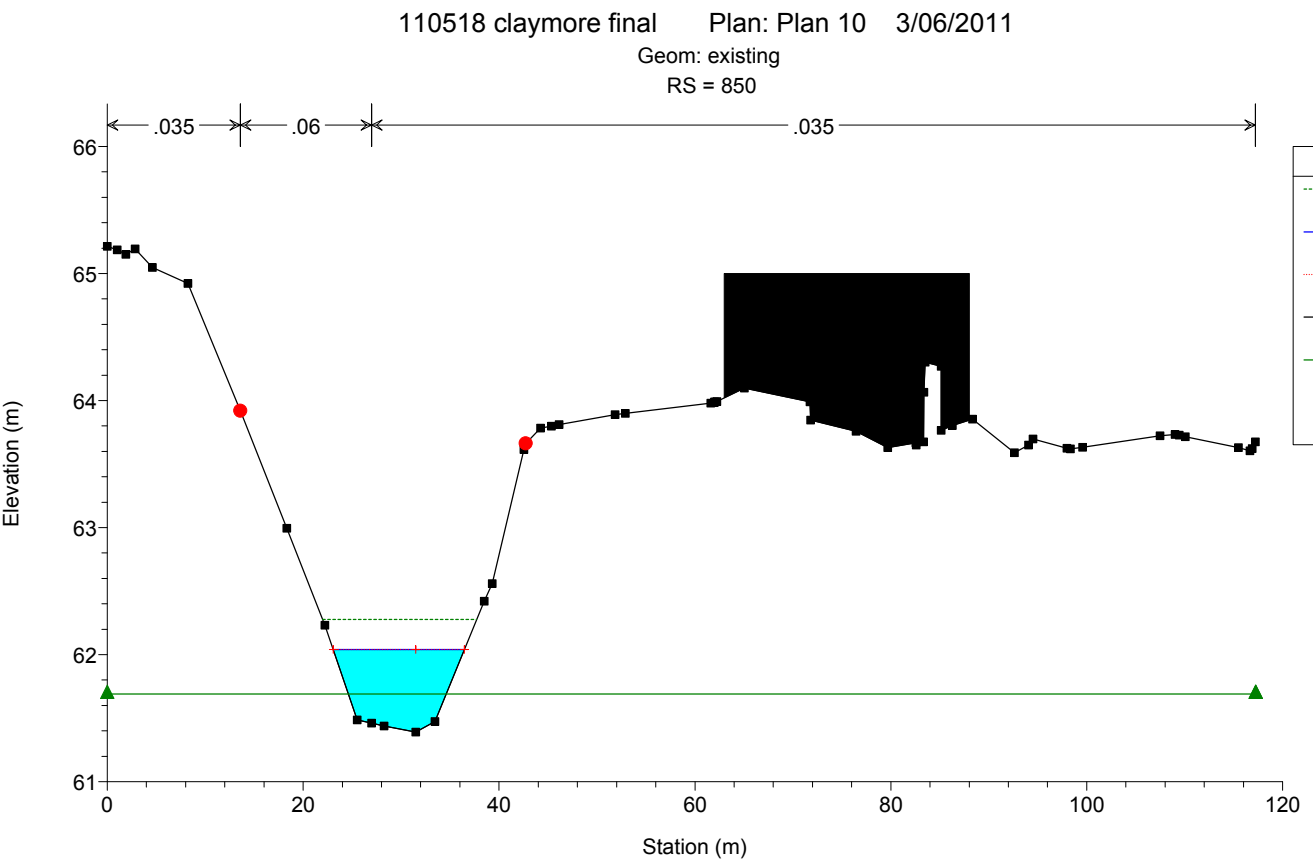
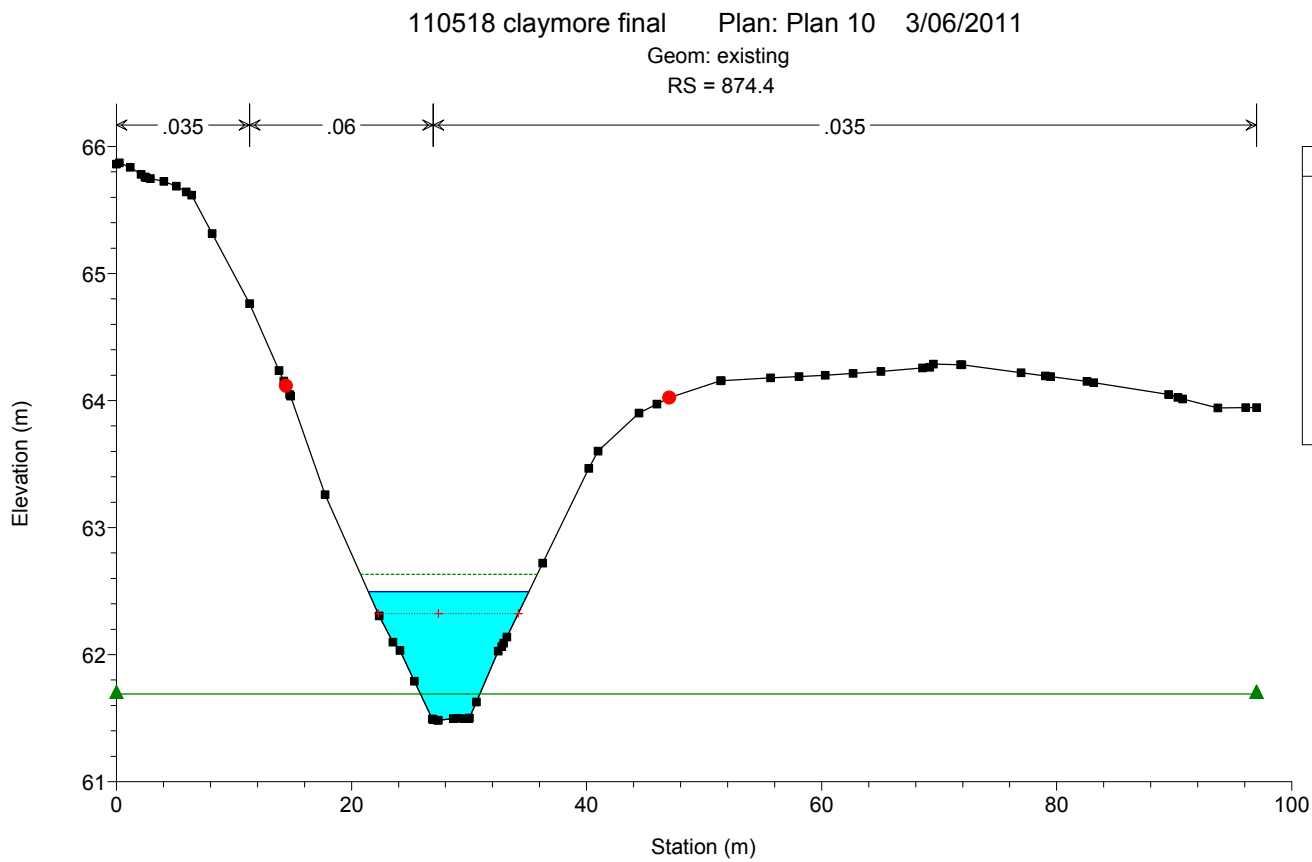
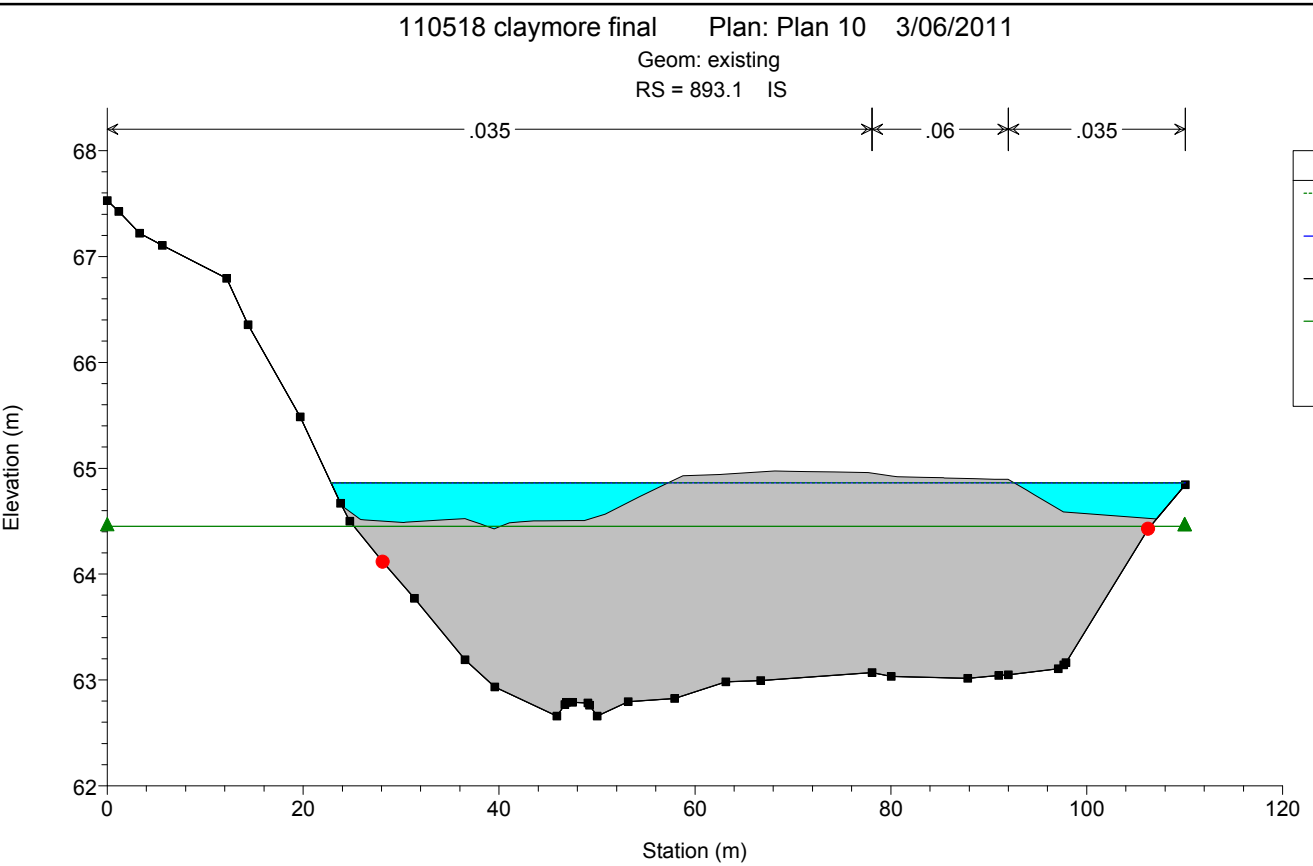
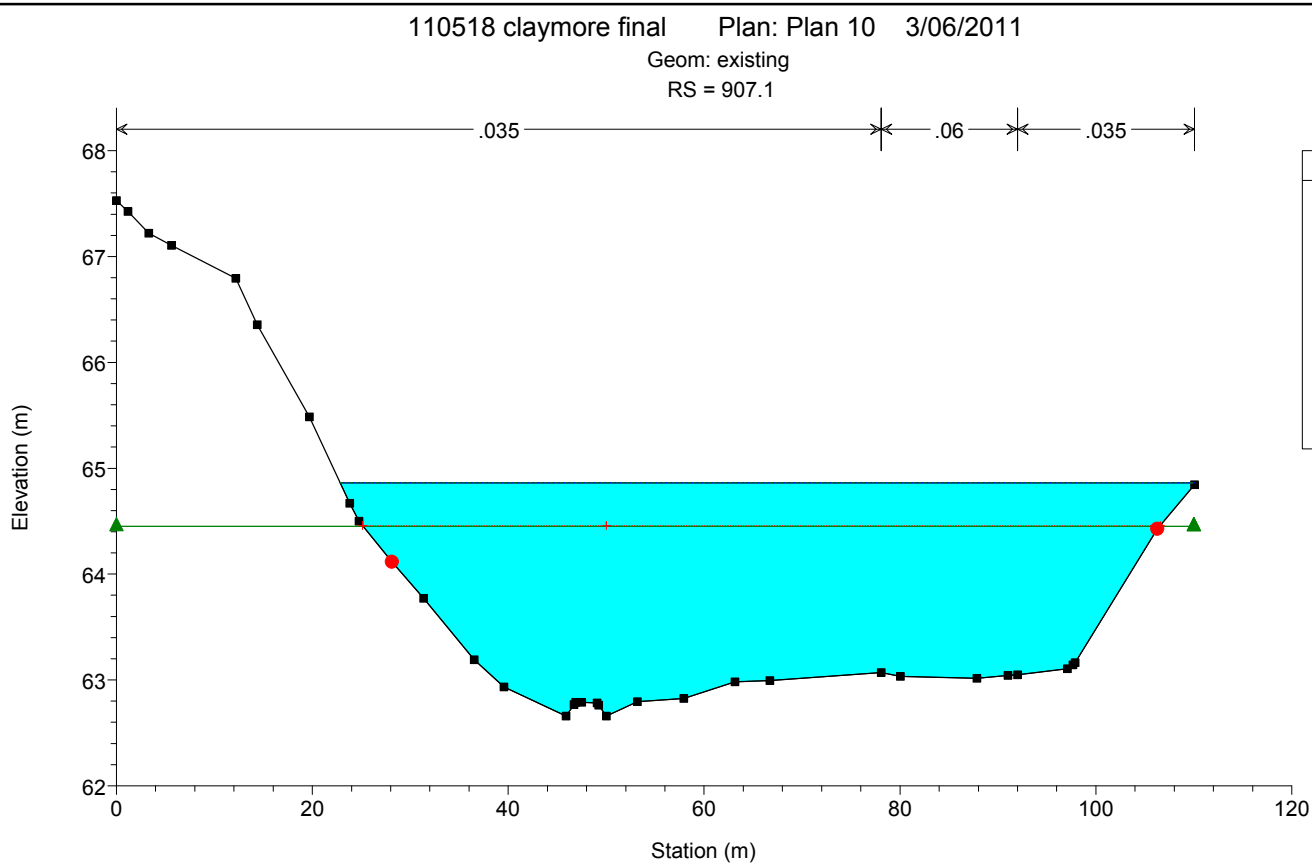


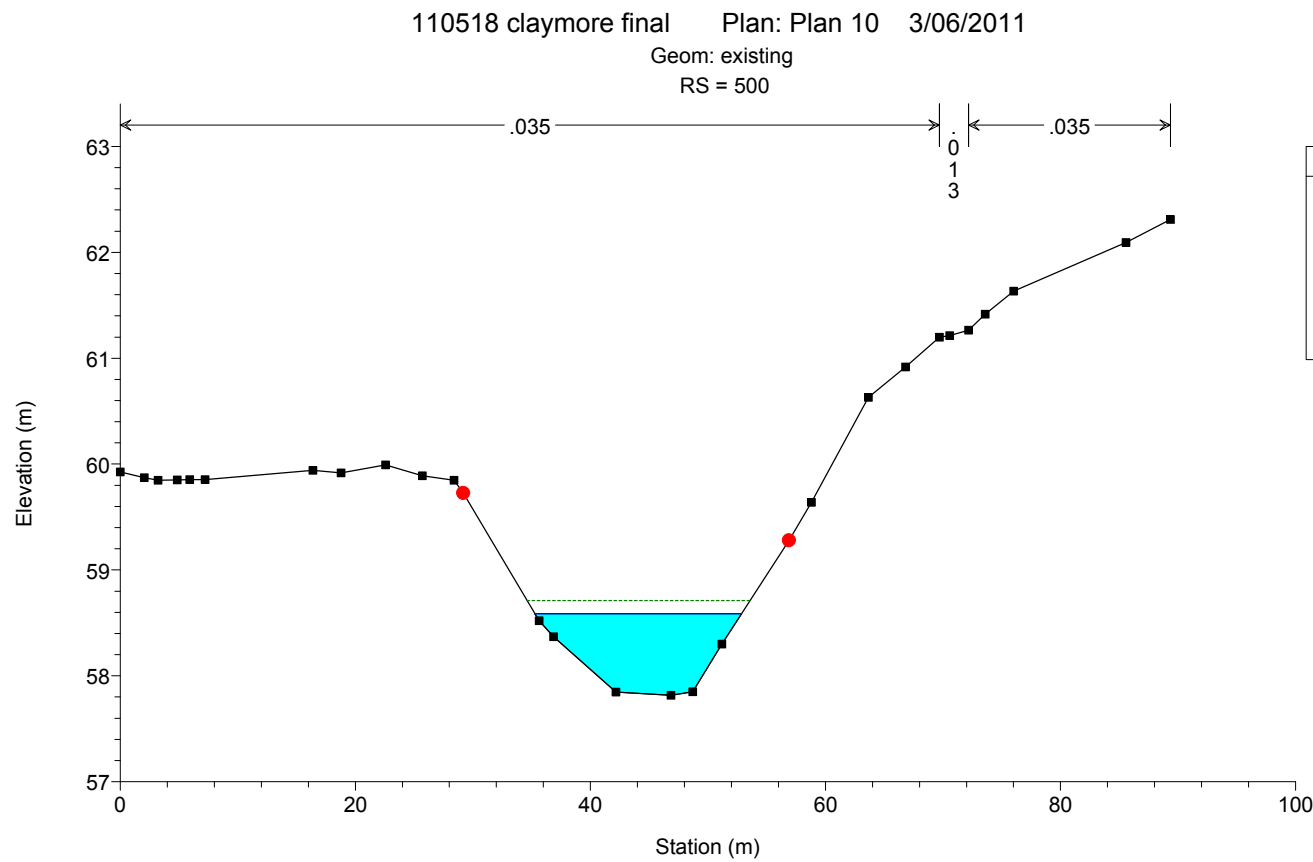
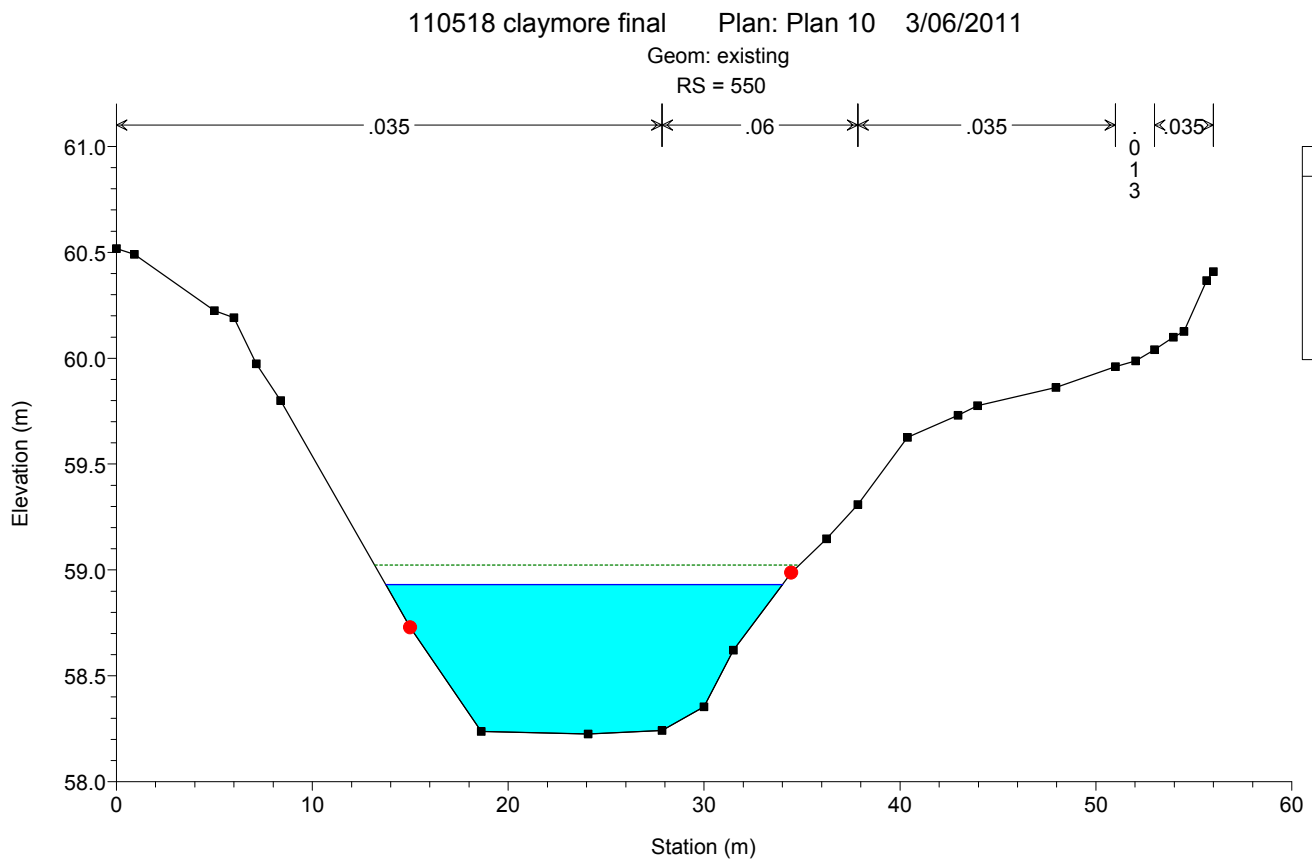
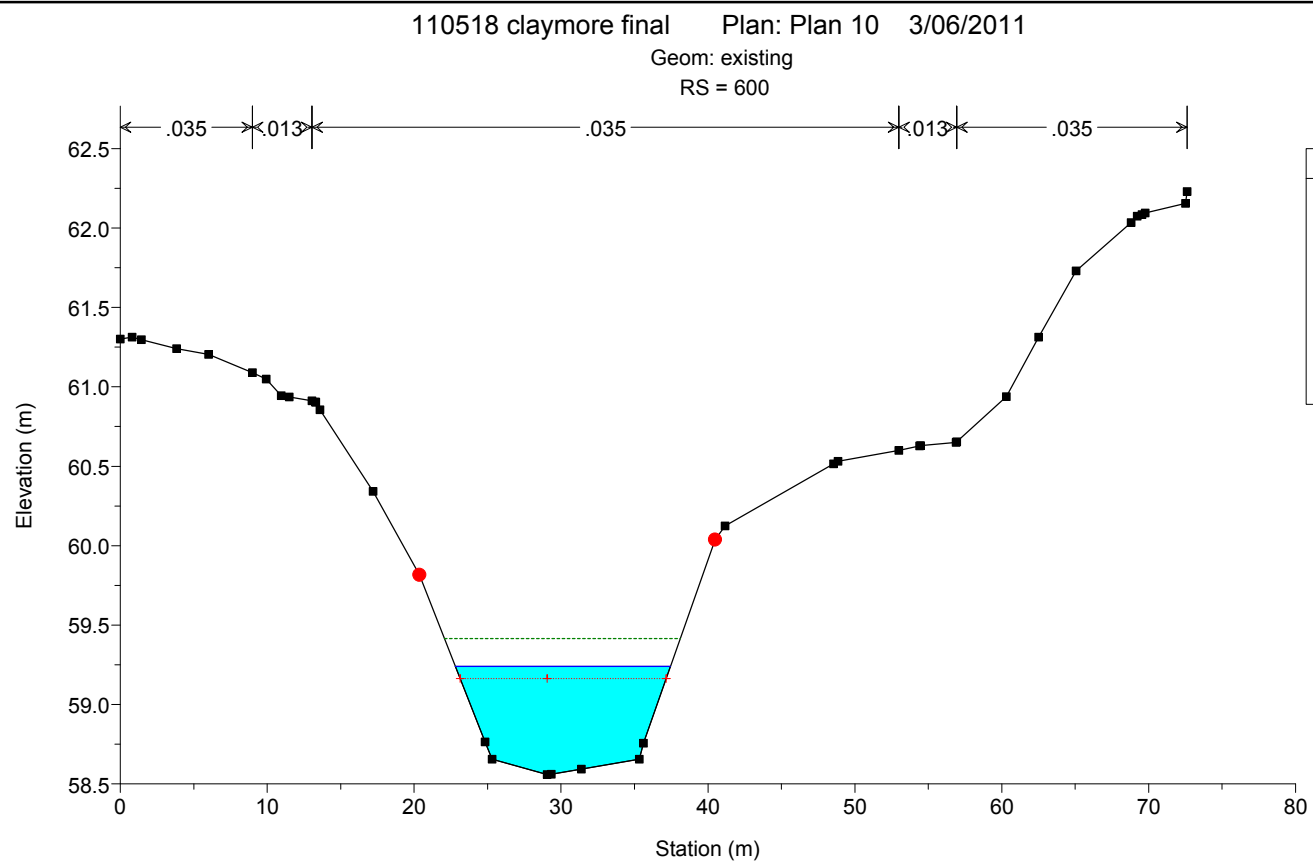
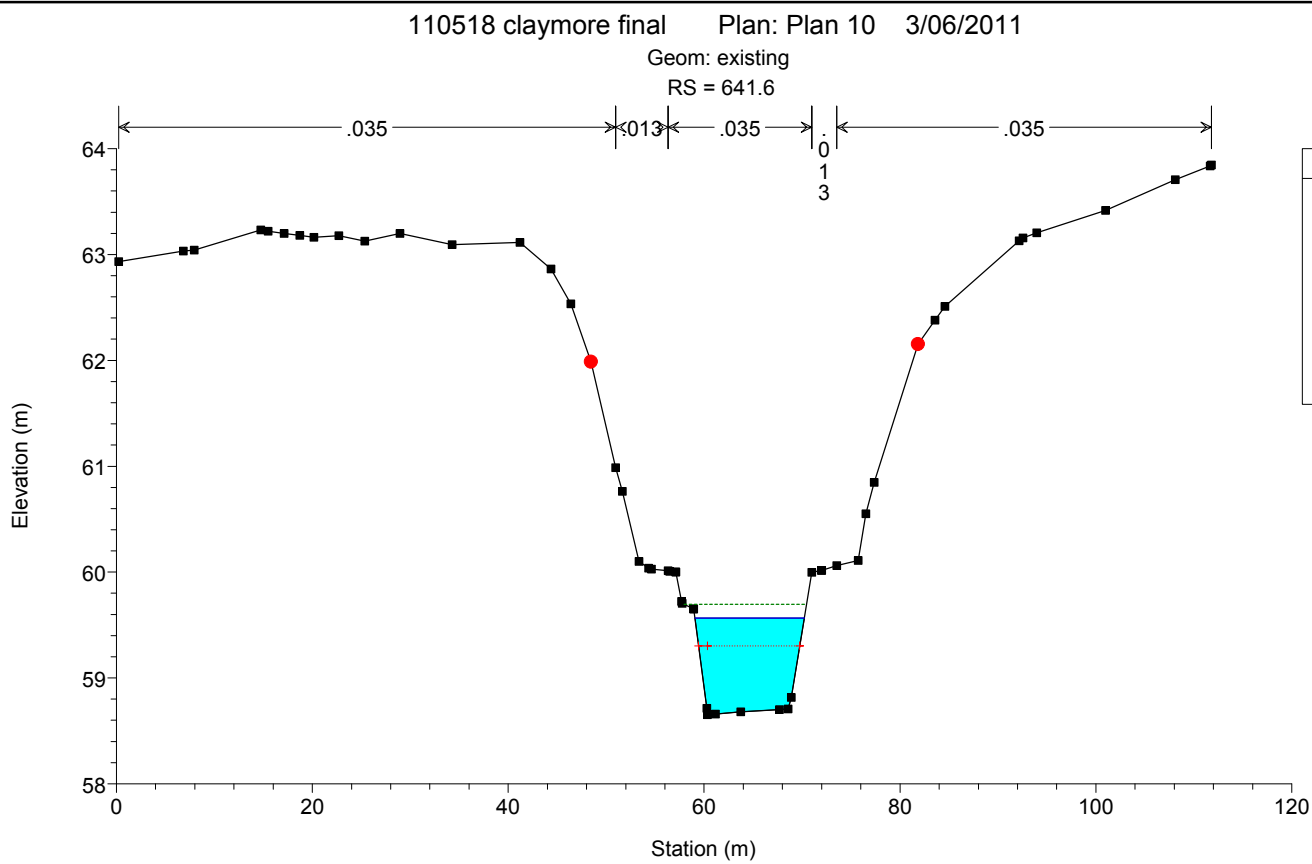


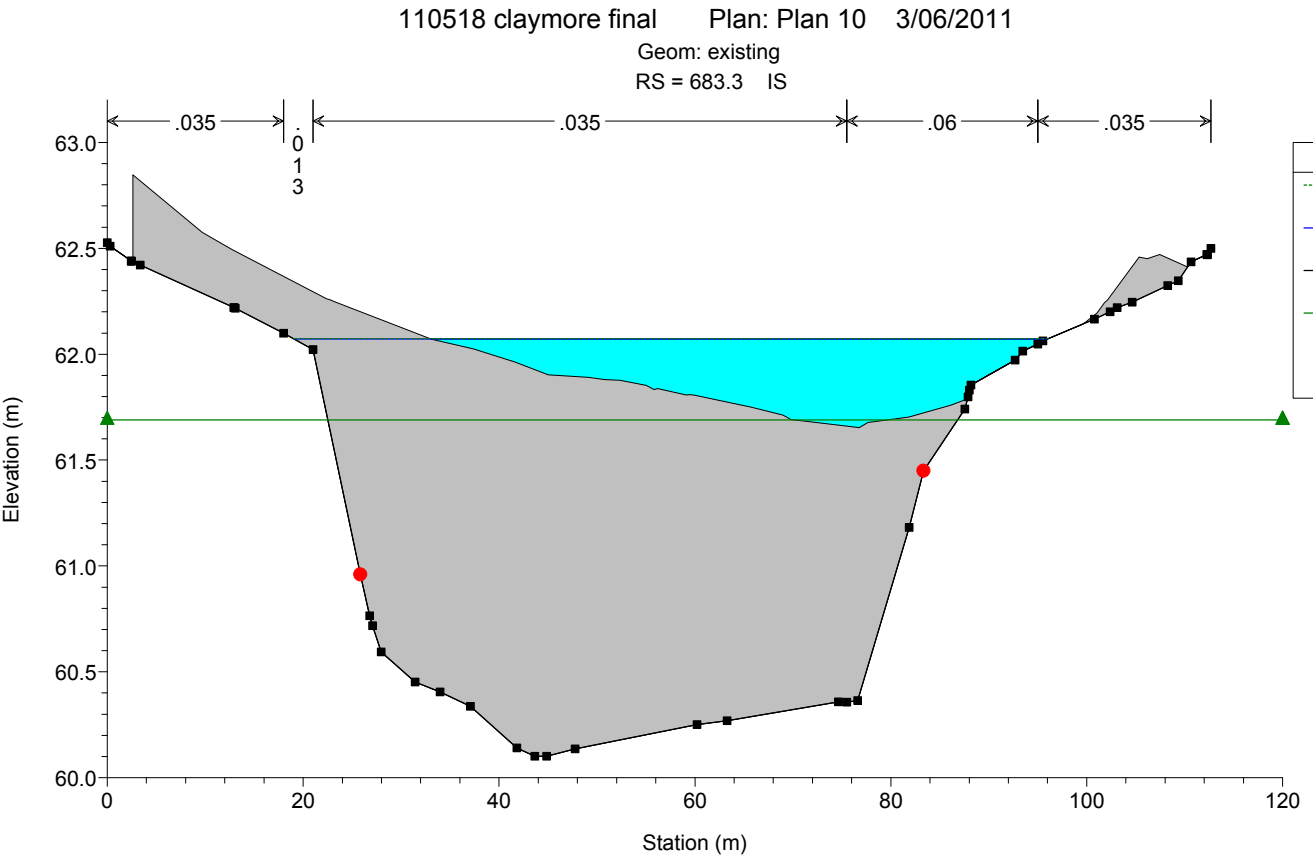
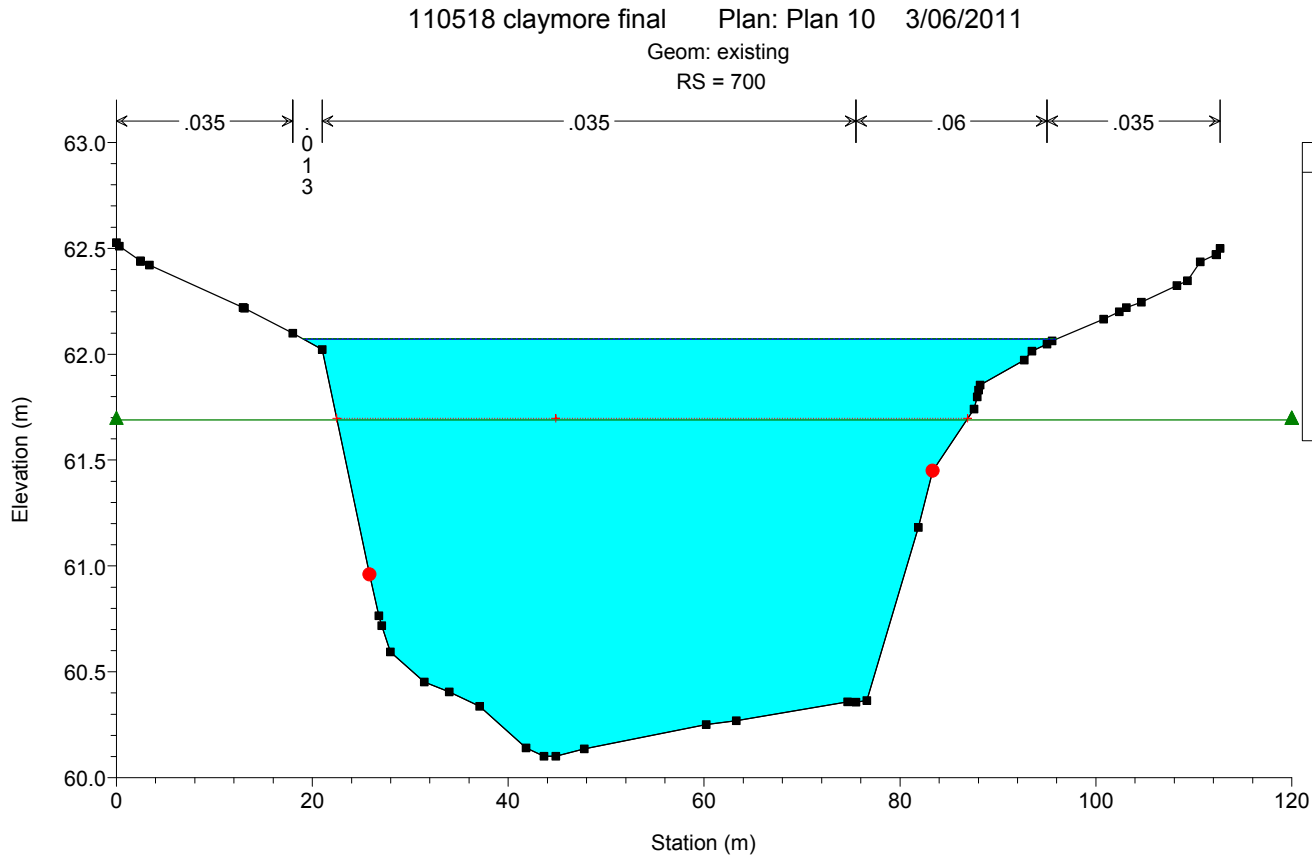
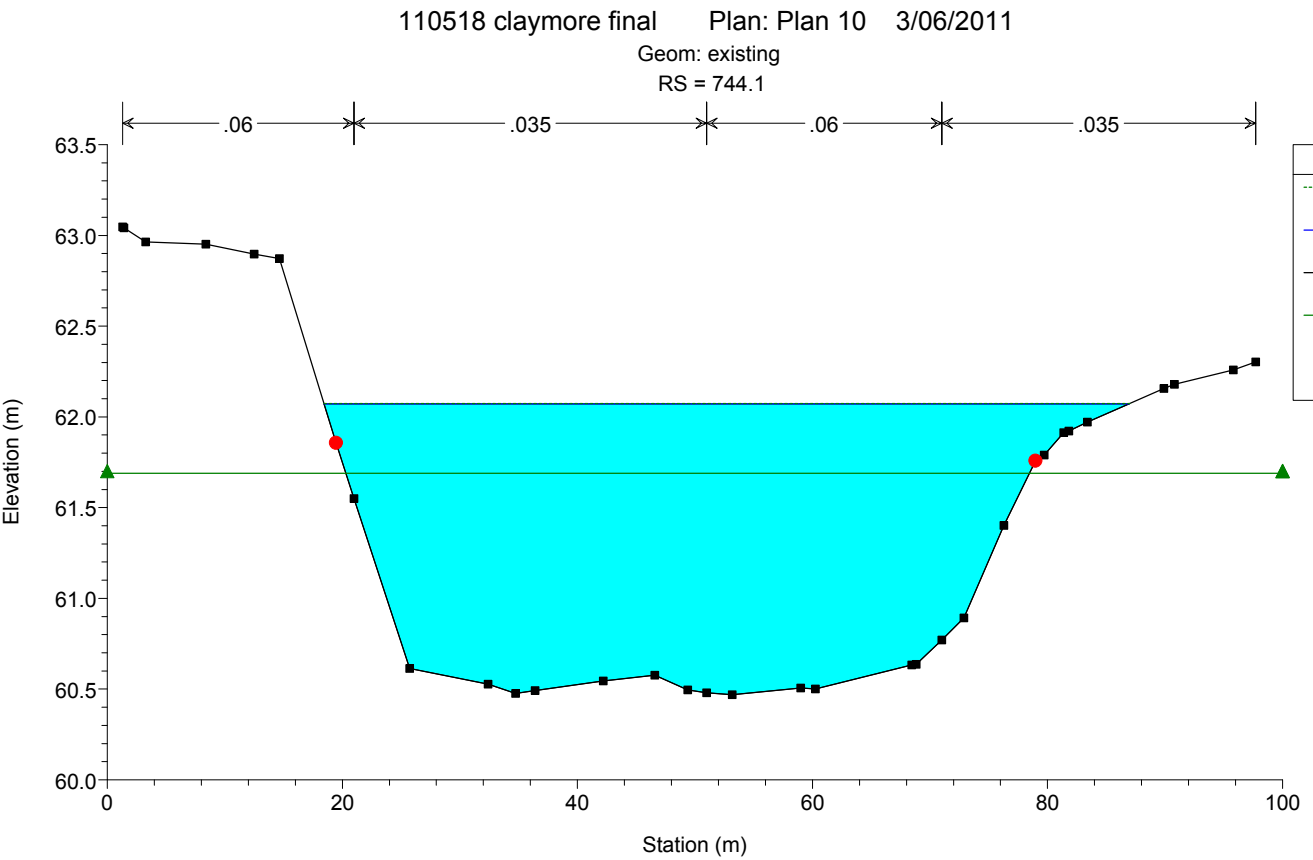
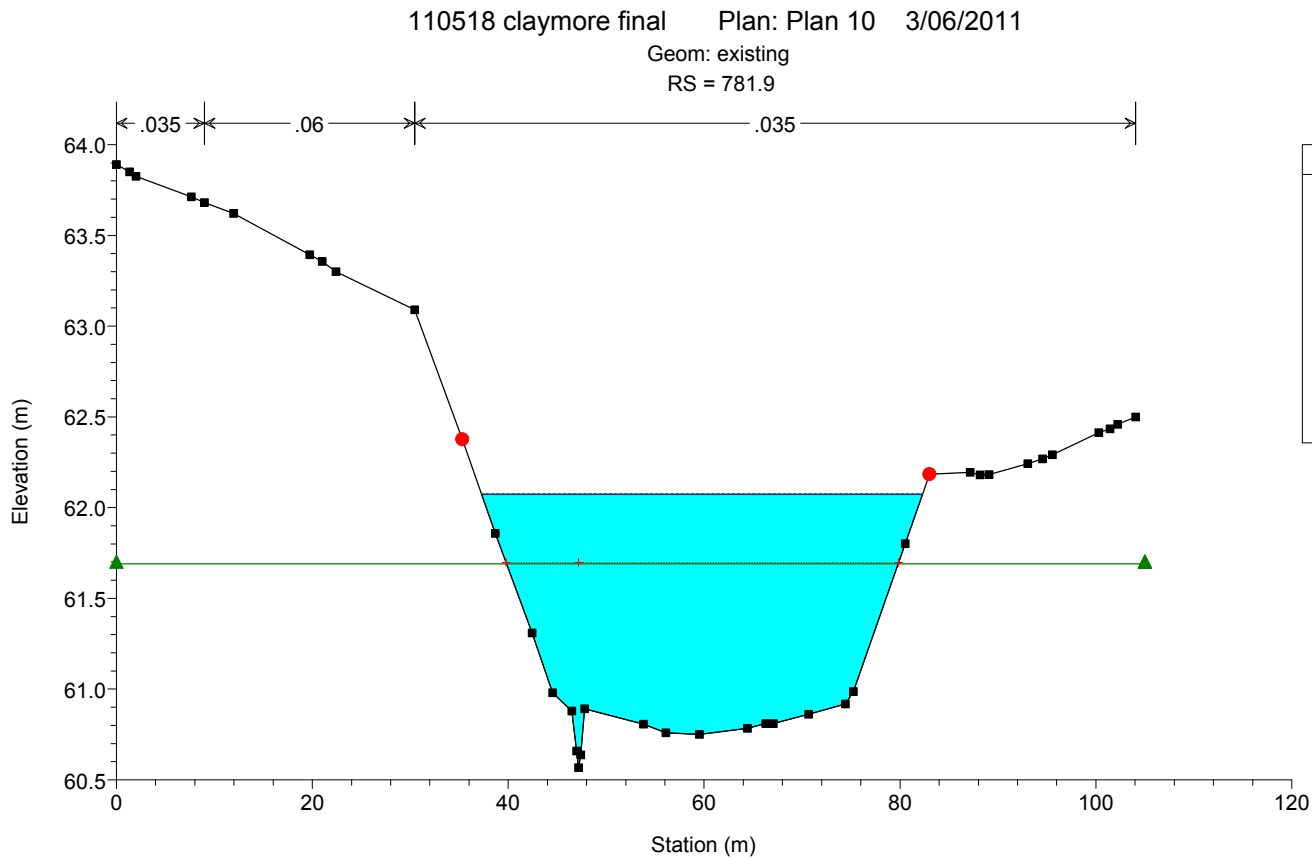


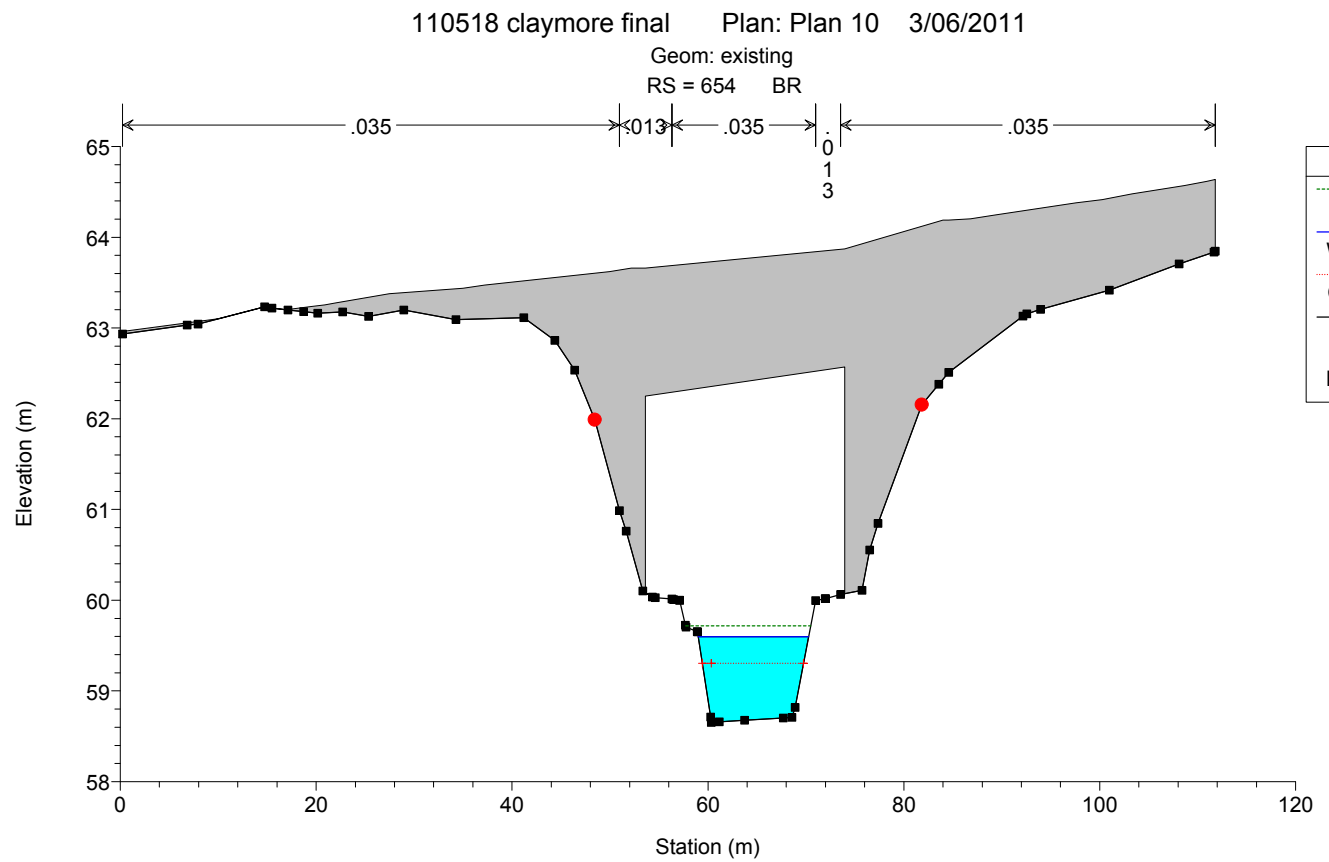
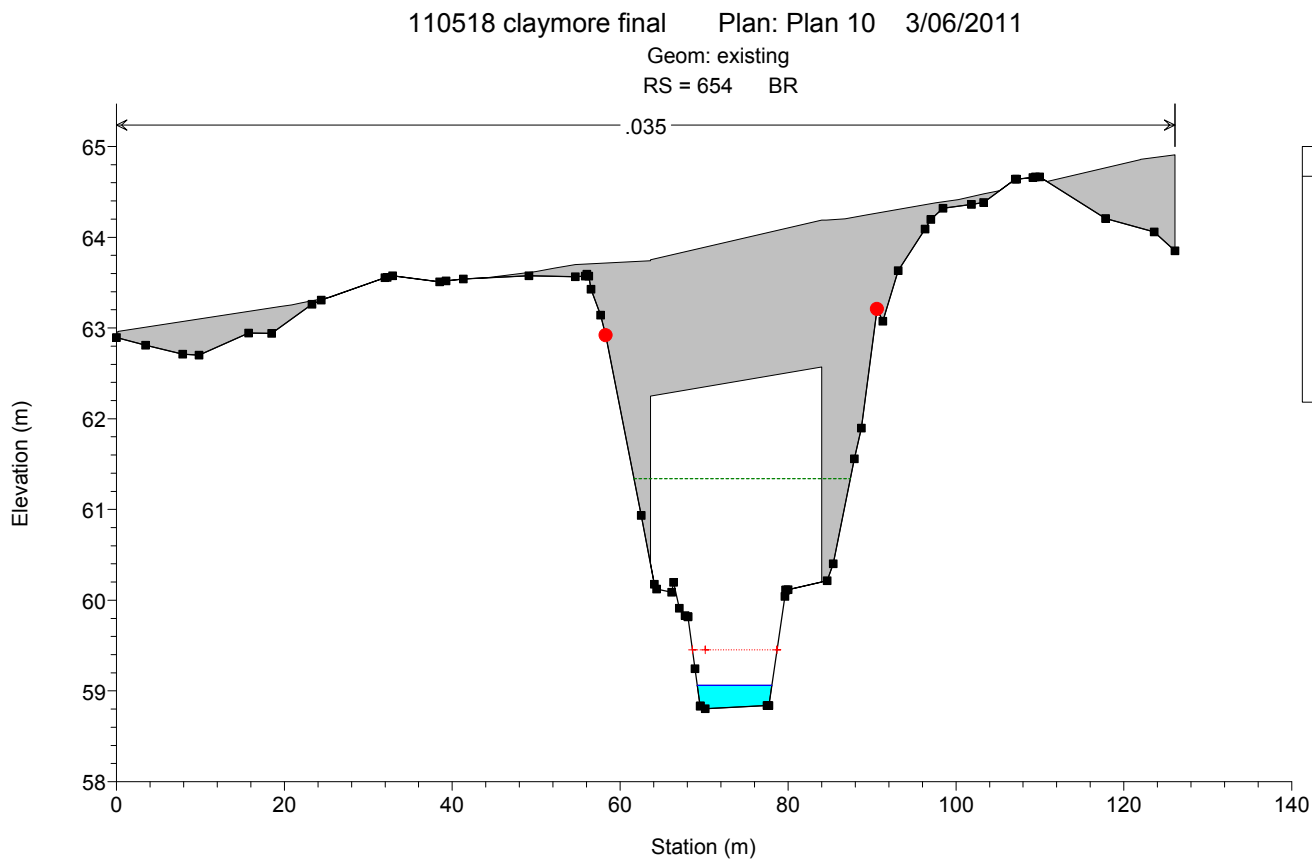
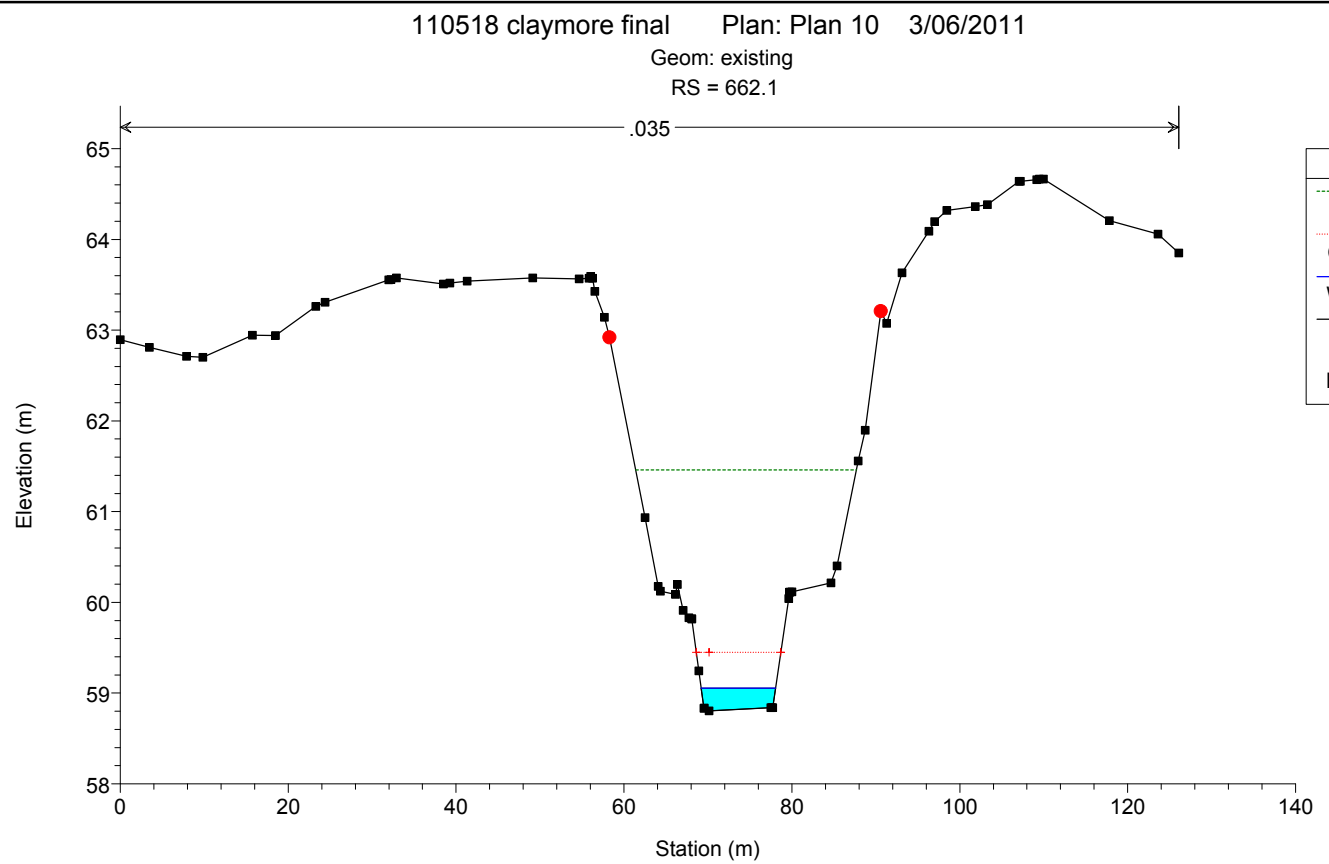
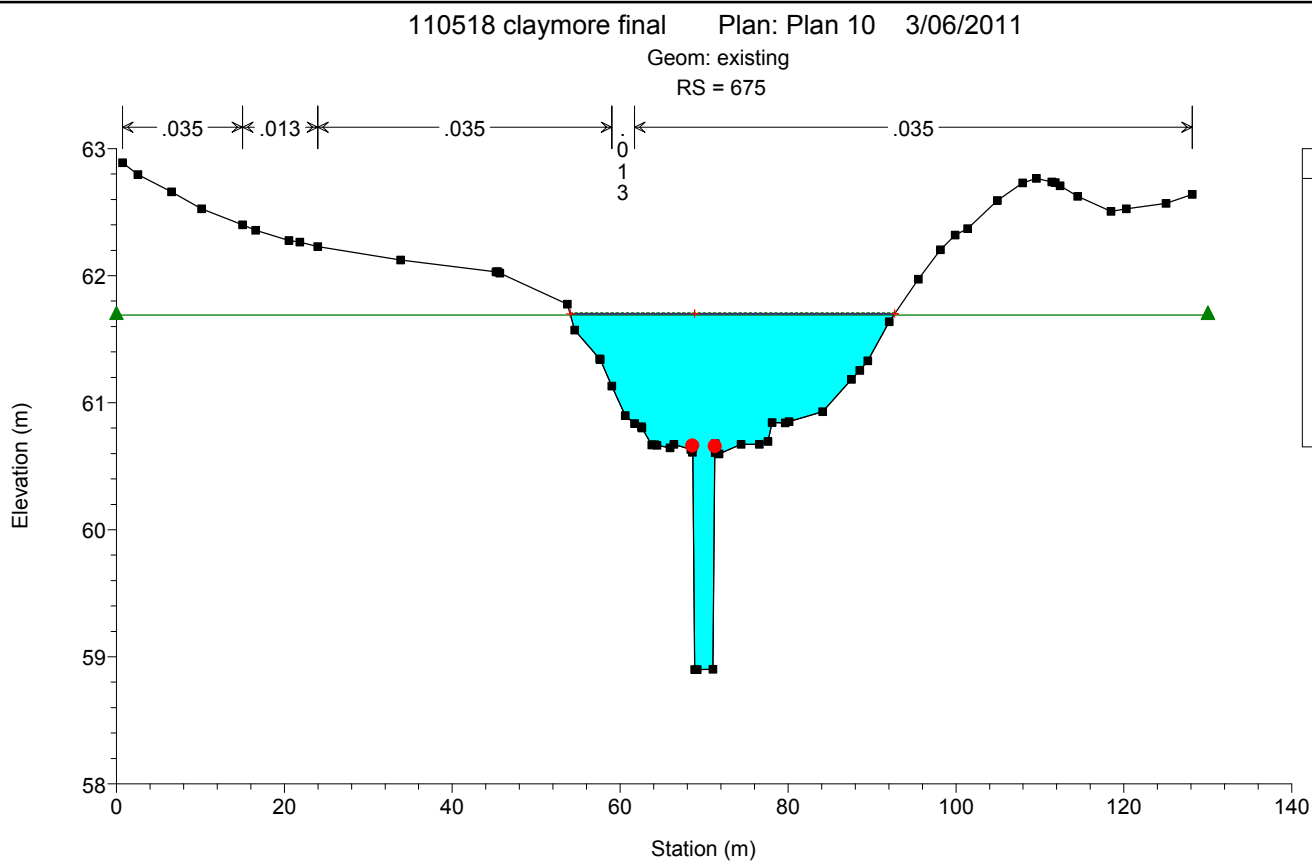


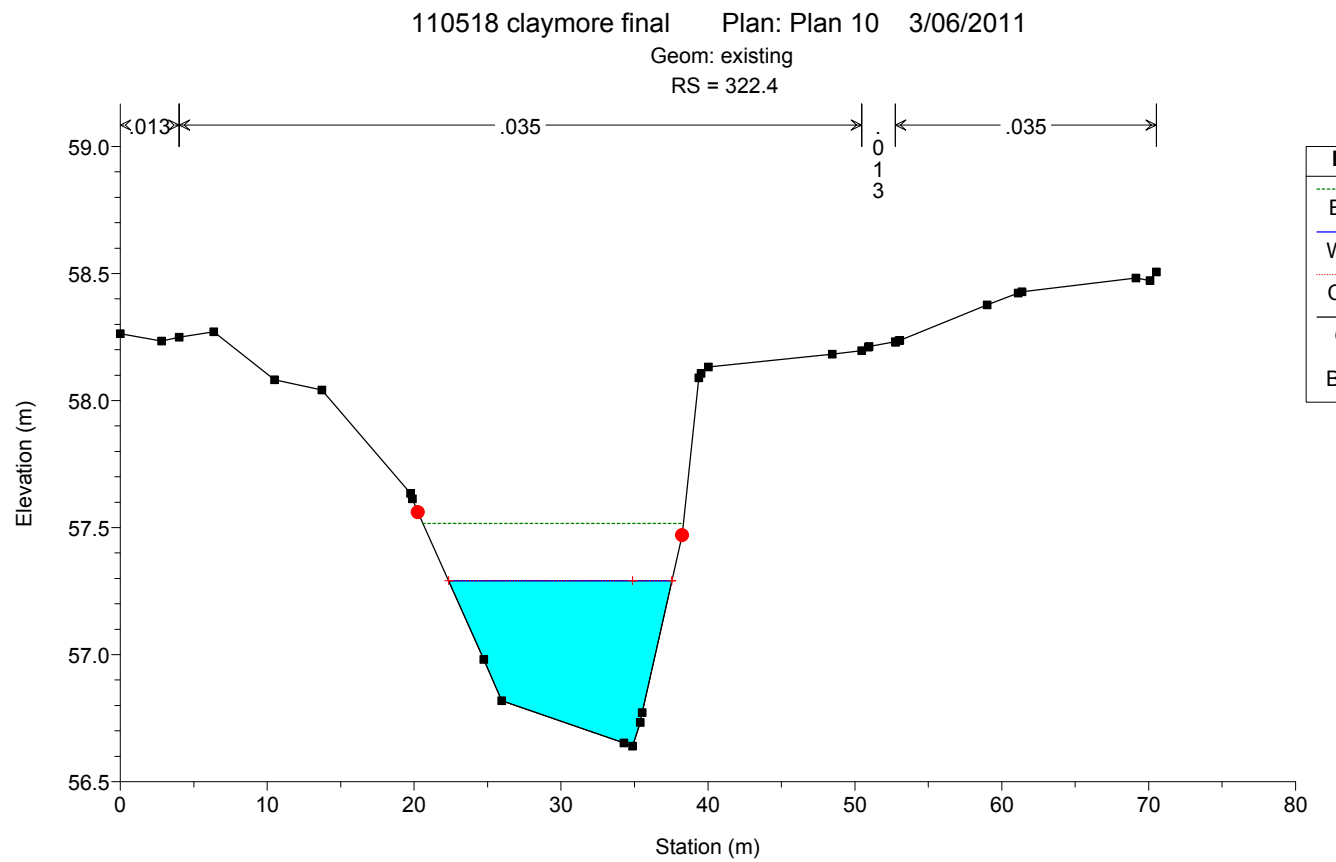
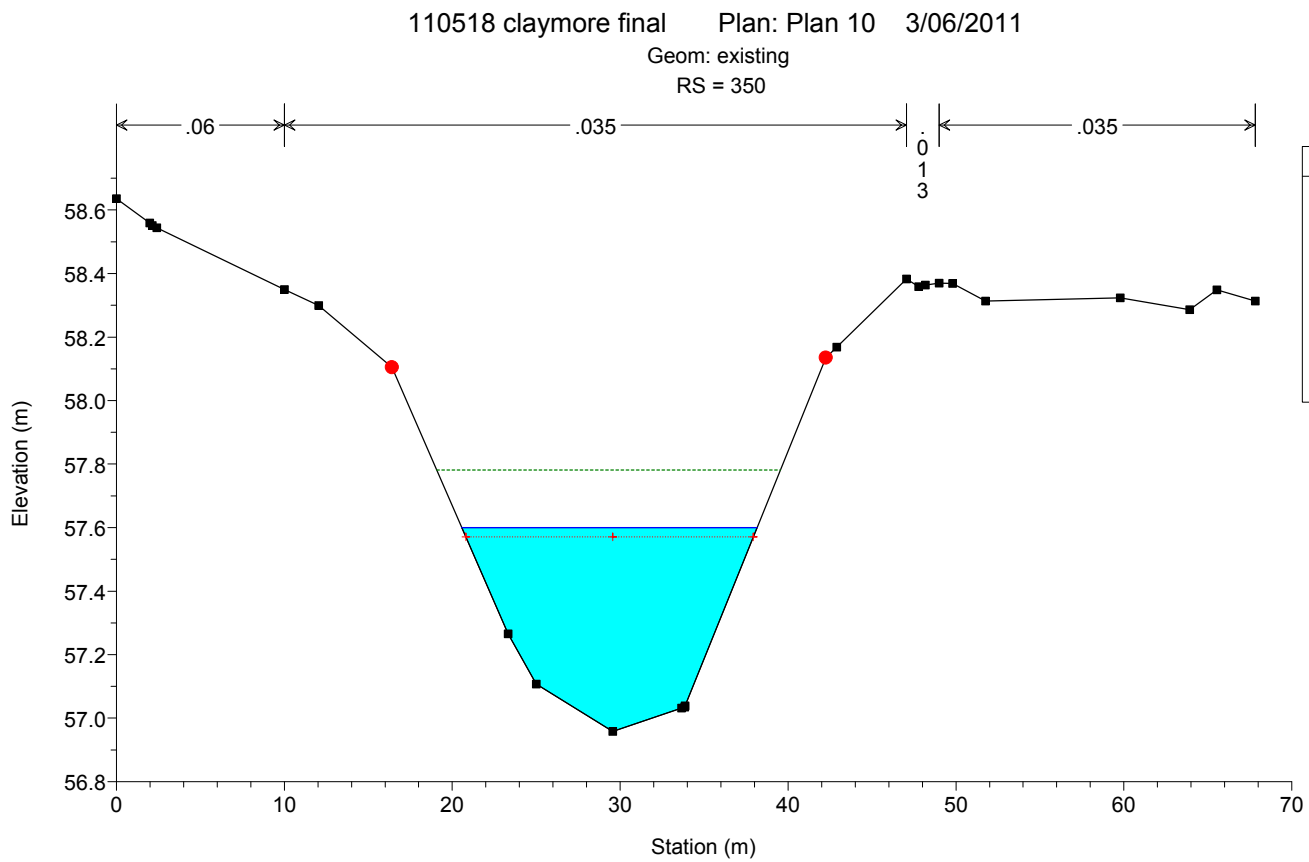
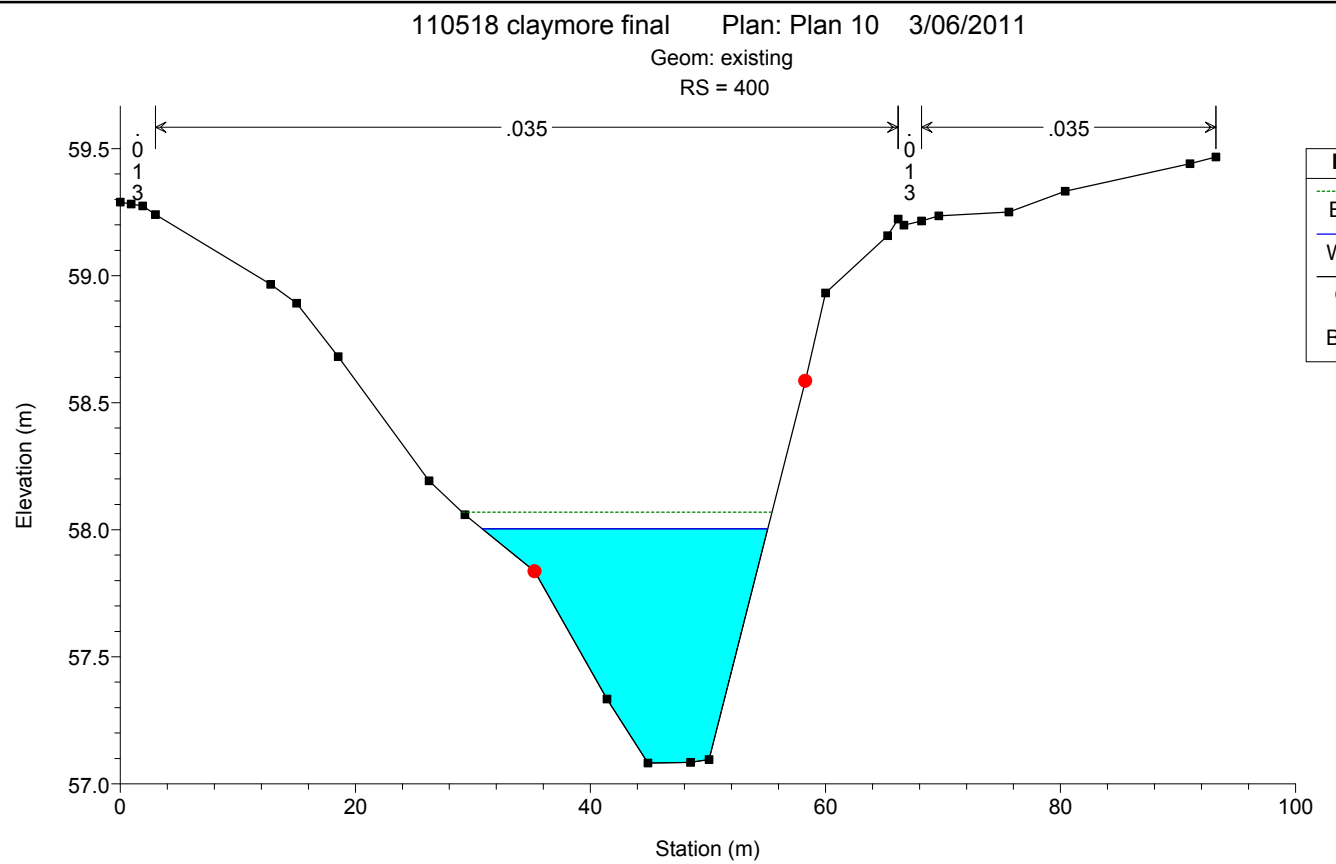
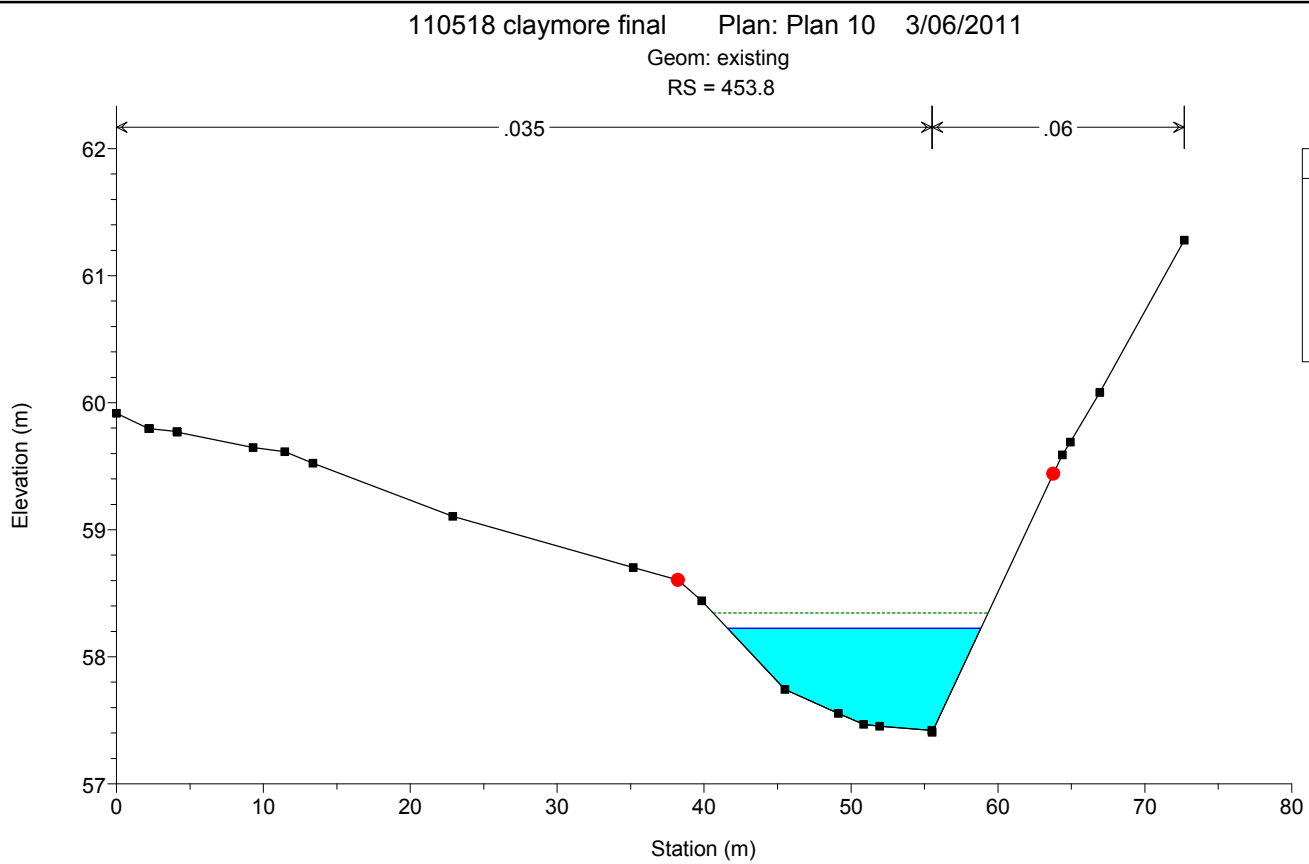


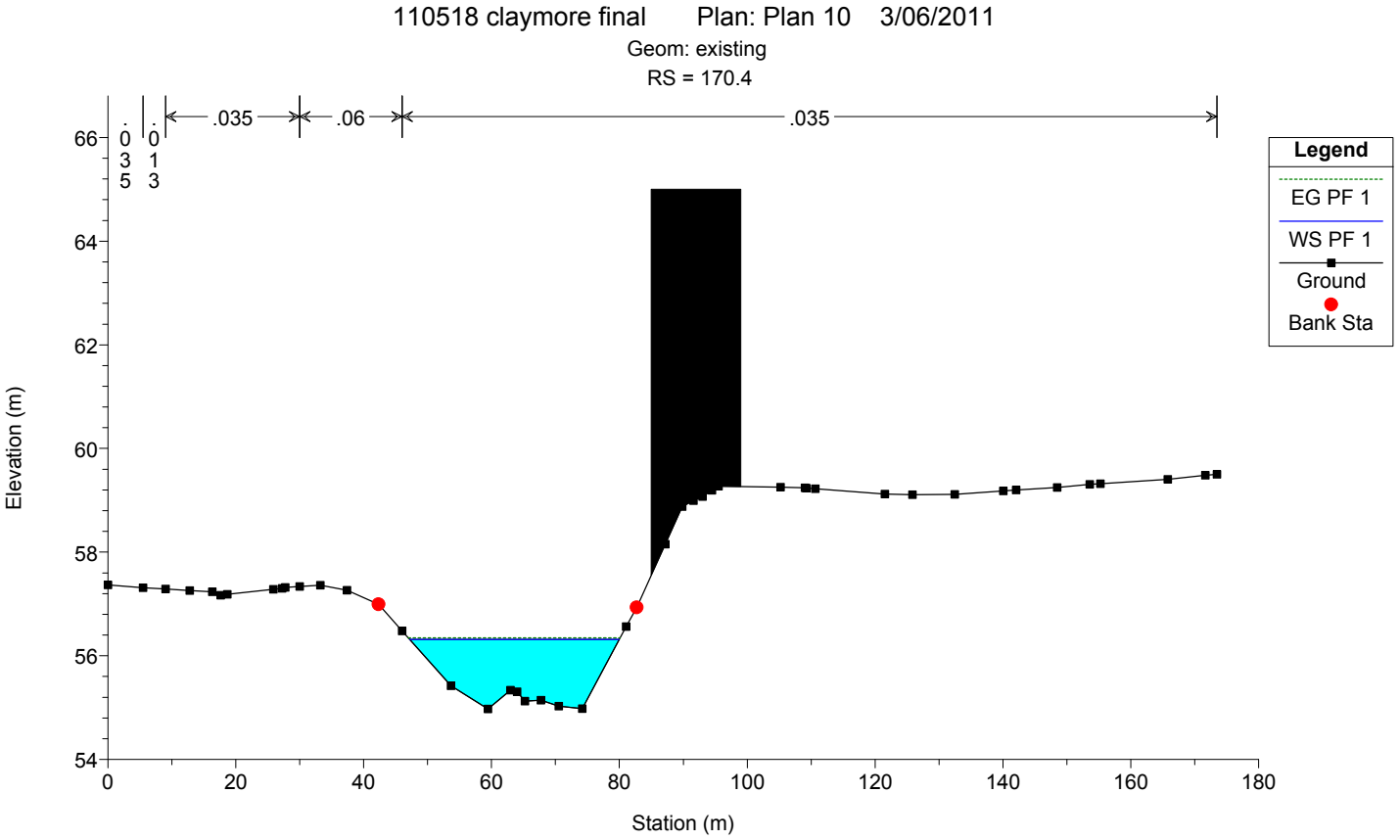
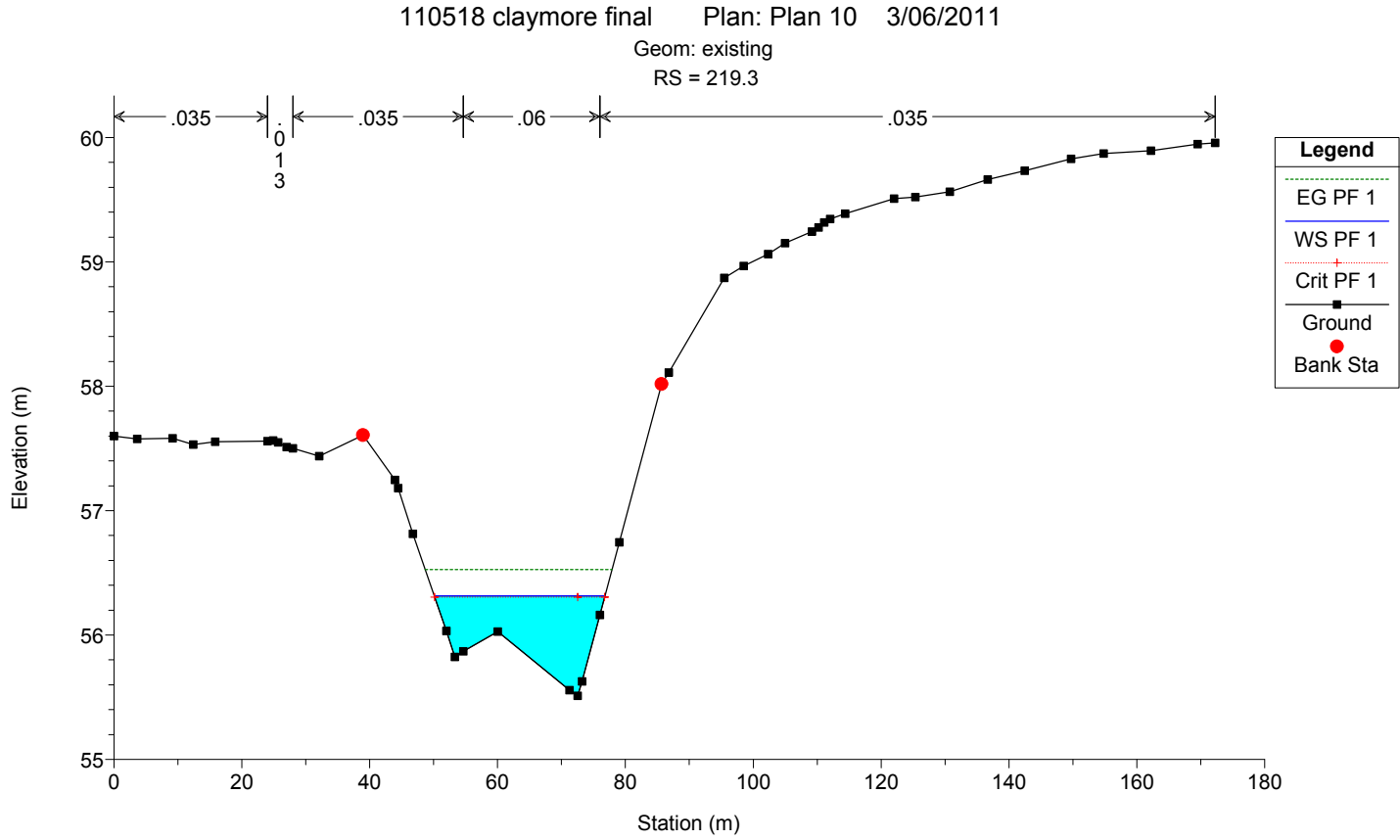
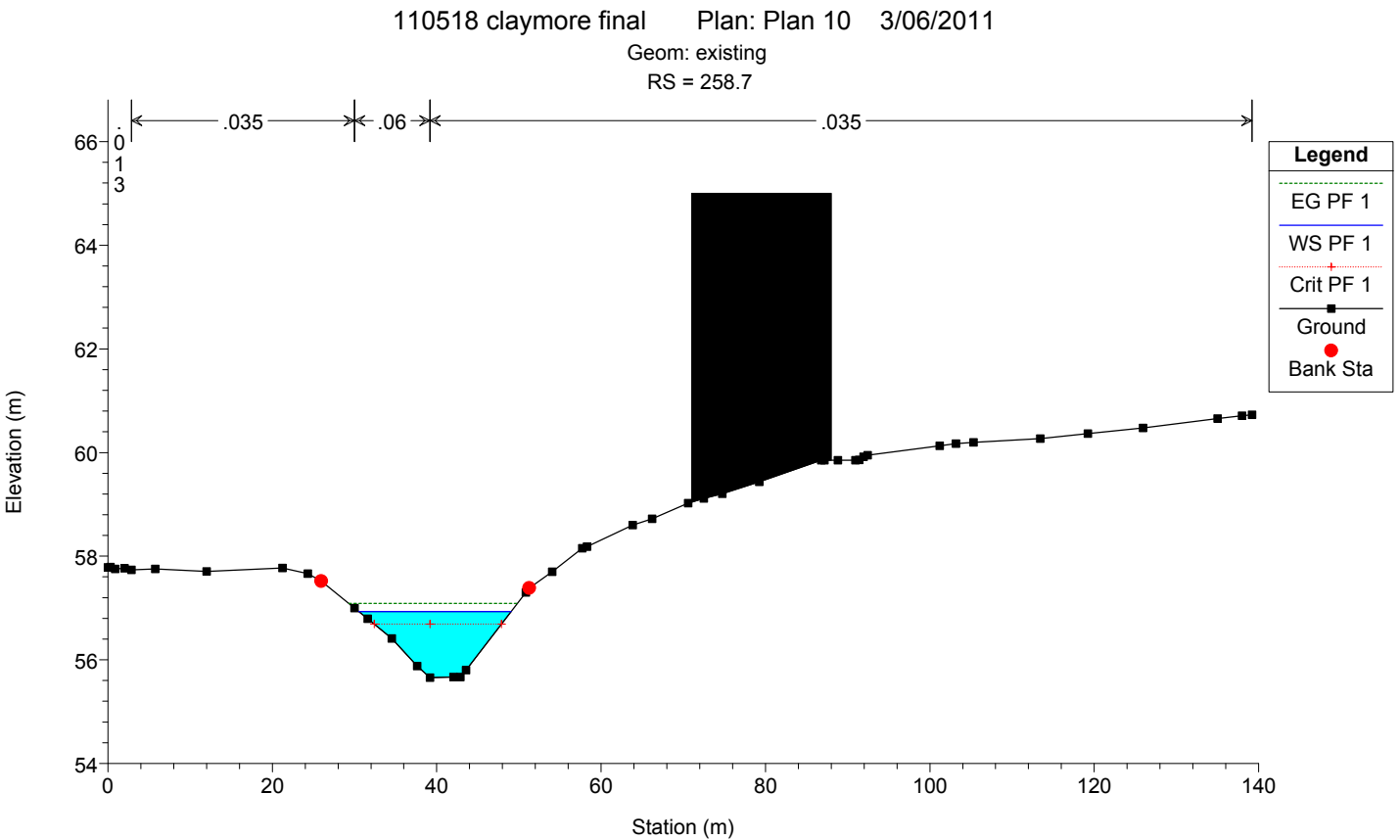
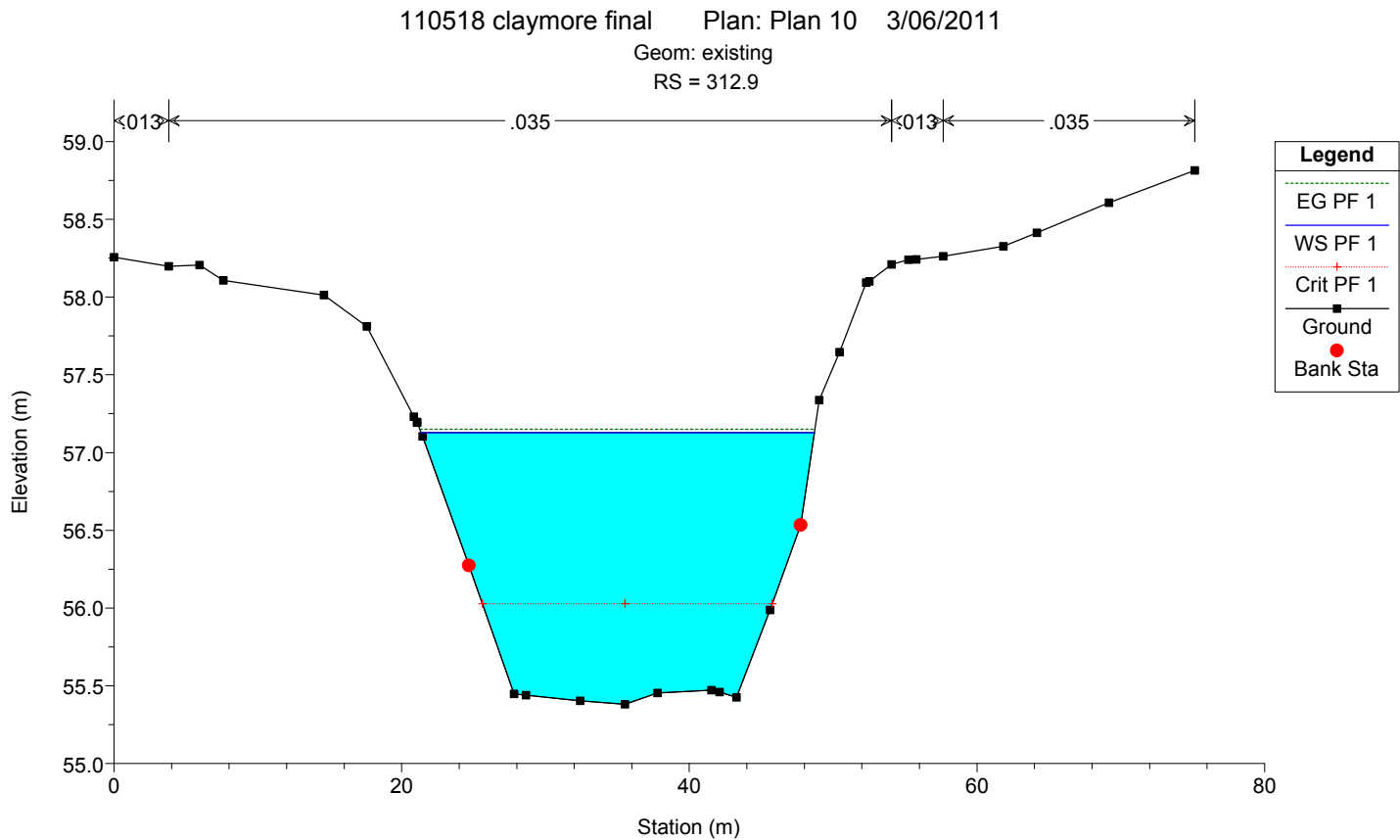


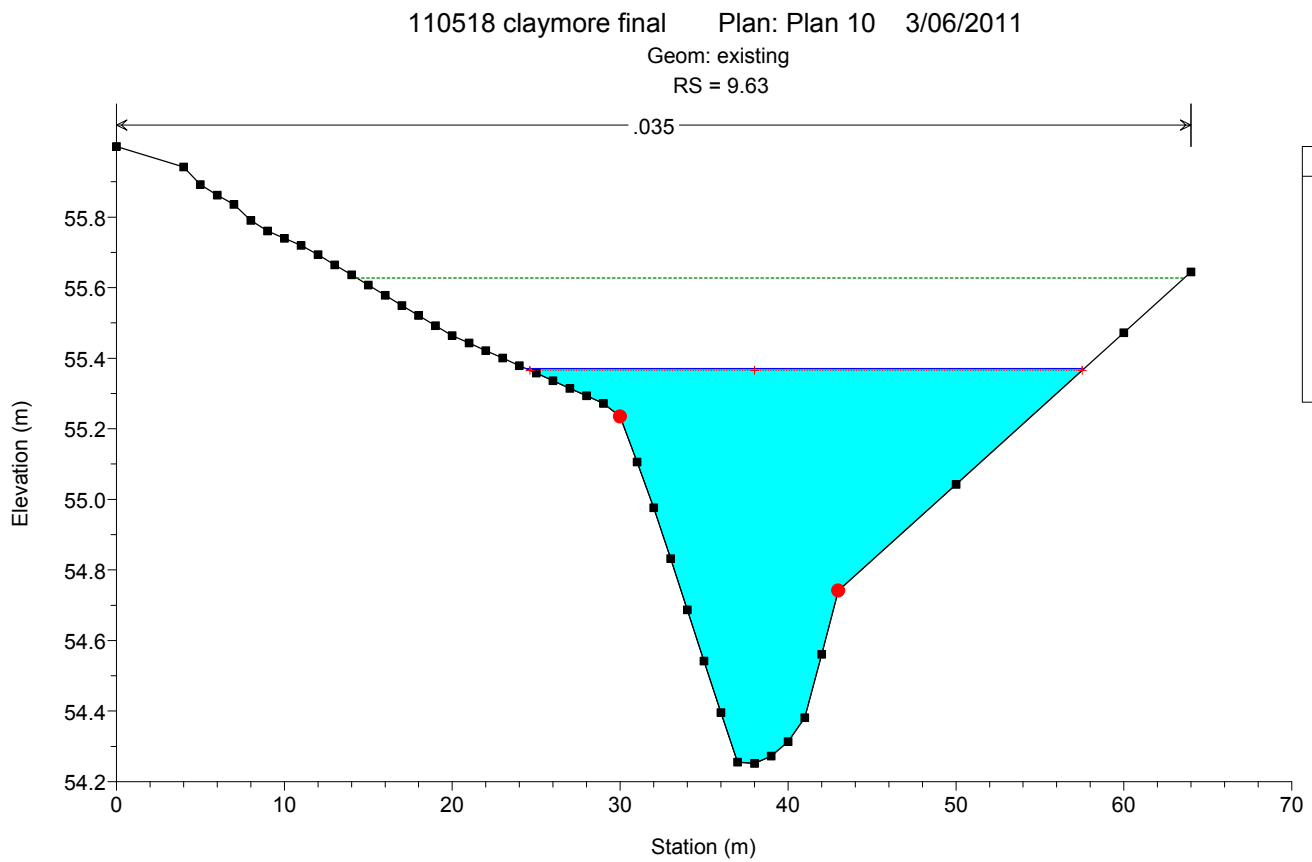
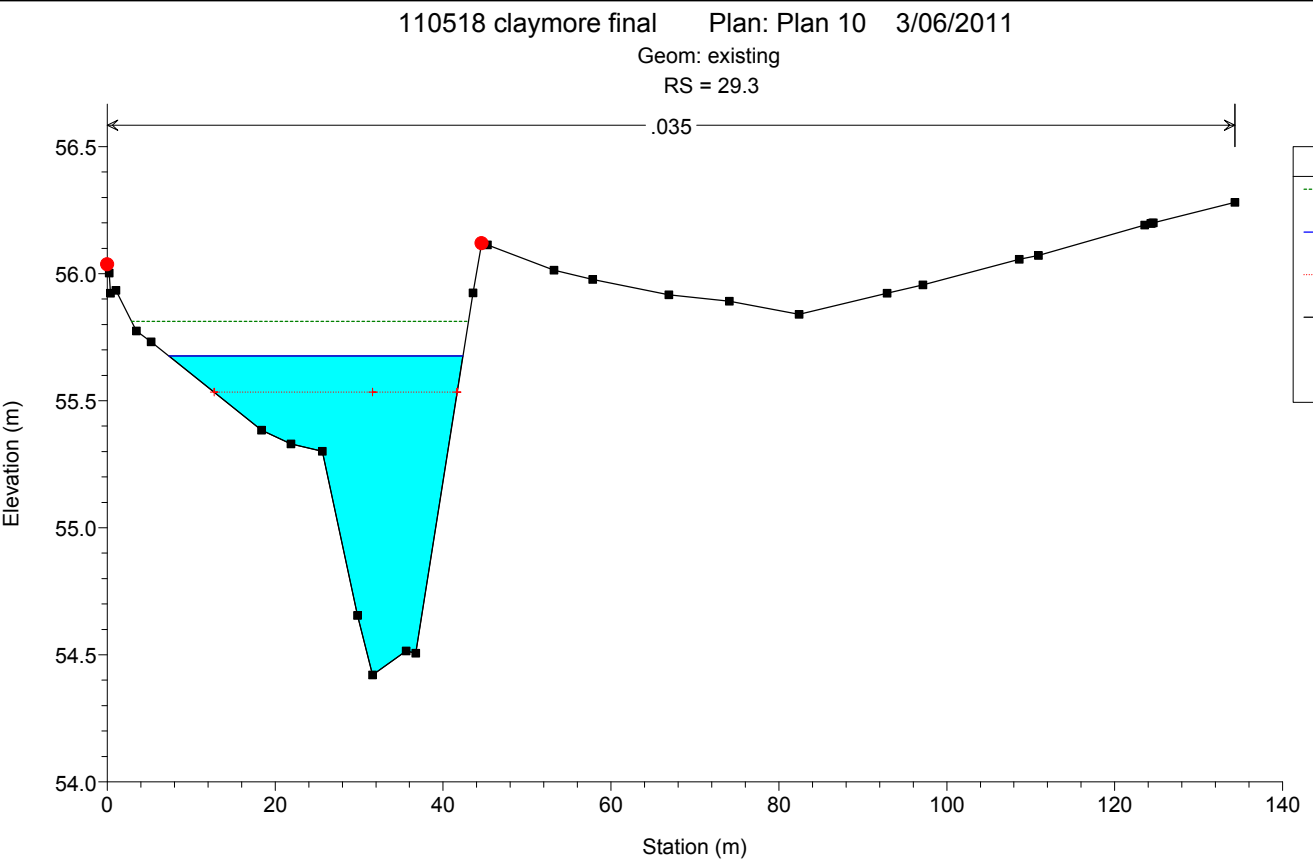
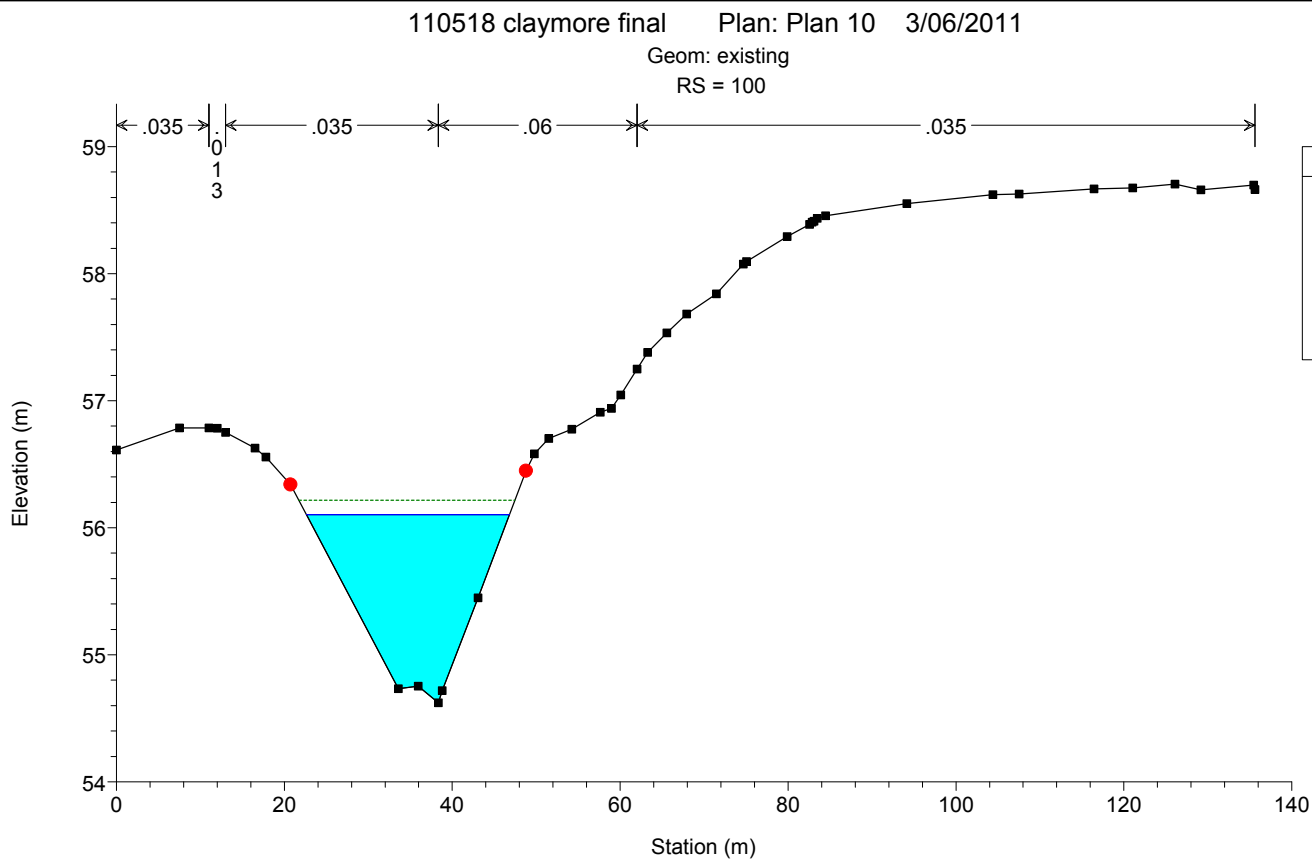












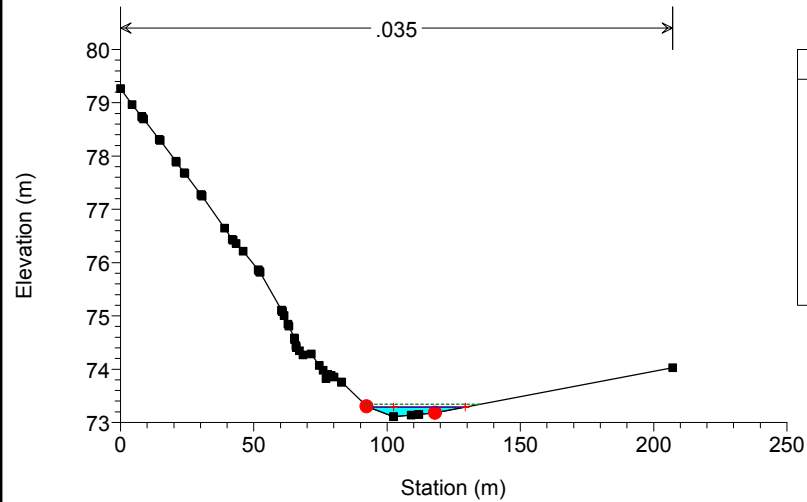
HEC-RAS Plan: prop 100yr River: 1 Reach: 1 Profile: PF 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
1	1628.9	PF 1	3.60	73.11	73.29	73.29	73.34	0.021667	1.04	3.71	36.41	0.95
1	1620.9		Ini Struct									
1	1613.2	PF 1	3.60	73.08	73.28	73.25	73.31	0.010867	0.91	4.57	39.97	0.71
1	1600	PF 1	3.60	72.80	73.25		73.27	0.001343	0.55	6.54	16.98	0.28
1	1575.9	PF 1	12.19	72.65	73.00	73.00	73.09	0.018526	1.47	9.42	51.14	0.97
1	1527.2	PF 1	12.90	70.26	71.75	71.69	71.75	0.000030	0.17	73.75	61.84	0.05
1	1505	PF 1	12.90	70.10	71.75		71.75	0.000020	0.16	82.73	60.11	0.04
1	1471	PF 1	12.90	69.91	71.75		71.75	0.000013	0.13	95.65	61.90	0.03
1	1450	PF 1	12.90	69.78	71.75	71.69	71.75	0.000012	0.14	93.26	57.86	0.03
1	1429.7	PF 1	12.90	69.53	71.75	71.69	71.75	0.000066	0.28	46.07	38.47	0.08
1	1417.6		Ini Struct									
1	1400	PF 1	4.67	68.45	69.09		69.15	0.006346	1.11	4.22	12.87	0.62
1	1387.84	PF 1	4.67	68.30	69.10		69.11	0.000893	0.55	8.51	15.64	0.24
1	1359	PF 1	4.67	68.00	69.07		69.08	0.001181	0.48	10.46	28.54	0.18
1	1300	PF 1	4.67	67.57	69.08	68.60	69.08	0.000008	0.08	66.50	87.67	0.03
1	1252.5	PF 1	20.95	67.39	69.07	68.60	69.07	0.000050	0.26	102.81	85.98	0.07
1	1200	PF 1	20.95	67.00	69.07		69.07	0.000009	0.13	167.18	104.15	0.03
1	1150	PF 1	20.95	66.55	69.07	68.60	69.07	0.000043	0.32	86.09	66.14	0.07
1	1128.4		Ini Struct									
1	1105.3	PF 1	16.80	64.76	65.75	65.71	65.96	0.011914	2.02	8.30	16.38	0.91
1	1077.3	PF 1	16.80	64.66	65.32	65.32	65.56	0.017085	2.17	7.76	16.51	1.01
1	1028	PF 1	16.80	63.84	64.94	64.50	64.99	0.001516	0.90	18.73	26.84	0.34
1	992.1	PF 1	19.87	63.79	64.92		64.95	0.000674	0.67	29.64	35.28	0.23
1	950.3	PF 1	19.87	63.22	64.94		64.94	0.000024	0.19	107.76	74.23	0.05
1	907.1	PF 1	19.87	62.66	64.94	64.46	64.94	0.000012	0.14	145.93	87.60	0.03
1	893.1		Ini Struct									
1	874.4	PF 1	16.35	61.48	62.57	62.40	62.73	0.011725	1.75	9.36	14.42	0.69
1	850	PF 1	16.35	61.39	62.11	62.11	62.37	0.017917	2.25	7.27	14.07	1.00
1	781.9	PF 1	16.35	60.57	62.12	61.70	62.12	0.000132	0.34	48.24	45.61	0.11
1	744.1	PF 1	17.08	60.47	62.12		62.12	0.000043	0.20	85.77	70.33	0.05
1	700	PF 1	17.08	60.10	62.12	61.70	62.12	0.000017	0.17	107.65	81.07	0.04
1	683.3		Ini Struct									
1	675	PF 1	17.08	58.90	61.70	61.70	61.71	0.000334	0.60	33.09	38.66	0.12
1	662.1	PF 1	17.08	58.80	59.11	59.55	61.46	0.319361	6.79	2.51	9.05	4.11
1	654		Bridge									
1	641.6	PF 1	17.08	58.65	59.63	59.40	59.80	0.005695	1.83	9.32	11.37	0.65
1	600	PF 1	16.96	58.56	59.36	59.23	59.52	0.007600	1.78	9.54	15.63	0.73
1	550	PF 1	16.96	58.23	59.06		59.14	0.006808	1.29	13.28	22.27	0.51
1	500	PF 1	16.96	57.82	58.66		58.79	0.006894	1.62	10.46	18.39	0.69
1	453.8	PF 1	16.96	57.41	58.29		58.43	0.009139	1.62	10.46	18.07	0.68
1	400	PF 1	16.96	57.08	58.07		58.15	0.003017	1.21	14.52	26.45	0.47
1	350	PF 1	16.96	56.96	57.66	57.63	57.86	0.013246	1.97	8.62	18.54	0.92
1	322.4	PF 1	16.96	56.64	57.35	57.35	57.60	0.015729	2.20	7.72	15.93	1.01
1	312.9	PF 1	32.59	55.38	56.99	56.15	57.04	0.000784	0.99	33.50	26.61	0.27
1	258.7	PF 1	32.59	55.22	56.56	56.47	56.91	0.009581	2.62	12.42	13.86	0.89
1	219.3	PF 1	32.59	55.07	56.34		56.51	0.008133	1.84	17.74	27.81	0.73
1	170.4	PF 1	32.59	54.89	56.29		56.34	0.001353	1.03	31.73	32.43	0.33
1	100	PF 1	32.59	54.63	55.88		56.10	0.016270	2.06	15.80	21.11	0.76
1	90		Lat Struct									
1	88.35	PF 1	26.25	54.59	55.95	55.46	56.01	0.001275	1.19	26.91	31.25	0.33
1	83.35		Culvert									
1	78.37	PF 1	23.56	54.55	55.80	55.43	55.89	0.002198	1.49	19.63	26.58	0.43
1	29.3	PF 1	23.56	54.42	55.60	55.40	55.73	0.004515	1.65	16.12	37.72	0.59
1	20.83	PF 1	23.15	54.35	55.35	55.35	55.65	0.014240	2.43	9.55	17.34	1.00
1	9.62	PF 1	19.10	54.25	55.06	55.18	55.46	0.019186	2.95	7.46	18.96	1.17

110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

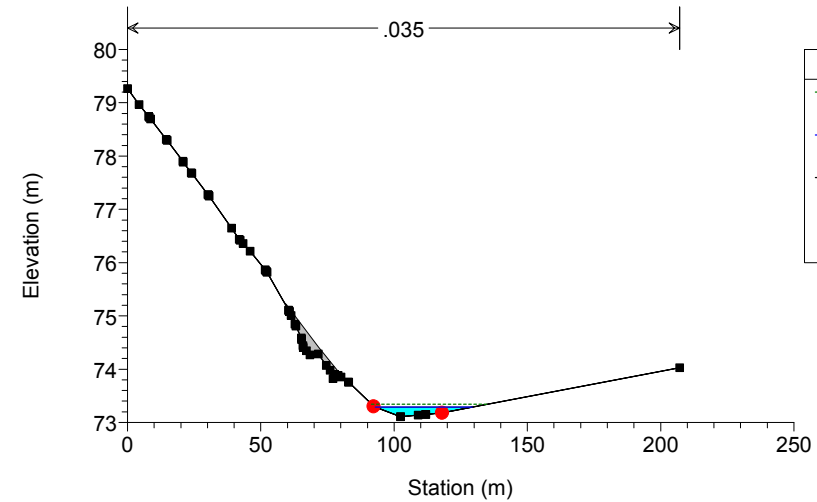
RS = 1628.9



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

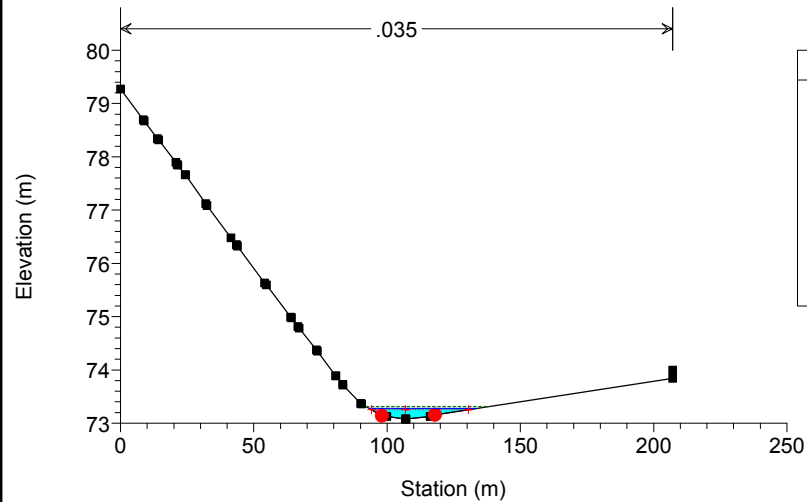
RS = 1620.9 IS



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

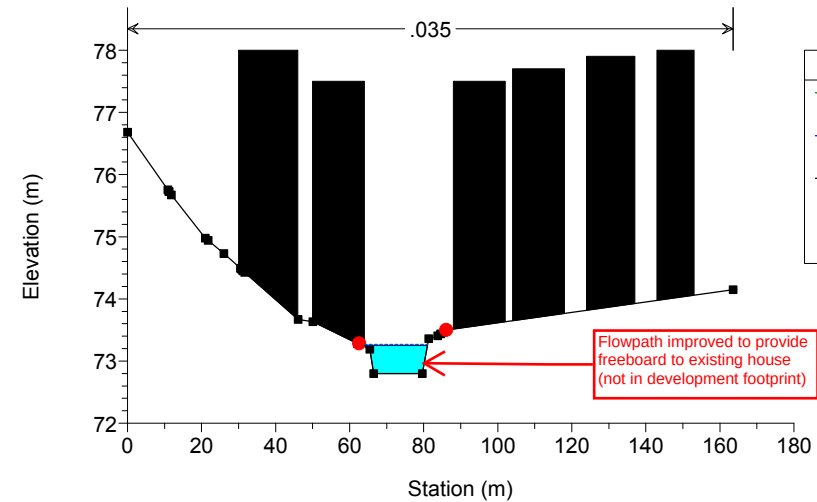
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110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

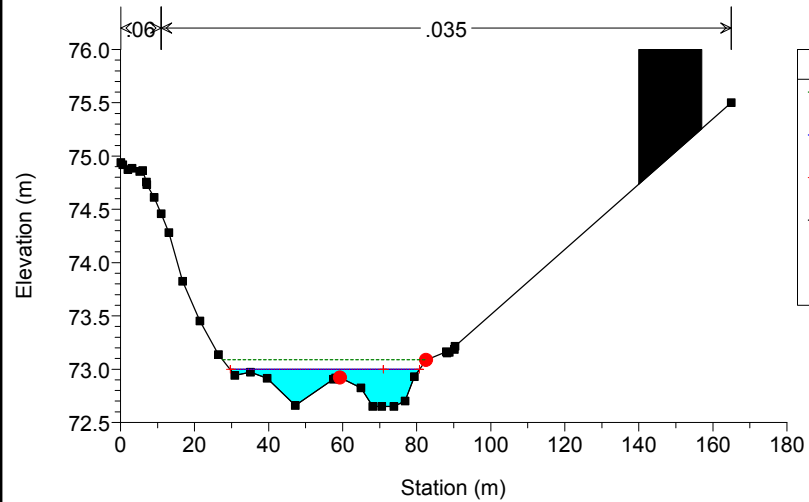
RS = 1600



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

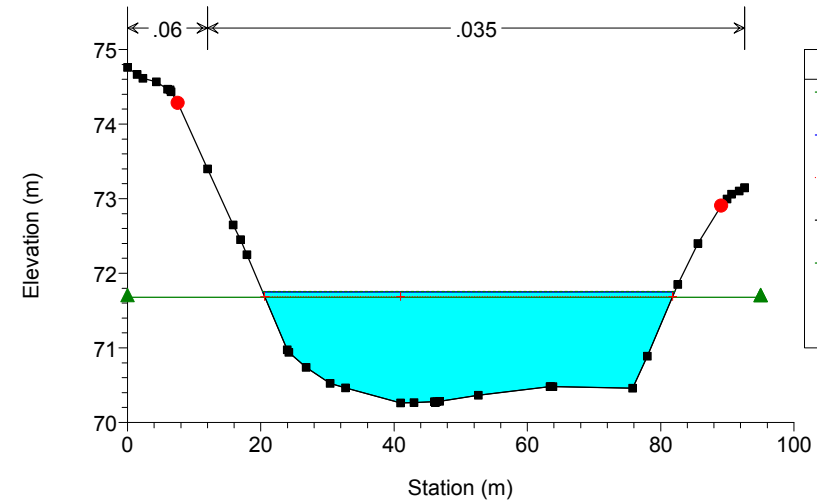
RS = 1575.9



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

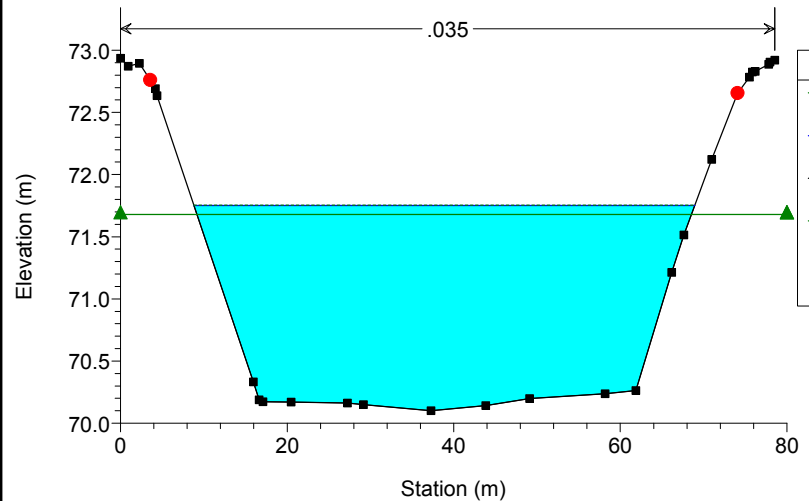
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110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

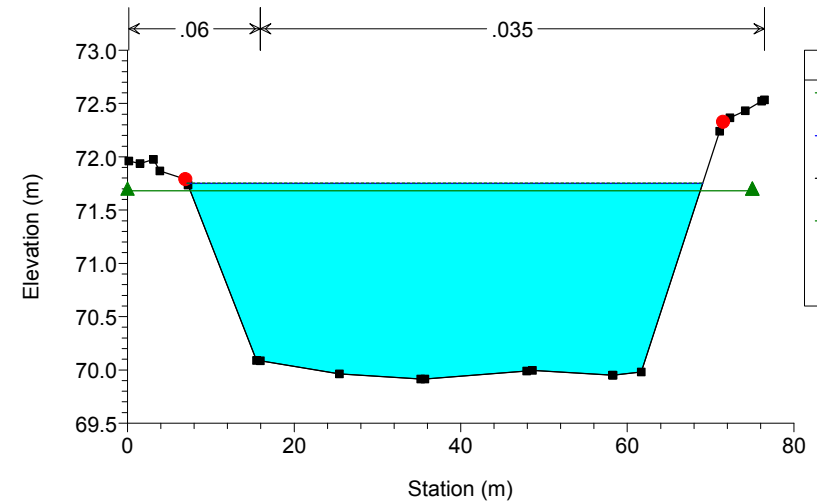
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110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

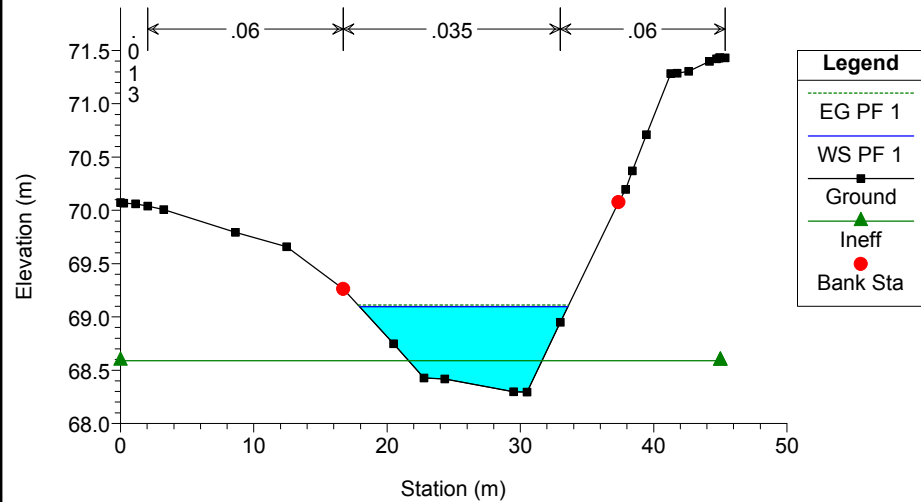
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110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

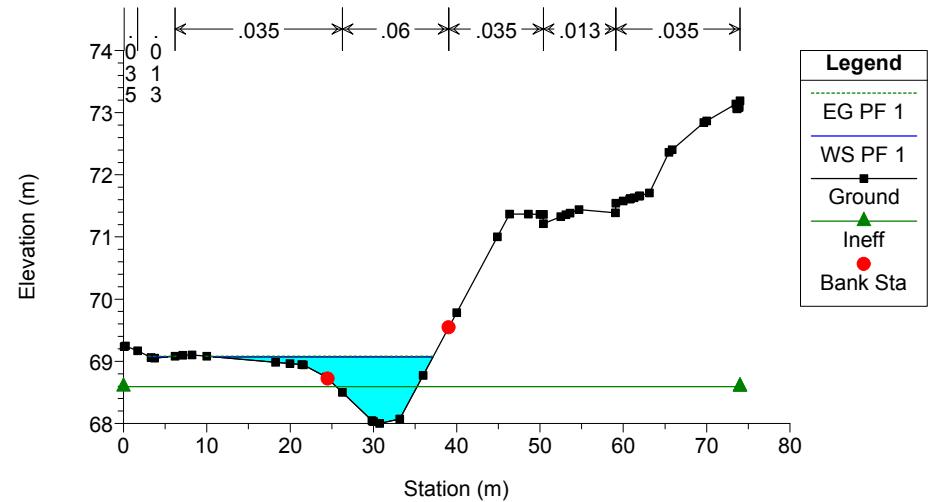
RS = 1387.84



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

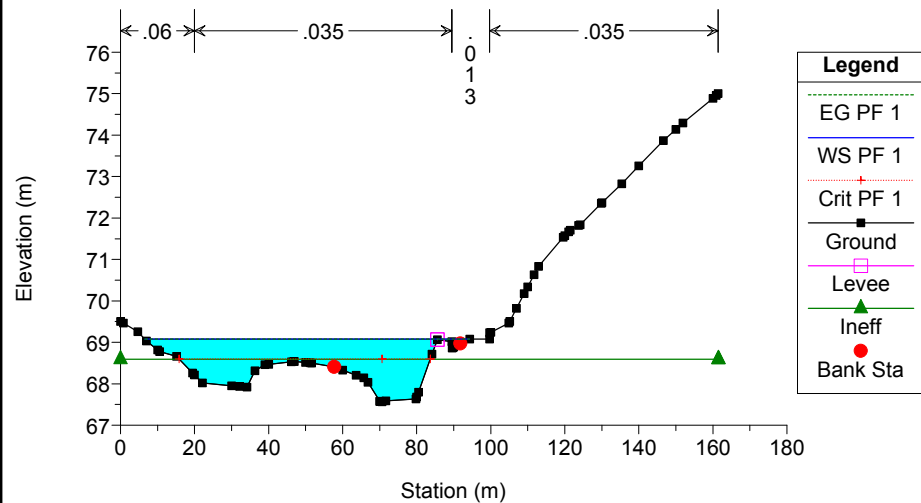
RS = 1359



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

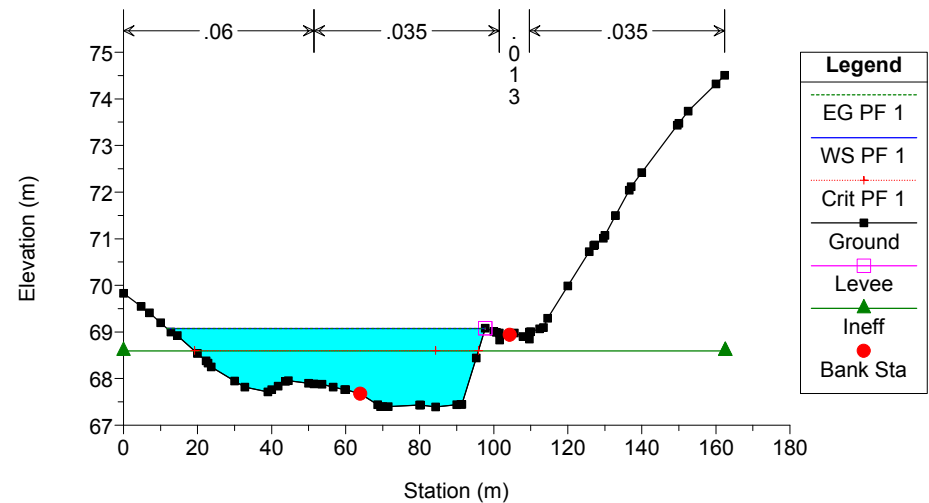
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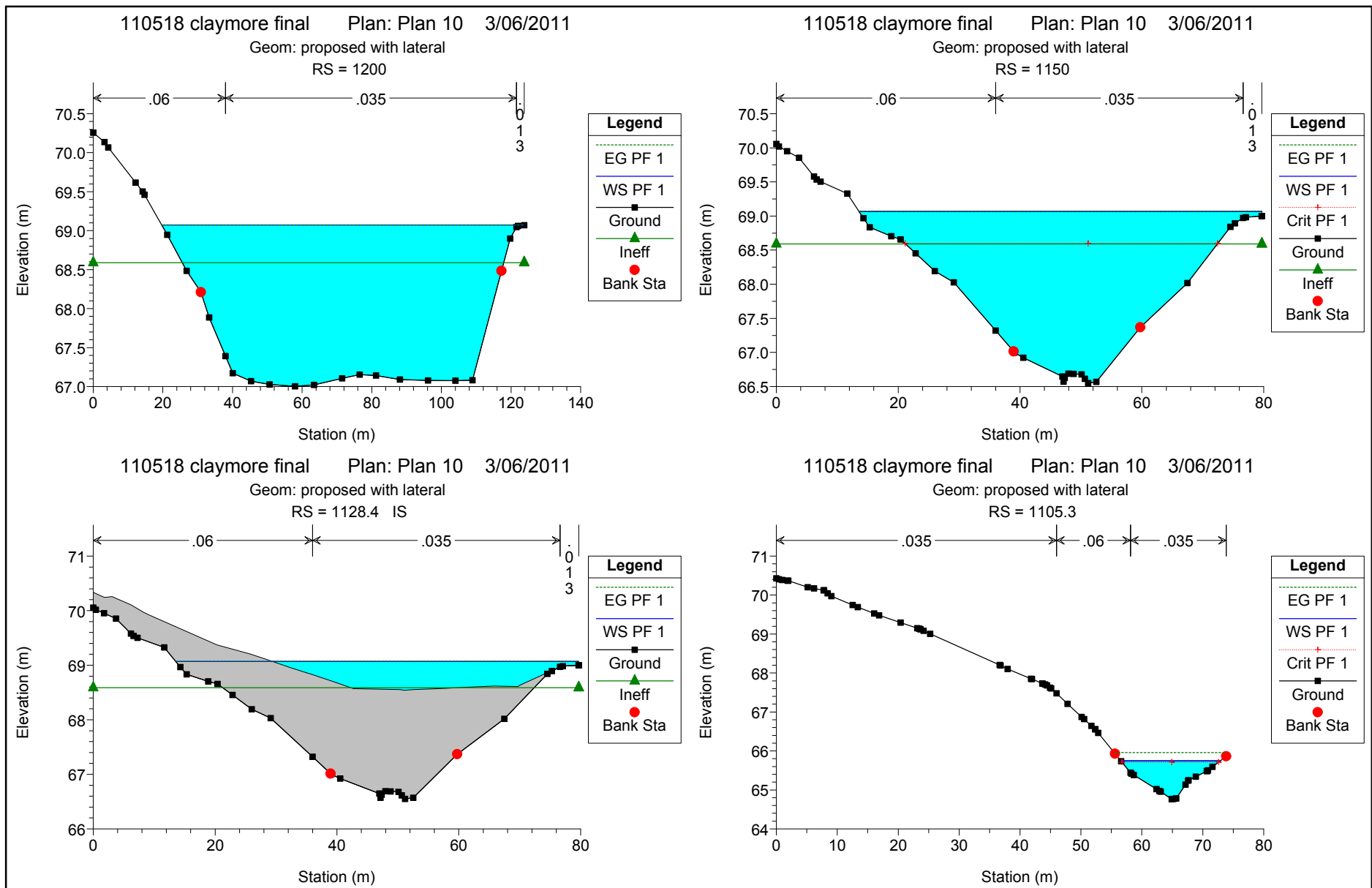


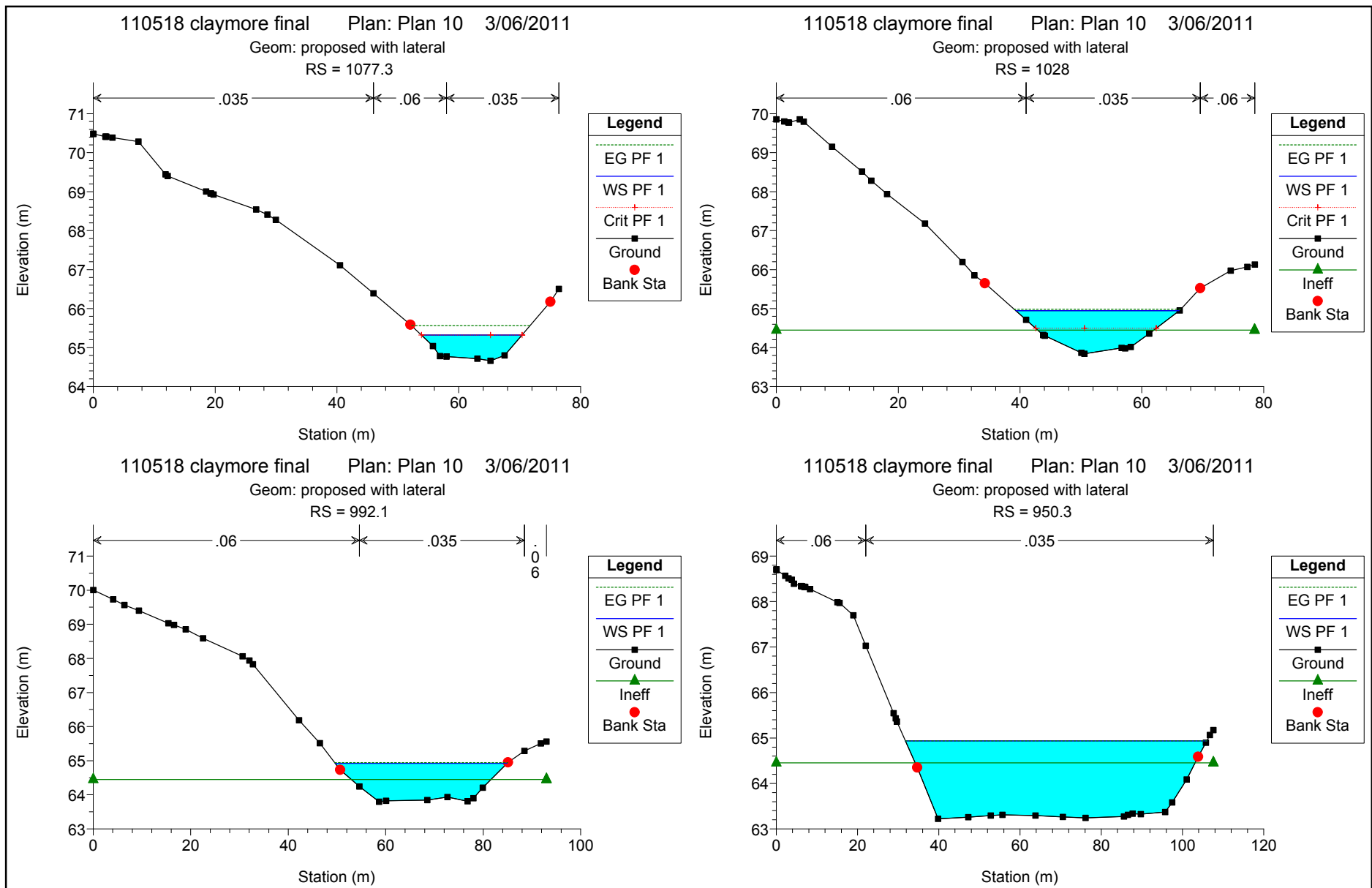
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

RS = 1252.5

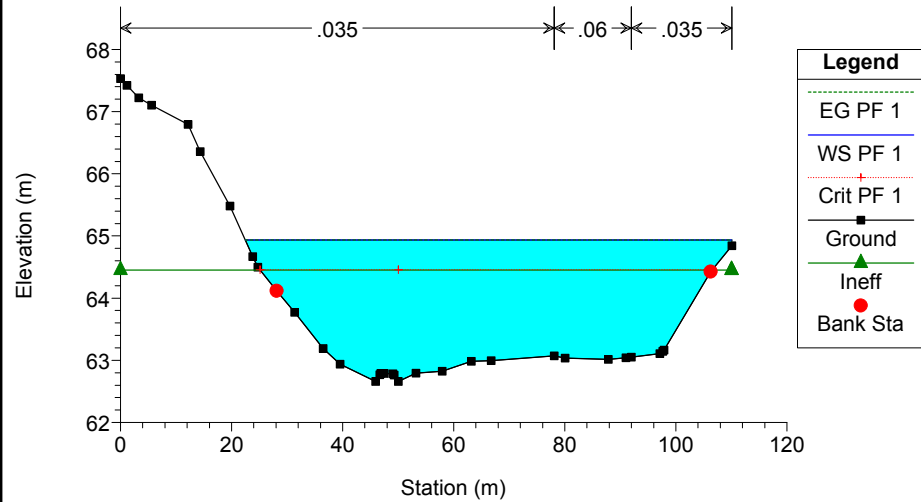






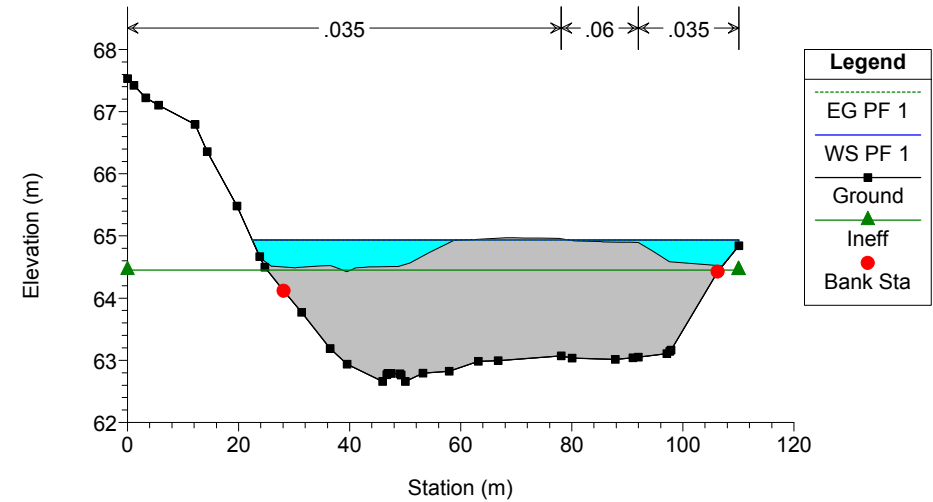
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 907.1



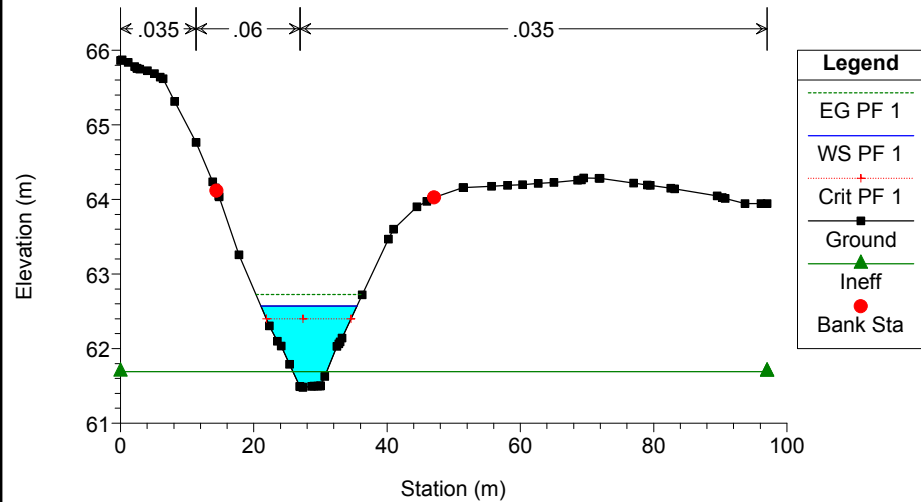
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 893.1 IS



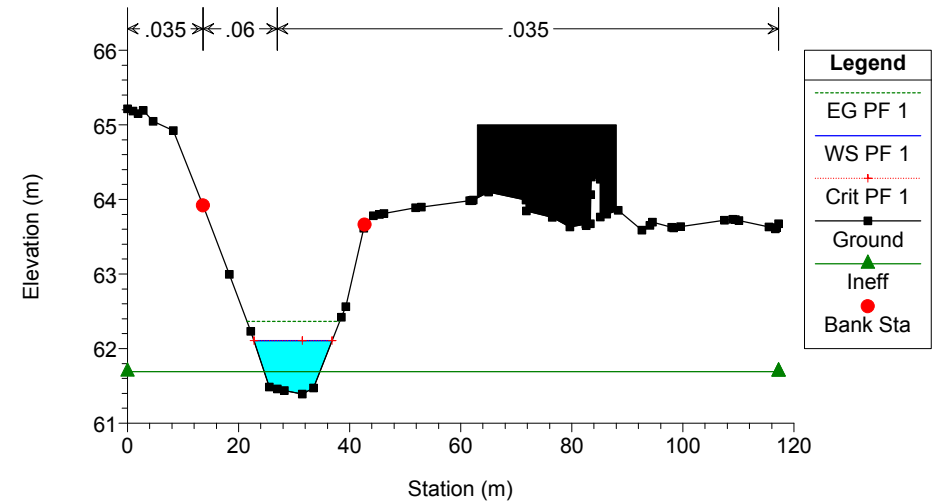
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 874.4



110518 claymore final Plan: Plan 10 3/06/2011

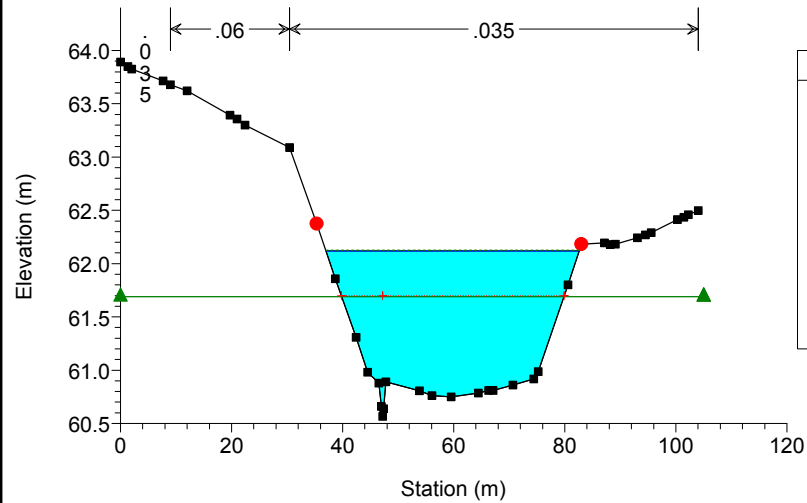
Geom: proposed with lateral
RS = 850



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

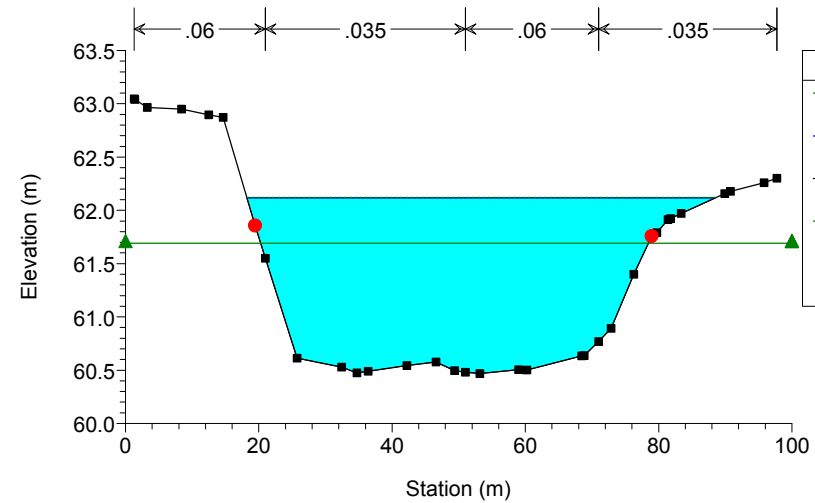
RS = 781.9



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

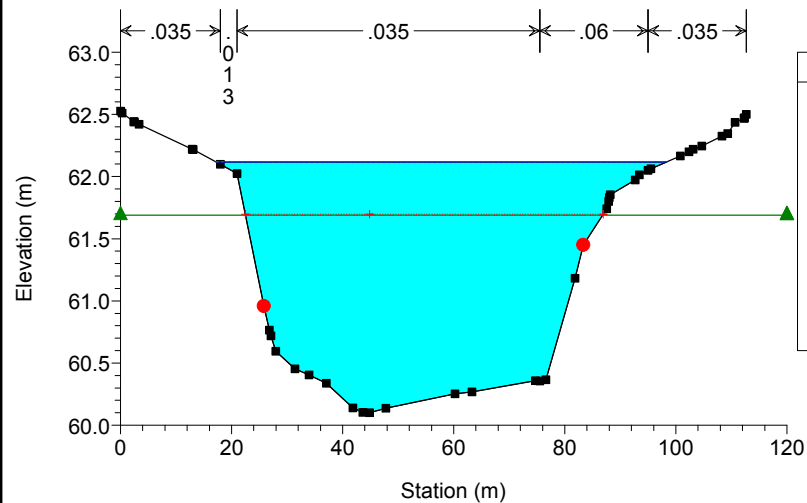
RS = 744.1



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

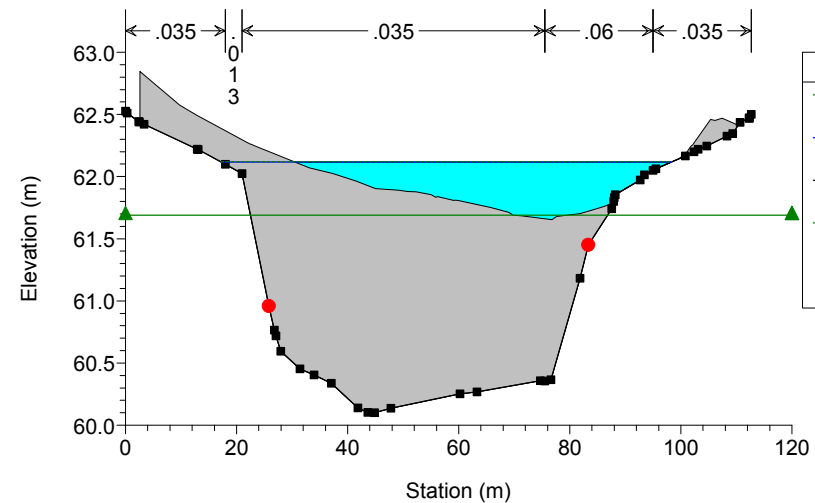
RS = 700

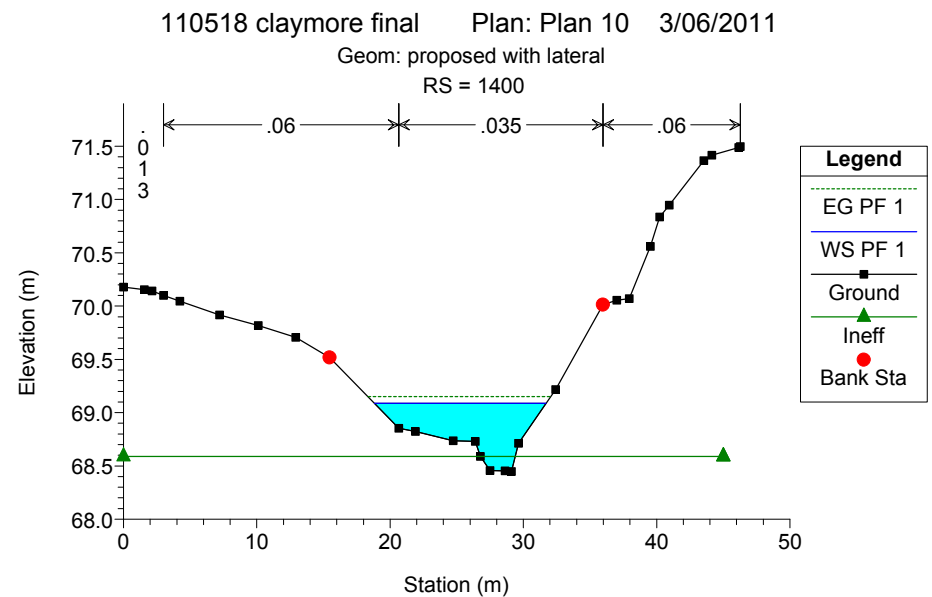
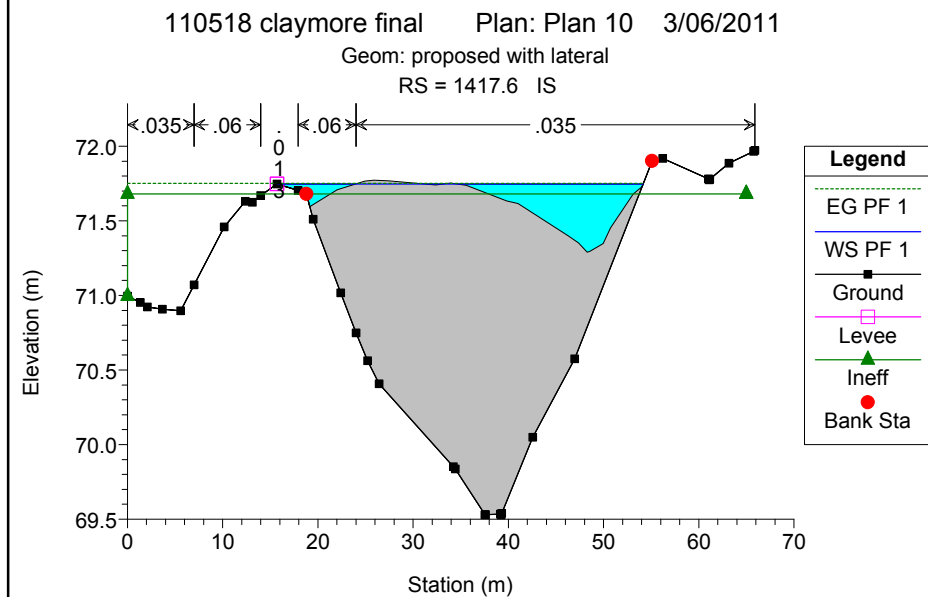
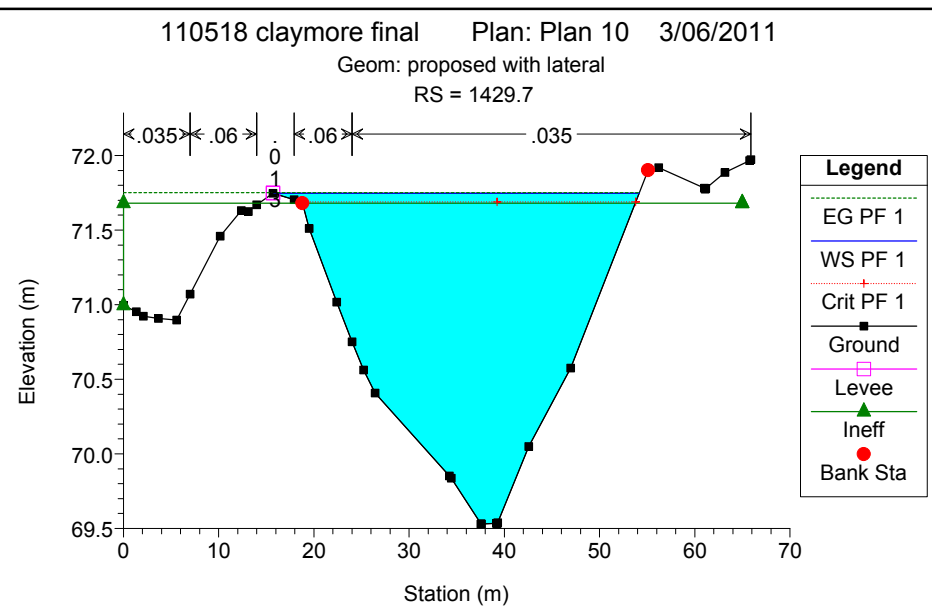
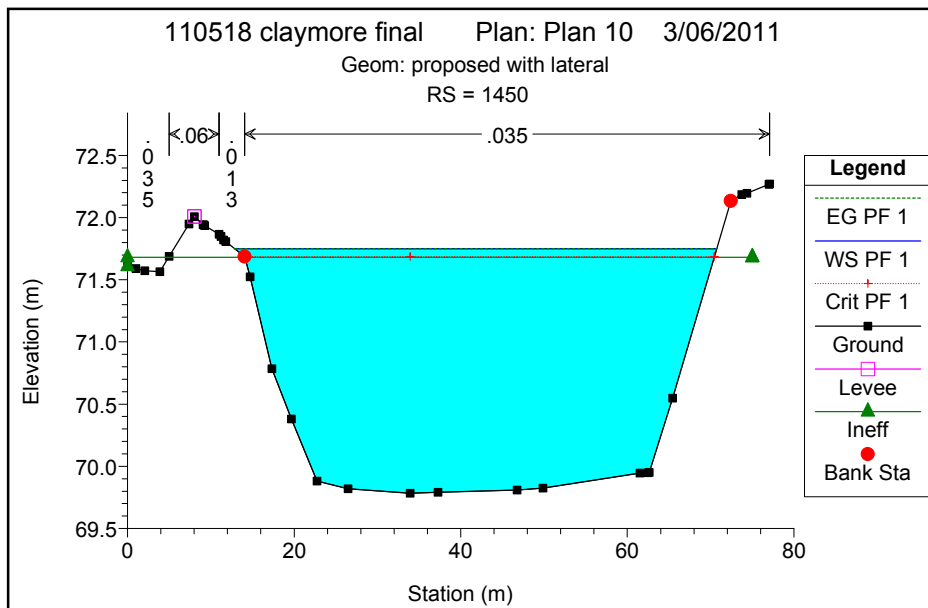


110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

RS = 683.3 IS

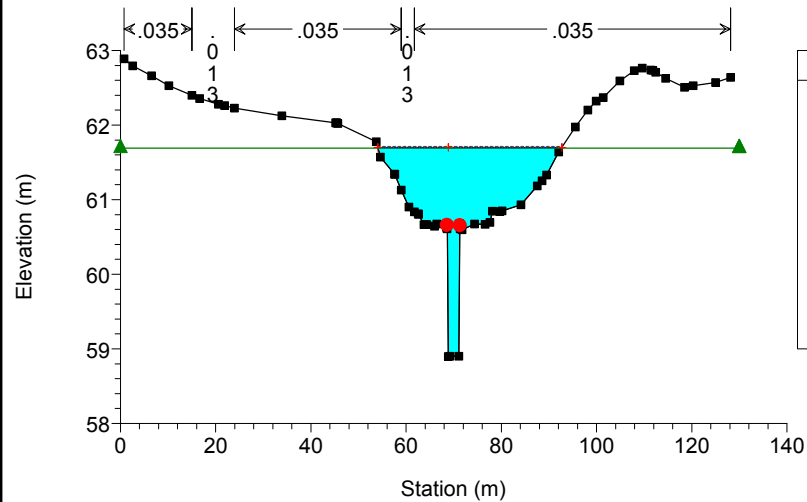




110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

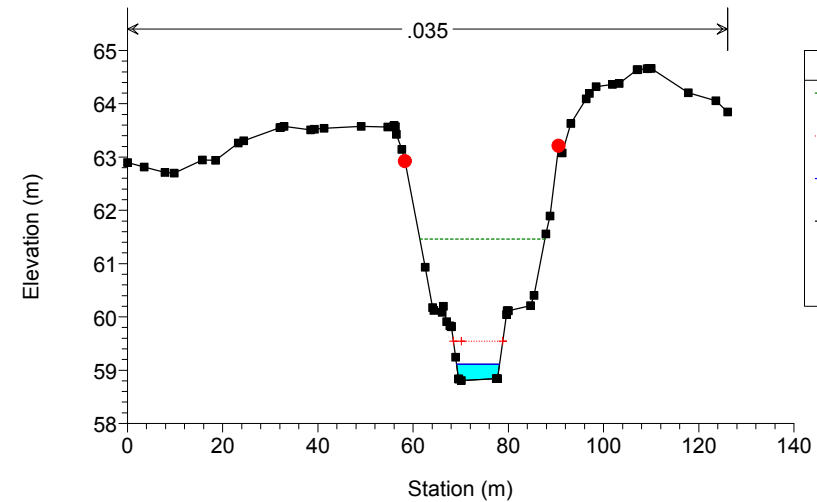
RS = 675



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

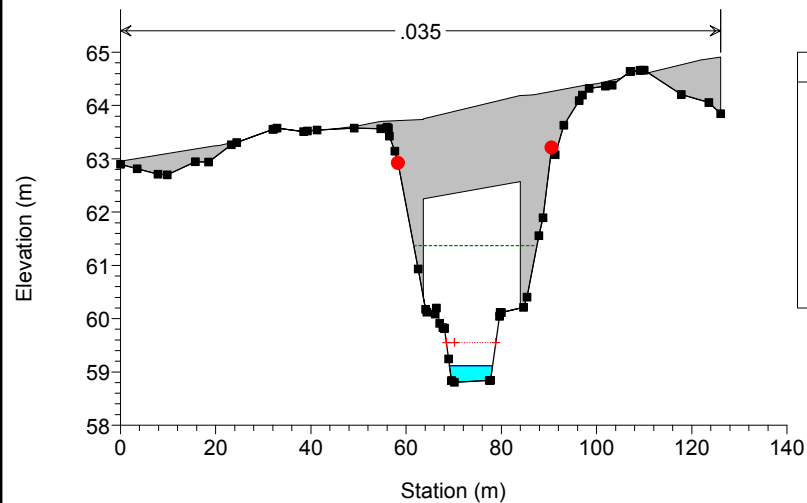
RS = 662.1



110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

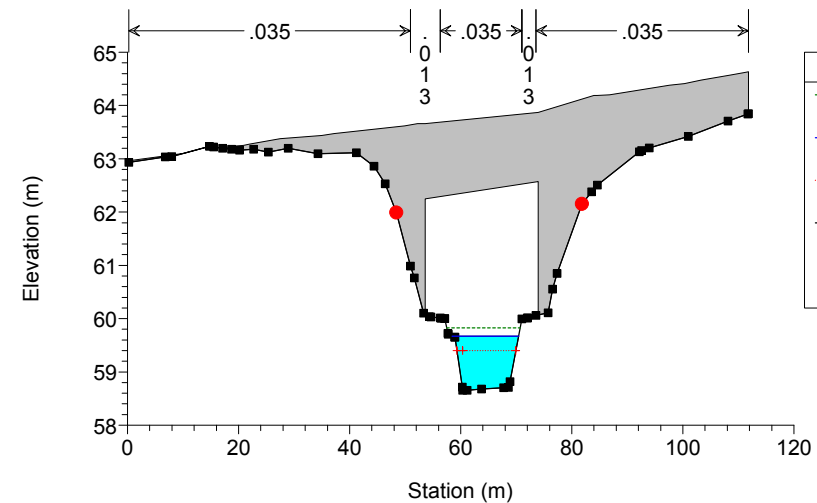
RS = 654 BR

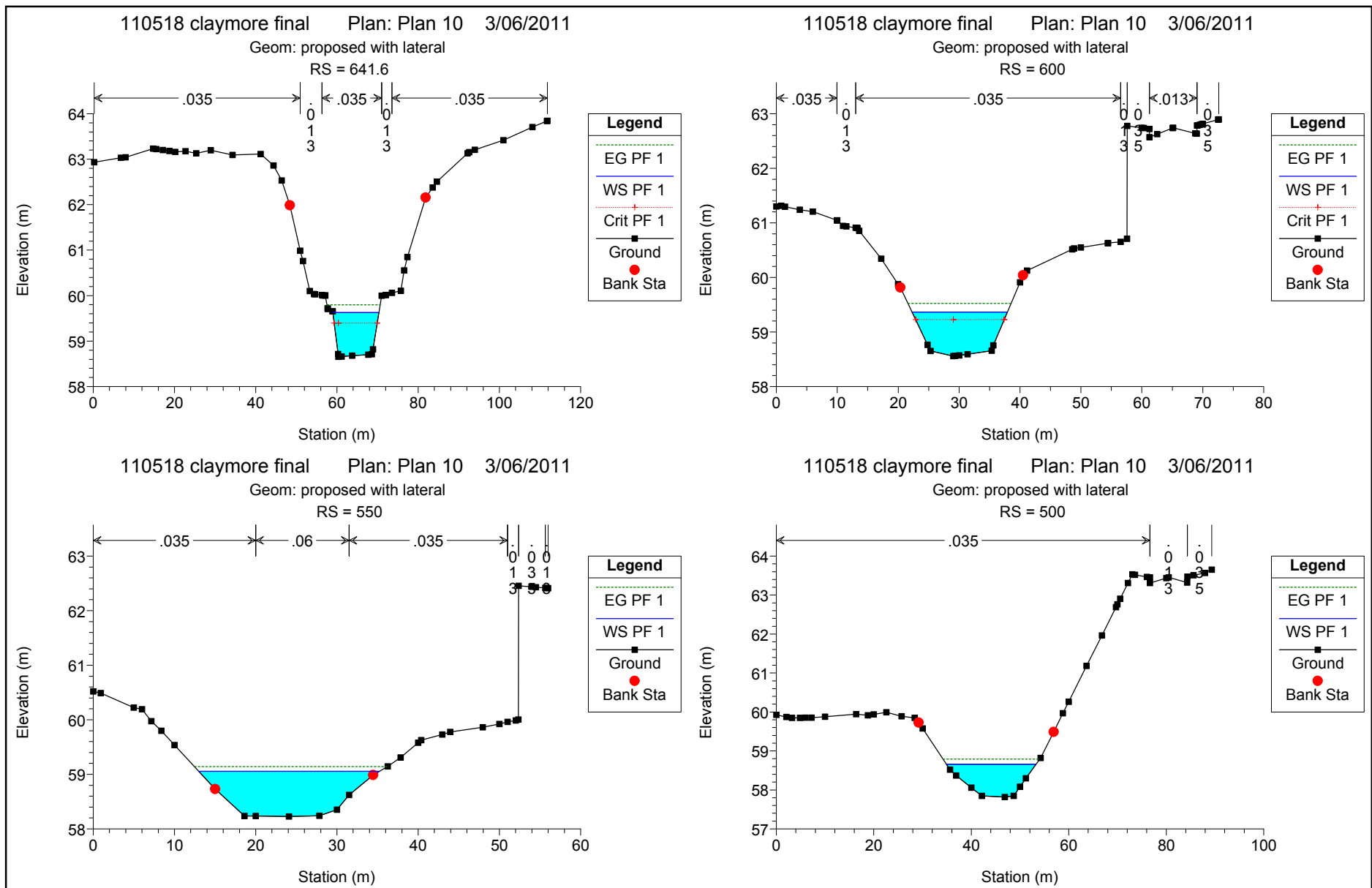


110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral

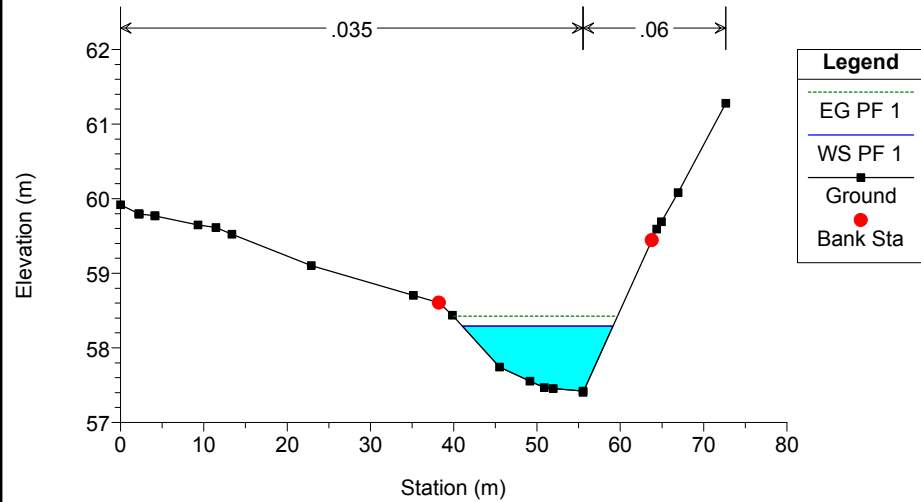
RS = 654 BR





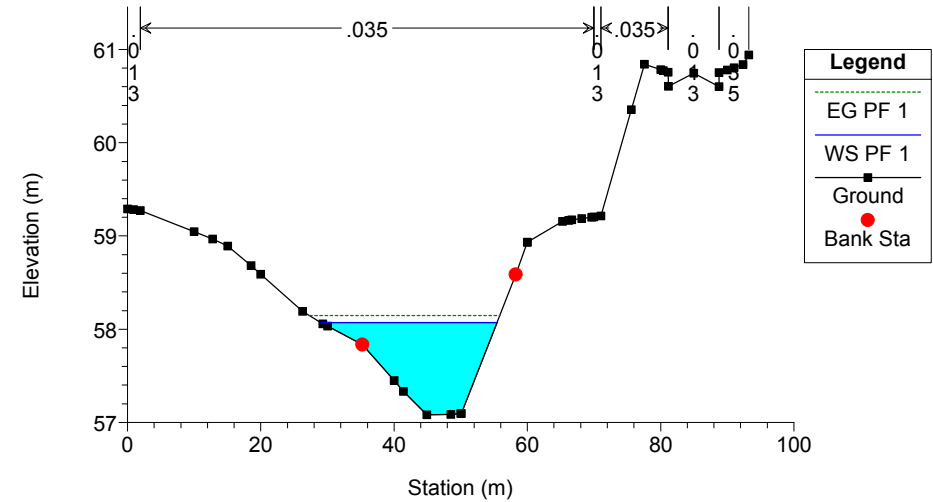
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 453.8



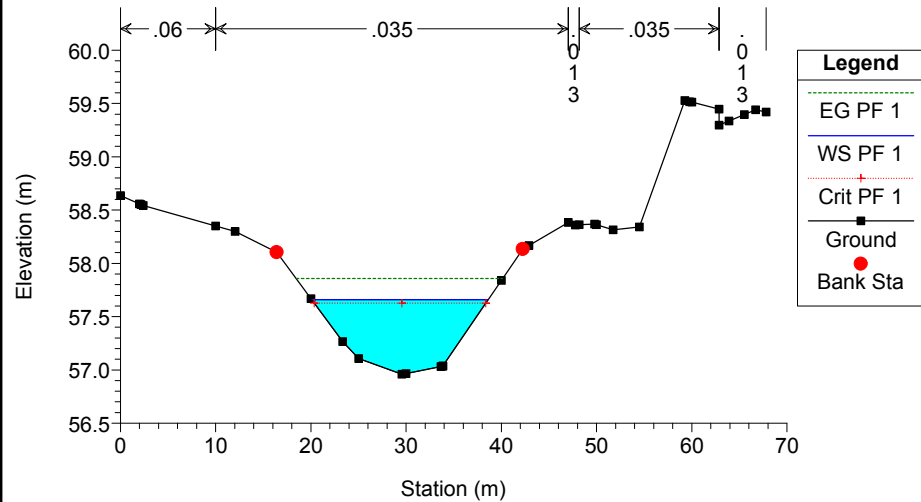
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 400



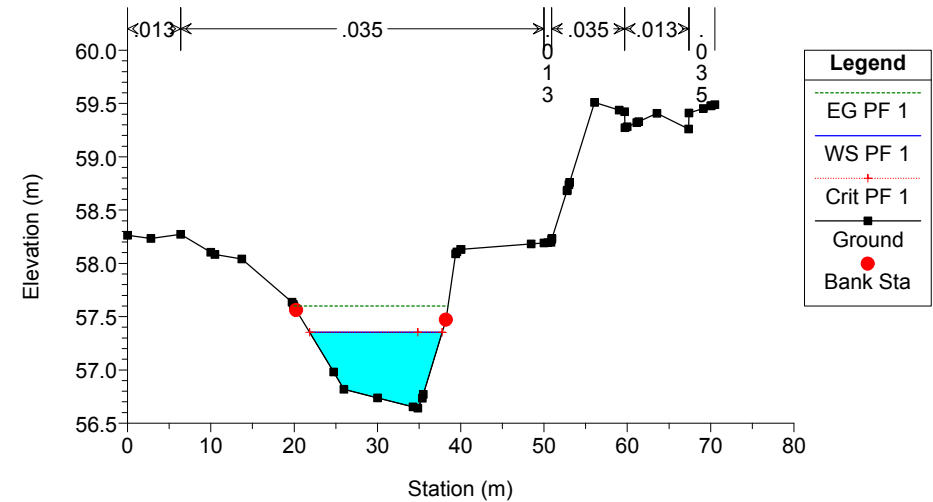
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 350



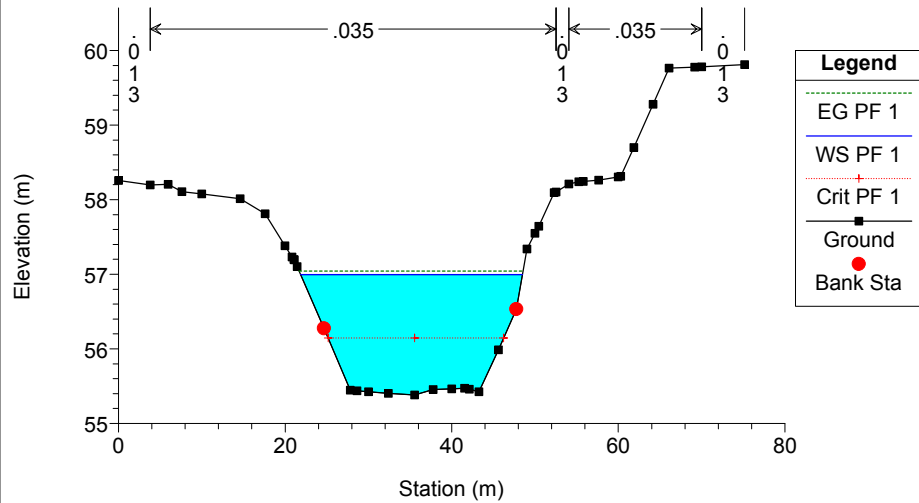
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 322.4



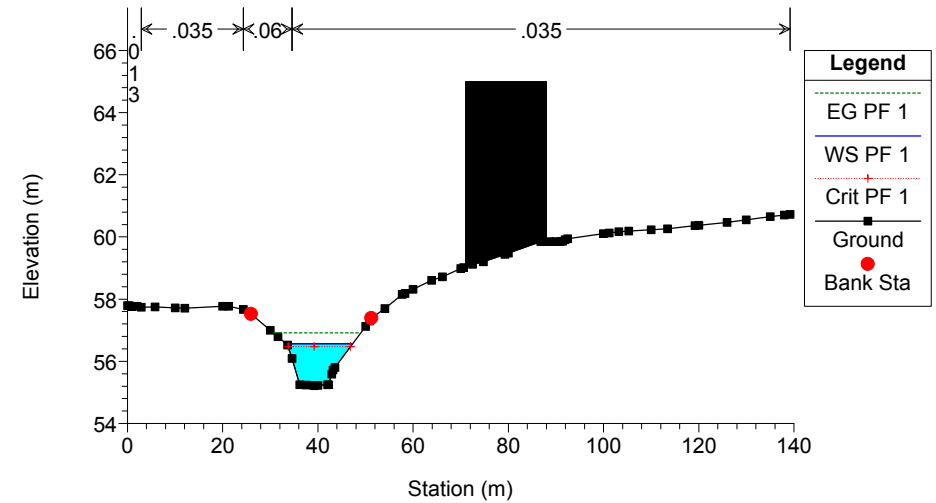
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 312.9



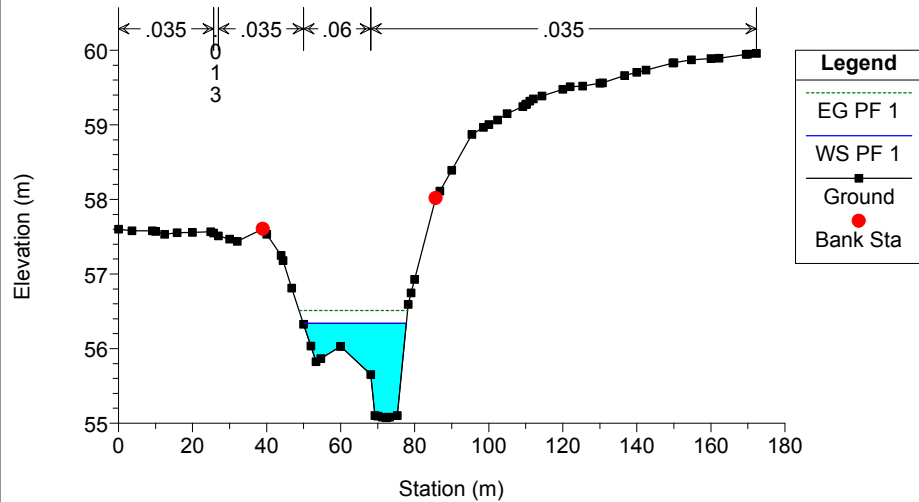
110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 258.7



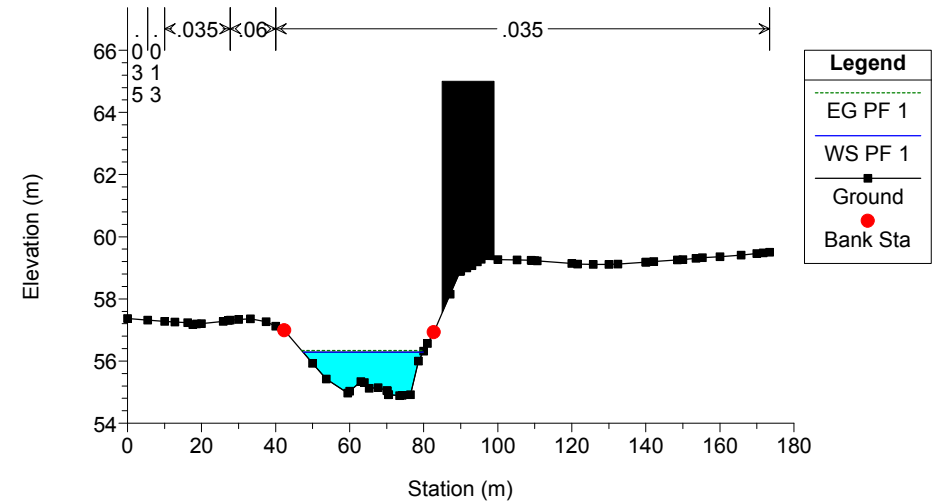
110518 claymore final Plan: Plan 10 3/06/2011

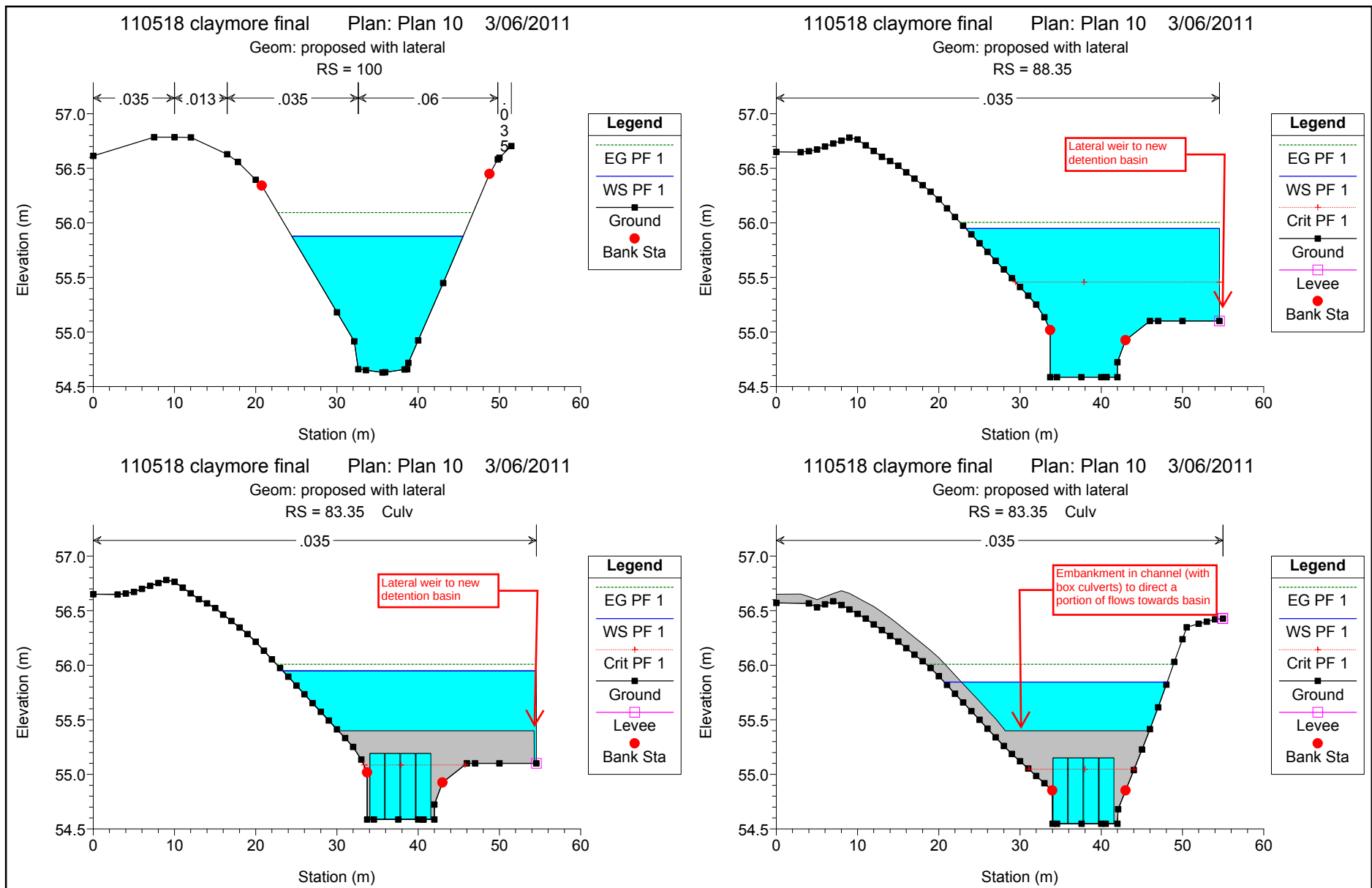
Geom: proposed with lateral
RS = 219.3

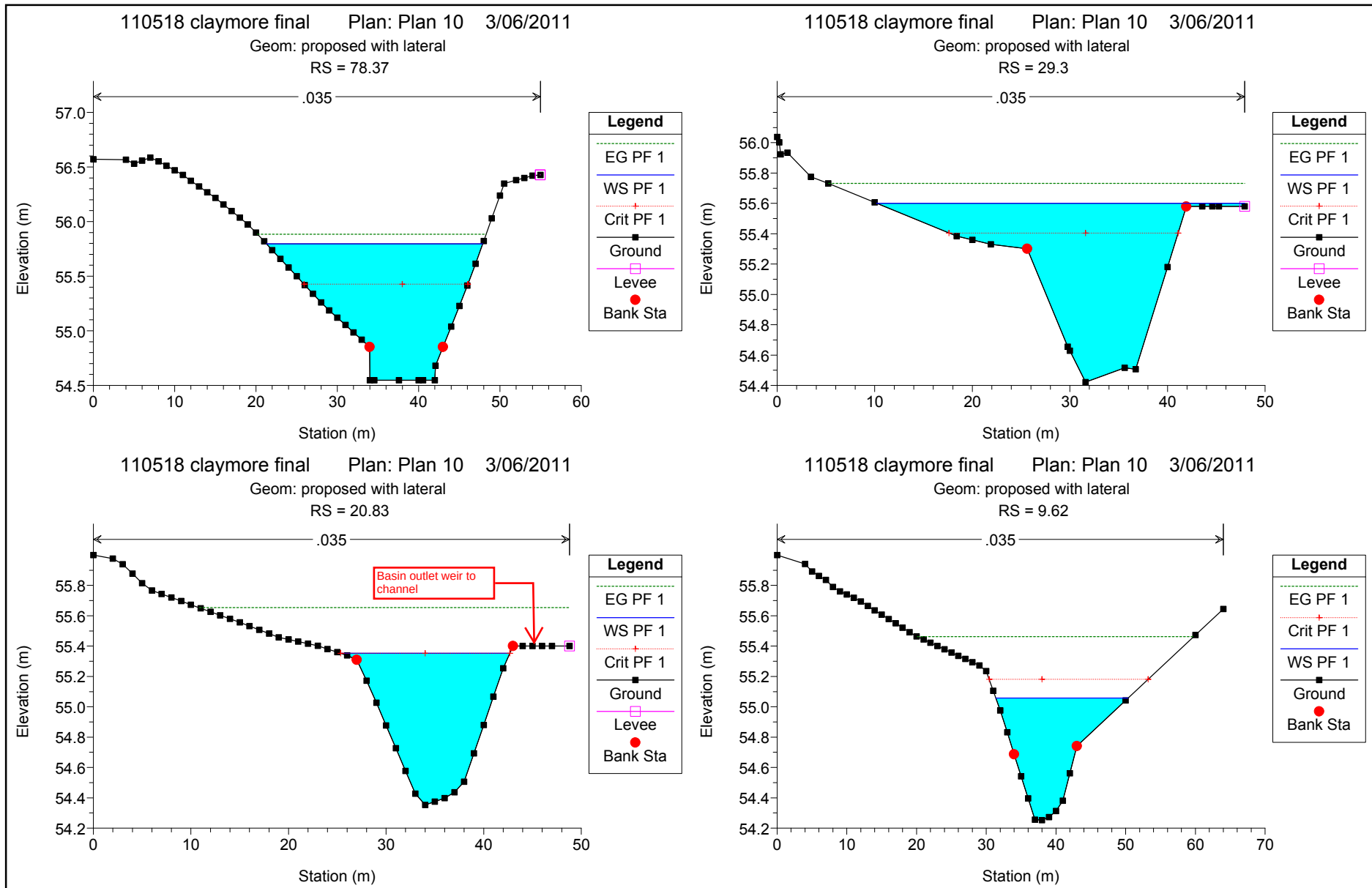


110518 claymore final Plan: Plan 10 3/06/2011

Geom: proposed with lateral
RS = 170.4

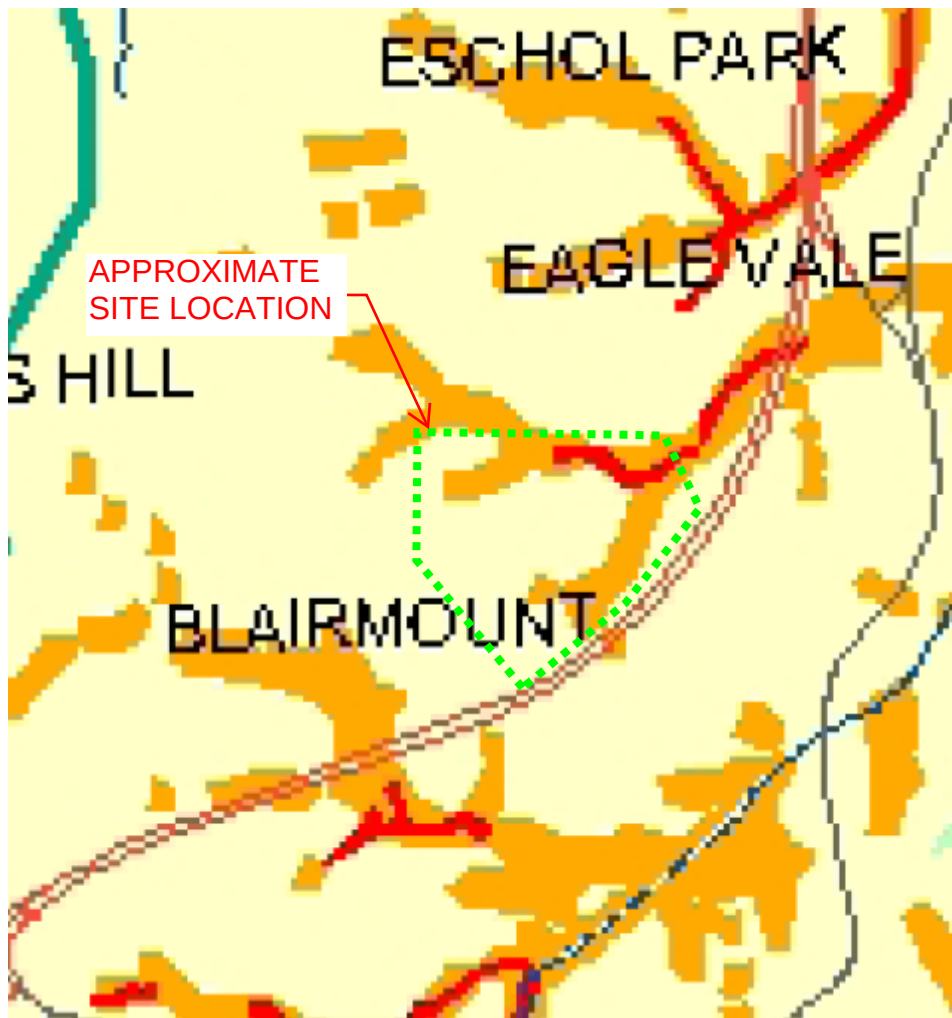






Appendix E: Salinity Maps

SALINITY MAPS



SOURCE: DIPNR, Salinity Potential in Western Sydney, 2002

MAPPING CATEGORY	ASSOCIATED SOIL LANDSCAPES	LANDFORM - GEOLOGY
KNOWN SALINITY Areas where there is a known occurrence of saline soil, or where air photo interpretation and field observations have confirmed more than one of these: a - scalding b - salt efflorescence c - vegetation dieback d - salt tolerant plant species e - waterlogging A high relative wetness index occurs in these areas.	* Salinity outbreaks occur in Blacktown (bt), Luddenham (lu) and Richmond (ri) Soil Landscapes - common at breaks of slope, lower slopes and drainage lines. * Berkshire Park (bp) and Upper Castlereagh (up) Soil Landscapes have localised salinity due to the impermeable nature of the clay parent material. * South Creek (sc), Monkey Creek (mk), Freemans Reach (fr) and Theresa Park (tp) Soil Landscapes have common saline outbreaks due to high run-on and low local relief. * Soils in the above landscapes have high clay content in subsoils and are imperfectly to poorly drained.	* Break of slope, lower slope and drainage lines of Wianamatta Shales (Rwb, Rwa and Rwm). * Localised salinity also occurs at the geological boundary between Tertiary Gravels (Ti, Tr) and underlying Wianamatta Shales (Rwb, Rwa/Quaternary Alluvials (Qpd, Qpa, Qpl, Qal). * Localised salinity occurs in Quaternary Alluvium (Qal, Qpn, Qpd) which underlies many of the drainage systems and wetland margins.
HIGH SALINITY POTENTIAL Areas where soil, geology, topography and groundwater conditions predispose a site to salinity. These conditions are similar to areas of known salinity (see above). These areas are most common in lower slopes and drainage systems where water accumulation is high (i.e. high relative wetness index).	* Soil Landscapes include Birrong (bi), Blacktown (bt) Berkshire Park (bp), Freemans Reach (fr), South Creek (sc), Theresa Park (tp), Richmond (ri) and Luddenham (lu). Drainage systems and convergent slopes are areas of highest risk. * Soils in these landscapes have high clay content in the subsoils, low permeability and high run-on. * Soil profiles may display signs of high salt concentrations at depth (i.e. >0.5m).	* Salinity is most likely to occur in lower slopes, foot-slopes, floodplains and creek lines on Quaternary Sediments (Qal, Qpn, Qpd, Qpc, Qpp, Qha) Wianamatta Shales (Rwb, Rwm, Rwa) where run-on is high, resulting in seasonally high water tables and soil saturation.
MODERATE SALINITY POTENTIAL Areas on Wianamatta Group Shales and Tertiary Alluvial Terraces. Scattered areas of scalding and indicator vegetation have been noted but no concentrations have been mapped. Saline areas may occur in this zone, which have not yet been identified or may occur if risk factors change adversely.	* Areas of Agnes Banks (ab), Berkshire Park (bp), Blacktown (bt), Luddenham (lu) and Lucas Heights (lh). * Steeper areas with moderate to high local relief and well drained subsoils such as Picton (pn), West Pennant Hills (wp) and Glenorie (gn) are at a lower risk of developing salinity. * Soils are moderate to well-drained due to their elevated position in the landscape.	* Hill-slopes and hill-crests on Wianamatta Shales (Rwb, Rwm, Rwa). * Raised abandoned alluvial terraces and drainage lines on Quaternary Alluvium (Qal, Qpn, Qpd, Qpc, Qpp) from Richmond to Camden and east to Rookwood. Localised areas of elevated, well-drained Tertiary Gravels (Ta, Ti, Tr).
VERY LOW SALINITY POTENTIAL Areas where salinity processes do not operate or are of minor significance. Soils are rapidly drained and underlying strata (Hawkesbury/Narrabeen Sandstone) are highly permeable, resulting in continual flushing and removal of salts in the landscape. No salinity has been observed in these areas and is not expected to occur.	* Rapidly drained soil landscapes with shallow soils include Warragamba (wb) and Hawkesbury (ha). * Gymea (gy) and Faulconbridge (fb) Soil Landscapes consist of highly permeable sands with well-drained subsoils. * Soils are well to rapidly drained. * Soils have high sand content.	* Occurring on Hawkesbury and Narrabeen Sandstone (Rh, Rno). * Groundwater is relatively fresh in these areas due to the sandstone's elevated position in the landscape and highly permeable nature, resulting in continuous flushing of the system (removal of any accumulated salts).

Appendix F: BASIX Output and Figure

Project summary		
Project name	Sample Project	
Street address	999 Sample Street Claymore 2559	
Local Government Area	Campbelltown City Council	
Plan type and plan number	deposited 999	
Lot no.	999	
Section no.	-	
Project type	separate dwelling house	
No. of bedrooms	3	
Project score		
Water	40	Target 40
Thermal Comfort	Pass	Target Pass
Energy	66	Target 40

Description of project

Project address

Project name	Sample Project
Street address	999 Sample Street Claymore 2559
Local Government Area	Campbelltown City Council
Plan type and plan number	Deposited Plan 999
Lot no.	999
Section no.	0

Project type

Project type	separate dwelling house
No. of bedrooms	3

Site details

Site area (m ²)	450
Roof area (m ²)	270
Conditioned floor area (m2)	245
Unconditioned floor area (m2)	25
Total area of garden and lawn (m2)	120

Assessor details and thermal loads

Assessor number	n/a
Certificate number	n/a
Climate zone	n/a
Area adjusted cooling load (MJ/m ² .year)	n/a
Area adjusted heating load (MJ/m ² .year)	n/a

Other

none	n/a
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Project score

Water	40	Target 40
Thermal Comfort	Pass	Target Pass
Energy	66	Target 40

Schedule of BASIX commitments

The commitments set out below regulate how the proposed development is to be carried out. It is a condition of any development consent granted, or complying development certificate issued, for the proposed development, that BASIX commitments be complied with.

Water Commitments	Show on DA plans	Show on CC/CDC plans & specs	Certifier check
Landscape			
The applicant must plant indigenous or low water use species of vegetation throughout 20 square metres of the site.	✓	✓	
Fixtures			
The applicant must install showerheads with a minimum rating of 3 star (> 4.5 but <= 6 L/min) in all showers in the development.		✓	✓
The applicant must install a toilet flushing system with a minimum rating of 3 star in each toilet in the development.		✓	✓
The applicant must install taps with a minimum rating of 3 star in the kitchen in the development.		✓	
The applicant must install basin taps with a minimum rating of 3 star in each bathroom in the development.		✓	
Alternative water			
Rainwater tank			
The applicant must install a rainwater tank of at least 2500 litres on the site. This rainwater tank must meet, and be installed in accordance with, the requirements of all applicable regulatory authorities.	✓	✓	✓
The applicant must configure the rainwater tank to collect rain runoff from at least 135 square metres of the roof area of the development (excluding the area of the roof which drains to any stormwater tank or private dam).		✓	✓
The applicant must connect the rainwater tank to: - all toilets in the development - at least one outdoor tap in the development (Note: NSW Health does not recommend that rainwater be used for human consumption in areas with potable water supply.)		✓ ✓	✓ ✓