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Figure 1-1: Concord River Watershed Map



Figure 1-2: Talbot Mills Dam Location Map

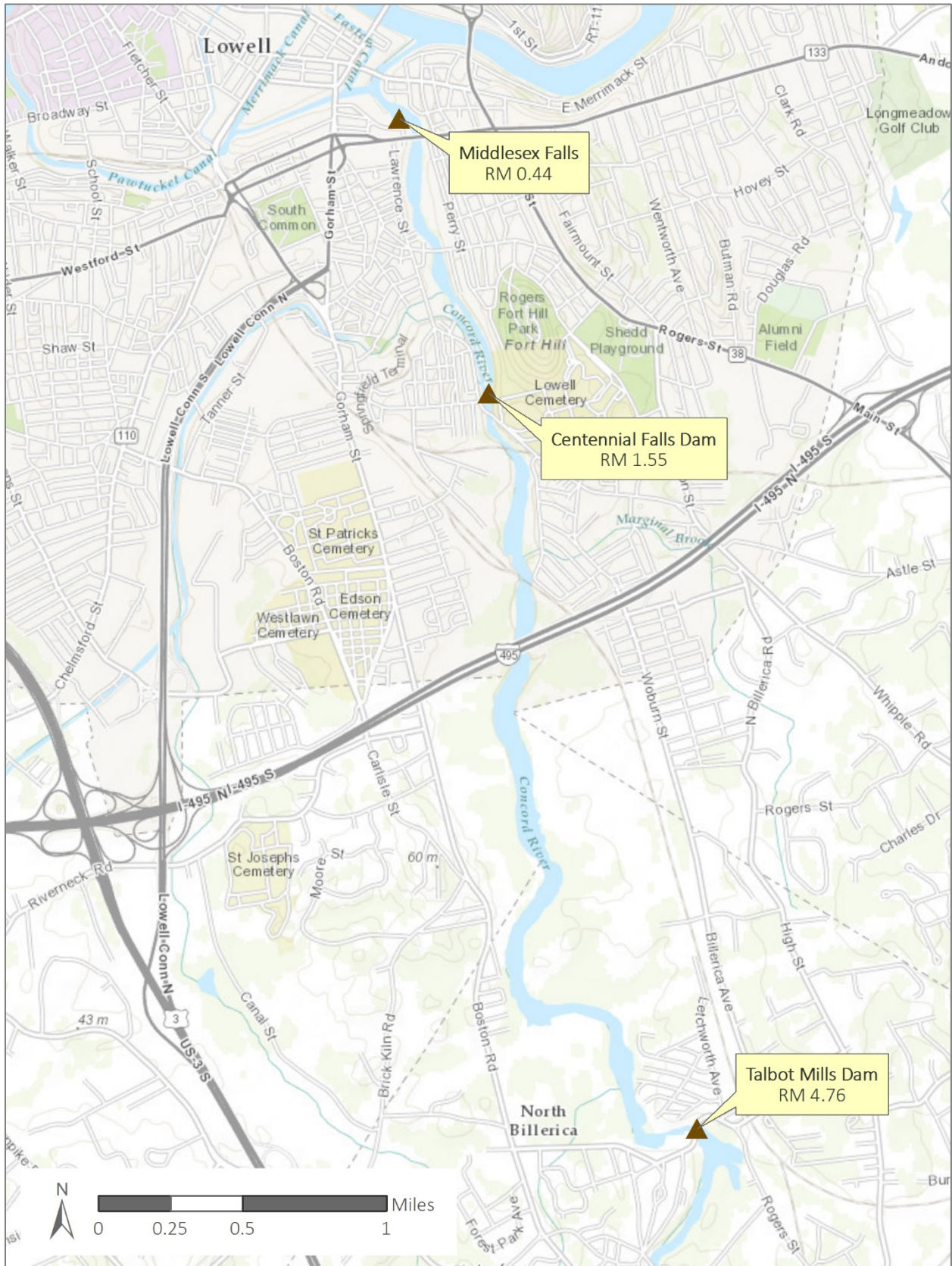


Figure 1-3: Talbot Mills Dam Aerial Image



Figure 1-4: Talbot Mills Dam Existing Conditions Plan

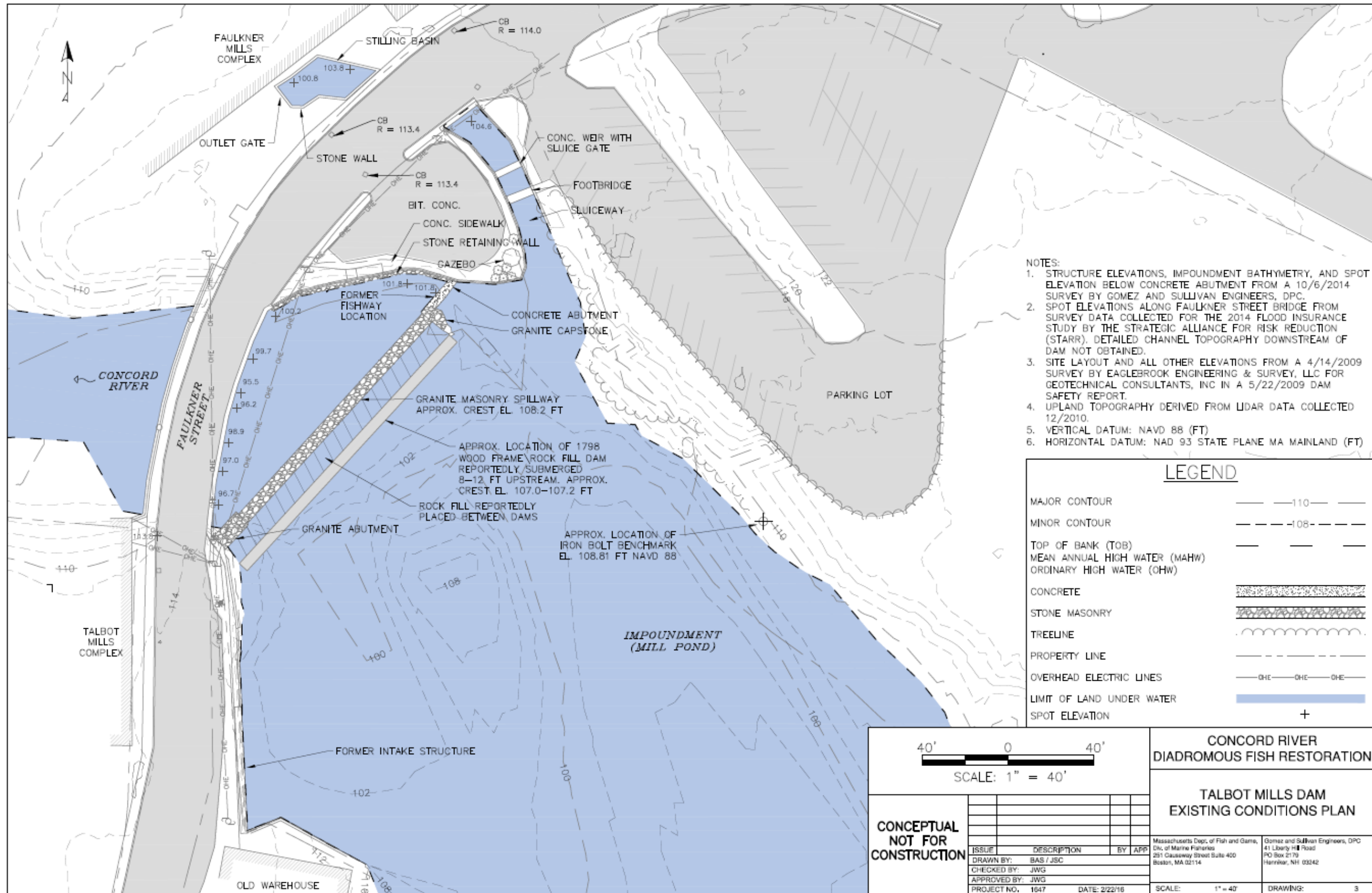


Figure 1-5: Proposed Talbot Mills Dam Removal Concept Plan

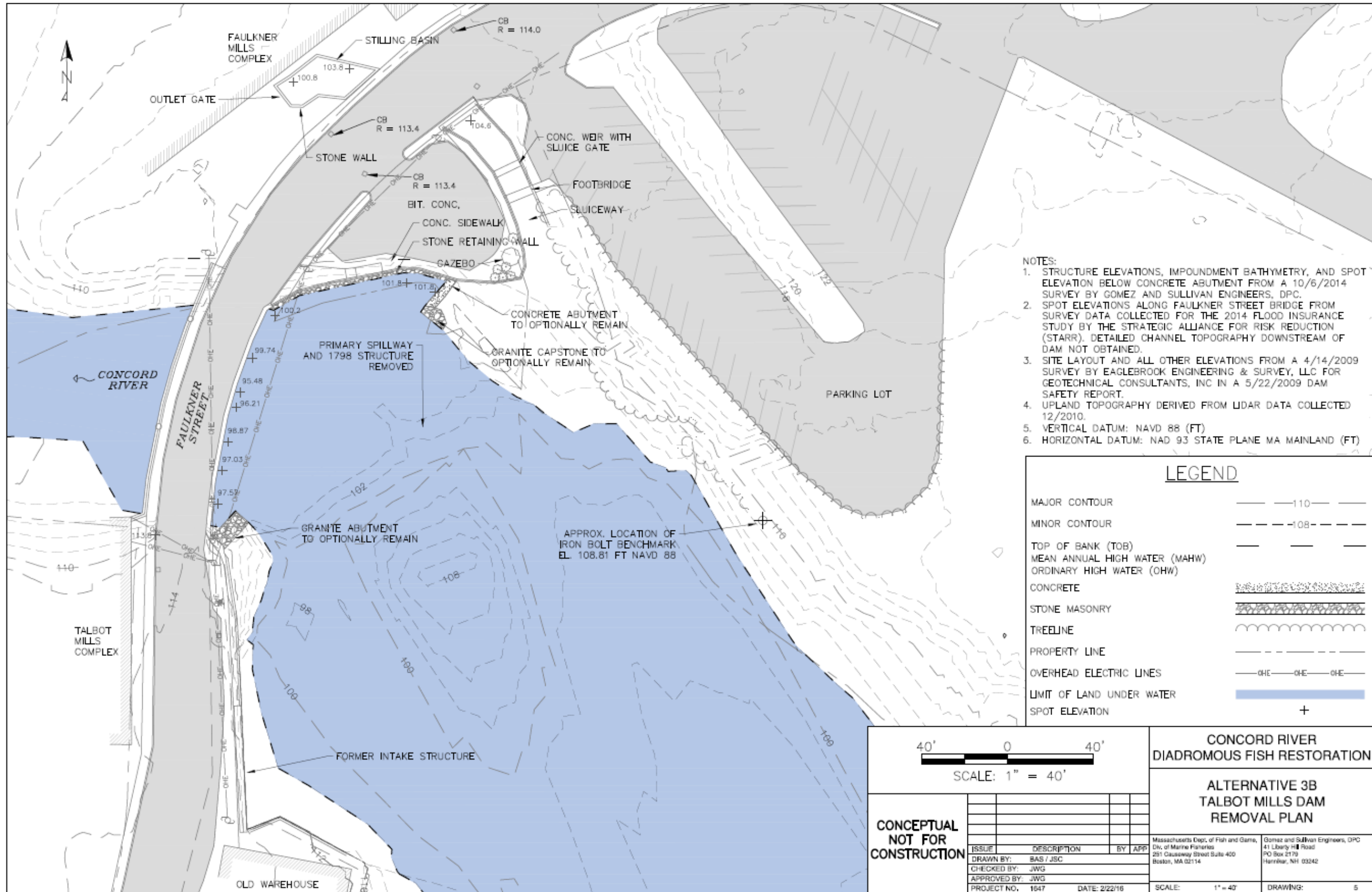
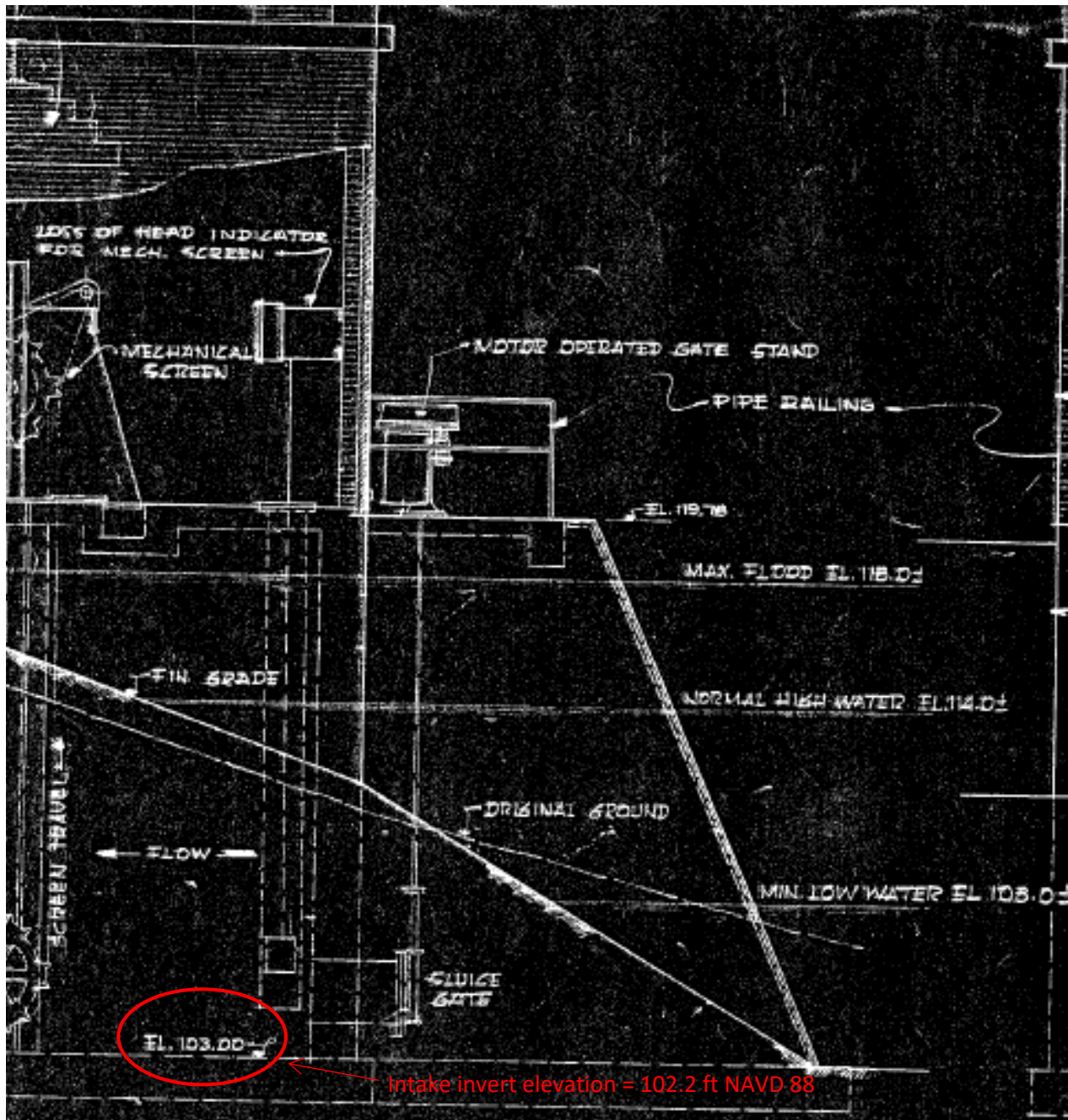


Figure 1-6: Billerica Water Supply Intake Elevation Detail



TOWN OF BILLERICA, MASSACHUSETTS PUBLIC WORKS DEPARTMENT		
WATER WORKS IMPROVEMENTS		
WATER TREATMENT PLANT INTAKE STATION		
ARCHITECTURAL DETAILS		
Drawn by: FS	Checked by: AJP	SHEET NO. 44
Approved: JRC	Camp, Dresser & McKee Consulting Engineers Boston, Mass.	ARCHITECTURE
Date: May 1, 1934		52-194
Scale: As Noted		

Note: Elevations assumed to be in feet NGVD 29. Conversion factor to feet NAVD 88 is -0.827.

Table 1-6: Summary of Key Water Supply Intake Elevations & Comparison to Modeled Elevations

Key Elevations Noted on Water Intake Drawing ¹		Corresponding Elevations Modeled in this Study		Difference (ft)
Description	Elevation (ft, NAVD 88) ²	Description	Elevation (ft, NAVD 88)	
Maximum Flood	117.2	1% AEP (100-Year Flood)	117.4	0.2
Normal High Water	113.2	50% AEP (2-Year Flood)	113.9	0.7
Minimum Low Water	107.2	Drought (7Q10)	108.3	1.1
Structure Invert	102.2	—	—	—

¹ See **Figure 1-6** for water intake drawing.

² It is assumed that elevations in the water intake drawing are given in NGVD 29, as NAVD 88 had not yet been introduced at the time of publication (1954). Elevations in this report have been converted to NAVD 88.

Figure 2.1-1: Talbot Mills Dam Lower Impoundment Key Features

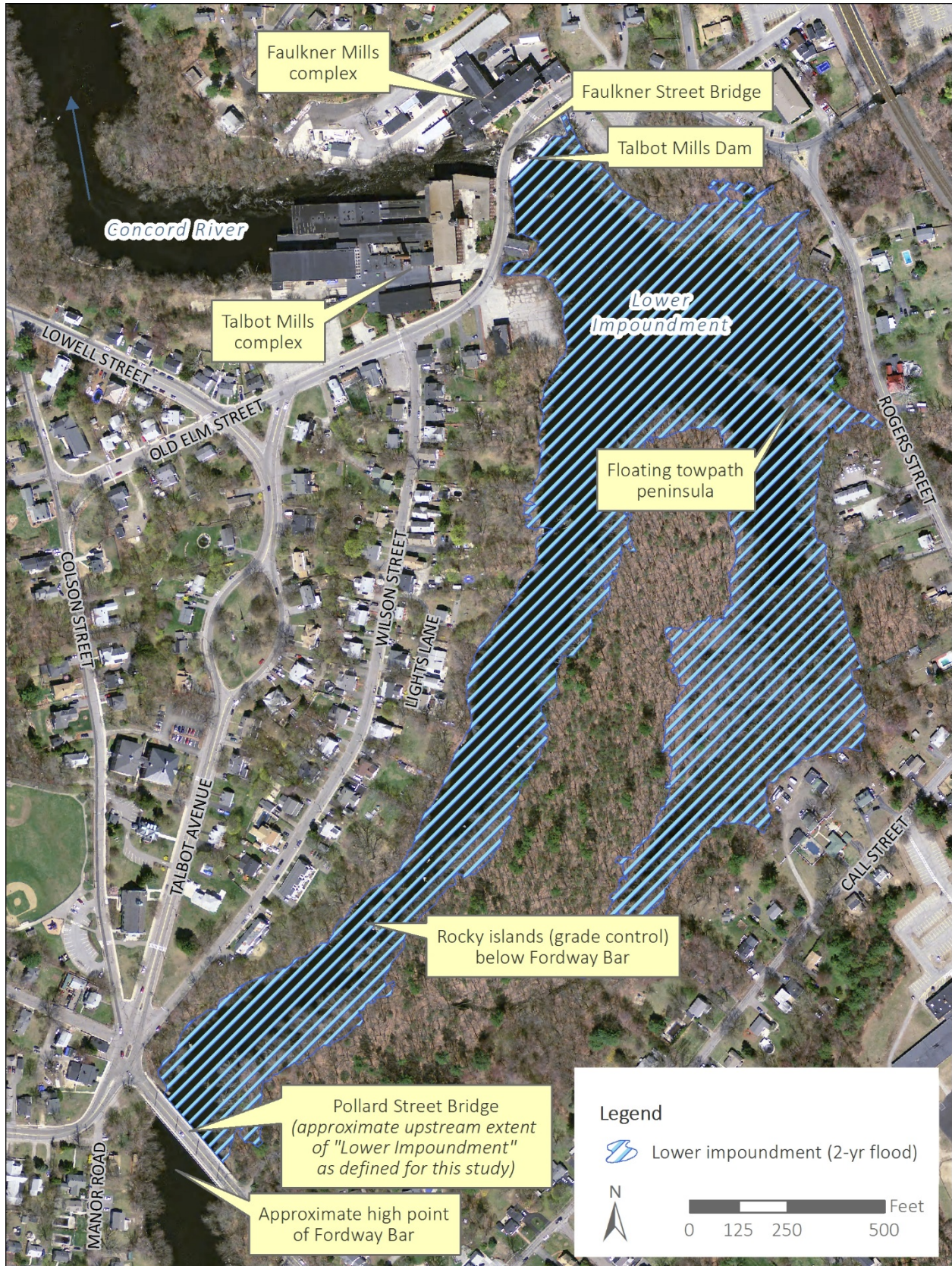


Figure 2.1-2: Bathymetry of Concord River from Talbot Mills Dam to Fordway Bar

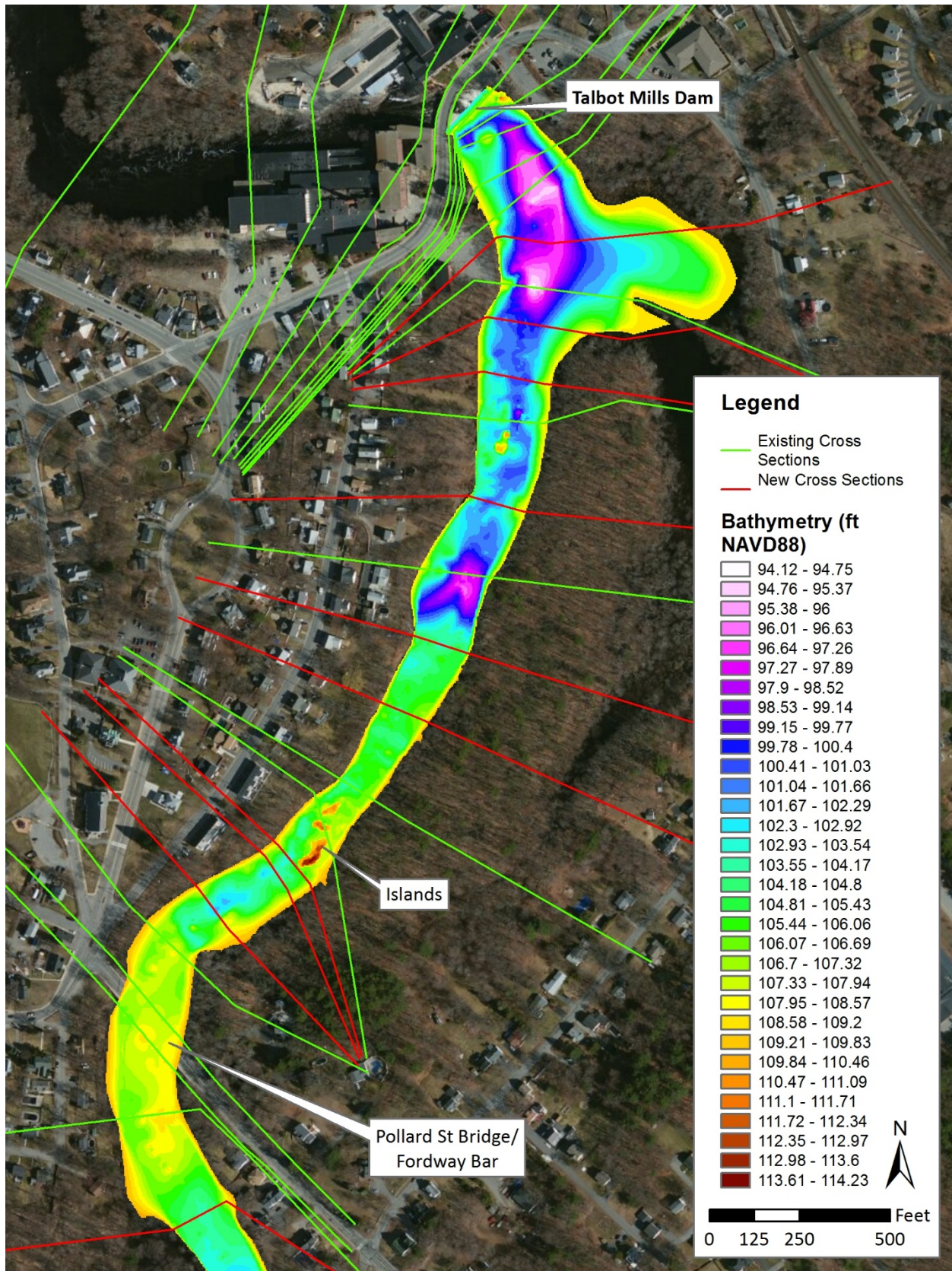


Figure 2.1-3: Bathymetry of Concord River from Fordway Bar to Boston Road (Route 3A)

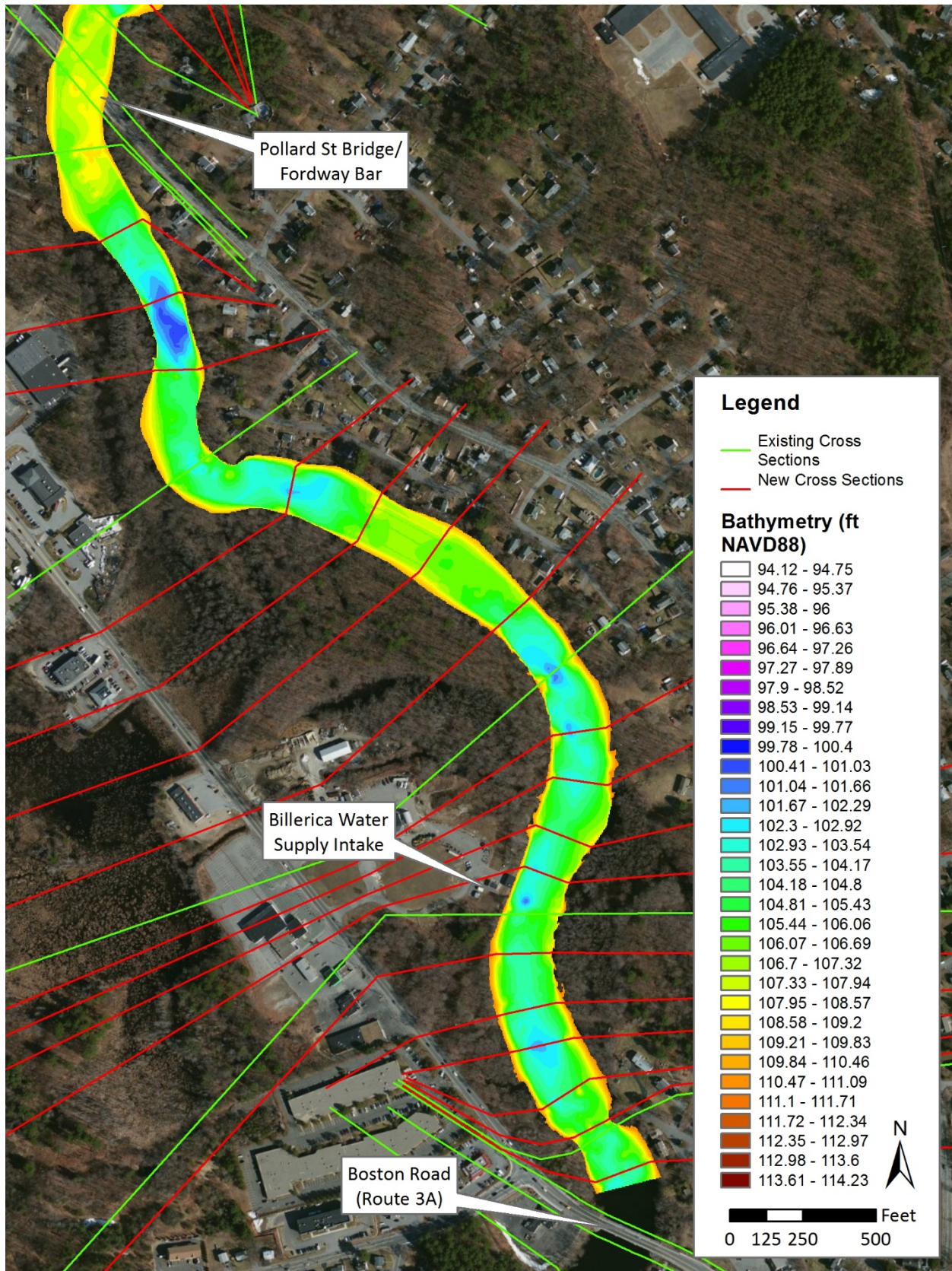
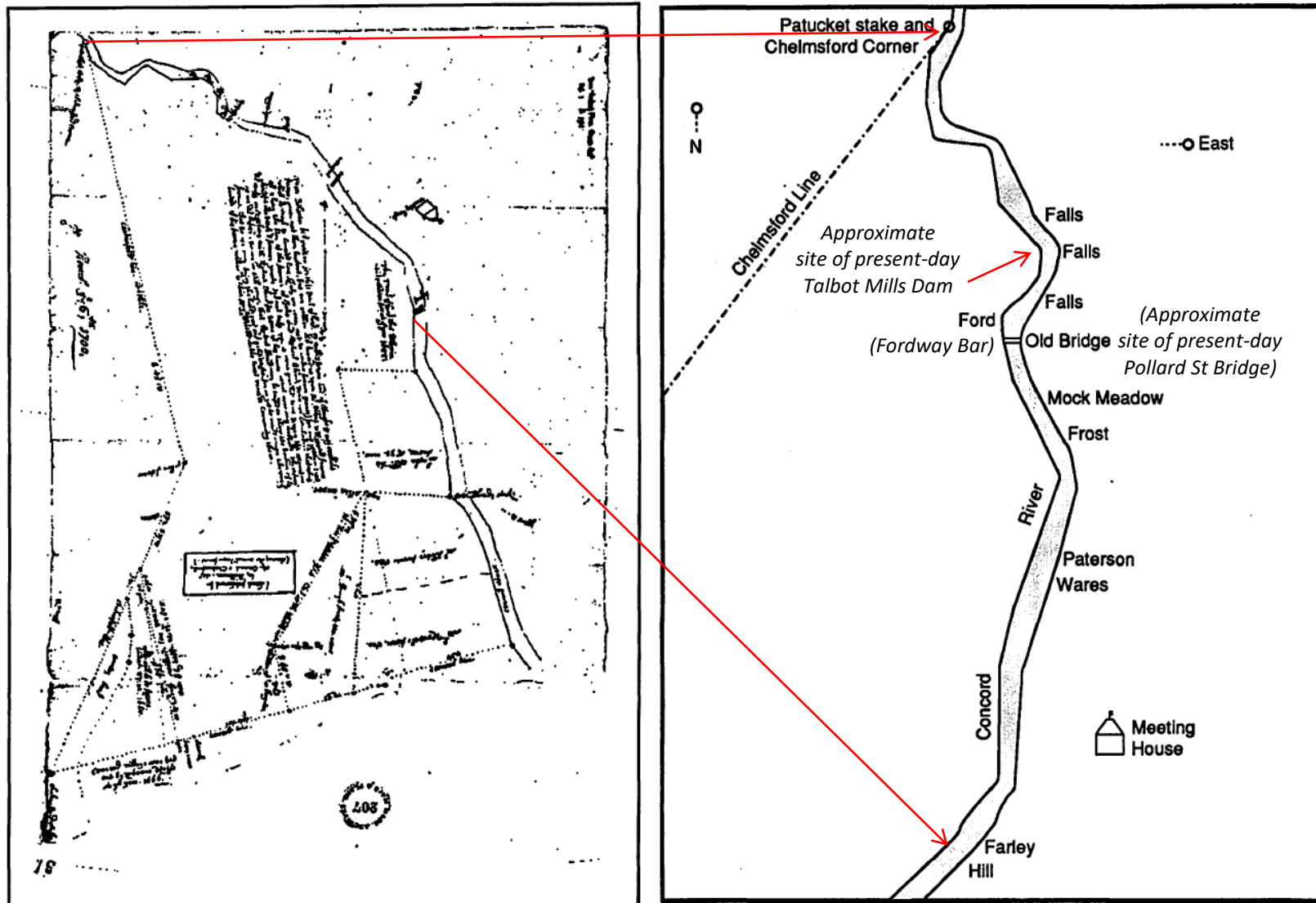
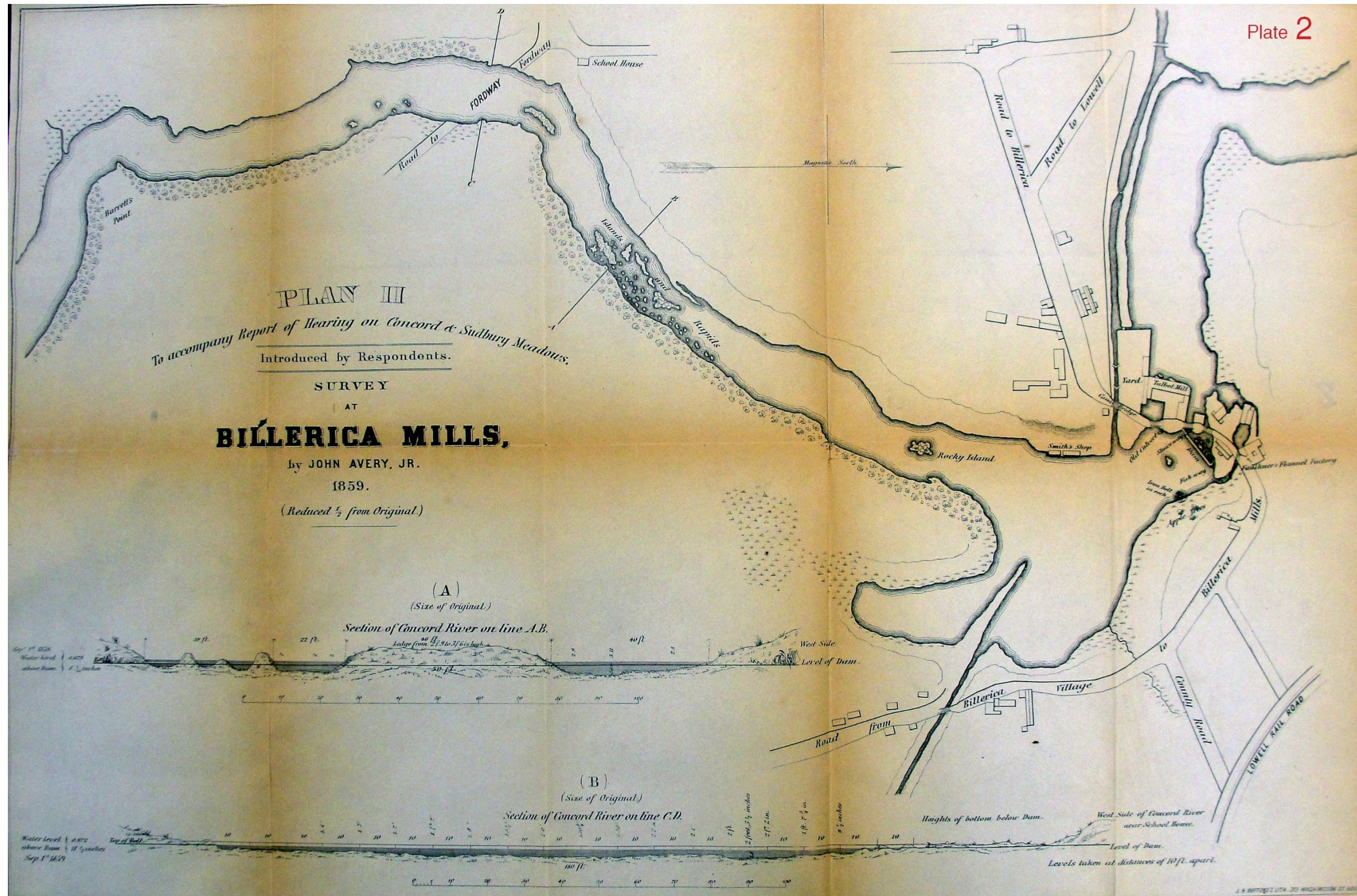


Figure 2.1-4: Historical Map Showing Falls Prior to Damming of Concord River



This early map of Billerica (left), prepared in 1700, indicates the existence of a series of falls in the Concord River between the present-day Pollard Street and Faulkner Bridges, as shown in the reproduced extract at right (Ingraham, 1995).

Figure 2.2-1: Historical Plan of Billerica Mills Showing Cross-Section of the Fordway Bar and Rapids



Source: Avery, Jr., 1859. Note locations of the Fordway Bar and islands/rapids downstream.

Figure 2.2-2: Pollard Street Bridge Plan and Profile Drawing

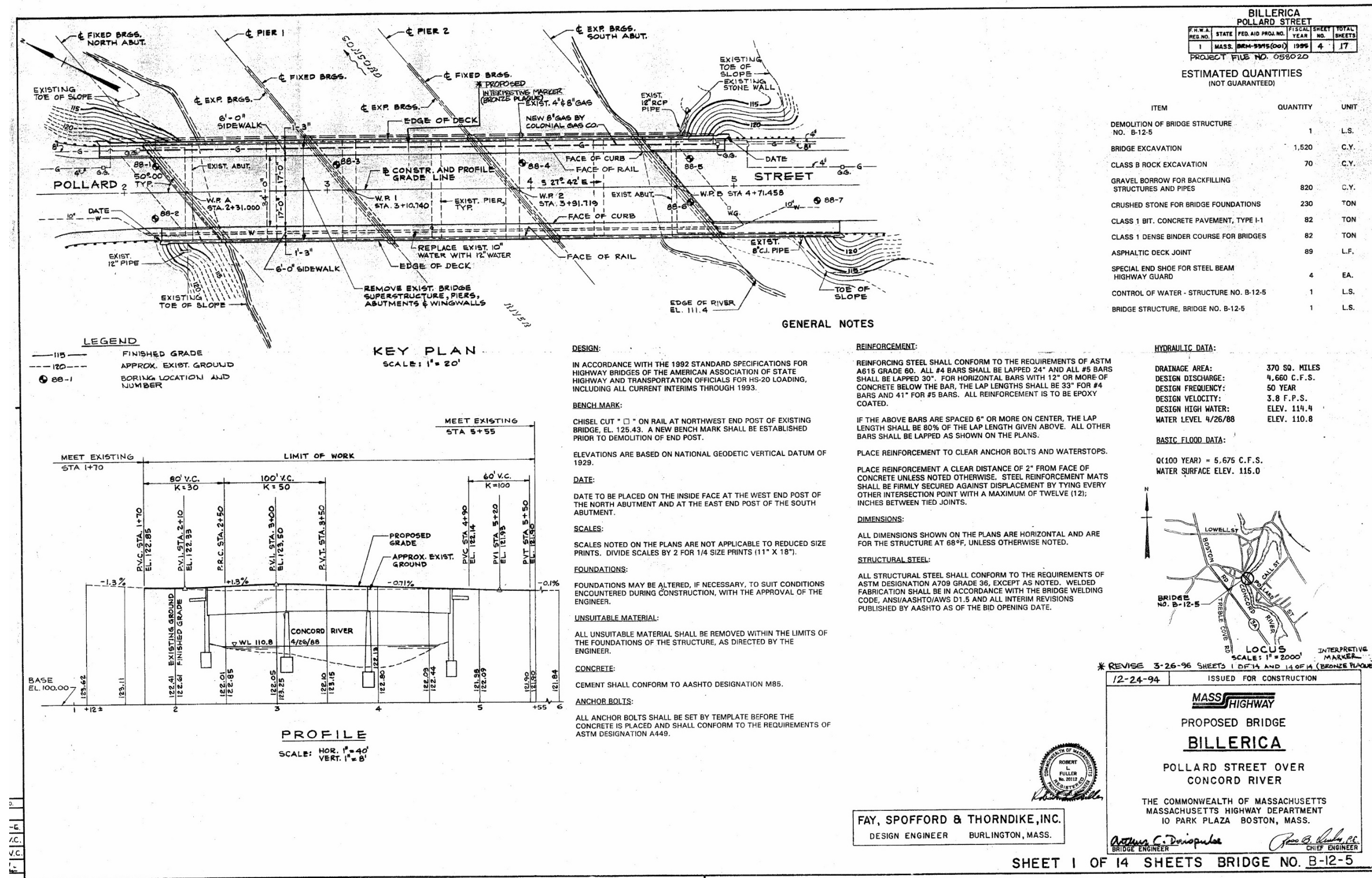


Figure 2.2-3: Pollard Street Bridge Boring Logs (1 of 2)

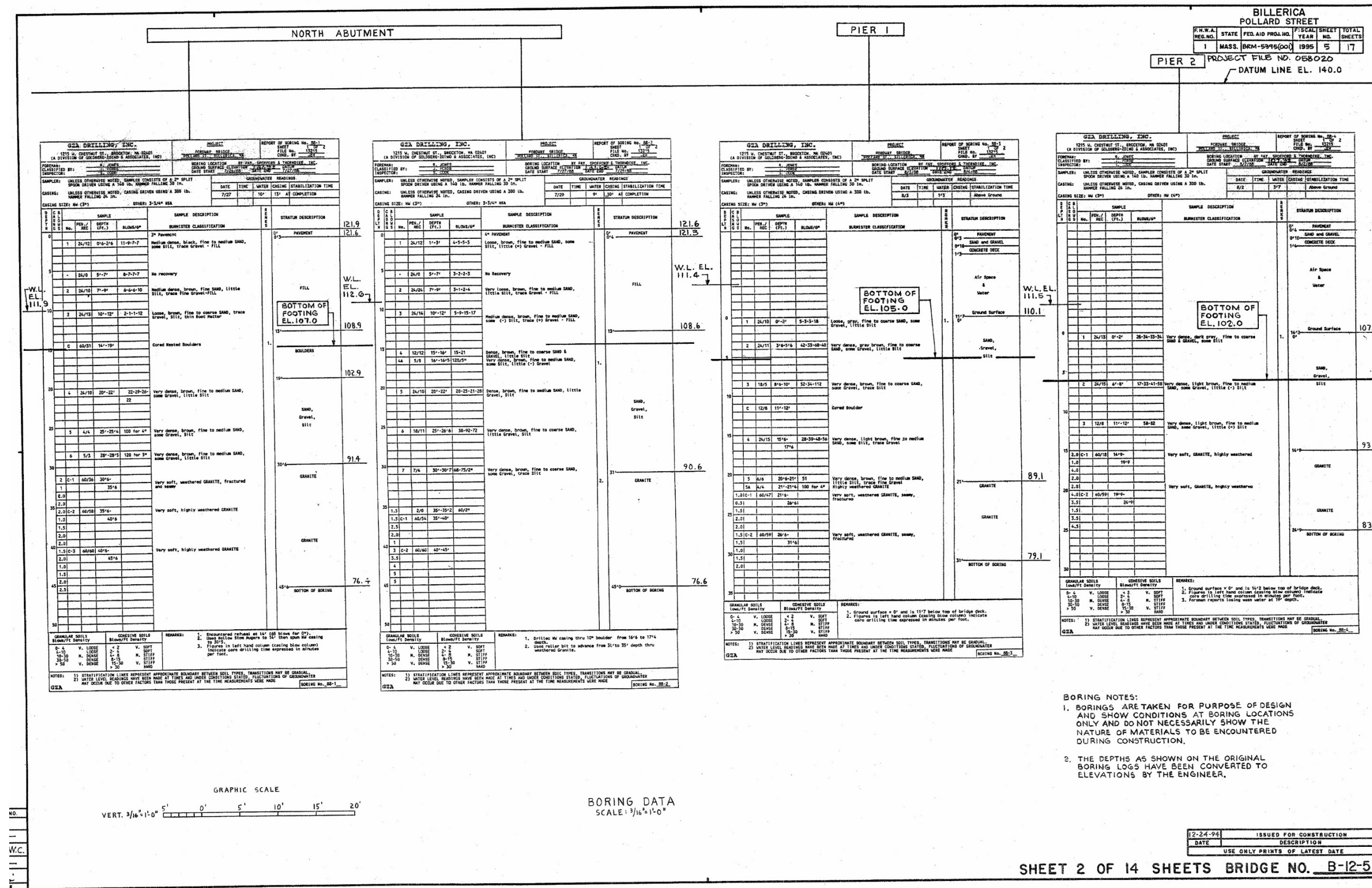


Figure 2.2-4: Pollard Street Bridge Boring Logs (2 of 2)

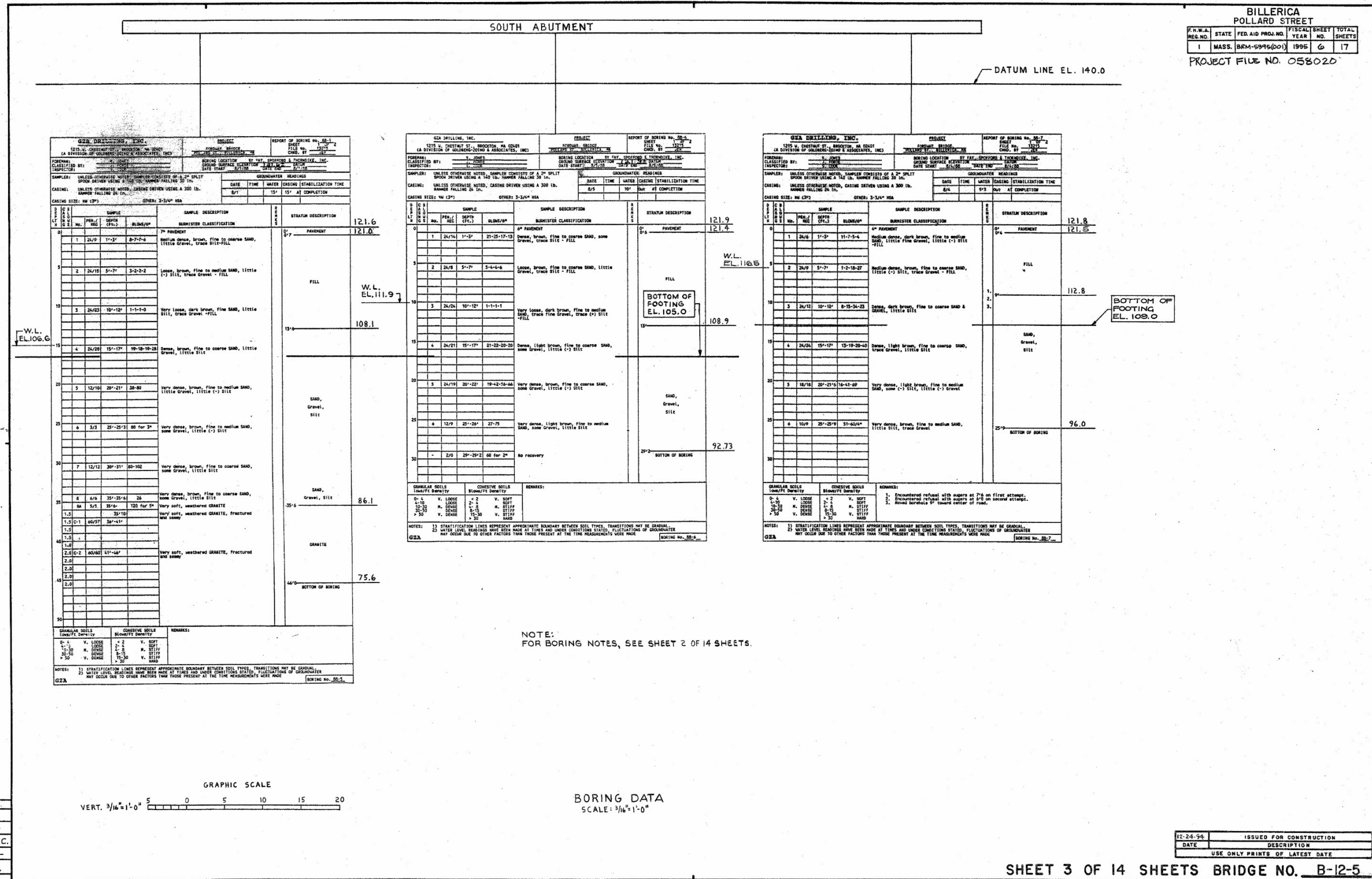


Figure 2.3-1: Water Level Logger Locations

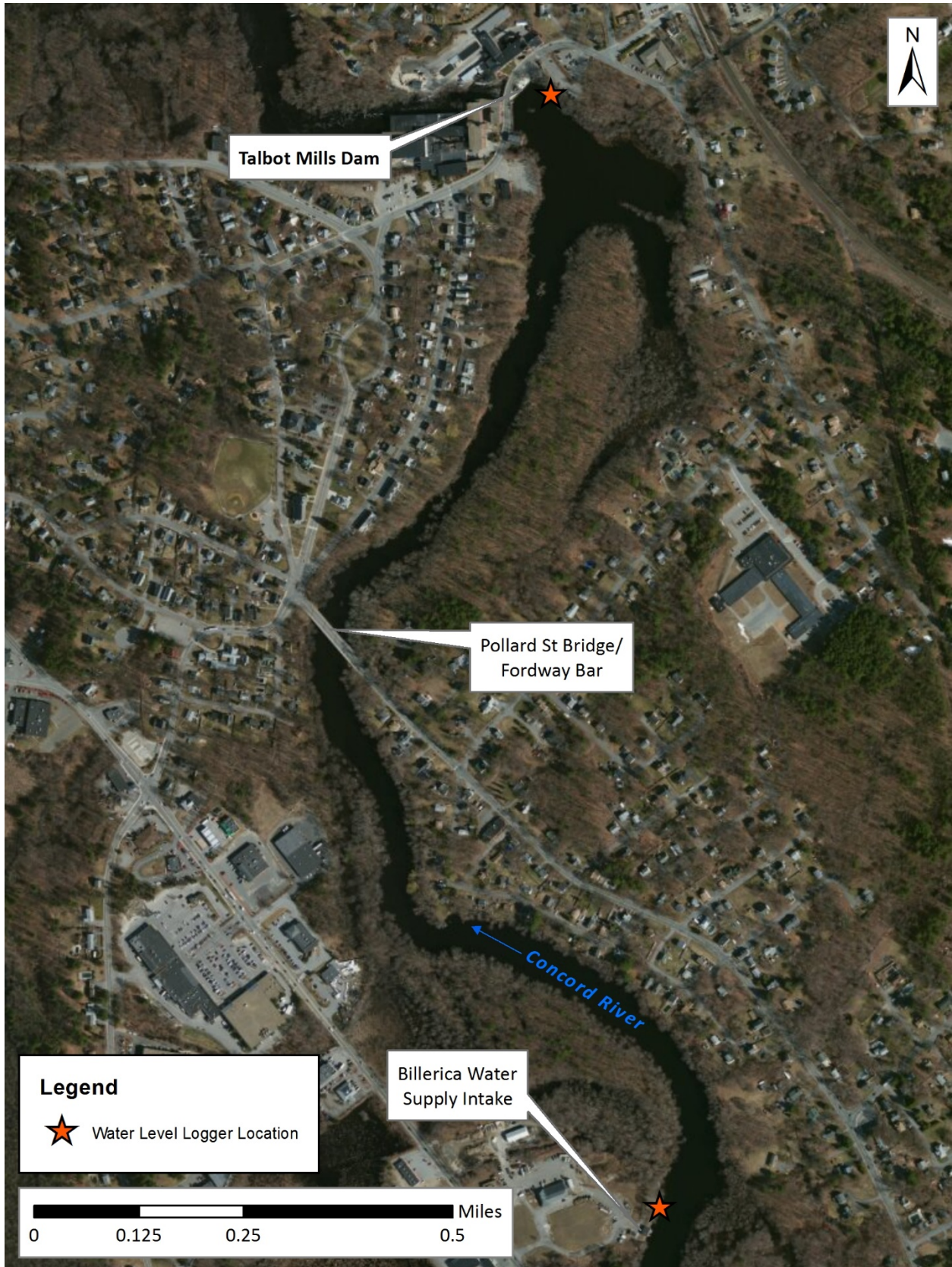


Figure 2.3-2: Talbot Mills Dam Impoundment Elevations (May 6-Sep 23, 2021)

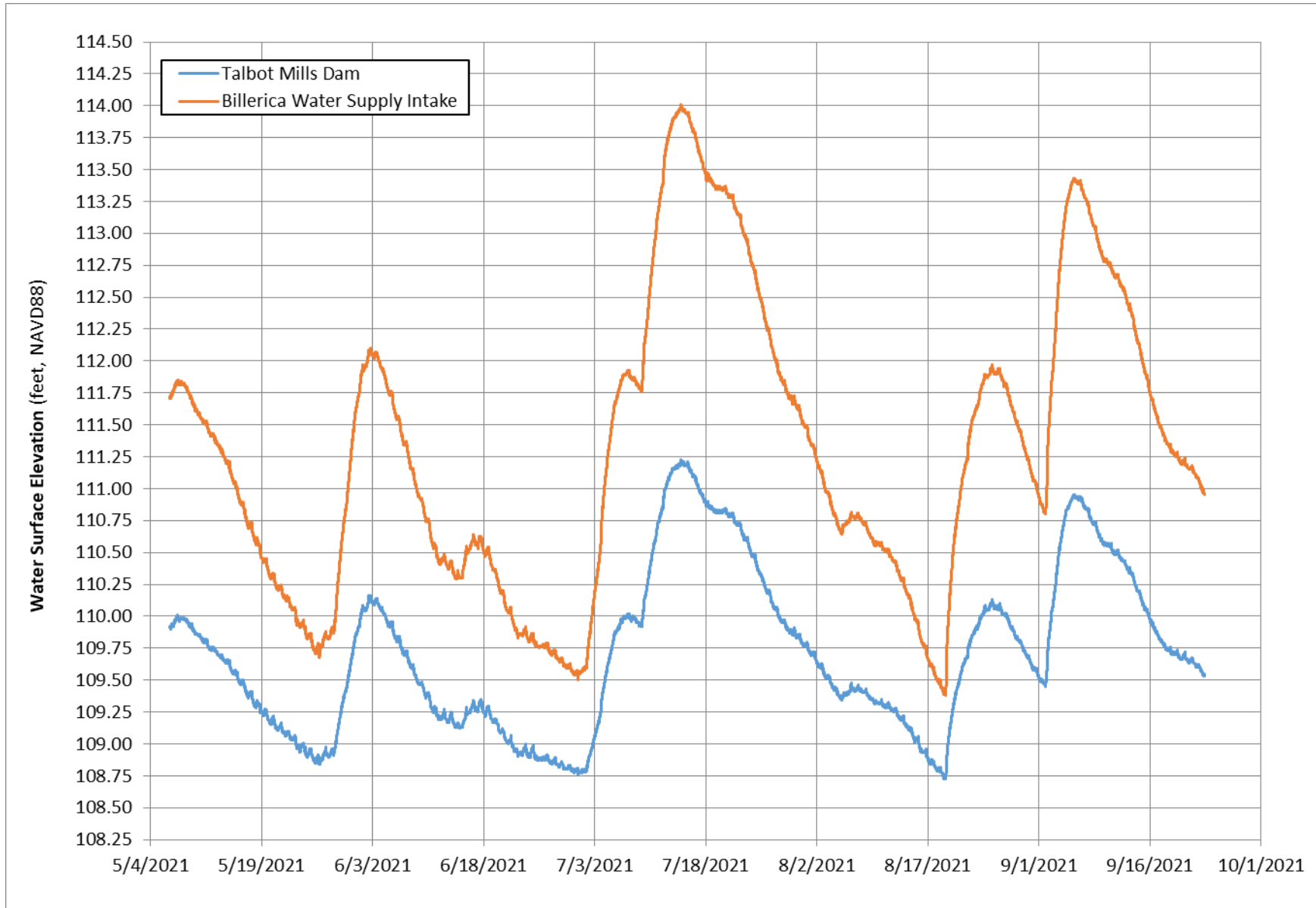


Figure 2.3-3: Water Surface Elevations versus Prorated Flow at Talbot Mills Dam

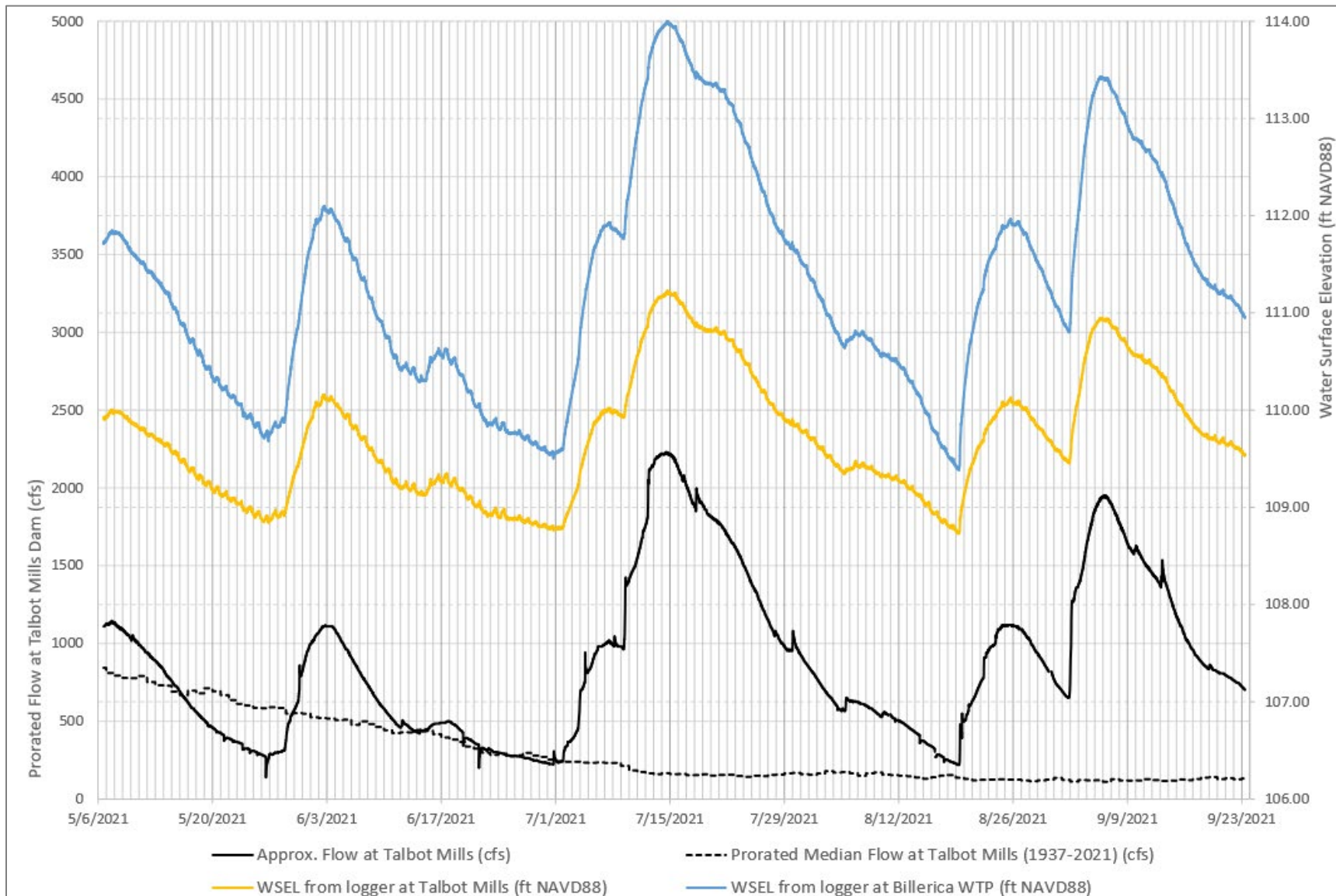


Figure 2.3-4: Stage-Discharge Relationship at Talbot Mills Dam (Jul 14-Sep 23, 2021)

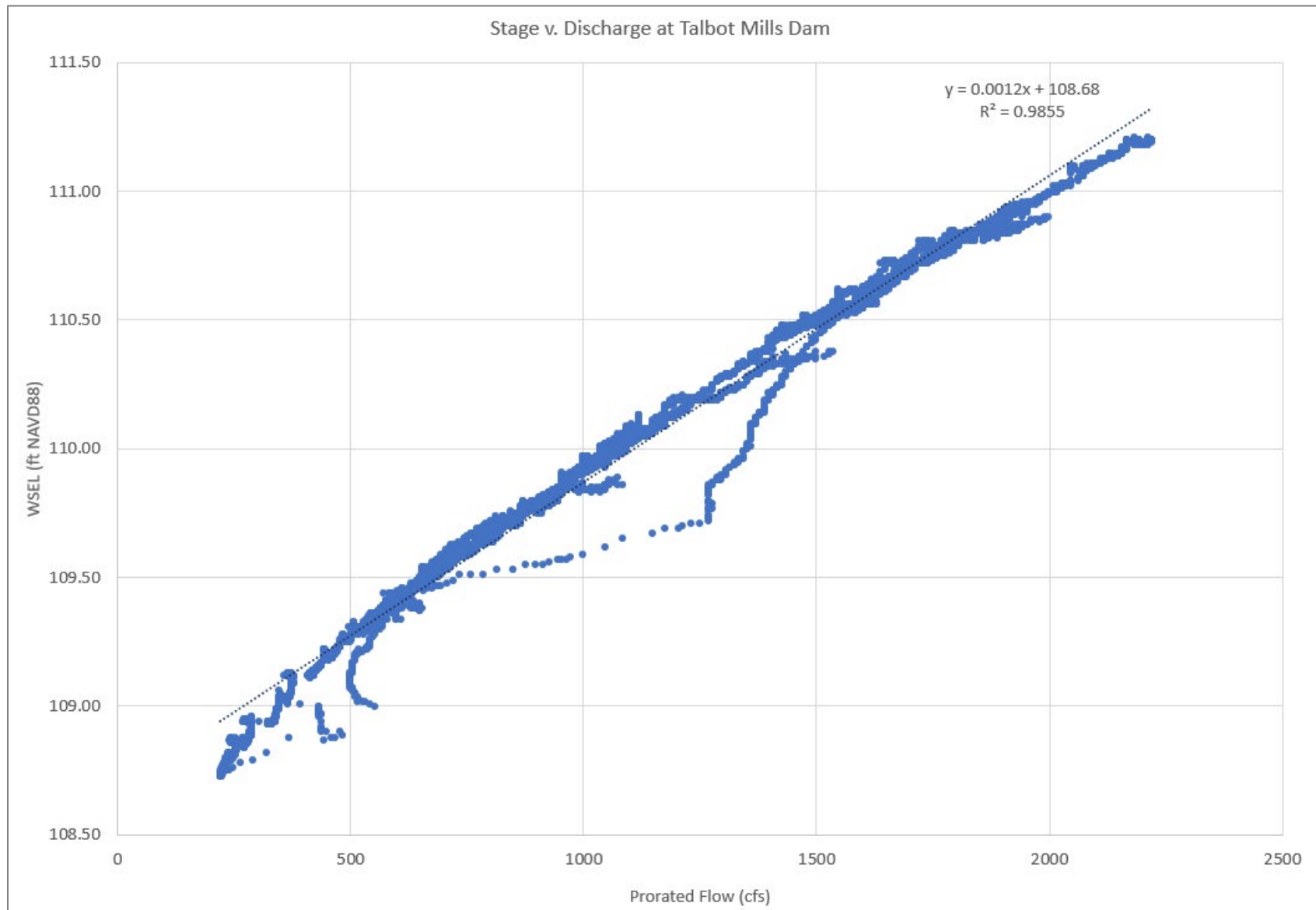


Figure 2.4-1: HEC-RAS Model Overview with New Cross Sections

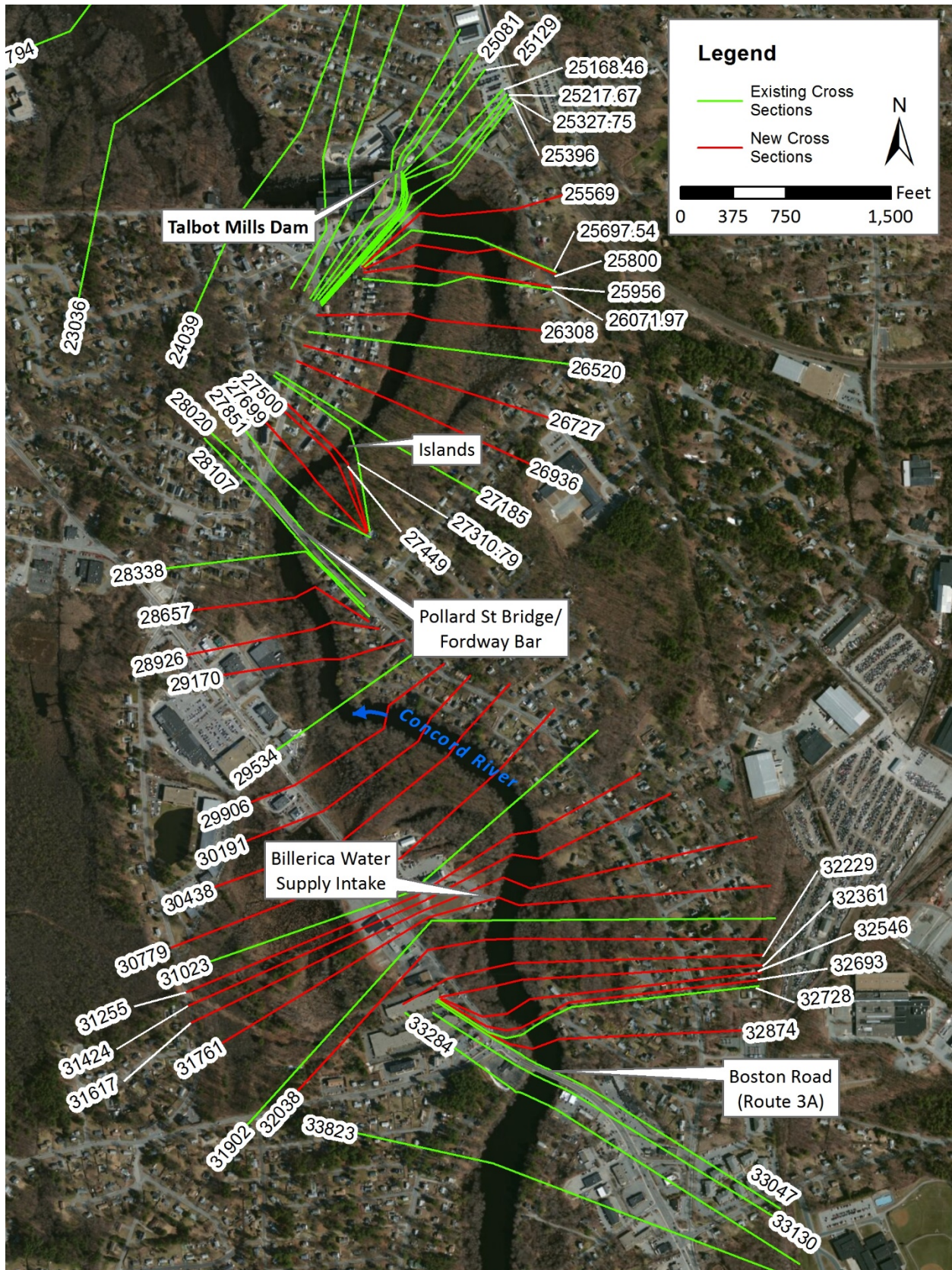


Table 2.4-1: Optimized Gate Settings for Observed Calibration Flows

Date of Flow	Prorated Flow at Talbot Mills Dam (cfs)	Optimized Gate Opening Height (ft)
09-21-21	787	1.47
09-06-21	1943	2.65
08-25-21	1119	1.6
08-19-21	219	0.65
08-08-21	583	1.05
07-14-21	2220	2.75
05-27-21	291	0.83
08-13-20	44	0.0
10-06-14	120	0.3

Figure 2.4-2: Optimized Gate Opening Height for Modeled Calibration Flows

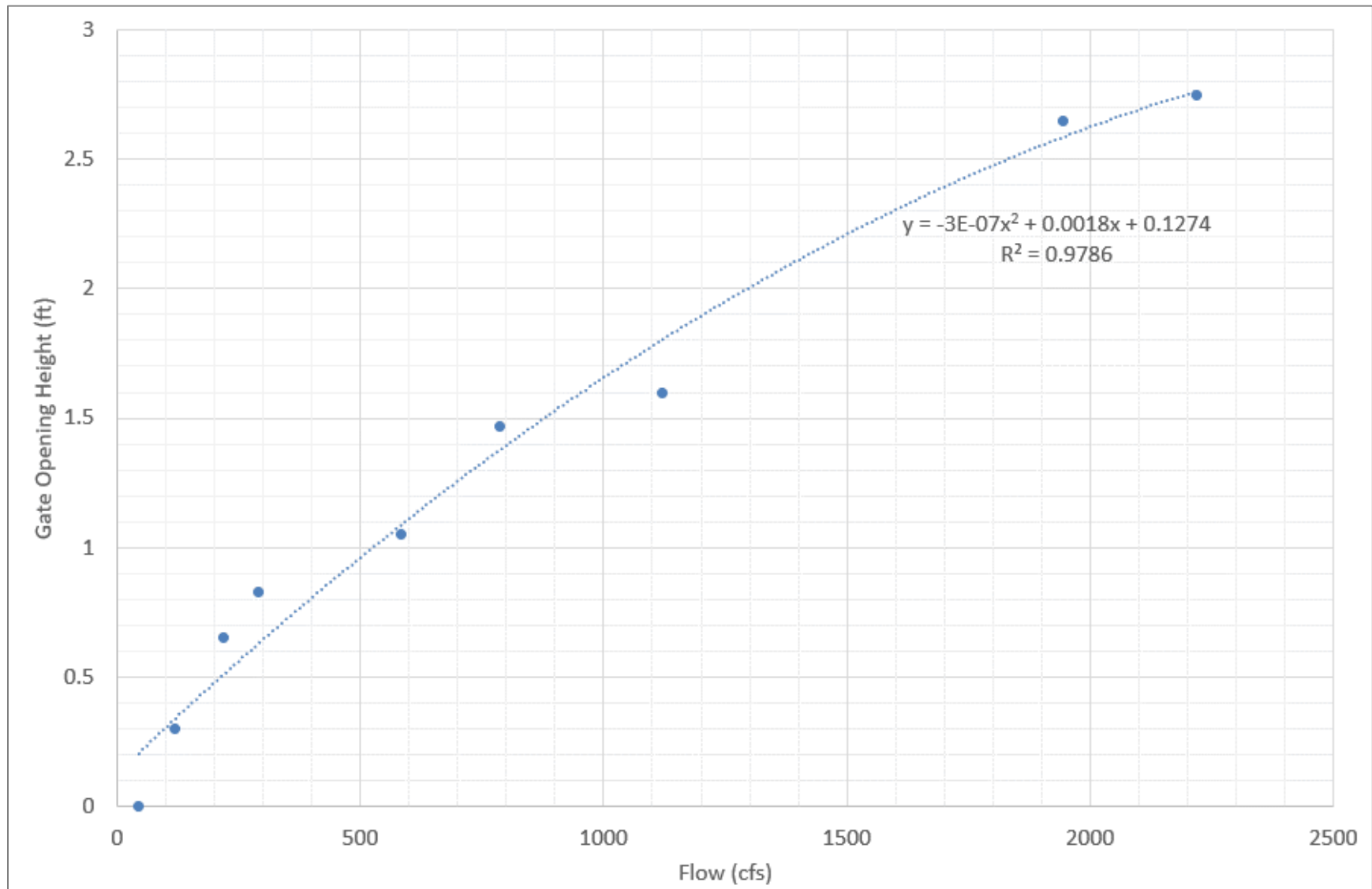


Table 2.4-2: Modeled versus Observed Water Surface Elevations for Calibration Flows

Location Description	River Station (ft)	Date	Flow (cfs)	Water Surface Elevation (ft, NAVD 88)		
				Observed	Modeled	Difference
Upstream of Boston Road (Route 3A)	33047	03-29-12	485	110.31 ¹	110.31	0.00
Billerica Water Supply Intake	31902	09-21-21	787	111.16 ²	111.07	-0.09
		09-06-21	1943	113.40 ²	113.28	-0.12
		08-25-21	1119	111.95 ²	111.8	-0.15
		08-19-21	219	109.39 ²	109.37	-0.02
		08-08-21	583	110.71 ²	110.55	-0.16
		07-14-21	2220	113.96 ²	113.71	-0.25
		05-27-21	291	109.75 ²	109.64	-0.11
		10-06-14	120	108.80 ³	108.91	0.11
Downstream of Pollard Street	27851	10-06-14	120	108.80 ³	108.61	-0.19
Water Level Logger Location Upstream of Talbot Mills Dam	25168	09-21-21	787	109.64 ²	109.67	0.03
		09-06-21	1943	110.93 ²	110.96	0.03
		08-25-21	1119	110.11 ²	110.07	-0.04
		08-19-21	219	108.74 ²	108.79	0.05
		08-08-21	583	109.40 ²	109.39	-0.01
		07-14-21	2220	111.2 ²	111.23	0.03
		05-27-21	291	108.8 ²	108.93	0.06
Just Upstream of Talbot Mills Dam	25129	10-06-14	120	108.5 ³	108.57	0.07
		08-13-20	44	>108.2 ⁴	108.34	> 0.0

¹ Ed Reiner, 2021, personal communication

² Gomez and Sullivan, 2021, water level logger data

³ Gomez and Sullivan, 2014, field data collection for 2016 Feasibility Study

⁴ Streamworks, 2020, Review of Talbot Mills Dam Removal Feasibility Study. Note: An exact water surface elevation was not recorded for the flow on August 13, 2020. The water level is known to be higher than the spillway elevation of 108.2 ft NAVD88, so a positive value indicates that there is flow over the dam as observed, and that the model is sufficiently recalibrated for this flow.

Table 2.4-3: Modeled versus Observed Water Surface Elevations for Verification Flows

Location Description	River Station (ft)	Date	Flow (cfs)	Water Surface Elevation (ft, NAVD 88)		
				Observed	Modeled	Difference
Downstream of Route 3	43243	03-17-10	5402	117.61 ¹	117.97	0.36
Upstream of River Street	39621	04-02-10	5236	117.19 ²	117.62	0.43
		03-17-10	5402	117.33 ³	117.78	0.45
Pinewood Avenue Private Gage	37622	04-02-10	5236	117.30 ¹	117.49	0.19
		03-17-10	5402	117.24 ¹	117.65	0.41
		03-01-10	3358	115.37 ¹	115.51	0.14
		03-11-08	3016	115.17 ¹	115.08	-0.09
		04-06-05	3201	115.27 ¹	115.32	0.05
Upstream of Boston Road (Route 3A)	33047	04-02-10	5236	117.34 ²	117.32	-0.02
		03-17-10	5402	117.22 ³	117.47	0.25
Billerica WTP	31902	07-29-20	81	108 ⁴ (approx.)	108.68	0.7 (approx.)
Upstream of Pollard Street	28107	07-29-20	81	108.4 ⁴ (approx.)	108.6	0.2 (approx.)
Talbot Mills Dam	25129	03-17-10	5402	113.8 ³	113.52	-0.28
Downstream of Faulkner Street	25043	04-02-10	5236	106.68 ³	106.76	0.08

¹ Ed Reiner, 2014. Concord R. Floods (Reiner).doc

² Gomez and Sullivan, 2021. Survey of Ed Reiner's high-water marks

³ USGS, 2011. 2010 Flood Heights

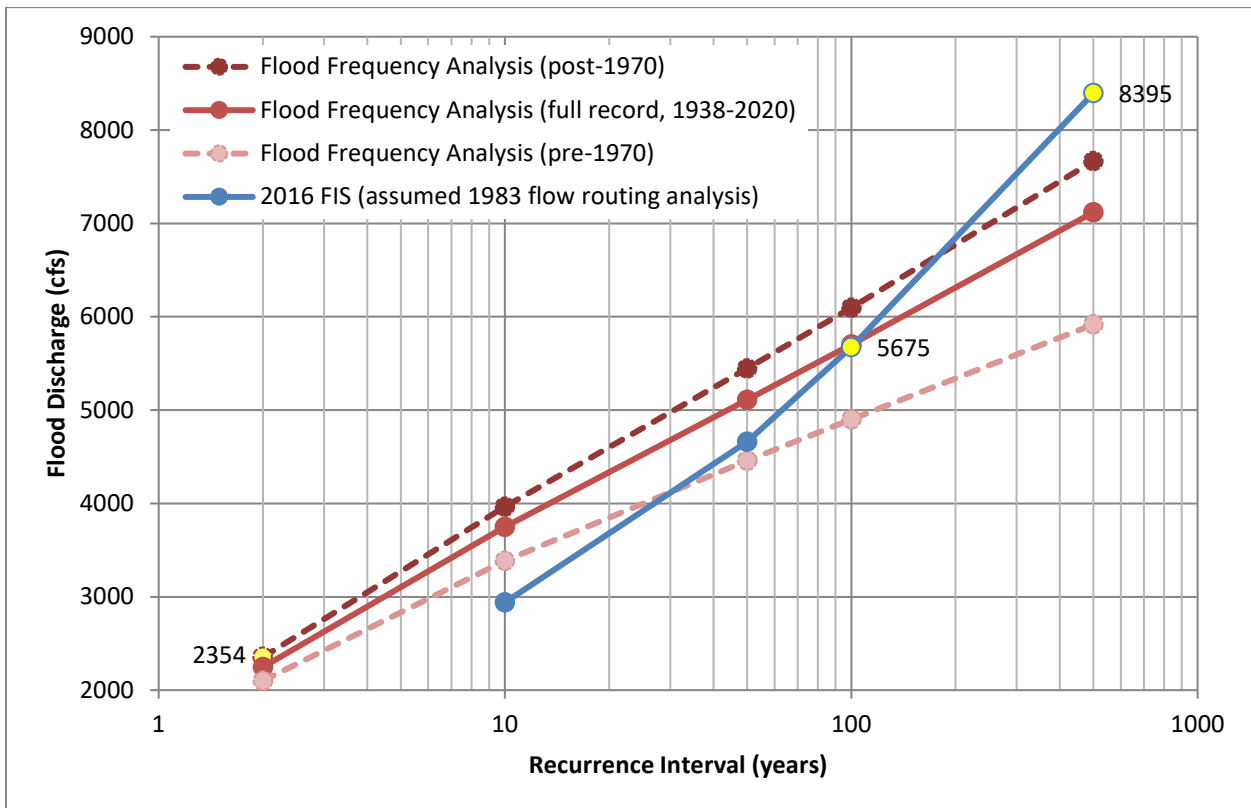
⁴ Streamworks, 2020.

Table 2.4-4: Summary of Updated Flood Flows for the Concord River at Talbot Mills Dam

Annual Exceedance Probability	Recurrence Interval (yrs)	Peak Discharge (cfs)			
		Updated Flood Frequency Analysis			2016 FIS
		Full Record 1938-2020	Pre-1970 (1938-1969)	Post-1970 (1970-2020)	
50%	2	2248	2101	2354	-
10%	10	3749	3386	3965	2940
2%	50	5110	4459	5446	4660
1%	100	5702	4902	6097	5675
0.2%	500	7119	5918	7667	8395

Note: Updated flood frequency analysis conducted using the USGS PeakFQ program with peak streamflow records for USGS Gage 01099500 Concord R Below Meadow Brook at Lowell, MA prorated by ratio of drainage areas (370/400 sq. mi. to the Talbot Mills Dam). FIS estimates assumed to be based on gage data and a flow routing analysis. Values highlighted in yellow were selected for use in the hydraulic model.

Figure 2.4-3: Comparison of Flood Flows for the Concord River at Talbot Mills Dam



Note: Points highlighted in yellow were selected for use in the hydraulic model.

Table 2.4-5: Summary of Flows Selected for Hydraulic Model

Description	Flow at Talbot Mills Dam (cfs)
7Q10 Drought Flow	28
Low (95% exceedance probability in Sept.)	33
Normal (Median Annual)	467
2-Year (50% AEP ¹)	2354
100-Year Flood (1% AEP)	5675
500-Year Flood (0.2% AEP)	8395

¹AEP = annual exceedance probability

Figure 2.4-4: Map of Talbot Mills Dam Impoundment Sediment Transects & Samples

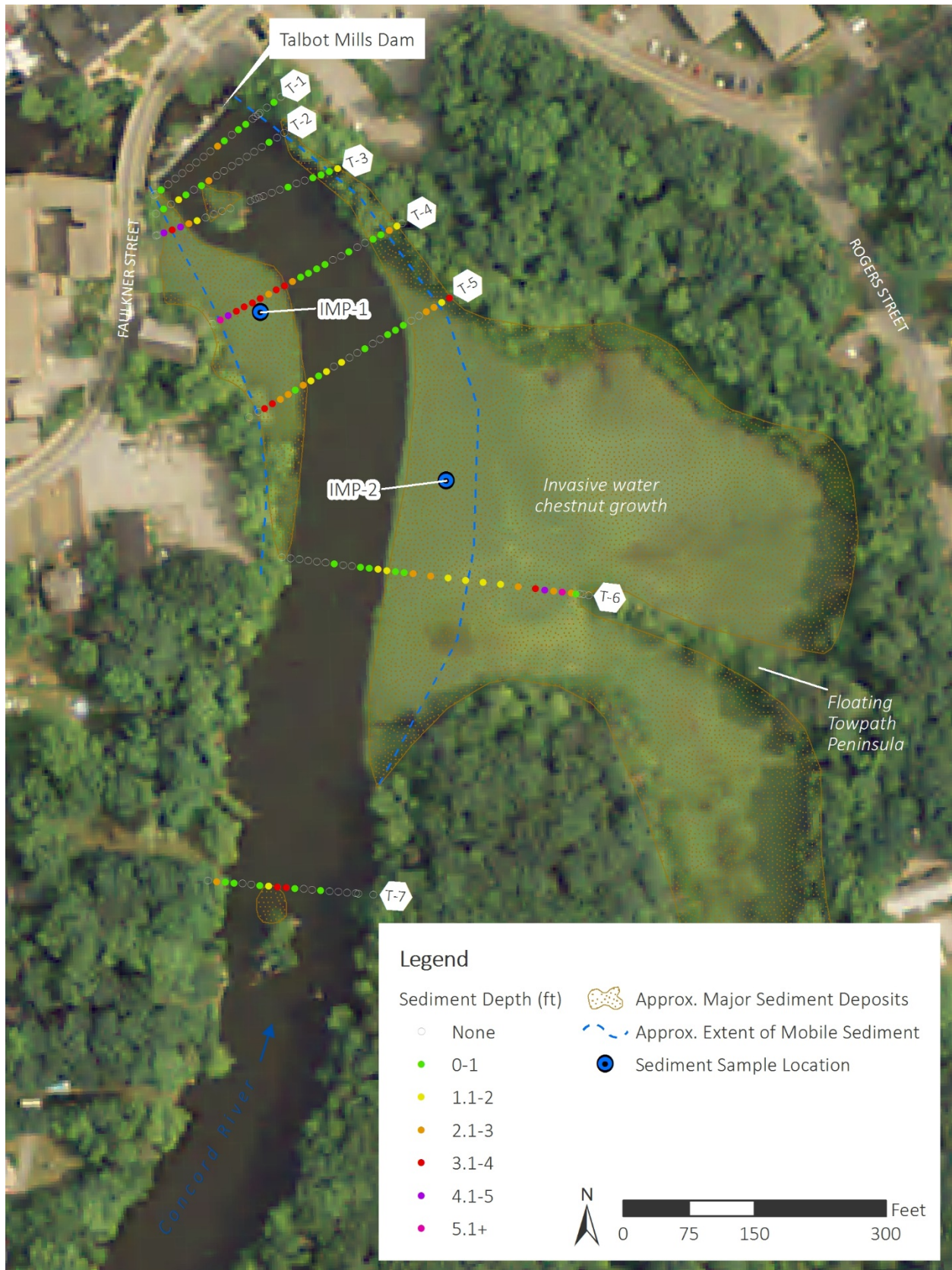


Figure 2.4-5: Talbot Mills Dam Impoundment Sediment Depth Transect T-1 (Updated Geometry)

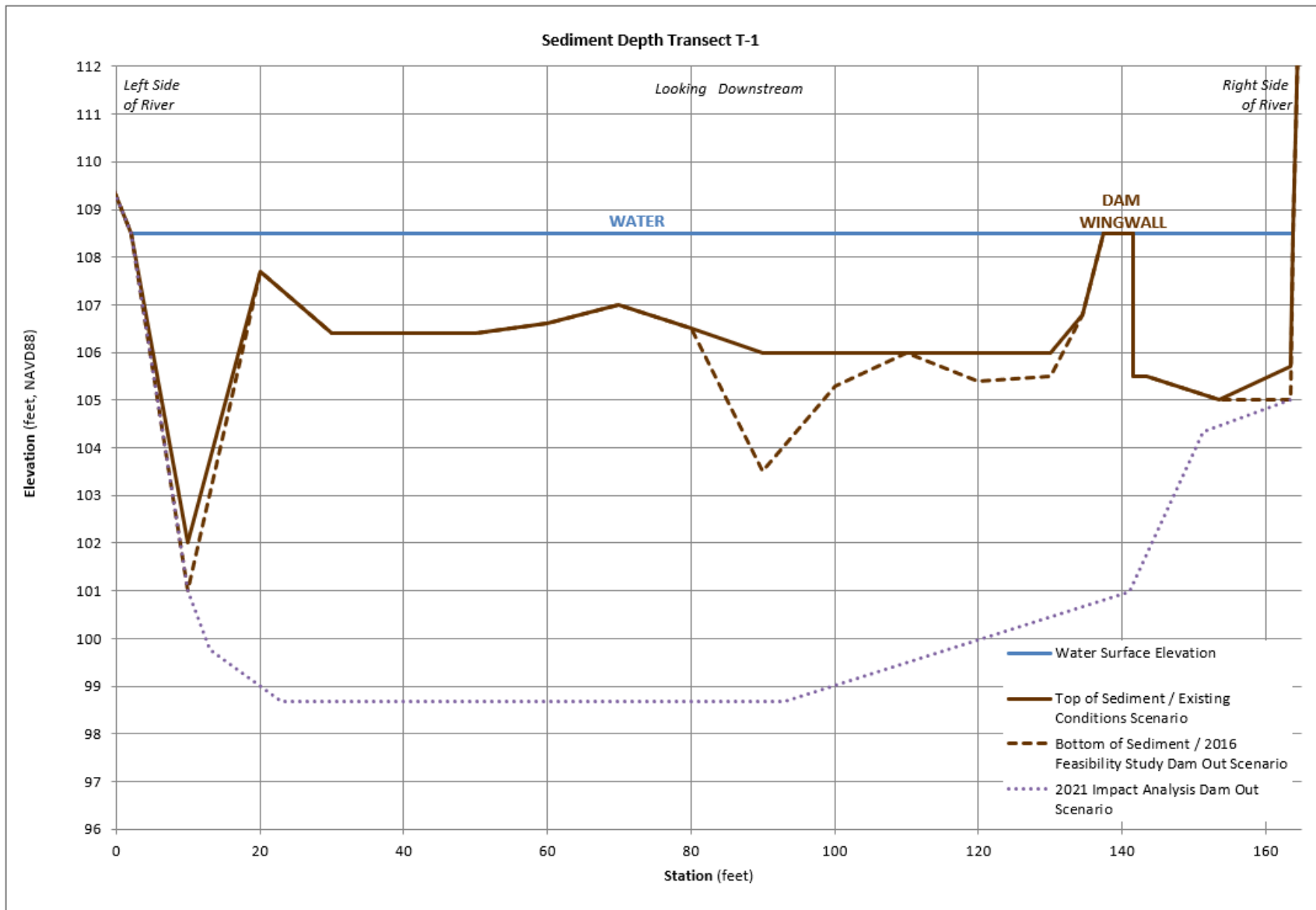


Figure 2.4-6: Talbot Mills Dam Impoundment Sediment Depth Transect T-2

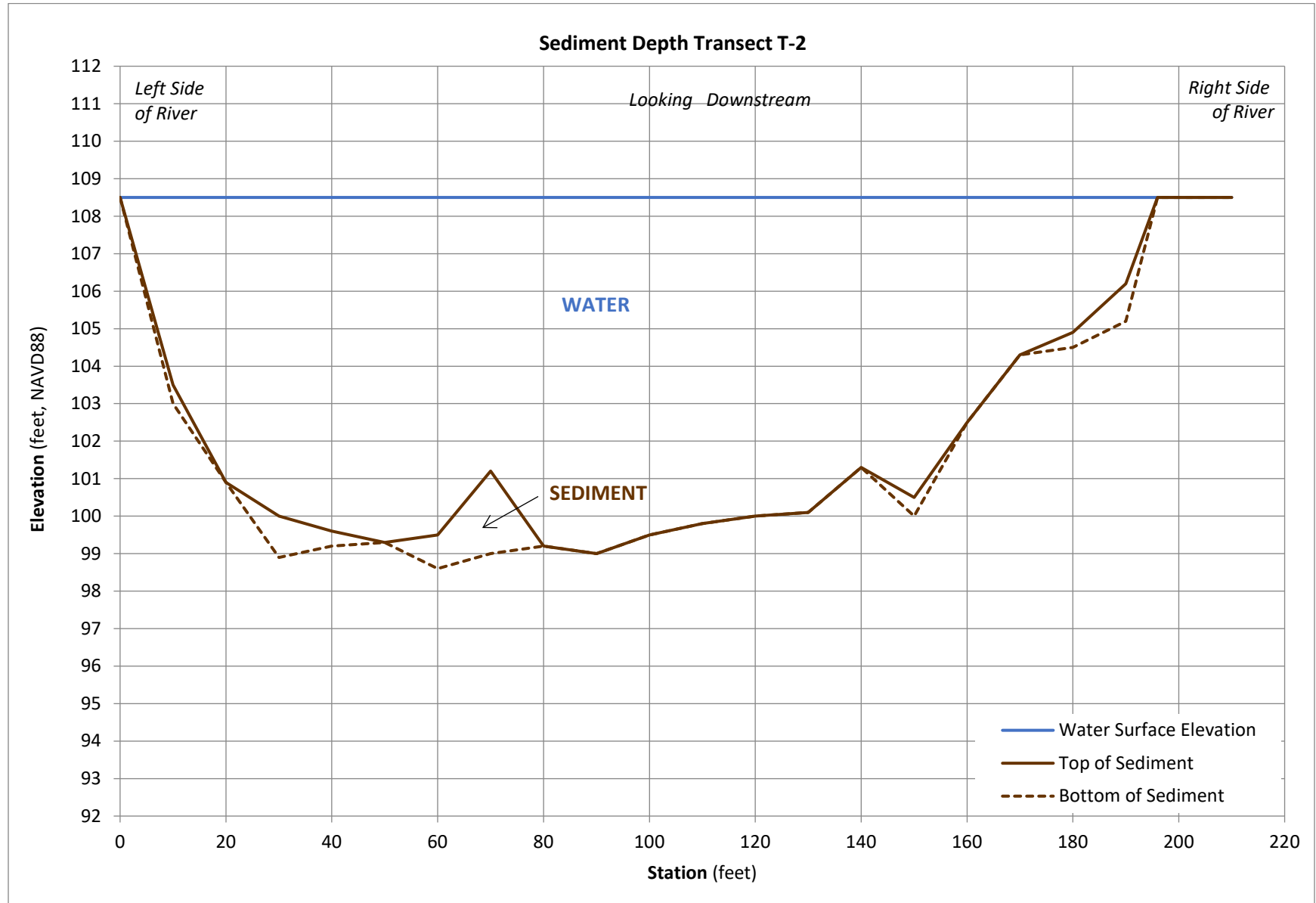


Figure 2.4-7: Talbot Mills Dam Impoundment Sediment Depth Transect T-3

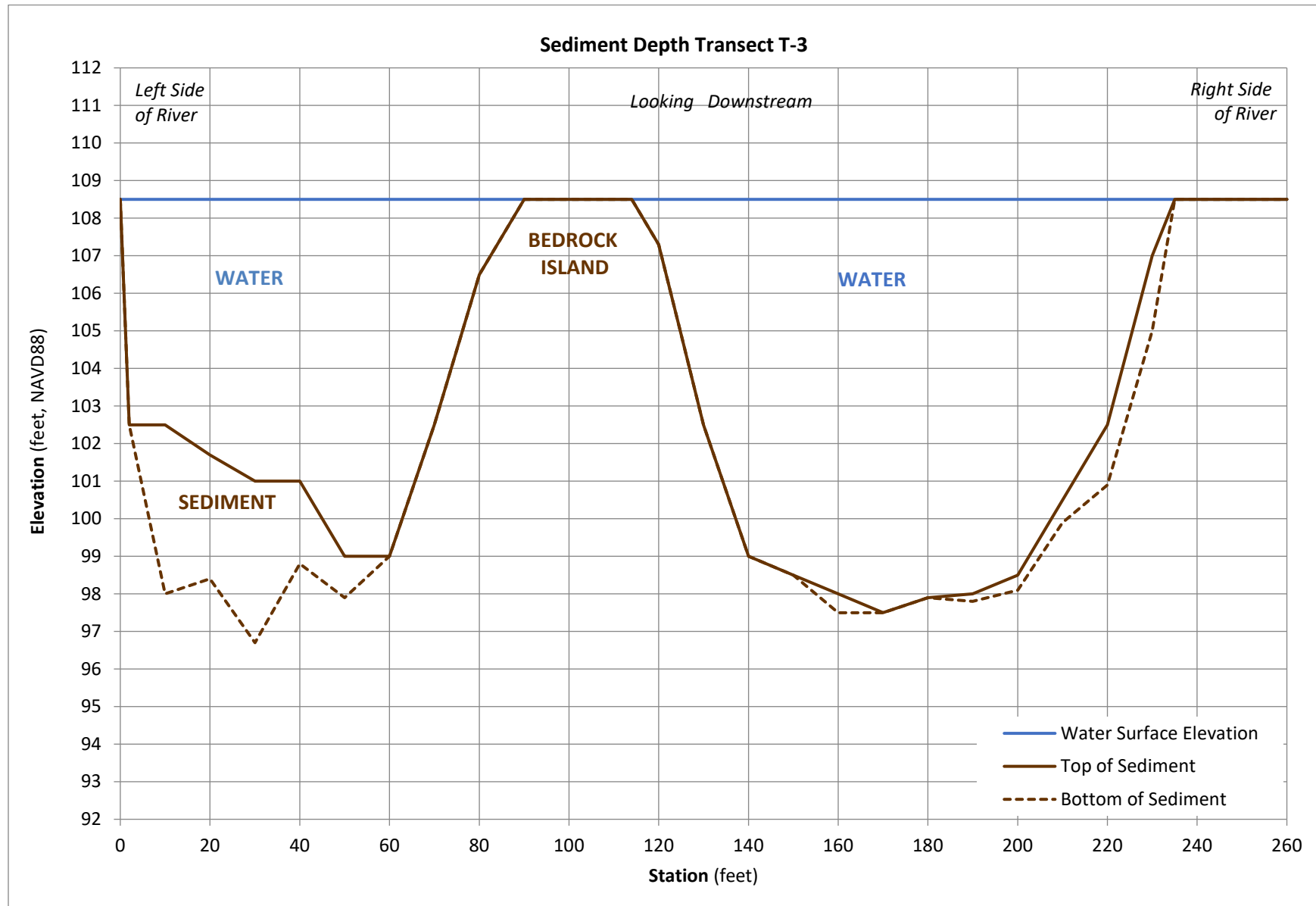


Figure 2.4-8: Talbot Mills Dam Impoundment Sediment Depth Transect T-4

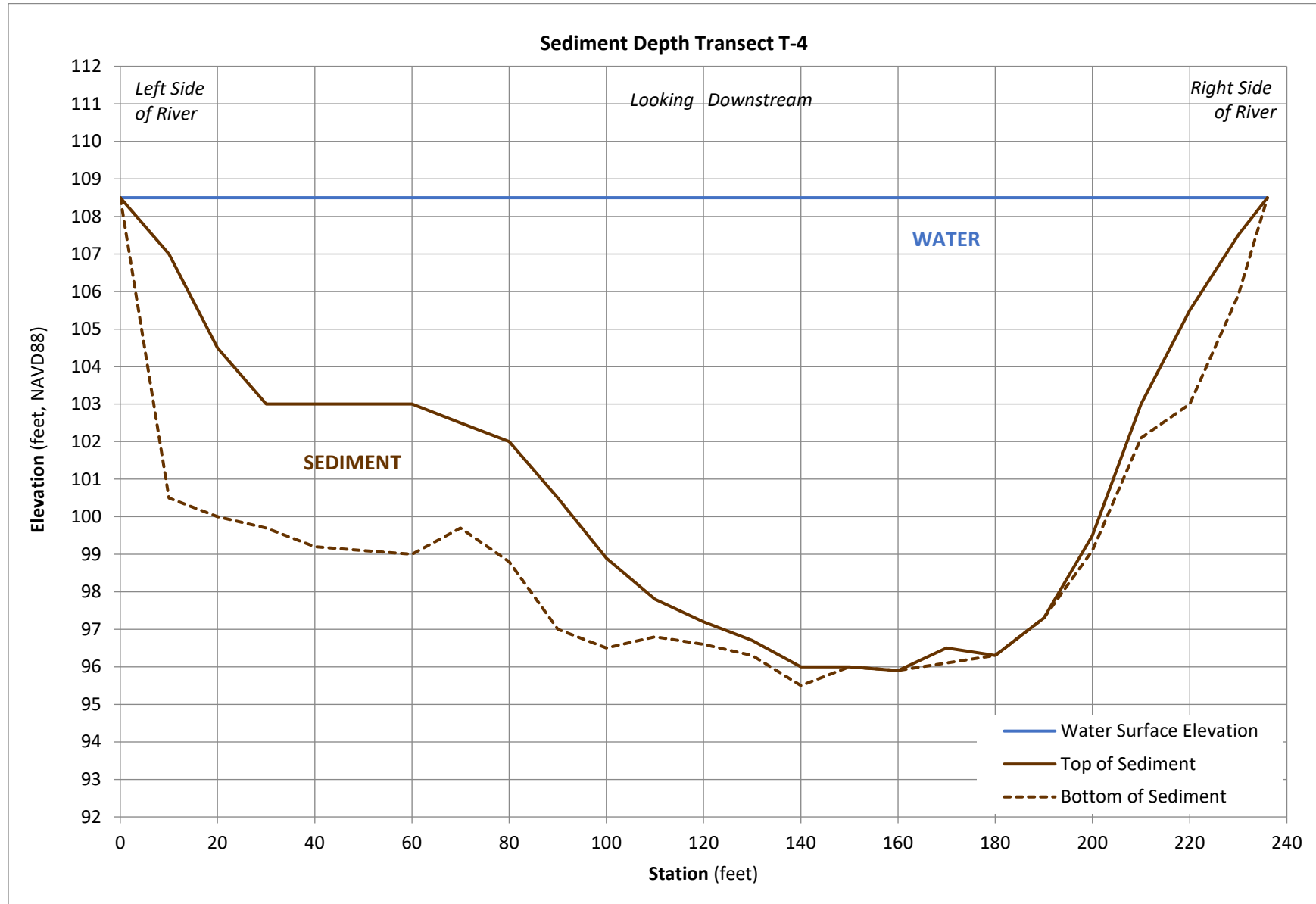


Figure 2.4-9: Talbot Mills Dam Impoundment Sediment Depth Transect T-5

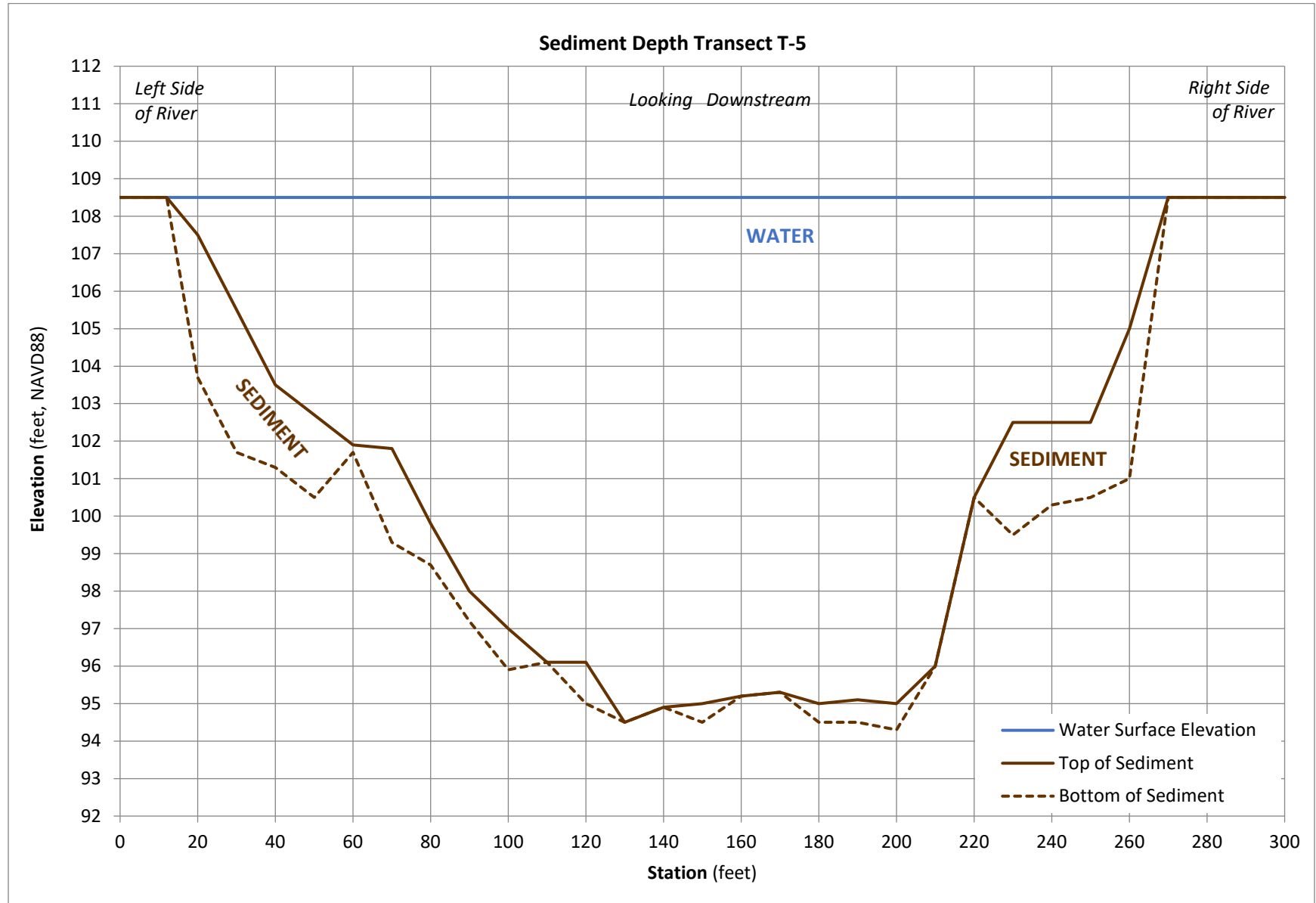


Figure 2.4-10: Talbot Mills Dam Impoundment Sediment Depth Transect T-6

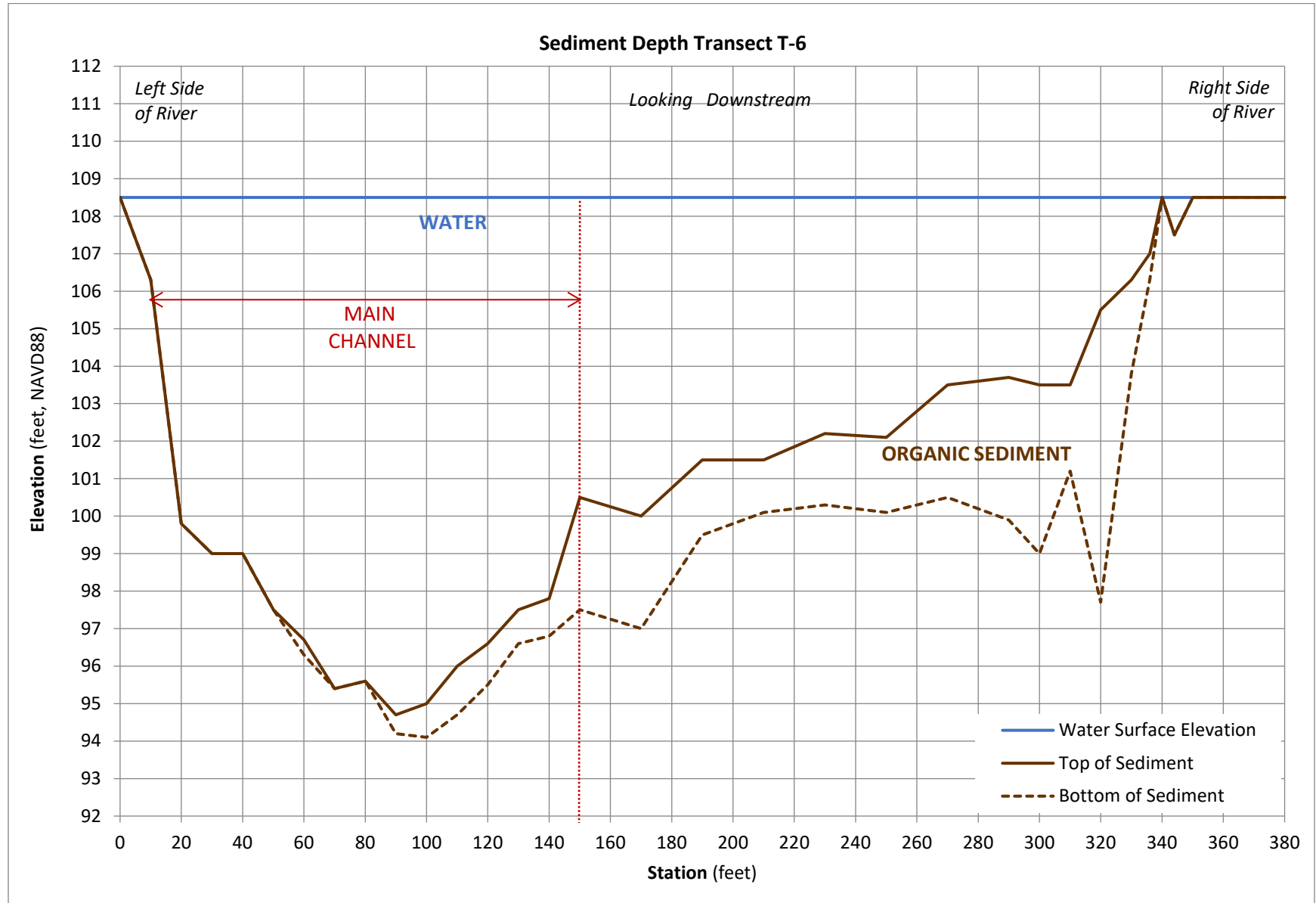


Figure 2.4-11: Talbot Mills Dam Impoundment Sediment Depth Transect T-7

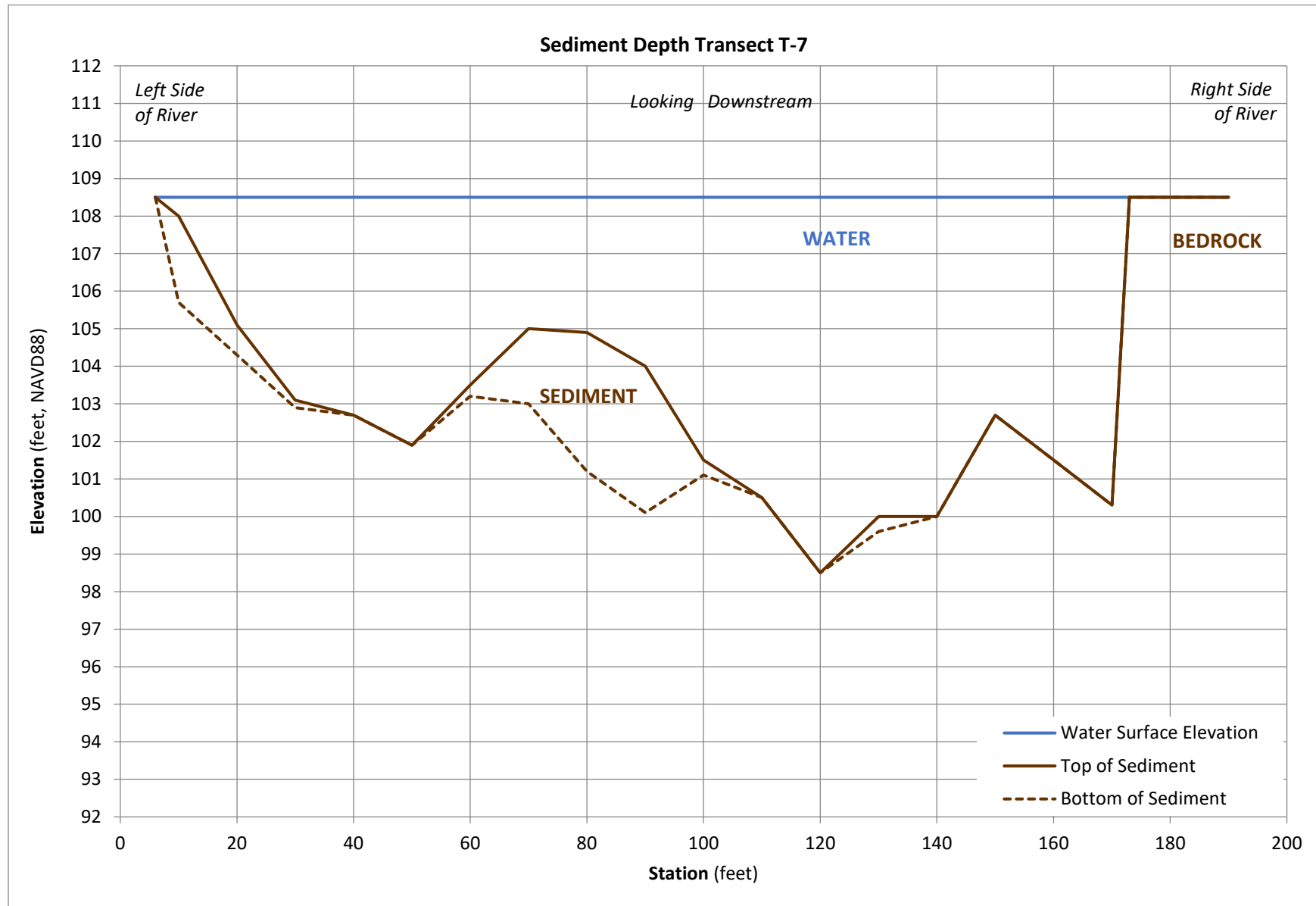


Figure 2.4-12: Talbot Mills Dam Impoundment Sediment Depth Transect T-8 (Fordway Bar)

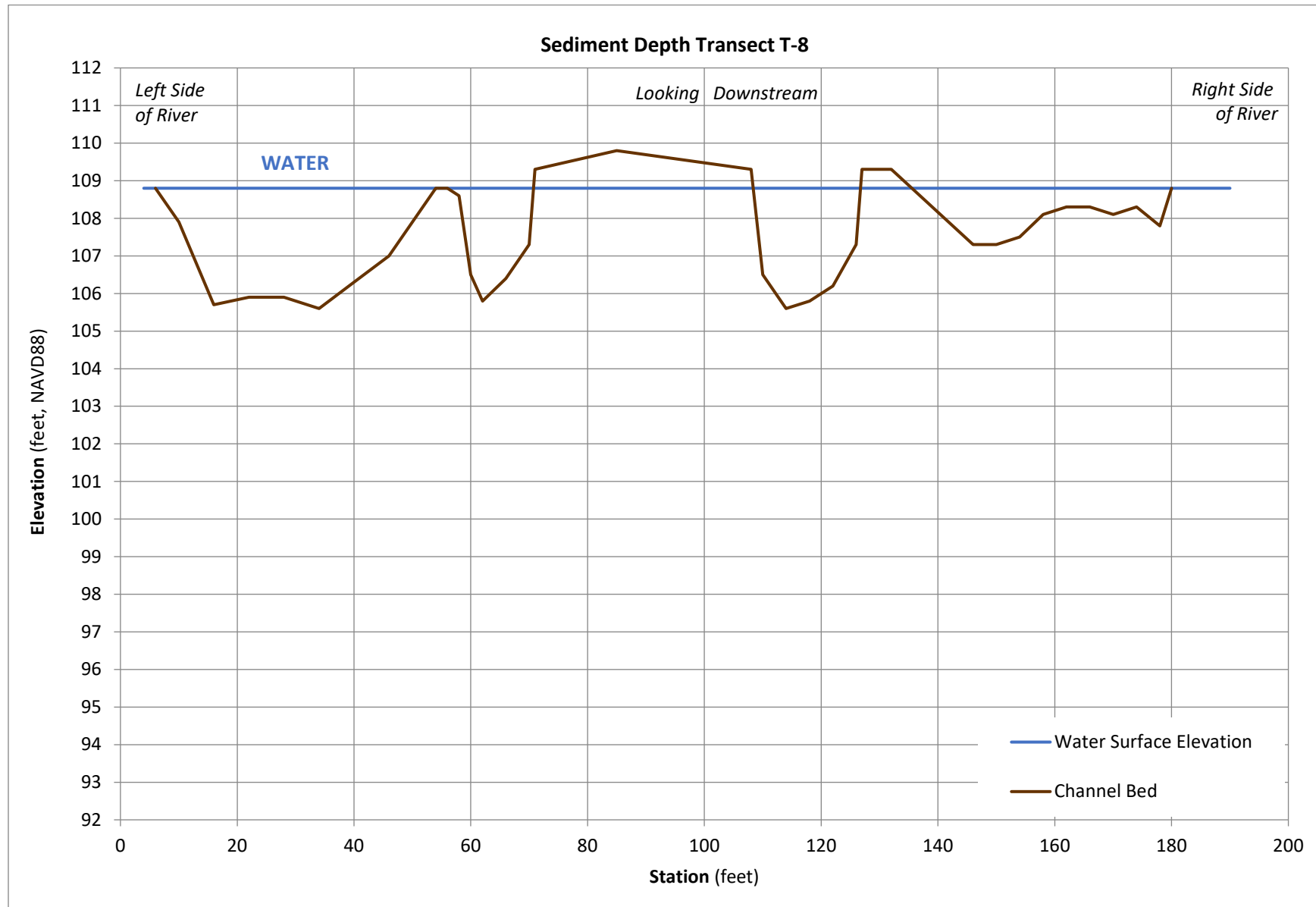


Table 2.4-6: Water Surface Elevation and Depth for Existing vs. Proposed Conditions at Billerica Water Intake

Description	Flow (cfs)	Water Surface Elevation (ft NAVD88)		Water Depth above Water Intake Invert ² (feet)		Difference (ft)
		Existing Conditions	Dam Removal	Existing Conditions	Dam Removal	
Drought (7Q10)	28	108.3	108.0	6.1	5.8	-0.35
Low (95% exceedance probability in Sept.)	33	108.4	108.0	6.2	5.8	-0.32
Median Annual	467	110.2	110.0	8.0	7.8	-0.17
2-Year (50% AEP ¹)	2354	113.9	113.6	11.7	11.4	-0.28
100-Year Flood (1% AEP)	5675	117.4	117.0	15.2	14.8	-0.43
500-Year Flood (0.2% AEP)	8395	119.4	119.2	17.2	17.0	-0.18

¹ AEP = annual exceedance probability

² Water Intake Invert Elevation = 102.2 feet NAVD88

Figure 2.4-13: Selected Water Surface Profiles for Existing Conditions versus Dam Removal Scenario

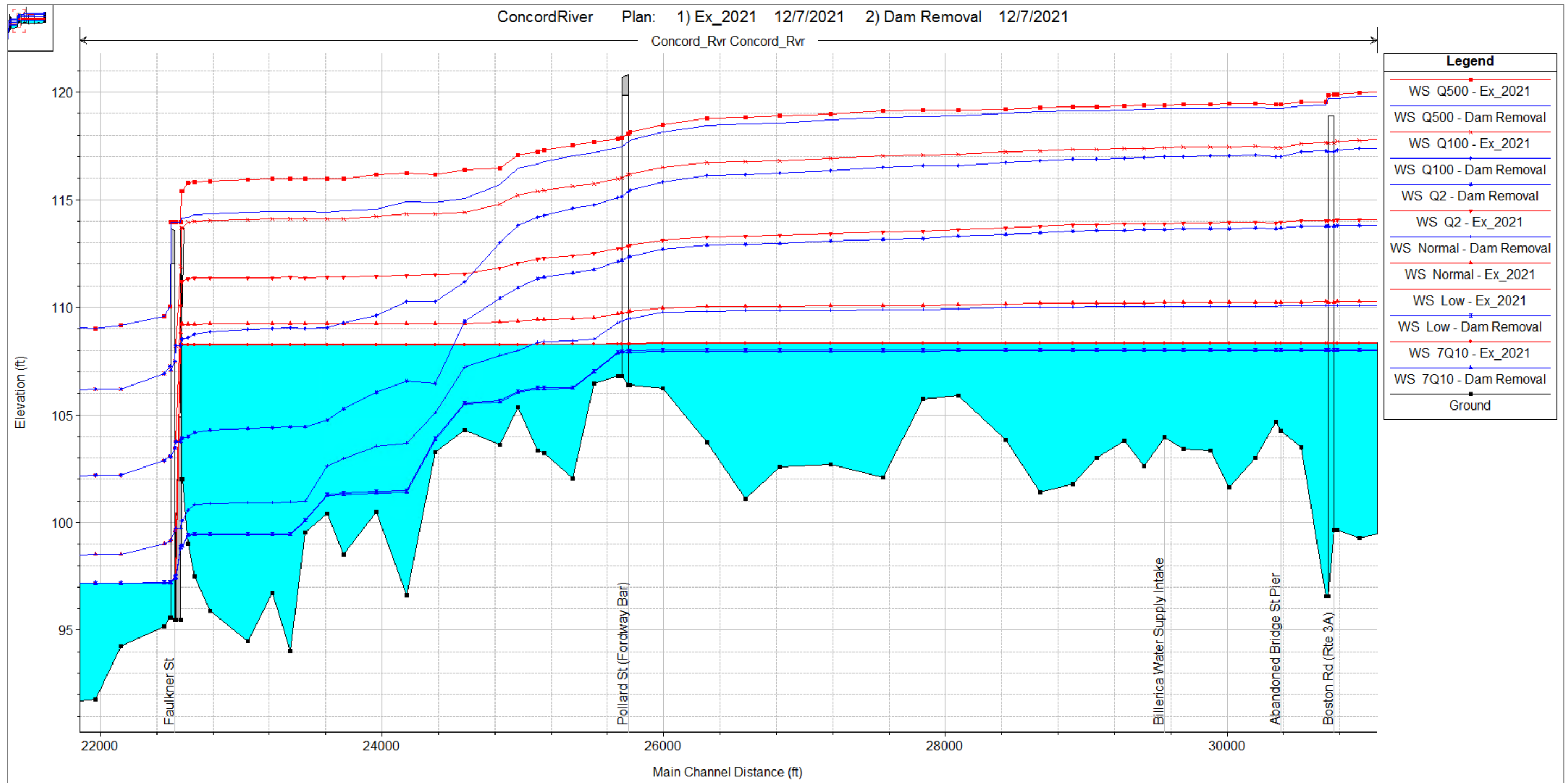


Table 2.4-7: Revised Hydraulic Model Results for Existing Conditions

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)*	Volume (ac-ft)*
Confluence of Sudbury & Assabet R.	85935	Low	32	102.42	108.37	5.95	0.06	136	136	465	2290	359	1806
		U/S Mig L	100	102.42	108.89	6.47	0.17	141	141	496	2493	388	1982
		Normal	444	102.42	110.62	8.20	0.52	162	157	779	3310	664	2691
		U/S Mig H	1540	102.42	113.83	11.41	1.05	1375	160	1866	7007	1604	6020
		2-yr Flood	2239	102.42	115.26	12.84	1.11	1865	160	2241	9663	1926	8353
		100-yr Flood	5399	102.42	119.78	17.36	0.94	2914	160	3099	20755	2610	17810
		500-yr Flood	7987	102.42	122.37	19.95	0.93	3502	160	3451	29024	2865	24517
U/S Lowell Rd	85496	Low	32	103.70	108.37	4.67	0.10	104	104	463	2285	358	1801
		U/S Mig L	100	103.70	108.89	5.19	0.28	112	112	495	2488	387	1977
		Normal	444	103.70	110.60	6.90	0.78	132	128	778	3303	662	2684
		U/S Mig H	1540	103.70	113.77	10.07	1.54	799	130	1856	6985	1594	5998
		2-yr Flood	2239	103.70	115.19	11.48	1.84	1067	130	2227	9624	1913	8314
		100-yr Flood	5399	103.70	119.73	16.03	1.85	2389	130	3075	20632	2586	17688
		500-yr Flood	7987	103.70	122.33	18.63	1.74	2803	130	3423	28833	2837	24326
D/S Lowell Rd; U/S Minute Man National Park	85225	Low	32	102.71	108.37	5.66	0.06	128	128	463	2283	357	1799
		U/S Mig L	100	102.71	108.88	6.17	0.18	134	134	495	2485	386	1974
		Normal	444	102.71	110.58	7.87	0.55	171	151	777	3299	662	2680
		U/S Mig H	1540	102.71	113.72	11.01	1.18	854	152	1854	6977	1591	5990
		2-yr Flood	2239	102.71	115.11	12.40	1.47	1348	152	2224	9612	1910	8302
		100-yr Flood	5399	102.71	119.49	16.78	1.37	1838	152	3069	20600	2580	17656
		500-yr Flood	7987	102.71	122.27	19.56	1.43	2183	152	3416	28785	2831	24278
U/S Pedestrian Bridge	83593	Low	32	102.89	108.37	5.48	0.10	121	120	458	2268	352	1784
		U/S Mig L	100	102.89	108.87	5.98	0.26	132	124	489	2467	381	1956
		Normal	444	102.89	110.52	7.63	0.74	183	131	771	3272	655	2653
		U/S Mig H	1540	102.89	113.60	10.71	1.40	527	131	1819	6897	1557	5910
		2-yr Flood	2239	102.89	114.98	12.09	1.59	920	131	2183	9478	1868	8168
		100-yr Flood	5399	102.89	119.42	16.53	1.58	1056	131	3022	20272	2533	17328
		500-yr Flood	7987	102.89	122.21	19.32	1.65	1144	131	3363	28317	2777	23810
D/S Pedestrian Bridge	83534	Low	32	102.62	108.37	5.75	0.09	116	116	458	2267	352	1783
		U/S Mig L	100	102.62	108.87	6.25	0.23	124	118	489	2467	381	1956
		Normal	444	102.62	110.51	7.89	0.69	148	127	771	3271	655	2652
		U/S Mig H	1540	102.62	113.56	10.94	1.43	285	139	1819	6895	1557	5908
		2-yr Flood	2239	102.62	114.92	12.30	1.69	618	139	2182	9476	1868	8166
		100-yr Flood	5399	102.62	119.39	16.77	1.99	895	139	3022	20268	2533	17324
		500-yr Flood	7987	102.62	122.18	19.56	2.09	1081	139	3361	28307	2775	23800
U/S Monument St; D/S Minute Man National Park	82381	Low	32	101.58	108.37	6.79	0.07	107	107	454	2253	349	1769
		U/S Mig L	100	101.58	108.87	7.29	0.21	112	112	485	2451	377	1940
		Normal	444	101.58	110.49	8.91	0.65	185	130	766	3248	651	2629
		U/S Mig H	1540	101.58	113.48	11.90	1.39	435	136	1811	6854	1549	5867
		2-yr Flood	2239	101.58	114.83	13.25	1.71	468	136	2171	9420	1856	8111
		100-yr Flood	5399	101.58	119.21	17.63	2.71	515	136	3006	20150	2517	17206
		500-yr Flood	7987	101.58	122.09	20.51	2.27	611	136	3343	28141	2757	23634
D/S Monument St	82261	Low	32	102.34	108.37	6.03	0.05	130	130	454	2252	348	1768
		U/S Mig L	100	102.34	108.87	6.53	0.15	134	134	485	2449	377	1938
		Normal	444	102.34	110.48	8.14	0.50	155	146	766	3246	650	2627
		U/S Mig H	1540	102.34	113.46	11.12	1.16	285	149	1810	6850	1548	5863
		2-yr Flood	2239	102.34	114.80	12.46	1.45	306	149	2170	9416	1856	8106
		100-yr Flood	5399	102.34	118.97	16.63	2.42	444	149	3005	20143	2516	17199
		500-yr Flood	7987	102.34	121.45	19.11	2.64	578	149	3342	28132	2757	23625
U/S Great Meadows NWR	80321	Low	32	101.29	108.37	7.08	0.05	140	140	448	2225	342	1741
		U/S Mig L	100	101.29	108.86	7.57	0.14	145	145	479	2419	371	1908
		Normal	444	101.29	110.45	9.16	0.45	160	159	759	3205	643	2586
		U/S Mig H	1540	101.29	113.39	12.10	0.94	851	160	1783	6760	1521	5774
		2-yr Flood	2239	101.29	114.74	13.45	0.98	1190	160	2137	9285	1823	7975
		100-yr Flood	5399	101.29	118.94	17.65	0.94	1393	160	2966	19860	2476	16916
		500-yr Flood	7987	101.29	121.43	20.14	0.97	1425	160	3299	27746	2713	23238
West Concord Impoundment	77896	Low	32	100.65	108.37	7.72	0.04	194	162	438	2181	333	1697
		U/S Mig L	100	100.65	108.86	8.21	0.10	511	167	461	2369	353	1858
		Normal	444	100.65	110.44	9.79	0.26	1149	178	723	3112	608	2492
		U/S Mig H	1540	100.65	113.38	12.73	0.33	2364	178	1696	6500	1434	5513
		2-yr Flood	2239	100.65	114.73	14.08	0.33	2815	178	2028	8889	1714	7579
		100-yr Flood	5399	100.65	118.93	18.28	0.36	3118	178	2843	18968	2354	16024

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)*	Volume (ac-ft)*
		500-yr Flood	7987	100.65	121.42	20.77	0.39	3168	178	3175	26547	2589	22040
East Concord Impoundment	74744	Low	32	100.85	108.37	7.52	0.08	84	84	429	2135	323	1651
		U/S Mig L	100	100.85	108.86	8.01	0.23	87	87	442	2316	334	1805
		Normal	444	100.85	110.41	9.56	0.55	1305	95	656	2994	540	2375
		U/S Mig H	1540	100.85	113.37	12.52	0.37	3148	95	1548	6057	1286	5070
		2-yr Flood	2239	100.85	114.72	13.87	0.33	3529	95	1858	8227	1543	6917
		100-yr Flood	5399	100.85	118.93	18.08	0.33	4088	95	2650	17523	2161	14579
		500-yr Flood	7987	100.85	121.42	20.57	0.36	4176	95	2977	24614	2391	20107
East Concord Impoundment (at dike)	72510	Low	32	100.85	108.37	7.52	0.04	188	188	422	2103	316	1619
		U/S Mig L	100	100.85	108.85	8.00	0.11	195	195	435	2280	327	1769
		Normal	444	100.85	110.39	9.54	0.35	437	205	620	2931	505	2312
		U/S Mig H	1540	100.85	113.35	12.50	0.63	1229	205	1461	5790	1199	4804
		2-yr Flood	2239	100.85	114.70	13.85	0.70	1267	205	1763	7837	1449	6527
		100-yr Flood	5399	100.85	118.91	18.06	0.93	1356	205	2543	16702	2053	13758
		500-yr Flood	7987	100.85	121.40	20.55	1.07	1410	205	2867	23522	2282	19015
U/S Bedford Rd/Carlisle Rd (Rte 225)	60443	Low	32	98.17	108.37	10.20	0.01	301	299	321	1619	215	1135
		U/S Mig L	103	98.17	108.85	10.68	0.04	307	304	330	1747	222	1236
		Normal	455	98.17	110.36	12.19	0.16	754	315	402	2197	287	1578
		U/S Mig H	1575	98.17	113.28	15.11	0.43	1579	316	938	3917	676	2930
		2-yr Flood	2290	98.17	114.62	16.45	0.55	2544	316	1144	5199	830	3890
		100-yr Flood	5522	98.17	118.79	20.62	1.00	5170	316	1698	10916	1209	7972
		500-yr Flood	8168	98.17	121.30	23.13	0.70	5917	316	1965	15562	1379	11055
D/S Bedford Rd/Carlisle Rd (Rte 225)	60144	Low	32	99.81	108.37	8.56	0.02	258	258	319	1609	214	1125
		U/S Mig L	103	99.81	108.85	9.04	0.06	271	271	329	1736	221	1225
		Normal	455	99.81	110.36	10.55	0.21	977	283	399	2183	283	1564
		U/S Mig H	1575	99.81	113.27	13.46	0.52	2146	283	932	3888	669	2901
		2-yr Flood	2290	99.81	114.60	14.79	0.66	2538	283	1136	5160	821	3851
		100-yr Flood	5522	99.81	118.74	18.93	1.13	5369	283	1681	10826	1192	7882
		500-yr Flood	8168	99.81	121.24	21.43	0.69	5778	283	1931	15393	1345	10886
U/S Nashua Rd (Rte 4); D/S Great Meadows NWR	49630	Low	33	99.19	108.37	9.18	0.02	332	244	234	1116	129	632
		U/S Mig L	105	99.19	108.85	9.66	0.06	350	248	241	1202	133	691
		Normal	467	99.19	110.34	11.15	0.23	385	255	260	1497	144	878
		U/S Mig H	1619	99.19	113.22	14.03	0.57	446	258	519	2359	256	1372
		2-yr Flood	2354	99.19	114.54	15.35	0.74	494	258	638	3027	323	1718
		100-yr Flood	5675	99.19	118.63	19.44	1.31	796	258	971	6177	482	3233
		500-yr Flood	8395	99.19	121.12	21.93	1.60	1018	258	1136	8854	550	4347
D/S Nashua Rd (Rte 4)	49390	Low	33	100.04	108.37	8.33	0.02	281	244	233	1109	127	625
		U/S Mig L	105	100.04	108.85	8.81	0.07	289	248	240	1194	131	683
		Normal	467	100.04	110.34	10.30	0.24	314	258	259	1488	143	868
		U/S Mig H	1619	100.04	113.20	13.16	0.60	377	262	517	2346	255	1359
		2-yr Flood	2354	100.04	114.52	14.47	0.77	641	262	636	3012	321	1703
		100-yr Flood	5675	100.04	118.57	18.53	1.35	1268	262	968	6153	479	3209
		500-yr Flood	8395	100.04	120.90	20.86	1.52	1342	262	1133	8823	547	4316
U/S Route 3	43510	Low	33	101.64	108.37	6.73	0.06	158	158	199	932	93	448
		U/S Mig L	105	101.64	108.85	7.21	0.16	163	163	205	1001	96	490
		Normal	467	101.64	110.31	8.67	0.50	181	181	220	1240	105	621
		U/S Mig H	1619	101.64	113.10	11.46	1.11	202	202	449	1946	187	959
		2-yr Flood	2354	101.64	114.38	12.74	1.36	215	207	560	2519	245	1209
		100-yr Flood	5675	101.64	118.31	16.67	2.21	564	212	872	5303	383	2359
		500-yr Flood	8395	101.64	120.56	18.92	2.76	765	212	1030	7743	445	3236
D/S Route 3	43243	Low	33	101.77	108.37	6.60	0.06	151	151	198	929	92	445
		U/S Mig L	105	101.77	108.84	7.07	0.16	159	159	204	997	95	486
		Normal	467	101.77	110.31	8.54	0.52	176	176	219	1234	104	615
		U/S Mig H	1619	101.77	113.08	11.31	1.14	199	189	448	1938	186	951
		2-yr Flood	2354	101.77	114.35	12.58	1.42	321	189	559	2509	244	1199
		100-yr Flood	5675	101.77	118.23	16.46	2.35	741	189	871	5288	381	2344
		500-yr Flood	8395	101.77	120.44	18.67	2.93	823	189	1029	7725	443	3218
U/S Abandoned Bridge	41859	Low	33	99.88	108.37	8.49	0.03	209	209	191	895	86	411
		U/S Mig L	105	99.88	108.84	8.96	0.07	213	213	197	959	88	448
		Normal	467	99.88	110.30	10.42	0.27	227	224	211	1186	95	567
		U/S Mig H	1619	99.88	113.06	13.18	0.68	325	224	436	1861	173	874
		2-yr Flood	2354	99.88	114.32	14.44	0.88	506	224	541	2413	227	1103
		100-yr Flood	5675	99.88	118.19	18.31	1.44	1188	224	842	5101	353	2157

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)*	Volume (ac-ft)*
		500-yr Flood	8395	99.88	120.41	20.53	1.67	1250	224	999	7473	413	2966
D/S Abandoned Bridge	41771	Low	33	99.82	108.36	8.54	0.02	212	212	191	893	85	409
		U/S Mig L	105	99.82	108.84	9.02	0.07	216	216	196	957	88	446
		Normal	467	99.82	110.29	10.47	0.26	234	224	211	1184	95	565
		U/S Mig H	1619	99.82	113.03	13.21	0.67	410	224	435	1857	173	871
		2-yr Flood	2354	99.82	114.28	14.46	0.87	611	224	540	2409	226	1099
		100-yr Flood	5675	99.82	118.14	18.32	1.43	1129	224	840	5093	351	2149
		500-yr Flood	8395	99.82	120.36	20.54	1.67	1228	224	996	7461	411	2954
U/S River St	39621	Low	33	101.95	108.36	6.41	0.04	239	195	180	844	75	360
		U/S Mig L	105	101.95	108.84	6.89	0.10	251	199	186	903	77	392
		Normal	467	101.95	110.28	8.33	0.35	279	203	199	1114	84	495
		U/S Mig H	1619	101.95	112.96	11.01	0.84	622	203	413	1745	151	758
		2-yr Flood	2354	101.95	114.20	12.25	1.07	1034	203	511	2265	196	955
		100-yr Flood	5675	101.95	118.04	16.09	1.49	1196	203	797	4803	308	1859
		500-yr Flood	8395	101.95	120.26	18.31	1.55	1235	203	946	7067	360	2560
D/S River St	39416	Low	33	102.66	108.36	5.70	0.04	255	220	179	840	74	356
		U/S Mig L	105	102.66	108.84	6.18	0.10	263	220	185	899	77	388
		Normal	467	102.66	110.27	7.61	0.33	282	220	198	1108	83	489
		U/S Mig H	1619	102.66	112.95	10.29	0.77	911	220	411	1736	149	749
		2-yr Flood	2354	102.66	114.17	11.51	0.98	959	220	508	2253	194	943
		100-yr Flood	5675	102.66	117.95	15.29	1.40	1002	220	794	4783	305	1838
		500-yr Flood	8395	102.66	120.19	17.53	1.53	1050	220	944	7041	358	2534
Pinewood Ave Private Gage	37622	Low	33	100.28	108.36	8.08	0.02	265	265	169	786	64	302
		U/S Mig L	105	100.28	108.83	8.55	0.07	270	270	174	840	66	329
		Normal	467	100.28	110.27	9.99	0.23	293	284	187	1033	71	414
		U/S Mig H	1619	100.28	112.92	12.64	0.57	864	285	382	1610	119	623
		2-yr Flood	2354	100.28	114.14	13.86	0.71	1251	285	470	2086	156	776
		100-yr Flood	5675	100.28	117.91	17.63	1.02	1355	285	751	4462	262	1518
		500-yr Flood	8395	100.28	120.14	19.86	1.19	1432	285	898	6621	312	2113
U/S Boston Rd (Rte 3A)	33130	Low	33	99.67	108.36	8.69	0.03	169	169	138	621	33	137
		U/S Mig L	105	99.67	108.83	9.16	0.10	173	172	143	661	34	149
		Normal	467	99.67	110.25	10.58	0.36	193	179	153	807	37	188
		U/S Mig H	1619	99.67	112.86	13.19	0.91	228	190	329	1276	67	289
		2-yr Flood	2354	99.67	114.05	14.38	1.16	239	190	397	1673	82	363
		100-yr Flood	5675	99.67	117.72	18.05	2.05	504	190	648	3722	159	777
		500-yr Flood	8395	99.67	119.89	20.22	2.56	665	190	779	5635	193	1128
D/S Boston Rd (Rte 3A)	33047	Low	33	96.59	108.36	11.77	0.03	176	176	138	619	33	135
		U/S Mig L	105	96.59	108.83	12.24	0.08	180	180	142	659	34	147
		Normal	467	96.59	110.25	13.66	0.31	193	185	153	805	37	186
		U/S Mig H	1619	96.59	112.86	16.27	0.81	245	185	329	1273	67	286
		2-yr Flood	2354	96.59	114.04	17.45	1.05	273	185	396	1670	82	360
		100-yr Flood	5675	96.59	117.65	21.06	1.93	334	185	648	3717	159	773
		500-yr Flood	8395	96.59	119.57	22.98	2.46	730	185	778	5629	192	1122
Abandoned Bridge Pier	32728	Low	33	104.26	108.36	4.10	0.09	118	118	137	614	31	130
		U/S Mig L	105	104.26	108.83	4.57	0.24	119	119	141	652	33	141
		Normal	467	104.26	110.24	5.97	0.78	122	120	151	797	36	178
		U/S Mig H	1619	104.26	112.80	8.53	1.78	185	120	327	1261	65	274
		2-yr Flood	2354	104.26	113.95	9.69	2.24	287	120	394	1655	80	346
		100-yr Flood	5675	104.26	117.43	13.16	3.80	472	120	644	3693	155	749
		500-yr Flood	8395	104.26	119.43	15.17	3.67	694	135	772	5595	186	1088
Billerica Water Supply Intake	31902	Low	33	103.96	108.36	4.40	0.07	193	193	133	602	28	118
		U/S Mig L	105	103.96	108.83	4.87	0.18	199	199	137	639	29	128
		Normal	467	103.96	110.21	6.25	0.54	217	202	147	778	32	159
		U/S Mig H	1619	103.96	112.74	8.78	1.13	555	202	319	1228	56	241
		2-yr Flood	2354	103.96	113.90	9.94	1.34	671	202	383	1611	69	301
		100-yr Flood	5675	103.96	117.42	13.46	1.96	1835	202	624	3593	135	649
		500-yr Flood	8395	103.96	119.41	15.45	1.92	2281	202	747	5451	161	944
U/S Pollard St; Fordway Bar	28107	Low	33	106.39	108.33	1.95	0.31	110	110	120	560	14	76
		U/S Mig L	105	106.39	108.70	2.31	0.70	141	141	123	590	15	79
		Normal	467	106.39	109.80	3.41	1.44	167	161	131	710	15	90
		U/S Mig H	1619	106.39	111.90	5.52	2.40	180	161	287	1108	25	121
		2-yr Flood	2354	106.39	112.90	6.51	2.78	189	161	342	1451	28	141
		100-yr Flood	5675	106.39	116.21	9.83	3.93	211	161	527	3179	38	235

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)*	Volume (ac-ft)*
		500-yr Flood	8395	106.39	118.16	11.77	4.65	235	161	630	4820	45	312
D/S Pollard St	28020	Low	33	106.79	108.32	1.52	0.31	139	139	119	559	14	76
		U/S Mig L	105	106.79	108.65	1.85	0.68	146	146	123	590	14	79
		Normal	467	106.79	109.70	2.90	1.51	149	147	131	709	15	90
		U/S Mig H	1619	106.79	111.75	4.96	2.63	158	147	286	1106	24	119
		2-yr Flood	2354	106.79	112.72	5.93	3.08	165	147	342	1449	27	140
		100-yr Flood	5675	106.79	115.96	9.17	4.43	205	147	527	3176	38	232
		500-yr Flood	8395	106.79	117.85	11.06	5.23	305	147	630	4816	44	309
Grade Control D/S of Fordway Bar	27311	Low	33	105.35	108.30	2.95	0.20	111	111	117	555	12	71
		U/S Mig L	105	105.35	108.55	3.20	0.54	119	119	120	585	12	74
		Normal	467	105.35	109.36	4.01	1.53	159	151	128	702	13	83
		U/S Mig H	1619	105.35	111.16	5.81	2.53	209	184	283	1094	21	107
		2-yr Flood	2354	105.35	112.07	6.72	2.88	222	184	339	1434	24	124
		100-yr Flood	5675	105.35	115.21	9.86	3.89	299	184	522	3148	33	204
		500-yr Flood	8395	105.35	117.08	11.73	4.38	409	184	625	4779	39	272
Floating Towpath Peninsula	25698	Low	33	94.02	108.29	14.28	0.02	359	159	111	524	6	40
		U/S Mig L	105	94.02	108.54	14.52	0.05	363	159	114	553	6	41
		Normal	467	94.02	109.22	15.21	0.20	371	159	122	665	6	45
		U/S Mig H	1619	94.02	110.66	16.64	0.58	583	159	269	1041	7	55
		2-yr Flood	2354	94.02	111.39	17.37	0.77	690	159	322	1370	8	60
		100-yr Flood	5675	94.02	114.11	20.09	1.43	896	159	497	3026	8	82
		500-yr Flood	8395	94.02	115.98	21.96	1.82	966	159	595	4605	9	98
U/S Talbot Mills Dam	25129	Low	33	102.00	108.29	6.29	0.10	170	157	105	484	0	0
		U/S Mig L	105	102.00	108.54	6.54	0.27	175	162	108	511	0	1
		Normal	467	102.00	109.21	7.21	0.95	176	162	116	619	0	1
		U/S Mig H	1619	102.00	110.55	8.55	2.27	182	162	262	987	0	1
		2-yr Flood	2354	102.00	111.23	9.23	2.86	185	162	314	1310	0	1
		100-yr Flood	5675	102.00	113.69	11.69	4.61	205	162	489	2944	0	1
		500-yr Flood	8395	102.00	115.39	13.39	5.52	335	162	586	4507	0	2

Table 2.4-8: Revised Hydraulic Model Results for Dam Removal Scenario

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)	Volume (ac-ft)
Confluence of Sudbury & Assabet R.	85935	Low	32	102.42	108.06	5.64	0.07	132.94	133	447	2125	341	1642
		U/S Mig L	100	102.42	108.71	6.29	0.17	139.23	139	478	2358	370	1849
		Normal	444	102.42	110.49	8.07	0.53	157.76	156	711	3125	595	2516
		U/S Mig H	1540	102.42	113.67	11.25	1.08	1204.03	160	1803	6604	1541	5661
		2-yr Flood	2239	102.42	115.10	12.68	1.15	1839.22	160	2172	9598	1857	8297
		100-yr Flood	5399	102.42	119.49	17.07	1.20	2866.45	160	3040	19655	2551	16911
		500-yr Flood	7987	102.42	122.27	19.85	0.94	3498.65	160	3433	27765	2847	23605
U/S Lowell Rd	85496	Low	32	103.7	108.06	4.36	0.12	98.54	99	445	2121	340	1638
		U/S Mig L	100	103.7	108.71	5.01	0.29	108.91	109	477	2353	369	1844
		Normal	444	103.7	110.46	6.76	0.80	130.74	128	709	3118	594	2509
		U/S Mig H	1540	103.7	113.61	9.91	1.58	792.59	130	1794	6584	1532	5640
		2-yr Flood	2239	103.7	115.02	11.32	1.88	971.39	130	2159	9558	1844	8258
		100-yr Flood	5399	103.7	119.44	15.74	1.95	2301.28	130	3016	19539	2527	16795
		500-yr Flood	7987	103.7	122.23	18.53	1.76	2797.19	130	3404	27579	2819	23420
D/S Lowell Rd; U/S Minute Man National Park	85225	Low	32	102.71	108.06	5.35	0.07	123.49	123	445	2119	339	1636
		U/S Mig L	100	102.71	108.70	5.99	0.19	131.91	132	476	2351	368	1842
		Normal	444	102.71	110.45	7.74	0.56	153.66	150	709	3114	593	2506
		U/S Mig H	1540	102.71	113.56	10.85	1.21	732.38	152	1792	6576	1529	5633
		2-yr Flood	2239	102.71	114.94	12.23	1.49	1318.06	152	2155	9546	1841	8245
		100-yr Flood	5399	102.71	119.18	16.47	1.43	1786.67	152	3011	19510	2522	16765
		500-yr Flood	7987	102.71	122.17	19.46	1.45	2172.37	152	3398	27532	2812	23373
U/S Pedestrian Bridge	83593	Low	32	102.89	108.05	5.16	0.11	113.37	113	440	2105	335	1622
		U/S Mig L	100	102.89	108.69	5.80	0.28	127.63	122	471	2334	363	1825
		Normal	444	102.89	110.38	7.49	0.76	164.60	131	703	3088	587	2480
		U/S Mig H	1540	102.89	113.43	10.54	1.44	474.67	131	1759	6500	1496	5557
		2-yr Flood	2239	102.89	114.80	11.91	1.66	915.59	131	2115	9409	1800	8109
		100-yr Flood	5399	102.89	119.07	16.18	1.66	1044.35	131	2965	19197	2475	16453
		500-yr Flood	7987	102.89	122.11	19.22	1.67	1139.75	131	3344	27076	2759	22916
D/S Pedestrian Bridge	83534	Low	32	102.62	108.05	5.43	0.10	111.59	112	440	2105	335	1621
		U/S Mig L	100	102.62	108.69	6.07	0.24	120.88	117	471	2333	363	1824
		Normal	444	102.62	110.37	7.75	0.72	145.48	126	703	3087	587	2479
		U/S Mig H	1540	102.62	113.39	10.77	1.47	232.54	139	1758	6499	1496	5556
		2-yr Flood	2239	102.62	114.73	12.11	1.74	607.98	139	2114	9407	1800	8107
		100-yr Flood	5399	102.62	119.03	16.41	2.07	839.38	139	2964	19193	2475	16448
		500-yr Flood	7987	102.62	122.07	19.45	2.11	1077.30	139	3343	27066	2757	22906
U/S Monument St; D/S Minute Man National Park	82381	Low	32	101.58	108.05	6.47	0.08	104.20	104	436	2092	331	1608
		U/S Mig L	100	101.58	108.69	7.11	0.21	110.60	111	467	2318	359	1809
		Normal	444	101.58	110.34	8.76	0.67	164.80	129	698	3065	583	2457
		U/S Mig H	1540	101.58	113.31	11.73	1.42	433.22	136	1751	6459	1488	5516
		2-yr Flood	2239	101.58	114.64	13.05	1.75	462.88	136	2103	9351	1788	8050
		100-yr Flood	5399	101.58	118.84	17.26	2.79	511.79	136	2948	19081	2459	16336
		500-yr Flood	7987	101.58	121.98	20.40	2.29	584.90	136	3325	26904	2739	22744
D/S Monument St	82261	Low	32	102.34	108.05	5.71	0.06	127.32	127	436	2090	331	1607
		U/S Mig L	100	102.34	108.69	6.35	0.16	132.79	133	467	2316	359	1808
		Normal	444	102.34	110.34	8.00	0.52	151.47	146	698	3063	582	2455
		U/S Mig H	1540	102.34	113.29	10.95	1.18	283.97	149	1750	6455	1488	5512
		2-yr Flood	2239	102.34	114.60	12.26	1.48	303.61	149	2102	9347	1788	8046
		100-yr Flood	5399	102.34	118.70	16.36	2.47	413.93	149	2948	19074	2459	16330
		500-yr Flood	7987	102.34	121.33	18.99	2.66	573.55	149	3324	26895	2738	22736
U/S Great Meadows NWR	80321	Low	32	101.29	108.05	6.76	0.05	137.25	137	430	2065	325	1582
		U/S Mig L	100	101.29	108.68	7.39	0.14	143.25	143	461	2287	353	1779
		Normal	444	101.29	110.30	9.01	0.47	158.73	158	691	3024	575	2415
		U/S Mig H	1540	101.29	113.21	11.92	0.98	732.43	160	1725	6370	1463	5427
		2-yr Flood	2239	101.29	114.53	13.24	1.04	1172.80	160	2069	9215	1755	7914
		100-yr Flood	5399	101.29	118.66	17.37	0.99	1387.90	160	2909	18802	2420	16057
		500-yr Flood	7987	101.29	121.31	20.02	0.99	1423.84	160	3281	26520	2695	22360
West Concord Impoundment	77896	Low	32	100.65	108.05	7.40	0.04	159.41	159	422	2024	317	1541
		U/S Mig L	100	100.65	108.68	8.03	0.11	393.39	165	446	2240	338	1731
		Normal	444	100.65	110.29	9.64	0.27	1073.18	177	657	2935	542	2327
		U/S Mig H	1540	100.65	113.19	12.54	0.35	2244.39	178	1644	6123	1382	5180
		2-yr Flood	2239	100.65	114.52	13.87	0.35	2792.65	178	1962	8815	1647	7514
		100-yr Flood	5399	100.65	118.65	18.00	0.37	3114.09	178	2787	17944	2298	15200

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)	Volume (ac-ft)
		500-yr Flood	7987	100.65	121.30	20.65	0.39	3166.08	178	3157	25352	2571	21193
East Concord Impoundment	74744	Low	32	100.85	108.05	7.20	0.09	81.69	82	413	1980	308	1497
		U/S Mig L	100	100.85	108.67	7.82	0.24	86.10	86	431	2190	323	1681
		Normal	444	100.85	110.26	9.41	0.61	1154.50	95	596	2829	480	2220
		U/S Mig H	1540	100.85	113.18	12.33	0.40	3072.79	95	1501	5706	1239	4762
		2-yr Flood	2239	100.85	114.51	13.66	0.35	3500.67	95	1793	8148	1478	6848
		100-yr Flood	5399	100.85	118.65	17.80	0.35	4074.12	95	2594	16554	2105	13809
		500-yr Flood	7987	100.85	121.30	20.45	0.36	4172.67	95	2959	23470	2374	19310
East Concord Impoundment (at dike)	72510	Low	32	100.85	108.05	7.20	0.04	182.55	183	406	1950	301	1467
		U/S Mig L	100	100.85	108.67	7.82	0.11	192.50	193	424	2156	316	1647
		Normal	444	100.85	110.23	9.38	0.36	277.75	205	566	2771	451	2163
		U/S Mig H	1540	100.85	113.15	12.30	0.65	1224.10	205	1416	5454	1154	4511
		2-yr Flood	2239	100.85	114.49	13.64	0.73	1263.08	205	1699	7756	1384	6455
		100-yr Flood	5399	100.85	118.63	17.78	0.96	1348.00	205	2487	15762	1998	13018
		500-yr Flood	7987	100.85	121.28	20.43	1.09	1407.69	205	2850	22405	2264	18246
U/S Bedford Rd/Carlisle Rd (Rte 225)	60443	Low	32	98.17	108.05	9.88	0.02	296.73	296	308	1496	203	1013
		U/S Mig L	103	98.17	108.67	10.50	0.05	304.62	302	320	1642	212	1133
		Normal	455	98.17	110.20	12.03	0.17	639.07	314	378	2073	263	1465
		U/S Mig H	1575	98.17	113.08	14.91	0.43	1474.39	316	903	3675	641	2731
		2-yr Flood	2290	98.17	114.40	16.23	0.56	2481.23	316	1100	5105	786	3804
		100-yr Flood	5522	98.17	118.50	20.33	1.01	5122.72	316	1652	10219	1163	7474
		500-yr Flood	8168	98.17	121.18	23.01	0.71	5859.78	316	1952	14679	1366	10519
D/S Bedford Rd/Carlisle Rd (Rte 225)	60144	Low	32	99.81	108.05	8.24	0.02	250.97	251	307	1486	201	1003
		U/S Mig L	103	99.81	108.67	8.86	0.06	265.41	265	319	1631	211	1122
		Normal	455	99.81	110.20	10.39	0.22	880.47	283	375	2060	260	1451
		U/S Mig H	1575	99.81	113.07	13.26	0.53	2061.05	283	897	3647	635	2704
		2-yr Flood	2290	99.81	114.38	14.57	0.67	2444.62	283	1092	5066	778	3765
		100-yr Flood	5522	99.81	118.45	18.64	1.15	5283.60	283	1635	10133	1146	7389
		500-yr Flood	8168	99.81	121.11	21.30	0.70	5753.99	283	1918	14519	1333	10359
U/S Nashua Rd (Rte 4); D/S Great Meadows NWR	49630	Low	33	99.19	108.05	8.86	0.02	322.17	242	223	1018	118	535
		U/S Mig L	105	99.19	108.66	9.47	0.07	342.31	246	232	1113	124	604
		Normal	467	99.19	110.18	10.99	0.23	382.68	255	253	1397	138	788
		U/S Mig H	1619	99.19	113.01	13.82	0.59	428.46	258	497	2193	235	1250
		2-yr Flood	2354	99.19	114.31	15.12	0.75	491.29	258	613	2927	298	1626
		100-yr Flood	5675	99.19	118.33	19.14	1.33	752.00	258	940	5693	451	2948
		500-yr Flood	8395	99.19	120.98	21.79	1.61	999.78	258	1127	8203	541	4043
D/S Nashua Rd (Rte 4)	49390	Low	33	100.04	108.05	8.01	0.02	275.47	242	222	1012	117	528
		U/S Mig L	105	100.04	108.66	8.62	0.07	286.19	246	231	1105	123	597
		Normal	467	100.04	110.18	10.14	0.25	312.07	257	252	1388	136	779
		U/S Mig H	1619	100.04	113.00	12.96	0.61	357.81	262	496	2181	234	1237
		2-yr Flood	2354	100.04	114.29	14.25	0.78	582.72	262	611	2912	297	1611
		100-yr Flood	5675	100.04	118.27	18.23	1.38	1215.87	262	938	5670	448	2925
		500-yr Flood	8395	100.04	120.76	20.72	1.53	1338.29	262	1123	8173	538	4014
U/S Route 3	43510	Low	33	101.64	108.05	6.41	0.06	153.76	154	189	845	83	361
		U/S Mig L	105	101.64	108.66	7.02	0.16	161.11	161	196	918	88	410
		Normal	467	101.64	110.15	8.51	0.52	179.01	179	214	1147	98	538
		U/S Mig H	1619	101.64	112.89	11.25	1.14	200.27	200	429	1794	166	851
		2-yr Flood	2354	101.64	114.14	12.50	1.40	212.00	206	537	2419	222	1118
		100-yr Flood	5675	101.64	117.99	16.35	2.28	541.27	212	842	4849	353	2105
		500-yr Flood	8395	101.64	120.41	18.77	2.78	763.22	212	1021	7124	435	2965
D/S Route 3	43243	Low	33	101.77	108.05	6.28	0.06	145.43	145	188	841	82	358
		U/S Mig L	105	101.77	108.66	6.89	0.17	156.13	156	195	914	87	406
		Normal	467	101.77	110.14	8.37	0.54	174.37	174	213	1141	97	533
		U/S Mig H	1619	101.77	112.86	11.09	1.18	197.60	189	428	1786	165	843
		2-yr Flood	2354	101.77	114.11	12.34	1.46	288.24	189	535	2409	221	1108
		100-yr Flood	5675	101.77	117.91	16.14	2.41	729.68	189	841	4835	352	2090
		500-yr Flood	8395	101.77	120.29	18.52	2.97	814.67	189	1020	7106	434	2947
U/S Abandoned Bridge	41859	Low	33	99.88	108.05	8.17	0.03	206.28	206	181	809	76	326
		U/S Mig L	105	99.88	108.66	8.78	0.08	211.55	212	188	879	80	370
		Normal	467	99.88	110.14	10.26	0.27	224.82	224	205	1095	89	486
		U/S Mig H	1619	99.88	112.84	12.96	0.70	276.15	224	416	1711	154	768
		2-yr Flood	2354	99.88	114.07	14.19	0.90	486.55	224	519	2313	204	1012
		100-yr Flood	5675	99.88	117.86	17.98	1.49	1125.51	224	813	4656	324	1912

Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)	Volume (ac-ft)
		500-yr Flood	8395	99.88	120.25	20.37	1.69	1248.84	224	990	6864	404	2704
D/S Abandoned Bridge	41771	Low	33	99.82	108.04	8.22	0.03	209.61	210	181	808	75	324
		U/S Mig L	105	99.82	108.65	8.83	0.07	214.59	215	188	877	80	368
		Normal	467	99.82	110.13	10.31	0.27	231.68	224	204	1092	89	484
		U/S Mig H	1619	99.82	112.81	12.99	0.68	370.99	224	415	1708	153	765
		2-yr Flood	2354	99.82	114.04	14.22	0.89	570.01	224	518	2309	203	1008
		100-yr Flood	5675	99.82	117.79	17.97	1.48	1102.76	224	811	4649	322	1905
		500-yr Flood	8395	99.82	120.21	20.39	1.70	1225.15	224	987	6853	402	2693
U/S River St	39621	Low	33	101.95	108.04	6.09	0.04	227.00	192	171	762	65	278
		U/S Mig L	105	101.95	108.65	6.70	0.11	246.44	198	177	825	69	316
		Normal	467	101.95	110.11	8.16	0.36	278.21	203	193	1025	77	416
		U/S Mig H	1619	101.95	112.74	10.79	0.86	598.91	203	395	1599	133	656
		2-yr Flood	2354	101.95	113.95	12.00	1.10	969.69	203	490	2165	175	865
		100-yr Flood	5675	101.95	117.67	15.72	1.55	1192.33	203	768	4375	279	1630
		500-yr Flood	8395	101.95	120.10	18.15	1.57	1224.36	203	938	6475	352	2316
D/S River St	39416	Low	33	102.66	108.04	5.38	0.04	248.70	220	170	758	64	274
		U/S Mig L	105	102.66	108.65	5.99	0.10	260.27	220	177	820	68	312
		Normal	467	102.66	110.11	7.45	0.34	280.06	220	192	1019	76	411
		U/S Mig H	1619	102.66	112.72	10.06	0.80	850.75	220	393	1591	131	648
		2-yr Flood	2354	102.66	113.92	11.26	1.01	953.55	220	487	2154	173	853
		100-yr Flood	5675	102.66	117.57	14.91	1.46	997.97	220	766	4355	277	1611
		500-yr Flood	8395	102.66	120.02	17.36	1.55	1048.30	220	935	6450	349	2290
Pinewood Ave Private Gage	37622	Low	33	100.28	108.04	7.76	0.02	261.10	261	159	707	54	224
		U/S Mig L	105	100.28	108.65	8.37	0.07	267.97	268	166	764	58	255
		Normal	467	100.28	110.10	9.82	0.24	289.55	283	181	947	65	338
		U/S Mig H	1619	100.28	112.69	12.41	0.59	824.13	285	364	1471	102	528
		2-yr Flood	2354	100.28	113.88	13.60	0.73	1208.16	285	450	1988	136	688
		100-yr Flood	5675	100.28	117.53	17.25	1.07	1339.86	285	723	4051	234	1306
		500-yr Flood	8395	100.28	119.97	19.69	1.21	1415.99	285	890	6046	304	1887
U/S Boston Rd (Rte 3A)	33130	Low	33	99.67	108.04	8.37	0.04	166.32	166	129	551	24	67
		U/S Mig L	105	99.67	108.65	8.98	0.11	171.48	171	135	590	27	81
		Normal	467	99.67	110.08	10.41	0.37	191.19	179	147	727	32	118
		U/S Mig H	1619	99.67	112.63	12.96	0.93	225.84	190	314	1149	52	205
		2-yr Flood	2354	99.67	113.79	14.12	1.20	236.67	190	379	1579	65	278
		100-yr Flood	5675	99.67	117.32	17.65	2.12	452.92	190	623	3350	134	605
		500-yr Flood	8395	99.67	119.71	20.04	2.60	626.47	190	772	5104	186	945
D/S Boston Rd (Rte 3A)	33047	Low	33	96.59	108.04	11.45	0.03	173.09	173	129	549	24	66
		U/S Mig L	105	96.59	108.65	12.06	0.09	178.26	178	135	588	26	79
		Normal	467	96.59	110.08	13.49	0.31	187.26	184	147	724	31	116
		U/S Mig H	1619	96.59	112.62	16.03	0.83	241.54	185	314	1145	51	202
		2-yr Flood	2354	96.59	113.78	17.19	1.08	269.54	185	379	1576	65	275
		100-yr Flood	5675	96.59	117.25	20.66	1.98	325.46	185	623	3345	134	601
		500-yr Flood	8395	96.59	119.39	22.80	2.55	684.25	185	771	5099	186	940
Abandoned Bridge Pier	32728	Low	33	104.26	108.04	3.78	0.10	117.76	118	128	544	23	60
		U/S Mig L	105	104.26	108.65	4.38	0.26	118.89	119	133	582	25	73
		Normal	467	104.26	110.07	5.80	0.80	121.24	120	146	716	30	108
		U/S Mig H	1619	104.26	112.56	8.29	1.84	166.96	120	312	1134	50	191
		2-yr Flood	2354	104.26	113.68	9.41	2.32	258.54	120	377	1561	63	261
		100-yr Flood	5675	104.26	117.01	12.74	3.95	457.75	120	619	3323	130	578
		500-yr Flood	8395	104.26	119.25	14.99	3.76	686.86	135	765	5067	179	908
Billerica Water Supply Intake	31902	Low	33	103.96	108.04	4.08	0.08	189.13	189	124	533	19	49
		U/S Mig L	105	103.96	108.64	4.68	0.19	196.83	197	130	569	22	60
		Normal	467	103.96	110.04	6.08	0.56	214.81	202	142	698	26	90
		U/S Mig H	1619	103.96	112.50	8.53	1.18	545.04	202	304	1103	42	160
		2-yr Flood	2354	103.96	113.62	9.66	1.40	605.45	202	367	1518	52	217
		100-yr Flood	5675	103.96	116.99	13.02	2.08	1765.26	202	600	3232	111	487
		500-yr Flood	8395	103.96	119.23	15.27	1.97	2251.84	202	741	4933	155	774
U/S Pollard St; Fordway Bar	28107	Low	33	106.39	107.98	1.60	0.47	82.55	83	112	495	6	12
		U/S Mig L	105	106.39	108.45	2.06	0.89	117.65	118	116	523	8	15
		Normal	467	106.39	109.48	3.10	1.72	165.16	161	126	633	10	25
		U/S Mig H	1619	106.39	111.45	5.06	2.71	177.05	161	275	991	13	48
		2-yr Flood	2354	106.39	112.38	5.99	3.12	184.68	161	328	1364	14	63
		100-yr Flood	5675	106.39	115.45	9.07	4.35	208.97	161	509	2864	20	119

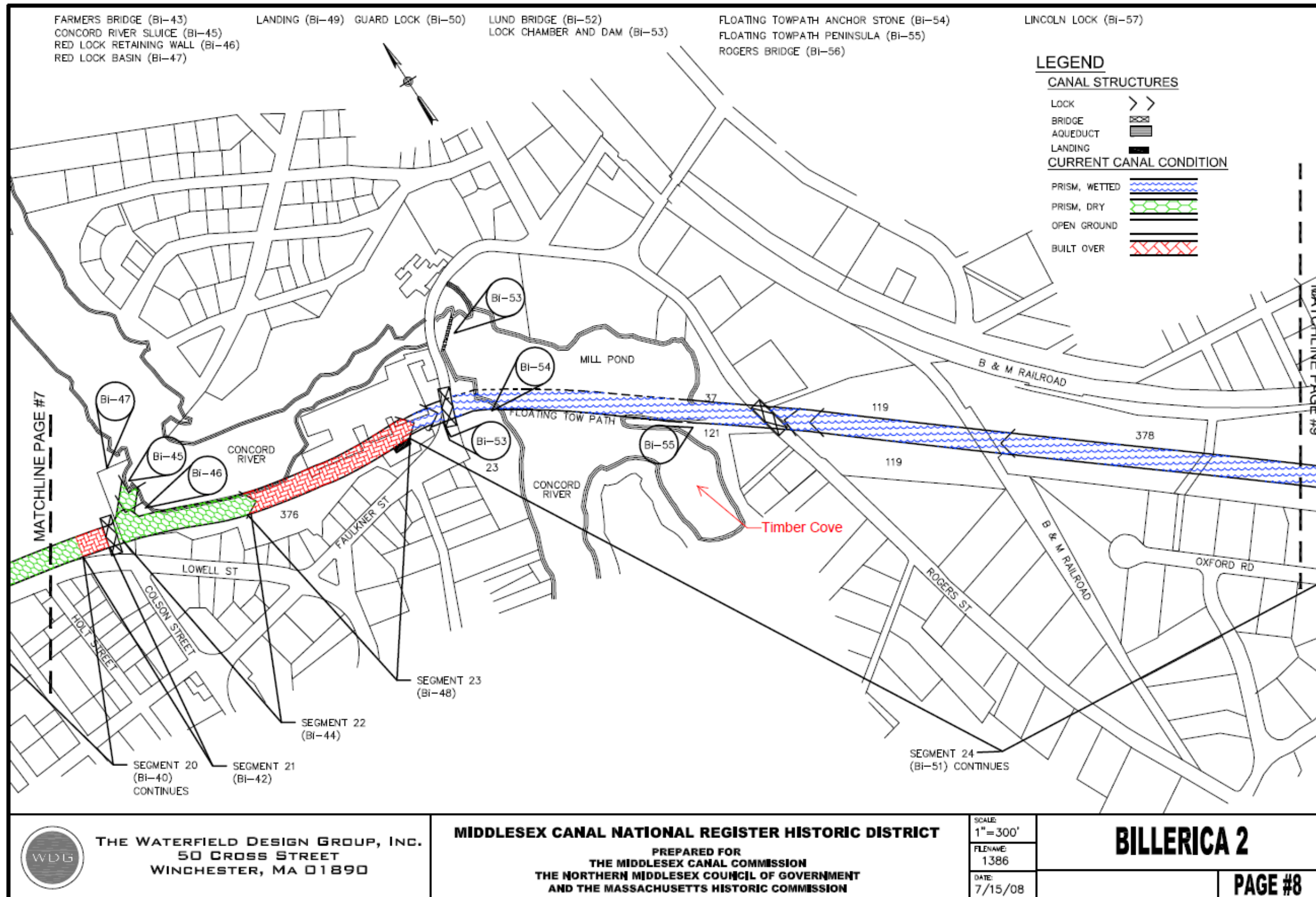
Location	River Sta (ft)	Flow Profile	Total Flow (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Max Ch Depth (ft)	Ch Vel (ft/s)	Total Top Width (ft)	Ch Top Width (ft)	Surface Area (ac)	Volume (ac-ft)	Surface Area (ac)	Volume (ac-ft)
		500-yr Flood	8395	106.39	117.77	11.39	4.84	227.97	161	626	4356	40	197
D/S Pollard St	28020	Low	33	106.79	107.91	1.12	0.62	123.11	123	111	495	6	11
		U/S Mig L	105	106.79	108.34	1.54	0.95	140.31	140	115	523	7	14
		Normal	467	106.79	109.29	2.49	1.87	147.97	147	125	633	10	24
		U/S Mig H	1619	106.79	111.22	4.43	3.02	154.60	147	275	990	12	46
		2-yr Flood	2354	106.79	112.13	5.33	3.50	159.61	147	328	1362	14	62
		100-yr Flood	5675	106.79	115.10	8.31	4.98	194.09	147	509	2862	20	117
		500-yr Flood	8395	106.79	117.42	10.63	5.48	281.03	147	626	4353	40	193
Grade Control D/S of Fordway Bar	27311	Low	33	105.35	106.07	0.72	3.07	37.12	37	110	493	5	10
		U/S Mig L	105	105.35	106.41	1.06	4.06	50.79	51	114	521	6	12
		Normal	467	105.35	107.99	2.64	3.46	90.10	90	123	628	8	19
		U/S Mig H	1619	105.35	110.05	4.70	3.87	197.26	171	272	979	10	36
		2-yr Flood	2354	105.35	110.93	5.58	4.06	206.33	171	325	1349	11	48
		100-yr Flood	5675	105.35	113.81	8.46	5.01	283.47	171	505	2838	16	93
		500-yr Flood	8395	105.35	116.48	11.13	4.80	364.45	171	621	4321	35	161
Floating Towpath Peninsula	25698	Low	33	94.02	99.46	5.44	0.08	125.08	125	108	490	2	6
		U/S Mig L	105	94.02	99.85	5.84	0.24	129.40	129	111	516	3	7
		Normal	467	94.02	100.93	6.92	0.79	146.20	146	119	619	3	10
		U/S Mig H	1619	94.02	103.24	9.22	1.68	236.79	146	266	962	4	19
		2-yr Flood	2354	94.02	104.46	10.44	1.96	288.88	146	319	1326	5	25
		100-yr Flood	5675	94.02	109.03	15.02	2.45	369.21	146	495	2793	6	48
		500-yr Flood	8395	94.02	114.46	20.45	2.09	904.59	146	594	4230	9	71
U/S Talbot Mills Dam	25129	Low	33	98.67	98.93	0.26	1.70	77.88	78	105	484		
		U/S Mig L	105	98.67	99.22	0.55	2.42	86.63	87	108	509		
		Normal	467	98.67	100.08	1.41	3.65	110.15	110	116	609		
		U/S Mig H	1619	98.67	102.66	3.99	3.53	137.96	131	262	943		
		2-yr Flood	2354	98.67	103.90	5.23	3.75	143.09	131	314	1301		
		100-yr Flood	5675	98.67	108.52	9.85	4.36	174.55	131	489	2744		
		500-yr Flood	8395	98.67	114.15	15.48	3.84	246.80	131	586	4160		

Figure 2.6-1: Iron Horse Park Location Overview Map



Imagery Source: Google Earth (2018)

Figure 2.6-2: Schematic Map of Segment 24 of Middlesex Canal (West)



THE WATERFIELD DESIGN GROUP, INC.
 50 CROSS STREET
 WINCHESTER, MA 01890

MIDDLESEX CANAL NATIONAL REGISTER HISTORIC DISTRICT
 PREPARED FOR
 THE MIDDLESEX CANAL COMMISSION
 THE NORTHERN MIDDLESEX COUNCIL OF GOVERNMENT
 AND THE MASSACHUSETTS HISTORIC COMMISSION

SCALE:
 1"=300'
 FILENAME:
 1386
 DATE:
 7/15/08

BILLERICA 2
PAGE #8

Figure 2.6-3: Schematic Map of Segment 24 of Middlesex Canal (East)

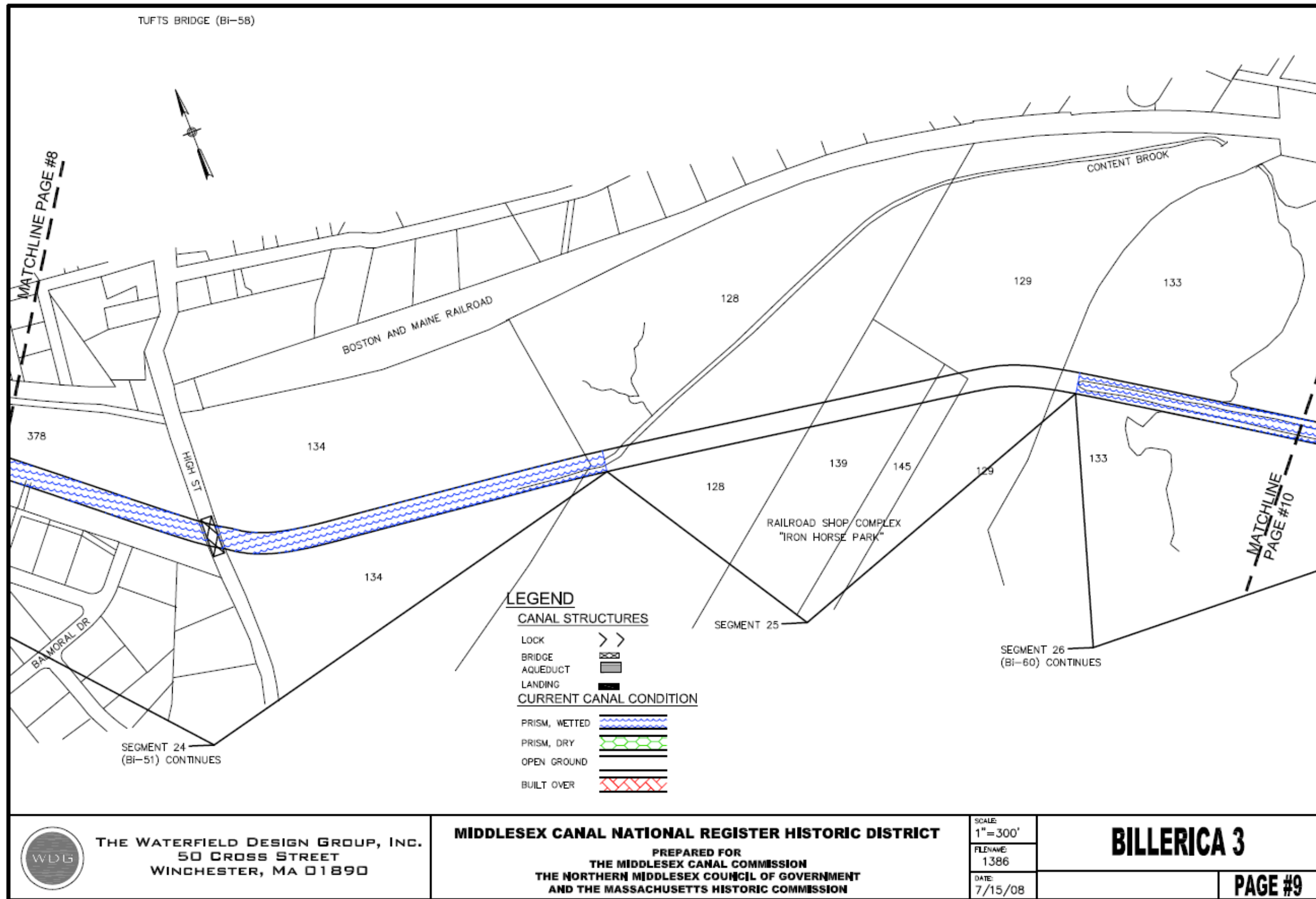


Figure 2.6-4: Extents and Features of Iron Horse Park Superfund Site

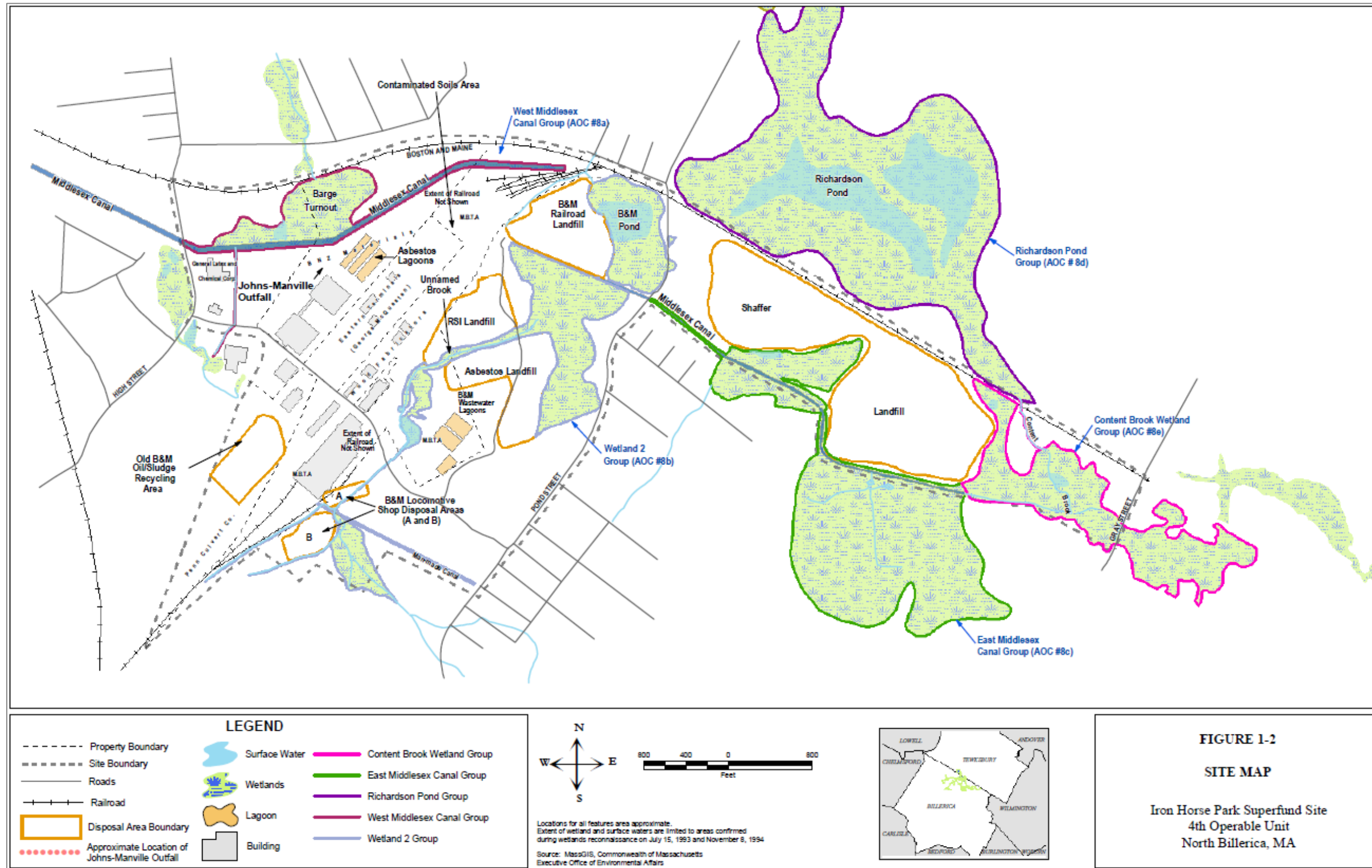


Figure 2.6-5: Elevation Profile of Former Canal Path Prior to Blasting at the “Deep Cut”



Figure 2.6-6: Shallow Overburden Groundwater Elevation Contours at Iron Horse Park

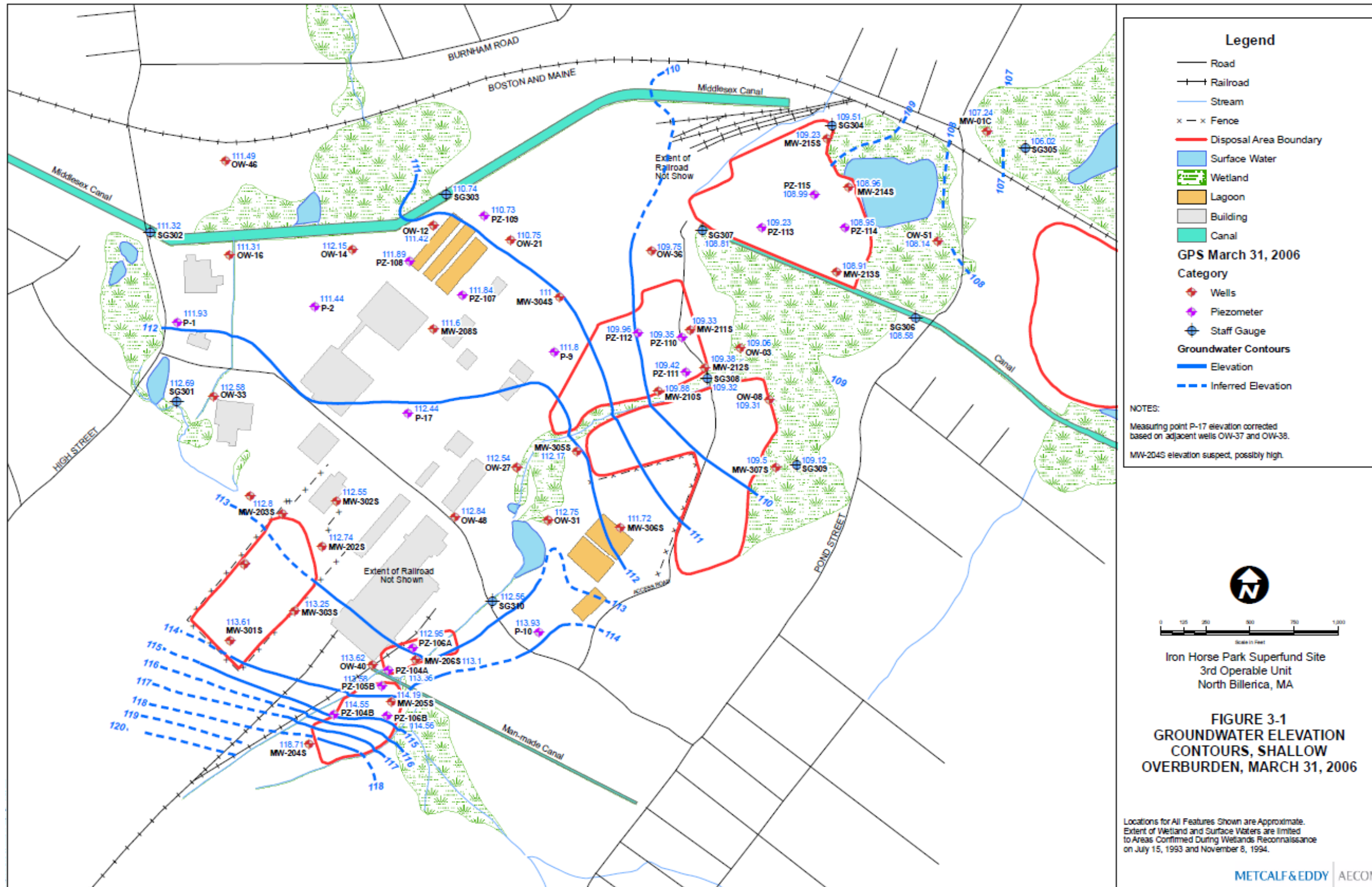


Figure 2.6-7: Bedrock Groundwater Elevation Contours at Iron Horse Park

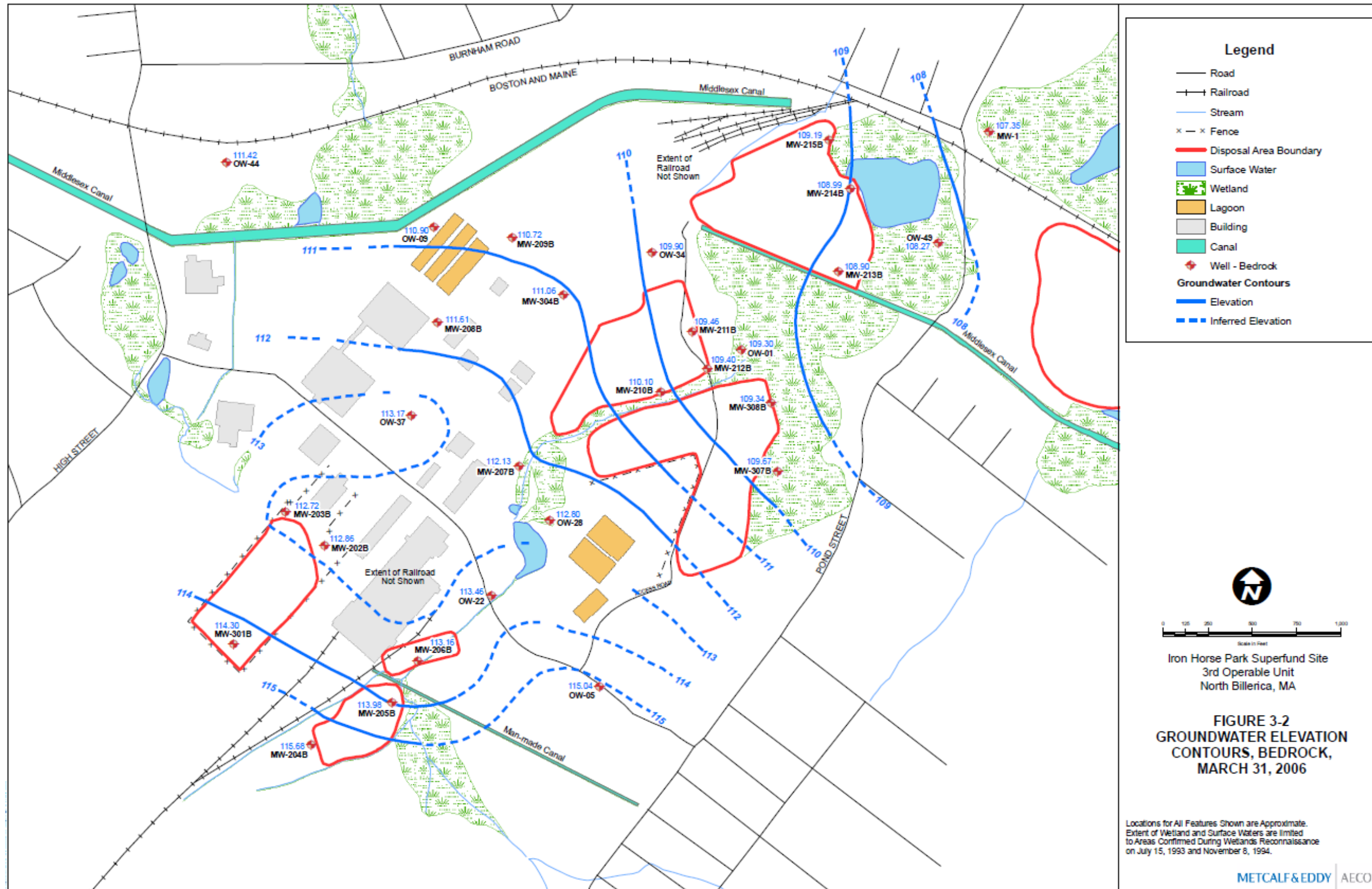


Figure 2.6-8: Stormwater Drainage Patterns and Controls at Iron Horse Park

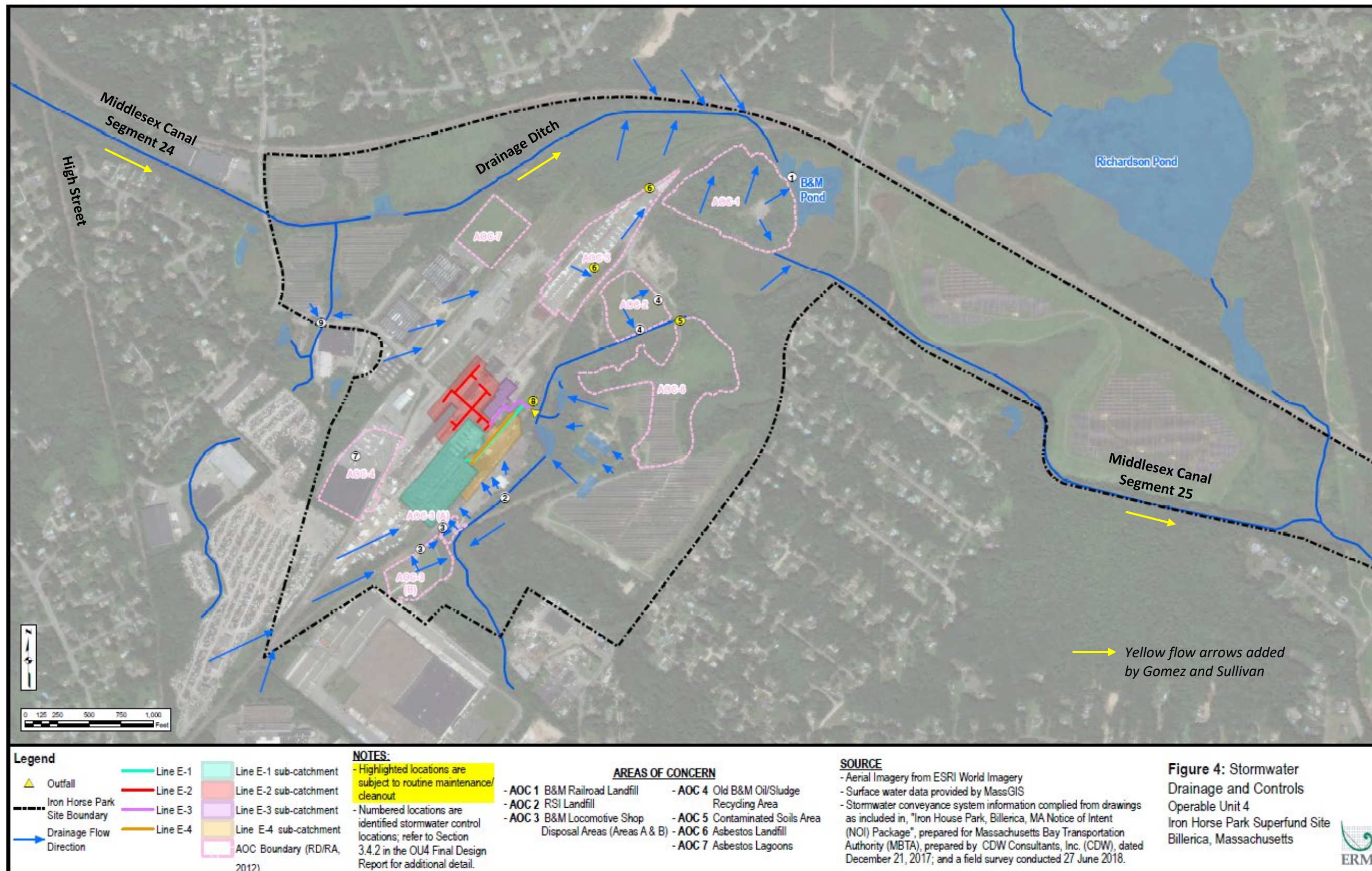


Figure 2.6-9: 2021 Installed Groundwater and Surface Water Monitoring Wells at Iron Horse Park

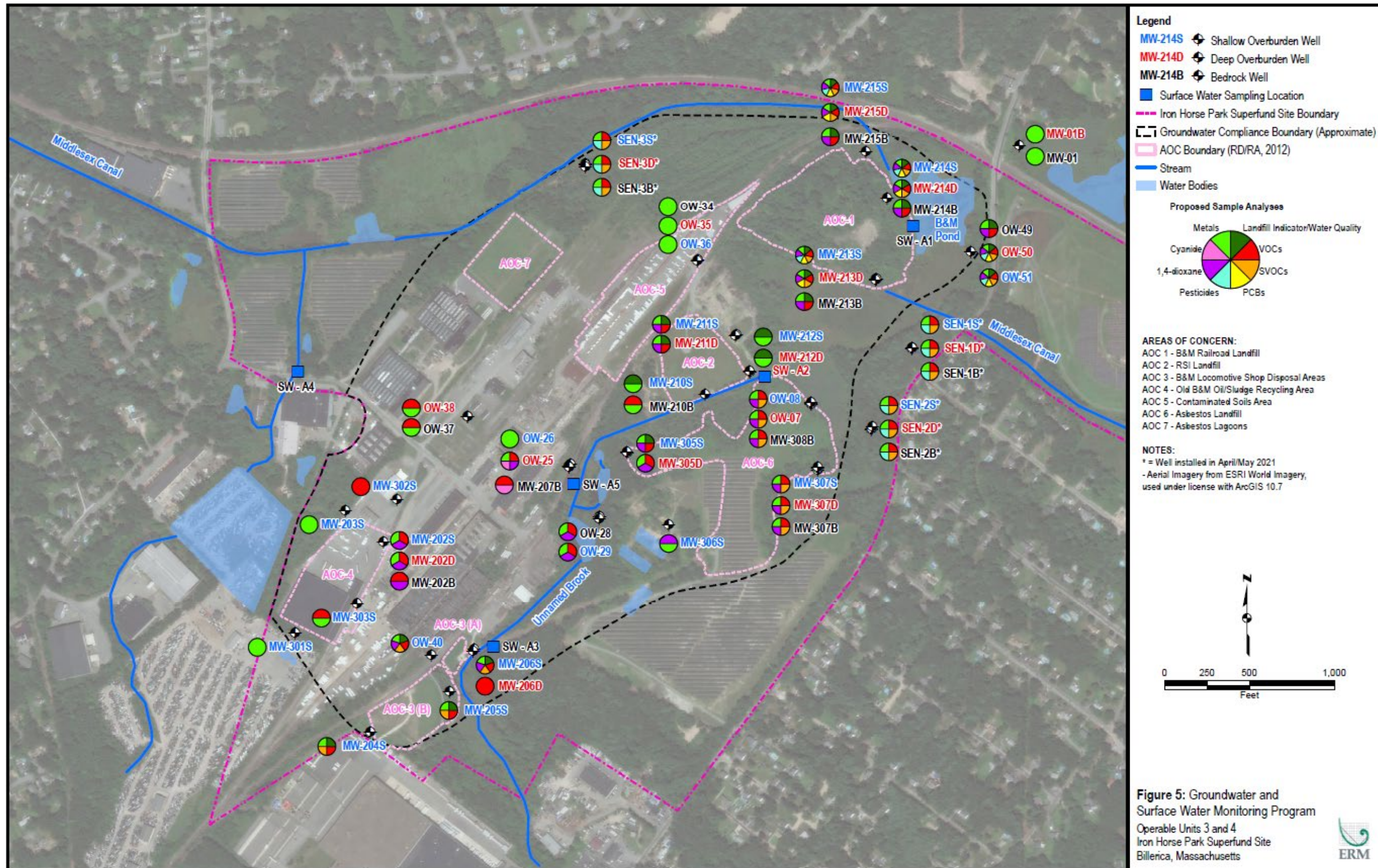


Figure 2.6-10: Extents of Sediment Remediation & Sampling Locations at Iron Horse Park

