

Table B-1D: Pipe Data and Hydraulic Simulation Results for the August 4th, 1988 Historical Event (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak / Design Flow	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL	
																					Length HGL (m)	Dist. From D/S MH (m)
2115	2116	81.670	81.533	2100	72.0	0.2	0.013	88.010	87.930	2.18	7.56	6.73	0.9	-0.126	2.06	83.644	83.556	Fut. Est. (4)	85.91	2.266		
2116	2117	81.383	81.270	2250	75.0	0.2	0.013	87.930	87.860	2.03	8.07	9.43	1.2	-0.077	2.09	83.556	83.415	Fut. Est. (4)	85.83	2.274		
2117	2122	81.120	81.028	2400	84.0	0.1	0.013	87.960	87.730	1.81	8.21	9.41	1.1	-0.105	2.10	83.415	83.305	Fut. Est. (4)	85.76	2.345		
2118	2137	82.797	82.689	750	98.0	0.1	0.013	87.780	88.700	0.84	0.37	0.36	1.0	-0.150	2.10	83.397	83.290	Fut. Est. (4)	85.68	2.283		
2119	2120	80.783	80.736	1650	47.0	0.1	0.013	87.700	87.650	1.35	2.88	3.24	1.1	0.368	2.13	82.801	82.798	Fut. Est. (4)	85.60	2.799		
2120	2121	80.716	80.631	1650	84.5	0.1	0.013	87.650	87.560	1.35	2.88	3.29	1.1	0.432	2.13	82.798	82.795	Fut. Est. (4)	85.55	2.752		
2121	2142	80.571	80.495	1650	76.0	0.1	0.013	87.560	87.330	1.35	2.88	3.44	1.2	0.574	2.14	82.795	82.795	Fut. Est. (4)	85.46	2.665		
2122	2136	80.878	80.794	2550	84.0	0.1	0.013	87.730	87.610	1.80	9.20	9.56	1.0	-0.123	2.10	83.305	83.098	Fut. Est. (4)	85.63	2.325		
2135	2136	81.066	81.031	2700	35.0	0.1	0.013	87.560	87.610	1.87	10.72	8.18	0.8	-0.486	2.10	83.280	83.098	Fut. Est. (4)	85.46	2.180		
2136	2138	80.644	80.508	2700	90.5	0.2	0.013	88.700	88.100	2.29	13.13	17.75	1.4	-0.246	2.10	83.098	82.851	Fut. Est. (4)	85.51	2.412		
2137	2138	82.669	82.522	750	98.0	0.2	0.013	88.700	88.100	0.98	0.43	0.46	1.1	-0.129	2.13	83.290	82.940	Fut. Est. (4)	86.60	3.310		
2138	2139	80.488	80.365	2700	77.0	0.2	0.013	88.100	88.000	2.37	13.56	18.21	1.3	-0.337	2.11	82.851	82.791	Fut. Est. (4)	86.00	3.149		
2139	2140	80.345	80.235	2700	73.5	0.2	0.013	88.000	88.250	2.29	13.13	18.21	1.4	-0.254	2.11	82.791	82.795	Fut. Est. (4)	85.90	3.109		
2140	ForeN	80.205	80.134	2700	47.0	0.2	0.013	88.250	83.500	2.29	13.13	17.27	1.3	-0.110	2.11	82.795	82.792	Fut. Est. (4)	86.15	3.355		
2140	2140w	N/A	N/A	N/A	N/A	N/A	N/A	88.250	88.250	N/A	N/A	0.87	N/A	N/A	2.12	82.795	82.793	Fut. Est. (4)	86.15	3.355		
2141	2142	84.466	83.839	300	95.0	0.7	0.013	88.370	87.330	1.11	0.08	0.06	0.7	-0.100	2.14	84.666	84.021	Fut. Est. (4)	86.27	1.604		
2142	2143	80.465	80.422	1650	43.0	0.1	0.013	87.330	86.880	1.35	2.88	3.48	1.2	0.680	2.14	82.795	82.795	Fut. Est. (4)	85.23	2.435		
2143	2144	80.272	80.220	1800	51.5	0.1	0.013	86.880	86.340	1.43	3.63	2.69	0.7	0.723	1.68	82.795	82.793	Fut. Est. (4)	84.78	1.985		
2143	2143w	N/A	N/A	N/A	N/A	N/A	N/A	86.880	86.880	N/A	N/A	1.04	N/A	N/A	2.14	82.795	82.792	Fut. Est. (4)	84.78	1.985		
2203	2204	82.592	82.502	2100	81.5	0.1	0.013	88.960	88.970	1.66	5.75	6.46	1.1	-0.184	2.08	84.508	84.408	Fut. Est. (4)	86.86	2.352		
2204	2205	82.482	82.360	2100	111.0	0.1	0.013	88.970	88.590	1.66	5.75	6.63	1.2	-0.174	2.08	84.408	84.262	Fut. Est. (4)	86.87	2.462		
2205	2206	82.340	82.259	2100	74.0	0.1	0.013	88.590	88.340	1.66	5.75	6.80	1.2	-0.178	2.09	84.262	84.155	Fut. Est. (4)	86.49	2.228		
2206	2207	82.239	82.157	2100	74.5	0.1	0.013	88.340	88.090	1.66	5.75	7.02	1.2	-0.184	2.09	84.155	84.038	Fut. Est. (4)	86.24	2.085		
2207	2208	82.137	82.023	2100	103.5	0.1	0.013	88.090	87.740	1.66	5.75	7.34	1.3	-0.199	2.09	84.038	83.863	Fut. Est. (4)	85.99	1.952		
2208	2209	82.003	81.994	2100	8.0	0.1	0.013	87.740	87.710	1.66	5.75	7.34	1.3	-0.240	2.09	83.863	83.844	Fut. Est. (4)	85.64	1.777		
2209	2210	81.974	81.842	2100	120.0	0.1	0.013	87.710	87.640	1.66	5.75	7.33	1.3	-0.230	2.10	83.844	83.637	Fut. Est. (4)	85.61	1.766		
2210	2211	81.692	81.573	2250	119.0	0.1	0.013	87.640	87.570	1.66	6.59	7.51	1.1	-0.305	2.12	83.637	83.492	Fut. Est. (4)	85.54	1.903		
2211	2135	81.273	81.236	2550	36.5	0.1	0.013	87.570	87.560	1.80	9.20	8.17	0.9	-0.331	2.10	83.492	83.280	Fut. Est. (4)	85.47	1.978		
2501	2118	83.368	83.172	375	75.5	0.3	0.013	87.890	87.780	0.81	0.09	0.08	0.9	-0.080	2.09	83.663	83.397	Fut. Est. (4)	85.79	2.127		
2143w	MainN	80.250	80.100	975	30.0	0.5	0.013	86.880	83.500	2.12	1.58	1.02	0.6	1.567	2.14	82.792	82.788	Fut. Est. (4)	84.78	1.988		
2140w	MainN	80.300	80.100	975	40.0	0.5	0.013	88.250	83.500	2.12	1.58	0.85	0.5	1.518	2.12	82.793	82.788	Fut. Est. (4)	86.15	3.357		

Note: ⁽¹⁾ A negative surcharge implies that the pipe is not flowing full

⁽²⁾ Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

⁽³⁾ Minimum USF elevation as per June 2010 "Trails Edge Phase 1 SWM Report" by IBI Group.

⁽⁴⁾ Future USF elevation estimated as 2.1 m below upstream top of manhole elevation or 1.8 m in employment lands (MH 2041 to MH 2057 and MH 2057 to MH 2060).

83.963 Interpolated HGL elevation

Table B-1E: Pipe Data and Hydraulic Simulation Results for the August 8th, 1996 Historical Event (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak / Design Flow	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL	
																					Length HGL (m)	Dist. From D/S MH (m)
B28	B30	83.692	82.980	750	142.5	0.5	0.013	88.194	88.193	1.78	0.79	0.32	0.4	-0.394	1.51	84.048	83.548	126	86.09	2.042		
B30	B33	82.230	82.103	1500	63.5	0.2	0.013	88.193	87.886	1.79	3.16	2.68	0.8	-0.182	1.45	83.548	83.474	3	85.87	2.322		
B31	B33	84.349	83.133	450	143.0	0.9	0.013	88.117	87.886	1.65	0.26	0.12	0.4	-0.232	1.47	84.567	83.474	95	85.99	1.423		
B31	B35	84.334	84.234	300	9.5	1.1	0.013	88.117	88.196	1.40	0.10	0.05	0.5	-0.067	1.33	84.567	84.559	104	86.40	1.833		
B33	B34	82.083	81.948	1500	58.5	0.2	0.013	87.886	87.886	1.92	3.39	2.80	0.8	-0.109	1.45	83.474	83.395	7	85.89	2.416		
B34	B38	81.928	81.788	1500	58.5	0.2	0.013	87.886	87.776	1.96	3.46	2.98	0.9	-0.033	1.58	83.395	83.294	59	86.06	2.665		
B35	B10	84.204	84.022	300	52.0	0.4	0.013	88.196	88.197	0.81	0.06	0.05	0.9	0.055	1.61	84.559	84.516	105	86.31	1.751		
B36	B37	83.993	83.592	300	59.0	0.7	0.013	87.997	88.115	1.13	0.08	0.06	0.7	-0.111	1.48	84.182	83.815	344	86.01	1.828		
B37	B38	83.517	82.913	375	80.5	0.8	0.013	88.115	87.776	1.37	0.15	0.13	0.8	-0.077	1.47	83.815	83.294	338	86.00	2.185		
B38	B52	81.638	81.551	1650	54.5	0.2	0.013	87.776	87.772	1.71	3.65	3.14	0.9	0.006	1.58	83.294	83.229	18	85.82	2.526		
B39	B40	84.568	84.136	300	27.0	1.6	0.013	88.469	88.320	1.73	0.12	0.00	0.0	-0.300	0.00	84.568	84.248	160	86.56	1.992		
B40	B41	83.911	83.747	525	54.5	0.3	0.013	88.320	88.394	1.09	0.24	0.17	0.7	-0.188	1.43	84.248	84.118	164	86.37	2.122		
B41	B30	83.717	83.205	525	64.0	0.8	0.013	88.394	88.193	1.78	0.38	0.28	0.7	-0.124	1.44	84.118	83.548	N/A	N/A	N/A		
B42	B43	84.621	84.321	375	45.5	0.7	0.013	88.269	87.998	1.29	0.14	0.08	0.5	-0.173	1.44	84.823	84.517	167	86.11	1.287		
B42	B45	84.501	84.141	375	103.0	0.4	0.013	88.269	88.178	0.94	0.10	0.10	1.0	-0.053	1.44	84.823	84.374	237	86.13	1.307		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.08	0.4	-0.171	1.44	84.495	84.407	168	86.26	1.765		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.08	0.4	-0.171	1.44	84.495	84.407	168	86.26	1.777		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.08	0.4	-0.171	1.44	84.495	84.407	169	86.38	1.929		
B44	B47	84.107	83.716	450	103.0	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	170	86.38	1.961		
B44	B47	84.107	83.716	450	103.0	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	175	85.95	1.543		
E72	B44	84.107	83.716	450	103.2	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	175	85.95	1.775		
E72	B44	84.107	83.716	450	103.2	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	174	86.09	1.862		
E72	B44	84.107	83.716	450	103.2	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	173	86.31	2.036		
E72	B44	84.107	83.716	450	103.2	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	172	86.32	1.996		
E72	B44	84.107	83.716	450	103.2	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	171	86.34	1.970		
E72	B44	84.107	83.716	450	103.2	0.4	0.013	88.123	87.962	1.11	0.18	0.13	0.8	-0.150	1.45	84.407	84.079	171	86.34	1.970		

Table B-1E: Pipe Data and Hydraulic Simulation Results for the August 8th, 1996 Historical Event (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak Design Flow (m³/s)	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL			
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)	
B45	B46	84.081	84.005	375	10.5	0.7	0.013	88.178	87.992	1.35	0.15	0.10	0.7	-0.097	1.44	84.359	84.308	222	86.26	1.901				
B46	B47	83.930	83.716	450	45.5	0.5	0.013	87.992	87.962	1.23	0.20	0.16	0.8	-0.072	1.44	84.308	84.079	220	85.95	1.642				
B47	B54	83.566	83.131	600	111.5	0.4	0.013	87.962	87.818	1.36	0.38	0.37	1.0	-0.087	1.48	84.079	83.582	185	85.85	1.771				
B48	B52	84.016	82.806	375	110.0	1.1	0.013	87.804	87.772	1.66	0.18	0.11	0.6	-0.162	1.45	84.229	83.229	211	85.83	1.601				
B49	B50	83.652	83.619	300	9.5	0.4	0.013	88.057	87.905	0.81	0.06	0.02	0.3	-0.175	1.44	83.777	83.737	309	86.14	2.363				
B50	B52	83.443	82.731	450	142.5	0.5	0.013	87.905	87.772	1.27	0.20	0.14	0.7	-0.156	1.45	83.737	83.229	300	85.81	2.073				
B52	B56	81.531	81.426	1650	58.5	0.2	0.013	87.772	87.712	1.81	3.87	3.33	0.9	0.048	1.57	83.229	83.152	N/A	N/A	N/A				
B54	B55	83.071	83.036	600	10.0	0.4	0.013	87.818	87.903	1.28	0.36	0.37	1.0	-0.089	1.51	83.582	83.510	188	86.02	2.438				
B55	B56	82.953	82.381	675	110.0	0.5	0.013	87.903	87.712	1.69	0.61	0.43	0.7	-0.118	1.50	83.510	83.152	199	85.69	2.180				
B56	B57	81.405	81.267	1650	60.5	0.2	0.013	87.712	87.813	2.04	4.37	3.93	0.9	0.097	1.54	83.152	83.044	N/A	N/A	N/A				
B57	B1	81.117	81.117	1800	10.5	0.2	0.013	87.813	87.811	1.75	4.45	4.21	0.9	0.127	1.52	83.044	83.028	N/A	N/A	N/A				
B58	B57	83.237	82.468	450	61.5	1.3	0.013	87.788	87.813	2.00	0.32	0.16	0.5	-0.194	1.43	83.493	83.044	262	85.71	2.217				
B59	B63	83.060	83.022	375	8.5	0.5	0.013	87.585	87.606	1.06	0.12	0.09	0.8	-0.120	1.58	83.315	83.241	270	85.73	2.415				
B60	B61	80.801	80.755	1800	30.5	0.2	0.013	87.550	87.550	1.75	4.45	4.39	1.0	0.012	1.53	82.613	82.610	N/A	N/A	N/A				
B61	B63	80.755	80.755	1800	73.5	0.2	0.013	87.550	86.340	1.75	4.45	4.39	1.0	0.055	1.54	82.610	82.609	N/A	N/A	N/A				
B63	B60	82.259	82.226	375	5.5	0.6	0.013	87.606	87.550	1.23	0.14	0.09	0.7	-0.018	1.59	82.616	82.613	N/A	N/A	N/A				
B120	B12	88.780	87.352	300	51.0	2.8	0.013	91.862	91.003	2.29	0.16	0.00	0.0	-0.300	0.00	88.780	87.375	N/A	N/A	N/A				
B180	B18	84.774	84.371	300	38.0	1.1	0.013	88.743	88.502	1.41	0.10	0.01	0.1	-0.226	1.43	84.848	84.489	B367N	86.55	1.702				
																		B367N	86.55	1.921				
																						37.9	14.8	84.629
																						61.6	18.4	83.178
																						61.6	30.6	83.267
																						61.6	41.9	83.349
																						61.6	54.3	83.440

Table B-1E: Pipe Data and Hydraulic Simulation Results for the August 8th, 1996 Historical Event (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak / Design Flow	U/S (¹)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)
B180	B41	84.611	83.942	300	76.0	0.9	0.013	88.743	88.394	1.28	0.09	0.08	0.8	-0.063	1.43	84.848	84.154	B364S	86.21	1.362	37.9	28.0	84.754
B410	B42	84.928	84.576	300	51.0	0.7	0.013	88.272	88.269	1.14	0.08	0.04	0.5	-0.143	1.42	85.085	84.823	B367S	86.70	1.946	77.2	18.1	84.317
B590	B59	83.957	83.090	375	102.0	0.9	0.013	87.720	87.585	1.46	0.16	0.09	0.6	-0.174	1.45	84.158	83.315	B362S	86.72	1.966	77.2	31.1	84.434
B2200	B27	83.997	83.902	675	19.0	0.5	0.013	87.660	88.285	1.66	0.59	0.19	0.3	-0.387	1.53	84.285	84.162	B363S	86.22	1.670	77.2	44.0	84.550
C12	C13	84.848	84.650	600	22.0	0.9	0.013	86.490	85.750	2.06	0.58	0.07	0.1	-0.445	1.48	85.003	84.998	B363N	86.72	1.915	77.2	72.4	84.805
C4MH	B2200	85.207	84.463	450	31.0	2.4	0.013	88.250	87.660	2.78	0.44	0.10	0.2	-0.274	1.53	85.383	84.612	B366N	86.28	1.730	77.2	72.4	84.805
C8MH	B5	85.210	84.950	300	26.0	1.0	0.013	88.060	87.803	1.37	0.10	0.07	0.7	-0.063	1.51	85.447	85.140	B366S	86.28	1.730	77.2	44.0	84.550
2144	ForeN	80.160	80.137	1800	22.5	0.1	0.013	86.340	83.500	1.43	3.63	7.45	2.0	0.649	1.58	82.609	82.608	B365N	86.28	1.846	77.2	31.1	84.434
CB1	CB2	86.457	86.410	250	19.5	0.2	0.013	88.880	88.750	0.59	0.03	0.05	1.6	0.581	1.51	87.288	87.170	B365S	86.26	1.943	77.2	18.1	84.317
CB2	CB3	86.410	86.385	250	10.5	0.2	0.013	88.750	88.670	0.59	0.03	0.05	1.6	0.510	1.51	87.170	87.107						
CB3	CB4	86.385	86.360	250	10.5	0.2	0.013	88.670	88.600	0.59	0.03	0.06	1.9	0.472	1.52	87.107	87.016						
CB4	CB5	86.360	86.335	250	10.5	0.2	0.013	88.600	88.530	0.59	0.03	0.06	1.9	0.406	1.53	87.016	86.922						
CB5	CB6	86.335	86.310	250	10.5	0.2	0.013	88.530	88.460	0.59	0.03	0.06	1.9	0.337	1.54	86.922	86.830						
CB6	CB7	86.310	86.285	250	10.5	0.2	0.013	88.460	88.390	0.59	0.03	0.06	2.2	0.270	1.54	86.830	86.711						
CB7	CB8	86.285	86.260	250	10.5	0.2	0.013	88.390	88.320	0.59	0.03	0.06	2.2	0.176	1.54	86.711	86.591						
CB8	C100MH	86.260	86.230	250	12.5	0.2	0.013	88.320	88.250	0.59	0.03	0.06	2.2	0.081	1.54	86.591	86.434						
CB9	CB10	86.187	86.133	250	22.5	0.2	0.013	88.280	88.340	0.59	0.03	-0.03	-0.9	0.099	1.51	86.536	86.575						
CB10	CB10i	86.133	86.086	250	19.6	0.2	0.013	88.340	88.410	0.59	0.03	-0.03	-0.9	0.192	1.50	86.575	86.609						
CB10i	CB11	86.086	86.032	250	22.4	0.2	0.013	88.410	88.200	0.59	0.03	-0.03	-0.9	0.273	1.49	86.609	86.647						
CB11	CB12	86.032	85.976	250	23.5	0.2	0.013	88.200	88.120	0.59	0.03	0.02	0.7	0.365	1.37	86.647	86.652						
CB12	CB13	85.976	85.945	250	13.0	0.2	0.013	88.120	88.080	0.59	0.03	0.02	0.6	0.426	1.37	86.652	86.654						
CB13	CB14	85.945	85.914	250	13.0	0.2	0.013	88.080	88.040	0.59	0.03	0.02	0.5	0.459	1.83	86.654	86.657						
CB14	CB15	85.914	85.883	250	13.0	0.2	0.013	88.040	88.000	0.59	0.03	0.03	0.9	0.493	1.36	86.657	86.653						
CB15	CB16	85.883	85.852	250	13.0	0.2	0.013	88.000	87.960	0.59	0.03	0.02	0.8	0.520	1.36	86.653	86.650						
CB16	CB17	85.852	85.821	250	13.0	0.2	0.013	87.960	87.920	0.59	0.03	0.02	0.8	0.548	1.83	86.650	86.647						
CB17	CB18	85.821	85.790	250	13.0	0.2	0.013	87.920	87.880	0.59	0.03	0.03	1.1	0.576	1.44	86.647	86.621						
CB18	CB19	85.790	85.759	250	13.0	0.2	0.013	87.880	87.840	0.59	0.03	0.03	1.0	0.581	1.44	86.621	86.594						
CB19	CB20	85.759	85.728	250	13.0	0.2	0.013	87.840	87.800	0.59	0.03	0.03	1.0	0.585	1.44	86.594	86.567						
CB20	CB21	85.728	85.697	250	13.0	0.2	0.013	87.800	87.760	0.59	0.03	0.03	1.0	0.589	1.54	86.567	86.541						
CB21	CB22	85.697	85.666	250	13.0	0.2	0.013	87.760	87.720	0.59	0.03	0.05	1.6	0.594	1.45	86.541	86.458						
CB22	CB23	85.666	85.635	250	13.0	0.2	0.013	87.720	87.680	0.59	0.03	0.05	1.6	0.542	1.51	86.458	86.376						
CB23	CB24	85.635	85.586	250	20.5	0.2	0.013	87.680	87.620	0.59	0.03	0.05	1.6	0.491	1.52	86.376	86.247						
CB24	CB25	85.586	85.518	250	28.5	0.2	0.013	87.620	87.540	0.59	0.03	0.05	1.7	0.411	1.52	86.247	86.009						

Table B-1E: Pipe Data and Hydraulic Simulation Results for the August 8th, 1996 Historical Event (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak / Design Flow	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL	
																					Length HGL (m)	Dist. From D/S MH (m)
2115	2116	81.670	81.533	2100	72.0	0.2	0.013	88.010	87.930	2.18	7.56	6.47	0.9	-0.298	1.53	83.472	83.394	Fut. Est. (4)	85.91	2.438		
2116	2117	81.383	81.270	2250	75.0	0.2	0.013	87.930	87.860	2.03	8.07	9.10	1.1	-0.239	1.54	83.394	83.262	Fut. Est. (4)	85.83	2.436		
2117	2122	81.120	81.028	2400	84.0	0.1	0.013	87.960	87.730	1.81	8.21	9.07	1.1	-0.258	1.55	83.262	83.154	Fut. Est. (4)	85.76	2.498		
2118	2137	82.797	82.689	750	98.0	0.1	0.013	87.780	88.700	0.84	0.37	0.35	0.9	-0.163	1.57	83.384	83.278	Fut. Est. (4)	85.68	2.296		
2119	2120	80.783	80.736	1650	47.0	0.1	0.013	87.700	87.650	1.35	2.88	3.34	1.2	0.175	1.59	82.608	82.610	Fut. Est. (4)	85.60	2.992		
2120	2121	80.716	80.631	1650	84.5	0.1	0.013	87.650	87.560	1.35	2.88	3.40	1.2	0.244	1.59	82.610	82.609	Fut. Est. (4)	85.55	2.940		
2121	2142	80.571	80.495	1650	76.0	0.1	0.013	87.560	87.330	1.35	2.88	3.57	1.2	0.388	1.60	82.609	82.607	Fut. Est. (4)	85.46	2.851		
2122	2136	80.878	80.794	2550	84.0	0.1	0.013	87.730	87.610	1.80	9.20	9.27	1.0	-0.274	1.56	83.154	82.932	Fut. Est. (4)	85.63	2.476		
2135	2136	81.066	81.031	2700	35.0	0.1	0.013	87.560	87.610	1.87	10.72	7.02	0.7	-0.672	1.57	83.094	82.932	Fut. Est. (4)	85.46	2.366		
2136	2138	80.644	80.508	2700	90.5	0.2	0.013	88.700	88.100	2.29	13.13	16.19	1.2	-0.412	1.57	82.932	82.700	Fut. Est. (4)	85.51	2.578		
2137	2138	82.669	82.522	750	98.0	0.2	0.013	88.700	88.100	0.98	0.43	0.45	1.0	-0.141	1.59	83.278	82.933	Fut. Est. (4)	86.60	3.322		
2138	2139	80.488	80.365	2700	77.0	0.2	0.013	88.100	88.000	2.37	13.56	16.70	1.2	-0.488	1.58	82.700	82.609	Fut. Est. (4)	86.00	3.300		
2139	2140	80.345	80.235	2700	73.5	0.2	0.013	88.000	88.250	2.29	13.13	16.75	1.3	-0.436	1.58	82.609	82.607	Fut. Est. (4)	85.90	3.291		
2140	ForeN	80.205	80.134	2700	47.0	0.2	0.013	88.250	83.500	2.29	13.13	16.14	1.2	-0.298	1.57	82.607	82.608	Fut. Est. (4)	86.15	3.543		
2140	2140w	N/A	N/A	N/A	N/A	N/A	N/A	88.250	88.250	N/A	N/A	0.64	N/A	N/A	1.57	82.607	82.605	Fut. Est. (4)	86.15	3.543		
2141	2142	84.466	83.839	300	95.0	0.7	0.013	88.370	87.330	1.11	0.08	0.05	0.7	-0.103	1.57	84.663	84.019	Fut. Est. (4)	86.27	1.607		
2142	2143	80.465	80.422	1650	43.0	0.1	0.013	87.330	86.880	1.35	2.88	3.63	1.3	0.492	1.60	82.607	82.606	Fut. Est. (4)	85.23	2.623		
2143	2144	80.272	80.220	1800	51.5	0.1	0.013	86.880	86.340	1.43	3.63	3.17	0.9	0.534	1.61	82.606	82.609	Fut. Est. (4)	84.78	2.174		
2143	2143w	N/A	N/A	N/A	N/A	N/A	N/A	86.880	86.880	N/A	N/A	0.57	N/A	N/A	3.23	82.606	82.603	Fut. Est. (4)	84.78	2.174		
2203	2204	82.592	82.502	2100	81.5	0.1	0.013	88.960	88.970	1.66	5.75	5.72	1.0	-0.438	1.56	84.254	84.153	Fut. Est. (4)	86.86	2.606		
2204	2205	82.482	82.360	2100	111.0	0.1	0.013	88.970	88.590	1.66	5.75	5.85	1.0	-0.429	1.56	84.153	84.008	Fut. Est. (4)	86.87	2.717		
2205	2206	82.340	82.259	2100	74.0	0.1	0.013	88.590	88.340	1.66	5.75	5.97	1.0	-0.432	1.56	84.008	83.905	Fut. Est. (4)	86.49	2.482		
2206	2207	82.239	82.157	2100	74.5	0.1	0.013	88.340	88.090	1.66	5.75	6.09	1.1	-0.434	1.56	83.905	83.797	Fut. Est. (4)	86.24	2.335		
2207	2208	82.137	82.023	2100	103.5	0.1	0.013	88.090	87.740	1.66	5.75	6.29	1.1	-0.440	1.57	83.797	83.635	Fut. Est. (4)	85.99	2.193		
2208	2209	82.003	81.994	2100	8.0	0.1	0.013	87.740	87.710	1.66	5.75	6.33	1.1	-0.468	1.57	83.635	83.616	Fut. Est. (4)	85.64	2.005		
2209	2210	81.974	81.842	2100	120.0	0.1	0.013	87.710	87.640	1.66	5.75	6.35	1.1	-0.458	1.57	83.616	83.416	Fut. Est. (4)	85.61	1.994		
2210	2211	81.692	81.573	2250	119.0	0.1	0.013	87.640	87.570	1.66	6.59	6.46	1.0	-0.526	1.59	83.416	83.283	Fut. Est. (4)	85.54	2.124		
2211	2135	81.273	81.236	2550	36.5	0.1	0.013	87.570	87.560	1.80	9.20	6.97	0.8	-0.540	1.57	83.283	83.094	Fut. Est. (4)	85.47	2.187		
2501	2118	83.368	83.172	375	75.5	0.3	0.013	87.890	87.780	0.81	0.09	0.07	0.8	-0.085	1.54	83.658	83.384	Fut. Est. (4)	85.79	2.132		
2143w	MainN	80.250	80.100	975	30.0	0.5	0.013	86.880	83.500	2.12	1.58	0.56	0.4	1.378	3.23	82.603	82.602	Fut. Est. (4)	84.78	2.177		
2140w	MainN	80.300	80.100	975	40.0	0.5	0.013	88.250	83.500	2.12	1.58	0.61	0.4	1.330	1.56	82.605	82.602	Fut. Est. (4)	86.15	3.545		

Note: (1) A negative surcharge implies that the pipe is not flowing full

(2) Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

(3) Minimum USF elevation as per June 2010 "Trails Edge Phase 1 SWM Report" by IBI Group.

(4) Future USF elevation estimated as 2.1 m below upstream top of manhole elevation or 1.8 m in employment lands (MH 2041 to MH 2057 and MH 2057 to MH 2060).

83.935 Interpolated HGL elevation

Table B-1F: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm + 20% (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m ³ /s)	Peak Pipe Flow (m ³ /s)	Peak Design Flow (m ³ /s)	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL			
																					Length HGL (m)	Dist. From D/S MH (m)	HGL (m)	
		84.081	84.005	375	10.5	0.7	0.013	87.992	87.992	1.35	0.15	0.11	0.7	0.956	0.89	85.412	85.380	251	86.33	0.864	103.2	96.9	85.466	
B46	B47	83.930	83.716	450	45.5	0.5	0.013	87.992	87.962	1.23	0.20	0.17	0.9	1.000	0.90	85.380	85.192	220	85.95	0.570			85.300	
																						45.6	26.2	85.357
B47	B54	83.566	83.131	600	111.5	0.4	0.013	87.962	87.818	1.36	0.38	0.41	1.1	1.026	0.94	85.192	84.677	185	85.85	0.658			85.241	
																						45.6	39.9	85.357
B48	B52	84.016	82.806	375	110.0	1.1	0.013	87.804	87.772	1.66	0.18	0.12	0.6	0.405	1.34	84.796	84.259	211	85.83	1.034			84.736	
B49	B50	83.652	83.619	300	9.5	0.4	0.013	88.057	87.905	0.81	0.06	0.05	0.8	0.914	1.01	84.866	84.841	309	86.14	1.274			84.787	
B50	B52	83.443	82.731	450	142.5	0.5	0.013	87.905	87.772	1.27	0.20	0.18	0.9	0.948	1.01	84.841	84.259	300	85.81	0.969			84.845	
B52	B56	81.531	81.426	1650	58.5	0.2	0.013	87.772	87.712	1.81	3.87	4.42	1.1	1.078	1.12	84.259	84.118	188	N/A	N/A			84.912	
B54	B55	83.071	83.036	600	10.0	0.4	0.013	87.818	87.903	1.28	0.36	0.40	1.1	1.006	1.19	84.677	84.612	199	N/A	N/A			84.963	
B55	B56	82.953	82.381	675	110.0	0.5	0.013	87.903	87.712	1.69	0.61	0.50	0.8	0.984	1.19	84.612	84.118	188	86.02	1.343			84.963	
B56	B57	81.405	81.267	1650	60.5	0.2	0.013	87.712	87.813	2.04	4.37	5.27	1.2	1.063	1.12	84.118	83.911	199	N/A	N/A			84.963	
B57	B1	81.117	81.117	1800	10.5	0.2	0.013	87.813	87.811	1.75	4.45	5.67	1.3	0.994	1.11	83.911	83.880	N/A	N/A	N/A			85.019	
B58	B57	83.237	82.468	450	61.5	1.3	0.013	87.788	87.813	2.00	0.32	0.23	0.7	0.734	1.08	84.421	83.911	262	85.71	1.289			85.073	
																						111.4	97.6	85.128
B59	B63	83.060	83.022	375	8.5	0.5	0.013	87.585	87.606	1.06	0.12	0.10	0.8	-0.105	1.26	83.330	83.252	270	85.73	2.400			84.063	
B60	B61	80.801	80.755	1800	30.5	0.2	0.013	87.550	87.550	1.75	4.45	5.93	1.3	0.521	1.11	83.122	83.099	N/A	N/A	N/A			84.164	
B61	2144	80.755	80.755	1800	73.5	0.2	0.013	87.550	86.340	1.75	4.45	5.93	1.3	0.544	1.12	83.099	83.051	N/A	N/A	N/A			84.258	
B63	B60	82.259	82.226	375	5.5	0.6	0.013	87.606	87.550	1.23	0.14	0.11	0.8	0.506	1.64	83.140	83.122	N/A	N/A	N/A			84.258	
B120	B12	88.780	87.352	300	51.0	2.8	0.013	91.862	91.003	2.29	0.16	0.00	0.0	-0.300	0.00	88.780	87.405	N/A	N/A	N/A			84.361	
B180	B18	84.774	84.371	300	38.0	1.1	0.013	88.743	88.502	1.41	0.10	0.08	0.8	0.815	1.01	85.889	85.703	B367N	86.55	0.661			85.776	
																						37.9	14.8	85.776

Table B-1F: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm + 20% (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m³/s)	Peak Pipe Flow (m³/s)	Peak / Design Flow	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL		
																					Length HGL (m)	Dist. From D/S MH (m)	HGL
B180	B41	84.611	83.942	300	76.0	0.9	0.013	88.743	88.394	1.28	0.09	0.09	1.0	0.978	0.96	85.889	85.317	B364S	86.21	0.321	37.9	28.0	85.840
B410	B42	84.928	84.576	300	51.0	0.7	0.013	88.272	88.269	1.14	0.08	0.09	1.1	0.480	0.93	85.708	85.663	232	86.45	0.742	77.2	18.1	85.451
B590	B59	83.957	83.090	375	102.0	0.9	0.013	87.720	87.585	1.46	0.16	0.10	0.6	-0.161	1.03	84.171	83.330	294	85.46	1.289	77.2	31.1	85.547
B2200	B27	83.997	83.902	675	19.0	0.5	0.013	87.660	88.285	1.66	0.59	0.35	0.6	0.653	1.02	85.325	85.278	122	86.48	1.155	77.2	44.0	85.643
C12	C13	84.848	84.650	600	22.0	0.9	0.013	86.490	85.750	2.06	0.58	0.26	0.4	-0.271	1.14	85.177	85.131	N/A	N/A	N/A	77.2	72.4	85.853
C4MH	B2200	85.207	84.463	450	31.0	2.4	0.013	88.250	87.660	2.78	0.44	0.31	0.7	0.259	1.03	85.916	85.325	N/A	N/A	N/A	77.2	72.4	85.853
C8MH	B5	85.210	84.950	300	26.0	1.0	0.013	88.060	87.803	1.37	0.10	0.11	1.1	0.196	1.03	85.706	85.204	N/A	N/A	N/A	77.2	72.4	85.853
2144	ForeN	80.160	80.137	1800	22.5	0.1	0.013	86.340	83.500	1.43	3.63	9.67	2.7	1.091	1.13	83.051	83.047	N/A	N/A	N/A	77.2	72.4	85.853
CB1	CB2	86.457	86.410	250	19.5	0.2	0.013	88.880	88.750	0.59	0.03	0.07	2.3	1.421	0.91	88.128	87.983	N/A	N/A	N/A	77.2	72.4	85.853
CB2	CB3	86.410	86.385	250	10.5	0.2	0.013	88.750	88.670	0.59	0.03	0.06	2.1	1.323	0.92	87.983	87.884	N/A	N/A	N/A	77.2	72.4	85.853
CB3	CB4	86.385	86.360	250	10.5	0.2	0.013	88.670	88.600	0.59	0.03	0.08	2.9	1.249	0.92	87.884	87.816	N/A	N/A	N/A	77.2	72.4	85.853
CB4	CB5	86.360	86.335	250	10.5	0.2	0.013	88.600	88.530	0.59	0.03	0.08	2.6	1.206	1.50	87.816	87.749	N/A	N/A	N/A	77.2	72.4	85.853
CB5	CB6	86.335	86.310	250	10.5	0.2	0.013	88.530	88.460	0.59	0.03	0.08	2.8	1.164	1.47	87.749	87.687	N/A	N/A	N/A	77.2	72.4	85.853
CB6	CB7	86.310	86.285	250	10.5	0.2	0.013	88.460	88.390	0.59	0.03	0.10	3.6	1.127	0.95	87.687	87.601	N/A	N/A	N/A	77.2	72.4	85.853
CB7	CB8	86.285	86.260	250	10.5	0.2	0.013	88.390	88.320	0.59	0.03	0.12	4.0	1.066	0.97	87.601	87.456	N/A	N/A	N/A	77.2	72.4	85.853
CB8	C100MH	86.260	86.230	250	12.5	0.2	0.013	88.320	88.250	0.59	0.03	0.16	5.5	0.946	1.06	87.456	86.480	N/A	N/A	N/A	77.2	72.4	85.853
CB9	CB10	86.187	86.133	250	22.5	0.2	0.013	88.280	88.340	0.59	0.03	-0.04	-1.5	0.533	1.25	86.970	87.060	N/A	N/A	N/A	77.2	72.4	85.853
CB10	CB10i	86.133	86.086	250	19.6	0.2	0.013	88.340	88.410	0.59	0.03	-0.04	-1.5	0.677	1.26	87.060	87.139	N/A	N/A	N/A	77.2	72.4	85.853
CB10i	CB11	86.086	86.032	250	22.4	0.2	0.013	88.410	88.200	0.59	0.03	-0.05	-1.6	0.803	0.91	87.139	87.230	N/A	N/A	N/A	77.2	72.4	85.853
CB11	CB12	86.032	85.976	250	23.5	0.2	0.013	88.200	88.120	0.59	0.03	0.03	0.9	0.948	0.85	87.230	87.214	N/A	N/A	N/A	77.2	72.4	85.853
CB12	CB13	85.976	85.945	250	13.0	0.2	0.013	88.120	88.080	0.59	0.03	-0.02	-0.7	0.988	1.51	87.214	87.208	N/A	N/A	N/A	77.2	72.4	85.853
CB13	CB14	85.945	85.914	250	13.0	0.2	0.013	88.080	88.040	0.59	0.03	-0.02	-0.7	1.013	1.51	87.208	87.206	N/A	N/A	N/A	77.2	72.4	85.853
CB14	CB15	85.914	85.883	250	13.0	0.2	0.013	88.040	88.000	0.59	0.03	0.04	1.3	1.042	0.92	87.206	87.180	N/A	N/A	N/A	77.2	72.4	85.853
CB15	CB16	85.883	85.852	250	13.0	0.2	0.013	88.000	87.960	0.59	0.03	0.03	1.0	1.047	0.93	87.180	87.160	N/A	N/A	N/A	77.2	72.4	85.853
CB16	CB17	85.852	85.821	250	13.0	0.2	0.013	87.960	87.920	0.59	0.03	0.02	0.8	1.058	0.84	87.160	87.146	N/A	N/A	N/A	77.2	72.4	85.853
CB17	CB18	85.821	85.790	250	13.0	0.2	0.013	87.920	87.880	0.59	0.03	0.04	1.5	1.075	0.91	87.146	87.110	N/A	N/A	N/A	77.2	72.4	85.853
CB18	CB19	85.790	85.759	250	13.0	0.2	0.013	87.880	87.840	0.59	0.03	0.04	1.3	1.070	0.91	87.110	87.078	N/A	N/A	N/A	77.2	72.4	85.853
CB19	CB20	85.759	85.728	250	13.0	0.2	0.013	87.840	87.800	0.59	0.03	0.03	1.1	1.069	0.95	87.078	87.049	N/A	N/A	N/A	77.2	72.4	85.853
CB20	CB21	85.728	85.697	250	13.0	0.2	0.013	87.800	87.760	0.59	0.03	0.03	1.1	1.071	1.63	87.049	87.028	N/A	N/A	N/A	77.2	72.4	85.853
CB21	CB22	85.697	85.666	250	13.0	0.2	0.013	87.760	87.720	0.59	0.03	0.06	1.9	1.081	0.89	87.028	86.990	N/A	N/A	N/A	77.2	72.4	85.853
CB22	CB23	85.666	85.635	250	13.0	0.2	0.013	87.720	87.680	0.59	0.03	0.06	2.0	1.074	1.60	86.990	86.953	N/A	N/A	N/A	77.2	72.4	85.853
CB23	CB24	85.635	85.586	250	20.5	0.2	0.013	87.680	87.620	0.59	0.03	0.06	2.2	1.068	1.59	86.953	86.899	N/A	N/A	N/A	77.2	72.4	85.853
CB24	CB25	85.586	85.518	250	28.5	0.2	0.013	87.620	87.540	0.59	0.03	0.07	2.4	1.063	1.57	86.899	86.825	N/A	N/A	N/A	77.2	72.4	85.853

Table B-1F: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm + 20% (Ultimate Conditions)

U/S MH	D/S MH	U/S Invert (m)	D/S Invert (m)	Pipe Dia. / Height (mm)	Pipe Length (m)	Pipe Slope (%)	n	U/S MH Cover Elev. (m)	D/S MH Cover Elev. (m)	Design Vel. (m/s)	Design Flow (m ³ /s)	Peak Pipe Flow (m ³ /s)	Peak Design Flow (m ³ /s)	Peak / U/S (1)	Surcharge U/S (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL	
																						Length HGL (m)	Dist. From D/S MH (m)
2115	2116	81.670	81.533	2100	72.0	0.2	0.013	88.010	87.930	2.18	7.56	8.16	1.1	0.873	1.18	84.643	84.486	Fut. Est. (4)	85.91	1.267			
2116	2117	81.383	81.270	2250	75.0	0.2	0.013	87.930	87.860	2.03	8.07	11.64	1.4	0.853	1.18	84.486	84.296	Fut. Est. (4)	85.83	1.344			
2117	2122	81.120	81.028	2400	84.0	0.1	0.013	87.960	87.730	1.81	8.21	11.84	1.4	0.776	1.20	84.296	83.951	Fut. Est. (4)	85.76	1.464			
2118	2137	82.797	82.689	750	98.0	0.1	0.013	87.780	88.700	0.84	0.37	0.43	1.2	0.064	1.36	83.611	83.483	Fut. Est. (4)	85.68	2.069			
2119	2120	80.783	80.736	1650	47.0	0.1	0.013	87.700	87.650	1.35	2.88	4.35	1.5	0.624	1.14	83.057	83.057	Fut. Est. (4)	85.60	2.543			
2120	2121	80.716	80.631	1650	84.5	0.1	0.013	87.650	87.560	1.35	2.88	4.43	1.5	0.691	1.14	83.057	83.055	Fut. Est. (4)	85.55	2.493			
2121	2142	80.571	80.495	1650	76.0	0.1	0.013	87.560	87.330	1.35	2.88	4.63	1.6	0.834	1.13	83.055	83.055	Fut. Est. (4)	85.46	2.405			
2122	2136	80.878	80.794	2550	84.0	0.1	0.013	87.730	87.610	1.80	9.20	11.81	1.3	0.523	1.20	83.951	83.640	Fut. Est. (4)	85.63	1.679			
2135	2136	81.066	81.031	2700	35.0	0.1	0.013	87.560	87.610	1.87	10.72	10.22	1.0	0.075	1.21	83.841	83.640	Fut. Est. (4)	85.46	1.619			
2136	2138	80.644	80.508	2700	90.5	0.2	0.013	88.700	88.100	2.29	13.13	21.96	1.7	0.296	1.19	83.640	83.242	Fut. Est. (4)	85.51	1.870			
2137	2138	82.669	82.522	750	98.0	0.2	0.013	88.700	88.100	0.98	0.43	0.56	1.3	0.064	1.31	83.483	83.242	Fut. Est. (4)	86.60	3.117			
2138	2139	80.488	80.365	2700	77.0	0.2	0.013	88.100	88.000	2.37	13.56	22.51	1.7	0.054	1.19	83.242	83.051	Fut. Est. (4)	86.00	2.758			
2139	2140	80.345	80.235	2700	73.5	0.2	0.013	88.000	88.250	2.29	13.13	22.58	1.7	0.006	1.20	83.051	83.050	Fut. Est. (4)	85.90	2.849			
2140	ForeN	80.205	80.134	2700	47.0	0.2	0.013	88.250	83.500	2.29	13.13	21.22	1.6	0.145	1.20	83.050	83.047	Fut. Est. (4)	86.15	3.100			
2140	2140w	N/A	N/A	N/A	N/A	N/A	N/A	88.250	88.250	N/A	N/A	0.00	N/A	N/A	0.00	83.049	83.047	Fut. Est. (4)	86.15	3.101			
2141	2142	84.466	83.839	300	95.0	0.7	0.013	88.370	87.330	1.11	0.08	0.06	0.8	-0.076	1.27	84.690	84.034	Fut. Est. (4)	86.27	1.580			
2142	2143	80.465	80.422	1650	43.0	0.1	0.013	87.330	86.880	1.35	2.88	4.69	1.6	0.940	1.14	83.055	83.054	Fut. Est. (4)	85.23	2.175			
2143	2144	80.272	80.220	1800	51.5	0.1	0.013	86.880	86.340	1.43	3.63	3.75	1.0	0.982	1.16	83.054	83.051	Fut. Est. (4)	84.78	1.726			
2143	2143w	N/A	N/A	N/A	N/A	N/A	N/A	86.880	86.880	N/A	N/A	0.00	N/A	N/A	0.00	83.054	83.044	Fut. Est. (4)	84.78	1.726			
2203	2204	82.592	82.502	2100	81.5	0.1	0.013	88.960	88.970	1.66	5.75	7.96	1.4	0.991	1.09	85.683	85.514	Fut. Est. (4)	86.86	1.177			
2204	2205	82.482	82.360	2100	111.0	0.1	0.013	88.970	88.590	1.66	5.75	8.18	1.4	0.932	1.09	85.514	85.274	Fut. Est. (4)	86.87	1.356			
2205	2206	82.340	82.259	2100	74.0	0.1	0.013	88.590	88.340	1.66	5.75	8.40	1.5	0.834	1.13	85.274	85.107	Fut. Est. (4)	86.49	1.216			
2206	2207	82.239	82.157	2100	74.5	0.1	0.013	88.340	88.090	1.66	5.75	8.69	1.5	0.768	1.13	85.107	84.927	Fut. Est. (4)	86.24	1.133			
2207	2208	82.137	82.023	2100	103.5	0.1	0.013	88.090	87.740	1.66	5.75	9.15	1.6	0.690	1.13	84.927	84.653	Fut. Est. (4)	85.99	1.063			
2208	2209	82.003	81.994	2100	8.0	0.1	0.013	87.740	87.710	1.66	5.75	9.22	1.6	0.550	1.14	84.653	84.625	Fut. Est. (4)	85.64	0.987			
2209	2210	81.974	81.842	2100	120.0	0.1	0.013	87.710	87.640	1.66	5.75	9.19	1.6	0.551	1.14	84.625	84.298	Fut. Est. (4)	85.61	0.985			
2210	2211	81.692	81.573	2250	119.0	0.1	0.013	87.640	87.570	1.66	6.59	9.09	1.4	0.356	1.21	84.298	84.083	Fut. Est. (4)	85.54	1.242			
2211	2135	81.273	81.236	2550	36.5	0.1	0.013	87.570	87.560	1.80	9.20	10.16	1.1	0.260	1.19	84.083	83.841	Fut. Est. (4)	85.47	1.387			
2501	2118	83.368	83.172	375	75.5	0.3	0.013	87.890	87.780	0.81	0.09	0.09	1.0	0.079	1.37	83.822	83.611	Fut. Est. (4)	85.79	1.968			
2143w	MainN	80.250	80.100	975	30.0	0.5	0.013	86.880	83.500	2.12	1.58	1.05	0.7	1.819	1.41	83.044	83.044	Fut. Est. (4)	84.78	1.736			
2140w	MainN	80.300	80.100	975	40.0	0.5	0.013	88.250	83.500	2.12	1.58	1.36	0.9	1.772	1.20	83.047	83.044	Fut. Est. (4)	86.15	3.103			

Note: (1) A negative surcharge implies that the pipe is not flowing full

(2) Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe. Actual HGL / freeboard at all connecting lots interpolated where conservative estimate does not meet freeboard requirements.

(3) Minimum USF elevation as per June 2010 "Trails Edge Phase 1 SWM Report" by IBI Group.

(4) Future USF elevation estimated as 2.1 m below upstream top of manhole elevation or 1.8 m in employment lands (MH 2041 to MH 2057 and MH 2057 to MH 2060).

84.667 Interpolated HGL elevation

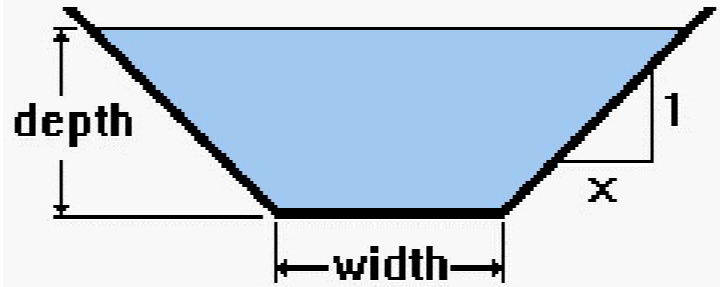
CALCULATION SHEET B-1: REQUIRED CAPACITY OF HYDRO CORRIDOR DITCH

$$Q = 1/n \times AR^{2/3} S^{1/2}$$

100-Year + 20% Stress Test

normal depth =	0.220	m
n =	0.05	
Channel width =	20	m
Trapezoidal Side Slope (H:1V) =	3	
A (area of flow) =	4.542	m ²
wetted perimeter =	21.391	m
R (hydraulic radius) =	0.212	m
S (slope) =	0.002	m/m
Q (flow) =	1.446	m ³ /s
velocity =	0.32	m/s

Trapezoid Section



Calculation Sheet B-2: Flow Depth at Location with Highest 100-Year + 20% Peak Flow on Mer Bleue Road

Sub-catchment(s)		A2044a	Comment 8.5 m wide road total flow for 100-year, 3-hour Chicago storm + 20% stress test	
Location		Mer Bleue Road		
Q _{combined} ⁽²⁾		1.246		
Tr	(m)	4.250		
So	(m/m)	0.005		
W	(m)	0.000		
Sw	(m/m)	0.000		
T	(m)	7.756		
Sx	(m/m)	0.02		
n _{road}		0.013		
dc	(m)	0.15		
Se	(m/m)	0.035		
n _{shoulder}		0.025		
dw	(m)	0.000		
Ts	(m)	7.756		
ds	(m)	0.155		
d	(m)	0.155		
d _{crown}	(m)	0.085		
dd	(m)	0.070		dd < 0.15 m, the max. depth over road crown of an arterial road
de	(m)	0.005		
Te	(m)	0.146	Flow is contained within ROW	
Q _{area(A+B)}	(m ³ /s)	0.000		
Q _{area(B)}	(m ³ /s)	0.000		
Q _{area(A)}	(m ³ /s)	0.000		
Q _{area(B+C+D)}	(m ³ /s)	0.708		
Q _{area(D)}	(m ³ /s)	0.085		
Q _{area(B+C)}	(m ³ /s)	0.623		
Q _{area(E)}	(m ³ /s)	0.000		
Q _{area(A+B+C+E)}	(m ³ /s)	0.623		
Q _{two sides}	(m³/s)	1.246		
d _{Flow} ⁽³⁾	(m)	0.155		d _{flow} < 0.30 m, the maximum allowable depth of flow
A _{flow two sides}	(m ²)	0.958		
v	(m/s)	1.300		
v × d	(m²/s)	0.202		v × d < 0.60 m ² /s

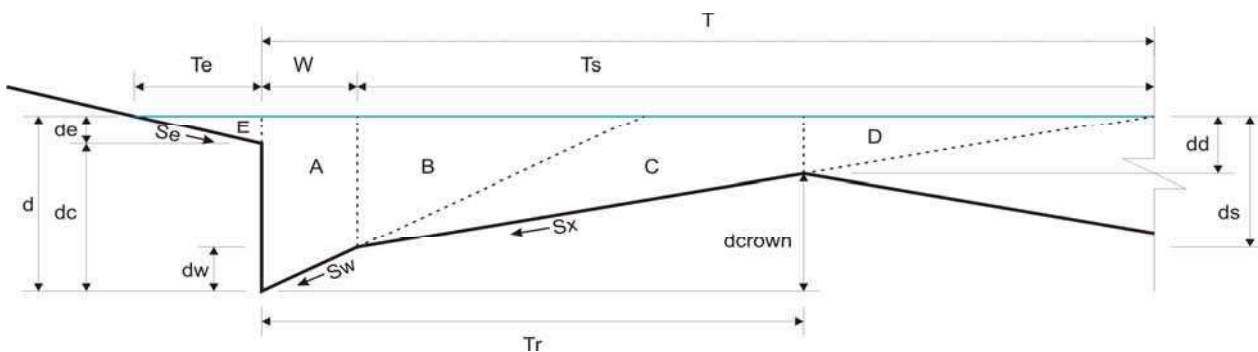
Notes:

(1) 100-year + 20% flow from DDSWMM model (Chicago storm), excess major system flow.

(2) The computations assume that the total incoming flow is equally divided on both sides on the road.

(3) Computations based on methodology described in MTO Drainage Management Manual, 1997, Ch.4, pp. 59-60.

So is the longitudinal road slope



Equations:

$$Q_{\text{area(A+B)}} = 0.375 \times So^{0.5} \times d^{2.667} / (n_{\text{road}} \times Sw)$$

$$Q_{\text{area(B)}} = 0.375 \times So^{0.5} \times (ds)^{2.667} / (n_{\text{road}} \times Sw)$$

$$Q_{\text{area(B+C+D)}} = 0.375 \times So^{0.5} \times (ds)^{2.667} / (n_{\text{road}} \times Sx)$$

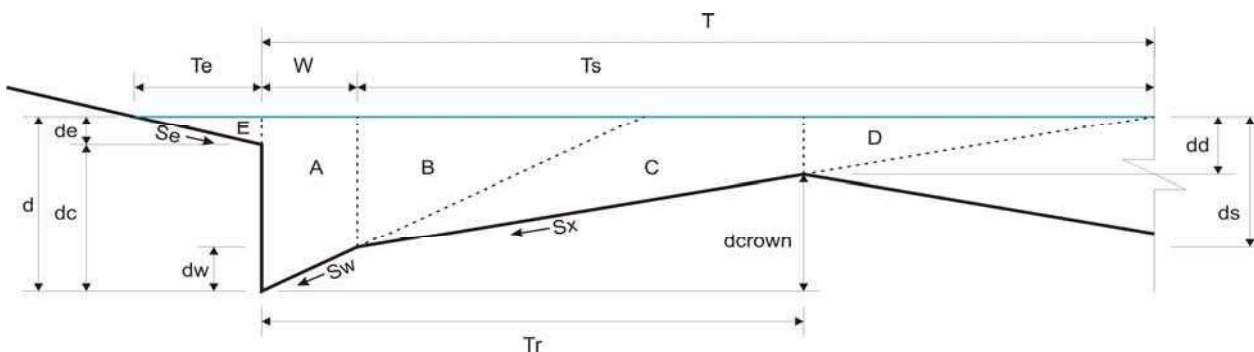
$$Q_{\text{area(D)}} = 0.375 \times So^{0.5} \times (dd)^{2.667} / (n_{\text{road}} \times Sx)$$

$$Q_{\text{area(E)}} = 0.375 \times So^{0.5} \times (de)^{2.667} / (n_{\text{shoulder}} \times Se)$$

Calculation Sheet B-3: Flow Depth at Location with Highest 100-Year + 20% Peak Flow on a Typical Street / Block

Sub-catchment(s)		A2211a	Comment
Location		Development Block	8.5 m wide road
Q _{combined} ⁽²⁾		0.675	excess major system flow for 100-year, 3-hour Chicago storm + 20% stress test
Tr	(m)	4.250	
So	(m/m)	0.005	
W	(m)	0.000	
Sw	(m/m)	0.000	
T	(m)	5.956	
Sx	(m/m)	0.02	
n _{road}		0.013	
dc	(m)	0.15	
Se	(m/m)	0.035	
n _{shoulder}		0.025	
dw	(m)	0.000	
Ts	(m)	5.956	
ds	(m)	0.119	
d	(m)	0.119	
d _{crown}	(m)	0.085	
dd	(m)	0.034	dd < 0.15 m, the max. depth over road crown of an arterial road
de	(m)	0.000	
Te	(m)	0.000	Flow is contained within ROW
Q _{area(A+B)}	(m ³ /s)	0.000	
Q _{area(B)}	(m ³ /s)	0.000	
Q _{area(A)}	(m ³ /s)	0.000	
Q _{area(B+C+D)}	(m ³ /s)	0.350	
Q _{area(D)}	(m ³ /s)	0.012	
Q _{area(B+C)}	(m ³ /s)	0.338	
Q _{area(E)}	(m ³ /s)	0.000	
Q _{area(A+B+C+E)}	(m ³ /s)	0.338	
Q _{two sides} ⁽³⁾	(m ³ /s)	0.675	
d _{Flow} ⁽³⁾	(m)	0.119	d _{flow} < 0.30 m, the maximum allowable depth of flow
d _{Spill} ⁽⁴⁾	(m)	0.179	d _{spill} + d _{static} = total depth at ponding area
A _{flow two sides}	(m ²)	0.651	
v	(m/s)	1.037	
v × d	(m ² /s)	0.123	v × d < 0.60 m ² /s

- Notes:
- (1) 100-year + 20% flow from DDSWMM model (Chicago storm), excess major system flow.
 - (2) The computations assume that the total incoming flow is equally divided on both sides on the road.
 - (3) Computations based on methodology described in MTO Drainage Management Manual, 1997, Ch.4, pp. 59-60.
So is the longitudinal road slope
 - (4) Computations based on overflow from ponding area as per City of Ottawa Technical Bulletin ISDTB-2014-01.



Equations:

$$Q_{\text{area(A+B)}} = 0.375 \times So^{0.5} \times d^{2.667} / (n_{\text{road}} \times Sw)$$

$$Q_{\text{area(B)}} = 0.375 \times So^{0.5} \times (ds)^{2.667} / (n_{\text{road}} \times Sw)$$

$$Q_{\text{area(B+C+D)}} = 0.375 \times So^{0.5} \times (ds)^{2.667} / (n_{\text{road}} \times Sx)$$

$$Q_{\text{area(D)}} = 0.375 \times So^{0.5} \times (dd)^{2.667} / (n_{\text{road}} \times Sx)$$

$$Q_{\text{area(E)}} = 0.375 \times So^{0.5} \times (de)^{2.667} / (n_{\text{shoulder}} \times Se)$$

ATTACHMENT

C

Pond Outlet Controls

Sediment Forebay Calculations

JFSA

Water Resources and
Environmental Consultants



Table C-1: Criteria for Required Storage Volumes Under Ultimate Conditions

Pond	Area (ha)	Imperviousness (%)	Storage Volume for Impervious Level ⁽¹⁾ (m ³ /ha)
N/A	N/A	55	110
SWM Pond 1	367.308	65	123.33
N/A	N/A	70	130

⁽¹⁾ Protection Level for Wet Pond: Normal 70% long-term S.S. removal.
SWM Planning & Design Manual, Table 3.2, p.3-10 (March 2003).

Table C-2: Required Storage Volumes for SWM Facility Under Ultimate Conditions

Pond Component	Required Volume (m ³)	Provided Volume ⁽⁴⁾ (m ³)	Volume Ratio	Provided Area ⁽⁵⁾ (m ²)	Provided Elevation (m)
Permanent Pool (PP) ⁽¹⁾	30609	43329	1.42	45043	Variable ⁽⁷⁾
Quality Control ⁽²⁾	14692	14692	1.00	N/A	80.471
Extended Detention ⁽³⁾	43405	67410	1.55	N/A	81.650
Forebay (20% PP)	N/A	N/A	N/A	9299	Variable ⁽⁷⁾
PP - Forebay	N/A	N/A	N/A	35744	Variable ⁽⁷⁾
Area Ratio (%) ⁽⁶⁾ =				21	

⁽¹⁾ Required PP volume based on Table C-1 (123.33 - 40 = 83.33 m³/ha).

⁽²⁾ Required quality control volume based on 40 m³/ha.

⁽³⁾ Required extended detention volume based on the detention of the 25 mm storm for a 24 to 48 hour drawdown time.

⁽⁴⁾ Provided volume based on stage-storage curve and extended detention (refer to Tables B-3 and B-4).

⁽⁵⁾ Based on grading plan provided by DSEL (refer to Figure 2).

⁽⁶⁾ As per MOE, Maximum Forebay Area: 33% of Total Permanent Pool.

⁽⁷⁾ Permanent pool elevations are 80.10 m in the main cells and the north forebay, and 81.50 m in the south forebay.

Table C-3: Extended Detention Parameters for SWM Facility Under Ultimate Conditions

		Quality Orifice Parameters	
Area (C3)	38627.70 m ²	Diameter	0.400 m
Volume	43328.78 m ³		
PP Elev	80.100 m	Area	0.126 m ²
QC Elev	80.471 m	Invert	80.100 m
h (m)	0.371 m	C _o	0.62

- Notes:
- C3 is the intercept from the area-depth linear regression.
 - PP Elev indicates the elevation of the permanent pool.
 - QC Elev indicates the elevation of the storage volume required by MOE for quality control.
 - h is the maximum water elevation above the orifice (m).

Table C-4: Extended Detention Drawdown Time for SWM Facility Under Ultimate Conditions (Existing Controls)

Elev. (m)	Active Storage			C2 (m ² /m)	Drawdown Time (h)	Drawdown Time (days)	Flow (m ³ /s)	Demarkation Point
	V (m ³)	A (m ²)	depth (m)					
80.100	0.0	38627.7	0.00				0.000	PP Elev
80.150	1939.2	38904.2	0.05	5530	13.92	0.58	0.019	
80.200	3891.1	39169.6	0.10	5419	19.73	0.82	0.038	
80.250	5856.3	39434.4	0.15	5378	24.22	1.01	0.057	
80.300	7834.8	39701.2	0.20	5367	28.03	1.17	0.075	
80.350	9826.5	39967.1	0.25	5358	31.40	1.31	0.094	
80.400	11842.6	40244.2	0.30	5388	34.48	1.44	0.112	
80.450	13848.1	40554.8	0.35	5506	37.34	1.56	0.130	
80.471	14692.0	40641.9	0.37	5433	38.46	1.60	0.137	QC Elev
80.500	15881.1	40764.6	0.40	5342	39.99	1.67	0.147	
80.550	17924.9	40986.3	0.45	5241	42.50	1.77	0.165	
80.600	19984.7	41307.2	0.50	5359	44.92	1.87	0.181	
80.650	22058.2	41595.7	0.55	5396	47.22	1.97	0.195	
80.700	24145.0	41875.1	0.60	5412	49.44	2.06	0.209	
80.750	26245.7	42153.8	0.65	5425	51.57	2.15	0.221	
80.800	28360.4	42432.0	0.70	5435	53.64	2.24	0.233	
80.850	30489.2	42713.0	0.75	5447	55.66	2.32	0.245	
80.900	32642.9	43004.5	0.80	5471	57.62	2.40	0.255	
80.950	34786.9	43330.9	0.85	5533	59.55	2.48	0.266	
81.000	36959.1	43555.0	0.90	5475	61.39	2.56	0.276	
81.050	39142.4	43776.1	0.95	5419	63.19	2.63	0.286	
81.100	41342.0	44101.5	1.00	5474	65.00	2.71	0.295	
81.150	43555.3	44393.1	1.05	5491	66.77	2.78	0.304	
81.200	45782.1	44674.4	1.10	5497	68.49	2.85	0.313	
81.250	48022.9	44955.7	1.15	5503	70.19	2.92	0.321	
81.300	50278.0	45236.5	1.20	5507	71.87	2.99	0.330	
81.350	52546.9	45521.0	1.25	5515	73.52	3.06	0.338	
81.400	54842.2	45814.9	1.30	5529	75.15	3.13	0.346	
81.450	57125.3	46147.2	1.35	5570	76.79	3.20	0.354	
81.500	59432.7	51527.5	1.40	9214	81.57	3.40	0.361	PP Elev (SFore)
81.550	62076.0	52864.9	1.45	9819	83.87	3.49	0.369	
81.600	64735.2	53290.3	1.50	9775	85.58	3.57	0.376	
81.650	67410.2	53639.4	1.55	9685	87.23	3.63	0.383	Ext. Det.
81.700	70100.2	53963.4	1.60	9585	88.84	3.70	0.390	
81.750	72806.3	54284.0	1.65	9489	90.44	3.77	0.397	

Table C-4: Extended Detention Drawdown Time for SWM Facility Under Ultimate Conditions (Existing Controls)

Elev. (m)	Active Storage			C2 (m ² /m)	Drawdown Time (h)	Drawdown Time (days)	Flow (m ³ /s)	Demarkation Point
	V (m ³)	A (m ²)	depth (m)					
81.800	75529.1	54603.9	1.70	9398	92.02	3.83	0.404	
81.850	78264.3	54924.2	1.75	9312	93.59	3.90	0.411	
81.900	81043.1	55252.8	1.80	9236	95.15	3.96	0.417	
81.950	83786.8	55650.9	1.85	9202	96.75	4.03	0.424	
82.000	86573.3	55847.9	1.90	9063	98.19	4.09	0.430	
82.050	89413.4	56891.6	1.95	9366	100.25	4.18	0.436	
82.100	92273.5	57309.6	2.00	9341	101.84	4.24	0.442	

- Notes:
- C2 is the slope coefficient from the area-depth linear regression.
 - PP Elev indicates the elevation of the permanent pool.
 - QC Elev indicates the elevation of the storage volume required by MOE for quality control.
 - Ext. Det. indicates the elevation of extended detention provided based on the detention of the 25 mm storm for a 24 to 48 hour drawdown time.

Table C-5: Stage-Storage-Outflow Curve for SWM Facility Under Ultimate Conditions (Existing Controls)

Elevation (m)	Active Sto. (m ³)	Demarkation Points	Quantity Control 1		Quantity Control 2		Quantity Control 3		Quantity Control 4	
			Vertical Orifice	Rectangular Weir	Rectangular Weir	Rectangular Weir	Rectangular Weir	Rectangular Weir		
83.350	169434		Dia (m) 0.400	L (m) 1.000	L (m) 3.000	L (m) 1.500	L (m) 1.500	L (m) 1.500	L (m) 1.500	
83.400	172761		Area (m ²) 0.126	C _w 1.800	C _w 1.800	C _w 1.800	C _w 1.800	C _w 1.800	C _w 1.800	
83.450	176080		Invert (m) 0.62	Invert (m) 81.65	Invert (m) 82.35	Invert (m) 82.35	Invert (m) 82.35	Invert (m) 82.35	Invert (m) 82.35	
83.500	179438	Top of Berm	Q @ D 0.154	n contr. 2	n contr. 2	n contr. 2	n contr. 2	n contr. 2	n contr. 2	
			Head (m) 3.250	Head (m) 1.700	Head (m) 1.000	Head (m) 1.000	Head (m) 1.000	Head (m) 1.000	Head (m) 1.000	
			Outflow (m ³ /s) 0.576	Outflow (m ³ /s) 0.907	Outflow (m ³ /s) 5.040	Outflow (m ³ /s) 5.403	Outflow (m ³ /s) 5.773	Outflow (m ³ /s) 6.149	Outflow (m ³ /s) 6.149	
			3.300	1.750	1.050	1.050	1.100	1.100	1.100	
			3.350	1.800	1.100	1.100	1.100	1.100	1.100	
			3.400	1.850	1.150	1.150	1.150	1.150	1.150	
			Outflow (m ³ /s) 11.202	Outflow (m ³ /s) 2.340	Outflow (m ³ /s) 2.340	Outflow (m ³ /s) 2.498	Outflow (m ³ /s) 2.658	Outflow (m ³ /s) 2.819	Outflow (m ³ /s) 2.819	
			16.943	2.340	2.498	2.498	2.658	2.819	2.819	
			17.276	2.498	2.658	2.819	2.819	2.819	2.819	
			17.608	2.658	2.819	2.819	2.819	2.819	2.819	
			17.944	2.819	2.819	2.819	2.819	2.819	2.819	

Notes :

- PP Elev indicates the elevation of the permanent pool.
- QC Elev indicates the elevation of the storage volume required by MOE for quality control.
- Ext. Det. indicates the elevation of extended detention provided based on the detention of the 25 mm storm for a 24 to 48 hour drawdown time.
- 100-Year indicates the elevation of the maximum allowable 100-year water level in the main pond cell.
- Top of Berm indicates the elevation at the top of the berm.
- Head losses for reverse grade pipe included in quality control outflow calculations.

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
To SWM Facility 1			
BLK246	2.890	64	184.960
R114	0.110	49	5.390
R113	0.130	49	6.370
R112A	0.170	49	8.330
S112A	0.140	73	10.220
S113	0.340	73	24.820
S112B	0.060	73	4.380
S101	0.200	73	14.600
S102	0.180	73	13.140
P104	0.420	0	0.000
S106	0.150	73	10.950
S114	0.290	73	21.170
S104	0.100	73	7.300
R112B	0.090	49	4.410
R104	0.220	49	10.780
S3901E	0.270	86	23.220
S54E	0.170	86	14.620
S55AE	0.120	86	10.320
S55BE	0.110	86	9.460
S55C	0.080	86	6.880
S56E	0.170	86	14.620
S3901W	0.190	86	16.340
S54W	0.110	86	9.460
S55AW	0.096	86	8.256
S55BW	0.096	86	8.256
S56W	0.097	86	8.342
EXT2A	1.516	100	151.600
EXT2B	0.720	49	35.280
S500C	0.310	86	26.660
S500	0.260	86	22.360
S307	0.250	73	18.250
S311	0.430	73	31.390
S312	0.350	73	25.550
S306	0.390	73	28.470
R301B	0.160	49	7.840
S301	0.360	73	26.280
S303	0.310	73	22.630
S304	0.280	73	20.440
R312A	0.330	49	16.170
R312B	0.110	49	5.390
R301A	0.150	49	7.350
R301C	0.120	49	5.880
R301D	0.100	49	4.900
S314	0.170	73	12.410
R305	0.170	49	8.330
R402B	0.130	49	6.370
R402A	0.130	49	6.370
S400e	0.030	71	2.130
S400A	0.100	71	7.100
S400B	0.100	71	7.100
S400C	0.120	71	8.520
S400D	0.070	71	4.970
S401A	0.060	71	4.260
S401B	0.110	71	7.810

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
S401C	0.290	71	20.590
S401E	0.020	71	1.420
S402A	0.510	71	36.210
S402C	0.340	71	24.140
S402G	0.110	71	7.810
S404	0.160	70	11.200
21	0.630	86	54.180
S410A	0.210	86	18.060
S410B	0.090	86	7.740
R410A	1.830	42	76.860
R410B	0.480	42	20.160
402I	0.760	63	47.880
A039NE	0.017	75	1.275
A039NW	0.046	74	3.404
A039SE	0.021	84	1.764
A039SW	0.023	57	1.311
A019a	1.550	29	44.950
A560b	4.990	64	319.360
A001N1	0.038	47	1.786
A001N2	0.047	36	1.692
A001NE	0.029	48	1.392
A001NW	0.017	47	0.799
A001R1	0.034	18	0.612
A001S1	0.057	54	3.078
A001S2	0.011	55	0.605
A001SE	0.047	62	2.914
A001SW	0.039	64	2.496
A003R1	0.040	20	0.800
A003R2	0.176	15	2.640
A004NE	0.098	66	6.468
A004NW	0.054	46	2.484
A004SW	0.024	42	1.008
A005NE	0.030	47	1.410
A005NW	0.018	50	0.900
A005SE	0.186	71	13.206
A005SW	0.130	80	10.400
A005W1	0.039	41	1.599
A006NE	0.105	71	7.455
A006NW	0.031	77	2.387
A006SE	0.142	76	10.792
A006SW	0.127	81	10.287
A007E1	0.117	74	8.658
A007E2	0.131	76	9.956
A007N1	0.063	84	5.292
A007NE	0.023	48	1.104
A007NW	0.045	62	2.790
A007R1	0.183	17	3.111
A007R2	0.036	19	0.684
A007S1	0.020	90	1.800
A007SE	0.021	52	1.092
A007SW	0.064	55	3.520
A008NE	0.039	33	1.287
A008NW	0.045	42	1.890
A008R1	0.027	19	0.513
A008R2	0.178	19	3.382

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A008R3	0.153	18	2.754
A008SE	0.021	33	0.693
A008SW	0.026	42	1.092
A009E1	0.090	70	6.300
A009E2	0.039	72	2.808
A009N1	0.018	50	0.900
A009N2	0.027	48	1.296
A009N3	0.028	29	0.812
A009NE	0.054	70	3.780
A009NW	0.027	63	1.701
A009SE	0.049	84	4.116
A009SW	0.044	70	3.080
A009W1	0.086	74	6.364
A009W2	0.037	70	2.590
A010NE	0.080	66	5.280
A010NW	0.080	71	5.680
A010S1	0.151	75	11.325
A010S2	0.151	75	11.325
A010SE	0.052	83	4.316
A010SW	0.052	75	3.900
A010W1	0.035	69	2.415
A011NE	0.076	82	6.232
A011NW	0.036	69	2.484
A011SW	0.189	77	14.553
A012NE	0.033	58	1.914
A012NW	0.055	65	3.575
A012SE	0.089	74	6.586
A012SW	0.040	80	3.200
A013N1	0.031	39	1.209
A013N2	0.029	86	2.494
A013NE	0.073	78	5.694
A013NW	0.037	78	2.886
A013S1	0.058	38	2.204
A013S2	0.062	79	4.898
A013SE	0.068	72	4.896
A013SW	0.042	74	3.108
A015N1	0.019	47	0.893
A015N2	0.010	40	0.400
A015NE	0.063	51	3.213
A015NW	0.057	70	3.990
A015S1	0.029	31	0.899
A015S2	0.007	43	0.301
A015SE	0.028	68	1.904
A015SW	0.081	74	5.994
A017NE	0.021	76	1.596
A017NW	0.168	76	12.768
A017SE	0.021	71	1.491
A017SW	0.048	73	3.504
A018DV1	0.621	74	45.954
A018NE	0.040	70	2.800
A018NW	0.045	56	2.520
A018R1	0.153	20	3.060
A018R2	0.114	21	2.394
A018R3	0.082	21	1.722
A018SE	0.021	71	1.491

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A018SW	0.026	50	1.300
A019b	0.073	73	5.329
A019DV1	0.084	59	4.956
A019E1	0.040	70	2.800
A019E2	0.022	73	1.606
A019N1	0.035	69	2.415
A019N2	0.064	77	4.928
A019N3	0.027	63	1.701
A019N4	0.082	76	6.232
A019NE	0.040	85	3.400
A019NW	0.023	61	1.403
A019R1	0.198	22	4.356
A019R2	0.080	16	1.280
A019S1	0.035	77	2.695
A019S2	0.066	70	4.620
A019S3	0.029	72	2.088
A019S4	0.083	72	5.976
A019SE	0.020	70	1.400
A019SW	0.026	50	1.300
A019W1	0.071	83	5.893
A019W2	0.065	72	4.680
A020E1	0.042	71	2.982
A020N1	0.066	52	3.432
A020N2	0.040	70	2.800
A020N3	0.049	57	2.793
A020NE	0.059	68	4.012
A020NW	0.064	67	4.288
A020S1	0.046	72	3.312
A020S2	0.022	68	1.496
A020SE	0.068	82	5.576
A020SW	0.068	75	5.100
A020W1	0.086	74	6.364
A020W2	0.047	66	3.102
A021NE	0.076	71	5.396
A021NW	0.122	67	8.174
A021SE	0.054	75	4.050
A021SW	0.073	63	4.599
A023N1	0.024	83	1.992
A023N2	0.059	73	4.307
A023NE	0.060	73	4.380
A023NW	0.032	84	2.688
A023R1	0.048	17	0.816
A023R2	0.130	18	2.340
A023R3	0.147	17	2.499
A023R4	0.116	20	2.320
A023S1	0.022	41	0.902
A023S2	0.048	46	2.208
A023SE	0.066	67	4.422
A023SW	0.026	81	2.106
A025NE	0.042	55	2.310
A025NW	0.094	55	5.170
A025SE	0.030	83	2.490
A025SW	0.020	45	0.900
A028R1	0.478	8	3.824
A029NE	0.050	66	3.300

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A029NW	0.015	53	0.795
A029R1	0.129	11	1.419
A029R2	0.156	18	2.808
A029R3	0.028	23	0.644
A029R4	0.110	21	2.310
A029R5	0.211	20	4.220
A029R6	0.048	10	0.480
A029S1	0.074	42	3.108
A029S2	0.108	60	6.480
A029SE	0.155	72	11.160
A029SW	0.186	71	13.206
A031NE	0.071	62	4.402
A031NW	0.034	74	2.516
A031SE	0.061	80	4.880
A031SW	0.027	37	0.999
A032NE	0.059	59	3.481
A032NW	0.024	29	0.696
A032R1	0.061	20	1.220
A032SE	0.054	78	4.212
A032SW	0.036	67	2.412
A034NE	0.024	71	1.704
A034NW	0.016	44	0.704
A034SE	0.021	48	1.008
A034SW	0.110	55	6.050
A039N1	0.042	88	3.696
A039N2	0.069	87	6.003
A039S1	0.021	57	1.197
A039S2	0.034	59	2.006
A040N1	0.032	81	2.592
A040N2	0.068	75	5.100
A040NE	0.082	84	6.888
A040NW	0.029	83	2.407
A040R1	0.050	19	0.950
A040R2	0.056	17	0.952
A040R3	0.076	20	1.520
A040R4	0.062	22	1.364
A040R5	0.040	13	0.520
A040S1	0.021	57	1.197
A040S2	0.035	60	2.100
A040SE	0.035	60	2.100
A040SW	0.021	57	1.197
A041a	3.700	86	318.200
A041DV1	0.631	66	41.646
A041DV2	0.018	49	0.882
A041DV3	0.048	40	1.920
A041DV4	0.144	46	6.624
A041DV5	0.129	46	5.934
A041DV6	0.070	36	2.520
A041N1	0.139	77	10.703
A041N2	0.030	73	2.190
A041NE	0.053	81	4.293
A041NW	0.044	77	3.388
A041S1	0.067	61	4.087
A041SE	0.035	60	2.100
A041SW	0.021	57	1.197

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A047PK1	0.375	7	2.625
A047R1	0.082	16	1.312
A047R2	0.052	16	0.832
A049NE	0.039	69	2.691
A049NW	0.018	72	1.296
A049R1	0.116	16	1.856
A049R2	0.023	20	0.460
A049R3	0.039	22	0.858
A049SE	0.072	69	4.968
A049SW	0.045	76	3.420
A100NE	3.234	65	210.210
A101E1	0.017	82	1.394
A101E2	0.150	57	8.550
A101E3	0.054	48	2.592
A101N1	0.151	64	9.664
A101N2	0.142	76	10.792
A101W1	0.033	64	2.112
A101W2	0.153	64	9.792
A107NW	0.087	72	6.264
A107SW	0.125	64	8.000
A140R1	0.054	22	1.188
A140R2	0.150	20	3.000
A140R3	0.125	20	2.500
A140R4	0.133	20	2.660
A140WK1	0.084	24	2.016
A170DV1	0.130	41	5.330
A170NE	0.040	70	2.800
A170NW	0.090	81	7.290
A170S1	0.038	71	2.698
A170S2	0.022	68	1.496
A170SE	0.020	70	1.400
A170SW	0.046	72	3.312
A200NE	0.035	34	1.190
A200NW	0.034	35	1.190
A200R1	0.026	13	0.338
A200R2	0.041	18	0.738
A200R3	0.049	18	0.882
A200R4	0.030	18	0.540
A250NE	0.051	67	3.417
A250NW	0.033	42	1.386
A250SE	0.071	73	5.183
A250SW	0.044	50	2.200
A470NE	0.009	78	0.702
A470NW	0.025	76	1.900
A470SE	0.040	73	2.920
A470SW	0.115	66	7.590
AChan2	2.658	100	265.800
AChan3	1.162	100	116.200
AForeS	1.859	37	68.783
ARes2	1.385	33	45.705
AWood1	0.847	7	5.929
AWood2	5.699	7	39.893
AMainN	4.070	43	175.010
AMainS	1.902	43	81.786
ARes1	1.212	24	29.088

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
AResN1	5.840	44	256.960
AResN2	1.070	26	27.820
AHE1	18.260	14	255.640
ATW1	3.090	86	265.740
ATW2	14.250	86	1225.500
B001N1	0.096	78	7.488
B001N2	0.090	78	7.020
B002NE	0.092	73	6.716
B002NW	0.101	77	7.777
B002R1	0.042	22	0.924
B002R2	0.056	22	1.232
B002R3	0.092	15	1.380
B002R4	0.033	9	0.297
B002R5	0.037	22	0.814
B002SE	0.048	44	2.112
B002SW	0.128	75	9.600
B002WK1	0.019	32	0.608
B004NE	0.067	72	4.824
B004NW	0.083	70	5.810
B004PK1	0.654	29	18.966
B004R1	0.067	13	0.871
B004R2	0.062	16	0.992
B004SE	0.032	72	2.304
B004SW	0.044	68	2.992
B004WK1	0.025	50	1.250
B005N1	0.080	73	5.840
B005N2	0.043	81	3.483
B005N3	0.030	63	1.890
B005NE	0.058	71	4.118
B005NW	0.156	70	10.920
B005R1	0.059	14	0.826
B005R2	0.119	22	2.618
B005R3	0.063	20	1.260
B005R4	0.121	22	2.662
B005S1	0.080	71	5.680
B005S2	0.043	77	3.311
B005SE	0.063	71	4.473
B005SW	0.075	68	5.100
B008NE	0.049	71	3.479
B008NW	0.076	63	4.788
B008R1	0.132	22	2.904
B008SE	0.024	75	1.800
B008SW	0.106	74	7.844
B009NE	0.043	79	3.397
B009NW	0.090	73	6.570
B009PK1	0.711	29	20.619
B009R1	0.057	23	1.311
B009R2	0.128	21	2.688
B009SE	0.029	62	1.798
B009SW	0.043	74	3.182
B010N1	0.041	78	3.198
B010N2	0.048	79	3.792
B010NE	0.055	69	3.795
B010NW	0.050	68	3.400
B010R1	0.116	22	2.552

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
B010S1	0.052	79	4.108
B010S2	0.049	76	3.724
B010SE	0.058	71	4.118
B010SW	0.048	75	3.600
B010W1	0.021	48	1.008
B010W2	0.025	48	1.200
B011NE	0.031	55	1.705
B011NW	0.097	72	6.984
B011R1	0.074	21	1.554
B011R2	0.113	22	2.486
B011S1	0.034	87	2.958
B011SE	0.030	53	1,590
B011SW	0.097	72	6.984
B012EX1	0.054	29	1.566
B012EX2	0.522	39	20.358
B012NE	0.082	63	5.166
B012NW	0.100	63	6.300
B012SE	0.074	63	4.662
B012SW	0.091	63	5.733
B013DV1	2.860	93	265.980
B013DV2	2.535	93	235.755
B013EX1	0.084	29	2.436
B013EX2	0.074	51	3.774
B013NE	0.080	62	4.960
B013NW	0.099	62	6.138
B015NE	0.085	63	5.355
B015NW	0.102	63	6.426
B015RE1	2.173	79	171.667
B015RE2	2.165	79	171.035
B015SE	0.049	63	3.087
B015SW	0.059	63	3.717
B016NE	0.135	68	9.180
B016NW	0.073	64	4.672
B016R1	0.065	24	1.560
B016R2	0.031	23	0.713
B016R3	0.056	11	0.616
B016R4	0.015	23	0.345
B016S1	0.061	68	4.148
B016S2	0.062	68	4.216
B016S3	0.029	61	1.769
B016SE	0.048	73	3.504
B016SW	0.052	76	3.952
B018NE	0.110	67	7.370
B018NW	0.049	72	3.528
B018R1	0.060	23	1.380
B018R2	0.044	23	1.012
B018R3	0.051	15	0.765
B018SE	0.023	48	1.104
B018SW	0.047	55	2.585
B019N1	0.070	64	4.480
B019N2	0.051	73	3.723
B019NE	0.067	70	4.690
B019NW	0.141	72	10.152
B019R1	0.045	12	0.540
B019R2	0.045	23	1.035

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
B019R3	0.032	22	0.704
B019R4	0.025	22	0.550
B019R5	0.052	23	1.196
B019S1	0.070	70	4.900
B019S2	0.064	73	4.672
B019SE	0.066	65	4.290
B019SW	0.074	61	4.514
B021R1	0.056	21	1.176
B021R2	0.128	23	2.944
B022N1	0.072	68	4.896
B022N2	0.050	72	3.600
B022N3	0.056	58	3.248
B022NE	0.055	69	3.795
B022NW	0.056	66	3.696
B022S1	0.073	68	4.964
B022S2	0.050	72	3.600
B022SE	0.055	68	3.740
B022SW	0.063	67	4.221
B022W1	0.045	71	3.195
B022W2	0.023	83	1.909
B022W3	0.024	46	1.104
B024NE	0.127	70	8.890
B024NW	0.021	62	1.302
B024R1	0.109	23	2.507
B024R2	0.051	22	1.122
B024R3	0.034	24	0.816
B024SE	0.057	72	4.104
B024SW	0.049	61	2.989
B026R1	0.120	23	2.760
B028N1	0.084	68	5.712
B028N2	0.048	83	3.984
B028NE	0.062	73	4.526
B028NW	0.092	58	5.336
B028R1	0.108	22	2.376
B028R2	0.056	21	1.176
B028R3	0.139	22	3.058
B028S1	0.085	72	6.120
B028S2	0.056	67	3.752
B028SE	0.062	65	4.030
B028SW	0.184	62	11.408
B031N1	0.062	71	4.402
B031N2	0.025	56	1.400
B031N3	0.070	82	5.740
B031NE	0.077	74	5.698
B031NW	0.171	73	12.483
B031R1	0.052	13	0.676
B031R2	0.135	21	2.835
B031R3	0.062	23	1.426
B031R4	0.094	21	1.974
B031R5	0.015	23	0.345
B031S1	0.063	70	4.410
B031S2	0.032	53	1.696
B031SE	0.077	74	5.698
B031SW	0.092	58	5.336
B033NE	0.131	71	9.301

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
B033NW	0.034	76	2.584
B033R1	0.041	22	0.902
B033R2	0.063	21	1.323
B033R3	0.142	21	2.982
B033SE	0.105	70	7.350
B033SW	0.045	84	3.780
B036NE	0.061	70	4.270
B036NW	0.047	77	3.619
B036R1	0.126	21	2.646
B036SE	0.059	71	4.189
B036SW	0.048	75	3.600
B036W1	0.025	48	1,200
B036W2	0.025	52	1,300
B037N1	0.045	78	3,510
B037NE	0.025	56	1,400
B037NW	0.094	73	6,862
B037R1	0.060	22	1,320
B037R2	0.113	21	2,373
B037R3	0.014	23	0,322
B037R4	0.012	25	0,300
B037SE	0.025	52	1,300
B037SW	0.095	73	6,935
B038NE	0.104	70	7,280
B038NW	0.032	78	2,496
B038SE	0.047	77	3,619
B038SW	0.047	81	3,807
B040NE	0.034	59	2,006
B040NW	0.028	58	1,624
B040R1	0.031	23	0,713
B040SE	0.129	70	9,030
B040SW	0.051	81	4,131
B041NE	0.034	59	2,006
B041NW	0.030	59	1,770
B041R1	0.031	23	0,713
B041SE	0.036	61	2,196
B041SW	0.043	74	3,182
B042N1	0.112	70	7,840
B042N2	0.044	73	3,212
B042N3	0.027	48	1,296
B042NE	0.116	72	8,352
B042NW	0.044	73	3,212
B042R1	0.090	21	1,890
B042R2	0.142	20	2,840
B042R3	0.077	16	1,232
B042S1	0.094	72	6,768
B042S2	0.094	71	6,674
B042SE	0.053	66	3,498
B042SW	0.027	48	1,296
B044NE	0.081	70	5,670
B044NW	0.082	71	5,822
B044R1	0.043	20	0,860
B044R2	0.088	22	1,936
B044SE	0.121	71	8,591
B044SW	0.053	70	3,710
B046NE	0.023	48	1,104

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
B046NW	0.055	63	3.465
B046R2	0.052	20	1.040
B046R3	0.080	27	2.160
B046S1	0.022	50	1.100
B046SE	0.038	79	3.002
B046SW	0.119	73	8.687
B047NE	0.112	71	7.952
B047NW	0.026	50	1.300
B047R1	0.125	22	2.750
B047R2	0.060	21	1.260
B047R3	0.053	23	1.219
B047R4	0.014	18	0.252
B047R5	0.048	21	1.008
B047R6	0.065	20	1.300
B047SE	0.111	73	8.103
B047SW	0.055	69	3.795
B048N1	0.027	48	1.296
B048NE	0.075	75	5.625
B048NW	0.064	70	4.480
B048R1	0.062	21	1.302
B048R2	0.082	20	1.640
B048R3	0.138	16	2.208
B048SE	0.076	79	6.004
B048SW	0.065	68	4.420
B048W1	0.032	47	1.504
B048W2	0.036	83	2.988
B048W3	0.024	50	1.200
B050N1	0.088	72	6.336
B050N2	0.033	52	1.716
B050NE	0.065	75	4.875
B050NW	0.070	64	4.480
B050R1	0.128	21	2.688
B050R2	0.068	22	1.496
B050R3	0.103	22	2.266
B050S1	0.087	72	6.264
B050S2	0.039	85	3.315
B050S3	0.023	61	1.403
B050SE	0.057	68	3.876
B050SW	0.153	72	11.016
B055N1	0.030	47	1.410
B055NE	0.096	69	6.624
B055NW	0.046	72	3.312
B055R1	0.118	21	2.478
B055SE	0.093	72	6.696
B055SW	0.048	71	3.408
B056NE	0.029	48	1.392
B056NW	0.028	61	1.708
B056SE	0.025	48	1.200
B056SW	0.025	64	1.600
B058NE	0.039	72	2.808
B058NW	0.046	72	3.312
B058R1	0.117	21	2.457
B058R2	0.102	22	2.244
B058SE	0.021	62	1.302
B058SW	0.031	61	1.891

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
B180N1	0.060	68	4.080
B180N2	0.060	68	4.080
B180N3	0.038	46	1.748
B180NE	0.065	71	4.615
B180NW	0.067	70	4.690
B180R1	0.117	23	2.691
B180R2	0.075	23	1.725
B180SE	0.050	72	3.600
B180SW	0.047	73	3.431
B410NE	0.025	56	1.400
B410NW	0.037	78	2.886
B590NE	0.103	74	7.622
B590NW	0.105	76	7.980
B590R1	0.067	22	1.474
B590R2	0.172	22	3.784
B590R3	0.120	21	2.520
B590R4	0.080	10	0.800
B590SE	0.108	69	7.452
B590SW	0.071	73	5.183
C001R1	0.084	9	0.756
C001R2	0.705	9	6.345
C003R1	0.200	11	2.200
C006R1	0.155	5	0.775
C009R1	0.377	6	2.262
C011R1	0.301	9	2.709
C012R1	0.092	13	1.196
C012WK1	0.028	66	1.848
C013PK1	0.428	29	12.412
C013R1	0.295	39	11.505
C013R2	0.151	40	6.040
C014R1	0.319	9	2.871
C017R1	0.342	6	2.052
C021R1	0.385	7	2.695
C025R1	0.196	7	1.372
C026R1	0.264	11	2.904
C028R1	0.334	10	3.340
C030R1	0.130	13	1.690
A301a	0.420	29	12.180
A301b	0.560	99	55.440
A301c	2.280	86	196.080
A301d	4.280	99	423.720
A301e	6.150	71	436.650
A301f	7.350	93	683.550
A301g	8.610	71	611.310
A1ia	0.980	86	84.280
A1ib	5.610	99	555.390
A1ic	0.960	86	82.560
A2000ia	0.530	71	37.630
A2001a	0.080	71	5.680
A2002a	0.410	71	29.110
A2002b	0.490	99	48.510
A2002c	0.410	71	29.110
A2003a	0.490	71	34.790
A2004a	0.070	71	4.970
A2005a	0.310	71	22.010

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A2006a	0.330	71	23.430
A2007a	0.200	71	14.200
A2008a	0.780	71	55.380
A2009a	0.270	71	19.170
A2010a	0.280	71	19.880
A2011a	0.280	71	19.880
A2012a	0.190	71	13.490
A2013a	0.780	71	55.380
A2014a	0.780	71	55.380
A2015a	0.200	71	14.200
A2016a	0.320	71	22.720
A2017a	0.280	71	19.880
A2018a	0.300	71	21.300
A2019a	0.210	71	14.910
A2020a	0.710	71	50.410
A2021a	0.780	71	55.380
A2022a	0.190	71	13.490
A2023a	0.270	71	19.170
A2024a	0.390	71	27.690
A2025a	0.110	71	7.810
A2026a	1.160	29	33.640
A2026b	0.390	71	27.690
A2027a	0.280	71	19.880
A2028a	0.160	71	11.360
A2029a	0.230	71	16.330
A2030a	0.630	71	44.730
A2031a	0.270	71	19.170
A2033a	0.280	71	19.880
A2033b	0.250	99	24.750
A2033c	0.550	71	39.050
A2034a	0.400	71	28.400
A2034b	0.230	71	16.330
A2034c	0.240	99	23.760
A2035a	0.330	71	23.430
A2035b	0.280	99	27.720
A2036a	0.210	71	14.910
A2036b	0.280	99	27.720
A2036c	1.270	29	36.830
A2037a	0.200	71	14.200
A2037b	0.210	99	20.790
A2037c	0.180	71	12.780
A2038a	0.120	71	8.520
A2038b	0.110	99	10.890
A2039a	0.230	71	16.330
A2039b	0.190	99	18.810
A2039c	0.200	71	14.200
A2040a	0.200	71	14.200
A2040b	0.150	99	14.850
A2041a	1.390	86	119.540
A2042a	1.200	86	103.200
A2043a	1.290	86	110.940
A2044a	2.140	99	211.860
A2044b	0.220	99	21.780
A2045a	1.630	86	140.180
A2046a	0.760	86	65.360

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A2046b	0.230	99	22.770
A2047a	1.150	86	98.900
A2047b	0.260	99	25.740
A2047c	0.470	86	40.420
A2048a	0.800	86	68.800
A2048b	1.140	86	98.040
A2048c	0.260	99	25.740
A2049a	0.250	99	24.750
A2049b	0.490	86	42.140
A2049c	0.760	86	65.360
A2050a	2.130	86	183.180
A2051a	1.340	86	115.240
A2052a	0.250	86	21.500
A2053a	1.000	86	86.000
A2054a	0.660	86	56.760
A2055a	0.360	86	30.960
A2056a	0.620	86	53.320
A2057a	0.440	86	37.840
A2057b	0.240	99	23.760
A2058a	1.780	29	51.620
A2058b	0.420	99	41.580
A2058c	9.400	29	272.600
A2059a	0.280	99	27.720
A2059b	0.170	71	12.070
A2060a	0.200	99	19.800
A2061a	0.200	99	19.800
A2062a	0.130	99	12.870
A2063a	0.190	99	18.810
A2065a	0.210	99	20.790
A2065b	0.210	71	14.910
A2066a	0.280	99	27.720
A2066b	0.320	71	22.720
A2067a	1.180	71	83.780
A2068a	0.240	71	17.040
A2069a	1.160	71	82.360
A2070a	0.240	71	17.040
A2071a	0.340	71	24.140
A2072a	0.200	99	19.800
A2073a	0.590	71	41.890
A2074a	0.730	71	51.830
A2075a	0.190	99	18.810
A2076a	1.420	71	100.820
A2077a	0.630	71	44.730
A2078a	0.540	71	38.340
A2079a	0.210	71	14.910
A2080a	0.160	71	11.360
A2081a	0.760	71	53.960
A2082a	0.550	71	39.050
A2083a	0.180	99	17.820
A2084a	0.920	71	65.320
A2085a	0.710	71	50.410
A2086a	0.590	71	41.890
A2087a	0.300	99	29.700
A2087b	0.530	71	37.630
A2088a	0.570	71	40.470

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A2089a	0.410	71	29.110
A2090a	2.180	29	63.220
A2090b	9.460	99	936.540
A2090c	0.410	71	29.110
A2091a	0.160	71	11.360
A2091b	0.170	71	12.070
A2091c	0.190	99	18.810
A2092a	0.200	71	14.200
A2092b	0.170	71	12.070
A2092c	0.170	99	16.830
A2093a	1.030	71	73.130
A2094a	0.220	71	15.620
A2095a	0.300	71	21.300
A2096a	0.120	71	8.520
A2096b	0.180	99	17.820
A2097a	3.120	99	308.880
A2097b	2.950	86	253.700
A2097c	0.720	99	71.280
A2097d	0.240	86	20.640
A2097e	2.770	99	274.230
A2097f	1.140	86	98.040
A2098a	0.390	71	27.690
A2099a	0.340	71	24.140
A2099b	0.180	71	12.780
A2099c	0.250	71	17.750
A2100a	0.510	71	36.210
A2101a	0.500	71	35.500
A2102a	0.310	71	22.010
A2103a	0.560	29	16.240
A2103b	0.380	71	26.980
A2104a	0.240	71	17.040
A2105a	0.440	71	31.240
A2106a	0.230	71	16.330
A2107a	0.260	71	18.460
A2108a	0.320	71	22.720
A2109a	0.510	71	36.210
A2110a	0.240	71	17.040
A2111a	0.170	71	12.070
A2112a	0.070	71	4.970
A2113a	0.130	71	9.230
A2114a	0.570	71	40.470
A2115a	0.480	71	34.080
A2116a	0.420	71	29.820
A2118a	0.610	71	43.310
A2119a	0.380	71	26.980
A2120a	0.430	71	30.530
A2121a	0.520	71	36.920
A2122a	1.170	71	83.070
A2135a	0.180	71	12.780
A2136a	0.370	71	26.270
A2137a	0.690	71	48.990
A2138a	0.380	71	26.980
A2139a	0.380	71	26.980
A2140a	0.110	71	7.810
A2141a	0.370	71	26.270

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A2203a	0.400	86	34.400
A2203b	4.660	29	135.140
A2204a	0.900	86	77.400
A2205a	0.840	86	72.240
A2206a	1.040	86	89.440
A2207a	1.490	86	128.140
A2208a	0.390	99	38.610
A2211a	4.000	86	344.000
A2501a	0.500	71	35.500
AforeN	4.900	50	245.000
C1007A	0.186	70	13.017
C1007B	0.294	70	20.557
C1007W	0.320	70	22.390
C2026A	0.183	70	12.816
C2026B	0.239	70	16.743
C2029A	1.133	64	72.818
L1006A	0.158	70	11.033
L1006B	0.357	70	24.985
L1006W	0.282	70	19.722
L2001A	0.245	76	18.575
L2002A	0.422	76	31.964
L2002B	0.674	34	23.102
L2002C	0.437	54	23.698
L2003A	0.261	76	19.769
L2003B	0.442	54	23.969
L2004A	0.231	76	17.471
L2004B	0.261	54	14.147
L2004C	0.579	54	31.443
L2005A	0.310	76	23.494
L2006A	0.285	76	21.588
L2007A	9.057	64	582.237
L2008A	0.316	77	24.398
L2009A	0.181	70	12.680
L2009B	0.629	34	21.578
L2010A	0.266	70	18.604
L2010B	0.569	34	19.505
L2012A	0.178	70	12.438
L2013A	0.167	70	11.669
L2013B	0.157	70	10.961
L2014B	0.242	77	18.657
L2015A	0.234	77	18.057
L2016A	0.324	77	25.020
L2017A	0.329	77	25.360
L2019A	0.126	60	7.562
L2020A	0.216	76	16.371
L2020B	0.549	34	18.821
L2021A	0.280	76	21.179
L2021B	0.283	54	15.339
L2021C	2.221	7	15.547
L2022A	0.242	76	18.329
L2022B	0.279	76	21.089
L2022S	0.161	70	11.247
L2023A	0.335	77	25.821
L2023B	0.180	77	13.859
L2024A	0.227	77	17.510

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
L2025A	0.226	76	17.139
L2025B	0.240	54	13.026
L2027A	0.305	70	21.351
L2029A	8.325	64	535.167
L2030A	3.226	64	207.377
L2031A	0.249	76	18.883
L2031B	0.409	54	22.176
L2032A	0.231	76	17.461
L2034A	0.275	76	20.837
L2034B	0.585	54	31.767
L2035A	0.327	76	24.750
L2036A	0.188	76	14.271
L2036B	0.668	54	36.239
L2037A	0.521	76	39.420
L2039A	0.236	76	17.844
L2007B	0.146	54	7.918
L2014A	0.238	77	18.327
L2030B	0.102	54	5.532
L2040A	0.103	54	5.596
C1001A	0.206	70	14.420
C1002A	0.130	70	9.072
C1002AA	0.068	70	4.760
C1002AB	0.183	34	6.252
C1003A	0.302	70	21.119
C1003B	0.179	70	12.495
L398	0.600	70	42.021
L397	0.723	70	50.631
L396	0.483	70	33.803
L395C	0.362	70	25.326
L395B	0.532	70	37.254
L395A	2.359	70	165.123
<i>Snow Dump</i> ⁽²⁾	6.780	99	671.220
To SWM Facility 3			
A043R1	0.226	8	1.808
A043R2	0.017	18	0.306
A043R3	0.076	32	2.432
A043R4	0.078	32	2.496
A043SE	0.064	64	4.096
A043SW	0.048	64	3.072
A044R1	0.173	12	2.076
A045N1	0.049	71	3.479
A045N2	0.081	77	6.237
A045NE	0.251	69	17.319
A045NW	0.043	84	3.612
A045S1	0.048	73	3.504
A045S2	0.081	78	6.318
A045SE	0.118	61	7.198
A045SW	0.043	86	3.698
A046NE	0.058	69	4.002
A046R1	0.170	21	3.570
A046R2	0.145	12	1.740
A046R3	0.280	14	3.920
A046SE	0.095	76	7.220
A046SW	0.039	77	3.003

Table C-6: Drainage Area to SWM Facility (Ultimate Conditions)

Segment ID ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
A047NE	0.015	73	1.095
A047NW	0.036	22	0.792
A047SE	0.027	74	1.998
A047SW	0.074	62	4.588
A101NE	0.073	73	5.329
A101NW	0.046	64	2.944
A101S1	0.107	64	6.848
A101S2	0.113	63	7.119
A101SE	0.084	70	5.880
A101SW	0.076	64	4.864
A102R1	0.087	32	2.784
A460NE	0.059	61	3.599
A460NW	0.090	57	5.130
A460PK1	0.355	7	2.485
A460R1	0.071	20	1.420
A460R2	0.057	19	1.083
A460R3	0.030	23	0.690
A460SE	0.041	85	3.485
A470R1	0.098	16	1.568
A470R2	0.144	17	2.448
A410F	0.520	64	33.280
AR410C	0.550	64	35.200
AS410C	0.110	86	9.460
AS410D	0.080	86	6.880
AS410E	0.100	86	8.600
Total	372.534	65	24149.596

⁽¹⁾ Refer to Figure A-1.

⁽²⁾ Snow dump is to remain as under existing conditions; modelled as constant inflow of 22 L/s from the forcemain to the north main cell.

Weighted Average Imperviousness = S(Area x Imp) / Total Area = 24149.596 / 372.534 = 65 %

Table C-7: Summary of Total Drainage Area (Ultimate Conditions)

Land Use ⁽¹⁾	Area (ha)	Imperviousness (%)	Area x Imp.
To SWM Facility 1	367.308	65	23898.921
To SWM Facility 3	5.226	48	250.675
Total	372.534	65	24149.596

⁽¹⁾ Refer to Figure A-1

Weighted Average Imperviousness = $S(\text{Area x Imp}) / \text{Total Area} = 24149.596 / 372.534 = 65\%$

Table C-8: Target Release Rates for SWM Facility ⁽¹⁾

Event	Pre-Development Release Rate (m ³ /s/ha)	Target Release Rate (m ³ /s)
2-Year, 24-Hour SCS	1.600	1.000
5-Year, 24-Hour SCS	2.900	2.300
10-Year, 24-Hour SCS	3.900	3.800
25-Year, 24-Hour SCS	5.500	5.600
50-Year, 24-Hour SCS	6.600	6.700
100-Year, 24-Hour SCS	7.800	8.000

⁽¹⁾ As per the April 2008 "East Urban Community Pond No. 1 Design Brief" by Stantec.

CALCULATION SHEET C-1: EXISTING CONTROLS (ULTIMATE CONDITIONS)

Quality Control 1		Quantity Control 1		Quantity Control 2		Quantity Control 3		Quantity Control 4	
Vertical Circular Orifice		Rectangular Weir		Rectangular Weir		Rectangular Weir		Rectangular Weir	
Diameter	(m)	L	(m)	L	(m)	L	(m)	L	(m)
A_o	(m ²)	C_w	(m)	C_w	(m)	C_w	(m)	C_w	(m)
invert	(m)	Crest Elev.	(m)	Crest Elev.	(m)	Crest Elev.	(m)	Crest Elev.	(m)
C_o		n		n		n		n	
Max Water Level	(m)	Max Water Level	(m)	Max Water Level	(m)	Max Water Level	(m)	Max Water Level	(m)
Head of Water	(m)	Head of Water	(m)	Head of Water	(m)	Head of Water	(m)	Head of Water	(m)
Q_o	(m ³ /s)	Q_w	(m ³ /s)	Q_w	(m ³ /s)	Q_w	(m ³ /s)	Q_w	(m ³ /s)
Orifice Equation:		Weir Equation:		Weir Equation:		Weir Equation:		Weir Equation:	
$Q_o = C_o A_o (2gh)^{0.5}$		$QW = C_w (L-0.1nh)h^{1.5}$		$QW = C_w (L-0.1nh)h^{1.5}$		$QW = C_w (L-0.1nh)h^{1.5}$		$QW = C_w (L-0.1nh)h^{1.5}$	
Not including outlet pipe losses									
Q_o is the orifice flow		Qw is the weir flow		Qw is the weir flow		Qw is the weir flow		Qw is the weir flow	
C_o is the orifice coefficient		Cw is the weir coefficient		Cw is the weir coefficient		Cw is the weir coefficient		Cw is the weir coefficient	
A_o is the orifice flow area		L is the weir length		L is the weir length		L is the weir length		L is the weir length	
g is the gravitational constant		h is the weir height		h is the weir height		h is the weir height		h is the weir height	
h is the head of water		n is the # of side contractions		n is the # of side contractions		n is the # of side contractions		n is the # of side contractions	