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MASTER SERVICING STUDY
EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN

RICHCRAFT HOMES

DEC 2020
DSEL 14-733

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STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
 Collector Roads Return Frequency = 5 years
 Arterial Roads Return Frequency = 10 years

Manning 0.013

Location	From Node	To Node	2 YEAR			5 YEAR			10 YEAR			100 YEAR			FLOW			SEWER DATA			TIME OF RATIO						
			AREA (Ha)	Indiv. 2/78 AC	Accum. 2/78 AC	AREA (Ha)	Indiv. 5/78 AC	Accum. 5/78 AC	AREA (Ha)	Indiv. 10/78 AC	Accum. 10/78 AC	AREA (Ha)	Indiv. 100/78 AC	Accum. 100/78 AC	Intensity (mm/h)	Intensity (mm/h)	Intensity (mm/h)	Peak Flow Q (l/s)	DIA (mm) (actual)	DIA (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	APACITY (l/s)	VELOCITY (m/s)	LOW (min)	Q/Q full
			R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
	2136	2138	0.37	0.70	93.83	0.00	69.94	0.00	5.35	0.00	14.86	27.52	42.41	57.14	66.82	97.40	97.81	2700	2700	CONC	0.15	90.5	13126	2.29	0.66	0.75	
			1.29	0.70	96.34	0.00	69.94	0.00	5.35	0.00	14.86																
			1.30	0.70	98.87	0.00	69.94	0.00	5.35	0.00	14.86																
	2138	2139	0.38	0.70	100.59	0.00	69.94	0.00	5.35	0.00	14.86	21.02	50.44	68.08	79.66	116.22	119.88	2700	2700	CONC	0.16	77.0	13566	2.37	0.54	0.88	
	2139	2140	0.38	0.70	101.33	0.00	69.94	0.00	5.35	0.00	14.86	21.56	49.64	66.99	78.38	114.34	118.34	2700	2700	CONC	0.15	73.5	13126	2.29	0.53	0.90	
	2140	HW	0.11	0.70	101.54	0.00	69.94	0.00	5.35	0.00	14.86	21.56	49.64	66.99	78.38	114.34	118.44	2700	2700	CONC	0.15	47.0	13126	2.29	0.34	0.90	
TO POND 1																											
TRUNK 3																											
			2.86	0.70	0.00	0.00	0.68	0.80	2.18	0.00	0.00	21.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00							
						5.57	5.81	6.06	14.04	0.00	0.00																
						5.57	5.81	6.06	14.04	0.00	0.00																
	2026	2026	7.33	0.70	14.26	19.83	0.49	0.90	1.23	19.55	0.00	0.00	21.15	50.25	67.82	79.36	115.77	148	1650	1650	CONC	0.14	32.0	3410	1.59	0.33	0.04
	2026	2119	0.39	0.70	20.59	0.00	20.84	0.40	0.00	20.84	0.00	0.00	22.39	49.76	67.15	78.57	114.61	1366	1650	1650	CONC	0.16	92.5	3646	1.71	0.90	0.37
	2119	2120	0.66	0.70	1.28	21.87	0.00	20.84	0.00	20.84	0.00	0.00	22.97	47.70	64.34	75.27	109.78	2204	1650	1650	CONC	0.10	47.0	2882	1.35	0.58	0.51
	2120	2121	0.43	0.70	0.84	22.71	0.00	20.84	0.00	20.84	0.00	0.00	24.01	46.36	62.52	73.13	106.63	2256	1650	1650	CONC	0.10	84.5	2882	1.35	1.04	0.76
	2121	2142	1.13	0.70	2.20	24.81	0.00	20.84	0.00	20.84	0.00	0.00	22.97	47.70	64.34	75.27	109.78	2204	1650	1650	CONC	0.10	76.0	2882	1.35	0.94	0.78
	2142	2143	0.37	0.70	0.72	25.63	0.00	20.84	0.00	20.84	0.00	0.00	24.01	46.36	62.52	73.13	106.63	2256	1800	1800	CONC	0.10	43.0	2882	1.35	0.53	0.78
	2143	2144				0.00	25.63	0.00	20.84	0.00	0.00	24.01	46.36	62.52	73.13	106.63	2256	1800	1800	CONC	0.10	51.1	3635	1.43	0.60	0.62	
TO POND 1						0.00	25.63	0.00	20.84	0.00	0.00	24.95	45.22	60.97	71.31	103.97	2260	1800	1800	CONC	0.10	22.5	3635	1.43	0.26	0.62	



Notes:
 1) Ottawa Rainfall-Intensity Curve
 2) Min. Velocity = 0.80 m/s

Definitions:
 Q = 76 AIR, where
 Q = Peak Flow in Litres per second (L/s)
 A = Area in hectares (ha)
 I = Rainfall Intensity (mm/h)
 R = Runoff Coefficient

PROJECT: Orleans EUC MUC
 LOCATION: City of Ottawa
 Date: October 2019
 Sheet No: 2

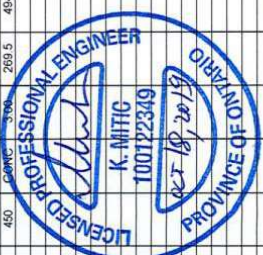


STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
 Collector Roads Return Frequency = 5 years
 Arterial Roads Return Frequency = 10 years

0.013

LOCATION	AREA (Ha)		2 YEAR		5 YEAR		10 YEAR		100 YEAR		FLOW		SEWER DATA		RATIO										
	From Node	To Node	AREA (Ha)	R	AREA (Ha)	R	AREA (Ha)	R	AREA (Ha)	R	Intensity (mm/h)	Intensity 5 Year (mm/h)	Intensity 10 Year (mm/h)	Intensity 100 Year (mm/h)		Peak Flow Q (l/s)	DIA (mm) (actual)	DIA (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF TRAVEL (min)	
NORTH EAST TRUNK*																									
201	202	203	5.68	0.80	12.63	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	291	675	675	CONC	0.20	262.0	376	1.05	4.16	0.77		
202	203	204	2.20	0.80	4.89	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00	291	675	675	CONC	0.20	193.0	376	1.05	3.06	0.77		
203	204		6.84	0.80	15.43	0.80	1.73	0.90	4.33	4.33	0.00	0.00	0.00	933	1050	1050	CONC	0.20	294.0	1221	1.41	3.47	0.76		
			5.29	0.80	11.76	0.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
			4.86	0.85	11.48	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
			0.19	0.40	0.21	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
			3.45	0.90	8.63	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
To Existing Storm to Wildflower Drive							66.21							1666	1350	1350	CONC	0.15	513.5	2067	1.44	5.93	0.81		
SOUTH WEST TRUNK																									
Commercial			7.58	0.85	17.37	0.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
Mid-High Density			4.28	0.90	10.71	0.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
			6.15	0.70	11.97	0.70	2.78	0.80	5.07	5.07	0.00	0.00	0.00												
			7.88	0.70	15.33	0.70	55.38	0.90	5.07	5.07	0.00	0.00	0.00												
To Storm By Others			302	0.42	0.47	0.42	0.56	0.90	6.47	6.47	0.00	0.00	0.00												
Mid-High Density Residential			0.00	0.80	0.00	0.80	0.49	0.90	1.23	1.23	0.00	0.00	0.00												
To Existing Fern Casey Street							0.00																		
Mid-High Density Residential			0.00	0.80	0.00	0.80	3.68	0.80	8.18	8.18	0.00	0.00	0.00												
To Existing Storm, to Axis Way							0.00																		
SOUTH EAST TRUNK																									
Hydro Easement			1.89	0.40	2.10	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
Hydro Easement			3.33	0.40	3.70	0.40	2.10	0.40	5.86	5.86	0.00	0.00	0.00												
Hydro Easement			8.94	0.90	22.37	0.90	28.17	0.90	0.00	0.00	0.00	0.00	0.00												
Parkette			0.63	0.40	0.70	0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00												
			0.99	0.80	2.20	0.80	31.07	0.80	0.00	0.00	0.00	0.00	0.00												
To Existing Storm to Gerry Lalonde Drive							0.00																		
Hydro Easement			1.86	0.40	2.07	0.40	2.07	0.40	5.34	5.34	0.00	0.00	0.00												
Hydro Easement			2.94	0.40	3.27	0.40	5.34	0.40	0.00	0.00	0.00	0.00													
To Existing Storm, Trigonra Crescent							0.00																		



DESIGNED	PROJECT	Orleans EUC MUC
CHECKED	LOCATION	City of Ottawa
DWG. REFERENCE	FILE REF.	Date: October 2019
		Sheet No 3

Notes:
 1) Ottawa Rainfall-Intensity Curve
 2) Min. Velocity = 0.80 m/s

Definitions:
 O = 2.78 AIR, where
 O = Peak Flow in Litres per second (L/s)
 A = Areas in hectares (ha)
 I = Rainfall Intensity (mm/h)
 R = Runoff Coefficient



June 2, 2019

David Schaeffer Engineering Limited

120 Iber Road, Unit 103
Stittsville, Ontario K2S 1E9

Attention: Ms. Laura Maxwell, P.Eng.

Subject: East Urban Community / Preliminary Hydraulic Gradeline Analysis and Pond Design

our file: 883-10

As requested by your office, we have evaluated, based on the available information as described below, the preliminary hydraulic gradeline results for the trunk storm sewer of the proposed East Urban Community northwest and southwest quadrants. The impact of the proposed development on the operation of downstream Stormwater Management (SWM) Pond 1 has also been evaluated, under ultimate conditions with the proposed expansion of the north main cell and north forebay(s) in place. The interim conditions design of the pond, prior to the proposed expansion of the north main cell and north forebay(s), is as documented in the March 2014 *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge West Subdivision*. Note that this is an update of the October 16, 2018 version of this memo.

The layout of the East Urban Community lands and external drainage areas to SWM Pond 1 under ultimate conditions are as shown in the conceptual storm servicing drawing provided by DSEL in Attachment A. A preliminary model of this drainage area was prepared in SWMHYMO based on the information provided by DSEL, with the simulated minor system inflows input to an XPSWMM model of the proposed trunk sewer. Minor system capture rates and surface storage were estimated based on previous studies of similar developments, the October 2012 *City of Ottawa Sewer Design Guidelines*, the design tools presented in the May 2014 *Stormwater Management Guidelines for New Developments Draft Report* by JFSA, the February 2014 *City of Ottawa Technical Bulletin ISDTB-2014-01*, and the September 2016 *City of Ottawa Technical Bulletin PIEDTB-2016-01*. The proposed design may be summarized as follows:

- 2-year capture on local roads (including capture of runoff from adjacent residential lots), with no surface storage used during the 2-year storm, and on-site storage of all excess flows during the 100-year storm. Similarly, 5-year capture on local roads (including capture of runoff from adjacent residential lots), with no surface storage used during the 5-year storm, and on-site storage of all excess flows during the 100-year storm. The 100-year + 20% stress test storage has been set to 145% of 100-year storage, based on Abbotsville Crossing pilot project.
- 10-year capture with no on-site surface storage has been modelled for the 2.14 ha of Mer Bleue Road tributary to SWM Pond 1, with excess major system flows draining overland to an external system.
- 5-year capture on the mid-high density blocks and adjacent 4.66 ha park block in the northwest quadrant, with no surface storage used during the 5-year storm, and on-site storage of all excess flows during the 100-year storm. with excess major system flows for events greater than the 100-year design storm draining overland to an open ditch in the hydro corridor and subsequently to the north main cell of the pond.

- The existing 6.78 ha snow dump is not to be developed and is expected to continue to operate with a forcemain draining to the north main cell of the pond via an open ditch in the hydro corridor. Based on the March 2006 *Innes Snow Disposal Facility Meltwater Management Report*, the design flow rate of the pump station and forcemain is 22 L/s, and has been modelled in XPSWMM as a constant inflow to the north main cell.
- 100-year capture and no on-site surface storage on the external Innes Park Woods and surrounding internal buffer.
- 5-year capture and no on-site surface storage on the mid-high density blocks in the southwest quadrant, with excess major system flows draining overland to Belcourt Extension and Axis Way.
- 5-year capture and 100-year on-site storage on the hydro corridor block, and 10-year capture and 100-year on-site storage on the Transitway Corridor and Brian Colburn Boulevard. Note that, based on an existing high point on the land to be occupied by Brian Colburn Boulevard and the Transitway Corridor, it is understood that these areas may be smaller than currently modelled. The delineation of these drainage areas from previous studies has been maintained for the purposes of this exercise, on the understanding that they may be re-evaluated at the detailed design stage.
- 2-year or 5-year capture (as marked in Attachment A) and 100-year on-site storage on all remaining development blocks in the northwest and southwest quadrants, and on the external commercial blocks draining through the site from the north. The 100-year + 20% stress test storage has been set to 145% of 100-year storage, based on Abbottsville Crossing pilot project.

Refer to Table A-1 of Attachment A for a summary of the information and estimates used in preparing the SWMHYMO model of the East Urban Community (and external commercial blocks) under ultimate conditions. Digital SWMHYMO modelling files are attached.

The total drainage area to SWM Pond 1 under ultimate conditions is approximately 367.31 ha at 65% imperviousness, as shown in Figure A-1 of Attachment A, and summarized in Table C-6 of Attachment C. Ultimate conditions drainage areas to SWM Facility 1 outside of the East Urban Community development have been modelled as follows:

- DDSWMM / XPSWMM modelling of Trails Edge Phase 1, Trails Edge West, Edgewater and Orleans Village subdivisions by JFSA (last updated in the July 2018 *Stormwater Management Report for the Orleans Village Subdivision*);
- DDSWMM / XPSWMM modelling of the Minto TrailsEdge Phase II subdivision by IBI Group (May 2015 *Design Brief for Minto TrailsEdge Phase II*); and
- PCSWMM modelling of the Trails Edge East subdivision by Stantec (dated August 22, 2018, subsequent to the May 2018 *Trails Edge East Phase 1 Servicing and Stormwater Management Report*).

These models also include external existing areas also tributary to the pond that pre-date these subdivisions. The models above have been modified as needed in order to avoid overlap and convey major and minor system outflows from one subdivision to the next. Note in particular that the proposed storm trunk sewer servicing the southwest quadrant of the East Urban Community (MH 301 -> MH 302 / Stantec MH 1008) has been inserted into the Stantec PCSWMM model in order to best simulate the hydraulic gradeline elevations in this trunk sewer and the impact of the proposed East Urban Community design on the Trails Edge East Phase 1 development. Minor system outflows from the PCSWMM model at the limit of Trails Edge East were then input to the combined XPSWMM model of Trails Edge Phase 1, Trails Edge West, Edgewater, Orleans Village, Minto TrailsEdge Phase II, the East Urban

Community, and ultimate SWM Facility 1 (including south Mud Creek channel).

An XPSWMM model schematic and hydraulic simulation results are presented in Attachment B for the 100-year 3-hour Chicago storm, 100-year 24-hour SCS Type II storm, and July 1979, August 1988 and August 1996 historical events. A freeboard of 0.3 m between the hydraulic gradeline and the estimated underside of footings has been provided throughout the proposed East Urban Community and external areas included in the XPSWMM model for the 100-year storms, and a freeboard of 0 m has been provided for the historical events. Attachment B also presents the stress test results for the hydraulic gradeline analysis based on a 20% increase in the 100-year storm, as per the October 2012 *City of Ottawa Sewer Design Guidelines*. Under these conditions, a freeboard of 0 m between the hydraulic gradeline and the estimated underside of footings has been provided throughout the proposed East Urban Community and external areas included in the XPSWMM model.

Similarly, based on the PCSWMM modelling results, a freeboard of 0.3 m has been provided between the 100-year hydraulic gradeline and the estimated underside of footings (estimated 2.1 m below ground level) between MH 301 and MH 302 in the southwest quadrant of the East Urban Community. A freeboard of 0 m has been provided for the historical events and the 100-year + 20% stress test. Additionally, the 100-year, historical event and 100-year + 20% minor system peak outflows from the southwest quadrant to Trails Edge East are smaller than those estimated in the modelling provided by Stantec, with similar runoff volumes. As such, the proposed design of the East Urban Community does not have a negative impact on the hydraulic gradeline results in Trails Edge East.

Major system outflow from the East Urban Community southwest quadrant to Trails Edge East is 0 L/s for all modelled events except for the 100-year + 20% stress test, where the major system flow on the first downstream road segment in Trails Edge East (C1007W-M2) is 1.189 m³/s; less than the 1.304 m³/s estimated in the modelling provided by Stantec. As such, the proposed design of the East Urban Community does not have a negative impact on major system water depths in Trails Edge East.

Excess major system flows from the 2.28 ha mid-high density block in the southwest quadrant, which has 5-year capture and no on-site surface storage, are modelled as draining to Belcourt Boulevard, as designed by IBI Group as part of the Minto TrailsEdge Phase II modelling. The revised 100-year flows on Belcourt Boulevard are less than those estimated in the modelling provided by IBI Group, and are therefore not of concern. Conversely, the revised 100-year + 20% flows are generally less than those estimated in the modelling provided by IBI Group, except on areas S56E / S56W at the curb cuts through the road median and to the channel, where the 100-year + 20% flow has increased by up to 185 L/s. However, based on the curb cut calculations found in the May 2015 *Design Brief for Minto TrailsEdge Phase II* by IBI Group, the maximum 100-year + 20% water depth at this location based on the updated flows would be approximately 37 cm, which is within a reasonable range based on current City standards.

Excess major system flows from the 3.70 ha mid-high density block in the southwest quadrant, which has 5-year capture and no on-site surface storage, are modelled as draining to Axis Way and Compass Road in Trails Edge West as designed by DSEL and JFSA. The updated 100-year total water depths on Axis Way and Compass Road are still less than 30 cm, in accordance with the original design. Furthermore, the 100-year + 20% total water depths are 33.3 cm or less, and would not reach the building envelopes based on the standards to which the subdivision was designed.

As noted earlier in this memo, excess major system flows from the mid-high density blocks, snow dump and adjacent 4.66 ha park block in the northwest quadrant during events greater than the 100-year design storm are intended to drain overland to an open ditch in the hydro corridor and subsequently to the north main cell of the pond. Based on SWMHYMO modelling, the estimated 1.446 m³/s 100-year + 20% stress test flow could be conveyed at a maximum depth of 22 cm in a trapezoidal ditch with 20 m bottom width, 3H:1V side slopes, 0.20% longitudinal slope, and an assumed Manning's roughness coefficient of 0.05 (refer to Calculation Sheet B-1 of Attachment B). This estimate and ditch sizing should be confirmed at a later design stage. Note that a culvert should be installed under the collector road crossing the hydro corridor in order to allow safe conveyance of flows in the ditch to the pond.

As noted earlier in this memo, Mer Bleue Road has been modelled with 10-year capture and no surface storage, and excess major system flows draining to a separate system. Based on SWMHYMO modelling and conservatively assuming an 8.5 m wide road, the estimated 100-year + 20% flow of 1.246 m³/s could be conveyed at a flow depth of 16 cm and velocity x depth of 0.20 m²/s (refer to Calculation Sheet B-2 of Attachment B).

As 100-year major system storage or capture is provided throughout the northwest quadrant, water depths on the road will be defined by static storage depths, of which a depth up to 35 cm is permitted by current City standards. The dynamic flow depths above static ponding areas during the 100-year + 20% stress test have been checked for feasibility in Calculation Sheet B-3 of Attachment B, based on the maximum overflow of 0.675 m³/s from any 100-year storage area within the northwest quadrant. Assuming a maximum static ponding depth of 35 cm and an 8.5 m wide local road, this overflow would correspond to a total water depth of 53 cm on the road (35 cm static + 18 cm flow depth over the spill point). This is a high level check only, and is conservative in that it does not account for the attenuation provided by dynamic storage above static ponding areas, which would reduce the peak overflow. Final results will depend on the detailed design of the subdivision and ponding areas, but this test demonstrates that it is possible for excess 100-year + 20% flows to be conveyed safely along a typical road without reaching building envelopes.

The 100-year flows on the remainder of the proposed East Urban Community development tributary to SWM Pond 1 will be retained in surface storage or captured to the storm sewer system, and as such a safe overland flow route is required only under conditions such as the 100-year + 20% stress test. At the detailed design stage, the East Urban Community must be designed such that water on the surface during the 100-year + 20% stress test does not reach building envelopes.

As noted above, it is proposed that the north main cell and north forebay be expanded to provide additional storage in support of the East Urban Community development. Note that the existing north forebay is to be split into two forebays, northeast and northwest, as part of the proposed expansion. The permanent pool elevation in the north forebay will also be lowered from 81.50 m to 80.10 m as part of the proposed reconstruction. The operation of SWM Facility 1 under ultimate conditions, with existing outlet controls remaining in place, is summarized in Table 1. The SWM facility stage-storage-discharge relationship and outlet controls are presented in Attachment C.

Table 1: Summary of SWM Facility 1 Operating Characteristics Under Ultimate Conditions

Pond Component	Total Inflow ⁽¹⁾ (m ³ /s)	Water Level (m)				Volume Used ⁽²⁾ (m ³)	Allowable Outflow ⁽³⁾ (m ³ /s)	Provided Outflow (m ³ /s)
		North Forebay	North Main Cell	South Forebay	South Main Cell			
Permanent Pool ⁽⁴⁾	N/A	80.100	80.100	81.500	80.100	43329	N/A	N/A
Quality Control	N/A	80.471	80.471	N/A	80.471	14692	N/A	0.137
Extended Detention	N/A	81.650	81.650	81.650	81.650	67410	N/A	0.383
2-Year, 24-Hour SCS	0.000	81.761	81.758	81.916	81.757	66193	1.000	0.461
5-Year, 24-Hour SCS	0.000	82.130	82.126	82.125	82.125	85838	2.300	0.981
10-Year, 24-Hour SCS	0.000	82.308	82.304	82.303	82.303	96162	3.800	1.294
25-Year, 24-Hour SCS	0.000	82.590	82.584	82.583	82.583	112944	5.600	2.603
50-Year, 24-Hour SCS	0.000	82.754	82.751	82.751	82.751	123225	6.700	4.057
100-Year, 24-Hour SCS ⁽⁵⁾	0.000	82.916	82.910	82.917	82.917	133392	8.000	5.716
July 1st, 1979 Event	0.000	83.045	83.042	83.047	83.047	141725	N/A	7.242
August 4, 1988 Event	0.000	82.792	82.788	82.794	82.794	125648	N/A	4.425
August 8, 1996 Event	0.000	82.608	82.602	82.602	82.602	114050	N/A	2.737

⁽²⁾ Volumes are active storage only for all SWM facility components except the permanent pool.

⁽³⁾ Refer to the March 2014 *Design Brief* for target release rates and volumes.

⁽⁴⁾ Bottom elevations are 79.00 m in the north main cell, 79.10 m in the south main cell, 79.50 m in the north forebay and 80.00 m in the south forebay.

⁽⁵⁾ Maximum allowable 100-year pond level = 83.0 m in the main cell (per the April 2008 "East Urban Community Pond No. 1 Design Brief" by Stantec).

The above results show that the actual provided release rates do not exceed the allowable release rates for SWM Pond 1. Note that the maximum 100-year pond level is 82.92 m; below the maximum allowable 100-year water level of 83.0 m.

SWM Pond 1 has been equipped with three sediment forebays, The forebays have been designed with minimum length to width ratios of approximately 3:1. Note that they do not exceed one third of the permanent pool area, as per the requirements of the *SWMP Design Manual*. The forebays have been sized to meet the greater of the settling and dispersion criteria, as stated in the *SWMP Design Manual*. Calculations and verification for the minimum dispersion length, settling length and the average velocity have been included in Calculation Sheets C-2, C-3 and C-4 of Attachment C. Note that the northeast forebay exceeds the average velocity requirement of 0.15 m/s during the 10-year design storm. However, this target is most appropriate for a particle size of approximately 0.45 mm. Conversely, the bottoms of the proposed forebays are hard, and the sediment deposits will correspond roughly to a particle size of 0.01 mm based on the clay/silt soils. For a 0.01 mm particle size, a 0.45 m/s average velocity is a more appropriate limit based on the erosion velocity graph referenced by the *SWMP Design Manual* (Hjülstrom, 1939). The average velocity in the northeast forebay does not exceed the target of 0.45 m/s during the 10-year design storm. Note that this same approach is used in an example of Page H-9 of the *SWMP Design Manual*.

SWM Pond 1 has a permanent pool volume of 43,329 m³, which is more than the minimum permanent pool volume the *SWMP Design Manual* requires for normal protection for a wet pond for the latest 367.308 ha drainage area at 65% imperviousness, as calculated below.

$$(123.33 - 40) \text{ m}^3/\text{ha} \times 367.308 \text{ ha} = 30,609 \text{ m}^3$$

The required quality control volume of 14,692 m³ (40 m³/ha) for the latest 367.308 ha drainage area is contained within the extended detention volume at an elevation of 80.471 m. The provided extended detention volume of 67,410 m³ exceeds the required volume of 43,405 m³ calculated based on detention of the 25 mm storm runoff.

It may therefore be concluded that the operation of SWM Pond 1 under ultimate conditions is in conformance with the requirements presented in the March 2014 *Design Brief for the Reconstruction of the East Urban Community Stormwater Management Pond 1 for the Trails Edge West Subdivision*.

Yours truly,

J.F. Sabourin and Associates Inc.



Laura Pipkins, P.Eng.

cc: J.F. Sabourin, M.Eng, P.Eng.
Director of Water Resources Projects

- Attachment A: Conceptual Storm Servicing (June 2019, DSEL)
Storm Sewer Calculation Sheet (June 2019, DSEL)
Total Drainage Area to SWM Facility (Ultimate Conditions)
Summary of East Urban Community Drainage Area Characteristics
- Attachment B: XPSWMM Model Schematic; Pipe Data and Hydraulic Simulation Results
Major System Flow Depth Calculations
- Attachment C: Pond Outlet Controls; Sediment Forebay Calculations

ATTACHMENT

A

Conceptual Storm Servicing
(June 2019, DSEL)

Storm Sewer Calculation Sheet
(June 2019, DSEL)

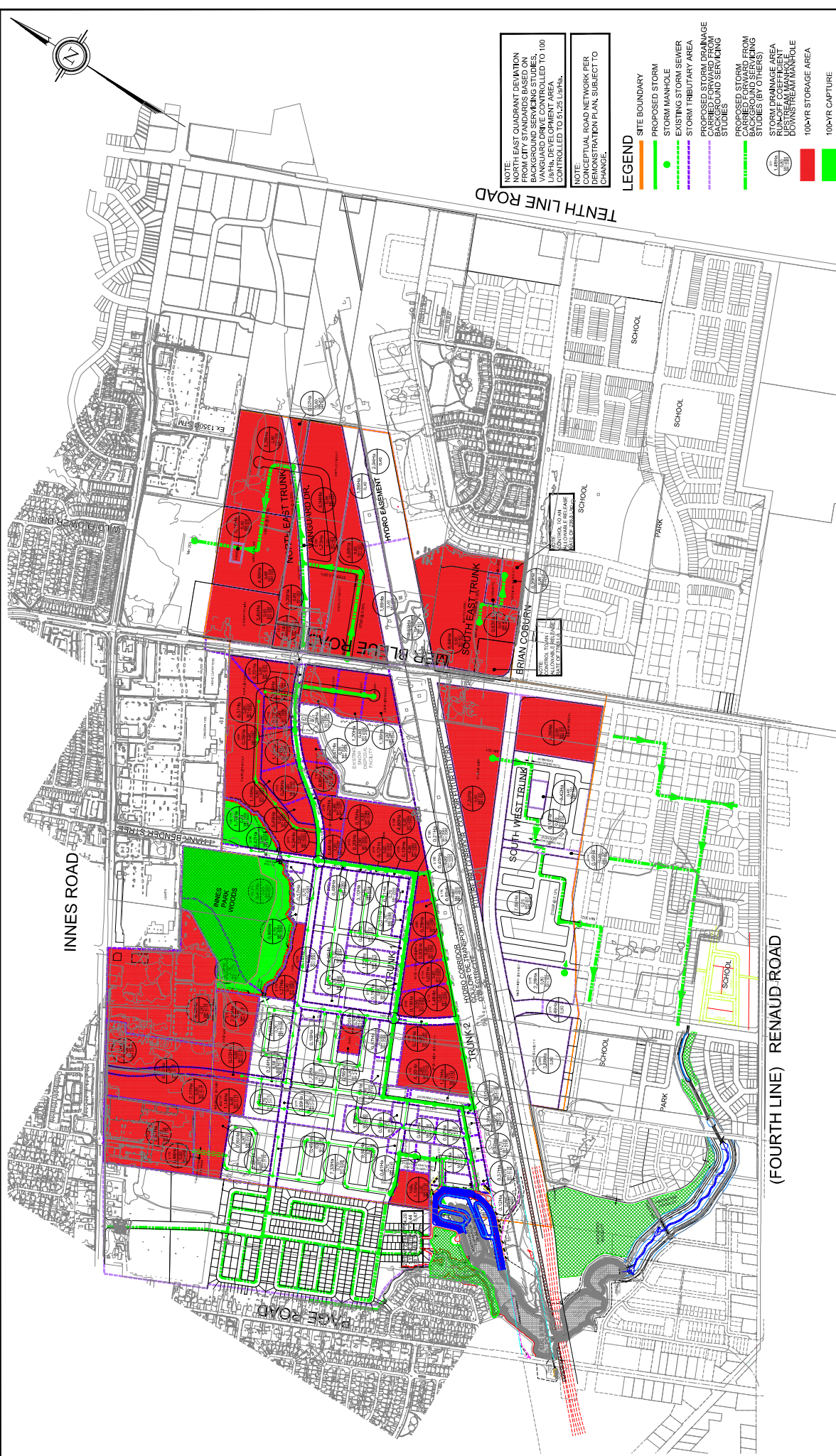
Total Drainage Area to SWM Facility (Ultimate Conditions)

Summary of East Urban Community Drainage Area Characteristics

JFSA

Water Resources and
Environmental Consultants





NOTE:
NORTH-EAST QUADRANT DEVIATION FROM CITY STANDARDS BASED ON VANGUARD DRIVE CONTROLLED TO 100 L/64Hr. DEVELOPMENT AREA CONTROLLED TO 5125 L/64Hr.

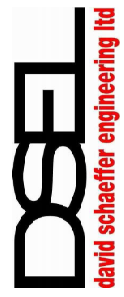
NOTE:
CONCEPTUAL ROAD NETWORK PER DEMONSTRATION PLAN. SUBJECT TO CHANGE.

- LEGEND**
- SITE BOUNDARY
 - PROPOSED STORM
 - STORM MANHOLE
 - EXISTING STORM SEWER
 - STORM TRIBUTARY AREA
 - PROPOSED STORM DRAINAGE CARRIED FORWARD FROM STUDY SOUND SERVICING
 - PROPOSED STORM CARRIED FORWARD FROM STUDY SOUND SERVICING
 - STORM DRAINAGE AREA RUNOFF COEFFICIENT 0.05 (RESIDENTIAL)
 - 100-HR STORAGE AREA
 - 100-HR CAPTURE

PROJECT No. : 14-733
 SCALE : 1:5000
 DATE : JUNE 2019
 DRAWING No. : 4

EAST URBAN COMMUNITY PHASE 3 AREA COMMUNITY DESIGN PLAN
 CONCEPTUAL STORM SERVICING

120 Iber Road, Unit 103
 Stittsville, ON K2S 1E9
 Tel. (613) 836-0856
 Fax. (613) 836-7183
 www.DSEL.ca





STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 3 years
Aerial Roads Return Frequency = 10 years

Manning 0.013

Table with columns: LOCATION, AREA (HA), 2 YEAR, 5 YEAR, 10 YEAR, 100 YEAR, TIME OF CONC., INTENSITY (mm/hr), PEAK FLOW Q (L/S), DIA (mm), TYPE, SLOPE (%), LENGTH (m), CAPACITY (L/S), VELOCITY (m/s), TIME OF RATIO. Rows include Unknown Road7-09, Unknown Road8-08, Unknown Road8-10, Unknown Road8-11, Unknown Road8-12, Unknown Road8-13, Unknown Road8-14, Unknown Road8-15, Unknown Road8-16, Unknown Road8-17, Unknown Road8-18, Unknown Road8-19, Unknown Road8-20.

Notes:
1) Ottawa Rainfall-Intensity Curve
2) Min. Velocity = 0.80 m/s



STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 3 years
Aerial Roads Return Frequency = 10 years

Manning 0.013

Table with columns for LOCATION, AREA (Ha), 5 YEAR, 10 YEAR, 100 YEAR, FLOW (Intensity, 5 Year, 10 Year, 100 Year), PEAK FLOW Q (L/s), DIA. (mm), TYPE, SLOPE (%), LENGTH (m), CAPACITY (L/s), TIME OF RATIO (min), and RATIO (min/Q/Q full).

Notes:
Q = 2.78 A^0.78 I^0.78, where
Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient



STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
Collector Roads Return Frequency = 3 years
Aerial Roads Return Frequency = 10 years

Manning 0.013

Table with columns: LOCATION, AREA (Ha), 2 YEAR, 5 YEAR, 10 YEAR, 100 YEAR, FLOW, PEAK FLOW, DRAINAGE AREA, SLOPE, LENGTH, CAPACITY, TIME OF TRAVEL, RATIO. Rows include various pipe sections and manholes.

Notes: Q = 2.78 AIR, where Q = Peak Flow in Litres per second (L/s)
A = Areas in hectares (Ha)
I = Rainfall Intensity (mm/h)
R = Runoff Coefficient
City of Ottawa
Date: 07 Jun 2019
Sheet No. 15 of 16



STORM SEWER CALCULATION SHEET (RATIONAL METHOD)

Local Roads Return Frequency = 2 years
 Collector Roads Return Frequency = 3 years
 Arterial Roads Return Frequency = 10 years

Manning 0.013

LOCATION	2 YEAR				5 YEAR				10 YEAR				100 YEAR				TIME OF TRAVEL (min)	RATIO
	AREA (Ha)	Perk. (l/s)	Accum. (mm)	R	AREA (Ha)	Perk. (l/s)	Accum. (mm)	R	AREA (Ha)	Perk. (l/s)	Accum. (mm)	R	AREA (Ha)	Perk. (l/s)	Accum. (mm)	R		
Contribution From Unknown Road14 - 13, Pipe 2032 - 2084																		
Contribution From Unknown Road14 - 13, Pipe 2040 - 2084	6.19																	
2084	0.85	0.92	0.70	1.79	25.94													
2085	2.16	0.71	0.70	1.38	27.32													
Contribution From Unknown Road16 - 15, Pipe 2115 - 2116	45.85																	
2116	2.117	0.42	0.70	0.82	73.99													
To Unknown Road12 - 1004, Pipe 2117 - 2122																		
2041	2042	1.39	0.80	3.09	3.09													
2042	2043	1.20	0.80	2.67	5.76													
2043	2044	1.29	0.80	2.87	8.63													
2044	2046				8.63													
Contribution From Unknown Road4 - 06, Pipe 2045 - 2046	3.63																	
2046	2047	0.76	0.80	1.89	13.94													
2047	2048	1.15	0.80	2.56	17.55													
2048	2049	1.14	0.80	2.78	16.33													
2049	2051	0.49	0.80	1.69	21.86													
2049	2057	0.76	0.80	1.89	24.64													
Contribution From Unknown Road4 - 06, Pipe 2056 - 2057	14.14																	
2057	2060	0.44	0.80	0.98	36.79													
Contribution From Unknown Road15 - 14, Pipe 2059 - 2060	0.33																	
2060	2061	0.00	0.00	0.00	40.10													
2061	2062	0.00	0.00	0.00	40.10													
2062	2063	0.00	0.00	0.00	40.10													
2063	2064	0.00	0.00	0.00	40.10													
To Unknown Road21 - 201, Pipe 2064 - 2203																		
Contribution From Unknown Road17 - 17, Pipe 2024 - 2025	17.96																	
2025	2026	0.11	0.70	0.21	18.18													
2026	2119	0.39	0.70	0.76	18.53													
To Unknown Road11 - 1003, Pipe 2119 - 2120																		
2119	2120	0.38	0.70	0.74	20.22													
2120	2121	0.39	0.70	0.76	21.06													
Contribution From Unknown Road24 - 205, Pipe 2141 - 2142	0.72																	
2141	2142	0.52	0.70	1.01	23.25													
Contribution From Unknown Road24 - 205, Pipe 2141 - 2142	0.72																	
2142	2143	0.39	0.70	0.76	23.97													
2143	2144	0.00	0.00	0.00	23.97													

Notes:
 Q = 2.78 AIR, where
 Q = Peak Flow in Litres per second (L/s)
 A = Areas in hectares (Ha)
 I = Rainfall Intensity (mm/h)
 R = Runoff Coefficient

Definitions:
 Q = 2.78 AIR, where
 Q = Peak Flow in Litres per second (L/s)
 A = Areas in hectares (Ha)
 I = Rainfall Intensity (mm/h)
 R = Runoff Coefficient

City of Ottawa
 Date: 07 Jun 2019
 Sheet No. 5 of 6
 ETO

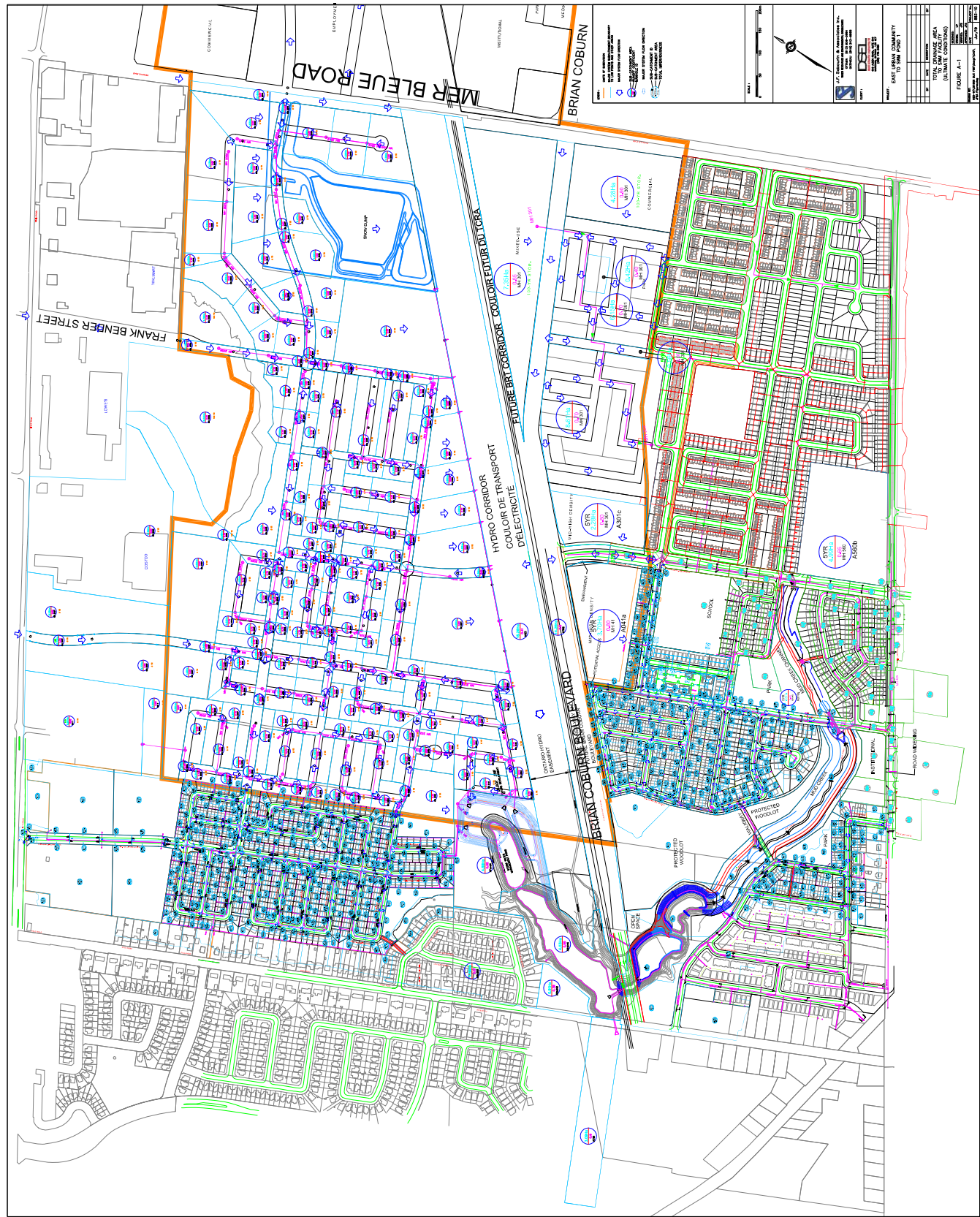


Table A-1: Summary of East Urban Community Drainage Area Characteristics

MH ID	SWMHYMO ID	Area (ha)	C	TIMP	XIMP	Min. Capture ⁽¹⁾	Min. Capture ⁽¹⁾ (m ³ /s)	100-Year Capture ⁽²⁾ (m ³ /s)	100-Year Storage ⁽²⁾		100-Year + 20% Capture ⁽³⁾ (m ³ /s)	100-Year + 20% Storage ⁽³⁾		Notes
									(m ³)	(m ³ /ha)		(m ³)	(m ³ /ha)	
41	A041a	3.70	0.80	86	86	5-Year	0.987	1.125	N/A	N/A	1.125	N/A	N/A	Modelled in DDSWMM; Negligible On-Site Storage Assumed Negligible On-Site Storage Assumed Also Modelled in DDSWMM; Negligible On-Site Storage Assumed
41	A301a	0.40	0.40	29	29	2-Year	0.026	0.030	N/A	N/A	0.032	N/A	N/A	
301	A301b	0.56	0.90	99	99	5-Year	0.159	0.181	46	82	0.194	67	120	
301	A301c	2.28	0.80	86	86	5-Year	0.803	0.529	N/A	N/A	0.603	N/A	N/A	
301	A301d	4.28	0.90	99	99	2-Year	0.817	0.931	573	134	0.996	831	194	
301	A301e	6.15	0.70	71	66	2-Year	0.771	0.879	857	139	0.941	1242	202	
301	A301f	7.35	0.85	93	93	2-Year	1.441	1.441	973	132	1.542	1411	192	
301	A301g	8.61	0.70	71	66	2-Year	1.049	1.196	1150	134	1.280	1668	194	
1i	A11a	0.98	0.80	86	81	5-Year	0.233	0.266	77	79	0.285	112	114	
1i	A11b	5.61	0.90	99	99	5-Year	1.465	1.670	417	74	1.787	605	108	
1i	A11c	0.96	0.80	86	81	5-Year	0.229	0.261	75	78	0.279	109	114	
20001	A2000a	0.53	0.70	71	66	2-Year	0.075	0.086	70	132	0.092	102	192	
2001	A2001a	0.08	0.70	71	66	2-Year	0.011	0.013	12	145	0.014	17	213	
2002	A2002a	0.41	0.70	71	66	2-Year	0.058	0.066	55	134	0.071	80	195	
2002	A2002b	0.49	0.90	99	99	5-Year	0.139	0.158	41	84	0.169	59	120	
2002	A2002c	0.41	0.70	71	66	2-Year	0.058	0.066	55	134	0.071	80	195	
2003	A2003a	0.49	0.70	71	66	2-Year	0.069	0.079	66	134	0.085	95	194	
2004	A2004a	0.07	0.70	71	66	2-Year	0.010	0.011	10	147	0.012	15	214	
2005	A2005a	0.31	0.70	71	66	2-Year	0.044	0.050	42	135	0.054	61	197	
2006	A2006a	0.33	0.70	71	66	2-Year	0.047	0.054	44	133	0.058	64	194	
2007	A2007a	0.20	0.70	71	66	2-Year	0.029	0.033	27	133	0.035	39	195	
2008	A2008a	0.78	0.70	71	66	2-Year	0.109	0.124	105	134	0.133	152	195	
2009	A2009a	0.27	0.70	71	66	2-Year	0.038	0.043	37	137	0.046	54	200	
2010	A2010a	0.28	0.70	71	66	2-Year	0.040	0.046	37	133	0.049	54	193	
2011	A2011a	0.28	0.70	71	66	2-Year	0.040	0.046	37	133	0.049	54	193	
2012	A2012a	0.19	0.70	71	66	2-Year	0.027	0.031	26	136	0.033	37	195	
2013	A2013a	0.78	0.70	71	66	2-Year	0.109	0.124	105	134	0.133	152	195	
2014	A2014a	0.78	0.70	71	66	2-Year	0.109	0.124	105	134	0.133	152	195	
2015	A2015a	0.20	0.70	71	66	2-Year	0.029	0.033	27	133	0.035	39	195	
2016	A2016a	0.32	0.70	71	66	2-Year	0.045	0.051	44	137	0.055	63	197	
2017	A2017a	0.28	0.70	71	66	2-Year	0.040	0.046	37	133	0.049	54	193	
2018	A2018a	0.21	0.70	71	66	2-Year	0.030	0.034	29	136	0.036	41	195	
2019	A2019a	0.21	0.70	71	66	2-Year	0.030	0.034	29	136	0.036	41	195	
2020	A2020a	0.71	0.70	71	66	2-Year	0.099	0.113	96	135	0.121	138	194	
2021	A2021a	0.78	0.70	71	66	2-Year	0.109	0.124	105	134	0.133	152	195	
2022	A2022a	0.19	0.70	71	66	2-Year	0.027	0.031	26	136	0.033	37	195	
2023	A2023a	0.27	0.70	71	66	2-Year	0.038	0.043	37	137	0.046	54	200	
2024	A2024a	0.39	0.70	71	66	2-Year	0.055	0.063	52	134	0.067	76	195	
2025	A2025a	0.11	0.70	71	66	2-Year	0.016	0.018	15	138	0.019	22	200	
2026	A2026a	1.16	0.40	29	19	5-Year	0.083	0.095	177	153	0.102	257	222	
2026	A2026b	0.39	0.70	71	66	2-Year	0.055	0.063	52	134	0.067	76	195	
2027	A2027a	0.28	0.70	71	66	2-Year	0.040	0.046	37	133	0.049	54	193	
2028	A2028a	0.16	0.70	71	66	2-Year	0.023	0.026	22	137	0.028	32	200	
2029	A2029a	0.23	0.70	71	66	2-Year	0.033	0.038	31	133	0.041	44	191	
2030	A2030a	0.63	0.70	71	66	2-Year	0.088	0.100	85	135	0.107	123	195	
2031	A2031a	0.27	0.70	71	66	2-Year	0.038	0.043	37	137	0.046	54	200	
2033	A2033a	0.28	0.70	71	66	2-Year	0.040	0.046	37	133	0.049	54	193	
2033	A2033b	0.25	0.90	99	99	5-Year	0.071	0.081	22	88	0.087	32	128	
2033	A2033c	0.55	0.70	71	66	2-Year	0.077	0.088	74	134	0.094	107	195	
2034	A2034a	0.40	0.70	71	66	2-Year	0.057	0.065	53	133	0.070	77	193	
2034	A2034b	0.23	0.70	71	66	2-Year	0.033	0.038	31	133	0.041	44	191	
2034	A2034c	0.24	0.90	99	99	5-Year	0.069	0.079	21	86	0.085	30	125	
2035	A2035a	0.33	0.70	71	66	2-Year	0.047	0.054	44	133	0.058	64	194	
2035	A2035b	0.28	0.90	99	99	5-Year	0.080	0.091	24	86	0.097	35	125	
2036	A2036a	0.21	0.70	71	66	2-Year	0.030	0.034	29	136	0.036	41	195	

Table A-1: Summary of East Urban Community Drainage Area Characteristics

MH ID	SWMHVMO ID	Area (ha)	C	TIMP	XIMP	Min. Capture ⁽¹⁾	Min. Capture ⁽¹⁾ (m ³ /s)	100-Year Capture ⁽²⁾ (m ³ /s)	100-Year Storage ⁽²⁾		100-Year + 20% Capture ⁽³⁾ (m ³ /s)	100-Year + 20% Storage ⁽³⁾		Notes
									(m ³)	(m ³ /ha)		(m ³)	(m ³ /ha)	
2036	A2036b	0.28	0.90	99	99	5-Year	0.080	0.091	24	86	0.097	35	125	
2036	A2036c	1.27	0.40	29	19	5-Year	0.091	0.104	194	152	0.111	281	221	
2037	A2037a	0.20	0.70	71	66	2-Year	0.029	0.033	27	133	0.035	39	195	
2037	A2037b	0.21	0.90	99	99	5-Year	0.068	0.068	19	89	0.073	27	129	
2037	A2037c	0.18	0.70	71	66	2-Year	0.026	0.030	24	133	0.032	35	194	
2038	A2038a	0.12	0.70	71	66	2-Year	0.017	0.019	17	142	0.020	25	208	
2038	A2038b	0.11	0.90	99	99	5-Year	0.032	0.036	10	91	0.039	14	127	
2039	A2039a	0.23	0.70	71	66	2-Year	0.033	0.038	31	133	0.041	44	191	
2039	A2039b	0.19	0.90	99	99	5-Year	0.054	0.062	17	89	0.066	24	126	
2039	A2039c	0.20	0.70	71	66	2-Year	0.029	0.033	27	133	0.035	39	195	
2040	A2040a	0.20	0.70	71	66	2-Year	0.029	0.033	27	133	0.035	39	195	
2040	A2040b	0.15	0.90	99	99	5-Year	0.043	0.049	14	90	0.052	20	133	
2041	A2041a	1.39	0.80	86	81	2-Year	0.234	0.267	184	132	0.286	266	191	
2042	A2042a	1.20	0.80	86	81	2-Year	0.203	0.231	159	132	0.247	230	192	
2043	A2043a	1.29	0.80	86	81	2-Year	0.217	0.247	171	133	0.264	248	192	
2044	A2044a	2.14	0.90	99	99	10-Year	0.694	0.791	N/A	N/A	0.846	N/A	N/A	Negligible On-Site Storage Assumed; Major Flow to External System
2044	A2044b	0.22	0.90	99	99	5-Year	0.063	0.072	19	87	0.077	28	127	
2045	A2045a	1.63	0.80	86	81	2-Year	0.272	0.310	216	133	0.332	313	192	
2046	A2046a	0.76	0.80	86	81	2-Year	0.130	0.148	101	133	0.158	147	193	
2046	A2046b	0.23	0.90	99	99	5-Year	0.066	0.075	20	87	0.080	29	126	
2047	A2047a	1.15	0.80	86	81	2-Year	0.195	0.222	152	132	0.238	220	191	
2047	A2047b	0.26	0.90	99	99	5-Year	0.074	0.084	23	88	0.090	33	127	
2047	A2047c	0.47	0.80	86	81	2-Year	0.081	0.092	64	135	0.098	92	196	
2048	A2048a	0.80	0.80	86	81	2-Year	0.137	0.156	106	133	0.167	154	193	
2048	A2048b	1.14	0.80	86	81	2-Year	0.193	0.220	151	132	0.235	219	192	
2048	A2048c	0.26	0.90	99	99	5-Year	0.074	0.084	23	88	0.090	33	127	
2049	A2049a	0.25	0.90	99	99	5-Year	0.085	0.097	66	134	0.104	95	194	
2049	A2049b	0.49	0.80	86	81	2-Year	0.085	0.097	66	134	0.104	95	194	
2049	A2049c	0.76	0.80	86	81	2-Year	0.130	0.148	101	133	0.158	147	193	
2050	A2050a	2.13	0.80	86	81	2-Year	0.350	0.399	285	134	0.427	413	194	
2051	A2051a	1.34	0.80	86	81	2-Year	0.226	0.258	177	132	0.276	256	191	
2052	A2052a	0.25	0.80	86	81	2-Year	0.044	0.050	34	136	0.054	49	196	
2053	A2053a	1.00	0.80	86	81	2-Year	0.170	0.194	132	132	0.208	192	192	
2054	A2054a	0.66	0.80	86	81	2-Year	0.113	0.129	88	134	0.138	128	194	
2055	A2055a	0.36	0.80	86	81	2-Year	0.063	0.072	48	134	0.077	70	194	
2056	A2056a	0.62	0.80	86	81	2-Year	0.107	0.122	83	133	0.131	120	194	
2057	A2057a	0.44	0.80	86	81	2-Year	0.076	0.087	59	135	0.093	86	195	
2057	A2057b	0.24	0.90	99	99	5-Year	0.069	0.079	21	86	0.085	30	125	
2058	A2058a	1.78	0.40	29	19	100-Year	0.434	0.434	N/A	N/A	0.464	N/A	N/A	Negligible On-Site Storage Assumed
2058	A2058b	0.42	0.90	99	99	5-Year	0.120	0.137	35	83	0.147	51	121	
2058	A2058c	9.40	0.40	29	19	100-Year	1.713	1.713	N/A	N/A	1.833	N/A	N/A	Negligible On-Site Storage Assumed
2059	A2059a	0.28	0.90	99	99	5-Year	0.080	0.091	24	86	0.097	35	125	
2059	A2059b	0.17	0.70	71	66	2-Year	0.024	0.027	24	140	0.029	34	200	
2060	A2060a	0.20	0.90	99	99	5-Year	0.057	0.065	18	89	0.070	26	130	
2061	A2061a	0.20	0.90	99	99	5-Year	0.057	0.065	18	89	0.070	26	130	
2062	A2062a	0.13	0.90	99	99	5-Year	0.037	0.042	12	93	0.045	17	131	
2063	A2063a	0.19	0.90	99	99	5-Year	0.054	0.062	17	89	0.066	24	126	
2065	A2065a	0.21	0.90	99	99	5-Year	0.060	0.068	19	89	0.073	27	129	
2065	A2065b	0.21	0.70	71	66	2-Year	0.030	0.034	29	136	0.036	41	195	
2066	A2066a	0.28	0.80	86	81	5-Year	0.080	0.091	24	86	0.097	35	125	
2066	A2066b	0.32	0.70	71	66	2-Year	0.045	0.051	44	137	0.055	63	197	
2067	A2067a	1.18	0.70	71	66	2-Year	0.163	0.186	159	134	0.199	230	195	
2068	A2068a	0.24	0.70	71	66	2-Year	0.034	0.039	33	136	0.042	47	196	
2069	A2069a	1.16	0.70	71	66	2-Year	0.160	0.182	157	135	0.195	227	196	
2070	A2070a	0.24	0.70	71	66	2-Year	0.034	0.039	33	136	0.042	47	196	

Table A-1: Summary of East Urban Community Drainage Area Characteristics

MH ID	SWMHVMO ID	Area (ha)	C	TIMP	XIMP	Min. Capture ⁽¹⁾	Min. Capture ⁽¹⁾ (m ³ /s)	100-Year Capture ⁽²⁾ (m ³ /s)	100-Year Storage ⁽²⁾		100-Year + 20% Capture ⁽³⁾ (m ³ /s)	100-Year + 20% Storage ⁽³⁾		Notes
									(m ³ /ha)	(m ³)		(m ³ /ha)	(m ³)	
2071	A2071a	0.34	0.70	71	66	2-Year	0.048	0.055	46	135	0.059	66	194	
2072	A2072a	0.20	0.90	99	99	5-Year	0.057	0.065	18	89	0.065	26	130	
2073	A2073a	0.59	0.70	71	66	2-Year	0.083	0.095	79	133	0.102	114	193	
2074	A2074a	0.73	0.70	71	66	2-Year	0.116	0.116	98	134	0.116	142	195	
2075	A2075a	0.19	0.90	99	99	5-Year	0.054	0.062	17	89	0.066	24	126	
2076	A2076a	1.42	0.70	71	66	2-Year	0.195	0.222	192	135	0.238	278	196	
2077	A2077a	0.63	0.70	71	66	2-Year	0.088	0.100	85	135	0.107	123	195	
2078	A2078a	0.54	0.70	71	66	2-Year	0.076	0.087	72	133	0.093	104	193	
2079	A2079a	0.21	0.70	71	66	2-Year	0.030	0.034	29	136	0.036	41	195	
2080	A2080a	0.16	0.70	71	66	2-Year	0.026	0.026	22	137	0.028	32	200	
2081	A2081a	0.76	0.70	71	66	2-Year	0.106	0.121	102	134	0.129	148	195	
2082	A2082a	0.55	0.70	71	66	2-Year	0.077	0.088	74	134	0.094	107	195	
2083	A2083a	0.18	0.90	99	99	5-Year	0.052	0.059	16	88	0.063	23	128	
2084	A2084a	0.92	0.70	71	66	2-Year	0.128	0.146	123	134	0.156	179	195	
2085	A2085a	0.71	0.70	71	66	2-Year	0.099	0.113	96	135	0.121	138	194	
2086	A2086a	0.59	0.70	71	66	2-Year	0.083	0.095	79	133	0.102	114	193	
2087	A2087a	0.30	0.90	99	99	5-Year	0.086	0.098	26	85	0.105	37	123	
2087	A2087b	0.53	0.70	71	66	2-Year	0.086	0.086	70	132	0.092	102	192	
2088	A2088a	0.57	0.70	71	66	2-Year	0.080	0.091	77	135	0.097	111	195	
2089	A2089a	0.41	0.70	71	66	2-Year	0.058	0.066	55	134	0.071	80	195	
2090	A2090a	2.18	0.40	29	19	100-Year	0.527	0.527	N/A	N/A	0.564	N/A	N/A	Negligible On-Site Storage Assumed
2090	A2090b	9.46	0.90	99	99	2-Year	1.693	1.930	1293	137	2.065	1875	198	
2090	A2090c	0.41	0.70	71	66	2-Year	0.058	0.066	55	134	0.071	80	195	
2091	A2091a	0.16	0.70	71	66	2-Year	0.023	0.026	22	137	0.028	32	200	
2091	A2091b	0.17	0.70	71	66	2-Year	0.024	0.027	24	140	0.029	34	200	
2091	A2091c	0.19	0.90	99	99	5-Year	0.054	0.062	17	89	0.066	24	126	
2092	A2092a	0.20	0.70	71	66	2-Year	0.029	0.033	27	133	0.035	39	195	
2092	A2092b	0.17	0.70	71	66	2-Year	0.024	0.027	24	140	0.029	34	200	
2092	A2092c	0.17	0.90	99	99	5-Year	0.049	0.056	15	88	0.060	22	129	
2093	A2093a	1.03	0.70	71	66	2-Year	0.143	0.163	138	134	0.174	200	194	
2094	A2094a	0.22	0.70	71	66	2-Year	0.031	0.035	31	139	0.037	44	200	
2095	A2095a	0.30	0.70	71	66	2-Year	0.049	0.049	40	133	0.052	58	193	
2096	A2096a	0.12	0.70	71	66	2-Year	0.017	0.019	17	142	0.020	25	208	
2096	A2096b	0.18	0.90	99	99	5-Year	0.052	0.059	16	88	0.063	23	128	
2097	A2097a	3.12	0.90	99	99	5-Year	0.842	0.960	237	76	1.027	343	110	
2097	A2097b	2.95	0.80	86	81	5-Year	0.676	0.771	222	75	0.825	322	109	
2097	A2097c	0.72	0.90	99	99	5-Year	0.204	0.233	58	81	0.249	84	117	
2097	A2097d	0.24	0.80	86	81	5-Year	0.058	0.066	20	85	0.071	29	121	
2097	A2097e	2.77	0.90	99	99	5-Year	0.752	0.857	211	76	0.917	306	110	
2097	A2097f	1.14	0.80	86	81	5-Year	0.270	0.308	89	78	0.330	129	113	
2098	A2098a	0.39	0.70	71	66	2-Year	0.055	0.063	52	134	0.067	76	195	
2099	A2099a	0.84	0.70	71	66	2-Year	0.048	0.055	46	135	0.059	66	194	
2099	A2099b	0.18	0.70	71	66	2-Year	0.026	0.030	24	133	0.032	35	194	
2099	A2099c	0.25	0.70	71	66	2-Year	0.036	0.041	33	133	0.044	48	192	
2100	A2100a	0.51	0.70	71	66	2-Year	0.072	0.082	68	134	0.088	99	194	
2101	A2101a	0.50	0.70	71	66	2-Year	0.071	0.081	66	133	0.087	96	192	
2102	A2102a	0.31	0.70	71	66	2-Year	0.044	0.050	42	135	0.054	61	197	
2103	A2103a	0.56	0.40	29	19	5-Year	0.046	0.052	77	137	0.056	112	200	
2103	A2103b	0.38	0.70	71	66	2-Year	0.038	0.062	50	133	0.066	73	192	
2104	A2104a	0.24	0.70	71	66	2-Year	0.034	0.039	33	136	0.042	47	196	
2105	A2105a	0.44	0.70	71	66	2-Year	0.062	0.071	59	134	0.076	85	193	
2106	A2106a	0.23	0.70	71	66	2-Year	0.033	0.038	31	133	0.041	44	191	
2107	A2107a	0.26	0.70	71	66	2-Year	0.037	0.042	35	135	0.045	51	196	
2108	A2108a	0.32	0.70	71	66	2-Year	0.045	0.051	44	137	0.055	63	197	
2109	A2109a	0.51	0.70	71	66	2-Year	0.072	0.082	68	134	0.088	99	194	

Table A-1: Summary of East Urban Community Drainage Area Characteristics

MH ID	SWMHVMO ID	Area (ha)	C	TIMP	XIMP	Min. Capture ⁽¹⁾	Min. Capture ⁽¹⁾ (m ³ /s)	100-Year Capture ⁽²⁾		100-Year Storage ⁽²⁾		100-Year + 20% Capture ⁽³⁾		100-Year + 20% Storage ⁽³⁾		Notes
								(m ³ /s)	(m ³ /s)	(m ³)	(m ³ /ha)	(m ³ /s)	(m ³ /s)	(m ³)	(m ³ /ha)	
2110	A2110a	0.24	0.70	71	66	2-Year	0.034	0.039	33	136	0.042	47	196			
2111	A2111a	0.17	0.70	71	66	2-Year	0.024	0.027	24	140	0.029	34	200			
2112	A2112a	0.07	0.70	71	66	2-Year	0.010	0.011	10	147	0.012	15	214			
2113	A2113a	0.13	0.70	71	66	2-Year	0.019	0.022	17	132	0.024	25	192			
2114	A2114a	0.57	0.70	71	66	2-Year	0.080	0.091	77	135	0.097	111	195			
2115	A2115a	0.48	0.70	71	66	2-Year	0.068	0.078	64	133	0.083	92	192			
2116	A2116a	0.42	0.70	71	66	2-Year	0.059	0.067	57	136	0.072	83	198			
2118	A2118a	0.61	0.70	71	66	2-Year	0.086	0.098	81	133	0.105	118	193			
2119	A2119a	0.38	0.70	71	66	2-Year	0.054	0.062	50	133	0.066	73	192			
2120	A2120a	0.43	0.70	71	66	2-Year	0.061	0.070	57	133	0.075	83	193			
2121	A2121a	0.52	0.70	71	66	2-Year	0.073	0.083	70	135	0.089	102	196			
2122	A2122a	1.17	0.70	71	66	2-Year	0.162	0.185	157	134	0.198	227	194			
2135	A2135a	0.18	0.70	71	66	2-Year	0.026	0.030	24	133	0.032	35	194			
2136	A2136a	0.37	0.70	71	66	2-Year	0.052	0.059	50	136	0.063	73	197			
2137	A2137a	0.69	0.70	71	66	2-Year	0.097	0.111	92	133	0.119	133	193			
2138	A2138a	0.38	0.70	71	66	2-Year	0.054	0.062	50	133	0.066	73	192			
2139	A2139a	0.38	0.70	71	66	2-Year	0.054	0.062	50	133	0.066	73	192			
2140	A2140a	0.11	0.70	71	66	2-Year	0.016	0.018	15	138	0.019	22	200			
2141	A2141a	0.37	0.70	71	66	2-Year	0.052	0.059	50	136	0.063	73	197			
2203	A2203a	0.40	0.80	86	81	5-Year	0.097	0.111	32	80	0.119	47	118			
2203	A2203b	4.66	0.40	29	19	5-Year	0.420	0.359	642	138	0.384	930	200			
2204	A2204a	0.90	0.80	86	81	5-Year	0.215	0.245	71	79	0.262	102	113			
2205	A2205a	0.84	0.80	86	81	5-Year	0.201	0.229	66	79	0.245	96	114			
2206	A2206a	1.04	0.80	86	81	5-Year	0.247	0.282	81	78	0.302	118	113			
2207	A2207a	1.49	0.80	86	81	5-Year	0.351	0.400	115	77	0.428	166	111			
2208	A2208a	0.39	0.90	99	99	5-Year	0.111	0.127	33	84	0.136	48	123			
2211	A2211a	4.00	0.80	86	81	5-Year	0.903	1.029	300	75	1.101	434	109			
2501	A2501a	0.50	0.70	71	66	2-Year	0.071	0.081	66	133	0.087	96	192			
ForeN	AForeN	4.90	0.55	50	50	100% Capture	N/A	N/A	N/A	N/A	N/A	N/A	N/A			North Forebay
MainS	AHE1	18.26	0.41	30	30	5-Year	0.688	0.688	635	35	0.688	635	35			Modelled in DDSWMM
MainS	ATW1	3.09	0.80	86	86	10-Year	3.295	3.295	1228	71	3.295	1228	397			Modelled in DDSWMM
MainS	ATW2	14.25	0.80	86	86	10-Year	3.295	3.295	1228	71	3.295	1228	397			Modelled in DDSWMM

⁽¹⁾ 2-year capture on local roads, 5-year capture on collector roads, and 10-year capture on arterial roads, with no surface storage used during these events (exceptions and greater than 2-year capture highlighted).

⁽²⁾ 100-year capture set to 11.4% of minimum capture, and 100-year surface storage set to minimum required to contain runoff within surface storage (exceptions as described under Notes).

⁽³⁾ 100-year + 20% stress test capture set at 107% of 100-year capture, and 100-year + 20% stress test storage set to 145% of 100-year storage, based on Abbottsville Crossing pilot project (exceptions as described under Notes).

ATTACHMENT

B

XPSWMM Model Schematic

Pipe Data and Hydraulic Simulation Results

Major System Flow Depth Calculations

JFSA

Water Resources and
Environmental Consultants



Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
1	2	84.836	84.565	450	77.5	0.4	0.013	87.787	87.641	1.06	0.17	0.09	0.5	-0.209	1.01	85.077	84.774	B91W	85.99	0.913		
2	3	84.535	84.483	450	13.0	0.4	0.013	87.641	87.716	1.13	0.18	0.09	0.5	-0.211	1.02	84.774	84.686	N/A	N/A		N/A	
3	4	84.333	84.218	600	38.5	0.3	0.013	87.716	87.586	1.19	0.34	0.17	0.5	-0.283	1.02	84.650	84.546	B90N	85.76	1.110		
4	8	84.143	84.095	675	24.0	0.2	0.013	87.586	87.608	1.05	0.38	0.22	0.6	-0.272	1.03	84.546	84.513	N/A	N/A		N/A	
5	6	84.639	84.427	525	106.0	0.2	0.013	87.722	87.781	0.89	0.19	0.12	0.6	-0.204	1.00	84.960	84.807	B87S	85.67	0.710		
6	12	84.352	84.177	600	87.5	0.2	0.013	87.781	87.701	0.97	0.27	0.23	0.8	-0.145	1.01	84.807	84.531	B95SS	85.57	0.763		
7	8	84.550	84.300	450	83.5	0.3	0.013	87.620	87.608	0.98	0.16	0.15	1.0	-0.047	1.09	84.953	84.574	B84W	85.52	0.567		
8	14	84.075	83.640	675	87.0	0.5	0.013	87.608	87.229	1.66	0.59	0.44	0.7	-0.237	1.04	84.513	84.059	N/A	N/A		N/A	
9	10	84.648	84.447	525	100.5	0.2	0.013	87.795	87.658	0.89	0.19	0.14	0.7	-0.158	1.00	85.015	84.883	B94NN	85.78	0.765		
10	11	84.297	84.131	675	110.5	0.2	0.013	87.658	87.429	0.91	0.33	0.31	0.9	-0.089	1.02	84.883	84.675	B96SS	85.56	0.677		
11	12	84.611	84.417	300	48.5	0.4	0.013	87.429	87.701	0.87	0.06	0.01	0.1	-0.236	1.03	84.675	84.531	B79E	85.53	0.855		
11	18	84.071	83.995	675	50.5	0.2	0.013	87.429	87.453	0.91	0.33	0.38	1.2	-0.071	1.03	84.675	84.384	B80E	85.38	0.705		
12	13	84.117	83.933	600	61.5	0.3	0.013	87.701	87.583	1.19	0.34	0.29	0.8	-0.186	1.02	84.531	84.280	B77W	85.51	0.979		
13	14	83.783	83.565	750	72.5	0.3	0.013	87.583	87.229	1.38	0.61	0.39	0.6	-0.269	1.03	84.264	84.049	B75W	85.37	1.106		
14	14	83.415	83.393	900	5.5	0.4	0.013	87.229	87.196	1.80	1.14	0.83	0.7	-0.266	1.04	84.049	83.998	N/A	N/A		N/A	
15	17	84.180	83.645	1200	107.0	0.5	0.013	87.920	87.688	2.44	2.76	0.08	0.0	-1.064	1.00	84.316	84.129	B97NN	85.85	1.534		
17	170	83.015	82.954	1800	60.5	0.1	0.013	87.688	87.537	1.43	3.63	2.24	0.6	-0.686	1.03	84.129	84.068	B96NS	85.72	1.591		
18	19	82.720	82.645	1950	75.0	0.1	0.013	87.453	87.272	1.51	4.50	2.76	0.6	-0.631	1.05	84.039	84.013	N/A	N/A		N/A	
19	19S	82.495	82.494	2100	1.0	0.1	0.013	87.272	87.272	1.58	5.48	4.33	0.8	-0.582	1.05	84.013	84.010	N/A	N/A		N/A	
19	19W	83.723	83.721	750	1.0	0.2	0.013	87.272	87.272	1.13	0.50	-0.11	-0.2	-0.397	0.96	84.076	84.013	N/A	N/A		N/A	
20	20S	82.392	82.391	2100	1.0	0.1	0.013	87.148	87.148	1.58	5.48	4.40	0.8	-0.531	1.06	83.961	83.958	N/A	N/A		N/A	
20	20W	84.186	84.183	375	1.0	0.3	0.013	87.148	87.148	0.79	0.09	-0.05	-0.5	-0.223	1.00	84.338	84.396	N/A	N/A		N/A	
21	22	82.264	82.210	2100	54.5	0.1	0.013	87.025	86.460	1.58	5.48	4.43	0.8	-0.451	1.07	83.913	83.860	68	85.16	1.247		
22	Chan2	82.180	82.150	2100	29.5	0.1	0.013	86.460	86.700	1.58	10.97	4.38	0.4	-0.420	1.08	83.860	83.849	N/A	N/A		N/A	
23	230	83.463	83.245	750	109.0	0.2	0.013	87.057	86.944	1.13	0.50	0.25	0.5	-0.356	1.13	83.857	83.555	B74W	85.14	1.283		
24	25	82.565	82.523	1350	21.0	0.2	0.013	86.989	86.774	1.67	2.39	1.07	0.4	-0.621	1.11	83.294	83.276	N/A	N/A		N/A	
25	250	82.493	82.416	1350	38.5	0.2	0.013	86.774	86.730	1.67	2.39	1.11	0.5	-0.567	1.10	83.276	83.249	17	85.09	1.814		
26	27	82.338	82.020	1350	63.5	0.5	0.013	86.637	86.394	2.64	3.77	1.55	0.4	-0.460	1.02	83.228	83.218	N/A	N/A		N/A	
27	Chan3	81.990	81.800	1350	38.0	0.5	0.013	86.394	86.300	2.64	3.77	1.50	0.4	-0.122	0.99	83.218	83.211	N/A	N/A		N/A	
28	29	84.242	84.190	375	17.5	0.3	0.013	87.130	87.017	0.87	0.10	0.00	0.0	-0.256	0.88	84.361	84.360	52	85.18	0.819		
29	30	83.965	83.760	600	82.0	0.3	0.013	87.017	87.075	1.09	0.31	0.20	0.6	-0.205	0.98	84.360	84.070	53	85.16	0.800		
30	31	83.685	83.601	675	33.5	0.3	0.013	87.075	86.964	1.17	0.42	0.25	0.6	-0.290	1.01	84.070	83.987	42	85.14	1.070		
31	32	83.541	83.463	675	31.0	0.3	0.013	86.964	86.962	1.17	0.42	0.30	0.7	-0.229	1.02	83.987	83.920	41	85.08	1.093		
32	33	83.433	83.309	675	41.5	0.3	0.013	86.962	86.911	1.29	0.46	0.36	0.8	-0.188	1.00	83.920	83.753	39	85.01	1.090		
33	34	83.249	83.210	675	13.0	0.3	0.013	86.911	86.830	1.29	0.46	0.36	0.8	-0.171	1.01	83.753	83.679	37	85.13	1.377		
34	35	83.180	83.026	675	44.0	0.4	0.013	86.830	86.728	1.39	0.50	0.41	0.8	-0.176	1.01	83.679	83.441	22	84.97	1.291		
35	26	82.951	82.938	750	6.5	0.2	0.013	86.728	86.637	1.13	0.50	0.41	0.8	-0.260	1.02	83.441	83.331	20	85.01	1.569		
N3900	N54	83.086	83.063	2743	22.9	0.1	0.013	88.154	88.111	1.89	11.18	5.01	0.4	-0.940	1.10	84.889	84.858	IBI (FUT)	N/A	N/A		
N3900	39	N/A	N/A	N/A	N/A	N/A	N/A	88.154	88.154	N/A	N/A	0.51	N/A	N/A	1.17	84.889	84.623	N/A	N/A		N/A	
N3900	41	83.331	83.729	1200	102.0	0.1	0.013	87.901	87.791	1.09	1.23	0.65	0.5	-0.560	1.09	84.471	84.390	B133W	85.88	1.409		
N3900	41	83.429	83.315	1500	114.0	0.1	0.013	87.791	87.688	1.26	2.24	2.18	1.0	-0.539	1.02	84.390	84.129	B132E	85.88	1.490		
43	44	83.752	83.283	375	67.0	0.7	0.013	86.937	86.631	1.33	0.15	0.07	0.5	-0.187	1.01	83.940	83.490	B4L120	85.11	1.170		
44	45	83.253	83.173	375	10.0	0.8	0.013	86.631	86.547	1.42	0.16	0.09	0.6	-0.138	1.02	83.490	83.378	B6L116	84.63	1.140		
45	46	83.023	82.468	525	111.0	0.5	0.013	86.547	86.360	1.40	0.30	0.14	0.5	-0.278	1.06	83.270	82.715	B1B	84.56	1.290		

Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
46	Ex102	82.318	81.915	675	80.6	0.5	0.013	86.360	86.237	1.66	0.59	0.28	0.5	-0.280	1.07	82.713	82.590	B15L1	84.44	1.727		
470	460	83.214	82.860	450	59.0	0.6	0.013	86.407	86.519	1.39	0.22	0.03	0.1	-0.352	0.95	83.312	83.071	B13L1	84.51	1.198		
48	49	83.384	83.360	300	6.0	0.4	0.013	86.367	86.328	0.87	0.06	0.03	0.6	-0.141	1.17	83.543	83.501	N/A	N/A	N/A		
49	50	83.285	82.955	375	66.0	0.5	0.013	86.328	86.244	1.12	0.12	0.05	0.4	-0.203	1.17	83.457	83.120	B8L1	84.23	0.773		
50	ExPlug2	82.880	82.836	450	22.0	0.2	0.013	86.244	86.132	0.80	0.13	0.05	0.4	-0.219	1.08	83.111	83.088	N/A	N/A	N/A		
N3901	N54	85.529	85.396	457	53.6	0.2	0.013	88.166	88.154	0.90	0.15	0.15	1.0	-0.099	0.99	85.887	85.665	IBI (FUT)	N/A	N/A		
N54	N55	83.033	82.918	2743	114.7	0.1	0.013	88.111	88.003	1.89	11.18	5.08	0.5	-0.918	1.11	84.858	84.814	IBI (FUT)	N/A	N/A		
N55	N56	82.898	82.750	2743	148.3	0.1	0.013	88.003	87.980	1.89	11.18	5.15	0.5	-0.827	1.12	84.814	84.777	IBI (FUT)	N/A	N/A		
N56	N57	82.600	82.570	3048	30.2	0.1	0.013	87.980	87.347	2.02	14.73	12.09	0.8	-0.871	1.11	84.777	84.715	IBI (FUT)	N/A	N/A		
N56	N101	84.082	84.000	610	63.1	0.1	0.013	87.980	87.410	0.79	0.23	0.41	1.8	0.085	1.23	84.777	84.547	IBI (FUT)	N/A	N/A		
N57	Chan1	82.570	82.554	3048	15.9	0.1	0.013	87.347	87.800	2.04	14.88	13.42	0.9	-0.903	1.11	84.715	84.567	IBI (FUT)	N/A	N/A		
170	18	82.934	82.870	1800	64.5	0.1	0.013	87.537	87.453	1.43	3.63	2.27	0.6	-0.666	1.04	84.068	84.039	B96SS	85.56	1.492		
460	46	82.840	82.543	450	49.5	0.6	0.013	86.519	86.360	1.39	0.22	0.10	0.4	-0.219	1.17	83.071	82.749	B13L5	84.51	1.439		
19S	20	82.494	82.412	2100	82.0	0.1	0.013	87.272	87.148	1.58	5.48	4.40	0.8	-0.584	1.06	84.010	83.961	N/A	N/A	N/A		
19W	23	83.721	83.483	750	119.0	0.2	0.013	87.272	87.057	1.13	0.50	0.14	0.3	-0.458	1.14	84.013	83.857	B71W	85.25	1.237		
20S	21	82.392	82.284	2100	106.5	0.1	0.013	87.148	87.025	1.58	5.48	4.41	0.8	-0.534	1.07	83.958	83.913	64	85.23	1.272		
20W	30	84.183	83.985	375	79.5	0.3	0.013	87.148	87.075	0.79	0.09	0.05	0.6	-0.162	1.00	84.396	84.149	56	85.28	0.884		
47	48	83.634	83.414	300	55.0	0.4	0.013	86.434	86.367	0.87	0.06	0.03	0.6	-0.134	1.17	83.800	83.555	B10L1	84.52	0.720		
Chan1	Chan1a	82.477	82.350	N/A	117.5	N/A	N/A	87.800	87.800	N/A	N/A	13.21	N/A	N/A	1.12	84.567	84.402	N/A	N/A	N/A		
Chan1a	Chan1b	82.350	82.300	N/A	54.4	N/A	N/A	87.800	87.800	N/A	N/A	13.05	N/A	N/A	1.15	84.402	84.290	N/A	N/A	N/A		
Chan1b	Chan1c	82.300	82.280	2100	18.0	0.1	0.013	87.800	87.800	1.76	22.23	13.00	0.6	-0.110	1.16	84.290	84.271	N/A	N/A	N/A		
Chan1c	Chan1d	82.280	82.189	N/A	88.1	N/A	N/A	87.800	87.800	N/A	N/A	12.95	N/A	N/A	1.17	84.271	83.981	N/A	N/A	N/A		
Chan1d	Chan1e	82.189	82.160	N/A	37.0	N/A	N/A	87.800	85.900	N/A	N/A	12.85	N/A	N/A	1.19	83.981	83.933	N/A	N/A	N/A		
Chan2	Chan3a	81.654	81.320	N/A	340.7	N/A	N/A	86.700	86.300	N/A	N/A	18.39	N/A	N/A	1.23	83.849	83.338	N/A	N/A	N/A		
Chan3	Chan4	81.200	81.080	N/A	175.5	N/A	N/A	86.300	86.100	N/A	N/A	19.44	N/A	N/A	1.33	83.211	82.738	N/A	N/A	N/A		
Chan4	ForeS	81.080	81.072	N/A	7.6	N/A	N/A	86.100	83.500	N/A	N/A	20.03	N/A	N/A	1.33	82.738	82.737	N/A	N/A	N/A		
DICB	15	84.647	84.405	975	22.0	1.1	0.013	86.190	87.920	3.15	2.35	0.00	0.0	-0.975	0.00	84.647	84.316	N/A	N/A	N/A		
Ex100	Ex111	82.193	82.180	975	18.7	0.1	0.013	85.372	84.902	0.79	0.59	0.59	1.0	-0.430	1.00	82.738	82.738	IBI (3)	83.47	0.732		
Ex107	Ex100	82.670	82.590	600	67.9	0.1	0.013	86.060	85.372	0.75	0.21	0.17	0.8	-0.188	1.00	83.082	82.858	IBI (3)	83.58	0.498		
Ex111	Chan4	81.700	81.685	975	15.0	0.1	0.013	84.902	86.100	0.95	0.71	0.59	0.8	0.063	0.98	82.738	82.738	IBI (3)	83.45	0.712		
ExPlug2	Ex107	82.836	82.821	450	7.3	0.2	0.013	86.132	86.060	0.80	0.13	0.05	0.4	-0.198	1.09	83.088	83.082	N/A	N/A	N/A		
ForeN	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	22.39	N/A	N/A	2.98	82.742	82.735	N/A	N/A	N/A		
ForeS	MainS	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	19.69	N/A	N/A	1.40	82.737	82.737	N/A	N/A	N/A		
MainN	Out	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	3.91	N/A	N/A	3.13	82.735	80.100	N/A	N/A	N/A		
MainS	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	13.35	N/A	N/A	1.47	82.737	82.735	N/A	N/A	N/A		
140	141	83.363	83.071	900	73.0	0.4	0.013	87.196	86.812	1.80	1.14	0.85	0.7	-0.265	1.04	83.998	83.657	N/A	N/A	N/A		
141	24	83.041	83.015	900	6.5	0.4	0.013	86.812	86.889	1.80	1.14	0.85	0.7	-0.284	1.05	83.657	83.560	N/A	N/A	N/A		
230	24	83.185	83.165	750	10.0	0.2	0.013	86.944	86.889	1.13	0.50	0.25	0.5	-0.380	1.14	83.555	83.468	N/A	N/A	N/A		
250	26	82.386	82.368	1350	9.0	0.2	0.013	86.730	86.637	1.67	2.39	1.15	0.5	-0.487	1.11	83.249	83.228	N/A	N/A	N/A		
259	27	84.086	83.981	1050	105.0	0.1	0.013	88.154	87.901	1.00	0.86	0.53	0.6	-0.513	1.18	84.623	84.471	B134W	86.14	1.517		
280	28	84.381	84.317	300	16.0	0.4	0.013	87.165	87.130	0.87	0.06	0.00	0.0	-0.300	0.00	84.381	84.361	47	85.21	0.829		
200	41	83.740	83.654	1050	43.0	0.2	0.013	87.754	87.791	1.41	1.22	0.03	0.0	-0.395	1.17	84.395	84.390	N/A	N/A	N/A		
Chan1e	Chan2	82.160	82.104	2400	55.0	0.1	0.013	85.900	86.700	1.73	15.66	12.81	0.8	-0.627	1.20	83.933	83.849	N/A	N/A	N/A		
N404	N406	82.649	82.574	1524	75.3	0.1	0.013	87.325	86.750	1.28	2.33	1.99	0.9	-0.201	1.01	83.972	83.910	IBI (4)	85.23	1.253		

Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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)	U/S (ʰ)	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)
N406	N407	82.200	82.173	1829	27.2	0.1	0.013	86.800	86.800	1.44	3.77	2.85	0.8	-0.119	0.99	83.910	83.893	IBI (4)	84.65	0.740			
N407	Chan2	82.143	82.136	1829	6.9	0.1	0.013	86.800	86.700	1.46	3.83	2.82	0.7	-0.079	0.99	83.893	83.849	IBI (4)	84.70	0.807			
N101	N102	83.919	83.887	686	63.1	0.1	0.013	87.410	87.380	0.86	0.32	0.51	1.6	-0.058	1.19	84.547	84.468	IBI (4)	85.31	0.763			
N104	N105	83.344	83.269	1067	68.2	0.1	0.013	87.400	87.620	1.06	0.95	0.64	0.7	-0.103	1.19	84.308	84.257	IBI (4)	85.30	0.992			
N105	N106	83.118	83.108	1219	9.5	0.1	0.013	87.620	87.500	1.19	1.38	0.85	0.6	-0.080	1.10	84.257	84.232	IBI (4)	85.52	1.263			
N106	19	83.088	82.957	1192	119.2	0.1	0.013	87.500	87.272	1.14	1.27	1.50	1.2	-0.048	1.11	84.232	84.013	IBI (4)	85.40	1.168			
N310	N311	84.140	84.017	381	30.6	0.4	0.013	87.394	87.200	1.02	0.12	0.07	0.6	-0.157	1.19	84.364	84.272	IBI (4)	85.29	0.930			
N311	N312	83.792	83.672	610	80.1	0.2	0.013	87.200	87.000	0.85	0.25	0.19	0.8	-0.130	1.17	84.272	84.195	IBI (4)	85.10	0.828			
N312	N313	83.597	83.533	686	42.8	0.2	0.013	87.000	86.700	0.92	0.34	0.36	1.1	-0.088	1.01	84.195	84.127	IBI (4)	84.90	0.705			
N313	N305	83.513	83.471	686	28.1	0.2	0.013	86.700	86.900	0.92	0.34	0.36	1.1	-0.072	1.01	84.127	84.089	IBI (4)	84.60	0.473			
N305	N306	83.246	83.181	914	43.7	0.1	0.013	86.900	86.500	1.11	0.73	0.80	1.1	-0.071	1.00	84.089	83.989	IBI (4)	84.80	0.711			
N306	N406	83.106	83.025	991	61.9	0.1	0.013	86.500	86.750	1.10	0.85	0.93	1.1	-0.108	0.99	83.989	83.910	IBI (4)	84.40	0.411			
N401	N402	83.000	82.962	1524	115.0	0.1	0.013	87.390	87.260	1.40	2.55	1.39	0.5	-0.438	1.00	84.086	84.041	IBI (4)	85.29	1.204			
N402	N403	82.842	82.728	1524	94.6	0.1	0.013	87.260	87.218	1.41	2.57	1.58	0.6	-0.325	1.02	84.041	84.002	IBI (4)	85.16	1.119			
N403	N404	82.698	82.679	1524	15.8	0.1	0.013	87.218	87.325	1.40	2.55	1.53	0.6	-0.220	1.02	84.002	83.972	IBI (4)	85.12	1.116			
N501	N501	84.013	83.965	1067	40.0	0.1	0.013	88.000	87.347	1.10	0.99	1.77	1.8	-0.246	1.02	84.834	84.721	IBI (4)	85.90	1.066			
N500C	N501	84.706	84.538	533	67.4	0.2	0.013	87.740	88.000	1.00	0.22	0.19	0.8	-0.169	1.08	85.070	84.834	IBI (4)	85.64	0.570			
N500	N500C	85.025	84.856	381	67.4	0.3	0.013	87.760	87.740	0.80	0.09	0.08	0.9	-0.096	0.95	85.310	85.070	IBI (4)	85.66	0.350			
N400	N401	83.119	83.020	1524	83.0	0.1	0.013	87.800	87.390	1.39	2.54	1.24	0.5	-0.519	1.20	84.124	84.086	IBI (4)	85.70	1.576			
N399	N400	83.238	83.139	1524	82.0	0.1	0.013	89.000	87.800	1.41	2.57	1.23	0.5	-0.593	1.07	84.169	84.124	IBI (4)	86.90	2.731			
N412	N404	83.560	83.474	686	8.5	1.0	0.013	87.400	87.325	2.39	0.88	0.24	0.3	-0.260	0.94	83.986	83.972	IBI (4)	85.30	1.314			
N410	N412	84.048	83.740	533	30.9	1.0	0.013	87.540	87.400	2.00	0.45	0.24	0.5	-0.244	0.94	84.337	84.016	IBI (4)	85.44	1.103			
N410B	N410	84.550	84.091	533	57.4	0.8	0.013	87.570	87.540	1.79	0.40	0.23	0.6	-0.241	0.94	84.842	84.379	IBI (4)	85.47	0.628			
N309	N310	84.297	84.160	381	34.3	0.4	0.013	87.350	87.394	1.01	0.12	0.07	0.6	-0.168	1.08	84.510	84.364	IBI (4)	85.25	0.740			
N308	N309	84.363	84.317	381	11.5	0.4	0.013	87.220	87.350	1.01	0.12	0.07	0.6	-0.230	1.01	84.514	84.510	IBI (4)	85.12	0.606			
N307	N308	84.656	84.383	381	68.2	0.4	0.013	87.400	87.220	1.01	0.12	0.07	0.6	-0.162	1.17	84.875	84.572	IBI (4)	85.30	0.425			
N304	N305	83.509	83.396	762	75.6	0.2	0.013	86.800	86.900	0.99	0.45	0.41	0.9	-0.163	1.01	84.108	84.089	IBI (4)	84.70	0.592			
N303	N304	83.693	83.584	686	36.1	0.3	0.013	86.760	86.800	1.30	0.48	0.28	0.6	-0.303	0.98	84.076	84.108	IBI (4)	84.66	0.584			
N301	N303	84.292	83.843	533	112.4	0.4	0.013	87.230	86.760	1.27	0.28	0.20	0.7	-0.227	0.97	84.598	84.140	IBI (4)	85.13	0.532			
N314	N304	84.131	83.959	305	38.2	0.5	0.013	87.100	86.800	0.93	0.07	0.05	0.7	-0.108	1.00	84.328	84.128	IBI (4)	85.00	0.672			
N114	N105	84.424	84.254	533	68.0	0.2	0.013	87.680	87.620	1.00	0.22	0.25	1.1	-0.149	0.96	84.808	84.589	IBI (4)	85.58	0.772			
N113	N114	84.995	84.574	381	60.0	0.7	0.013	87.530	87.680	1.34	0.15	0.15	1.0	-0.117	0.95	85.259	84.855	IBI (4)	85.71	0.451			
N112B	N113	85.186	85.070	305	11.6	1.0	0.013	87.580	87.530	1.38	0.10	0.03	0.3	-0.191	1.07	85.300	85.259	IBI (4)	85.76	0.460			
N112_2	N101	84.426	84.219	381	68.9	0.3	0.013	87.580	87.410	0.88	0.10	0.07	0.7	-0.134	1.00	84.673	84.547	IBI (4)	85.48	0.807			
N103	N104	83.658	83.644	762	13.1	0.1	0.013	87.370	87.400	0.83	0.38	0.57	1.5	-0.061	1.19	84.359	84.308	IBI (4)	85.27	0.911			
N102	N103	83.817	83.733	686	64.7	0.1	0.013	87.380	87.370	0.86	0.32	0.57	1.8	-0.035	1.19	84.468	84.359	IBI (4)	85.28	0.812			
Chan3a	Chan3	81.230	81.200	N/A	30.2	N/A	N/A	86.300	86.300	N/A	N/A	17.91	N/A	N/A	1.32	83.338	83.211	N/A	N/A	N/A			
C13	C13b	84.650	82.840	50	250.0	0.7	0.05	85.750	85.150	0.09	0.00	0.28	1539.1	0.380	1.04	85.080	83.256	N/A	N/A	N/A			
C13b	MainN	82.840	82.000	50	150.0	0.6	0.05	85.150	83.500	0.08	0.00	0.22	1358.3	0.366	1.26	83.256	82.735	N/A	N/A	N/A			
B1	B2	81.101	80.943	1800	105.0	0.2	0.013	87.811	87.288	1.75	4.45	5.03	1.1	0.580	1.14	83.481	83.266	276	85.47	1.989			
B2	B3	80.943	80.923	1800	13.5	0.2	0.013	87.288	87.329	1.75	4.45	5.17	1.2	0.523	1.14	83.266	83.153	275	85.74	2.474			
B3	B60	80.923	80.861	1800	41.5	0.2	0.013	87.329	87.550	1.75	4.45	5.17	1.2	0.430	1.14	83.153	82.759	273	85.68	2.527			
B4	B58	83.882	83.311	375	81.5	0.7	0.013	87.834	87.788	1.33	0.15	0.15	0.8	-0.095	1.16	84.162	83.783	254	85.75	1.588			
																		254	85.75	1.713	81.3	54.5	84.037

Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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)	
B5	B6	84.597	84.452	300	14.5	1.0	0.013	87.803	87.913	1.37	0.10	0.00	0.0	-0.252	1.17	84.645	84.714	253	85.79	1.703	81.3	65.3	84.087	
B5	B56	83.691	82.380	675	138.0	1.0	0.013	87.803	87.712	2.29	0.82	0.30	0.4	-0.311	1.17	84.055	83.668	40	85.69	1.635	81.3	79.1	84.152	
B6	B7	84.388	84.082	300	47.0	0.7	0.013	87.913	87.917	1.10	0.08	0.01	0.2	0.026	1.25	84.714	84.714	54	86.04	1.326	81.3	3.9	83.801	
B7	B8	84.022	83.956	300	12.0	0.6	0.013	87.917	87.801	1.01	0.07	0.02	0.2	0.392	1.26	84.714	84.714	55	85.97	1.256	81.3	14.2	83.849	
B8	B9	83.926	83.552	300	68.0	0.6	0.013	87.801	87.873	1.01	0.07	0.07	1.0	0.488	1.26	84.714	84.532	27	85.83	1.116	81.3	25.6	83.902	
B9	B57	83.477	82.547	375	71.5	1.3	0.013	87.873	87.813	1.81	0.20	0.19	1.0	0.680	1.17	84.532	83.505	21	85.69	1.158	81.3	37.8	83.959	
B10	B11	83.947	83.685	375	69.0	0.4	0.013	88.197	88.159	0.98	0.11	0.12	1.1	0.289	0.84	84.611	84.512	81	86.04	1.429	81.3			
B10	B49	84.417	83.682	300	106.5	0.7	0.013	88.197	88.057	1.14	0.08	0.04	0.5	-0.106	1.01	84.611	84.335	311	86.27	1.659	81.3			
B11	B34	83.665	83.053	375	80.5	0.8	0.013	88.159	87.886	1.38	0.15	0.17	1.1	0.472	0.93	84.512	84.007	74	85.92	1.408	81.3			
B12	B13	87.219	85.699	375	76.0	2.0	0.013	91.003	89.864	2.25	0.25	0.11	0.5	-0.197	0.93	87.397	85.877	N/A	N/A	N/A	81.3			
B13	B15	86.249	83.720	825	139.0	1.1	0.013	89.864	88.345	2.82	1.51	1.10	0.7	-0.288	0.95	85.786	84.564	N/A	N/A	N/A	81.3			
B15	B21	83.195	82.979	1350	58.5	0.4	0.013	88.345	88.484	2.27	3.25	2.14	0.7	0.019	0.96	84.564	84.488	N/A	N/A	N/A	81.3			
B16	B40	84.536	84.061	375	108.0	0.4	0.013	88.626	88.320	1.05	0.12	0.12	1.0	0.086	1.02	84.997	84.651	B370S	86.26	1.263	81.3			
B17	B16	84.801	84.611	300	9.5	2.0	0.013	88.702	88.626	1.93	0.14	-0.02	-0.2	-0.117	1.09	84.984	84.997	B370S	86.26	1.548	108.2	19.1	84.712	
B17	B18	84.894	84.371	300	48.0	1.1	0.013	88.702	88.502	1.43	0.10	0.02	0.2	-0.210	1.09	84.984	84.772	B370N	86.63	1.876	108.2	32.3	84.754	
B18	B21	84.296	83.934	375	67.0	0.5	0.013	88.502	88.484	1.17	0.13	0.11	0.8	0.101	1.11	84.772	84.488	B369S	86.63	1.836	108.2	44.6	84.794	
B19	B21	84.917	83.859	450	141.0	0.8	0.013	88.600	88.484	1.55	0.25	0.09	0.4	-0.257	1.03	85.110	84.488	B369N	86.41	1.527	108.2	72.4	84.883	
B19	B26	84.843	84.810	300	9.5	0.4	0.013	88.600	88.678	0.81	0.06	0.05	0.9	-0.033	0.84	85.110	85.091	B368S	86.53	1.604	108.2	85.9	84.926	
B21	B24	82.959	82.707	1350	58.5	0.4	0.013	88.484	88.145	2.45	3.50	2.30	0.7	0.179	0.95	84.488	84.388	B368N	86.63	1.660	108.2	99.7	84.970	
B22	B24	84.693	83.587	450	146.5	0.8	0.013	88.456	88.145	1.55	0.25	0.10	0.4	-0.240	0.99	84.903	84.388	B374S	86.87	1.878	108.2	106.7	84.992	
B22	B2200	84.552	84.434	300	29.0	0.4	0.013	88.456	87.660	0.88	0.06	0.09	1.4	0.051	0.95	84.903	84.666	B373N	86.67	1.699	108.2	100.1	84.971	
B24	B25	82.687	82.479	1350	41.5	0.5	0.013	88.145	88.096	2.64	3.77	2.43	0.6	0.351	0.94	84.388	84.297	B373S	86.55	1.649	108.2	78.1	84.901	
B25	B30	82.449	82.380	1350	14.0	0.5	0.013	88.096	88.193	2.61	3.74	2.40	0.6	0.498	1.14	84.297	84.261	B372S	86.55	1.691	108.2	65.2	84.859	
B26	B22	84.780	84.572	300	52.0	0.4	0.013	88.678	88.456	0.87	0.06	0.06	1.0	0.011	1.01	85.091	84.903	B372S	86.62	1.830	108.2	43.6	84.790	
B27	B28	83.872	83.767	675	10.5	1.0	0.013	88.285	88.194	2.35	0.84	0.30	0.4	0.028	1.15	84.575	84.552	B371N	86.62	1.869	108.2	31.4	84.751	
																		B371S	86.77	2.062	108.2	17.8	84.708	
																		B374N	86.75	1.766				
																		B376E	86.59	1.606				
																		B377W	86.51	1.738				
																		B356E	86.51	1.400				
																		B145N	86.73	1.620				
																		B136E	86.60	2.112				
																		B158	86.60	1.697				
																		B146S	86.09	1.702				
																		N/A	N/A					
																		124	86.63	1.539				
																		121	86.38	1.805				

Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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)
B28	B30	83.692	82.980	750	142.5	0.5	0.013	88.194	88.193	1.78	0.79	0.46	0.6	0.110	1.24	84.552	84.261	126	86.09	1.538		
B30	B33	82.230	82.103	1500	63.5	0.2	0.013	88.193	87.886	1.79	3.16	3.09	1.0	0.531	1.13	84.261	84.137	3	85.87	1.609		
B31	B33	84.349	83.133	450	143.0	0.9	0.013	88.117	87.886	1.65	0.26	0.14	0.5	-0.165	0.95	84.634	84.137	95	85.99	1.356		
B31	B35	84.334	84.234	300	9.5	1.1	0.013	88.117	88.196	1.40	0.10	0.06	0.6	0.000	1.51	84.634	84.630	104	86.40	1.766		
B33	B34	82.083	81.948	1500	58.5	0.2	0.013	87.886	87.886	1.92	3.39	3.34	1.0	0.554	1.30	84.137	84.007	7	85.89	1.753		
B34	B38	81.928	81.788	1500	58.5	0.2	0.013	87.886	87.776	1.96	3.46	3.60	1.0	0.579	1.31	84.007	84.005	59	86.06	2.053		
B35	B10	84.204	84.022	300	52.0	0.4	0.013	88.196	88.197	0.81	0.06	0.06	1.0	0.126	1.47	84.630	84.611	105	86.31	1.680		
B36	B37	83.993	83.592	300	59.0	0.7	0.013	87.997	88.115	1.13	0.08	0.06	0.8	0.356	1.33	84.649	84.425	344	86.01	1.361		
B37	B38	83.517	82.913	375	80.5	0.8	0.013	88.115	87.776	1.37	0.15	0.14	0.9	0.533	1.31	84.425	84.005	338	86.00	1.575		
B38	B52	81.638	81.551	1650	54.5	0.2	0.013	87.776	87.772	1.71	3.65	3.85	1.1	0.717	1.30	84.005	83.888	18	85.82	1.815		
B39	B40	84.568	84.136	300	27.0	1.6	0.013	88.469	88.320	1.73	0.12	-0.01	-0.1	-0.209	1.05	84.659	84.651	160	86.56	1.901		
B40	B41	83.911	83.747	525	54.5	0.3	0.013	88.320	88.394	1.09	0.24	0.19	0.8	0.215	0.98	84.651	84.574	164	86.37	1.719		
B41	B30	83.717	83.205	525	64.0	0.8	0.013	88.394	88.193	1.78	0.38	0.33	0.8	0.332	0.97	84.574	84.261	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	0.11	0.7	0.073	0.94	85.069	84.957	167	86.11	1.041		
B42	B45	84.501	84.141	375	103.0	0.4	0.013	88.269	88.178	0.94	0.10	0.11	1.1	0.193	0.97	85.069	84.848	237	86.13	1.061		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
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B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
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B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
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B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957	84.917	168	86.26	1.303		
B43	B44	84.291	84.182	375	10.5	1.0	0.013	87.998	88.123	1.62	0.18	0.11	0.6	0.291	0.95	84.957						

Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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	
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	0.038	0.99	84.949	84.574	B364S	86.21	1.261		77.2	18.1	84.662
B410	B42	84.928	84.576	300	51.0	0.7	0.013	88.272	88.269	1.14	0.08	0.08	1.0	-0.053	0.92	85.175	85.069	232	86.45	1.275		77.2	18.1	84.662
B590	B59	83.957	83.090	375	102.0	0.9	0.013	87.720	87.585	1.46	0.16	0.16	0.6	-0.162	1.12	84.170	83.328	294	85.46	1.290		77.2	31.1	84.725
B2200	B27	83.997	83.902	675	19.0	0.5	0.013	87.660	88.285	1.66	0.59	0.30	0.5	-0.063	1.14	84.609	84.575	122	86.48	1.871		77.2	44.0	84.788
C12	C13	84.848	84.650	600	22.0	0.9	0.013	86.490	85.750	2.06	0.58	0.12	0.2	-0.375	1.19	85.073	85.080	N/A	N/A	N/A		77.2	72.4	84.926
C4MH	B2200	85.207	84.463	450	31.0	2.4	0.013	88.250	87.660	2.78	0.44	0.21	0.5	-0.165	1.12	85.492	84.684	N/A	N/A	N/A		77.2	72.4	84.926
C8MH	B5	85.210	84.950	300	26.0	1.0	0.013	88.060	87.803	1.37	0.10	0.10	1.0	0.119	1.11	85.629	85.196	N/A	N/A	N/A		77.2	72.4	84.926
2144	ForeN	80.160	80.137	1800	22.5	0.1	0.013	86.340	83.500	1.43	3.63	8.77	2.4	0.793	1.18	82.743	82.742	N/A	N/A	N/A		77.2	44.0	84.788
CB1	CB2	86.457	86.410	250	19.5	0.2	0.013	88.880	88.750	0.59	0.03	0.06	2.2	1.360	0.96	88.067	87.921	N/A	N/A	N/A		77.2	72.4	84.926
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	1.261	0.98	87.921	87.825	N/A	N/A	N/A		77.2	72.4	84.926
CB3	CB4	86.385	86.360	250	10.5	0.2	0.013	88.670	88.600	0.59	0.03	0.08	2.7	1.190	0.96	87.825	87.755	N/A	N/A	N/A		77.2	72.4	84.926
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	1.145	1.37	87.755	87.683	N/A	N/A	N/A		77.2	72.4	84.926
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	1.098	1.34	87.683	87.612	N/A	N/A	N/A		77.2	72.4	84.926
CB6	CB7	86.310	86.285	250	10.5	0.2	0.013	88.460	88.390	0.59	0.03	0.10	3.5	1.052	1.02	87.612	87.485	N/A	N/A	N/A		77.2	72.4	84.926
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	0.950	1.06	87.485	87.153	N/A	N/A	N/A		77.2	72.4	84.926
CB8	C100MH	86.260	86.230	250	12.5	0.2	0.013	88.320	88.250	0.59	0.03	0.13	4.5	0.643	1.12	87.153	86.480	N/A	N/A	N/A		77.2	72.4	84.926
CB9	CB10	86.187	86.133	250	22.5	0.2	0.013	88.280	88.340	0.59	0.03	-0.04	-1.4	0.359	1.14	86.796	86.902	N/A	N/A	N/A		77.2	72.4	84.926
CB10	CB10i	86.133	86.086	250	19.6	0.2	0.013	88.340	88.410	0.59	0.03	-0.04	-1.4	0.519	1.14	86.902	86.996	N/A	N/A	N/A		77.2	72.4	84.926
CB10i	CB11	86.086	86.032	250	22.4	0.2	0.013	88.410	88.200	0.59	0.03	-0.04	-1.5	0.660	0.94	86.996	87.102	N/A	N/A	N/A		77.2	72.4	84.926
CB11	CB12	86.032	85.976	250	23.5	0.2	0.013	88.200	88.120	0.59	0.03	0.02	0.8	0.820	0.87	87.102	87.105	N/A	N/A	N/A		77.2	72.4	84.926
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	0.879	1.39	87.105	87.106	N/A	N/A	N/A		77.2	72.4	84.926
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	0.911	1.38	87.106	87.107	N/A	N/A	N/A		77.2	72.4	84.926
CB14	CB15	85.914	85.883	250	13.0	0.2	0.013	88.040	88.000	0.59	0.03	0.03	1.0	0.943	0.86	87.107	87.087	N/A	N/A	N/A		77.2	72.4	84.926
CB15	CB16	85.883	85.852	250	13.0	0.2	0.013	88.000	87.960	0.59	0.03	0.03	0.9	0.954	0.86	87.087	87.072	N/A	N/A	N/A		77.2	72.4	84.926
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	0.970	0.86	87.072	87.062	N/A	N/A	N/A		77.2	72.4	84.926
CB17	CB18	85.821	85.790	250	13.0	0.2	0.013	87.920	87.880	0.59	0.03	0.04	1.4	0.991	0.95	87.062	87.027	N/A	N/A	N/A		77.2	72.4	84.926
CB18	CB19	85.790	85.759	250	13.0	0.2	0.013	87.880	87.840	0.59	0.03	0.04	1.2	0.987	0.95	87.027	86.995	N/A	N/A	N/A		77.2	72.4	84.926
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	0.986	1.50	86.995	86.967	N/A	N/A	N/A		77.2	72.4	84.926
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	0.989	1.50	86.967	86.947	N/A	N/A	N/A		77.2	72.4	84.926
CB21	CB22	85.697	85.666	250	13.0	0.2	0.013	87.760	87.720	0.59	0.03	0.05	1.9	1.000	0.92	86.947	86.907	N/A	N/A	N/A		77.2	72.4	84.926
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	0.991	1.47	86.907	86.867	N/A	N/A	N/A		77.2	72.4	84.926
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	0.982	1.46	86.867	86.804	N/A	N/A	N/A		77.2	72.4	84.926
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	0.968	1.44	86.804	86.682	N/A	N/A	N/A		77.2	72.4	84.926

Table B-1A: Pipe Data and Hydraulic Simulation Results for the 100-Year, 3-Hour Chicago Storm (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 Surcharge (m)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL (m)	
																					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	7.32	1.0	0.192	1.18	83.962	83.845	Fut. Est. (4)	85.91	1.948		
2116	2117	81.383	81.270	2250	75.0	0.2	0.013	87.930	87.860	2.03	8.07	10.28	1.3	0.212	1.22	83.845	83.666	Fut. Est. (4)	85.83	1.985		
2117	2122	81.120	81.028	2400	84.0	0.1	0.013	87.960	87.730	1.81	8.21	10.27	1.3	0.146	1.23	83.666	83.521	Fut. Est. (4)	85.76	2.094		
2118	2137	82.797	82.689	750	98.0	0.1	0.013	87.780	88.700	0.84	0.37	0.39	1.0	-0.110	1.24	83.437	83.325	Fut. Est. (4)	85.68	2.243		
2119	2120	80.783	80.736	1650	47.0	0.1	0.013	87.700	87.650	1.35	2.88	3.99	1.4	0.307	1.19	82.740	82.741	Fut. Est. (4)	85.60	2.860		
2120	2121	80.716	80.631	1650	84.5	0.1	0.013	87.650	87.560	1.35	2.88	4.07	1.4	0.375	1.20	82.741	82.743	Fut. Est. (4)	85.55	2.809		
2121	2142	80.571	80.495	1650	76.0	0.1	0.013	87.560	87.330	1.35	2.88	4.25	1.5	0.522	1.20	82.743	82.745	Fut. Est. (4)	85.46	2.717		
2122	2136	80.878	80.794	2550	84.0	0.1	0.013	87.730	87.610	1.80	9.20	10.45	1.1	0.093	1.23	83.521	83.272	Fut. Est. (4)	85.63	2.109		
2135	2136	81.066	81.031	2700	35.0	0.1	0.013	87.560	87.610	1.87	10.72	8.97	0.8	-0.308	1.28	83.458	83.272	Fut. Est. (4)	85.46	2.002		
2136	2138	80.644	80.508	2700	90.5	0.2	0.013	88.700	88.100	2.29	13.13	19.39	1.5	-0.072	1.24	83.272	82.972	Fut. Est. (4)	85.51	2.238		
2137	2138	82.669	82.522	750	98.0	0.2	0.013	88.700	88.100	0.98	0.43	0.50	1.2	-0.094	1.27	83.325	82.972	Fut. Est. (4)	86.60	3.275		
2138	2139	80.488	80.365	2700	77.0	0.2	0.013	88.100	88.000	2.37	13.56	19.95	1.5	-0.216	1.24	82.972	82.745	Fut. Est. (4)	86.00	3.028		
2139	2140	80.345	80.235	2700	73.5	0.2	0.013	88.000	88.250	2.29	13.13	20.02	1.5	-0.300	1.25	82.745	82.748	Fut. Est. (4)	85.90	3.155		
2140	ForeN	80.205	80.134	2700	47.0	0.2	0.013	88.250	83.500	2.29	13.13	18.99	1.4	-0.157	1.25	82.748	82.742	Fut. Est. (4)	86.15	3.402		
2140	2140w	N/A	N/A	N/A	N/A	N/A	N/A	88.250	88.250	N/A	N/A	1.05	N/A	N/A	1.25	82.748	82.746	Fut. Est. (4)	86.15	3.402		
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	-0.088	1.25	84.678	84.028	Fut. Est. (4)	86.27	1.592		
2142	2143	80.465	80.422	1650	43.0	0.1	0.013	87.330	86.880	1.35	2.88	4.31	1.5	0.631	1.20	82.746	82.747	Fut. Est. (4)	85.23	2.484		
2143	2144	80.272	80.220	1800	51.5	0.1	0.013	86.880	86.340	1.43	3.63	3.56	1.0	0.675	1.22	82.747	82.743	Fut. Est. (4)	84.78	2.033		
2143	2143w	N/A	N/A	N/A	N/A	N/A	N/A	86.880	86.880	N/A	N/A	0.76	N/A	N/A	1.19	82.747	82.746	Fut. Est. (4)	84.78	2.033		
2203	2204	82.592	82.502	2100	81.5	0.1	0.013	88.960	88.970	1.66	5.75	6.86	1.2	0.198	1.20	84.890	84.771	Fut. Est. (4)	86.86	1.970		
2204	2205	82.482	82.360	2100	111.0	0.1	0.013	88.970	88.590	1.66	5.75	7.06	1.2	0.189	1.21	84.771	84.597	Fut. Est. (4)	86.87	2.099		
2205	2206	82.340	82.259	2100	74.0	0.1	0.013	88.590	88.340	1.66	5.75	7.25	1.3	0.157	1.21	84.597	84.470	Fut. Est. (4)	86.49	1.893		
2206	2207	82.239	82.157	2100	74.5	0.1	0.013	88.340	88.090	1.66	5.75	7.50	1.3	0.131	1.23	84.470	84.329	Fut. Est. (4)	86.24	1.770		
2207	2208	82.137	82.023	2100	103.5	0.1	0.013	88.090	87.740	1.66	5.75	7.87	1.4	0.092	1.23	84.329	84.109	Fut. Est. (4)	85.99	1.661		
2208	2209	82.003	81.994	2100	8.0	0.1	0.013	87.740	87.710	1.66	5.75	7.92	1.4	0.006	1.22	84.109	84.086	Fut. Est. (4)	85.64	1.531		
2209	2210	81.974	81.842	2100	120.0	0.1	0.013	87.710	87.640	1.66	5.75	7.92	1.4	0.012	1.23	84.086	83.829	Fut. Est. (4)	85.61	1.524		
2210	2211	81.692	81.573	2250	119.0	0.1	0.013	87.640	87.570	1.66	6.59	7.91	1.2	-0.113	1.23	83.829	83.674	Fut. Est. (4)	85.54	1.711		
2211	2135	81.273	81.236	2550	36.5	0.1	0.013	87.570	87.560	1.80	9.20	8.88	1.0	-0.149	1.28	83.674	83.458	Fut. Est. (4)	85.47	1.796		
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	-0.066	1.12	83.677	83.437	Fut. Est. (4)	85.79	2.113		
2143w	MainN	80.250	80.100	975	30.0	0.5	0.013	86.880	83.500	2.12	1.58	0.72	0.5	1.521	1.17	82.746	82.735	Fut. Est. (4)	84.78	2.034		
2140w	MainN	80.300	80.100	975	40.0	0.5	0.013	88.250	83.500	2.12	1.58	1.01	0.6	1.471	1.24	82.746	82.735	Fut. Est. (4)	86.15	3.404		

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).

84.037 Interpolated HGL elevation

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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)	U/S (ʰ)	Time to Peak (h)	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard (m)	Interpolated HGL (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
1	2	84.836	84.565	450	77.5	0.4	0.013	87.787	87.641	1.06	0.17	0.08	0.5	-0.214	11.93	85.072	84.769	B91W	85.99	0.918		
2	3	84.535	84.483	450	13.0	0.4	0.013	87.641	87.716	1.13	0.18	0.08	0.5	-0.216	11.95	84.769	84.683	N/A	N/A			
3	4	84.333	84.218	600	38.5	0.3	0.013	87.716	87.586	1.19	0.34	0.16	0.5	-0.287	11.95	84.646	84.543	B90N	85.76	1.114		
4	8	84.143	84.095	675	24.0	0.2	0.013	87.586	87.608	1.05	0.38	0.21	0.6	-0.275	11.96	84.543	84.511	N/A	N/A			
5	6	84.639	84.427	525	106.0	0.2	0.013	87.722	87.781	0.89	0.19	0.12	0.6	-0.211	11.93	84.953	84.799	B87S	85.67	0.717		
6	12	84.352	84.177	600	87.5	0.2	0.013	87.781	87.701	0.97	0.27	0.22	0.8	-0.153	11.94	84.799	84.525	B95SS	85.57	0.771		
7	8	84.550	84.300	450	83.5	0.3	0.013	87.620	87.608	0.98	0.16	0.15	1.0	-0.047	12.00	84.953	84.574	B84W	85.52	0.567		
8	14	84.075	83.640	675	87.0	0.5	0.013	87.608	87.229	1.66	0.59	0.43	0.7	-0.239	11.98	84.511	84.057	N/A	N/A			
9	10	84.648	84.447	525	100.5	0.2	0.013	87.795	87.658	0.89	0.19	0.14	0.7	-0.163	11.93	85.010	84.878	B94NN	85.78	0.770		
10	11	84.297	84.131	675	110.5	0.2	0.013	87.658	87.429	0.91	0.33	0.31	0.9	-0.094	11.95	84.878	84.672	B96SS	85.56	0.682		
11	12	84.611	84.417	300	48.5	0.4	0.013	87.429	87.701	0.87	0.06	0.01	0.1	-0.239	11.97	84.672	84.525	B79E	85.53	0.858		
11	18	84.071	83.995	675	50.5	0.2	0.013	87.429	87.453	0.91	0.33	0.38	1.2	-0.074	11.97	84.672	84.383	B80E	85.38	0.708		
12	13	84.117	83.933	600	61.5	0.3	0.013	87.701	87.583	1.19	0.34	0.28	0.8	-0.192	11.96	84.525	84.276	B77W	85.51	0.985		
13	14	83.783	83.565	750	72.5	0.3	0.013	87.583	87.229	1.38	0.61	0.38	0.6	-0.275	11.97	84.258	84.043	B75W	85.37	1.112		
14	140	83.415	83.393	900	5.5	0.4	0.013	87.229	87.196	1.80	1.14	0.82	0.7	-0.272	11.98	84.043	83.993	N/A	N/A			
15	17	84.180	83.645	1200	107.0	0.5	0.013	87.920	87.688	2.44	2.76	0.08	0.0	-1.065	11.93	84.315	84.220	B97NN	85.85	1.535		
17	170	83.015	82.954	1800	60.5	0.1	0.013	87.688	87.537	1.43	3.63	2.37	0.7	-0.595	12.02	84.220	84.152	B96NS	85.72	1.500		
18	19	82.720	82.645	1950	75.0	0.1	0.013	87.453	87.272	1.51	4.50	2.94	0.7	-0.558	12.03	84.112	84.071	N/A	N/A			
19	19S	82.495	82.494	2100	1.0	0.1	0.013	87.272	87.272	1.58	5.48	4.42	0.8	-0.524	12.02	84.071	84.067	N/A	N/A			
19	19W	83.723	83.721	750	1.0	0.2	0.013	87.272	87.272	1.13	0.50	0.11	0.2	-0.402	12.04	84.071	84.070	N/A	N/A			
20	20S	82.392	82.391	2100	1.0	0.1	0.013	87.148	87.148	1.58	5.48	4.51	0.8	-0.485	12.03	84.007	84.004	N/A	N/A			
20	20W	84.186	84.183	375	1.0	0.3	0.013	87.148	87.148	0.79	0.09	-0.04	-0.5	-0.223	11.92	84.338	84.396	N/A	N/A			
21	22	82.264	82.210	2100	54.5	0.1	0.013	87.025	86.460	1.58	5.48	4.55	0.8	-0.431	12.03	83.933	83.857	68	85.16	1.227		
22	Chan2	82.180	82.150	2100	29.5	0.1	0.013	86.460	86.700	1.58	10.97	4.53	0.4	-0.423	12.04	83.857	83.847	N/A	N/A			
23	230	83.463	83.245	750	109.0	0.2	0.013	87.057	86.944	1.13	0.50	0.29	0.6	-0.319	12.05	83.894	83.587	B74W	85.14	1.246		
24	25	82.565	82.523	1350	21.0	0.2	0.013	86.989	86.774	1.67	2.39	1.10	0.5	-0.602	12.04	83.313	83.283	N/A	N/A			
25	250	82.493	82.416	1350	38.5	0.2	0.013	86.774	86.730	1.67	2.39	1.14	0.5	-0.560	12.04	83.283	83.240	17	85.09	1.807		
26	27	82.338	82.020	1350	63.5	0.5	0.013	86.637	86.394	2.64	3.77	1.55	0.4	-0.471	12.03	83.217	83.210	N/A	N/A			
27	Chan3	81.990	81.800	1350	38.0	0.5	0.013	86.394	86.300	2.64	3.77	1.52	0.4	-0.130	12.04	83.210	83.205	N/A	N/A			
28	29	84.242	84.190	375	17.5	0.3	0.013	87.130	87.017	0.87	0.10	0.00	0.0	-0.256	11.82	84.361	84.360	52	85.18	0.819		
29	30	83.965	83.760	600	82.0	0.3	0.013	87.017	87.075	1.09	0.31	0.20	0.6	-0.205	11.95	84.360	84.069	53	85.16	0.800		
30	31	83.685	83.601	675	33.5	0.3	0.013	87.075	86.964	1.17	0.42	0.25	0.6	-0.291	11.95	84.069	83.984	42	85.14	1.071		
31	32	83.541	83.463	675	31.0	0.3	0.013	86.964	86.962	1.17	0.42	0.30	0.7	-0.232	11.95	83.984	83.917	41	85.08	1.096		
32	33	83.433	83.309	675	41.5	0.3	0.013	86.962	86.911	1.29	0.46	0.36	0.8	-0.191	11.96	83.917	83.748	39	85.01	1.093		
33	34	83.249	83.210	675	13.0	0.3	0.013	86.911	86.830	1.29	0.46	0.36	0.8	-0.176	11.96	83.748	83.674	37	85.13	1.382		
34	35	83.180	83.026	675	44.0	0.4	0.013	86.830	86.728	1.39	0.50	0.41	0.8	-0.181	11.95	83.674	83.437	22	84.97	1.296		
35	26	82.951	82.938	750	6.5	0.2	0.013	86.728	86.637	1.13	0.50	0.41	0.8	-0.264	11.96	83.437	83.328	20	85.01	1.573		
N3900	N54	83.086	83.063	2743	22.9	0.1	0.013	88.154	88.111	1.89	11.18	4.83	0.4	-0.957	12.01	84.872	84.843	IBI (FUT)	N/A	N/A		
N3900	39	N/A	N/A	N/A	N/A	N/A	N/A	88.154	88.154	N/A	N/A	0.49	N/A	N/A	12.09	84.872	84.639	N/A	N/A			
40	41	83.831	83.729	1200	102.0	0.1	0.013	87.901	87.791	1.09	1.23	0.65	0.5	-0.518	12.04	84.513	84.453	B133W	85.88	1.367		
41	17	83.429	83.315	1500	114.0	0.1	0.013	87.791	87.688	1.26	2.24	2.29	1.0	-0.476	12.01	84.453	84.220	B132E	85.88	1.427		
43	44	83.752	83.283	375	67.0	0.7	0.013	86.937	86.631	1.33	0.15	0.07	0.5	-0.188	11.94	83.939	83.490	B4L120	85.11	1.171		
44	45	83.253	83.173	375	10.0	0.8	0.013	86.631	86.547	1.42	0.16	0.09	0.6	-0.138	12.00	83.490	83.378	B6L116	84.63	1.140		
45	46	83.023	82.468	525	111.0	0.5	0.013	86.547	86.360	1.40	0.30	0.14	0.5	-0.277	12.01	83.271	82.715	B1B	84.56	1.289		

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
46	Ex102	82.318	81.915	675	80.6	0.5	0.013	86.360	86.237	1.66	0.59	0.28	0.5	-0.279	12.02	82.714	82.590	B15L1	84.44	1.726		
470	460	83.214	82.860	450	59.0	0.6	0.013	86.407	86.519	1.39	0.22	0.03	0.1	-0.351	11.87	83.313	83.071	B13L1	84.51	1.197		
48	49	83.384	83.360	300	6.0	0.4	0.013	86.367	86.328	0.87	0.06	0.03	0.6	-0.141	12.00	83.543	83.501	N/A	N/A	N/A		
49	50	83.285	82.955	375	66.0	0.5	0.013	86.328	86.244	1.12	0.12	0.05	0.4	-0.203	12.00	83.457	83.120	B8L1	84.23	0.773		
50	ExPlug2	82.880	82.836	450	22.0	0.2	0.013	86.244	86.132	0.80	0.13	0.05	0.4	-0.217	12.00	83.113	83.091	N/A	N/A	N/A		
N3901	N3900	85.529	85.396	457	53.6	0.2	0.013	88.166	88.154	0.90	0.15	0.15	1.0	-0.099	11.97	85.887	85.665	IBI (FUT)	N/A	N/A		
N54	N55	83.033	82.918	2743	114.7	0.1	0.013	88.111	88.003	1.89	11.18	4.89	0.4	-0.933	12.02	84.843	84.802	IBI (FUT)	N/A	N/A		
N55	N56	82.898	82.750	2743	148.3	0.1	0.013	88.003	87.980	1.89	11.18	4.98	0.4	-0.839	12.02	84.802	84.768	IBI (FUT)	N/A	N/A		
N56	N57	82.600	82.570	3048	30.2	0.1	0.013	87.980	87.347	2.02	14.73	12.01	0.8	-0.880	12.03	84.768	84.706	IBI (FUT)	N/A	N/A		
N56	N101	84.082	84.000	610	63.1	0.1	0.013	87.980	87.410	0.79	0.23	0.39	1.7	0.076	11.99	84.768	84.643	IBI (FUT)	N/A	N/A		
N57	Chan1	82.570	82.554	3048	15.9	0.1	0.013	87.347	87.800	2.04	14.88	13.29	0.9	-0.912	12.02	84.706	84.557	IBI (FUT)	N/A	N/A		
170	18	82.934	82.870	1800	64.5	0.1	0.013	87.537	87.453	1.43	3.63	2.42	0.7	-0.582	12.02	84.152	84.112	B96SS	85.56	1.408		
460	46	82.840	82.543	450	49.5	0.6	0.013	86.519	86.360	1.39	0.22	0.10	0.4	-0.219	12.08	83.071	82.749	B13L5	84.51	1.439		
19S	20	82.494	82.412	2100	82.0	0.1	0.013	87.272	87.148	1.58	5.48	4.49	0.8	-0.527	12.02	84.067	84.007	N/A	N/A	N/A		
19W	23	83.721	83.483	750	119.0	0.2	0.013	87.272	87.057	1.13	0.50	0.20	0.4	-0.401	12.05	84.070	83.894	B71W	85.25	1.180		
20S	21	82.392	82.284	2100	106.5	0.1	0.013	87.148	87.025	1.58	5.48	4.52	0.8	-0.488	12.03	84.004	83.933	64	85.23	1.226		
20W	30	84.183	83.985	375	79.5	0.3	0.013	87.148	87.075	0.79	0.09	0.05	0.6	-0.162	11.92	84.396	84.149	56	85.28	0.884		
47	48	83.634	83.414	300	55.0	0.4	0.013	86.434	86.367	0.87	0.06	0.03	0.6	-0.134	12.00	83.800	83.555	B10L1	84.52	0.720		
Chan1	Chan1a	82.477	82.350	N/A	117.5	N/A	N/A	87.800	87.800	N/A	N/A	13.10	N/A	N/A	12.04	84.557	84.391	N/A	N/A	N/A		
Chan1a	Chan1b	82.350	82.300	N/A	54.4	N/A	N/A	87.800	87.800	N/A	N/A	12.91	N/A	N/A	12.05	84.391	84.280	N/A	N/A	N/A		
Chan1b	Chan1c	82.300	82.280	2100	18.0	0.1	0.013	87.800	87.800	1.76	22.23	12.84	0.6	-0.120	12.05	84.280	84.262	N/A	N/A	N/A		
Chan1c	Chan1d	82.280	82.189	N/A	88.1	N/A	N/A	87.800	87.800	N/A	N/A	12.78	N/A	N/A	12.06	84.262	83.977	N/A	N/A	N/A		
Chan1d	Chan1e	82.189	82.160	N/A	37.0	N/A	N/A	87.800	85.900	N/A	N/A	12.63	N/A	N/A	12.08	83.977	83.929	N/A	N/A	N/A		
Chan2	Chan3a	81.654	81.320	N/A	340.7	N/A	N/A	86.700	86.300	N/A	N/A	18.47	N/A	N/A	12.10	83.847	83.331	N/A	N/A	N/A		
Chan3	Chan4	81.200	81.080	N/A	175.5	N/A	N/A	86.300	86.100	N/A	N/A	19.26	N/A	N/A	12.18	83.205	82.917	N/A	N/A	N/A		
Chan4	ForeS	81.080	81.072	N/A	7.6	N/A	N/A	86.100	83.500	N/A	N/A	19.74	N/A	N/A	12.16	82.917	82.917	N/A	N/A	N/A		
DICB	15	84.647	84.405	975	22.0	1.1	0.013	86.190	87.920	3.15	2.35	0.00	0.0	-0.975	0.00	84.647	84.315	N/A	N/A	N/A		
Ex100	Ex111	82.193	82.180	975	18.7	0.1	0.013	85.372	84.902	0.79	0.59	0.59	1.0	-0.250	11.94	82.918	82.917	IBI (3)	83.47	0.552		
Ex107	Ex100	82.670	82.590	600	67.9	0.1	0.013	86.060	85.372	0.75	0.21	0.18	0.8	-0.185	11.94	83.085	82.918	IBI (3)	83.58	0.495		
Ex111	Chan4	81.700	81.685	975	15.0	0.1	0.013	84.902	86.100	0.95	0.71	0.59	0.8	0.242	11.94	82.917	82.917	IBI (3)	83.45	0.533		
ExPlug2	Ex107	82.836	82.821	450	7.3	0.2	0.013	86.132	86.060	0.80	0.13	0.05	0.4	-0.195	12.01	83.091	83.085	N/A	N/A	N/A		
ForeN	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	24.63	N/A	N/A	13.73	82.916	82.910	N/A	N/A	N/A		
ForeS	MainS	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	17.66	N/A	N/A	12.18	82.917	82.916	N/A	N/A	N/A		
MainN	Out	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	5.72	N/A	N/A	13.31	82.910	80.100	N/A	N/A	N/A		
MainS	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	12.08	N/A	N/A	12.23	82.917	82.910	N/A	N/A	N/A		
140	141	83.363	83.071	900	73.0	0.4	0.013	87.196	86.812	1.80	1.14	0.84	0.7	-0.270	11.99	83.993	83.653	N/A	N/A	N/A		
141	24	83.041	83.015	900	6.5	0.4	0.013	86.812	86.889	1.80	1.14	0.84	0.7	-0.288	11.99	83.653	83.556	N/A	N/A	N/A		
230	24	83.185	83.165	750	10.0	0.2	0.013	86.944	86.889	1.13	0.50	0.29	0.6	-0.348	12.06	83.587	83.494	N/A	N/A	N/A		
250	26	82.386	82.368	1350	9.0	0.2	0.013	86.730	86.637	1.67	2.39	1.19	0.5	-0.496	12.05	83.240	83.217	N/A	N/A	N/A		
259	28	84.086	83.981	1050	105.0	0.1	0.013	88.154	87.901	1.00	0.86	0.52	0.6	-0.497	12.07	84.639	84.513	B134W	86.14	1.501		
280	28	84.381	84.317	300	16.0	0.4	0.013	87.165	87.130	0.87	0.06	0.00	0.0	-0.300	0.00	84.381	84.361	47	85.21	0.829		
200	41	83.740	83.654	1050	43.0	0.2	0.013	87.754	87.791	1.41	1.22	0.05	0.0	-0.335	12.09	84.455	84.453	N/A	N/A	N/A		
Chan1e	Chan2	82.160	82.104	2400	55.0	0.1	0.013	85.900	86.700	1.73	15.66	12.58	0.8	-0.631	12.10	83.929	83.847	N/A	N/A	N/A		
N404	N406	82.649	82.574	1524	75.3	0.1	0.013	87.325	86.750	1.28	2.33	1.91	0.8	-0.207	11.99	83.966	83.906	IBI (4)	85.23	1.259		

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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)
N406	N407	82.200	82.173	1829	27.2	0.1	0.013	86.750	86.800	1.44	3.77	2.75	0.7	-0.123	12.01	83.906	83.890	IBI (4)	84.65	0.744			
N407	Chan2	82.143	82.136	1829	6.9	0.1	0.013	86.800	86.700	1.46	3.83	2.74	0.7	-0.082	12.01	83.890	83.847	IBI (4)	84.70	0.810			
N101	N102	83.919	83.887	686	63.1	0.1	0.013	87.410	87.380	0.86	0.32	0.51	1.6	0.038	12.10	84.643	84.528	IBI (4)	85.31	0.667			
N104	N105	83.344	83.269	1067	68.2	0.1	0.013	87.400	87.620	1.06	0.95	0.64	0.7	-0.062	12.13	84.349	84.306	IBI (4)	85.30	0.951			
N105	N106	83.118	83.108	1219	9.5	0.1	0.013	87.620	87.500	1.19	1.38	0.82	0.6	-0.031	12.00	84.306	84.288	IBI (4)	85.52	1.214			
N106	19	83.088	82.957	1192	119.2	0.1	0.013	87.500	87.272	1.14	1.27	1.45	1.1	0.008	12.00	84.288	84.071	IBI (4)	85.40	1.112			
N310	N311	84.140	84.017	381	30.6	0.4	0.013	87.394	87.200	1.02	0.12	0.07	0.6	-0.156	12.02	84.365	84.277	IBI (4)	85.29	0.929			
N311	N312	83.792	83.672	610	80.1	0.2	0.013	87.200	87.000	0.85	0.25	0.19	0.7	-0.125	11.93	84.277	84.213	IBI (4)	85.10	0.823			
N312	N313	83.597	83.533	686	42.8	0.2	0.013	87.000	86.700	0.92	0.34	0.36	1.0	-0.070	11.92	84.213	84.144	IBI (4)	84.90	0.687			
N313	N305	83.513	83.471	686	28.1	0.2	0.013	86.700	86.900	0.92	0.34	0.35	1.0	-0.055	11.92	84.144	84.104	IBI (4)	84.60	0.456			
N305	N306	83.246	83.181	914	43.7	0.1	0.013	86.900	86.500	1.11	0.73	0.78	1.1	-0.056	11.91	84.104	83.987	IBI (4)	84.80	0.696			
N306	N406	83.106	83.025	991	61.9	0.1	0.013	86.500	86.750	1.10	0.85	0.91	1.1	-0.110	11.90	83.987	83.906	IBI (4)	84.40	0.413			
N401	N402	83.000	82.962	1524	115.0	0.1	0.013	87.390	87.260	1.40	2.55	1.32	0.5	-0.431	12.06	84.093	84.048	IBI (4)	85.29	1.197			
N402	N403	82.842	82.728	1524	94.6	0.1	0.013	87.260	87.218	1.41	2.57	1.52	0.6	-0.318	12.07	84.048	84.001	IBI (4)	85.16	1.112			
N403	N404	82.698	82.679	1524	15.8	0.1	0.013	87.218	87.325	1.40	2.55	1.52	0.6	-0.221	12.08	84.001	83.966	IBI (4)	85.12	1.117			
N501	N57	84.013	83.965	1067	40.0	0.1	0.013	88.000	87.347	1.10	0.99	1.76	1.8	-0.248	11.94	84.832	84.722	IBI (4)	85.90	1.068			
N500C	N501	84.706	84.538	533	67.4	0.2	0.013	87.740	88.000	1.00	0.22	0.19	0.8	-0.169	12.00	85.070	84.832	IBI (4)	85.64	0.570			
N500	N500C	85.025	84.856	381	67.4	0.3	0.013	87.760	87.740	0.80	0.09	0.08	0.9	-0.096	11.95	85.310	85.070	IBI (4)	85.66	0.350			
N400	N401	83.119	83.020	1524	83.0	0.1	0.013	87.800	87.390	1.39	2.54	1.23	0.5	-0.512	12.09	84.131	84.093	IBI (4)	85.70	1.569			
N399	N400	83.238	83.139	1524	82.0	0.1	0.013	89.000	87.800	1.41	2.57	1.21	0.5	-0.587	12.07	84.175	84.131	IBI (4)	86.90	2.725			
N412	N404	83.560	83.474	686	8.5	1.0	0.013	87.400	87.325	2.39	0.88	0.24	0.3	-0.272	11.94	83.974	83.966	IBI (4)	85.30	1.326			
N410	N412	84.048	83.740	533	30.9	1.0	0.013	87.540	87.400	2.00	0.45	0.24	0.5	-0.246	11.93	84.335	84.015	IBI (4)	85.44	1.105			
N410B	N410	84.550	84.091	533	57.4	0.8	0.013	87.570	87.540	1.79	0.40	0.23	0.6	-0.242	11.94	84.841	84.378	IBI (4)	85.47	0.629			
N309	N310	84.297	84.160	381	34.3	0.4	0.013	87.350	87.394	1.01	0.12	0.07	0.6	-0.168	12.01	84.510	84.365	IBI (4)	85.25	0.740			
N308	N309	84.363	84.317	381	11.5	0.4	0.013	87.220	87.350	1.01	0.12	0.07	0.6	-0.230	12.00	84.514	84.510	IBI (4)	85.12	0.606			
N307	N308	84.656	84.383	381	68.2	0.4	0.013	87.400	87.220	1.01	0.12	0.07	0.6	-0.162	12.00	84.875	84.572	IBI (4)	85.30	0.425			
N304	N305	83.509	83.396	762	75.6	0.2	0.013	86.800	86.900	0.99	0.45	0.41	0.9	-0.145	11.93	84.126	84.104	IBI (4)	84.70	0.574			
N303	N304	83.693	83.584	686	36.1	0.3	0.013	86.760	86.800	1.30	0.48	0.28	0.6	-0.288	11.89	84.091	84.126	IBI (4)	84.66	0.569			
N301	N303	84.292	83.843	533	112.4	0.4	0.013	87.230	86.760	1.27	0.28	0.20	0.7	-0.227	11.89	84.598	84.140	IBI (4)	85.13	0.532			
N314	N304	84.131	83.959	305	38.2	0.5	0.013	87.100	86.800	0.93	0.07	0.05	0.7	-0.108	11.92	84.328	84.128	IBI (4)	85.00	0.672			
N114	N105	84.424	84.254	533	68.0	0.2	0.013	87.680	87.620	1.00	0.22	0.25	1.1	-0.150	11.95	84.807	84.589	IBI (4)	85.58	0.773			
N113	N114	84.995	84.574	381	60.0	0.7	0.013	87.530	87.680	1.34	0.15	0.15	1.0	-0.117	11.95	85.259	84.855	IBI (4)	85.71	0.451			
N112B	N113	85.186	85.070	305	11.6	1.0	0.013	87.580	87.530	1.38	0.10	0.03	0.3	-0.191	11.99	85.300	85.259	IBI (4)	85.76	0.460			
N112_2	N101	84.426	84.219	381	68.9	0.3	0.013	87.580	87.410	0.88	0.10	0.07	0.7	-0.092	11.92	84.715	84.643	IBI (4)	85.48	0.765			
N103	N104	83.658	83.644	762	13.1	0.1	0.013	87.370	87.400	0.83	0.38	0.57	1.5	-0.025	12.12	84.395	84.349	IBI (4)	85.27	0.875			
N102	N103	83.817	83.733	686	64.7	0.1	0.013	87.380	87.370	0.86	0.32	0.56	1.8	0.025	12.12	84.528	84.395	IBI (4)	85.28	0.752			
Chan3a	Chan3	81.230	81.200	N/A	30.2	N/A	N/A	86.300	86.300	N/A	N/A	17.71	N/A	N/A	12.18	83.331	83.205	N/A	N/A	N/A			
C13	C13b	84.650	82.840	50	250.0	0.7	0.05	85.750	85.150	0.09	0.00	0.31	1716.9	0.384	12.05	85.084	83.276	N/A	N/A	N/A			
C13b	MainN	82.840	82.000	50	150.0	0.6	0.05	85.150	83.500	0.08	0.00	0.25	1547.9	0.386	12.18	83.276	82.910	N/A	N/A	N/A			
B1	B2	81.101	80.943	1800	105.0	0.2	0.013	87.811	87.288	1.75	4.45	4.91	1.1	0.560	12.06	83.461	83.204	276	85.47	2.009			
B2	B3	80.943	80.923	1800	13.5	0.2	0.013	87.288	87.329	1.75	4.45	5.05	1.1	0.461	12.03	83.204	83.107	275	85.74	2.536			
B3	B60	80.923	80.861	1800	41.5	0.2	0.013	87.329	87.550	1.75	4.45	5.05	1.1	0.384	12.06	83.107	82.961	273	85.68	2.573			
B4	B58	83.882	83.311	375	81.5	0.7	0.013	87.834	87.788	1.33	0.15	0.12	0.8	-0.108	12.09	84.149	83.738	254	85.75	1.601			
																		254	85.75	1.736	81.3	54.5	84.014

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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)	U/S Surcharge (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)
B5	B6	84.597	84.452	300	14.5	1.0	0.013	87.803	87.913	1.37	0.10	0.00	0.0	-0.281	12.09	84.616	84.633	50	85.79	1.722	81.3	65.3	84.068
B5	B6	83.691	82.380	675	138.0	1.0	0.013	87.803	87.712	2.29	0.82	0.30	0.4	-0.333	12.08	84.033	83.587	40	85.98	1.842	81.3	79.1	84.138
B6	B7	84.388	84.082	300	47.0	0.7	0.013	87.913	87.917	1.10	0.08	0.01	0.2	-0.055	12.14	84.633	84.629	54	85.68	1.922	81.3	3.9	83.758
B7	B8	84.022	83.956	300	12.0	0.6	0.013	87.917	87.801	1.01	0.07	0.02	0.3	0.307	12.16	84.629	84.628	55	85.79	1.980	81.3	14.2	83.810
B8	B9	83.926	83.552	300	68.0	0.6	0.013	87.801	87.873	1.01	0.07	0.08	1.1	0.402	12.17	84.628	84.430	27	85.83	1.873	81.3	25.6	83.867
B9	B57	83.477	82.547	375	71.5	1.3	0.013	87.873	87.813	1.81	0.20	0.19	0.9	0.578	12.09	84.430	83.483	21	85.69	1.851	81.3	37.8	83.929
B10	B11	83.947	83.685	375	69.0	0.4	0.013	88.197	88.159	0.98	0.11	0.12	1.1	0.236	11.74	84.558	84.450	81	86.04	1.851	81.3		
B10	B49	84.417	83.682	300	106.5	0.7	0.013	88.197	88.057	1.14	0.08	0.04	0.5	-0.159	11.98	84.558	84.183	311	86.27	1.712	81.3		
B11	B34	83.665	83.053	375	80.5	0.8	0.013	88.159	87.886	1.38	0.15	0.17	1.1	0.410	11.89	84.450	83.988	74	85.92	1.470	81.3		
B12	B13	87.219	85.699	375	76.0	2.0	0.013	91.003	89.864	2.25	0.25	0.11	0.4	-0.201	11.93	87.393	85.872	N/A	N/A		81.3		
B13	B15	85.249	83.720	825	139.0	1.1	0.013	89.864	88.345	2.82	1.51	1.09	0.7	-0.303	11.94	85.771	84.419	N/A	N/A		81.3		
B15	B21	83.195	82.979	1350	58.5	0.4	0.013	88.345	88.484	2.27	3.25	2.07	0.6	-0.126	11.92	84.419	84.356	N/A	N/A		81.3		
B16	B40	84.536	84.061	375	108.0	0.4	0.013	88.626	88.320	1.05	0.12	0.12	1.0	0.022	11.98	84.933	84.536	B370S	86.26	1.327	81.3		
B17	B16	84.801	84.611	300	9.5	2.0	0.013	88.702	88.626	1.93	0.14	0.01	0.1	-0.168	12.07	84.933	84.933	B370S	86.26	1.654	108.2	19.1	94.606
B17	B18	84.894	84.371	300	48.0	1.1	0.013	88.702	88.502	1.43	0.10	0.00	0.0	-0.261	12.03	84.933	84.578	B370N	86.63	1.975	108.2	32.3	84.655
B18	B21	84.296	83.934	375	67.0	0.5	0.013	88.502	88.484	1.17	0.13	0.10	0.8	-0.093	12.00	84.578	84.356	B369S	86.63	1.930	108.2	44.6	84.700
B19	B21	84.917	83.859	450	141.0	0.8	0.013	88.600	88.484	1.55	0.25	0.09	0.4	-0.259	11.98	85.108	84.356	B369N	86.41	1.608	108.2	72.4	84.802
B19	B26	84.843	84.810	300	9.5	0.4	0.013	88.600	88.678	0.81	0.06	0.05	0.9	-0.035	11.76	85.108	85.088	B368S	86.53	1.679	108.2	85.9	84.851
B21	B24	82.959	82.707	1350	58.5	0.4	0.013	88.484	88.145	2.45	3.50	2.17	0.6	0.047	11.93	84.356	84.273	B368N	86.63	1.728	108.2	99.7	84.902
B22	B24	84.693	83.587	450	146.5	0.8	0.013	88.456	88.145	1.55	0.25	0.10	0.4	-0.246	11.93	84.897	84.273	B374S	86.87	1.943	108.2	106.7	84.927
B22	B2200	84.552	84.434	300	29.0	0.4	0.013	88.456	87.660	0.88	0.06	0.09	1.4	0.045	11.92	84.897	84.665	B373N	86.67	1.767	108.2	100.1	84.903
B24	B24	82.687	82.479	1350	41.5	0.5	0.013	88.145	88.096	2.64	3.77	2.31	0.6	0.236	12.09	84.273	84.187	B372S	86.55	1.727	108.2	78.1	84.823
B25	B30	82.449	82.380	1350	14.0	0.5	0.013	88.096	88.193	2.61	3.74	2.33	0.6	0.388	12.12	84.187	84.154	B372S	86.55	1.775	108.2	65.2	84.775
B26	B22	84.780	84.572	300	52.0	0.4	0.013	88.678	88.456	0.87	0.06	0.06	1.0	0.008	12.11	85.088	84.897	B372S	86.62	1.924	108.2	43.6	84.696
B27	B28	83.872	83.767	675	10.5	1.0	0.013	88.285	88.194	2.35	0.84	0.34	0.4	-0.021	12.06	84.526	84.497	B371N	86.62	1.969	108.2	31.4	84.651
																		B371S	86.77	2.169	108.2	17.8	84.601
																		B374N	86.75	1.817	81.3		
																		B376E	86.59	1.657	81.3		
																		B377W	86.51	1.932	81.3		
																		B356E	86.51	1.402	81.3		
																		351	86.73	1.622	81.3		
																		B145N	86.60	2.244	81.3		
																		B136E	86.15	1.253	81.3		
																		B158	86.60	1.703	81.3		
																		B146S	86.09	1.817	81.3		
																		N/A	N/A	1.542	81.3		
																		N/A	N/A	1.854	81.3		
																		124	86.63	1.542	81.3		
																		121	86.38	1.854	81.3		

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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)
B45	B46	84.081	84.005	375	10.5	0.7	0.013	88.178	87.992	1.35	0.15	0.11	0.7	0.267	11.90	84.723	84.698	222	86.26	1.537	103.2	96.9	84.771
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	0.318	11.91	84.698	84.538	220	85.95	1.252	103.2	84.5	84.741
B47	B54	83.566	83.131	600	111.5	0.4	0.013	87.962	87.818	1.36	0.38	0.39	1.0	0.372	11.91	84.538	84.090	185	85.85	1.312	45.6	26.2	84.630
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	-0.106	12.09	84.285	83.894	211	85.83	1.545	111.4	12.7	84.141
B49	B50	83.652	83.619	300	9.5	0.4	0.013	88.057	87.905	0.81	0.06	0.03	0.6	0.231	12.19	84.183	84.171	309	86.14	1.957	111.4	23.8	84.186
B50	B52	83.443	82.731	450	142.5	0.5	0.013	87.905	87.772	1.27	0.20	0.16	0.8	0.278	12.04	84.171	83.894	300	85.81	1.639	111.4	36.3	84.236
B52	B56	81.531	81.426	1650	58.5	0.2	0.013	87.772	87.712	1.81	3.87	3.95	1.0	0.713	12.19	83.894	83.587	N/A	N/A	N/A	111.4	50.9	84.295
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	0.419	12.19	84.090	84.032	188	86.02	1.930	111.4	61.8	84.339
B55	B56	82.953	82.381	675	110.0	0.5	0.013	87.903	87.712	1.69	0.61	0.47	0.8	0.404	12.09	84.032	83.587	199	85.69	1.658	111.4	74.0	84.388
B56	B57	81.405	81.267	1650	60.5	0.2	0.013	87.712	87.813	2.04	4.37	4.55	1.0	0.532	12.06	83.587	83.483	N/A	N/A	N/A	111.4	85.7	84.435
B57	B1	81.117	81.117	1800	10.5	0.2	0.013	87.813	87.811	1.75	4.45	4.90	1.1	0.566	12.06	83.483	83.461	N/A	N/A	N/A	111.4	85.7	84.435
B58	B57	83.237	82.468	450	61.5	1.3	0.013	87.788	87.813	2.00	0.32	0.21	0.7	0.051	11.92	83.738	83.483	262	85.71	1.972	111.4	97.6	84.483
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	-0.109	12.17	83.326	83.249	270	85.73	2.404	61.6	18.4	83.559
B60	B61	80.801	80.755	1800	30.5	0.2	0.013	87.550	87.550	1.75	4.45	5.14	1.2	0.360	12.06	82.961	82.949	N/A	N/A	N/A	61.6	30.6	83.610
B61	2144	80.755	80.755	1800	73.5	0.2	0.013	87.550	86.340	1.75	4.45	5.14	1.2	0.394	12.07	82.949	82.924	N/A	N/A	N/A	61.6	41.9	83.656
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	0.328	12.18	82.962	82.961	N/A	N/A	N/A	61.6	54.3	83.708
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	87.393	N/A	N/A	N/A	61.6		
B180	B18	84.774	84.371	300	38.0	1.1	0.013	88.743	88.502	1.41	0.10	0.05	0.5	-0.132	12.00	84.942	84.578	B367N	86.55	1.608	37.9	14.8	84.720

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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)	
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	0.031	11.93	84.942	84.461	B364S	86.21	1.268		77.2	18.1	84.574
B410	B42	84.928	84.576	300	51.0	0.7	0.013	88.272	88.269	1.14	0.08	0.06	0.7	-0.107	11.92	85.121	84.916	232	86.45	1.329		77.2	18.1	84.574
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	-0.164	12.12	84.168	83.326	294	85.46	1.292		77.2	31.1	84.655
B2200	B27	83.997	83.902	675	19.0	0.5	0.013	87.660	88.285	1.66	0.59	0.34	0.6	-0.103	12.02	84.569	84.526	122	86.48	1.911		77.2	44.0	84.735
C12	C13	84.848	84.650	600	22.0	0.9	0.013	86.490	85.750	2.06	0.58	0.17	0.3	-0.343	12.08	85.105	85.084	N/A	N/A	N/A		77.2	72.4	84.912
C4MH	B2200	85.207	84.463	450	31.0	2.4	0.013	88.250	87.660	2.78	0.44	0.26	0.6	-0.113	12.02	85.544	84.714	N/A	N/A	N/A		77.2	72.4	84.912
C8MH	B5	85.210	84.950	300	26.0	1.0	0.013	88.060	87.803	1.37	0.10	0.10	1.1	0.153	12.02	85.663	85.200	N/A	N/A	N/A		77.2	72.4	84.912
2144	ForeN	80.160	80.137	1800	22.5	0.1	0.013	86.340	83.500	1.43	3.63	7.96	2.2	0.964	12.00	82.924	82.916	N/A	N/A	N/A		77.2	72.4	84.912
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	1.398	11.88	88.105	87.960	N/A	N/A	N/A		77.2	72.4	84.912
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	1.300	11.89	87.960	87.861	N/A	N/A	N/A		77.2	72.4	84.912
CB3	CB4	86.385	86.360	250	10.5	0.2	0.013	88.670	88.600	0.59	0.03	0.08	2.8	1.226	11.88	87.861	87.792	N/A	N/A	N/A		77.2	72.4	84.912
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	1.182	12.27	87.792	87.724	N/A	N/A	N/A		77.2	72.4	84.912
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	1.139	12.25	87.724	87.660	N/A	N/A	N/A		77.2	72.4	84.912
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	1.100	11.92	87.660	87.570	N/A	N/A	N/A		77.2	72.4	84.912
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	1.035	11.94	87.570	87.402	N/A	N/A	N/A		77.2	72.4	84.912
CB8	C100MH	86.260	86.230	250	12.5	0.2	0.013	88.320	88.250	0.59	0.03	0.16	5.3	0.892	12.02	87.402	86.480	N/A	N/A	N/A		77.2	72.4	84.912
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	0.440	12.08	86.877	86.975	N/A	N/A	N/A		77.2	72.4	84.912
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	0.592	12.08	86.975	87.063	N/A	N/A	N/A		77.2	72.4	84.912
CB10i	CB11	86.086	86.032	250	22.4	0.2	0.013	88.410	88.200	0.59	0.03	-0.04	-1.5	0.727	11.87	87.063	87.162	N/A	N/A	N/A		77.2	72.4	84.912
CB11	CB12	86.032	85.976	250	23.5	0.2	0.013	88.200	88.120	0.59	0.03	0.02	0.8	0.880	11.77	87.162	87.162	N/A	N/A	N/A		77.2	72.4	84.912
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	0.936	12.26	87.162	87.162	N/A	N/A	N/A		77.2	72.4	84.912
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	0.967	12.26	87.162	87.162	N/A	N/A	N/A		77.2	72.4	84.912
CB14	CB15	85.914	85.883	250	13.0	0.2	0.013	88.040	88.000	0.59	0.03	0.03	1.1	0.998	11.89	87.162	87.137	N/A	N/A	N/A		77.2	72.4	84.912
CB15	CB16	85.883	85.852	250	13.0	0.2	0.013	88.000	87.960	0.59	0.03	0.03	0.9	1.004	11.93	87.137	87.118	N/A	N/A	N/A		77.2	72.4	84.912
CB16	CB17	85.852	85.821	250	13.0	0.2	0.013	87.960	87.920	0.59	0.03	0.02	0.7	1.016	11.75	87.118	87.105	N/A	N/A	N/A		77.2	72.4	84.912
CB17	CB18	85.821	85.790	250	13.0	0.2	0.013	87.920	87.880	0.59	0.03	0.04	1.4	1.034	11.88	87.105	87.069	N/A	N/A	N/A		77.2	72.4	84.912
CB18	CB19	85.790	85.759	250	13.0	0.2	0.013	87.880	87.840	0.59	0.03	0.04	1.2	1.029	11.88	87.069	87.036	N/A	N/A	N/A		77.2	72.4	84.912
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	1.027	11.95	87.036	87.006	N/A	N/A	N/A		77.2	72.4	84.912
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	1.028	12.41	87.006	86.985	N/A	N/A	N/A		77.2	72.4	84.912
CB21	CB22	85.697	85.666	250	13.0	0.2	0.013	87.760	87.720	0.59	0.03	0.05	1.9	1.038	11.85	86.985	86.945	N/A	N/A	N/A		77.2	72.4	84.912
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	1.029	12.38	86.945	86.906	N/A	N/A	N/A		77.2	72.4	84.912
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	1.021	12.37	86.906	86.847	N/A	N/A	N/A		77.2	72.4	84.912
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	1.011	12.35	86.847	86.753	N/A	N/A	N/A		77.2	72.4	84.912

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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)	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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
CB25	CB50	85.760	85.383	250	39.0	1.0	0.013	87.540	88.572	1.21	0.06	0.09	1.5	0.743	12.11	86.753	85.856	N/A	N/A	N/A	N/A	N/A
CB25	CB25i	85.518	85.493	250	10.5	0.2	0.013	87.540	87.640	0.59	0.03	0.03	1.0	0.985	12.21	86.753	86.738	N/A	N/A	N/A	N/A	N/A
CB25i	CB26	85.493	85.452	250	17.0	0.2	0.013	87.640	87.480	0.59	0.03	0.04	1.3	0.995	12.06	86.738	86.667	N/A	N/A	N/A	N/A	N/A
CB26	CB27	85.452	85.409	250	18.0	0.2	0.013	87.480	87.420	0.59	0.03	0.03	1.1	0.965	12.03	86.667	86.619	N/A	N/A	N/A	N/A	N/A
CB27	CB28	85.409	85.378	250	13.0	0.2	0.013	87.420	87.380	0.59	0.03	0.03	1.1	0.960	12.33	86.619	86.590	N/A	N/A	N/A	N/A	N/A
CB28	CB29	85.378	85.342	250	15.0	0.2	0.013	87.380	87.330	0.59	0.03	0.05	1.8	0.962	11.87	86.590	86.536	N/A	N/A	N/A	N/A	N/A
CB29	CB30	85.342	85.281	250	25.5	0.2	0.013	87.330	87.250	0.59	0.03	0.06	2.2	0.944	12.31	86.536	86.416	N/A	N/A	N/A	N/A	N/A
CB30	C12	85.281	85.198	250	34.5	0.2	0.013	87.250	86.490	0.59	0.03	0.09	3.1	0.885	12.09	86.416	85.430	N/A	N/A	N/A	N/A	N/A
CB50	C8MH	85.330	85.270	300	4.0	1.0	0.013	88.572	88.060	1.37	0.10	0.10	1.1	0.226	12.01	85.856	85.663	N/A	N/A	N/A	N/A	N/A
CB100	CB1	86.503	86.457	250	19.0	0.2	0.013	89.000	88.880	0.59	0.03	-0.01	-0.3	1.353	11.88	88.106	88.105	N/A	N/A	N/A	N/A	N/A
C100MH	C4MH	86.107	85.954	375	4.5	3.4	0.013	88.250	88.250	2.93	0.32	0.17	0.5	-0.083	12.02	86.399	86.148	N/A	N/A	N/A	N/A	N/A
C101MH	CB9	86.221	86.187	250	14.3	0.2	0.013	88.240	88.280	0.59	0.03	-0.10	-3.3	-0.016	11.93	86.455	86.877	N/A	N/A	N/A	N/A	N/A
C101MH	C4MH	86.165	86.075	300	4.5	2.0	0.013	88.240	88.250	1.93	0.14	0.10	0.7	-0.057	11.93	86.408	86.260	N/A	N/A	N/A	N/A	N/A
1000	N3900	83.165	83.135	2700	17.9	0.0	0.013	87.742	88.154	0.26	1.52	5.17	3.4	-0.988	12.02	84.877	84.872	N/A	N/A	N/A	N/A	N/A
2000	N56	82.960	82.930	2250	31.0	0.0	0.013	87.484	87.980	0.17	0.66	7.27	11.0	-0.116	12.01	85.094	84.768	N/A	N/A	N/A	N/A	N/A
N398	N399	83.840	83.708	1050	112.8	0.0	0.013	87.890	89.000	0.10	0.09	1.21	14.1	-0.214	12.04	84.676	84.333	N/A	N/A	N/A	N/A	N/A
i	2003	85.670	85.390	1200	100.0	0.3	0.013	89.370	89.920	1.82	2.06	2.03	1.0	-0.099	12.04	86.771	86.174	Fut. Est. (4)	87.27	0.499	0.499	0.499
2000i	2001	84.205	83.642	300	60.5	0.9	0.013	87.910	87.670	1.32	0.09	0.08	0.9	-0.072	12.13	84.433	83.863	Fut. Est. (4)	85.81	1.377	1.377	1.377
2001	2121	83.567	83.520	375	13.5	0.4	0.013	87.670	87.560	0.94	0.10	0.10	0.9	-0.084	12.08	83.858	83.747	Fut. Est. (4)	85.57	1.712	1.712	1.712
2002	2010	84.726	83.952	525	119.0	0.7	0.013	88.840	88.420	1.60	0.35	0.27	0.8	-0.127	12.05	85.124	84.308	Fut. Est. (4)	86.74	1.616	1.616	1.616
2003	2004	83.279	83.198	1200	29.0	0.3	0.013	89.920	89.920	1.82	2.06	2.10	1.0	0.547	12.05	85.026	84.879	Fut. Est. (4)	87.82	2.794	2.794	2.794
2004	2005	83.168	83.130	1200	13.5	0.3	0.013	89.920	89.910	1.82	2.06	2.11	1.0	0.511	12.07	84.879	84.781	Fut. Est. (4)	87.82	2.941	2.941	2.941
2005	2009	83.100	82.898	1200	69.5	0.3	0.013	89.910	89.790	1.86	2.10	2.17	1.0	0.481	12.09	84.781	84.596	Fut. Est. (4)	87.81	3.029	3.029	3.029
2006	2007	87.229	87.036	300	53.5	0.4	0.013	90.030	89.980	0.82	0.06	0.05	0.9	-0.070	12.05	87.459	87.237	Fut. Est. (4)	87.93	0.471	0.471	0.471
2007	2008	86.961	86.926	375	13.5	0.3	0.013	89.980	89.960	0.81	0.09	0.08	0.9	-0.099	12.14	87.237	87.160	Fut. Est. (4)	87.88	0.643	0.643	0.643
2008	2009	86.701	86.534	600	119.0	0.1	0.013	89.960	89.790	0.81	0.23	0.20	0.9	-0.141	12.13	87.160	86.826	Fut. Est. (4)	87.86	0.700	0.700	0.700
2009	2010	82.878	82.637	1200	71.0	0.3	0.013	89.790	88.420	2.01	2.27	2.42	1.1	0.518	12.09	84.596	84.308	Fut. Est. (4)	87.69	3.094	3.094	3.094
2010	2011	82.337	82.232	1500	80.5	0.1	0.013	88.420	88.340	1.44	2.55	2.74	1.1	0.472	12.08	84.309	84.221	Fut. Est. (4)	86.32	2.011	2.011	2.011
2011	2012	82.212	82.136	1500	63.5	0.1	0.013	88.340	88.270	1.39	2.45	2.79	1.1	0.509	12.09	84.221	84.069	Fut. Est. (4)	86.24	2.019	2.019	2.019
2012	2013	82.106	82.090	1500	13.5	0.1	0.013	88.270	88.260	1.39	2.45	2.82	1.2	0.463	12.09	84.069	84.013	Fut. Est. (4)	86.17	2.101	2.101	2.101
2013	2017	82.060	81.910	1500	115.0	0.1	0.013	88.260	88.150	1.44	2.55	2.90	1.1	0.453	12.09	84.013	83.705	Fut. Est. (4)	86.16	2.147	2.147	2.147
2014	2015	84.372	83.719	375	99.0	0.7	0.013	88.320	88.220	1.29	0.14	0.12	0.8	-0.100	12.12	84.647	83.974	Fut. Est. (4)	86.22	1.573	1.573	1.573
2015	2016	83.623	83.513	375	9.5	1.2	0.013	88.220	88.210	1.71	0.19	0.15	0.8	-0.057	12.14	83.941	83.824	Fut. Est. (4)	86.12	2.179	2.179	2.179
2016	2017	83.360	83.103	525	66.0	0.4	0.013	88.210	88.150	1.24	0.27	0.22	0.8	-0.061	12.15	83.824	83.705	Fut. Est. (4)	86.11	2.286	2.286	2.286
2017	2018	81.850	81.757	1500	66.5	0.1	0.013	88.150	88.070	1.50	2.64	3.09	1.2	0.355	12.10	83.705	83.684	Fut. Est. (4)	86.05	2.345	2.345	2.345
2018	2019	81.737	81.651	1500	66.0	0.1	0.013	88.070	88.010	1.44	2.55	3.13	1.2	0.447	12.10	83.684	83.447	Fut. Est. (4)	85.97	2.286	2.286	2.286
2019	2020	81.621	81.609	1500	9.5	0.1	0.013	88.010	88.000	1.44	2.55	3.15	1.2	0.326	12.10	83.447	83.399	Fut. Est. (4)	85.91	2.463	2.463	2.463
2020	2024	81.459	81.293	1650	118.5	0.1	0.013	88.000	87.880	1.59	3.41	3.21	0.9	0.290	12.10	83.399	83.173	Fut. Est. (4)	85.90	2.501	2.501	2.501
2021	2022	83.906	83.115	375	96.5	0.8	0.013	88.050	87.960	1.44	0.16	0.12	0.8	-0.126	12.12	84.155	83.408	Fut. Est. (4)	85.95	1.795	1.795	1.795
2022	2023	83.085	82.942	375	13.5	1.1	0.013	87.960	87.950	1.63	0.18	0.15	0.8	-0.052	12.18	83.408	83.283	Fut. Est. (4)	85.86	2.452	2.452	2.452
2023	2024	82.792	82.647	525	63.0	0.2	0.013	87.950	87.880	0.95	0.21	0.21	1.0	-0.034	12.17	83.283	83.173	Fut. Est. (4)	85.85	2.567	2.567	2.567
2024	2025	81.233	81.126	1650	71.0	0.2	0.013	87.880	87.820	1.65	3.53	3.39	1.0	0.290	12.11	83.173	83.009	Fut. Est. (4)	85.78	2.607	2.607	2.607
2025	2026	81.066	81.021	1650	32.0	0.1	0.013	87.820	87.790	1.59	3.41	3.38	1.0	0.293	12.11	83.009	82.964	Fut. Est. (4)	85.72	2.711	2.711	2.711
2026	2119	80.991	80.843	1650	92.5	0.2	0.013	87.790	87.700	1.71	3.65	3.51	1.0	0.323	12.11	82.964	82.928	Fut. Est. (4)	85.69	2.726	2.726	2.726

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
2027	2119	83.283	83.141	300	40.5	0.4	0.013	87.740	87.700	0.81	0.06	0.05	0.8	-0.071	12.09	83.512	83.305	Fut. Est. (4)	85.64	2.128		
2028	2029	84.108	83.916	300	31.0	0.6	0.013	87.960	87.930	1.08	0.08	0.03	0.3	-0.178	12.02	84.230	84.034	Fut. Est. (4)	85.86	1.630		
2029	2030	83.741	83.674	300	14.0	0.5	0.013	87.930	87.920	0.95	0.07	0.06	0.9	-0.063	12.05	83.978	83.868	Fut. Est. (4)	85.83	1.852		
2030	2031	83.341	83.225	525	68.5	0.2	0.013	87.920	87.850	0.82	0.18	0.16	0.9	-0.156	12.10	83.710	83.555	Fut. Est. (4)	85.82	2.110		
2031	2118	83.150	83.054	600	68.5	0.1	0.013	87.850	87.780	0.81	0.23	0.20	0.9	-0.195	12.12	83.555	83.418	Fut. Est. (4)	85.75	2.195		
2032	2084	85.584	84.062	300	99.5	1.5	0.013	88.380	88.280	1.69	0.12	0.00	0.0	-0.300	0.00	85.584	84.134	Fut. Est. (4)	86.28	0.696		
2033	2034	85.693	84.897	450	92.5	0.9	0.013	89.380	89.470	1.66	0.26	0.20	0.8	-0.153	12.04	85.990	85.208	Fut. Est. (4)	87.28	1.290		
2034	2035	84.597	84.469	750	98.5	0.1	0.013	89.470	89.440	0.91	0.40	0.37	0.9	-0.139	12.05	85.208	85.104	Fut. Est. (4)	87.37	2.162		
2035	2036	84.389	84.253	825	113.5	0.1	0.013	89.440	89.130	0.93	0.50	0.50	1.0	-0.110	12.06	85.104	84.991	Fut. Est. (4)	87.34	2.236		
2036	2037	84.178	84.001	900	118.0	0.2	0.013	89.130	88.810	1.10	0.70	0.70	1.0	-0.087	12.04	84.991	84.776	Fut. Est. (4)	87.03	2.039		
2037	2038	83.853	83.710	900	84.0	0.2	0.013	88.810	88.520	1.17	0.75	0.80	1.1	0.023	12.03	84.776	84.622	Fut. Est. (4)	86.71	1.934		
2038	2039	83.690	83.603	900	48.5	0.2	0.013	88.520	88.440	1.21	0.77	0.84	1.1	0.032	12.04	84.622	84.522	Fut. Est. (4)	86.42	1.798		
2039	2040	83.528	83.410	975	84.5	0.1	0.013	88.440	88.360	1.12	0.84	0.96	1.1	0.019	12.04	84.522	84.380	Fut. Est. (4)	86.34	1.818		
2040	2084	83.390	83.267	975	82.0	0.2	0.013	88.360	88.280	1.16	0.87	1.02	1.2	0.015	12.03	84.380	84.134	Fut. Est. (4)	86.26	1.880		
2041	2042	87.020	86.828	525	29.5	0.7	0.013	91.140	91.030	1.60	0.35	0.26	0.7	-0.188	12.05	87.357	87.164	Fut. Est. (4)	89.34	1.983		
2042	2043	86.440	86.201	750	95.5	0.3	0.013	91.030	90.700	1.26	0.56	0.48	0.9	-0.157	12.05	87.033	86.856	Fut. Est. (4)	89.23	2.197		
2043	2044	86.121	85.769	825	110.0	0.3	0.013	90.700	90.320	1.52	0.81	0.72	0.9	-0.090	12.09	86.856	86.478	Fut. Est. (4)	88.90	2.044		
2044	2046	85.694	85.486	900	33.5	0.6	0.013	90.320	90.250	2.24	1.43	1.49	1.0	-0.116	12.01	86.478	86.333	Fut. Est. (4)	88.52	2.042		
2045	2046	86.727	86.126	525	92.5	0.7	0.013	90.330	90.250	1.60	0.35	0.30	0.9	-0.093	12.08	87.159	86.496	Fut. Est. (4)	89.03	1.871		
2046	2047	85.186	84.938	1200	103.5	0.2	0.013	90.250	90.090	1.69	1.91	1.96	1.0	-0.053	11.99	86.333	86.163	Fut. Est. (4)	88.45	2.117		
2047	2048	84.638	84.521	1500	117.0	0.1	0.013	90.090	89.920	1.26	2.24	2.26	1.0	0.025	12.00	86.163	86.075	Fut. Est. (4)	88.29	2.127		
2048	2049	84.491	84.356	1500	112.5	0.1	0.013	89.920	89.730	1.39	2.45	2.61	1.1	0.084	12.00	86.075	85.951	Fut. Est. (4)	88.12	2.045		
2049	2057	84.323	84.212	1500	85.5	0.1	0.013	89.730	89.570	1.44	2.55	2.83	1.1	0.128	11.99	85.951	85.831	Fut. Est. (4)	87.93	1.979		
2050	2051	86.849	86.095	675	116.0	0.7	0.013	90.890	90.770	1.89	0.68	0.38	0.6	-0.291	12.05	87.233	86.774	Fut. Est. (4)	89.09	1.857		
2051	2052	85.839	85.575	825	120.0	0.2	0.013	90.770	90.650	1.26	0.67	0.64	1.0	0.110	12.17	86.774	86.556	Fut. Est. (4)	88.97	2.196		
2052	2053	85.545	85.522	825	10.5	0.2	0.013	90.650	90.610	1.26	0.67	0.71	1.1	0.186	12.25	86.556	86.527	Fut. Est. (4)	88.85	2.294		
2053	2054	85.447	85.254	900	87.5	0.2	0.013	90.610	90.250	1.33	0.85	0.89	1.1	0.180	12.25	86.527	86.349	Fut. Est. (4)	88.81	2.283		
2054	2055	85.224	84.996	900	87.5	0.3	0.013	90.250	89.900	1.45	0.92	1.03	1.1	0.225	12.18	86.349	86.111	Fut. Est. (4)	88.45	2.101		
2055	2056	84.966	84.938	900	10.5	0.3	0.013	89.900	89.870	1.48	0.94	1.11	1.2	0.245	12.18	86.111	86.068	Fut. Est. (4)	88.10	1.989		
2056	2057	84.863	84.722	975	67.0	0.2	0.013	89.870	89.570	1.38	1.03	1.23	1.2	0.230	12.18	86.068	85.831	Fut. Est. (4)	88.07	2.002		
2057	2060	83.893	83.775	1800	90.5	0.1	0.013	89.570	89.370	1.63	4.14	3.95	1.0	0.138	11.99	85.831	85.620	Fut. Est. (4)	87.77	1.939		
2058	2059	88.954	88.188	1200	116.0	0.7	0.013	92.650	91.890	2.80	3.17	2.25	0.7	-0.449	12.03	89.705	88.935	Fut. Est. (4)	90.55	0.845		
2059	2060	85.142	84.567	1200	88.5	0.7	0.013	91.890	89.370	2.78	3.14	2.35	0.7	-0.362	12.03	85.980	85.620	Fut. Est. (4)	89.79	3.810		
2060	2061	83.620	83.433	1800	81.5	0.2	0.013	89.370	89.260	2.17	5.51	6.23	1.1	0.200	12.06	85.620	85.398	Fut. Est. (4)	87.27	1.650		
2061	2062	83.413	83.239	1800	79.0	0.2	0.013	89.260	89.150	2.12	5.39	6.25	1.2	0.185	12.07	85.398	85.179	Fut. Est. (4)	87.16	1.762		
2062	2063	83.219	83.112	1800	51.0	0.2	0.013	89.150	89.070	2.07	5.27	6.27	1.2	0.160	12.07	85.179	85.034	Fut. Est. (4)	87.05	1.871		
2063	2064	82.962	82.852	1950	78.5	0.1	0.013	89.070	88.950	1.78	5.32	6.30	1.2	0.122	12.07	85.034	84.883	Fut. Est. (4)	86.97	1.936		
2064	2203	82.702	82.652	2100	50.0	0.1	0.013	88.950	88.960	1.58	5.48	6.26	1.1	0.081	12.08	84.883	84.683	Fut. Est. (4)	86.85	1.967		
2065	2066	84.488	84.295	450	96.5	0.2	0.013	88.930	88.780	0.80	0.13	0.09	0.7	-0.117	12.02	84.821	84.737	Fut. Est. (4)	86.83	2.009		
2066	2072	84.145	84.011	600	96.0	0.1	0.013	88.780	88.620	0.81	0.23	0.22	0.9	-0.008	12.00	84.737	84.547	Fut. Est. (4)	86.68	1.943		
2067	2071	84.525	84.345	600	120.0	0.2	0.013	88.620	88.700	0.84	0.24	0.18	0.8	-0.127	12.16	84.998	84.854	Fut. Est. (4)	86.82	1.822		
2068	2070	85.106	84.911	300	30.0	0.7	0.013	88.880	88.760	1.10	0.08	0.04	0.5	-0.152	12.06	85.254	85.059	Fut. Est. (4)	86.78	1.526		
2069	2070	84.820	84.544	525	120.0	0.2	0.013	89.000	88.760	0.95	0.21	0.18	0.9	-0.112	12.09	85.233	84.936	Fut. Est. (4)	86.90	1.667		
2070	2071	84.422	84.325	600	51.0	0.2	0.013	88.760	88.700	0.95	0.27	0.26	1.0	-0.086	12.21	84.936	84.854	Fut. Est. (4)	86.66	1.724		

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
2071	2072	84.039	83.872	750	88.0	0.2	0.013	88.700	88.620	1.10	0.49	0.52	1.1	0.065	12.22	84.854	84.647	Fut. Est. (4)	86.60	1.746		
2072	2075	83.786	83.588	825	79.0	0.3	0.013	88.620	88.510	1.34	0.72	0.71	1.0	0.036	11.99	84.647	84.488	Fut. Est. (4)	86.52	1.873		
2073	2074	85.057	84.664	375	62.0	0.7	0.013	88.680	88.610	1.28	0.14	0.09	0.7	-0.154	12.08	85.278	84.874	Fut. Est. (4)	86.58	1.302		
2074	2075	84.097	83.944	600	109.0	0.1	0.013	88.610	88.510	0.81	0.23	0.21	0.9	-0.064	12.19	84.633	84.488	Fut. Est. (4)	86.51	1.877		
2075	2083	83.438	83.293	975	85.0	0.2	0.013	88.510	88.410	1.24	0.92	0.96	1.0	0.075	12.20	84.488	84.364	Fut. Est. (4)	86.41	1.922		
2076	2077	85.002	84.762	600	120.0	0.2	0.013	89.190	89.060	0.97	0.27	0.22	0.8	-0.147	12.24	85.455	85.302	Fut. Est. (4)	87.09	1.635		
2077	2078	84.742	84.513	600	79.0	0.3	0.013	89.060	88.680	1.17	0.33	0.32	1.0	-0.040	12.23	85.302	85.122	Fut. Est. (4)	86.96	1.658		
2078	2079	84.438	84.272	675	75.5	0.2	0.013	88.680	88.590	1.10	0.39	0.41	1.0	0.009	12.23	85.122	84.944	Fut. Est. (4)	86.58	1.458		
2079	2080	84.242	84.210	675	13.5	0.2	0.013	88.590	88.580	1.15	0.41	0.45	1.1	0.027	12.24	84.944	84.885	Fut. Est. (4)	86.49	1.546		
2080	2081	84.180	84.079	675	39.0	0.3	0.013	88.580	88.540	1.20	0.43	0.47	1.1	0.030	12.24	84.885	84.786	Fut. Est. (4)	86.48	1.595		
2081	2082	83.928	83.732	750	85.0	0.2	0.013	88.540	88.490	1.21	0.53	0.59	1.1	0.108	12.24	84.786	84.598	Fut. Est. (4)	86.44	1.654		
2082	2083	83.657	83.512	825	85.0	0.2	0.013	88.490	88.410	1.11	0.59	0.68	1.2	0.116	12.24	84.598	84.364	Fut. Est. (4)	86.39	1.792		
2083	2084	83.218	82.990	1050	81.5	0.3	0.013	88.410	88.280	1.67	1.44	1.69	1.2	0.096	12.20	84.364	84.134	Fut. Est. (4)	86.31	1.946		
2084	2085	82.690	82.478	1350	118.0	0.2	0.013	88.280	88.110	1.58	2.26	2.76	1.2	0.094	12.17	84.134	83.867	Fut. Est. (4)	86.18	2.046		
2085	2116	82.178	82.058	1650	119.5	0.1	0.013	88.110	87.930	1.35	2.88	3.02	1.0	0.039	12.19	83.867	83.681	Fut. Est. (4)	86.01	2.143		
2086	2087	85.028	84.428	375	75.0	0.8	0.013	89.140	88.700	1.42	0.16	0.09	0.6	-0.167	12.10	85.236	84.706	Fut. Est. (4)	87.04	1.804		
2087	2088	84.203	84.047	600	74.5	0.2	0.013	88.700	88.460	1.00	0.28	0.26	0.9	-0.097	12.06	84.706	84.579	Fut. Est. (4)	86.60	1.894		
2088	2089	83.970	83.828	675	74.5	0.2	0.013	88.460	88.220	1.02	0.37	0.35	1.0	-0.066	12.07	84.579	84.376	Fut. Est. (4)	86.36	1.781		
2089	2114	83.754	83.572	675	79.0	0.2	0.013	88.220	88.150	1.13	0.40	0.41	1.0	-0.053	12.09	84.376	83.979	Fut. Est. (4)	86.12	1.744		
2090	2091	84.276	83.844	1350	66.5	0.7	0.013	89.210	88.840	3.01	4.30	2.32	0.5	-0.422	12.02	85.204	84.632	Fut. Est. (4)	87.11	1.906		
2091	2092	83.740	83.404	1350	68.5	0.5	0.013	88.840	88.910	2.61	3.74	2.41	0.6	-0.458	12.02	84.632	84.469	Fut. Est. (4)	86.74	2.108		
2092	2096	83.254	83.055	1500	68.5	0.3	0.013	88.910	88.880	2.15	3.81	2.57	0.7	-0.285	12.14	84.469	84.405	Fut. Est. (4)	86.81	2.341		
2093	2094	85.433	84.664	450	116.5	0.7	0.013	89.290	89.070	1.46	0.23	0.16	0.7	-0.172	12.09	85.711	85.001	Fut. Est. (4)	87.19	1.479		
2094	2095	84.634	84.560	450	14.0	0.5	0.013	89.070	89.040	1.31	0.21	0.19	0.9	-0.083	12.11	85.001	84.868	Fut. Est. (4)	86.97	1.969		
2095	2096	84.410	84.238	600	71.5	0.2	0.013	89.040	88.880	1.06	0.30	0.24	0.8	-0.144	12.10	84.866	84.555	Fut. Est. (4)	86.94	2.074		
2096	2100	83.035	82.808	1500	75.5	0.3	0.013	88.880	88.800	2.19	3.87	2.94	0.8	-0.130	12.14	84.405	84.175	Fut. Est. (4)	86.78	2.375		
2097	2099	84.177	83.536	1050	60.5	1.1	0.013	89.430	89.060	3.25	2.81	2.95	1.0	-0.125	12.04	85.102	84.453	Fut. Est. (4)	87.33	2.228		
2098	2099	85.001	84.533	300	72.0	0.7	0.013	89.280	89.060	1.10	0.08	0.06	0.8	-0.076	12.13	85.225	84.725	Fut. Est. (4)	87.18	1.955		
2099	2100	83.236	83.003	1350	75.0	0.3	0.013	89.060	88.800	2.08	2.97	3.11	1.0	-0.190	12.04	84.396	84.175	Fut. Est. (4)	86.96	2.564		
2100	2101	82.403	82.227	1950	80.0	0.2	0.013	88.800	88.470	2.23	6.67	5.86	0.9	-0.178	12.04	84.175	84.069	Fut. Est. (4)	86.70	2.525		
2101	2114	82.207	82.044	1950	74.0	0.2	0.013	88.470	88.150	2.23	6.67	5.86	0.9	-0.088	12.04	84.069	83.961	Fut. Est. (4)	86.37	2.301		
2102	2103	85.073	84.693	300	58.5	0.7	0.013	88.700	88.400	1.10	0.08	0.05	0.6	-0.127	12.09	85.246	84.864	Fut. Est. (4)	86.60	1.354		
2103	2104	84.407	84.209	525	79.0	0.3	0.013	88.400	88.320	0.99	0.22	0.16	0.7	-0.173	12.09	84.759	84.564	Fut. Est. (4)	86.30	1.541		
2104	2105	84.178	84.095	525	9.5	0.9	0.013	88.320	88.300	1.85	0.40	0.20	0.5	-0.139	12.12	84.564	84.526	Fut. Est. (4)	86.22	1.656		
2105	2113	84.020	83.902	600	53.5	0.2	0.013	88.300	88.250	1.02	0.29	0.27	0.9	-0.094	12.11	84.526	84.301	Fut. Est. (4)	86.20	1.674		
2106	2107	84.967	84.580	300	59.5	0.7	0.013	88.460	88.400	1.10	0.08	0.04	0.5	-0.155	12.06	85.112	84.765	Fut. Est. (4)	86.36	1.248		
2107	2112	84.444	84.229	375	82.5	0.3	0.013	88.400	88.310	0.81	0.09	0.08	0.9	-0.054	12.12	84.765	84.581	Fut. Est. (4)	86.30	1.535		
2108	2109	85.129	84.745	300	59.0	0.7	0.013	88.980	88.780	1.10	0.08	0.05	0.6	-0.125	12.09	85.304	84.918	Fut. Est. (4)	86.88	1.576		
2109	2110	84.534	84.336	450	79.0	0.3	0.013	88.780	88.490	0.90	0.14	0.13	0.9	-0.096	12.09	84.888	84.696	Fut. Est. (4)	86.68	1.792		
2110	2111	84.306	84.243	450	9.5	0.7	0.013	88.490	88.450	1.46	0.23	0.17	0.7	-0.060	12.10	84.696	84.643	Fut. Est. (4)	86.39	1.694		
2111	2112	84.167	84.078	525	35.5	0.3	0.013	88.450	88.310	0.99	0.22	0.19	0.9	-0.049	12.10	84.643	84.581	Fut. Est. (4)	86.35	1.707		
2112	2113	84.033	83.933	525	24.5	0.4	0.013	88.310	88.250	1.27	0.28	0.28	1.0	0.023	12.12	84.581	84.301	Fut. Est. (4)	86.21	1.629		
2113	2114	83.613	83.487	825	79.0	0.2	0.013	88.250	88.150	1.07	0.57	0.57	1.0	-0.137	12.12	84.301	83.961	Fut. Est. (4)	86.15	1.849		
2114	2115	82.024	81.820	1950	73.0	0.3	0.013	88.150	88.010	2.52	7.53	6.87	0.9	-0.013	12.10	83.961	83.794	Fut. Est. (4)	86.05	2.089		

Table B-1B: Pipe Data and Hydraulic Simulation Results for the 100-Year, 24-Hour SCS Type II Storm (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 (m)	
																					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	6.93	0.9	0.024	12.10	83.794	83.681	Fut. Est. (4)	85.91	2.116		
2116	2117	81.383	81.270	2250	75.0	0.2	0.013	87.930	87.860	2.03	8.07	9.66	1.2	0.048	12.11	83.681	83.515	Fut. Est. (4)	85.83	2.149		
2117	2122	81.120	81.028	2400	84.0	0.1	0.013	87.960	87.730	1.81	8.21	9.65	1.2	-0.005	12.11	83.515	83.382	Fut. Est. (4)	85.76	2.245		
2118	2137	82.797	82.689	750	98.0	0.1	0.013	87.780	88.700	0.84	0.37	0.37	1.0	-0.129	12.12	83.418	83.308	Fut. Est. (4)	85.68	2.262		
2119	2120	80.783	80.736	1650	47.0	0.1	0.013	87.700	87.650	1.35	2.88	3.59	1.2	0.495	12.12	82.928	82.928	Fut. Est. (4)	85.60	2.672		
2120	2121	80.716	80.631	1650	84.5	0.1	0.013	87.650	87.560	1.35	2.88	3.63	1.3	0.562	12.12	82.928	82.928	Fut. Est. (4)	85.55	2.622		
2121	2142	80.571	80.495	1650	76.0	0.1	0.013	87.560	87.330	1.35	2.88	3.78	1.3	0.707	12.14	82.928	82.927	Fut. Est. (4)	85.46	2.532		
2122	2136	80.878	80.794	2550	84.0	0.1	0.013	87.730	87.610	1.80	9.20	9.83	1.1	-0.046	12.12	83.382	83.161	Fut. Est. (4)	85.63	2.248		
2135	2136	81.066	81.031	2700	35.0	0.1	0.013	87.560	87.610	1.87	10.72	8.64	0.8	-0.415	12.14	83.351	83.161	Fut. Est. (4)	85.46	2.109		
2136	2138	80.644	80.508	2700	90.5	0.2	0.013	87.610	88.100	2.29	13.13	18.47	1.4	-0.183	12.12	83.161	82.918	Fut. Est. (4)	85.51	2.349		
2137	2138	82.669	82.522	750	98.0	0.2	0.013	88.700	88.100	0.98	0.43	0.48	1.1	-0.111	12.14	83.308	82.948	Fut. Est. (4)	86.60	3.292		
2138	2139	80.488	80.365	2700	77.0	0.2	0.013	88.100	88.000	2.37	13.56	19.02	1.4	-0.270	12.13	82.918	82.919	Fut. Est. (4)	86.00	3.082		
2139	2140	80.345	80.235	2700	73.5	0.2	0.013	88.000	88.250	2.29	13.13	19.08	1.5	-0.126	12.13	82.919	82.917	Fut. Est. (4)	85.90	2.981		
2140	ForeN	80.205	80.134	2700	47.0	0.2	0.013	88.250	83.500	2.29	13.13	18.20	1.4	0.012	12.14	82.917	82.916	Fut. Est. (4)	86.15	3.233		
2140	2140w	N/A	N/A	N/A	N/A	N/A	N/A	88.250	88.250	N/A	N/A	0.91	N/A	N/A	12.11	82.917	82.916	Fut. Est. (4)	86.15	3.233		
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	-0.094	12.15	84.672	84.024	Fut. Est. (4)	86.27	1.598		
2142	2143	80.465	80.422	1650	43.0	0.1	0.013	87.330	86.880	1.35	2.88	3.82	1.3	0.812	12.14	82.927	82.927	Fut. Est. (4)	85.23	2.303		
2143	2144	80.272	80.220	1800	51.5	0.1	0.013	86.880	86.340	1.43	3.63	2.98	0.8	0.855	12.00	82.927	82.924	Fut. Est. (4)	84.78	1.853		
2143	2143w	N/A	N/A	N/A	N/A	N/A	N/A	86.880	86.880	N/A	N/A	1.12	N/A	N/A	12.15	82.927	82.922	Fut. Est. (4)	84.78	1.853		
2203	2204	82.592	82.502	2100	81.5	0.1	0.013	88.960	88.970	1.66	5.75	6.66	1.2	-0.009	12.09	84.683	84.565	Fut. Est. (4)	86.86	2.177		
2204	2205	82.482	82.360	2100	111.0	0.1	0.013	88.970	88.590	1.66	5.75	6.84	1.2	-0.017	12.09	84.565	84.392	Fut. Est. (4)	86.87	2.305		
2205	2206	82.340	82.259	2100	74.0	0.1	0.013	88.590	88.340	1.66	5.75	7.06	1.2	-0.048	12.11	84.392	84.273	Fut. Est. (4)	86.49	2.098		
2206	2207	82.239	82.157	2100	74.5	0.1	0.013	88.340	88.090	1.66	5.75	7.31	1.3	-0.066	12.11	84.273	84.146	Fut. Est. (4)	86.24	1.967		
2207	2208	82.137	82.023	2100	103.5	0.1	0.013	88.090	87.740	1.66	5.75	7.67	1.3	-0.091	12.11	84.146	83.959	Fut. Est. (4)	85.99	1.844		
2208	2209	82.003	81.994	2100	8.0	0.1	0.013	87.740	87.710	1.66	5.75	7.67	1.3	-0.144	12.09	83.959	83.939	Fut. Est. (4)	85.64	1.681		
2209	2210	81.974	81.842	2100	120.0	0.1	0.013	87.710	87.640	1.66	5.75	7.67	1.3	-0.135	12.09	83.939	83.721	Fut. Est. (4)	85.61	1.671		
2210	2211	81.692	81.573	2250	119.0	0.1	0.013	87.640	87.570	1.66	6.59	7.65	1.2	-0.221	12.13	83.721	83.570	Fut. Est. (4)	85.54	1.819		
2211	2135	81.273	81.236	2550	36.5	0.1	0.013	87.570	87.560	1.80	9.20	8.58	0.9	-0.253	12.14	83.570	83.351	Fut. Est. (4)	85.47	1.900		
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	-0.072	12.09	83.671	83.418	Fut. Est. (4)	85.79	2.119		
2143w	MainN	80.250	80.100	975	30.0	0.5	0.013	86.880	83.500	2.12	1.58	1.10	0.7	1.697	12.16	82.922	82.910	Fut. Est. (4)	84.78	1.858		
2140w	MainN	80.300	80.100	975	40.0	0.5	0.013	88.250	83.500	2.12	1.58	0.89	0.6	1.641	12.11	82.916	82.910	Fut. Est. (4)	86.15	3.234		

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).

84.014 Interpolated HGL elevation

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
1	2	84.836	84.565	450	77.5	0.4	0.013	87.787	87.641	1.06	0.17	0.08	0.5	-0.225	1.52	85.061	84.758	B91W	85.99	0.929		
2	3	84.535	84.483	450	13.0	0.4	0.013	87.641	87.716	1.13	0.18	0.08	0.4	-0.227	1.54	84.758	84.674	N/A	N/A			
3	4	84.333	84.218	600	38.5	0.3	0.013	87.716	87.586	1.19	0.34	0.16	0.5	-0.296	1.54	84.637	84.534	B90N	85.76	1.123		
4	8	84.143	84.095	675	24.0	0.2	0.013	87.586	87.608	1.05	0.38	0.21	0.5	-0.284	1.55	84.534	84.501	N/A	N/A			
5	6	84.639	84.427	525	106.0	0.2	0.013	87.722	87.781	0.89	0.19	0.11	0.6	-0.228	1.52	84.936	84.787	B87S	85.67	0.734		
6	12	84.352	84.177	600	87.5	0.2	0.013	87.781	87.701	0.97	0.27	0.21	0.8	-0.165	1.56	84.787	84.516	B95SS	85.57	0.783		
7	8	84.550	84.300	450	83.5	0.3	0.013	87.620	87.608	0.98	0.16	0.15	0.9	-0.066	1.54	84.934	84.567	B84W	85.52	0.586		
8	14	84.075	83.640	675	87.0	0.5	0.013	87.608	87.229	1.66	0.59	0.42	0.7	-0.249	1.56	84.501	84.050	N/A	N/A			
9	10	84.648	84.447	525	100.5	0.2	0.013	87.795	87.658	0.89	0.19	0.13	0.7	-0.179	1.52	84.994	84.854	B94NN	85.78	0.786		
10	11	84.297	84.131	675	110.5	0.2	0.013	87.658	87.429	0.91	0.33	0.29	0.9	-0.118	1.54	84.854	84.657	B96SS	85.56	0.706		
11	12	84.611	84.417	300	48.5	0.4	0.013	87.429	87.701	0.87	0.06	0.00	0.1	-0.254	1.57	84.657	84.516	B79E	85.53	0.873		
11	18	84.071	83.995	675	50.5	0.2	0.013	87.429	87.453	0.91	0.33	0.36	1.1	-0.089	1.57	84.657	84.375	B80E	85.38	0.723		
12	13	84.117	83.933	600	61.5	0.3	0.013	87.701	87.583	1.19	0.34	0.27	0.8	-0.201	1.58	84.516	84.270	B77W	85.51	0.994		
13	14	83.783	83.565	750	72.5	0.3	0.013	87.583	87.229	1.38	0.61	0.37	0.6	-0.285	1.59	84.248	84.030	B75W	85.37	1.122		
14	14	83.415	83.393	900	5.5	0.4	0.013	87.229	87.196	1.80	1.14	0.79	0.7	-0.285	1.59	84.030	83.980	N/A	N/A			
15	17	84.180	83.645	1200	107.0	0.5	0.013	87.920	87.688	2.44	2.76	0.07	0.0	-1.067	1.52	84.313	84.215	B97NN	85.85	1.537		
17	170	83.015	82.954	1800	60.5	0.1	0.013	87.688	87.537	1.43	3.63	2.16	0.6	-0.600	1.61	84.215	84.160	B96NS	85.72	1.505		
18	19	82.720	82.645	1950	75.0	0.1	0.013	87.453	87.272	1.51	4.50	2.72	0.6	-0.542	1.60	84.128	84.097	N/A	N/A			
19	19S	82.495	82.494	2100	1.0	0.1	0.013	87.272	87.272	1.58	5.48	4.21	0.8	-0.498	1.61	84.097	84.094	N/A	N/A			
19	19W	83.723	83.721	750	1.0	0.2	0.013	87.272	87.272	1.13	0.50	0.12	0.2	-0.376	1.67	84.097	84.097	N/A	N/A			
20	20S	82.392	82.391	2100	1.0	0.1	0.013	87.148	87.148	1.58	5.48	4.31	0.8	-0.452	1.62	84.040	84.037	N/A	N/A			
20	20W	84.186	84.183	375	1.0	0.3	0.013	87.148	87.148	0.79	0.09	-0.04	-0.5	-0.224	1.51	84.337	84.396	N/A	N/A			
21	22	82.264	82.210	2100	54.5	0.1	0.013	87.025	86.460	1.58	5.48	4.40	0.8	-0.387	1.63	83.977	83.906	68	85.16	1.183		
22	Chan2	82.180	82.150	2100	29.5	0.1	0.013	86.460	86.700	1.58	10.97	4.39	0.4	-0.374	1.63	83.906	83.892	N/A	N/A			
23	230	83.463	83.245	750	109.0	0.2	0.013	87.057	86.944	1.13	0.50	0.33	0.7	-0.291	1.66	83.922	83.612	B74W	85.14	1.218		
24	25	82.565	82.523	1350	21.0	0.2	0.013	86.989	86.774	1.67	2.39	1.12	0.5	-0.527	1.64	83.388	83.367	N/A	N/A			
25	250	82.493	82.416	1350	38.5	0.2	0.013	86.774	86.730	1.67	2.39	1.16	0.5	-0.476	1.64	83.367	83.330	17	85.09	1.723		
26	27	82.338	82.020	1350	63.5	0.5	0.013	86.637	86.394	2.64	3.77	1.57	0.4	-0.385	1.63	83.303	83.279	N/A	N/A			
27	Chan3	81.990	81.800	1350	38.0	0.5	0.013	86.394	86.300	2.64	3.77	1.56	0.4	-0.061	1.63	83.279	83.263	N/A	N/A			
28	29	84.242	84.190	375	17.5	0.3	0.013	87.130	87.017	0.87	0.10	0.00	0.0	-0.258	1.43	84.359	84.358	52	85.18	0.821		
29	30	83.965	83.760	600	82.0	0.3	0.013	87.017	87.075	1.09	0.31	0.20	0.6	-0.207	1.53	84.358	84.065	53	85.16	0.802		
30	31	83.685	83.601	675	33.5	0.3	0.013	87.075	86.964	1.17	0.42	0.25	0.6	-0.295	1.54	84.065	83.979	42	85.14	1.075		
31	32	83.541	83.463	675	31.0	0.3	0.013	86.964	86.962	1.17	0.42	0.29	0.7	-0.237	1.55	83.979	83.908	41	85.08	1.101		
32	33	83.433	83.309	675	41.5	0.3	0.013	86.962	86.911	1.29	0.46	0.35	0.8	-0.200	1.56	83.908	83.738	39	85.01	1.102		
33	34	83.249	83.210	675	13.0	0.3	0.013	86.911	86.830	1.29	0.46	0.35	0.8	-0.186	1.56	83.738	83.663	37	85.13	1.392		
34	35	83.180	83.026	675	44.0	0.4	0.013	86.830	86.728	1.39	0.50	0.39	0.8	-0.192	1.56	83.663	83.428	22	84.97	1.307		
35	26	82.951	82.938	750	6.5	0.2	0.013	86.728	86.637	1.13	0.50	0.39	0.8	-0.273	1.57	83.428	83.321	20	85.01	1.582		
N3900	N54	83.086	83.063	2743	22.9	0.1	0.013	88.154	88.111	1.89	11.18	4.71	0.4	-0.957	1.60	84.872	84.844	IBI (FUT)	N/A	N/A		
N3900	39	N/A	N/A	N/A	N/A	N/A	N/A	88.154	88.154	N/A	N/A	0.49	N/A	N/A	1.69	84.872	84.635	N/A	N/A			
40	41	83.831	83.729	1200	102.0	0.1	0.013	87.901	87.791	1.09	1.23	0.65	0.5	-0.542	1.65	84.489	84.412	B133W	85.88	1.391		
41	17	83.429	83.315	1500	114.0	0.1	0.013	87.791	87.688	1.26	2.24	2.05	0.9	-0.517	1.59	84.412	84.215	B132E	85.88	1.468		
43	44	83.752	83.283	375	67.0	0.7	0.013	86.937	86.631	1.33	0.15	0.07	0.5	-0.188	1.52	83.939	83.490	B4L120	85.11	1.171		
44	45	83.253	83.173	375	10.0	0.8	0.013	86.631	86.547	1.42	0.16	0.09	0.6	-0.138	1.67	83.490	83.378	B6L116	84.63	1.140		
45	46	83.023	82.468	525	111.0	0.5	0.013	86.547	86.360	1.40	0.30	0.14	0.5	-0.277	1.55	83.271	82.715	B1B	84.56	1.289		

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
46	Ex102	82.318	81.915	675	80.6	0.5	0.013	86.360	86.237	1.66	0.59	0.28	0.5	-0.278	1.55	82.715	82.590	B15L1	84.44	1.725		
470	460	83.214	82.860	450	59.0	0.6	0.013	86.407	86.519	1.39	0.22	0.03	0.1	-0.351	1.46	83.313	83.071	B13L1	84.51	1.197		
48	49	83.384	83.360	300	6.0	0.4	0.013	86.367	86.328	0.87	0.06	0.03	0.6	-0.141	1.75	83.543	83.501	N/A	N/A	N/A		
49	50	83.285	82.955	375	66.0	0.5	0.013	86.328	86.244	1.12	0.12	0.05	0.4	-0.203	1.75	83.457	83.120	B8L1	84.23	0.773		
50	ExPlug2	82.880	82.836	450	22.0	0.2	0.013	86.244	86.132	0.80	0.13	0.05	0.4	-0.221	1.74	83.109	83.086	N/A	N/A	N/A		
N3901	N3900	85.529	85.396	457	53.6	0.2	0.013	88.166	88.154	0.90	0.15	0.13	0.9	-0.123	1.52	85.863	85.651	IBI (FUT)	N/A	N/A		
N54	N55	83.033	82.918	2743	114.7	0.1	0.013	88.111	88.003	1.89	11.18	4.76	0.4	-0.932	1.63	84.844	84.805	IBI (FUT)	N/A	N/A		
N55	N56	82.898	82.750	2743	148.3	0.1	0.013	88.003	87.980	1.89	11.18	4.86	0.4	-0.836	1.62	84.805	84.771	IBI (FUT)	N/A	N/A		
N56	N57	82.600	82.570	3048	30.2	0.1	0.013	87.980	87.347	2.02	14.73	11.77	0.8	-0.877	1.59	84.771	84.713	IBI (FUT)	N/A	N/A		
N56	N101	84.082	84.000	610	63.1	0.1	0.013	87.980	87.410	0.79	0.23	0.38	1.7	0.079	1.53	84.771	84.640	IBI (FUT)	N/A	N/A		
N57	Chan1	82.570	82.554	3048	15.9	0.1	0.013	87.347	87.800	2.04	14.88	13.05	0.9	-0.905	1.60	84.713	84.572	IBI (FUT)	N/A	N/A		
170	18	82.934	82.870	1800	64.5	0.1	0.013	87.537	87.453	1.43	3.63	2.23	0.6	-0.574	1.61	84.160	84.128	B96SS	85.56	1.400		
460	46	82.840	82.543	450	49.5	0.6	0.013	86.519	86.360	1.39	0.22	0.10	0.4	-0.219	1.83	83.071	82.749	B13L5	84.51	1.439		
19S	20	82.494	82.412	2100	82.0	0.1	0.013	87.272	87.148	1.58	5.48	4.29	0.8	-0.500	1.61	84.094	84.040	N/A	N/A	N/A		
19W	23	83.721	83.483	750	119.0	0.2	0.013	87.272	87.057	1.13	0.50	0.23	0.5	-0.374	1.64	84.097	83.922	B71W	85.25	1.153		
20S	21	82.392	82.284	2100	106.5	0.1	0.013	87.148	87.025	1.58	5.48	4.34	0.8	-0.455	1.62	84.037	83.977	64	85.23	1.193		
20W	30	84.183	83.985	375	79.5	0.3	0.013	87.148	87.075	0.79	0.09	0.05	0.6	-0.162	1.52	84.396	84.148	56	85.28	0.884		
47	48	83.634	83.414	300	55.0	0.4	0.013	86.434	86.367	0.87	0.06	0.03	0.6	-0.134	1.75	83.800	83.555	B10L1	84.52	0.720		
Chan1	Chan1a	82.477	82.350	N/A	117.5	N/A	N/A	87.800	87.800	N/A	N/A	13.04	N/A	N/A	1.60	84.572	84.412	N/A	N/A	N/A		
Chan1a	Chan1b	82.350	82.300	N/A	54.4	N/A	N/A	87.800	87.800	N/A	N/A	12.90	N/A	N/A	1.65	84.412	84.306	N/A	N/A	N/A		
Chan1b	Chan1c	82.300	82.280	2100	18.0	0.1	0.013	87.800	87.800	1.76	22.23	12.86	0.6	-0.094	1.65	84.306	84.288	N/A	N/A	N/A		
Chan1c	Chan1d	82.280	82.189	N/A	88.1	N/A	N/A	87.800	87.800	N/A	N/A	12.82	N/A	N/A	1.67	84.288	84.016	N/A	N/A	N/A		
Chan1d	Chan1e	82.189	82.160	N/A	37.0	N/A	N/A	87.800	85.900	N/A	N/A	12.75	N/A	N/A	1.69	84.016	83.971	N/A	N/A	N/A		
Chan2	Chan3a	81.654	81.320	N/A	340.7	N/A	N/A	86.700	86.300	N/A	N/A	19.20	N/A	N/A	1.72	83.892	83.390	N/A	N/A	N/A		
Chan3	Chan4	81.200	81.080	N/A	175.5	N/A	N/A	86.300	86.100	N/A	N/A	21.03	N/A	N/A	1.79	83.263	83.047	N/A	N/A	N/A		
Chan4	ForeS	81.080	81.072	N/A	7.6	N/A	N/A	86.100	83.500	N/A	N/A	21.89	N/A	N/A	1.78	83.047	83.047	N/A	N/A	N/A		
DICB	15	84.647	84.405	975	22.0	1.1	0.013	86.190	87.920	3.15	2.35	0.00	0.0	-0.975	0.00	84.647	84.313	N/A	N/A	N/A		
Ex100	Ex111	82.193	82.180	975	18.7	0.1	0.013	85.372	84.902	0.79	0.59	0.59	1.0	-0.121	1.54	83.047	83.047	IBI (3)	83.47	0.423		
Ex107	Ex100	82.670	81.685	600	67.9	0.1	0.013	86.060	85.372	0.75	0.21	0.17	0.8	-0.191	1.53	83.079	83.047	IBI (3)	83.58	0.501		
Ex111	Chan4	81.700	81.685	975	15.0	0.1	0.013	84.902	86.100	0.95	0.71	0.59	0.8	0.372	1.54	83.047	83.047	IBI (3)	83.45	0.403		
ExPlug2	Ex107	82.836	82.821	450	7.3	0.2	0.013	86.132	86.060	0.80	0.13	0.05	0.4	-0.200	1.75	83.086	83.079	N/A	N/A	N/A		
ForeN	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	28.93	N/A	N/A	3.13	83.045	83.042	N/A	N/A	N/A		
ForeS	MainS	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	20.57	N/A	N/A	1.79	83.047	83.047	N/A	N/A	N/A		
MainN	Out	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	7.24	N/A	N/A	2.69	83.042	80.100	N/A	N/A	N/A		
MainS	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	14.02	N/A	N/A	1.84	83.047	83.042	N/A	N/A	N/A		
140	141	83.363	83.071	900	73.0	0.4	0.013	87.196	86.812	1.80	1.14	0.82	0.7	-0.283	1.59	83.980	83.643	N/A	N/A	N/A		
141	24	83.041	83.015	900	6.5	0.4	0.013	86.812	86.889	1.80	1.14	0.82	0.7	-0.298	1.60	83.643	83.548	N/A	N/A	N/A		
230	24	83.185	83.165	750	10.0	0.2	0.013	86.944	86.889	1.13	0.50	0.33	0.7	-0.323	1.67	83.612	83.513	N/A	N/A	N/A		
250	26	82.386	82.368	1350	9.0	0.2	0.013	86.730	86.637	1.67	2.39	1.21	0.5	-0.406	1.64	83.330	83.303	N/A	N/A	N/A		
259	27	84.086	83.981	1050	105.0	0.1	0.013	88.154	87.901	1.00	0.86	0.51	0.6	-0.501	1.67	84.635	84.489	B134W	86.14	1.505		
280	28	84.381	84.317	300	16.0	0.4	0.013	87.165	87.130	0.87	0.06	0.00	0.0	-0.300	0.00	84.381	84.359	47	85.21	0.829		
200	41	83.740	83.654	1050	43.0	0.2	0.013	87.754	87.791	1.41	1.22	0.03	0.0	-0.378	1.84	84.412	84.412	N/A	N/A	N/A		
Chan1e	Chan2	82.160	82.104	2400	55.0	0.1	0.013	85.900	86.700	1.73	15.66	12.72	0.8	-0.589	1.71	83.971	83.892	N/A	N/A	N/A		
N404	N406	82.649	82.574	1524	75.3	0.1	0.013	87.325	86.750	1.28	2.33	1.95	0.8	-0.132	1.60	84.041	83.965	IBI (4)	85.23	1.184		

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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)
N406	N407	82.200	82.173	1829	27.2	0.1	0.013	86.750	86.800	1.44	3.77	2.77	0.7	-0.064	1.59	83.965	83.944	IBI (4)	84.65	0.685			
N407	Chan2	82.143	82.136	1829	6.9	0.1	0.013	86.800	86.700	1.46	3.83	2.77	0.7	-0.028	1.59	83.944	83.892	IBI (4)	84.70	0.756			
N101	N102	83.919	83.887	686	63.1	0.1	0.013	87.410	87.380	0.86	0.32	0.49	1.6	0.035	1.54	84.640	84.525	IBI (4)	85.31	0.670			
N104	N105	83.344	83.269	1067	68.2	0.1	0.013	87.400	87.620	1.06	0.95	0.60	0.6	-0.035	1.60	84.376	84.329	IBI (4)	85.30	0.924			
N105	N106	83.118	83.108	1219	9.5	0.1	0.013	87.620	87.500	1.19	1.38	0.82	0.6	-0.008	1.55	84.329	84.309	IBI (4)	85.52	1.191			
N106	19	83.088	82.957	1192	119.2	0.1	0.013	87.500	87.272	1.14	1.27	1.46	1.1	0.029	1.55	84.309	84.097	IBI (4)	85.40	1.091			
N310	N311	84.140	84.017	381	30.6	0.4	0.013	87.394	87.200	1.02	0.12	0.07	0.6	-0.156	1.54	84.365	84.290	IBI (4)	85.29	0.929			
N311	N312	83.792	83.672	610	80.1	0.2	0.013	87.200	87.000	0.85	0.25	0.18	0.7	-0.112	1.53	84.290	84.245	IBI (4)	85.10	0.810			
N312	N313	83.597	83.533	686	42.8	0.2	0.013	87.000	86.700	0.92	0.34	0.34	1.0	-0.038	1.56	84.245	84.184	IBI (4)	84.90	0.655			
N313	N305	83.513	83.471	686	28.1	0.2	0.013	86.700	86.900	0.92	0.34	0.34	1.0	-0.015	1.56	84.184	84.147	IBI (4)	84.60	0.416			
N305	N306	83.246	83.181	914	43.7	0.1	0.013	86.900	86.500	1.11	0.73	0.75	1.0	-0.013	1.55	84.147	84.039	IBI (4)	84.80	0.653			
N306	N406	83.106	83.025	991	61.9	0.1	0.013	86.500	86.750	1.10	0.85	0.86	1.0	-0.058	1.54	84.039	83.965	IBI (4)	84.40	0.361			
N401	N402	83.000	82.962	1524	115.0	0.1	0.013	87.390	87.260	1.40	2.55	1.33	0.5	-0.370	1.65	84.154	84.115	IBI (4)	85.29	1.136			
N402	N403	82.842	82.728	1524	94.6	0.1	0.013	87.260	87.218	1.41	2.57	1.55	0.6	-0.251	1.64	84.115	84.073	IBI (4)	85.16	1.045			
N403	N404	82.698	82.679	1524	15.8	0.1	0.013	87.218	87.325	1.40	2.55	1.54	0.6	-0.149	1.64	84.073	84.041	IBI (4)	85.12	1.045			
N501	N57	84.013	83.965	1067	40.0	0.1	0.013	88.000	87.347	1.10	0.99	1.54	1.6	-0.265	1.50	84.815	84.713	IBI (4)	85.90	1.085			
N500C	N501	84.706	84.538	533	67.4	0.2	0.013	87.740	88.000	1.00	0.22	0.17	0.7	-0.193	1.52	85.046	84.815	IBI (4)	85.64	0.594			
N500	N500C	85.025	84.856	381	67.4	0.3	0.013	87.760	87.740	0.80	0.09	0.08	0.8	-0.116	1.51	85.290	85.055	IBI (4)	85.66	0.370			
N400	N401	83.119	83.020	1524	83.0	0.1	0.013	87.800	87.390	1.39	2.54	1.19	0.5	-0.460	1.65	84.183	84.154	IBI (4)	85.70	1.517			
N399	N400	83.238	83.139	1524	82.0	0.1	0.013	89.000	87.800	1.41	2.57	1.17	0.5	-0.546	1.57	84.216	84.183	IBI (4)	86.90	2.684			
N412	N404	83.560	83.474	686	8.5	1.0	0.013	87.400	87.325	2.39	0.88	0.23	0.3	-0.189	1.52	84.057	84.041	IBI (4)	85.30	1.243			
N410	N412	84.048	83.740	533	30.9	1.0	0.013	87.540	87.400	2.00	0.45	0.23	0.5	-0.252	1.52	84.329	84.057	IBI (4)	85.44	1.111			
N410B	N410	84.550	84.091	533	57.4	0.8	0.013	87.570	87.540	1.79	0.40	0.22	0.5	-0.247	1.51	84.836	84.373	IBI (4)	85.47	0.634			
N309	N310	84.297	84.160	381	34.3	0.4	0.013	87.350	87.394	1.01	0.12	0.07	0.6	-0.169	1.54	84.509	84.365	IBI (4)	85.25	0.741			
N308	N309	84.363	84.317	381	11.5	0.4	0.013	87.220	87.350	1.01	0.12	0.07	0.6	-0.231	1.53	84.513	84.509	IBI (4)	85.12	0.607			
N307	N308	84.656	84.383	381	68.2	0.4	0.013	87.400	87.220	1.01	0.12	0.07	0.6	-0.163	1.53	84.874	84.571	IBI (4)	85.30	0.426			
N304	N305	83.509	83.396	762	75.6	0.2	0.013	86.800	86.900	0.99	0.45	0.39	0.9	-0.097	1.53	84.174	84.147	IBI (4)	84.70	0.526			
N303	N304	83.693	83.584	686	36.1	0.3	0.013	86.760	86.800	1.30	0.48	0.28	0.6	-0.230	1.53	84.149	84.174	IBI (4)	84.66	0.511			
N301	N303	84.292	83.843	533	112.4	0.4	0.013	87.230	86.760	1.27	0.28	0.20	0.7	-0.227	1.56	84.598	84.149	IBI (4)	85.13	0.532			
N314	N304	84.131	83.959	305	38.2	0.5	0.013	87.100	86.800	0.93	0.07	0.05	0.7	-0.109	1.51	84.327	84.174	IBI (4)	85.00	0.673			
N114	N105	84.424	84.254	533	68.0	0.2	0.013	87.680	87.620	1.00	0.22	0.25	1.1	-0.151	1.52	84.806	84.588	IBI (4)	85.58	0.774			
N113	N114	84.995	84.574	381	60.0	0.7	0.013	87.530	87.680	1.34	0.15	0.15	1.0	-0.117	1.51	85.259	84.855	IBI (4)	85.71	0.451			
N112B	N113	85.186	85.070	305	11.6	1.0	0.013	87.580	87.530	1.38	0.10	0.03	0.3	-0.198	1.60	85.293	85.259	IBI (4)	85.76	0.467			
N112_2	N101	84.426	84.219	381	68.9	0.3	0.013	87.580	87.410	0.88	0.10	0.08	0.8	-0.078	1.60	84.729	84.640	IBI (4)	85.48	0.751			
N103	N104	83.658	83.644	762	13.1	0.1	0.013	87.370	87.400	0.83	0.38	0.52	1.4	-0.005	1.55	84.415	84.376	IBI (4)	85.27	0.855			
N102	N103	83.817	83.733	686	64.7	0.1	0.013	87.380	87.370	0.86	0.32	0.53	1.7	0.022	1.55	84.525	84.415	IBI (4)	85.28	0.755			
Chan3a	Chan3	81.230	81.200	N/A	30.2	N/A	N/A	86.300	86.300	N/A	N/A	18.80	N/A	N/A	1.79	83.390	83.263	N/A	N/A	N/A			
C13	C13b	84.650	82.840	50	250.0	0.7	0.05	85.750	85.150	0.09	0.00	0.32	1755.8	0.372	1.77	85.072	83.299	N/A	N/A	N/A			
C13b	MainN	82.840	82.000	50	150.0	0.6	0.05	85.150	83.500	0.08	0.00	0.32	2034.4	0.409	1.93	83.299	83.042	N/A	N/A	N/A			
B1	B2	81.101	80.943	1800	105.0	0.2	0.013	87.811	87.288	1.75	4.45	4.87	1.1	0.592	1.70	83.493	83.370	276	85.47	1.977			
B2	B3	80.943	80.923	1800	13.5	0.2	0.013	87.288	87.329	1.75	4.45	5.05	1.1	0.627	1.69	83.370	83.302	275	85.74	2.370			
B3	B60	80.923	80.861	1800	41.5	0.2	0.013	87.329	87.550	1.75	4.45	5.00	1.1	0.579	1.70	83.302	83.076	273	85.68	2.378			
B4	B58	83.882	83.311	375	81.5	0.7	0.013	87.834	87.788	1.33	0.15	0.15	0.8	-0.116	1.84	84.141	83.711	254	85.75	1.609			
																		254	85.75	1.751	81.3	54.5	83.999

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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 (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)
B5	B6	84.597	84.452	300	14.5	1.0	0.013	87.803	87.913	1.37	0.10	0.00	0.0	-0.305	0.00	84.592	84.592	B370S	85.79	1.734	81.3	65.3	84.056
B5	B56	83.691	82.380	675	138.0	1.0	0.013	87.803	87.712	2.29	0.82	0.30	0.4	-0.337	1.68	84.029	83.590	B370N	85.98	1.851	81.3	79.1	84.129
B6	B7	84.388	84.082	300	47.0	0.7	0.013	87.913	87.917	1.10	0.08	0.01	0.1	-0.096	1.81	84.592	84.590	B369S	85.68	1.948	81.3	3.9	83.732
B7	B8	84.022	83.956	300	12.0	0.6	0.013	87.917	87.801	1.01	0.07	0.02	0.2	0.268	1.84	84.590	84.590	B369N	85.79	2.004	81.3	14.2	83.786
B8	B9	83.926	83.552	300	68.0	0.6	0.013	87.801	87.873	1.01	0.07	0.07	0.9	0.364	1.84	84.590	84.380	B368S	85.74	1.894	81.3	25.6	83.846
B9	B57	83.477	82.547	375	71.5	1.3	0.013	87.873	87.813	1.81	0.20	0.19	0.9	0.528	1.67	84.380	83.501	B370S	85.78	1.869	81.3	37.8	83.911
B10	B11	83.947	83.685	375	69.0	0.4	0.013	88.197	88.159	0.98	0.11	0.11	1.0	0.242	1.38	84.564	84.454		86.01	1.418			
B10	B49	84.417	83.682	300	106.5	0.7	0.013	88.197	88.057	1.14	0.08	0.04	0.4	-0.153	1.65	84.564	84.196		85.69	1.661			
B11	B34	83.665	83.053	375	80.5	0.8	0.013	88.159	87.886	1.38	0.15	0.17	1.1	0.414	1.49	84.454	83.979		86.04	1.448			
B12	B13	87.219	85.699	375	76.0	2.0	0.013	91.003	89.864	2.25	0.25	0.10	0.4	-0.210	1.52	87.384	85.864		85.97	1.380			
B13	B15	85.249	83.720	825	139.0	1.1	0.013	89.864	88.345	2.82	1.51	1.07	0.7	-0.307	1.54	85.767	84.391		85.83	1.240			
B15	B21	83.195	82.979	1350	58.5	0.4	0.013	88.345	88.484	2.27	3.25	1.99	0.6	-0.154	1.60	84.391	84.329		86.27	1.706			
B16	B40	84.536	84.061	375	108.0	0.4	0.013	88.626	88.320	1.05	0.12	0.11	1.0	-0.036	1.62	84.875	84.473		85.92	1.466			
B17	B16	84.801	84.611	300	9.5	2.0	0.013	88.702	88.626	1.93	0.14	-0.01	-0.1	-0.226	1.69	84.875	84.875		86.26	1.716	108.2	19.1	84.544
B17	B18	84.894	84.371	300	48.0	1.1	0.013	88.702	88.502	1.43	0.10	0.00	0.0	-0.319	0.00	84.875	84.537		86.63	2.037	108.2	32.3	84.593
B18	B21	84.296	83.934	375	67.0	0.5	0.013	88.502	88.484	1.17	0.13	0.08	0.6	-0.134	1.56	84.537	84.329		86.63	1.991	108.2	44.6	84.639
B19	B21	84.917	83.859	450	141.0	0.8	0.013	88.600	88.484	1.55	0.25	0.09	0.4	-0.260	1.62	85.107	84.329		86.41	1.668	108.2	72.4	84.742
B19	B26	84.843	84.810	300	9.5	0.4	0.013	88.600	88.678	0.81	0.06	0.05	0.9	-0.036	2.00	85.107	85.087		86.53	1.738	108.2	85.9	84.792
B21	B24	82.959	82.707	1350	58.5	0.4	0.013	88.484	88.145	2.45	3.50	2.11	0.6	0.020	1.50	84.329	84.249		86.63	1.787	108.2	99.7	84.843
B22	B24	84.693	83.587	450	146.5	0.8	0.013	88.456	88.145	1.55	0.25	0.10	0.4	-0.251	1.55	84.892	84.249		86.87	2.001	108.2	106.7	84.869
B22	B2200	84.552	84.434	300	29.0	0.4	0.013	88.456	87.660	0.88	0.06	0.09	1.4	0.040	1.53	84.892	84.664		86.67	1.825	108.2	100.1	84.845
B24	B24	82.687	82.479	1350	41.5	0.5	0.013	88.145	88.096	2.64	3.77	2.26	0.6	0.212	1.79	84.249	84.168		86.55	1.787	108.2	78.1	84.763
B25	B30	82.449	82.380	1350	14.0	0.5	0.013	88.096	88.193	2.61	3.74	2.27	0.6	0.369	1.85	84.168	84.137		86.62	1.835	108.2	65.2	84.715
B26	B22	84.780	84.572	300	52.0	0.4	0.013	88.678	88.456	0.87	0.06	0.06	1.0	0.007	1.60	85.087	84.892		86.62	2.030	108.2	43.6	84.635
B27	B28	83.872	83.767	675	10.5	1.0	0.013	88.285	88.194	2.35	0.84	0.34	0.4	-0.033	1.73	84.514	84.484		86.62	2.231	108.2	17.8	84.539
B27	B17	84.894	84.371	300	48.0	1.1	0.013	88.702	88.502	1.43	0.10	0.00	0.0	-0.319	0.00	84.875	84.537		86.75	1.875	108.2	32.3	84.593
B28	B28	83.872	83.767	675	10.5	1.0	0.013	88.285	88.194	2.35	0.84	0.34	0.4	-0.033	1.73	84.514	84.484		86.38	1.866	108.2	17.8	84.539

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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)
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	-0.013	1.58	84.898	84.415	B364S	86.21	1.312	77.2	18.1	84.528
B410	B42	84.928	84.576	300	51.0	0.7	0.013	88.272	88.269	1.14	0.08	0.05	0.6	-0.137	1.51	85.091	84.927	232	86.45	1.359	77.2	18.1	84.528
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	-0.162	1.87	84.170	83.328	294	85.46	1.290	77.2	31.1	84.610
B2200	B27	83.997	83.902	675	19.0	0.5	0.013	87.660	88.285	1.66	0.59	0.34	0.6	-0.113	1.72	84.559	84.514	122	86.48	1.921	77.2	44.0	84.690
C12	C13	84.848	84.650	600	22.0	0.9	0.013	86.490	85.750	2.06	0.58	0.19	0.3	-0.324	1.77	85.124	85.072	N/A	N/A	N/A	77.2	72.4	84.868
C4MH	B2200	85.207	84.463	450	31.0	2.4	0.013	88.250	87.660	2.78	0.44	0.26	0.6	-0.116	1.70	85.541	84.712	N/A	N/A	N/A	77.2	72.4	84.868
C8MH	B5	85.210	84.950	300	26.0	1.0	0.013	88.060	87.803	1.37	0.10	0.10	1.1	0.146	1.70	85.656	85.199	N/A	N/A	N/A	77.2	72.4	84.868
2144	ForeN	80.160	80.137	1800	22.5	0.1	0.013	86.340	83.500	1.43	3.63	8.01	2.2	1.087	1.62	83.047	83.045	N/A	N/A	N/A	77.2	72.4	84.868
CB1	CB2	86.457	86.410	250	19.5	0.2	0.013	88.880	88.750	0.59	0.03	0.06	2.2	1.389	1.48	88.096	87.952	N/A	N/A	N/A	77.2	72.4	84.868
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	1.292	1.50	87.952	87.855	N/A	N/A	N/A	77.2	72.4	84.868
CB3	CB4	86.385	86.360	250	10.5	0.2	0.013	88.670	88.600	0.59	0.03	0.08	2.7	1.220	1.49	87.855	87.787	N/A	N/A	N/A	77.2	72.4	84.868
CB4	CB5	86.360	86.335	250	10.5	0.2	0.013	88.600	88.530	0.59	0.03	0.08	2.7	1.177	2.11	87.787	87.720	N/A	N/A	N/A	77.2	72.4	84.868
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	1.135	2.08	87.720	87.656	N/A	N/A	N/A	77.2	72.4	84.868
CB6	CB7	86.310	86.285	250	10.5	0.2	0.013	88.460	88.390	0.59	0.03	0.10	3.5	1.096	1.54	87.656	87.565	N/A	N/A	N/A	77.2	72.4	84.868
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	1.030	1.57	87.565	87.393	N/A	N/A	N/A	77.2	72.4	84.868
CB8	C100MH	86.260	86.230	250	12.5	0.2	0.013	88.320	88.250	0.59	0.03	0.15	5.3	0.883	1.71	87.393	86.480	N/A	N/A	N/A	77.2	72.4	84.868
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	0.438	1.82	86.875	86.978	N/A	N/A	N/A	77.2	72.4	84.868
CB10	CB10i	86.133	86.086	250	19.6	0.2	0.013	88.340	88.410	0.59	0.03	-0.04	-1.4	0.595	1.82	86.978	87.068	N/A	N/A	N/A	77.2	72.4	84.868
CB10i	CB11	86.086	86.032	250	22.4	0.2	0.013	88.410	88.200	0.59	0.03	-0.04	-1.4	0.732	1.82	87.068	87.169	N/A	N/A	N/A	77.2	72.4	84.868
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	0.887	2.13	87.169	87.167	N/A	N/A	N/A	77.2	72.4	84.868
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	0.941	2.13	87.167	87.167	N/A	N/A	N/A	77.2	72.4	84.868
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	0.972	2.13	87.167	87.167	N/A	N/A	N/A	77.2	72.4	84.868
CB14	CB15	85.914	85.883	250	13.0	0.2	0.013	88.040	88.000	0.59	0.03	0.03	1.0	1.003	1.51	87.167	87.143	N/A	N/A	N/A	77.2	72.4	84.868
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	1.010	1.52	87.143	87.124	N/A	N/A	N/A	77.2	72.4	84.868
CB16	CB17	85.852	85.821	250	13.0	0.2	0.013	87.960	87.920	0.59	0.03	0.02	0.7	1.022	2.49	87.124	87.111	N/A	N/A	N/A	77.2	72.4	84.868
CB17	CB18	85.821	85.790	250	13.0	0.2	0.013	87.920	87.880	0.59	0.03	0.04	1.3	1.040	1.47	87.111	87.076	N/A	N/A	N/A	77.2	72.4	84.868
CB18	CB19	85.790	85.759	250	13.0	0.2	0.013	87.880	87.840	0.59	0.03	0.04	1.2	1.036	1.48	87.076	87.043	N/A	N/A	N/A	77.2	72.4	84.868
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	1.034	1.46	87.043	87.014	N/A	N/A	N/A	77.2	72.4	84.868
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	1.036	1.46	87.043	87.014	N/A	N/A	N/A	77.2	72.4	84.868
CB21	CB22	85.697	85.666	250	13.0	0.2	0.013	87.760	87.720	0.59	0.03	0.05	1.9	1.047	1.45	86.994	86.955	N/A	N/A	N/A	77.2	72.4	84.868
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	1.039	2.19	86.955	86.917	N/A	N/A	N/A	77.2	72.4	84.868
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	1.032	2.19	86.917	86.859	N/A	N/A	N/A	77.2	72.4	84.868
CB24	CB25	85.586	85.518	250	28.5	0.2	0.013	87.620	87.540	0.59	0.03	0.07	2.5	1.023	2.17	86.859	86.774	N/A	N/A	N/A	77.2	72.4	84.868

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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)
CB25	CB50	85.760	85.383	250	39.0	1.0	0.013	87.540	88.572	1.21	0.06	0.09	1.6	0.764	1.81	86.774	85.846	N/A	N/A	N/A		
CB25	CB25i	85.518	85.493	250	10.5	0.2	0.013	87.540	87.640	0.59	0.03	0.03	1.0	1.006	2.56	86.774	86.759	N/A	N/A	N/A		
CB25i	CB26	85.493	85.452	250	17.0	0.2	0.013	87.640	87.480	0.59	0.03	0.04	1.3	1.016	1.75	86.759	86.689	N/A	N/A	N/A		
CB26	CB27	85.452	85.409	250	18.0	0.2	0.013	87.480	87.420	0.59	0.03	0.03	1.1	0.987	1.65	86.689	86.642	N/A	N/A	N/A		
CB27	CB28	85.409	85.378	250	13.0	0.2	0.013	87.420	87.380	0.59	0.03	0.03	1.1	0.983	2.14	86.642	86.615	N/A	N/A	N/A		
CB28	CB29	85.378	85.342	250	15.0	0.2	0.013	87.380	87.330	0.59	0.03	0.05	1.8	0.987	1.47	86.615	86.562	N/A	N/A	N/A		
CB29	CB30	85.342	85.281	250	25.5	0.2	0.013	87.330	87.250	0.59	0.03	0.06	2.2	0.970	2.12	86.562	86.450	N/A	N/A	N/A		
CB30	C12	85.281	85.198	250	34.5	0.2	0.013	87.250	86.490	0.59	0.03	0.09	3.2	0.919	1.78	86.450	85.430	N/A	N/A	N/A		
CB50	C8MH	85.330	85.270	300	4.0	1.0	0.013	88.572	88.060	1.37	0.10	0.10	1.1	0.216	1.69	85.846	85.656	N/A	N/A	N/A		
CB100	CB1	86.503	86.457	250	19.0	0.2	0.013	89.000	88.880	0.59	0.03	-0.01	-0.2	1.343	1.48	88.096	88.096	N/A	N/A	N/A		
C100MH	C4MH	86.107	85.954	375	4.5	3.4	0.013	88.250	88.250	2.93	0.32	0.17	0.5	-0.089	1.71	86.393	86.145	N/A	N/A	N/A		
C101MH	CB9	86.221	86.187	250	14.3	0.2	0.013	88.240	88.280	0.59	0.03	-0.10	-3.3	-0.016	1.67	86.455	86.875	N/A	N/A	N/A		
C101MH	C4MH	86.165	86.075	300	4.5	2.0	0.013	88.240	88.250	1.93	0.14	0.10	0.7	-0.058	1.67	86.407	86.260	N/A	N/A	N/A		
1000	N3900	83.165	83.135	2700	17.9	0.0	0.013	87.742	88.154	0.26	1.52	5.08	3.4	-0.988	1.60	84.877	84.872	N/A	N/A	N/A		
2000	N56	82.960	82.930	2250	31.0	0.0	0.013	87.484	87.980	0.17	0.66	7.11	10.8	-0.129	1.57	85.081	84.771	N/A	N/A	N/A		
N398	N399	83.840	83.708	1050	112.8	0.0	0.013	87.890	89.000	0.10	0.09	1.18	13.7	-0.228	1.56	84.662	84.324	N/A	N/A	N/A		
i	2003	85.670	85.390	1200	100.0	0.3	0.013	89.370	89.920	1.82	2.06	1.94	0.9	-0.137	1.54	86.733	86.157	Fut. Est. (4)	87.27	0.537		
2000i	2001	84.205	83.642	300	60.5	0.9	0.013	87.910	87.670	1.32	0.09	0.08	0.9	-0.075	1.74	84.430	83.860	Fut. Est. (4)	85.81	1.380		
2001	2121	83.567	83.520	375	13.5	0.4	0.013	87.670	87.560	0.94	0.10	0.09	0.9	-0.088	1.74	83.854	83.745	Fut. Est. (4)	85.57	1.716		
2002	2010	84.726	83.952	525	119.0	0.7	0.013	88.840	88.420	1.60	0.35	0.26	0.8	-0.141	1.54	85.110	84.292	Fut. Est. (4)	86.74	1.630		
2003	2004	83.279	83.198	1200	29.0	0.3	0.013	89.920	89.920	1.82	2.06	2.01	1.0	0.072	1.57	84.551	84.433	Fut. Est. (4)	87.82	3.269		
2004	2005	83.168	83.130	1200	13.5	0.3	0.013	89.920	89.910	1.82	2.06	2.02	1.0	0.065	1.57	84.433	84.351	Fut. Est. (4)	87.82	3.387		
2005	2009	83.100	82.898	1200	69.5	0.3	0.013	89.910	89.790	1.86	2.10	2.05	1.0	0.051	1.58	84.351	84.172	Fut. Est. (4)	87.81	3.459		
2006	2007	87.229	87.036	300	53.5	0.4	0.013	90.030	89.980	0.82	0.06	0.05	0.9	-0.070	1.72	87.459	87.235	Fut. Est. (4)	87.93	0.471		
2007	2008	86.961	86.926	375	13.5	0.3	0.013	89.980	89.960	0.81	0.09	0.08	0.9	-0.101	1.72	87.235	87.156	Fut. Est. (4)	87.88	0.645		
2008	2009	86.701	86.534	600	119.0	0.1	0.013	89.960	89.790	0.81	0.23	0.20	0.9	-0.145	1.74	87.156	86.824	Fut. Est. (4)	87.86	0.704		
2009	2010	82.878	82.637	1200	71.0	0.3	0.013	89.790	88.420	2.01	2.27	2.27	1.0	0.094	1.58	84.172	83.952	Fut. Est. (4)	87.69	3.518		
2010	2011	82.337	82.232	1500	80.5	0.1	0.013	88.340	88.340	1.44	2.55	2.53	1.0	0.115	1.59	83.952	83.862	Fut. Est. (4)	86.32	2.368		
2011	2012	82.212	82.136	1500	63.5	0.1	0.013	88.270	88.270	1.39	2.45	2.55	1.0	0.150	1.59	83.862	83.763	Fut. Est. (4)	86.24	2.378		
2012	2013	82.106	82.090	1500	13.5	0.1	0.013	88.270	88.260	1.39	2.45	2.57	1.0	0.157	1.60	83.763	83.718	Fut. Est. (4)	86.17	2.407		
2013	2017	82.060	81.910	1500	115.0	0.1	0.013	88.260	88.150	1.44	2.55	2.66	1.0	0.158	1.61	83.718	83.459	Fut. Est. (4)	86.16	2.442		
2014	2015	84.372	83.719	375	99.0	0.7	0.013	88.320	88.220	1.29	0.14	0.12	0.8	-0.104	1.77	84.643	83.972	Fut. Est. (4)	86.22	1.577		
2015	2016	83.623	83.513	375	9.5	1.2	0.013	88.220	88.210	1.71	0.19	0.15	0.8	-0.084	1.72	83.914	83.765	Fut. Est. (4)	86.12	2.206		
2016	2017	83.360	83.103	525	66.0	0.4	0.013	88.210	88.150	1.24	0.27	0.20	0.7	-0.186	1.72	83.699	83.459	Fut. Est. (4)	86.11	2.411		
2017	2018	81.850	81.757	1500	66.5	0.1	0.013	88.150	88.070	1.50	2.64	2.87	1.1	0.109	1.61	83.459	83.358	Fut. Est. (4)	86.05	2.591		
2018	2019	81.737	81.651	1500	66.0	0.1	0.013	88.070	88.010	1.44	2.55	2.90	1.1	0.121	1.62	83.358	83.244	Fut. Est. (4)	85.97	2.612		
2019	2020	81.621	81.609	1500	9.5	0.1	0.013	88.010	88.000	1.44	2.55	2.92	1.1	0.123	1.62	83.244	83.232	Fut. Est. (4)	85.91	2.666		
2020	2024	81.459	81.293	1650	118.5	0.1	0.013	88.000	87.880	1.59	3.41	3.01	0.9	0.123	1.63	83.232	83.180	Fut. Est. (4)	85.90	2.668		
2021	2022	83.906	83.115	375	96.5	0.8	0.013	88.050	87.960	1.44	0.16	0.12	0.7	-0.129	1.70	84.152	83.386	Fut. Est. (4)	85.95	1.798		
2022	2023	83.085	82.942	375	13.5	1.1	0.013	87.960	87.950	1.63	0.18	0.15	0.8	-0.074	1.74	83.386	83.275	Fut. Est. (4)	85.86	2.474		
2023	2024	82.792	82.647	525	63.0	0.2	0.013	87.950	87.880	0.95	0.21	0.19	0.9	-0.042	1.75	83.275	83.180	Fut. Est. (4)	85.85	2.575		
2024	2025	81.233	81.126	1650	71.0	0.2	0.013	87.880	87.820	1.65	3.53	3.24	0.9	0.297	1.63	83.180	83.134	Fut. Est. (4)	85.78	2.600		
2025	2026	81.066	81.021	1650	32.0	0.1	0.013	87.820	87.790	1.59	3.41	3.25	1.0	0.418	1.63	83.134	83.120	Fut. Est. (4)	85.72	2.586		
2026	2119	80.991	80.843	1650	92.5	0.2	0.013	87.790	87.700	1.71	3.65	3.39	0.9	0.479	1.64	83.120	83.059	Fut. Est. (4)	85.69	2.570		

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
2027	2119	83.283	83.141	300	40.5	0.4	0.013	87.740	87.700	0.81	0.06	0.04	0.8	-0.074	1.77	83.509	83.303	Fut. Est. (4)	85.64	2.131		
2028	2029	84.108	83.916	300	31.0	0.6	0.013	87.960	87.930	1.08	0.08	0.03	0.3	-0.178	1.61	84.230	84.034	Fut. Est. (4)	85.86	1.630		
2029	2030	83.741	83.674	300	14.0	0.5	0.013	87.930	87.920	0.95	0.07	0.06	0.9	-0.066	1.61	83.975	83.866	Fut. Est. (4)	85.83	1.855		
2030	2031	83.341	83.225	525	68.5	0.2	0.013	87.920	87.850	0.82	0.18	0.16	0.9	-0.161	1.80	83.705	83.549	Fut. Est. (4)	85.82	2.115		
2031	2118	83.150	83.054	600	68.5	0.1	0.013	87.850	87.780	0.81	0.23	0.20	0.9	-0.201	1.81	83.549	83.409	Fut. Est. (4)	85.75	2.201		
2032	2084	85.584	84.062	300	99.5	1.5	0.013	88.380	88.280	1.69	0.12	0.00	0.0	-0.300	0.00	85.584	84.009	Fut. Est. (4)	86.28	0.696		
2033	2034	85.693	84.897	450	92.5	0.9	0.013	89.380	89.470	1.66	0.26	0.20	0.7	-0.162	1.54	85.981	85.184	Fut. Est. (4)	87.28	1.299		
2034	2035	84.597	84.469	750	98.5	0.1	0.013	89.470	89.440	0.91	0.40	0.36	0.9	-0.175	1.54	85.172	85.059	Fut. Est. (4)	87.37	2.198		
2035	2036	84.389	84.253	825	113.5	0.1	0.013	89.440	89.130	0.93	0.50	0.48	1.0	-0.155	1.54	85.059	84.929	Fut. Est. (4)	87.34	2.281		
2036	2037	84.178	84.001	900	118.0	0.2	0.013	89.130	88.810	1.10	0.70	0.68	1.0	-0.149	1.54	84.929	84.651	Fut. Est. (4)	87.03	2.101		
2037	2038	83.853	83.710	900	84.0	0.2	0.013	88.810	88.520	1.17	0.75	0.79	1.1	-0.102	1.55	84.651	84.508	Fut. Est. (4)	86.71	2.059		
2038	2039	83.690	83.603	900	48.5	0.2	0.013	88.520	88.440	1.21	0.77	0.83	1.1	-0.082	1.56	84.508	84.416	Fut. Est. (4)	86.42	1.912		
2039	2040	83.528	83.410	975	84.5	0.1	0.013	88.440	88.360	1.12	0.84	0.94	1.1	-0.087	1.55	84.416	84.288	Fut. Est. (4)	86.34	1.924		
2040	2084	83.390	83.267	975	82.0	0.2	0.013	88.360	88.280	1.16	0.87	1.00	1.2	-0.077	1.55	84.288	84.009	Fut. Est. (4)	86.26	1.972		
2041	2042	87.020	86.828	525	29.5	0.7	0.013	91.140	91.030	1.60	0.35	0.25	0.7	-0.193	1.68	87.352	87.158	Fut. Est. (4)	89.34	1.988		
2042	2043	86.440	86.201	750	95.5	0.3	0.013	91.030	90.700	1.26	0.56	0.47	0.8	-0.184	1.71	87.006	86.820	Fut. Est. (4)	89.23	2.224		
2043	2044	86.121	85.769	825	110.0	0.3	0.013	90.700	90.320	1.52	0.81	0.70	0.9	-0.126	1.70	86.820	86.403	Fut. Est. (4)	88.90	2.080		
2044	2046	85.694	85.486	900	33.5	0.6	0.013	90.320	90.250	2.24	1.43	1.35	0.9	-0.191	1.51	86.403	86.174	Fut. Est. (4)	88.52	2.117		
2045	2046	86.727	86.126	525	92.5	0.7	0.013	90.330	90.250	1.60	0.35	0.29	0.8	-0.103	1.71	87.149	86.491	Fut. Est. (4)	89.03	1.881		
2046	2047	85.186	84.938	1200	103.5	0.2	0.013	90.250	90.090	1.69	1.91	1.83	1.0	-0.253	1.51	86.133	85.947	Fut. Est. (4)	88.45	2.317		
2047	2048	84.638	84.521	1500	117.0	0.1	0.013	90.090	89.920	1.26	2.24	2.15	1.0	-0.191	1.52	85.947	85.868	Fut. Est. (4)	88.29	2.343		
2048	2049	84.491	84.356	1500	112.5	0.1	0.013	89.920	89.730	1.39	2.45	2.52	1.0	-0.123	1.53	85.868	85.758	Fut. Est. (4)	88.12	2.252		
2049	2057	84.323	84.212	1500	85.5	0.1	0.013	89.730	89.570	1.44	2.55	2.78	1.1	-0.065	1.55	85.758	85.650	Fut. Est. (4)	87.93	2.172		
2050	2051	86.849	86.095	675	116.0	0.7	0.013	90.890	90.770	1.89	0.68	0.38	0.6	-0.311	1.70	87.213	86.615	Fut. Est. (4)	89.09	1.877		
2051	2052	85.839	85.575	825	120.0	0.2	0.013	90.770	90.650	1.26	0.67	0.63	0.9	-0.049	1.84	86.615	86.405	Fut. Est. (4)	88.97	2.355		
2052	2053	85.545	85.522	825	10.5	0.2	0.013	90.650	90.610	1.26	0.67	0.69	1.0	0.035	1.84	86.405	86.375	Fut. Est. (4)	88.85	2.445		
2053	2054	85.447	85.254	900	87.5	0.2	0.013	90.610	90.250	1.33	0.85	0.88	1.0	0.028	1.83	86.375	86.194	Fut. Est. (4)	88.81	2.435		
2054	2055	85.224	84.996	900	87.5	0.3	0.013	90.250	89.900	1.45	0.92	1.01	1.1	0.070	1.87	86.194	85.959	Fut. Est. (4)	88.45	2.256		
2055	2056	84.966	84.938	900	10.5	0.3	0.013	89.900	89.870	1.48	0.94	1.07	1.1	0.093	1.87	85.959	85.915	Fut. Est. (4)	88.10	2.141		
2056	2057	84.863	84.722	975	67.0	0.2	0.013	89.870	89.570	1.38	1.03	1.18	1.2	0.077	1.87	85.915	85.650	Fut. Est. (4)	88.07	2.155		
2057	2060	83.893	83.775	1800	90.5	0.1	0.013	89.570	89.370	1.63	4.14	3.96	1.0	-0.043	1.76	85.650	85.442	Fut. Est. (4)	87.77	2.120		
2058	2059	88.954	88.188	1200	116.0	0.7	0.013	92.650	91.890	2.80	3.17	2.04	0.6	-0.496	1.68	89.658	88.888	Fut. Est. (4)	90.55	0.892		
2059	2060	85.142	84.567	1200	88.5	0.7	0.013	91.890	89.370	2.78	3.14	2.12	0.7	-0.435	1.68	85.907	85.442	Fut. Est. (4)	89.79	3.883		
2060	2061	83.620	83.433	1800	81.5	0.2	0.013	89.370	89.260	2.17	5.51	5.94	1.1	0.022	1.74	85.442	85.220	Fut. Est. (4)	87.27	1.828		
2061	2062	83.413	83.239	1800	79.0	0.2	0.013	89.260	89.150	2.12	5.39	5.99	1.1	0.007	1.74	85.220	84.999	Fut. Est. (4)	87.16	1.940		
2062	2063	83.219	83.112	1800	51.0	0.2	0.013	89.150	89.070	2.07	5.27	6.02	1.1	-0.020	1.75	84.999	84.858	Fut. Est. (4)	87.05	2.051		
2063	2064	82.962	82.852	1950	78.5	0.1	0.013	89.070	88.950	1.78	5.32	6.06	1.1	-0.054	1.75	84.858	84.718	Fut. Est. (4)	86.97	2.112		
2064	2203	82.702	82.652	2100	50.0	0.1	0.013	88.950	88.960	1.58	5.48	6.08	1.1	-0.084	1.75	84.718	84.523	Fut. Est. (4)	86.85	2.132		
2065	2066	84.488	84.295	450	96.5	0.2	0.013	88.930	88.780	0.80	0.13	0.09	0.7	-0.159	1.52	84.779	84.615	Fut. Est. (4)	86.83	2.051		
2066	2072	84.145	84.011	600	96.0	0.1	0.013	88.780	88.620	0.81	0.23	0.22	0.9	-0.130	1.53	84.615	84.545	Fut. Est. (4)	86.68	2.065		
2067	2071	84.525	84.345	600	120.0	0.2	0.013	88.620	88.700	0.84	0.24	0.18	0.7	-0.171	1.78	84.954	84.773	Fut. Est. (4)	86.82	1.866		
2068	2070	85.106	84.911	300	30.0	0.7	0.013	88.880	88.760	1.10	0.08	0.04	0.5	-0.154	1.59	85.252	85.057	Fut. Est. (4)	86.78	1.528		
2069	2070	84.820	84.544	525	120.0	0.2	0.013	89.000	88.760	0.95	0.21	0.17	0.8	-0.118	1.72	85.227	84.874	Fut. Est. (4)	86.90	1.673		
2070	2071	84.422	84.325	600	51.0	0.2	0.013	88.760	88.700	0.95	0.27	0.25	0.9	-0.148	1.78	84.874	84.773	Fut. Est. (4)	86.66	1.786		

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
2071	2072	84.039	83.872	750	88.0	0.2	0.013	88.700	88.620	1.10	0.49	0.50	1.0	-0.016	1.78	84.773	84.545	Fut. Est. (4)	86.60	1.827		
2072	2075	83.786	83.588	825	79.0	0.3	0.013	88.620	88.510	1.34	0.72	0.71	1.0	-0.066	1.54	84.545	84.397	Fut. Est. (4)	86.52	1.975		
2073	2074	85.057	84.684	375	62.0	0.7	0.013	88.680	88.610	1.28	0.14	0.09	0.6	-0.157	1.70	85.275	84.871	Fut. Est. (4)	86.58	1.305		
2074	2075	84.097	83.944	600	109.0	0.1	0.013	88.610	88.510	0.81	0.23	0.20	0.9	-0.122	1.76	84.575	84.397	Fut. Est. (4)	86.51	1.935		
2075	2083	83.438	83.293	975	85.0	0.2	0.013	88.510	88.410	1.24	0.92	0.94	1.0	-0.016	1.76	84.397	84.266	Fut. Est. (4)	86.41	2.013		
2076	2077	85.002	84.762	600	120.0	0.2	0.013	89.190	89.060	0.97	0.27	0.21	0.8	-0.179	1.79	85.423	85.235	Fut. Est. (4)	87.09	1.667		
2077	2078	84.742	84.513	600	79.0	0.3	0.013	89.060	88.680	1.17	0.33	0.31	0.9	-0.107	1.81	85.235	85.048	Fut. Est. (4)	86.96	1.725		
2078	2079	84.438	84.272	675	75.5	0.2	0.013	88.680	88.590	1.10	0.39	0.39	1.0	-0.065	1.82	85.048	84.882	Fut. Est. (4)	86.58	1.532		
2079	2080	84.242	84.210	675	13.5	0.2	0.013	88.590	88.580	1.15	0.41	0.43	1.0	-0.035	1.87	84.882	84.821	Fut. Est. (4)	86.49	1.608		
2080	2081	84.180	84.079	675	39.0	0.3	0.013	88.580	88.540	1.20	0.43	0.46	1.1	-0.034	1.86	84.821	84.726	Fut. Est. (4)	86.48	1.659		
2081	2082	83.928	83.732	750	85.0	0.2	0.013	88.540	88.490	1.21	0.53	0.58	1.1	0.048	1.86	84.726	84.525	Fut. Est. (4)	86.44	1.714		
2082	2083	83.657	83.512	825	85.0	0.2	0.013	88.490	88.410	1.11	0.59	0.67	1.1	0.043	1.82	84.525	84.266	Fut. Est. (4)	86.39	1.865		
2083	2084	83.218	82.990	1050	81.5	0.3	0.013	88.410	88.280	1.67	1.44	1.64	1.1	-0.002	1.78	84.266	84.009	Fut. Est. (4)	86.31	2.044		
2084	2085	82.690	82.478	1350	118.0	0.2	0.013	88.280	88.110	1.58	2.26	2.72	1.2	-0.031	1.77	84.009	83.742	Fut. Est. (4)	86.18	2.171		
2085	2116	82.178	82.058	1650	119.5	0.1	0.013	88.110	87.930	1.35	2.88	2.88	1.0	-0.086	1.79	83.742	83.552	Fut. Est. (4)	86.01	2.268		
2086	2087	85.028	84.428	375	75.0	0.8	0.013	89.140	88.700	1.42	0.16	0.09	0.6	-0.171	1.70	85.232	84.679	Fut. Est. (4)	87.04	1.808		
2087	2088	84.203	84.047	600	74.5	0.2	0.013	88.700	88.460	1.00	0.28	0.25	0.9	-0.124	1.54	84.679	84.552	Fut. Est. (4)	86.60	1.921		
2088	2089	83.970	83.828	675	74.5	0.2	0.013	88.460	88.220	1.02	0.37	0.33	0.9	-0.093	1.55	84.552	84.352	Fut. Est. (4)	86.36	1.808		
2089	2114	83.754	83.572	675	79.0	0.2	0.013	88.220	88.150	1.13	0.40	0.39	1.0	-0.077	1.56	84.352	83.969	Fut. Est. (4)	86.12	1.768		
2090	2091	84.276	83.844	1350	66.5	0.7	0.013	89.210	88.840	3.01	4.30	2.26	0.5	-0.440	1.67	85.186	84.576	Fut. Est. (4)	87.11	1.924		
2091	2092	83.740	83.404	1350	68.5	0.5	0.013	88.840	88.910	2.61	3.74	2.35	0.6	-0.514	1.68	84.576	84.346	Fut. Est. (4)	86.74	2.164		
2092	2096	83.254	83.055	1500	68.5	0.3	0.013	88.910	88.880	2.15	3.81	2.46	0.6	-0.408	1.71	84.346	84.265	Fut. Est. (4)	86.81	2.464		
2093	2094	85.433	84.664	450	116.5	0.7	0.013	89.290	89.070	1.46	0.23	0.16	0.7	-0.176	1.71	85.707	84.997	Fut. Est. (4)	87.19	1.483		
2094	2095	84.634	84.560	450	14.0	0.5	0.013	89.070	89.040	1.31	0.21	0.19	0.9	-0.087	1.75	84.997	84.866	Fut. Est. (4)	86.97	1.973		
2095	2096	84.410	84.238	600	71.5	0.2	0.013	89.040	88.880	1.06	0.30	0.24	0.8	-0.148	1.76	84.862	84.553	Fut. Est. (4)	86.94	2.078		
2096	2100	83.035	82.808	1500	75.5	0.3	0.013	88.880	88.800	2.19	3.87	2.77	0.7	-0.270	1.70	84.265	83.982	Fut. Est. (4)	86.78	2.515		
2097	2099	84.177	83.536	1050	60.5	1.1	0.013	89.430	89.060	3.25	2.81	2.82	1.0	-0.176	1.53	85.051	84.402	Fut. Est. (4)	87.33	2.279		
2098	2099	85.001	84.533	300	72.0	0.7	0.013	89.280	89.060	1.10	0.08	0.06	0.8	-0.079	1.77	85.222	84.723	Fut. Est. (4)	87.18	1.958		
2099	2100	83.236	83.003	1350	75.0	0.3	0.013	89.060	88.800	2.08	2.97	3.00	1.0	-0.313	1.52	84.273	83.982	Fut. Est. (4)	86.96	2.687		
2100	2101	82.403	82.227	1950	80.0	0.2	0.013	88.800	88.470	2.23	6.67	5.65	0.8	-0.371	1.55	83.982	83.869	Fut. Est. (4)	86.70	2.718		
2101	2114	82.207	82.044	1950	74.0	0.2	0.013	88.470	88.150	2.23	6.67	5.68	0.9	-0.288	1.55	83.869	83.770	Fut. Est. (4)	86.37	2.501		
2102	2103	85.073	84.693	300	58.5	0.7	0.013	88.700	88.400	1.10	0.08	0.05	0.6	-0.129	1.78	85.244	84.862	Fut. Est. (4)	86.60	1.356		
2103	2104	84.407	84.209	525	79.0	0.3	0.013	88.400	88.320	0.99	0.22	0.16	0.7	-0.178	1.79	84.754	84.556	Fut. Est. (4)	86.30	1.546		
2104	2105	84.178	84.095	525	9.5	0.9	0.013	88.320	88.300	1.85	0.40	0.19	0.5	-0.147	1.79	84.556	84.518	Fut. Est. (4)	86.22	1.664		
2105	2113	84.020	83.902	600	53.5	0.2	0.013	88.300	88.250	1.02	0.29	0.26	0.9	-0.102	1.80	84.518	84.292	Fut. Est. (4)	86.20	1.682		
2106	2107	84.967	84.580	300	59.5	0.7	0.013	88.460	88.400	1.10	0.08	0.04	0.5	-0.157	1.59	85.110	84.756	Fut. Est. (4)	86.36	1.250		
2107	2112	84.444	84.229	375	82.5	0.3	0.013	88.400	88.310	0.81	0.09	0.08	0.9	-0.063	1.83	84.756	84.574	Fut. Est. (4)	86.30	1.544		
2108	2109	85.129	84.745	300	59.0	0.7	0.013	88.980	88.780	1.10	0.08	0.05	0.6	-0.127	1.78	85.302	84.916	Fut. Est. (4)	86.88	1.578		
2109	2110	84.534	84.336	450	79.0	0.3	0.013	88.780	88.490	0.90	0.14	0.13	0.9	-0.103	1.78	84.881	84.687	Fut. Est. (4)	86.68	1.799		
2110	2111	84.306	84.243	450	9.5	0.7	0.013	88.490	88.450	1.46	0.23	0.16	0.7	-0.069	1.79	84.687	84.634	Fut. Est. (4)	86.39	1.703		
2111	2112	84.167	84.078	525	35.5	0.3	0.013	88.450	88.310	0.99	0.22	0.19	0.9	-0.058	1.79	84.634	84.574	Fut. Est. (4)	86.35	1.716		
2112	2113	84.033	83.933	525	24.5	0.4	0.013	88.310	88.250	1.27	0.28	0.28	1.0	0.016	1.80	84.574	84.292	Fut. Est. (4)	86.21	1.636		
2113	2114	83.613	83.487	825	79.0	0.2	0.013	88.250	88.150	1.07	0.57	0.56	1.0	-0.146	1.81	84.292	83.935	Fut. Est. (4)	86.15	1.858		
2114	2115	82.024	81.820	1950	73.0	0.3	0.013	88.150	88.010	2.52	7.53	6.65	0.9	-0.204	1.57	83.770	83.641	Fut. Est. (4)	86.05	2.280		

Table B-1C: Pipe Data and Hydraulic Simulation Results for the July 1st, 1979 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)
2115	2116	81.670	81.533	2100	72.0	0.2	0.013	88.010	87.930	2.18	7.56	6.70	0.9	-0.129	1.58	83.641	83.552	Fut. Est. (4)	85.91	2.269		
2116	2117	81.383	81.270	2250	75.0	0.2	0.013	87.930	87.860	2.03	8.07	9.44	1.2	-0.081	1.59	83.552	83.413	Fut. Est. (4)	85.83	2.278		
2117	2122	81.120	81.028	2400	84.0	0.1	0.013	87.960	87.730	1.81	8.21	9.43	1.1	-0.107	1.59	83.413	83.304	Fut. Est. (4)	85.76	2.347		
2118	2137	82.797	82.689	750	98.0	0.1	0.013	87.780	88.700	0.84	0.37	0.37	1.0	-0.138	1.78	83.409	83.300	Fut. Est. (4)	85.68	2.271		
2119	2120	80.783	80.736	1650	47.0	0.1	0.013	87.700	87.650	1.35	2.88	3.47	1.2	0.626	1.64	83.059	83.059	Fut. Est. (4)	85.60	2.541		
2120	2121	80.716	80.631	1650	84.5	0.1	0.013	87.650	87.560	1.35	2.88	3.52	1.2	0.693	1.64	83.059	83.057	Fut. Est. (4)	85.55	2.491		
2121	2142	80.571	80.495	1650	76.0	0.1	0.013	87.560	87.330	1.35	2.88	3.66	1.3	0.836	1.63	83.057	83.056	Fut. Est. (4)	85.46	2.403		
2122	2136	80.878	80.794	2550	84.0	0.1	0.013	87.730	87.610	1.80	9.20	9.58	1.0	-0.124	1.59	83.304	83.097	Fut. Est. (4)	85.63	2.326		
2135	2136	81.066	81.031	2700	35.0	0.1	0.013	87.560	87.610	1.87	10.72	8.35	0.8	-0.478	1.66	83.288	83.097	Fut. Est. (4)	85.46	2.172		
2136	2138	80.644	80.508	2700	90.5	0.2	0.013	88.700	88.100	2.29	13.13	17.88	1.4	-0.247	1.65	83.097	83.050	Fut. Est. (4)	85.51	2.413		
2137	2138	82.669	82.522	750	98.0	0.2	0.013	87.610	88.100	0.98	0.43	0.47	1.1	-0.119	1.79	83.300	83.050	Fut. Est. (4)	86.60	3.300		
2138	2139	80.488	80.365	2700	77.0	0.2	0.013	88.100	88.000	2.37	13.56	18.40	1.4	-0.138	1.66	83.050	83.049	Fut. Est. (4)	86.00	2.950		
2139	2140	80.345	80.235	2700	73.5	0.2	0.013	88.000	88.250	2.29	13.13	18.47	1.4	0.004	1.66	83.049	83.048	Fut. Est. (4)	85.90	2.851		
2140	ForeN	80.205	80.134	2700	47.0	0.2	0.013	88.250	83.500	2.29	13.13	17.64	1.3	0.143	1.67	83.048	83.045	Fut. Est. (4)	86.15	3.102		
2140	2140w	N/A	N/A	N/A	N/A	N/A	N/A	88.250	88.250	N/A	N/A	0.85	N/A	N/A	1.66	83.048	83.045	Fut. Est. (4)	86.15	3.102		
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	-0.097	1.83	84.669	84.023	Fut. Est. (4)	86.27	1.601		
2142	2143	80.465	80.422	1650	43.0	0.1	0.013	87.330	86.880	1.35	2.88	3.68	1.3	0.941	1.62	83.056	83.055	Fut. Est. (4)	85.23	2.174		
2143	2144	80.272	80.220	1800	51.5	0.1	0.013	86.880	86.340	1.43	3.63	3.10	0.9	0.983	1.62	83.055	83.047	Fut. Est. (4)	84.78	1.725		
2143	2143w	N/A	N/A	N/A	N/A	N/A	N/A	86.880	86.880	N/A	N/A	1.03	N/A	N/A	1.76	83.055	83.043	Fut. Est. (4)	84.78	1.725		
2203	2204	82.592	82.502	2100	81.5	0.1	0.013	88.960	88.970	1.66	5.75	6.50	1.1	-0.169	1.75	84.523	84.422	Fut. Est. (4)	86.86	2.337		
2204	2205	82.482	82.360	2100	111.0	0.1	0.013	88.970	88.590	1.66	5.75	6.65	1.2	-0.160	1.74	84.422	84.277	Fut. Est. (4)	86.87	2.448		
2205	2206	82.340	82.259	2100	74.0	0.1	0.013	88.590	88.340	1.66	5.75	6.81	1.2	-0.163	1.74	84.277	84.170	Fut. Est. (4)	86.49	2.213		
2206	2207	82.239	82.157	2100	74.5	0.1	0.013	88.340	88.090	1.66	5.75	7.00	1.2	-0.169	1.65	84.170	84.057	Fut. Est. (4)	86.24	2.070		
2207	2208	82.137	82.023	2100	103.5	0.1	0.013	88.090	87.740	1.66	5.75	7.33	1.3	-0.180	1.63	84.057	83.883	Fut. Est. (4)	85.99	1.933		
2208	2209	82.003	81.994	2100	8.0	0.1	0.013	87.740	87.710	1.66	5.75	7.41	1.3	-0.220	1.64	83.883	83.863	Fut. Est. (4)	85.64	1.757		
2209	2210	81.974	81.842	2100	120.0	0.1	0.013	87.710	87.640	1.66	5.75	7.41	1.3	-0.211	1.64	83.863	83.650	Fut. Est. (4)	85.61	1.747		
2210	2211	81.692	81.573	2250	119.0	0.1	0.013	87.640	87.570	1.66	6.59	7.44	1.1	-0.292	1.71	83.650	83.506	Fut. Est. (4)	85.54	1.890		
2211	2135	81.273	81.236	2550	36.5	0.1	0.013	87.570	87.560	1.80	9.20	8.31	0.9	-0.317	1.65	83.506	83.288	Fut. Est. (4)	85.47	1.964		
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	-0.078	1.70	83.665	83.409	Fut. Est. (4)	85.79	2.125		
2143w	MainN	80.250	80.100	975	30.0	0.5	0.013	86.880	83.500	2.12	1.58	1.00	0.6	1.818	1.76	83.043	83.042	Fut. Est. (4)	84.78	1.737		
2140w	MainN	80.300	80.100	975	40.0	0.5	0.013	88.250	83.500	2.12	1.58	0.82	0.5	1.770	1.66	83.045	83.042	Fut. Est. (4)	86.15	3.105		

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).

83.999 Interpolated HGL elevation

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 (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
1	2	84.836	84.565	450	77.5	0.4	0.013	87.787	87.641	1.06	0.17	0.08	0.5	-0.221	1.94	85.065	84.761	B91W	85.99	0.925		
2	3	84.535	84.483	450	13.0	0.4	0.013	87.641	87.716	1.13	0.18	0.08	0.4	-0.224	1.96	84.761	84.676	N/A	N/A			
3	4	84.333	84.218	600	38.5	0.3	0.013	87.716	87.586	1.19	0.34	0.16	0.5	-0.293	1.96	84.640	84.537	B90N	85.76	1.120		
4	8	84.143	84.095	675	24.0	0.2	0.013	87.586	87.608	1.05	0.38	0.21	0.6	-0.281	1.97	84.537	84.505	N/A	N/A			
5	6	84.639	84.427	525	106.0	0.2	0.013	87.722	87.781	0.89	0.19	0.11	0.6	-0.225	1.94	84.939	84.787	B87S	85.67	0.731		
6	12	84.352	84.177	600	87.5	0.2	0.013	87.781	87.701	0.97	0.27	0.21	0.8	-0.165	1.97	84.787	84.516	B95SS	85.57	0.783		
7	8	84.550	84.300	450	83.5	0.3	0.013	87.620	87.608	0.98	0.16	0.15	1.0	-0.056	1.96	84.944	84.571	B84W	85.52	0.576		
8	14	84.075	83.640	675	87.0	0.5	0.013	87.608	87.229	1.66	0.59	0.42	0.7	-0.245	1.98	84.505	84.052	N/A	N/A			
9	10	84.648	84.447	525	100.5	0.2	0.013	87.795	87.658	0.89	0.19	0.13	0.7	-0.181	1.94	84.992	84.854	B94NN	85.78	0.788		
10	11	84.297	84.131	675	110.5	0.2	0.013	87.658	87.429	0.91	0.33	0.29	0.9	-0.118	1.97	84.854	84.657	B96SS	85.56	0.706		
11	12	84.611	84.417	300	48.5	0.4	0.013	87.429	87.701	0.87	0.06	0.00	0.0	-0.254	2.00	84.657	84.516	B79E	85.53	0.873		
11	18	84.071	83.995	675	50.5	0.2	0.013	87.429	87.453	0.91	0.33	0.36	1.1	-0.089	2.00	84.657	84.375	B80E	85.38	0.723		
12	13	84.117	83.933	600	61.5	0.3	0.013	87.701	87.583	1.19	0.34	0.27	0.8	-0.201	2.00	84.516	84.270	B77W	85.51	0.994		
13	14	83.783	83.565	750	72.5	0.3	0.013	87.583	87.229	1.38	0.61	0.37	0.6	-0.289	2.00	84.244	84.030	B75W	85.37	1.126		
14	14	83.415	83.393	900	5.5	0.4	0.013	87.229	87.196	1.80	1.14	0.79	0.7	-0.285	2.00	84.030	83.980	N/A	N/A			
15	17	84.180	83.645	1200	107.0	0.5	0.013	87.920	87.688	2.44	2.76	0.07	0.0	-1.067	1.95	84.313	84.186	B97NN	85.85	1.537		
17	170	83.015	82.954	1800	60.5	0.1	0.013	87.688	87.537	1.43	3.63	2.13	0.6	-0.629	2.02	84.186	84.127	B96NS	85.72	1.534		
18	19	82.720	82.645	1950	75.0	0.1	0.013	87.453	87.272	1.51	4.50	2.70	0.6	-0.579	2.04	84.091	84.055	N/A	N/A			
19	19S	82.495	82.494	2100	1.0	0.1	0.013	87.272	87.272	1.58	5.48	4.16	0.8	-0.540	2.03	84.055	84.052	N/A	N/A			
19	19W	83.723	83.721	750	1.0	0.2	0.013	87.272	87.272	1.13	0.50	0.12	0.2	-0.418	2.09	84.055	84.055	N/A	N/A			
20	20S	82.392	82.391	2100	1.0	0.1	0.013	87.148	87.148	1.58	5.48	4.26	0.8	-0.496	2.03	83.996	83.993	N/A	N/A			
20	20W	84.186	84.183	375	1.0	0.3	0.013	87.148	87.148	0.79	0.09	-0.04	-0.5	-0.224	1.94	84.337	84.395	N/A	N/A			
21	22	82.264	82.210	2100	54.5	0.1	0.013	87.025	86.460	1.58	5.48	4.31	0.8	-0.440	2.04	83.924	83.849	68	85.16	1.236		
22	Chan2	82.180	82.150	2100	29.5	0.1	0.013	86.460	86.700	1.58	10.97	4.29	0.4	-0.431	2.04	83.849	83.838	N/A	N/A			
23	230	83.463	83.245	750	109.0	0.2	0.013	87.057	86.944	1.13	0.50	0.27	0.6	-0.336	2.05	83.877	83.572	B74W	85.14	1.263		
24	25	82.565	82.523	1350	21.0	0.2	0.013	86.989	86.774	1.67	2.39	1.07	0.4	-0.585	2.03	83.330	83.303	N/A	N/A			
25	250	82.493	82.416	1350	38.5	0.2	0.013	86.774	86.730	1.67	2.39	1.11	0.5	-0.540	2.04	83.303	83.254	17	85.09	1.787		
26	27	82.338	82.020	1350	63.5	0.5	0.013	86.637	86.394	2.64	3.77	1.53	0.4	-0.474	2.03	83.214	83.205	N/A	N/A			
27	Chan3	81.990	81.800	1350	38.0	0.5	0.013	86.394	86.300	2.64	3.77	1.51	0.4	-0.135	2.04	83.205	83.200	N/A	N/A			
28	29	84.242	84.190	375	17.5	0.3	0.013	87.130	87.017	0.87	0.10	0.00	0.0	-0.257	2.02	84.360	84.359	52	85.18	0.820		
29	30	83.965	83.760	600	82.0	0.3	0.013	87.017	87.075	1.09	0.31	0.20	0.6	-0.206	1.97	84.359	84.066	53	85.16	0.801		
30	31	83.685	83.601	675	33.5	0.3	0.013	87.075	86.964	1.17	0.42	0.25	0.6	-0.294	1.98	84.066	83.980	42	85.14	1.074		
31	32	83.541	83.463	675	31.0	0.3	0.013	86.964	86.962	1.17	0.42	0.29	0.7	-0.236	1.98	83.980	83.911	41	85.08	1.100		
32	33	83.433	83.309	675	41.5	0.3	0.013	86.962	86.911	1.29	0.46	0.36	0.8	-0.197	2.00	83.911	83.741	39	85.01	1.099		
33	34	83.249	83.210	675	13.0	0.3	0.013	86.911	86.830	1.29	0.46	0.36	0.8	-0.183	2.01	83.741	83.665	37	85.13	1.389		
34	35	83.180	83.026	675	44.0	0.4	0.013	86.830	86.728	1.39	0.50	0.39	0.8	-0.190	1.99	83.665	83.430	22	84.97	1.305		
35	26	82.951	82.938	750	6.5	0.2	0.013	86.728	86.637	1.13	0.50	0.39	0.8	-0.271	2.00	83.430	83.323	20	85.01	1.580		
N3900	N54	83.086	83.063	2743	22.9	0.1	0.013	88.154	88.111	1.89	11.18	4.56	0.4	-0.996	2.03	84.833	84.806	IBI (FUT)	N/A			
N3900	39	N/A	N/A	N/A	N/A	N/A	N/A	88.154	88.154	N/A	N/A	0.46	N/A	N/A	2.09	84.833	84.613	N/A	N/A			
40	41	83.831	83.729	1200	102.0	0.1	0.013	87.901	87.791	1.09	1.23	0.60	0.5	-0.564	2.05	84.467	84.398	B133W	85.88	1.413		
41	17	83.429	83.315	1500	114.0	0.1	0.013	87.791	87.688	1.26	2.24	2.04	0.9	-0.531	2.01	84.398	84.186	B132E	85.88	1.482		
43	44	83.752	83.283	375	67.0	0.7	0.013	86.937	86.631	1.33	0.15	0.07	0.5	-0.188	1.94	83.939	83.490	B4L120	85.11	1.171		
44	45	83.253	83.173	375	10.0	0.8	0.013	86.631	86.547	1.42	0.16	0.09	0.6	-0.138	2.00	83.490	83.378	B6L116	84.63	1.140		
45	46	83.023	82.468	525	111.0	0.5	0.013	86.547	86.360	1.40	0.30	0.14	0.5	-0.277	2.01	83.271	82.715	B1B	84.56	1.289		

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 (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 (m)	
																					Length HGL (m)	Dist. From D/S MH (m)
46	Ex102	82.318	81.915	675	80.6	0.5	0.013	86.360	86.237	1.66	0.59	0.28	0.5	-0.279	2.01	82.714	82.590	B15L1	84.44	1.726		
470	460	83.214	82.860	450	59.0	0.6	0.013	86.407	86.519	1.39	0.22	0.03	0.1	-0.351	1.80	83.313	83.071	B13L1	84.51	1.197		
48	49	83.384	83.360	300	6.0	0.4	0.013	86.367	86.328	0.87	0.06	0.03	0.6	-0.141	2.00	83.543	83.501	N/A	N/A	N/A		
49	50	83.285	82.955	375	66.0	0.5	0.013	86.328	86.244	1.12	0.12	0.05	0.4	-0.203	2.01	83.457	83.120	B8L1	84.23	0.773		
50	ExPlug2	82.880	82.836	450	22.0	0.2	0.013	86.244	86.132	0.80	0.13	0.05	0.4	-0.220	2.02	83.110	83.087	N/A	N/A	N/A		
N3901	N3900	85.529	85.396	457	53.6	0.2	0.013	88.166	88.154	0.90	0.15	0.15	1.0	-0.103	1.94	85.883	85.663	IBI (FUT)	N/A	N/A		
N54	N55	83.033	82.918	2743	114.7	0.1	0.013	88.111	88.003	1.89	11.18	4.61	0.4	-0.970	2.04	84.806	84.766	IBI (FUT)	N/A	N/A		
N55	N56	82.898	82.750	2743	148.3	0.1	0.013	88.003	87.980	1.89	11.18	4.76	0.4	-0.875	2.15	84.766	84.734	IBI (FUT)	N/A	N/A		
N56	N57	82.600	82.570	3048	30.2	0.1	0.013	87.980	87.347	2.02	14.73	11.58	0.8	-0.914	2.03	84.734	84.676	IBI (FUT)	N/A	N/A		
N56	N101	84.082	84.000	610	63.1	0.1	0.013	87.980	87.410	0.79	0.23	0.37	1.6	0.042	2.13	84.734	84.597	IBI (FUT)	N/A	N/A		
N57	Chan1	82.570	82.554	3048	15.9	0.1	0.013	87.347	87.800	2.04	14.88	12.84	0.9	-0.942	2.04	84.676	84.533	IBI (FUT)	N/A	N/A		
170	18	82.934	82.870	1800	64.5	0.1	0.013	87.537	87.453	1.43	3.63	2.19	0.6	-0.607	2.03	84.127	84.091	B96SS	85.56	1.433		
460	46	82.840	82.543	450	49.5	0.6	0.013	86.519	86.360	1.39	0.22	0.10	0.4	-0.219	2.08	83.071	82.749	B13L5	84.51	1.439		
19S	20	82.494	82.412	2100	82.0	0.1	0.013	87.272	87.148	1.58	5.48	4.24	0.8	-0.542	2.03	84.052	83.996	N/A	N/A	N/A		
19W	23	83.721	83.483	750	119.0	0.2	0.013	87.272	87.057	1.13	0.50	0.19	0.4	-0.416	2.04	84.055	83.877	B71W	85.25	1.195		
20S	21	82.392	82.284	2100	106.5	0.1	0.013	87.148	87.025	1.58	5.48	4.28	0.8	-0.499	2.04	83.993	83.924	64	85.23	1.237		
20W	30	84.183	83.985	375	79.5	0.3	0.013	87.148	87.075	0.79	0.09	0.05	0.6	-0.163	1.94	84.395	84.148	56	85.28	0.885		
47	48	83.634	83.414	300	55.0	0.4	0.013	86.434	86.367	0.87	0.06	0.03	0.6	-0.134	2.00	83.800	83.555	B10L1	84.52	0.720		
Chan1	Chan1a	82.477	82.350	N/A	117.5	N/A	N/A	87.800	87.800	N/A	N/A	12.62	N/A	N/A	2.04	84.533	84.370	N/A	N/A	N/A		
Chan1a	Chan1b	82.350	82.300	N/A	54.4	N/A	N/A	87.800	87.800	N/A	N/A	12.43	N/A	N/A	2.05	84.370	84.261	N/A	N/A	N/A		
Chan1b	Chan1c	82.300	82.280	2100	18.0	0.1	0.013	87.800	87.800	1.76	22.23	12.38	0.6	-0.139	2.07	84.261	84.244	N/A	N/A	N/A		
Chan1c	Chan1d	82.280	82.189	N/A	88.1	N/A	N/A	87.800	87.800	N/A	N/A	12.34	N/A	N/A	2.07	84.244	83.964	N/A	N/A	N/A		
Chan1d	Chan1e	82.189	82.160	N/A	37.0	N/A	N/A	87.800	85.900	N/A	N/A	12.26	N/A	N/A	2.09	83.964	83.917	N/A	N/A	N/A		
Chan2	Chan3a	81.654	81.320	N/A	340.7	N/A	N/A	86.700	86.300	N/A	N/A	18.09	N/A	N/A	2.10	83.838	83.325	N/A	N/A	N/A		
Chan3	Chan4	81.200	81.080	N/A	175.5	N/A	N/A	86.300	86.100	N/A	N/A	19.00	N/A	N/A	2.15	83.200	82.794	N/A	N/A	N/A		
Chan4	ForeS	81.080	81.072	N/A	7.6	N/A	N/A	86.100	83.500	N/A	N/A	19.42	N/A	N/A	2.13	82.794	82.794	N/A	N/A	N/A		
DICB	15	84.647	84.405	975	22.0	1.1	0.013	86.190	87.920	3.15	2.35	0.00	0.0	-0.975	0.00	84.647	84.313	N/A	N/A	N/A		
Ex100	Ex111	82.193	82.180	975	18.7	0.1	0.013	85.372	84.902	0.79	0.59	0.59	1.0	-0.373	1.95	82.795	82.795	IBI (3)	83.47	0.675		
Ex107	Ex100	82.670	81.685	600	67.9	0.1	0.013	86.060	85.372	0.75	0.21	0.17	0.8	-0.189	1.94	83.081	82.857	IBI (3)	83.58	0.499		
Ex111	Chan4	81.700	81.685	975	15.0	0.1	0.013	84.902	86.100	0.95	0.71	0.59	0.8	0.120	1.95	82.795	82.794	IBI (3)	83.45	0.655		
ExPlug2	Ex107	82.836	82.821	450	7.3	0.2	0.013	86.132	86.060	0.80	0.13	0.05	0.4	-0.199	2.02	83.087	83.081	N/A	N/A	N/A		
ForeN	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	23.01	N/A	N/A	3.05	82.791	82.788	N/A	N/A	N/A		
ForeS	MainS	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	17.18	N/A	N/A	2.09	82.794	82.794	N/A	N/A	N/A		
MainN	Out	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	4.43	N/A	N/A	3.43	82.788	80.100	N/A	N/A	N/A		
MainS	MainN	N/A	N/A	N/A	N/A	N/A	N/A	83.500	83.500	N/A	N/A	11.35	N/A	N/A	2.14	82.794	82.788	N/A	N/A	N/A		
140	141	83.363	83.071	900	73.0	0.4	0.013	87.196	86.812	1.80	1.14	0.82	0.7	-0.283	2.00	83.980	83.643	N/A	N/A	N/A		
141	24	83.041	83.015	900	6.5	0.4	0.013	86.812	86.889	1.80	1.14	0.82	0.7	-0.298	2.01	83.643	83.548	N/A	N/A	N/A		
230	24	83.185	83.165	750	10.0	0.2	0.013	86.944	86.889	1.13	0.50	0.27	0.5	-0.363	2.06	83.572	83.481	N/A	N/A	N/A		
250	26	82.386	82.368	1350	9.0	0.2	0.013	86.730	86.637	1.67	2.39	1.16	0.5	-0.482	2.04	83.254	83.214	N/A	N/A	N/A		
259	40	84.086	83.981	1050	105.0	0.1	0.013	88.154	87.901	1.00	0.86	0.49	0.6	-0.523	2.07	84.613	84.467	B134W	86.14	1.527		
280	28	84.381	84.317	300	16.0	0.4	0.013	87.165	87.130	0.87	0.06	0.00	0.0	-0.300	0.00	84.381	84.360	47	85.21	0.829		
200	41	83.740	83.654	1050	43.0	0.2	0.013	87.754	87.791	1.41	1.22	0.05	0.0	-0.386	2.09	84.404	84.398	N/A	N/A	N/A		
Chan1e	Chan2	82.160	82.104	2400	55.0	0.1	0.013	85.900	86.700	1.73	15.66	12.24	0.8	-0.643	2.10	83.917	83.838	N/A	N/A	N/A		
N404	N406	82.649	82.574	1524	75.3	0.1	0.013	87.325	86.750	1.28	2.33	1.84	0.8	-0.211	2.02	83.962	83.894	IBI (4)	85.23	1.263		