298 AXIS WAY

minto Communities

SITE SERVICING REPORT

PROJECT No: 240801

CITY OF OTTAWA

DECEMBER 2024

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

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DESIGN BRIEF

1.0 BACKGROUND

1.1 General

Atrel Engineering has been retained by Minto Communities to complete a site servicing for a residential development of approximately 2.67 ha. located in Orleans, in the City of Ottawa. The proposed site plan, referred to as "298 Axis Way," is located within the Trailsedge Subdivision. It is bordered by Brian Coburn Boulevard to the north, Axis Way to the south, Fern Casey Street to the east, and 640 Compass Street to the west, as shown in *Figure 1* below.

Figure 1-Location Map

The proposed development contains a mix of back-to-back townhouse (Avenue Towns) and apartment buildings (Metro Towns) amounting to 200 units expected to be under construction upon approval of various reports and drawings by the relevant agencies.

1.2 Previously Approved Studies and Reports

The following studies were utilized in the preparation of this report.

- Paterson Group Engineering report titled "Supplemental Geotechnical Investigation, Proposed Residential Development, Trails Edge Stage 3, Renaud Road, Ottawa, Ontario", dated June 4, 2020
- DSEL report titled "Design Brief for the Trails Edge West Richcraft Group of Companies", dated January 26, 2015
- DSEL report titled "Master Servicing Study for East Urban Community Phase 3, Area Community Design Plan, Richcraft Homes", dated December 2020
- IBI Group report titled "Design Brief, Minto Trails Edge Phase II", dated January 2015
- DSEL report titled "Servicing report for Trails Edge and Orleans Business Park, Minto Developments Inc., Richcraft Group of Companies", dated March 2014
- JFSA report titled "Stormwater Management Report for the Trails Edge Subdivision)", updated January 2015

1.3 Services

298 Axis Way can physically be connected to the following services:

i) There is an existing 200 mm diameter watermain stubs off Axis Way through Block 139.

ii) There is an existing 1050 mm diameter storm sewer off Axis Way through Block 139.

iii) There is an existing 200 mm diameter sanitary sewer off Axis Way through Block 139.

It is proposed to connect directly on the abovementioned existing services as they have been designed accordingly. The watermain, storm and sanitary sewers of the proposed site plan were designed in conjunction with the previously approved studies and reports listed in section 1.2.

1.4 Geotechnical Recommendation for Servicing

The proposed site plan is designed in conjunction with Paterson's Engineering Geotechnical Investigation report titled "Supplemental Geotechnical Investigation, Proposed Residential Development, Trails Edge Stage 3, Renaud Road, Ottawa, Ottawa, Ontario", dated June 4, 2020. The geotechnical report offers grade-raise recommendations and provides subsurface information that informs the detailed design of municipal infrastructure and grading within the specified development.

1.5 Permits and Approval Required for Servicing

To construct the proposed site plan, multiple permits and approvals are required as mentioned below:

- The City of Ottawa approval of various reports and plans related to this project.
- An Environment Compliance Approval (ECA) from the Ministry of Environment, Conservation and Parks (MOECP) is required to construct the sanitary sewers and storm sewers.
- A Form 1 "Record of Watermain Authorized as a Future Alteration" from the MOECP to construct the watermain.

2.0 STORM SEWERS

2.1 General

The proposed site plan is situated within the Trails Edge West Subdivision, located north of Mud Creek and the existing stormwater management (SWM) facility. This facility currently manages the stormwater quantity and quality for the entire Trails Edge Subdivision, including the proposed site. According to JFSA's Stormwater Management report, a runoff coefficient of 0.80 has was assumed for the proposed site. The minor flow system capture rate is to be limited to the 5 year flow with sufficient on-site storage to retain excess flows up to the 100 year return period. The plan includes installing catch basins in the parking areas and roadways, with a storm sewer connection proposed on Axis Way.

2.2 Design Constraints

The main design constraints were established in JFSA report titled "Stormwater Management Report for the Trails Edge West, Subdivision, updated in January, 2015" and are outlined below:

a) Minor System

i. Storm sewers sizing is to be designed based on the 5-year storm event using a time of concentration of 10 minutes.

ii. All residential inlets will be equipped with inlet control devices (ICD). The term "inlet" refers to "a single catch basin" or "a group of interconnected catch basins" connected by a single lead into the minor system. The inflow rate into the minor system shall be limited to ensure no surface ponding during the 5-year storm event. The release rate was established by JFSA to be 984 l/s during the 5-year DDSWMM flow event for the segment ID A041a which includes the proposed site plan (refer to excerpt pages 8 and 9 and Table 1 and 3 from JFSA's report in Appendix A).

iii. The hydraulic grade line for a 100-year storm event shall be computed and the maximum permitted hydraulic grade line elevation is to be 0.30m below the underside of footing.

b) Major System and Emergency Overflow

i. Routing to emergency storage area shall be provided and illustrated on the grade control plan. This routing must incorporate a maximum of 0.35 m flow depth on the streets and parking's under either static or dynamic conditions. An overall positive slope of 0.10% will be required across consecutive ponding area spill points for routing purposes.

ii. On site detention storage volume are to be calculated and can be provided in the parking areas and road way..

c) Water Quality

i. The existing East Urban Community Stormwater Management Pond 1 (EUC Pond 1) was designed with water quality control targets specified in DSEL's report. It was planned to achieve a Normal level of fish habitat protection, corresponding to a 70% removal of total suspended solids (TSS).

2.3 Tributary Area

The proposed site plan will convey its storm water flow towards the existing 1050mm storm sewer stub on Axis Way which will ultimately reach Mud Creek and the existing SWM pond via existing storm sewers.

Each storm drainage area is divided in several sub-basin areas in order to evaluate the storm water flow for each pipe of the storm sewer system. Drawing 240801-STM1 show the delineation of the sub-basin areas. Also, the storm drainage plan from Trails Edge West and the associated storm sewer calculation sheet is included in Appendix A, which shows the tributary areas draining to the existing 1050 mm diameter storm sewer at the entrance of the project (Block 136).

A runoff coefficient was calculated for each sub-basin area using 0.20 for grass and 0.90 for asphalt and roofs.

2.4 Theoretical Flows

The stormwater design flows for the proposed site plan were calculated using the Rational Method, assuming a 10-minute inlet time and the 5-year Intensity-Duration-Frequency (IDF) curve from the City of Ottawa. To prevent system surcharging during major events such as the 100-year storm, overall storm sewer inflow will be controlled by inlet control devices (ICDs).

JFSA conducted a dual drainage analysis for the existing Trails Edge development, providing the hydraulic grade line (HGL) for the 100-year, 3-hour Chicago storm event at the connection point, identified as STM MH 2. The HGLs for all storm events were compared to the proposed underside of footings (USFs) to ensure a minimum freeboard of 0.30 m. In cases where the HGL is below the sewer obvert, the USF was verified to maintain at least 0.50 m clearance above the obvert.
For detailed calculations, refer to Appendix B:

- Table 1: Rational Method stormwater computation forms.
- Table 2: Restricted flow computation form and HGL analysis.

2.5 Stormwater Management and Storm Sewers

The minor drainage system refers to the storm sewers, catch basins, swales and ditches and is usually designed to carry the so-called 1 in 5 year storm event. A storm sewer computation form shows these calculations and a hydraulic grade line for the restricted flow was also tabulated (see Table 1 and 2 in Appendix "A"). The major drainage system consists of the roads and rear yard swales and should accommodate runoff of the storm events above the 1 in 5 year such as the 1 in 100-year storm event.

As per DSEL's report titled "Design Brief for the Trails Edge West, Richcraft Group of Companies, revised on January 26, 2015", the minor system inflow rate should be limited to the 5-year release rate. Inlet control devices (ICD) were sized to ensure the site's total release rate respects the allowable release rate stated in the previously approved reports. ICDs will be installed in the catch basins in order to prevent uncontrolled surcharge of the minor system for storm events above the 1 in 5 years.

The allowable release rates were derived from JFSA's simulation results for Segment A041a, which has a total area of 3.73 ha and an associated release rate of 984 L/s, including the proposed site plan. Segment A041a consists of three areas:

- 298 Axis Way: 2.67 ha
- 640 Compass St.: 0.98 ha
- Entrance from Axis Way: 0.08 ha

Based on a release rate of 263.8 L/s/ha (984 L/s ÷ 3.73 ha), the allowable release rate for the proposed site, including the Axis Way entrance (2.75 ha), is 725.45 L/s (263.8 L/s/ha × 2.75 ha).

A portion of the site (0.42 ha) drains directly onto Brian Coburn Boulevard and Fern Casey Street. To account for these uncontrolled flows, the 100-year event flow from this area (143.90 L/s) was deducted from the allowable minor system release rate, resulting in an adjusted rate of 581.55 L/s.

Additionally, two existing ICDs at the project entrance provide a combined release rate of 39.8 L/s (19.9 L/s each). Subtracting this from the adjusted rate, the allowable release rate for the controlled site plan area is 541.75 L/s.

The hydraulic grade line of the restricted flow, which simulates the flow into the minor system during event larger than the 5 year event, like the 100 year storm event, was calculated and shown everywhere to be at least 0.30m below the underside of footing (refer to table 2 in Appendix A). All rear yard and road catchbasins will be equipped with an inlet control device (ICD) to achieve the desired restricted flow and avoid any uncontrolled surcharged of the minor system.

The ICDs were sized using the orifice sizing equation presented below:

$$r = \sqrt{\frac{Q}{c\pi\sqrt{2gh}}}$$

Where:

$r = radius\ of\ pipe\ (m)$
$Q = discharge\ \left(\frac{m^3}{s}\right)$
$c = Coefficient\ of\ Discharge = 0.61$
$g = gravity = 9.81\ \left(\frac{m}{s^2}\right)$
$h = head\ (m)$

The majority of the permanent ICDs were sized according to the City of Ottawa MS-22.15, S18.4-3 & S18.4-5 dated March 2023 within the proposed development. Refer to Table 3 in Appendix "A" for the proposed ICD sizes and further details.

A few vortex flow regulators are proposed at low design flow inlet of 8.0 l/s and 10.0 l/s, refer to Figure 1 in Appendix "A" for details.

In summary, the total restricted flow release rate for the proposed development is 540.60 L/s, which is within the allowable release rate of 541.75 L/s. This design complies with the release rates outlined in previously approved reports and studies.

2.6 Storage Analysis

The best location to achieve the storage volume requirements, due to the landscape of the proposed subdivision, is in the road and parking sags (refer to drawing No. 240801-PA1). The proposed site plan's minor storm water flows will drain into a storm sewer as previously stated and the overland route will mostly follow the paved roads heading towards the existing SWM Pond.

The major drainage system consists of the roads and rear yard swales which should accommodate runoff of storm events that generates flows larger than the restricted flows such as the 100 year storm event. As per the JFSA's report the 100 year storm event is to be stored within the site, while providing an overflow route for any event larger that the 100 year storm event. As per JFSA's report, 312 m^3 of storage was used for the entire 3.73 ha, see excerpt in Appendix A. A storage per hectare can be calculated to 83.67 m^3 / ha. (312 m^3 / 3.73 ha.) Using the site's area of 2.67 ha, it can be calculated that 223.4 m^3 of storage needs to be provided to store the 100 year storm event.

The individual storage volumes from each catchment area of the proposed development were calculated (refer to ponding plans 240801-PA1 for individual sub-catchment storage volumes). The total storage volume was calculated at 294 m^3 within the roads and parking areas which aligns with the previously approved reports and studies.

3.0 SANITARY SEWERS

3.1 Criteria

The criteria used in the design of the sanitary sewers are based on the Ministry of Environment (MOE), the City of Ottawa and current practices in the Eastern Ontario.

The criteria used for the sizing of the sanitary sewer system are outlined below:

- Minimum velocity – 0.60 m/s
- Maximum velocity – 3.0 m/s
- Residential average flow – 280l/c/day
- Residential peaking factor – Harmon formula
- Infiltration inflow – 0.33 l/s/ha
- Minimum Diameter – 200 mm

Section 4.3 of the Ottawa sewer design guidelines provide standards for population densities in Ottawa. The following table illustrates the population densities used for the proposed site plan.

Unit Type	Person per Unit
2 Bedroom Apartments	2.1
3 Bedroom Apartments	3.1
Back-to-Back Townhouse	2.7

In summary, for a total of 96 2-bedroom apartment, 64 3-bedroom apartment and 40 townhouses, the total population for the proposed development is estimated to be 460.0

3.2 Tributary Area Characteristics

The sanitary drainage area is divided into several sub-basin areas, in order to assess the flow to the sewer (refer to plan No. 240801-SAN1). The design sanitary flow for each sub-basin is determined using the theoretical flow and adding infiltration as per the above-mentioned criteria.

3.3 Theoretical Flows

The flow was calculated using the Harmon equation to obtain the peaking factor, a population density and the infiltration rate per area.

The following equations were used to calculate the sanitary flow:

$$Peaking\ Factor = P.F = 1 + \left[\frac{14}{4 + \left({}^{pop}/_{1000}\right)^{0.5}}\right] \times K$$

Where:
$K = Correction\ Factor = 1$
$2 < P.F < 4$

$$Infiltration = Area \times Infiltration\ Rate$$

$$Flow = \frac{pop \times Residential\ Average\ Flow \times P.F}{86400}$$

$$Total\ Flow = Flow + Infiltration$$

A projected peak flow of 6.84 l/s was calculated at the connection of existing maintenance hole 2a. The sanitary sewer computation form can be found in Appendix "B – Table 5".

3.4 Analysis

The sanitary sewage flow of the proposed site plan will be conveyed to the existing sanitary sewer on Axis Way and was design to take the flow from this development. It has been determined that the existing surrounding pipes which will receive the sanitary sewers from 298 Axis Way and have been adequately designed to do so. It has been determined that 200mm diameter pipes are satisfactory to service all 200 units in the site plan.

The sanitary sewer computation form (Appendix "B" table 5) as well as the engineering drawings (Appendix "D") demonstrates that the existing and proposed infrastructure depths and capacities are satisfactory to service the proposed site plan.

4.0 WATERMAIN ANALYSIS

4.1 Background and Boundary Conditions

This analysis was carried out using the "H2ONET v.5.0" program as a design aid. The governing authorities design guidelines used during this analysis are the City of Ottawa's Design Guidelines for Water Distribution and the Technical Bulletin ISDTB-2014-02 - "Revision to Ottawa Design Guidelines - Water".

The following table summarizes the "Per Unit Populations" imposed by the City of Ottawa's Guidelines which were used for the purpose of this study.

Watermain Design Population Density

Unit Type	**Person per Unit**
2 Bedroom Apartments	2.1
3 Bedroom Apartments	3.1
Back-to-Back Townhouse	2.7

The water demands for the entire site were calculated using an average daily consumption rate of 280 l/c·d for residential dwellings. The table below condenses the calculated results for demands under average day, maximum day and peak hour conditions for the proposed site.

Watermain Demands

Type of Development	Average Daily Demand	Maximum Daily Demand	Peak Hour Demand
Residential	280 l/c.d	2.50 x Average Day	5.50 x Average Day
298 Axis Way	1.4907 l/s	3.7269 l/s	8.1991 l/s

Watermain boundary conditions were provided by the City of Ottawa at two locations (please see boundary condition from the City received December 4, 2024 in Appendix "C"):

A complete model analysis of the site plan was carried out to carefully assess the different demand scenario. Refer to sketch 240801-WA1 in Appendix "C".

4.2 Assessment of the Watermain System

The analysis was executed under average day and peak hour conditions (Refer to sketch 240801-WA2 in Appendix "C" for average day demands and all other relevant information regarding the watermain analysis).

The system was designed and verified in order to satisfy residual pressure requirements from the City of Ottawa's Design Guidelines for Water Distribution which ranges from 276 kPa to 552 kPa during average day and peak hour demands. The following table summarizes maximum and minimum residual pressures throughout the network for each condition. Furthermore, tables 7 to 10 in Appendix "C" show all relevant calculations and results from these analyses.

Condition	Min. Head (m)	Min. Pressure (kPa)	Max. Head (m)	Max. Pressure (kPa)
Average Day	41.90	411.00	37.73	420.48
Peak Hour	42.85	370.15	38.83	380.96

A fire-flow of from 167 l/s to 233 l/s were also simulated throughout the system during maximum day demand. The system was designed and verified in order to withstand fire flow demands while satisfying minimum residual pressure requirements of 140 kPa.

4.3 Fire Underwriters Survey (FUS)

The Fire Underwriters Survey provides guidance which was followed for the calculation of required fire-flows. Fire-flows of 133 l/s to 233 l/s were simulated throughout the system during maximum day demands.

The proposed development will consist of two different types of dwelling units, and the required fire flows were calculated for each unit in the development. Fire flow areas have been delineated, refer to drawing 240801-WA3 in Appendix C. The required fire flow of each fire area was calculated, refer to table 11 to 15 in Appendix "E" for details.

The maximum day plus fire flow analysis was conducted to ensure that the water system is adequate to within the development and provide the appropriate fire flow for each fire flow areas.

All relevant fire flow calculations and results are found in Table 10 in Appendix "E".

5.0 BEST MANAGEMENT PRACTICES

To minimize the impact of the development to the watercourse, it is suggested to implement various mitigating measures mainly to reduce the suspended solids as follows:

i) Plan No 240801-ESC1 titled “erosion and sediment control plan” is included in the set of plans and shall be implemented during the construction.

ii) A sump of at least 600mm will be provided in all catch basins in order to minimize the amount of suspended solids from entering the sewer system.

iii) Each inlet catch basin will be controlled by an inlet control device, which will reduce the runoff rate.

iv) During construction, filter cloth will be placed under all catch basin and manhole frame and covers, siltation curtains and straw bales will be placed wherever water runoff can carry excessive sediments into the sewer system.

v) To prevent the event where water runoff would get into the storm sewer during construction, one temporary construction ICD will be installed at the outlet of the proposed development. Refer to Appendix “A” for Orifice sizing and location (Table 4).

vi) To prevent the event where water runoff would get into the sanitary sewer during construction, one temporary construction ICD would need to be installed ahead of any construction of the proposed development. Refer to Appendix “B” for Orifice sizing and location (Table 6).

6.0 CONCLUSION

In summary, the storm and sanitary gravity sewer pipes were designed as outlined above to accommodate the proposed site plan. Stormwater management was implemented within the proposed development to align with the criteria set in the Trails Edge Subdivision and the storm water will drain into the existing storm sewer on Axis Way before reaching Mud Creek and SWM pond. Finaly, the proposed watermain system satisfies all requirements for water distribution as well as fire-fighting requirement.

All of which is respectfully submitted:

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APPENDIX "A"

Excerpt pages 8 and 9 from JFSA's report
Excerpt Table 1 and 3 from JFSA's report
Trails Edge West Storm Drainage Plan (DSEL) dated Jan. 26, 2015
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Table 3 - Inlet Control Device Table
Figure 2 – Hydrovex Design
Table 4 - Temporary Construction ICD at storm MH 2

- Ponding Area Routing: *Double Routing Method, as per the February 2014 "City of Ottawa Technical Bulletin ISDTB-2014-01".*
- Depth of backyard swales: *As per DSEL's Grading Plan*
- Street and pipe dimensions: *As per DSEL's Plan and Profiles*
- Right-of-way characteristics: *As per DSEL's Details of Roads*
- Downstream HGL: *Free outfall conditions assumed at the pond outlet.*

4 PROPOSED MINOR AND MAJOR SYSTEM DRAINAGE

The proposed minor and major system drainage routes are shown in plan view in Figures 2 and 3, respectively. In accordance with the City of Ottawa standards, the minor system has been designed to accommodate the 5-year post development flows from within the site and from external areas.

A Rational Method design was conducted by DSEL (refer to Appendix A) in order to estimate minor system flows based on the City of Ottawa IDF relationship and selected runoff coefficients. Note that DSEL's Rational Method design sheets have been prepared on the understanding that the future development east of Belcourt extension will remain undeveloped under Interim A conditions (labeled "pre-development" conditions in Appendix A). As previously noted, the DDSWMM / XPSWMM modelling for this report treats this area as developed under both Interim A and Interim B conditions in order to be conservative and consistent with previous studies.

The minor system capture on the following areas should be limited to the 5-year Rational Method flows as per DSEL's design (estimated below):

Park Block 9 (A047PK1, 0. 377 ha, C = 0.25)	:	25 L/s
Existing Woodlot (AWood1, 0.847 ha, C = 0.25)	:	62 L/s
External Mixed Use Centre Block 135 (A041a, 3.73 ha, C = 0.80)	:	846 L/s
External Multiple Blocks 138/139 (by others; A018b/A018a, 1.86 ha, C=0.80)	:	366 L/s
External Park Block 140 (by others; A019a, 1.93 ha, C = 0.40)	:	229 L/s

Excess flows from these blocks will spill onto the street and be conveyed overland to Mud Creek, with the exception of the park blocks. Excess flows from Park Block 9 will spill onto the street and be conveyed overland to East Urban Community SWM Pond 3, and excess flows from external Park Block 140 will spill directly overland to Mud Creek.

Within the proposed development, standard Tempest Inlet Control Device (ICD) types A, B, C, D and E and lead pipe capacities will be used to limit minor system capture to the 5-year flow. Note that IPEX has changed these standard ICDs of Types A, B, C, D and F to "Tempest" ICDs of Types A, B, C, D and E (refer to Appendix B for details). For the previously approved

townhouse development draining to Trails Edge Phase 1 (south of Mud Creek and west of Compass Street), minor system capture is limited as per the *Trails Edge Phase 1 Stormwater Management Report* dated June 2010 by IBI Group (approx. 85 L/s/ha).

For modelling purposes, minor system capture rates on undetailed future residential development to the east of Trails Edge West were limited to 112% of the 5-year flows, as simulated in DDSWMM, with 30 m^3/ha of surface storage. The additional 12% capture is to account for the additional flows captured by standard inlet control devices during the 100-year storm.

Minor system capture rates in future (undetailed) school, high density, mixed use, multiples, institutional and commercial blocks south of the transitway corridor / hydro easement are to be limited to the 5-year flow with sufficient on-site storage to retain excess flows up to the 100-year return period.

Continuous overland flow routes have been provided on the internal streets of the proposed Trails Edge West subdivision in order to convey the major system flows to the pond. In general, the major system has been designed to accommodate the 100-year less the 5-year post-development flows from within the site and from external areas. Note that the 100-year major system flows on large lumped catchments may be significant due to the size of the drainage area; these areas will be further discretized and the actual major system flows identified at the appropriate detailed design stages for these areas.

The street segments within the proposed development have been designed using a 'saw tooth' or 'sagged' road profile. The runoff from within these segments will be conveyed to catchbasins located at the lowest point within the street segment. Flows in excess of the catchbasin capture rate will be temporarily stored within the 'sagged' street segments and released slowly to the storm sewers. When the storage on a specific street segment is surpassed, the excess water will flow towards the next downstream street sag, and eventually to the appropriate outlet. It should be noted that the major system would outlet without flooding any properties in the subdivision.

In the event that the drainage system's capacity to capture surface flows is exceeded, Figure 4 presents the maximum extent of static surface ponding on the streets based on grading. Note that the double routing method was used to model the attenuation provided by dynamic storage above static ponding areas, in accordance with the February 2014 *City of Ottawa Technical Bulletin ISDTB-2014-01*.

Details of 100-year street storage results (i.e. actual volume used and depth of water) are provided in Table D-7 of Appendix D. This information, combined with the dynamic flow depths calculated in DDSWMM, demonstrates that total 100-year depth of water (static and dynamic) on the street at these ponding areas would be retained within the right-of-way and would not exceed 30 cm within the proposed subdivision, or 35 cm with the previously approved townhouse development where minor system capture is limited to 85 L/s/ha by

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
A001N1	0.017	4.5	0.000	0	A008R1	0.090	5.2	0.028	0
LP001N1	0.031	20.5	0.020	4.04	A008R2	0.082	5.1	0.000	0
A001N2	0.015	4.2	0.000	0	A008R3	0.040	2.8	0.000	0
A001NE	0.016	4.3	0.000	0	A008SE	0.068	7.5	0.000	0
LP001NE	0.023	15.0	0.020	0.75	A008SW	0.010	3.6	0.000	0
A001NW	0.008	3.2	0.000	0	A009E1	0.051	6.7	0.000	0
A001R1	0.009	0.6	0.008	0	LP009E1	0.069	16.5	0.036	1
A001S1	0.032	5.6	0.000	0	A009E2	0.019	4.6	0.000	0
LP001S1	0.037	21.0	0.020	6	A009N1	0.008	3.3	0.000	0
A001S2	0.006	2.9	0.000	0	LP009N1	0.020	13.7	0.010	1
A001SE	0.023	5.0	0.000	0	A009N2	0.012	3.8	0.000	0
LP001SE	0.041	16.2	0.020	2	A009N3	0.010	3.5	0.000	0
A001SW	0.018	4.6	0.000	0	LP009N3	0.012	12.9	0.010	1
A003R1	0.048	3.3	0.020	0	A009NE	0.026	5.1	0.000	0
A003R2	0.038	2.7	0.000	0	LP009NE	0.051	16.7	0.028	2
A004NE	0.057	7.0	0.000	0	A009NW	0.013	3.9	0.000	0
LP004NE	0.056	10.9	0.028	1	LP009NW	0.034	15.7	0.020	2
A004NW	0.082	8.0	0.000	0	A009SE	0.026	5.1	0.000	0
LP004NW	0.087	12.2	0.020	1	A009SW	0.021	4.8	0.000	0
A004SW	0.010	3.5	0.000	0	A009W1	0.047	6.5	0.000	0
A005NE	0.014	4.0	0.000	0	LP009W1	0.064	16.3	0.036	1
LP005NE	0.021	14.8	0.010	1	A009W2	0.018	4.5	0.000	0
A005NW	0.008	3.3	0.000	0	A010NE	0.049	6.6	0.000	0
A005SE	0.090	8.3	0.000	0	LP010NE	0.075	18.8	0.036	2
LP005SE	0.089	26.3	0.050	12.71	A010NW	0.049	6.6	0.000	0
A005SW	0.069	7.5	0.000	0	LP010NW	0.074	18.7	0.036	3
LP005SW	0.068	25.5	0.050	4.17	A010S1	0.089	8.2	0.000	0
A005W1	0.016	4.3	0.000	0	LP010S1	0.106	21.8	0.050	2
LP005W1	0.016	14.3	0.010	1	A010S2	0.089	8.3	0.000	0
A006NE	0.051	6.7	0.000	0	LP010S2	0.116	20.2	0.050	1
LP006NE	0.065	13.4	0.036	1	A010SE	0.027	5.3	0.000	0
A006NW	0.016	4.3	0.000	0	A010SW	0.026	5.1	0.000	0
A006SE	0.072	7.7	0.000	0	A010W1	0.018	4.6	0.000	0
LP006SE	0.072	20.6	0.036	3	A011NE	0.057	7.0	0.000	0
A006SW	0.067	7.5	0.000	0	A011NW	0.072	7.7	0.000	0
LP006SW	0.084	21.1	0.036	2	LP011NW	0.122	21.3	0.028	2
A007E1	0.071	7.6	0.000	0	A011SW	0.097	8.5	0.000	0
LP007E1	0.088	20.2	0.028	2	LP011SW	0.145	22.9	0.050	2
A007E2	0.067	7.5	0.000	0	A012NE	0.045	6.4	0.000	0
LP007E2	0.095	20.4	0.036	3	LP012NE	0.060	17.1	0.020	2
A007N1	0.034	5.7	0.000	0	A012NW	0.025	5.1	0.000	0
A007NE	0.043	6.3	0.000	0	A012SE	0.045	6.4	0.000	0
LP007NE	0.087	23.2	0.035	6	LP012SE	0.064	17.3	0.036	2
A007NW	0.053	6.8	0.000	0	A012SW	0.021	4.8	0.000	0
A007R1	0.051	3.6	0.000	0	A013N1	0.087	8.2	0.000	0
A007R2	0.058	4.1	0.020	0	LP013N1	0.115	24.1	0.020	2
A007S1	0.011	3.7	0.000	0	A013N2	0.037	6.0	0.000	0
A007SE	0.035	5.8	0.000	0	A013NE	0.050	6.6	0.000	0
LP007SE	0.061	22.2	0.035	6	LP013NE	0.068	16.5	0.028	1
A007SW	0.027	5.2	0.000	0	A013NW	0.019	4.6	0.000	0
A008NE	0.057	6.9	0.000	0	A013S1	0.053	6.7	0.000	0
LP008NE	0.115	19.1	0.020	2	LP013S1	0.158	12.3	0.028	1
A008NW	0.067	7.5	0.000	0	A013S2	0.044	6.3	0.000	0
LP008NW	0.071	17.6	0.020	2	A013SE	0.043	6.3	0.000	0

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
LP013SE	0.063	16.3	0.028	1	A019SW	0.011	3.7	0.000	0
A013SW	0.021	4.8	0.000	0	A019W1	0.038	6.0	0.000	0
A015N1	0.009	3.4	0.000	0	LP019W1	0.075	24.8	0.020	6
LP015N1	0.012	10.8	0.010	0.77	A019W2	0.033	5.7	0.000	0
A015N2	0.004	2.4	0.000	0	LP019W2	0.061	24.2	0.020	6
A015NE	0.027	5.2	0.000	0	A020E1	0.202	11.2	0.020	0
LP015NE	0.041	22.2	0.020	7.36	A020N1	0.027	5.2	0.000	0
A015NW	0.029	5.3	0.000	0	LP020N1	0.049	16.6	0.028	2
LP015NW	0.068	23.5	0.036	6	A020N2	0.250	12.2	0.000	0
A015S1	0.010	3.6	0.000	0	LP020N2	0.251	22.2	0.020	2
LP015S1	0.013	10.9	0.010	1	A020N3	0.023	4.9	0.000	0
A015S2	0.003	2.2	0.000	0	A020NE	0.029	5.4	0.000	0
A015SE	0.014	4.1	0.000	0	LP020NE	0.051	28.7	0.028	7.62
A015SW	0.040	6.1	0.000	0	A020NW	0.030	5.5	0.000	0
A017NE	0.046	6.4	0.000	0	LP020NW	0.052	16.7	0.028	1
LP017NE	0.051	15.6	0.020	2	A020S1	0.022	4.9	0.000	0
A017NW	0.088	8.2	0.000	0	A020S2	0.011	3.7	0.000	0
LP017NW	0.109	18.0	0.069	1	A020SE	0.036	5.9	0.000	0
A017SE	0.011	3.6	0.000	0	LP020SE	0.036	27.9	0.020	5.36
A017SW	0.023	5.0	0.000	0	A020SW	0.034	5.8	0.000	0
A018a	0.324	10.4	0.171	48.48	LP020SW	0.034	6.8	0.020	1
A018b	0.632	13.3	0.334	95.29	A020W1	0.049	6.6	0.006	0
A018NE	0.024	5.0	0.000	0	A020W2	0.022	4.9	0.000	0
LP018NE	0.034	15.8	0.020	2	A021NE	0.039	6.1	0.000	0
A018NW	0.093	8.4	0.000	0	LP021NE	0.603	24.5	0.036	6
LP018NW	0.098	18.6	0.020	2	A021NW	0.098	8.6	0.000	0
A018R1	0.089	5.2	0.028	0	LP021NW	0.466	20.4	0.069	1
A018R2	0.051	3.6	0.000	0	A021SE	0.596	16.9	0.000	0
A018R3	0.023	1.6	0.000	0	A021SW	0.078	7.9	0.000	0
A018SE	0.011	3.6	0.000	0	A023N1	0.013	3.9	0.000	0
A018SW	0.011	3.7	0.000	0	A023N2	0.042	6.2	0.000	0
A019a	0.448	9.9	0.194	152.23	LP023N2	0.054	14.8	0.028	1
A019E1	0.329	13.5	0.000	0	A023NE	0.042	6.2	0.000	0
LP019E1	0.328	23.5	0.020	2	LP023NE	0.059	14.0	0.028	1
A019E2	0.011	3.7	0.000	0	A023NW	0.017	4.5	0.000	0
A019N1	0.017	4.4	0.000	0	A023R1	0.145	6.0	0.028	0
A019N2	0.045	6.4	0.000	0	A023R2	0.133	5.8	0.000	0
LP019N2	0.061	15.2	0.028	1	A023R3	0.106	5.4	0.000	0
A019N3	0.012	3.9	0.000	0	A023R4	0.071	5.0	0.000	0
A019N4	0.042	6.2	0.000	0	A023S1	0.009	3.3	0.000	0
LP019N4	0.053	13.8	0.028	1	A023S2	0.149	10.0	0.000	0
A019NE	0.493	15.7	0.000	0	LP023S2	0.154	18.2	0.020	1
LP019NE	0.500	25.2	0.020	2	A023SE	0.044	6.3	0.000	0
A019NW	0.039	6.1	0.000	0	LP023SE	0.057	14.0	0.028	1
LP019NW	0.042	15.6	0.020	1	A023SW	0.014	4.0	0.000	0
A019R1	0.068	4.8	0.020	0	A025NE	0.127	9.5	0.000	0
A019R2	0.021	1.5	0.000	0	LP025NE	0.133	17.6	0.020	1
A019S1	0.018	4.5	0.000	0	A025NW	0.285	12.8	0.000	0
A019S2	0.045	6.4	0.000	0	LP025NW	0.288	25.6	0.028	1
LP019S2	0.062	15.2	0.028	1	A025SE	0.016	4.3	0.000	0
A019S3	0.014	4.1	0.000	0	A025SW	0.008	3.3	0.000	0
A019S4	0.041	6.2	0.000	0	A028R1	0.221	6.9	0.000	0
LP019S4	0.054	13.8	0.028	1	A029NE	0.023	4.9	0.000	0
A019SE	0.010	3.6	0.000	0	A029NW	0.007	3.2	0.000	0

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
A029R1	0.077	5.1	0.020	0	A040R3	0.039	2.7	0.000	0
A029R2	0.047	3.3	0.000	0	A040R4	0.023	1.6	0.000	0
A029R3	0.010	0.7	0.000	0	A040R5	0.011	0.8	0.000	0
A029R4	0.033	2.3	0.000	0	A040S1	0.010	3.5	0.000	0
A029R5	0.086	5.2	0.000	0	A040S2	0.017	4.4	0.000	0
A029R6	0.097	5.3	0.028	0	LP040S2	0.026	15.2	0.020	1.56
A029S1	0.030	5.5	0.000	0	A040SE	0.017	4.4	0.000	0
LP029S1	0.040	18.1	0.020	2	LP040SE	0.026	15.2	0.020	1.56
A029S2	0.049	6.6	0.000	0	A040SW	0.010	3.5	0.000	0
LP029S2	0.054	Based on 3.73 ha and runoff coefficient of 0.80		2	A041a	1.868	20.5	0.984	312.08
A029SE	0.071			0	A041N1	0.092	8.3	0.000	0
LP029SE	0.093			14.41	LP041N1	0.107	21.9	0.050	2
A029SW	0.085	6.3	0.000	0	A041N2	0.016	4.3	0.000	0
LP029SW	0.091	21.4	0.050	10	A041NE	0.080	7.9	0.000	0
A031NE	0.040	6.1	0.000	0	LP041NE	0.090	18.3	0.036	2
LP031NE	0.056	15.9	0.028	1	A041NW	0.022	4.9	0.000	0
A031NW	0.017	4.4	0.000	0	A041S1	0.033	5.7	0.000	0
A031SE	0.037	6.0	0.000	0	LP041S1	0.070	17.6	0.020	2
LP031SE	0.046	15.4	0.020	1	A041SE	0.017	4.4	0.000	0
A031SW	0.010	3.5	0.000	0	LP041SE	0.026	17.2	0.020	1.56
A032NE	0.036	5.9	0.000	0	A041SW	0.010	3.5	0.000	0
LP032NE	0.044	16.3	0.020	1	A043R1	0.026	1.8	0.000	0
A032NW	0.008	3.3	0.000	0	A043R2	0.028	1.9	0.020	0
A032R1	0.021	1.5	0.019	0	A043R3	0.024	1.7	0.020	0
A032SE	0.038	6.0	0.000	0	A043R4	0.024	1.7	0.020	0
LP032SE	0.054	16.8	0.028	1	A043SE	0.019	4.6	0.000	0
A032SW	0.017	4.5	0.000	0	LP043SE	0.019	9.6	0.010	1
A034NE	0.012	3.8	0.000	0	A043SW	0.021	4.8	0.000	0
A034NW	0.006	3.1	0.000	0	LP043SW	0.026	10.2	0.010	1
A034SE	0.021	4.8	0.000	0	A044R1	0.035	2.4	0.020	0
LP034SE	0.028	11.3	0.020	1	A045N1	0.024	5.0	0.000	0
A034SW	0.051	6.7	0.000	0	A045N2	0.142	9.8	0.000	0
LP034SW	0.057	13.0	0.028	1	LP045N2	0.156	27.2	0.010	9
A036DV1	0.253	9.4	0.130	0	A045NE	0.128	9.5	0.000	0
A036NE	0.021	4.8	0.000	0	LP045NE	0.148	22.0	0.010	5
A036NW	0.137	9.7	0.000	0	A045NW	0.023	4.9	0.000	0
A036SE	0.026	5.1	0.000	0	A045R1	0.039	2.7	0.020	0
LP036SE	0.087	N/A	0.025	13.27	A045S1	0.023	4.9	0.000	0
A036SW	0.027	5.2	0.000	0	A045S2	0.089	8.2	0.000	0
LP036SW	0.161	N/A	0.025	20	LP045S2	0.110	26.0	0.010	9
A039N1	0.023	3.7	0.000	0	A045SE	0.063	7.3	0.000	0
A039N2	0.037	4.6	0.000	0	LP045SE	0.083	20.0	0.010	5
LP039N2	0.059	15.4	0.036	2	A045SW	0.023	4.9	0.000	0
A039S1	0.010	2.7	0.000	0	A046NE	0.220	11.6	0.000	0
A039S2	0.016	3.3	0.000	0	LP046NE	0.230	21.8	0.010	2
LP039S2	0.026	13.9	0.020	1.38	A046NW	0.022	4.8	0.000	0
A040N1	0.017	4.5	0.000	0	A046R1	0.041	2.8	0.020	0
A040N2	0.044	6.3	0.000	0	A046SE	0.110	9.0	0.000	0
LP040N2	0.060	17.1	0.028	2	LP046SE	0.135	19.7	0.010	2
A040NE	0.051	6.7	0.000	0	A046SW	0.036	5.9	0.000	0
LP040NE	0.065	20.4	0.036	2	A047E1	0.009	3.3	0.000	0
A040NW	0.015	4.2	0.000	0	A047E2	0.019	4.7	0.000	0
A040R1	0.059	4.1	0.020	0	LP047E2	0.027	15.3	0.027	0.5
A040R2	0.050	3.5	0.000	0	A047NE	0.004	2.5	0.000	0

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A047NW	0.011	3.6	0.000	0	A170S2	0.011	3.7	0.000	0
A047PK1	0.053	3.7	0.025	0	A170SE	0.010	3.6	0.000	0
A047PK2	0.075	5.0	0.000	0	A170SW	0.022	4.9	0.000	0
A047R1	0.040	2.8	0.020	0	A200NE	0.045	6.4	0.000	0
A047R2	0.127	5.7	0.020	0	A200NW	0.016	4.3	0.000	0
A047R3	0.020	1.4	0.000	0	A200R1	0.006	0.5	0.000	0
A047R4	0.030	2.1	0.000	0	A200R2	0.014	1.0	0.000	0
A047R5	0.036	2.5	0.020	0	A200R3	0.024	1.7	0.000	0
A047SE	0.020	4.7	0.000	0	A200R4	0.030	2.1	0.020	0
LP047SE	0.023	15.9	0.010	2	A213a	0.359	10.8	0.187	22.5
A047SW	0.060	7.1	0.000	0	A216a	0.686	13.8	0.369	45.3
LP047SW	0.068	18.5	0.010	2	A216b	1.133	16.7	0.576	216.08
A047W1	0.018	4.5	0.000	0	A250NE	0.112	9.1	0.000	0
A047W2	0.072	7.7	0.000	0	A250NW	0.253	12.3	0.000	0
LP047W2	0.089	18.3	0.027	2	A250SE	0.039	6.1	0.000	0
A049NE	0.023	4.9	0.000	0	LP250SE	0.129	22.2	0.036	3
LP049NE	0.030	20.5	0.027	0.8	A250SW	0.033	5.6	0.000	0
A049NW	0.009	3.3	0.000	0	LP250SW	0.348	19.6	0.020	1
A049SE	0.065	7.4	0.000	0	A306a	0.643	13.4	0.354	44.7
LP049SE	0.076	22.8	0.027	2	A308a	0.353	10.7	0.049	6
A049SW	0.019	4.6	0.000	0	A309a	0.490	12.1	0.146	18.6
A100NE	1.632	19.4	0.416	97	A310a	0.747	14.2	0.151	18.9
A101E1	0.052	6.7	0.000	0	A310b	0.708	13.9	0.390	49.2
A101E2	0.126	9.4	0.000	0	A401a	1.688	19.7	1.668	0
LP101E2	0.170	23.3	0.023	7.79	A401b	3.931	28.0	2.774	0
A101E3	0.049	6.6	0.000	0	A403a	0.096	6.5	0.053	6.6
A101N1	0.069	7.6	0.016	0	A460NE	0.038	6.0	0.000	0
A101N2	0.075	7.8	0.016	0	LP460NE	0.168	23.5	0.010	2
A101NE	0.221	11.7	0.000	0	A460NW	0.137	9.7	0.000	0
A101NW	0.022	4.8	0.000	0	LP460NW	0.240	25.0	0.010	2
A101S1	0.051	6.7	0.000	0	A460SE	0.132	9.6	0.000	0
LP101S1	0.255	32.3	0.013	33.65	A560a	0.283	9.8	0.155	16.8
A101S2	0.055	6.9	0.000	0	A560b	1.898	20.6	0.970	370.63
LP101S2	0.249	32.2	0.013	33.65	AChan1	0.842	12.2	0.842	0
A101SE	0.129	9.5	0.000	0	AChan2	1.582	15.3	1.582	0
LP101SE	0.143	25.9	0.013	33.65	AChan3	1.265	14.5	1.265	0
A101SW	0.035	5.8	0.000	0	AChan4	1.465	15.1	1.465	0
A101W1	0.016	4.4	0.000	0	AForeS	0.489	10.2	0.489	0
A101W2	0.117	9.2	0.000	0	ARes2	0.360	10.8	0.000	0
LP101W2	0.278	28.7	0.023	7.79	AWood1	0.131	5.8	0.061	0
A107NW	0.046	6.4	0.000	0	AWood2	0.403	9.3	0.000	0
LP107NW	1.513	30.1	0.048	58.71	OUT-W	0.374	14.2	0.000	0
A107SW	0.307	13.2	0.000	0	D001N1	0.000	N/A (2)	N/A (2)	N/A (2)
A140R1	0.165	6.2	0.028	0	D001NE	0.000	N/A (2)	N/A (2)	N/A (2)
A140R2	0.153	6.1	0.000	0	D001S1	0.007	N/A (2)	N/A (2)	N/A (2)
A140R3	0.120	5.6	0.000	0	D001SE	0.021	N/A (2)	N/A (2)	N/A (2)
A140R4	0.092	5.3	0.000	0	D004NE	0.028	N/A (2)	N/A (2)	N/A (2)
A140WK1	0.258	7.9	0.000	0	D004NW	0.067	N/A (2)	N/A (2)	N/A (2)
A170NE	0.030	5.5	0.000	0	D005NE	0.011	N/A (2)	N/A (2)	N/A (2)
LP170NE	0.035	15.8	0.020	2	D005SE	0.000	N/A (2)	N/A (2)	N/A (2)
A170NW	0.061	7.2	0.000	0	D005SW	0.000	N/A (2)	N/A (2)	N/A (2)
LP170NW	0.083	18.0	0.036	2	D005W1	0.006	N/A (2)	N/A (2)	N/A (2)
A170S1	0.024	5.0	0.000	0	D006NE	0.030	N/A (2)	N/A (2)	N/A (2)
LP170S1	0.034	15.7	0.020	2	D006SE	0.036	N/A (2)	N/A (2)	N/A (2)

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D006SW	0.049	N/A (2)	N/A (2)	N/A (2)	D025NE	0.113	N/A (2)	N/A (2)	N/A (2)
D007E1	0.060	N/A (2)	N/A (2)	N/A (2)	D025NW	0.260	N/A (2)	N/A (2)	N/A (2)
D007E2	0.059	N/A (2)	N/A (2)	N/A (2)	D029S1	0.020	N/A (2)	N/A (2)	N/A (2)
D007NE	0.053	N/A (2)	N/A (2)	N/A (2)	D029S2	0.026	N/A (2)	N/A (2)	N/A (2)
D007SE	0.006	N/A (2)	N/A (2)	N/A (2)	D029SE	0.000	N/A (2)	N/A (2)	N/A (2)
D008NE	0.095	N/A (2)	N/A (2)	N/A (2)	D029SW	0.005	N/A (2)	N/A (2)	N/A (2)
D008NW	0.051	N/A (2)	N/A (2)	N/A (2)	D031NE	0.028	N/A (2)	N/A (2)	N/A (2)
D009E1	0.033	N/A (2)	N/A (2)	N/A (2)	D031SE	0.027	N/A (2)	N/A (2)	N/A (2)
D009N1	0.010	N/A (2)	N/A (2)	N/A (2)	D032NE	0.024	N/A (2)	N/A (2)	N/A (2)
D009N3	0.001	N/A (2)	N/A (2)	N/A (2)	D032SE	0.026	N/A (2)	N/A (2)	N/A (2)
D009NE	0.023	N/A (2)	N/A (2)	N/A (2)	D034SE	0.008	N/A (2)	N/A (2)	N/A (2)
D009NW	0.014	N/A (2)	N/A (2)	N/A (2)	D034SW	0.028	N/A (2)	N/A (2)	N/A (2)
D009W1	0.028	N/A (2)	N/A (2)	N/A (2)	D036SE	0.000	N/A (2)	N/A (2)	N/A (2)
D010NE	0.040	N/A (2)	N/A (2)	N/A (2)	D036SW	0.136	N/A (2)	N/A (2)	N/A (2)
D010NW	0.038	N/A (2)	N/A (2)	N/A (2)	D039N2	0.024	N/A (2)	N/A (2)	N/A (2)
D010S1	0.056	N/A (2)	N/A (2)	N/A (2)	D039S2	0.000	N/A (2)	N/A (2)	N/A (2)
D010S2	0.066	N/A (2)	N/A (2)	N/A (2)	D040N2	0.032	N/A (2)	N/A (2)	N/A (2)
D011NW	0.093	N/A (2)	N/A (2)	N/A (2)	D040NE	0.030	N/A (2)	N/A (2)	N/A (2)
D011SW	0.094	N/A (2)	N/A (2)	N/A (2)	D040S2	0.000	N/A (2)	N/A (2)	N/A (2)
D012NE	0.041	N/A (2)	N/A (2)	N/A (2)	D040SE	0.000	N/A (2)	N/A (2)	N/A (2)
D012SE	0.029	N/A (2)	N/A (2)	N/A (2)	D041N1	0.057	N/A (2)	N/A (2)	N/A (2)
D013N1	0.095	N/A (2)	N/A (2)	N/A (2)	D041NE	0.055	N/A (2)	N/A (2)	N/A (2)
D013NE	0.040	N/A (2)	N/A (2)	N/A (2)	D041S1	0.050	N/A (2)	N/A (2)	N/A (2)
D013S1	0.130	N/A (2)	N/A (2)	N/A (2)	D041SE	0.000	N/A (2)	N/A (2)	N/A (2)
D013SE	0.035	N/A (2)	N/A (2)	N/A (2)	D043SE	0.009	N/A (2)	N/A (2)	N/A (2)
D015N1	0.000	N/A (2)	N/A (2)	N/A (2)	D043SW	0.016	N/A (2)	N/A (2)	N/A (2)
D015NE	0.000	N/A (2)	N/A (2)	N/A (2)	D045N2	0.146	N/A (2)	N/A (2)	N/A (2)
D015NW	0.032	N/A (2)	N/A (2)	N/A (2)	D045NE	0.138	N/A (2)	N/A (2)	N/A (2)
D015S1	0.000	N/A (2)	N/A (2)	N/A (2)	D045S2	0.100	N/A (2)	N/A (2)	N/A (2)
D017NE	0.031	N/A (2)	N/A (2)	N/A (2)	D045SE	0.073	N/A (2)	N/A (2)	N/A (2)
D017NW	0.040	N/A (2)	N/A (2)	N/A (2)	D046NE	0.220	N/A (2)	N/A (2)	N/A (2)
D018NE	0.014	N/A (2)	N/A (2)	N/A (2)	D046SE	0.125	N/A (2)	N/A (2)	N/A (2)
D018NW	0.078	N/A (2)	N/A (2)	N/A (2)	D047E2	0.000	N/A (2)	N/A (2)	N/A (2)
D019E1	0.308	N/A (2)	N/A (2)	N/A (2)	D047SE	0.013	N/A (2)	N/A (2)	N/A (2)
D019N2	0.033	N/A (2)	N/A (2)	N/A (2)	D047SW	0.058	N/A (2)	N/A (2)	N/A (2)
D019N4	0.025	N/A (2)	N/A (2)	N/A (2)	D047W2	0.062	N/A (2)	N/A (2)	N/A (2)
D019NE	0.480	N/A (2)	N/A (2)	N/A (2)	D049NE	0.000	N/A (2)	N/A (2)	N/A (2)
D019NW	0.022	N/A (2)	N/A (2)	N/A (2)	D049SE	0.049	N/A (2)	N/A (2)	N/A (2)
D019S2	0.034	N/A (2)	N/A (2)	N/A (2)	D170NE	0.015	N/A (2)	N/A (2)	N/A (2)
D019S4	0.026	N/A (2)	N/A (2)	N/A (2)	D170NW	0.047	N/A (2)	N/A (2)	N/A (2)
D019W1	0.055	N/A (2)	N/A (2)	N/A (2)	D170S1	0.014	N/A (2)	N/A (2)	N/A (2)
D019W2	0.041	N/A (2)	N/A (2)	N/A (2)	D250SE	0.093	N/A (2)	N/A (2)	N/A (2)
D020N1	0.020	N/A (2)	N/A (2)	N/A (2)	D250SW	0.329	N/A (2)	N/A (2)	N/A (2)
D020N2	0.231	N/A (2)	N/A (2)	N/A (2)	D460NE	0.158	N/A (2)	N/A (2)	N/A (2)
D020NE	0.000	N/A (2)	N/A (2)	N/A (2)	D460NW	0.230	N/A (2)	N/A (2)	N/A (2)
D020NW	0.023	N/A (2)	N/A (2)	N/A (2)	A039NE	0.015	4.2	0.000	0
D020SE	0.000	N/A (2)	N/A (2)	N/A (2)	LP039NE	0.056	16.9	0.028	2
D020SW	0.014	N/A (2)	N/A (2)	N/A (2)	A039NW	0.023	4.9	0.000	0
D021NE	0.567	N/A (2)	N/A (2)	N/A (2)	A039SE	0.010	3.6	0.000	0
D021NW	0.397	N/A (2)	N/A (2)	N/A (2)	LP039SE	0.032	15.6	0.020	2
D023N2	0.026	N/A (2)	N/A (2)	N/A (2)	A039SW	0.011	3.7	0.000	0
D023NE	0.030	N/A (2)	N/A (2)	N/A (2)	A051NE	0.035	4.5	0.000	0
D023S2	0.134	N/A (2)	N/A (2)	N/A (2)	LP051NE	0.052	16.7	0.028	2
D023SE	0.029	N/A (2)	N/A (2)	N/A (2)	A051NW	0.036	4.5	0.000	0

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
LP051NW	0.053	16.7	0.028	2	A108a	0.927	15.4	0.547	56.4
A051SE	0.018	3.4	0.000	0	A110a	1.491	18.7	0.201	22.5
A051SW	0.018	3.4	0.000	0	A112a	1.615	19.3	0.198	22.2
A052E1	0.046	4.9	0.000	0	A112b	0.693	13.8	0.367	102.32
LP052E1	0.064	17.3	0.036	3	A112c	0.697	13.8	0.400	48
A052E2	0.019	3.5	0.000	0	A112d	1.213	17.2	0.666	66.6
A052NE	0.041	4.7	0.000	0	A112e	1.364	18.0	0.717	225.56
LP052NE	0.059	17.0	0.028	2	A201a	0.420	11.4	0.236	27
A052NW	0.046	4.9	0.000	0	A202a	2.036	21.3	1.163	138.9
LP052NW	0.063	17.3	0.036	3	A203a	1.348	18.0	0.211	27.6
A052SE	0.019	3.5	0.000	0	A204a	1.194	17.1	0.082	10.2
A052SW	0.019	3.5	0.000	0	A205a	1.516	18.8	0.858	113.4
A052W1	0.045	4.9	0.000	0	A206a	1.769	20.1	0.252	33.3
LP052W1	0.063	17.3	0.036	3	A207a	1.717	19.8	0.237	31.2
A052W2	0.019	3.5	0.000	0	A208a	1.903	20.7	0.167	18.9
A053NE	0.045	4.9	0.000	0	A209a	1.793	20.2	0.127	14.4
LP053NE	0.055	19.6	0.028	1	A1101a	0.444	11.7	0.059	5.4
A053NW	0.045	4.9	0.000	0	A1101b	0.285	9.9	0.151	42.15
LP053NW	0.063	19.9	0.036	6	A1101c	0.412	11.3	0.218	61.59
A053SE	0.011	2.9	0.000	0	A1101d	0.333	10.5	0.169	57.75
A053SW	0.019	3.5	0.000	0	A1101e	0.606	13.1	0.307	110.74
A054E1	0.054	5.2	0.000	0	A1101f	0.888	15.2	0.500	57.3
LP054E1	0.081	N/A	0.036	6	A1102a	2.147	21.7	1.240	156
A054E2	0.028	4.1	0.000	0	A2001a	0.516	12.3	0.226	26.7
A054NE	0.059	5.4	0.000	0	A2070a	1.699	19.7	0.260	34.8
LP054NE	0.083	N/A	0.036	6	A2071a	1.234	17.3	0.651	195.43
A054NW	1.403	18.3	0.000	0	A2071b	0.758	11.7	0.379	102.3
LP054NW	1.389	N/A	0.036	6	A2071c	2.091	21.5	1.199	144.9
A054SE	0.027	4.0	0.000	0	A2090a	1.658	19.5	0.037	4.2
A054SW	0.027	4.0	0.000	0	A2110a	0.492	12.1	0.272	30.3
A054W1	1.046	16.2	0.000	0	A2110b	1.431	18.4	0.743	274.37
LP054W1	1.046	N/A	0.036	6	D039NE	0.036	N/A (2)	N/A (2)	N/A (2)
A054W2	0.028	4.1	0.000	0	D039SE	0.017	N/A (2)	N/A (2)	N/A (2)
A055a	0.922	15.4	0.509	64.2	D051NE	0.024	N/A (2)	N/A (2)	N/A (2)
A055NE	0.052	5.2	0.000	0	D051NW	0.024	N/A (2)	N/A (2)	N/A (2)
LP055NE	0.079	N/A	0.036	1	D052E1	0.028	N/A (2)	N/A (2)	N/A (2)
A055NW	0.852	15.0	0.000	0	D052NE	0.030	N/A (2)	N/A (2)	N/A (2)
LP055NW	0.879	N/A	0.036	1	D052NW	0.028	N/A (2)	N/A (2)	N/A (2)
A055S1	0.059	5.4	0.008	0	D052W1	0.028	N/A (2)	N/A (2)	N/A (2)
A055SE	0.028	4.1	0.000	0	D053NE	0.027	N/A (2)	N/A (2)	N/A (2)
A055SW	0.422	11.4	0.000	0	D053NW	0.004	N/A (2)	N/A (2)	N/A (2)
A056E1	0.082	6.2	0.000	0	D054E1	0.047	N/A (2)	N/A (2)	N/A (2)
LP056E1	0.112	N/A	0.112	0	D054NE	0.051	N/A (2)	N/A (2)	N/A (2)
A056E2	0.034	4.4	0.000	0	D054NW	1.353	N/A (2)	N/A (2)	N/A (2)
A056W1	1.643	19.5	0.000	0	D054W1	1.011	N/A (2)	N/A (2)	N/A (2)
LP056W1	1.624	N/A	1.624	0	D055NE	0.044	N/A (2)	N/A (2)	N/A (2)
A056W2	0.034	4.4	0.000	0	D055NW	0.843	N/A (2)	N/A (2)	N/A (2)
A101a	0.446	11.7	0.265	24.6	AForeN	1.308	14.8	1.300	0
A101b	1.668	19.6	1.163	0	AMainN	1.236	14.4	1.226	0
A101c	1.663	19.6	0.873	280.42	AMainS	0.784	11.8	0.780	0
A101d	4.107	28.6	2.150	681.82	ARes1	0.251	9.4	0.000	0
A103a	0.576	12.9	0.345	31.5	AResN1	1.860	20.5	1.836	0
A103b	1.449	18.5	0.764	233.82	AResN2	0.268	9.6	0.265	0
A103c	1.776	20.1	0.937	284.38	AHE1b	2.905	16.8	0.688	3226.76

Table 1: Summary of Major System Results for the 100-Year 3-Hour Chicago Storm

DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)	DDSWMM Segment ID	Approach Flow (m^3/s)	Flow Depth (cm)	Captured Flow (m^3/s)	Storage Used (m^3)
ATW1b	0.518	10.3	0.000	0	NCOM2	3.680	N/A	0.000	0
ATW2b	1.388	15.1	0.000	0	NNAT1	3.415	N/A	0.000	0
ATW3b	2.554	29.7	0.000	0	NNAT2	0.540	N/A	0.000	0
NorthB	9.389	24.1	9.389	0	NNAT3	1.575	N/A	0.000	0
S-TW1b	3.162	32.5	1.563	1501.81	NNAT4	3.211	N/A	0.000	0
NCOM1	2.627	N/A	0.000	0					

(1) Flow depths on major system catchments were estimated using DDSWMM. Total water depths at low points calculated as flow depth plus static ponding depth (per grading plan); refer to Table D-7 of Appendix D for details.

(2) Dummy segments used in the double routing method for road ponding areas; DDSWMM flow depths do not represent actual conditions, as dummy segments are intended to replicate dynamic attenuation effects only.

Table 3: Composite Hydraulic Gradeline Results for 100-Year Design Storms and Historical Events

U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [1] (m)
1	2	85.077	84.774	B91W	85.99	0.913
2	3	84.774	84.686	N/A	N/A	N/A
3	4	84.650	84.546	B90N	85.76	1.110
4	8	84.546	84.513	N/A	N/A	N/A
5	6	84.960	84.807	B87S	85.67	0.710
6	12	84.807	84.531	B95SS	85.57	0.763
7	8	84.953	84.574	B84W	85.52	0.567
8	14	84.513	84.059	N/A	N/A	N/A
9	10	85.015	84.883	B94NN	85.78	0.765
10	11	84.883	84.678	B96SS	85.56	0.677
11	12	84.678	84.531	B79E	85.53	0.852
11	18	84.678	84.567	B80E	85.38	0.702
12	13	84.531	84.280	B77W	85.51	0.979
13	14	84.264	84.049	B75W	85.37	1.106
14	140	84.049	83.998	N/A	N/A	N/A
15	17	85.137	84.788	B97NN	85.85	0.713
17	170	84.788	84.655	B96NS	85.72	0.932
18	19	84.567	84.477	N/A	N/A	N/A
19	19S	84.477	84.473	N/A	N/A	N/A
19	19W	84.477	84.475	N/A	N/A	N/A
20	20S	84.379	84.374	N/A	N/A	N/A
20	20W	85.979	84.396	N/A	N/A	N/A
21	22	84.248	84.095	68	85.16	0.912
22	Chan2	84.095	84.059	N/A	N/A	N/A
23	230	84.216	83.795	B74W	85.14	0.924
24	25	83.595	83.578	N/A	N/A	N/A
25	250	83.578	83.544	17	85.09	1.512
26	27	83.516	83.470	N/A	N/A	N/A
27	Chan3	83.470	83.441	N/A	N/A	N/A
28	29	84.361	84.361	52	85.18	0.819
29	30	84.361	84.070	53	85.16	0.799
30	31	84.070	83.987	42	85.14	1.070
31	32	83.987	83.920	41	85.08	1.093
32	33	83.920	83.753	39	85.01	1.090
33	34	83.753	83.679	37	85.13	1.377
34	35	83.679	83.538	22	84.97	1.291
35	26	83.538	83.516	20	85.01	1.472
36	37	85.694	84.913	N/A	N/A	N/A
37	38	84.913	84.638	N/A	N/A	N/A
38	Chan2	84.638	84.059	N/A	N/A	N/A
39	54	85.823	85.746	Ground	88.15	2.331
39	39W	85.823	85.030	N/A	N/A	N/A
40	41	84.934	84.879	B133W	85.88	0.946
41	17	84.879	84.788	B132E	85.88	1.001
43	44	83.954	83.505	B4N	85.11	1.156
44	45	83.505	83.390	B6E	84.63	1.125
45	46	83.294	82.735	B6W	84.63	1.336
46	ExPlug1	82.725	82.608	N/A	N/A	N/A
47	460	83.474	83.086	N/A	N/A	N/A
47	47N	83.474	83.815	N/A	N/A	N/A
48	49	83.586	83.575	N/A	N/A	N/A
49	50	83.575	83.241	N/A	N/A	N/A
50	ExPlug2	83.241	83.199	N/A	N/A	N/A

Table 3: Composite Hydraulic Gradeline Results for 100-Year Design Storms and Historical Events

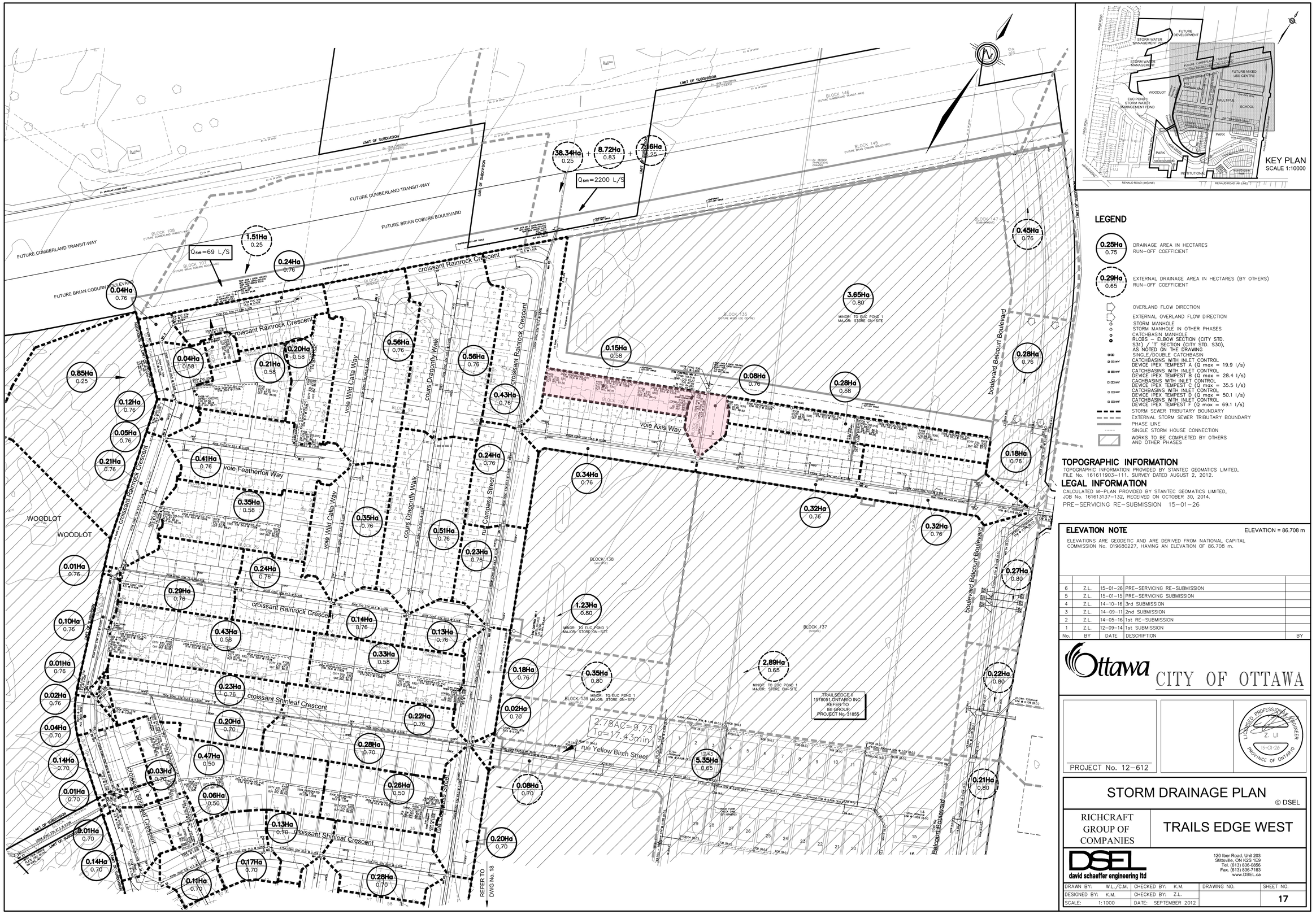
U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [1] (m)
51	52	85.983	85.941	Ground	88.44	2.454
52	53	85.941	85.852	Ground	88.29	2.348
53	39	85.852	85.823	Ground	88.17	2.314
54	55	85.746	85.633	Ground	88.11	2.365
55	56	85.633	85.447	Ground	88.00	2.370
56	560	85.447	85.258	Ground	87.41	1.966
56	214	85.447	85.236	Ground	87.41	1.966
560	Chan1	85.258	85.046	N/A	N/A	N/A
101	102	87.254	87.090	Ground	88.87	1.615
102	103	87.090	86.958	Ground	89.63	2.543
103	104	86.958	86.870	Ground	89.50	2.542
104	105	86.870	86.766	Ground	89.37	2.497
105	106	86.766	86.660	Ground	89.22	2.455
106	107	86.660	86.544	Ground	89.10	2.440
107	108	86.544	86.441	Ground	88.97	2.421
108	109	86.441	86.357	Ground	88.85	2.409
109	110	86.357	86.241	Ground	88.75	2.391
110	111	86.241	86.175	Ground	88.65	2.409
111	112	86.175	86.103	Ground	88.56	2.386
112	113	86.103	85.978	Ground	88.44	2.335
113	39	85.978	85.823	Ground	88.30	2.325
170	18	84.655	84.567	B96SS	85.56	0.905
201	2001	86.465	86.426	Ground	88.94	2.474
2002	202	86.413	86.377	Ground	88.81	2.394
202	203	86.377	86.323	Ground	88.72	2.339
203	204	86.323	86.259	Ground	88.61	2.284
204	205	86.259	86.187	Ground	88.51	2.251
205	206	86.187	86.082	Ground	88.41	2.223
206	207	86.082	86.006	Ground	88.29	2.204
207	2070	86.006	85.920	Ground	88.17	2.159
208	209	85.751	85.679	Ground	87.77	2.014
209	2090	85.679	85.619	Ground	87.60	1.922
211	55	85.732	85.633	Ground	87.68	1.948
214	215	85.236	84.930	Ground	87.59	2.353
215	216	84.930	84.690	Ground	87.58	2.648
216	217	84.690	84.626	Ground	87.57	2.880
217	19	84.626	84.477	Ground	87.46	2.832
306	307	85.655	85.459	Ground	87.84	2.183
307	308	85.459	85.432	Ground	87.74	2.278
308	309	85.432	85.253	Ground	87.68	2.243
309	310	85.253	85.164	Ground	87.62	2.364
310	311	85.164	84.991	Ground	87.51	2.349
311	37	84.991	84.913	Ground	87.45	2.456
401	402	86.527	86.161	Ground	86.99	0.466
402	403	86.161	86.036	Ground	86.88	0.723
403	36	86.036	85.694	Ground	86.90	0.864
460	46	83.086	82.761	N/A	N/A	N/A
1101	1102	86.687	86.670	Ground	89.51	2.821
1102	1103	86.670	86.569	Ground	89.42	2.746
1103	1104	86.569	86.483	Ground	89.28	2.709
1104	1105	86.483	86.422	Ground	89.17	2.684
1105	1106	86.422	86.378	Ground	89.02	2.596
1106	1107	86.378	86.318	Ground	88.93	2.551

Table 3: Composite Hydraulic Gradeline Results for 100-Year Design Storms and Historical Events

U/S MH	D/S MH	Max. U/S HGL (m)	Max. D/S HGL (m)	Lot Number	USF (m)	Freeboard [1] (m)
1107	110	86.318	86.241	Ground	88.81	2.490
2001	2002	86.426	86.413	Ground	88.84	2.411
2070	2071	85.920	85.815	Ground	88.05	2.126
2071	208	85.815	85.751	Ground	87.92	2.105
2090	56	85.619	85.447	Ground	87.48	1.856
2110	211	85.821	85.732	Ground	87.80	1.979
19S	20	84.473	84.379	N/A	N/A	N/A
19W	23	84.475	84.216	B71W	85.25	0.775
20S	21	84.374	84.248	64	85.23	0.856
20W	30	84.396	84.149	56	85.28	0.884
47N	48	83.815	83.586	N/A	N/A	N/A
Chan1	Chan1a	85.046	84.794	N/A	N/A	N/A
Chan1a	Chan1b	84.794	84.681	N/A	N/A	N/A
Chan1b	Chan1c	84.681	84.615	N/A	N/A	N/A
Chan1c	Chan1d	84.615	84.271	N/A	N/A	N/A
Chan1d	Chan1e	84.271	84.209	N/A	N/A	N/A
Chan2	Chan3	84.059	83.441	N/A	N/A	N/A
Chan3	Chan4	83.441	83.121	N/A	N/A	N/A
Chan4	ForeS	83.121	83.121	N/A	N/A	N/A
DICB	15	85.431	85.159	N/A	N/A	N/A
Ex100	Ex111	83.122	83.121	IBI (3)	83.47	0.348
Ex107	Ex100	83.184	83.122	IBI (3)	83.58	0.396
Ex111	Chan4	83.121	83.121	IBI (3)	83.45	0.329
ExPlug1	Ex102	82.608	82.590	IBI (3)	83.66	1.052
ExPlug2	Ex107	83.199	83.184	N/A	N/A	N/A
ForeN	MainN	83.119	83.118	N/A	N/A	N/A
ForeS	MainS	83.121	83.120	N/A	N/A	N/A
MainN	Out	83.119	80.100	N/A	N/A	N/A
MainS	MainN	83.121	83.119	N/A	N/A	N/A
140	141	83.998	83.657	N/A	N/A	N/A
141	24	83.657	83.595	N/A	N/A	N/A
230	24	83.795	83.650	N/A	N/A	N/A
250	26	83.544	83.516	N/A	N/A	N/A
39W	40	85.030	84.934	B134W	86.14	1.110
280	28	84.381	84.361	47	85.21	0.829
200	41	84.881	84.879	N/A	N/A	N/A
Chan1e	Chan2	84.209	84.059	N/A	N/A	N/A

Note: [1] Conservative estimate of freeboard based on U/S HGL and lowest USF connected to pipe.

HGL at MH 200



TOPOGRAPHIC INFORMATION

TOPOGRAPHIC INFORMATION PROVIDED BY STANTEC GEOMATICS LIMITED, FILE No. 161611903-111, SURVEY DATED AUGUST 2, 2012.

LEGAL INFORMATION

CALCULATED M-PLAN PROVIDED BY STANTEC GEOMATICS LIMITED, JOB No. 161613137-132, RECEIVED ON OCTOBER 30, 2014.

PRE-SERVICING RE-SUBMISSION 15-01-26

ELEVATION NOTE

ELEVATION = 86.708 m

ELEVATIONS ARE GEODETIC AND ARE DERIVED FROM NATIONAL CAPITAL COMMISSION No. 019680227, HAVING AN ELEVATION OF 86.708 m.

No.	BY	DATE	DESCRIPTION	BY
6	Z.L.	15-01-26	PRE-SERVICING RE-SUBMISSION	
5	Z.L.	15-01-15	PRE-SERVICING SUBMISSION	
4	Z.L.	14-10-16	3rd SUBMISSION	
3	Z.L.	14-09-11	2nd SUBMISSION	
2	Z.L.	14-05-16	1st RE-SUBMISSION	
1	Z.L.	12-09-14	1st SUBMISSION	

Ottawa CITY OF OTTAWA

PROJECT No. 12-612

PROFESSIONAL ENGINEER Z. LI 15-01-26 PROVINCE OF ONTARIO

STORM DRAINAGE PLAN

RICHCRAFT GROUP OF COMPANIES

TRAILS EDGE WEST

DSEL david schaeffer engineering ltd
120 Iber Road, Unit 203
Stittsville, ON K2S 1E9
Tel. (613) 836-0856
Fax. (613) 836-7183
www.DSEL.ca

DRAWN BY: W.L./C.M.	CHECKED BY: K.M.	DRAWING NO.	SHEET NO.
DESIGNED BY: K.M.	CHECKED BY: Z.L.		17
SCALE: 1:1000	DATE: SEPTEMBER 2012		

STORM SEWER CALCULATION SHEET (RATIONAL METHOD) (INTERIM B CONDITION)

Manning 0.013 Return Frequency

Location	LOCATION From Node	LOCATION To Node	AREA (Ha) R= 0.25	R= 0.40	R= 0.50	R= 0.58	R= 0.65	R= 0.70	R= 0.73	R= 0.76	R= 0.80	R= 0.83	FLOW Indiv. 2.78 AC	Accum. 2.78 AC	Time of Conc.	Rainfall Intensity	Peak Flow Q (l/s)	ICD DATA No.	Type	Flow Q (l/s)	Accum. Flow	DESIGN FLOW	SEWER DATA DIA. (mm) (actual)	DIA. (mm) (nominal)	TYPE	SLOPE (%)	LENGTH (m)	CAPACITY (l/s)	VELOCITY (m/s)	TIME OF FLOW (min.)	RATIO Q/Q full
Block 138 (Access)																														
Contribution From Block 135 (Fut. Mixed Used Centre)											3.65		8.12	8.12	10.00	104.19	845.8			845.8	845.8	845.8									
																		RYCB	A	19.9	865.7										
						0.15							0.24	8.36					A	19.9	885.6									
	Cont 2	41				0.28				0.08			0.62	8.98	10.00	104.19	935.6		A	19.9	905.5	935.6	1050	1050	CONC	0.20	43.0	1221	1.41	0.51	0.77
To voie Axis Way , Pipe 41 - 17														8.98	10.51						905.5									
voie Axis Way																														
From Future Phase																	649.0			649.0	649.0	649.0	(Flow from 675mm Orifice in Splitter MH 39 to MH 40 as per JFSA's calculation)						
																			D	50.1	699.1									
																			A	19.9	719.0									
																			C	35.5	754.5									
	39	40								0.32			0.68	0.68	10.00	104.19	719.4		A	19.9	774.4	719.4	1050	1050	CONC	0.11	111.26	906	1.05	1.77	0.79
																		RYCB	A	19.9	794.3									
																			A	19.9	814.2									
																			C	35.5	849.7									
																			B	28.4	878.1									
	40	41								0.32			0.68	1.35	11.77	95.68	778.4		A	19.9	898.0	778.4	1200	1200	CONC	0.10	102.0	1233	1.09	1.56	0.63
Contribution From Block 136 (Access), Cont 2 - 41													8.98		10.51						905.5									
																			C	35.5	1839.0									
																			A	19.9	1858.9									
																			D	50.1	1909.0									
	41	17								0.34			0.72	11.05	13.33	89.36	1636.5		A	19.9	1928.9	1636.5	1500	1500	CONC	0.10	114.0	2235	1.26	1.50	0.73
To rue Compass Street, Pipe 17 - 170														11.05	14.83		649.0				1928.9									
cours Dragonfly Walk																														
																			A	19.9	19.9									
																			A	19.9	39.8									
																			B	28.4	68.2									
																			C	35.5	103.7									
	9	10								0.56			1.18	1.18	10.00	104.19	123.3		C	35.5	139.2	123.3	525	525	CONC	0.20	100.5	192	0.89	1.89	0.64
																			C	35.5	174.7									
																			C	35.5	210.2									
																			D	50.1	260.3									
	10	11								0.51			1.08	2.26	11.89	95.19	215.2		D	50.1	310.4	215.2	675	675	CONC	0.15	110.5	326	0.91	2.02	0.66
To croissant Rainrock Crescent, Pipe 11 - 18														2.26	13.91						310.4									
voie Wild Calla Way																														
																			A	19.9	19.9									
																			D	50.1	70.0									
	5	6								0.56			1.18	1.18	10.00	104.19	123.3		D	50.1	120.1	123.3	525	525	CONC	0.20	106.0	192	0.89	1.99	0.64
																			C	35.5	155.6									
																			C	35.5	191.1									
	6	12								0.35			0.74	1.92	11.99	94.74	182.2		C	35.5	226.6	182.2	600	600	CONC	0.20	87.5	275	0.97	1.50	0.66
To croissant Rainrock Crescent, Pipe 12 - 13														1.92	13.49						226.6									
voie Featherfoil Way																														
																			E	69.1	69.1									
																		RYCB	A	19.9	89.0									
																			B	28.4	117.4									
	7	8				0.20				0.41			1.19	1.19	10.00	104.19	123.9		C	35.5	152.9	123.9	450	450	PVC	0.30	83.5	156	0.98	1.42	0.79
To croissant Rainrock Crescent, Pipe 6 - 14														1.19	11.42						152.9									
croissant Rainrock Crescent																														
																			A	19.9	19.9									
																			A	19.9	39.8									
																		RYCB	A	19.9	59.7									
																			A	19.9	79.6									
	1	2				0.03				0.24			0.56	0.56	10.00	104.19	57.9		A	19.9	99.5	57.9	450	450	PVC	0.35	77.5	169	1.06	1.22	0.34
	2	3								0.04			0.08	0.64	11.22	98.17	62.8				99.5	62.8	450	450	PVC	0.40	13.0	180	1.13	0.19	0.35
Contribution From DICB3			0.85										0.59	0.59	10.00	104.19	61.6				61.6	61.6	300	300	PVC	1.00	11.0	97	1.37	0.13	0.64
	3	4				0.21				0.12			0.59	1.82	11.41	97.30	177.4	RYCB	A	19.9	181.0	177.4	600	600	CONC	0.30	38.5	336	1.19	0.54	0.53
																			A	19.9	200.9									
	4	8								0.05			0.11	1.93	11.95	94.92	183.0		B	28.4	229.3	183.0	675	675	CONC	0.20	24.0	376	1.05	0.38	0.49
Contribution From voie Featherfoil Way, Pipe 7 - 8													1.19		11.42						152.9									
																			A	19.9	402.1									
																			A	19.9	422.0									
	8	14				0.35				0.21			1.01	4.13	12.33	93.31	384.9	RYCB	B	28.4	450.4	384.9	675	675	CONC	0.50	87.0	594	1.66	0.87	0.65
To BLOCK 105 (6m Servicing Corridor), Pipe 14 - 140														4.13	13.20						450.4									

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

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

Designed: K.M.
Checked: Z.L.
Dwg. Reference: Storm Drainage Plan, Dwg. No. 17 to 20

PROJECT: TRAILS EDGE WEST
LOCATION: City of Ottawa
File Ref: 12-612 Date: January, 2015 Sheet No. 1 of 3

LICENSED PROFESSIONAL ENGINEER Z. LI 1/26/2015 PROVINCE OF ONTARIO

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **298 Axis Way**
CLIENT: MINTO COMMUNITIES INC.
PROJECT #: 240801
BY: ATREL ENGINEERING LTD
DATE: DECEMBER 4 2024

STORM FREQUENCY : 5 YEAR
RATIONAL METHOD Q= 2.78 AIR
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 1

LOCATION					AREA (ha.) RUNOFF COEFFICIENT						RATIONAL METHOD		5 YEAR		**ACTUAL**			SEWER DATA						UpStream		DwStream	
STREET NAMES	FROM (Up)		TO (Down)		0.50	0.60	0.65	0.70	0.75	0.80	INDIV. 2.78AR	ACCUM. 2.78AR	TIME CONC. (MIN)	RAINF. INTENS. (MM/HR)	**PIPE FLOW (L/S)**	DIA. (N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)
Street No. 3	MH	601	MH	611	0.04		0.12			0.22	0.76	0.76	10.00	104.19	79.36	375	366.4	0.45	71.0	110.58	28%	1.05	1.13	85.78	85.41	85.46	85.09
Street No. 3	MH	611	MH	613					0.20		0.42	1.18	11.13	98.59	116.21	450	457.2	0.30	40.5	162.91	29%	0.99	0.68	85.46	85.01	85.34	84.89
Street No. 1	MH	612	MH	613				0.12			0.23	0.23	10.00	104.19	24.33	300	299.2	0.34	25.5	55.99	57%	0.80	0.53	85.43	85.13	85.34	85.04
Street No. 1	MH	613	MH	623						0.21	0.47	1.88	11.81	95.52	179.51	525	533.4	0.30	55.0	245.74	27%	1.10	0.83	85.34	84.82	85.17	84.65
Street No. 2	MH	616	MH	618			0.07			0.10	0.35	0.35	10.00	104.19	36.35	300	299.2	0.34	28.0	55.99	35%	0.80	0.59	85.47	85.17	85.37	85.07
Street No. 4	MH	617	MH	618						0.17	0.38	0.38	10.00	104.19	39.39	300	299.2	0.34	45.5	55.99	30%	0.80	0.95	85.52	85.22	85.37	85.07
Street No. 2	MH	618	MH	619				0.17			0.33	1.06	10.95	99.42	105.17	450	457.2	0.25	50.0	148.72	29%	0.91	0.92	85.37	84.92	85.24	84.79
Street No. 2	MH	619	MH	623								1.06	11.87	95.24	100.74	450	457.2	0.25	17.5	148.72	32%	0.91	0.32	85.21	84.76	85.17	84.72
Street No. 1	MH	623	MH	627				0.12		0.07	0.39	3.33	12.64	92.04	306.15	675	685.8	0.25	43.0	438.47	30%	1.19	0.60	85.17	84.50	85.06	84.39
Street No. 2	MH	625	MH	626					0.30		0.63	0.63	10.00	104.19	65.17	375	366.4	0.26	73.0	84.05	22%	0.80	1.53	85.32	84.95	85.13	84.76
Street No. 2	MH	626	MH	627								0.63	11.53	96.77	60.53	375	366.4	0.26	16.0	84.05	28%	0.80	0.33	85.10	84.73	85.06	84.69
Street No. 1	MH	627	MH	628				0.13			0.25	4.20	13.25	89.69	377.12	750	762.0	0.25	36.0	580.71	35%	1.27	0.47	85.06	84.31	84.97	84.22
Street No. 1	MH	628	MH	629				0.21			0.41	4.61	13.72	87.94	405.70	825	838.2	0.20	74.5	669.70	39%	1.21	1.02	84.97	84.15	84.82	84.00
Street No. 1	MH	629	MH	2								4.61	14.74	84.41	389.42	825	838.2	0.20	4.5	669.70	42%	1.21	0.06	84.79	83.97	84.78	83.96
Street No. 1	MH	2	MH	41	0.08	0.15					0.36	4.97	14.80	84.20	418.88	1050	1066.8	0.25	43.0	1424.40	71%	1.59	0.45	84.78	83.73	84.67	83.62

Proposed Storm Sewers
Existing Storm Sewers

STORM SEWER COMPUTATION FORM

DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **298 Axis Way**
CLIENT: MINTO COMMUNITIES INC.
PROJECT #: 240801
BY: ATREL ENGINEERING LTD
DATE: DECEMBER 4 2024

RESTRICTED FLOW
PVC/CONC N= 0.013
CSP N= 0.024
CORR N= 0.021

Table 2

LOCATION					AREA (ha.) RUNOFF COEFFICIENT						Restricted Flow	**ACTUAL PIPE FLOW**	DIA.		SEWER DATA						UpStream		DwStream		**UpStream**		Down	UpStream	
STREET NAMES	FROM (Up)		TO (Down)		0.50	0.60	0.65	0.70	0.75	0.80	(L/S)	**(L/S)**	(N0M) (mm)	(ACT)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	TIME OF FLOW (MIN)	Obv. (M)	Inv. (M)	Obv. (M)	Inv. (M)	**Hgl at UP-MH (M)**	Hgl Out UP-MH (M)	MH Hgl (M)	USF ELEV (M)	HGL FREEBOARD (M)
Street No. 3	MH	601	MH	611	0.04		0.12			0.22	103.00	103.00	375	366.4	0.45	71.0	110.58	7%	1.05	1.13	85.78	85.41	85.46	85.09	85.82	85.82	85.54	86.64	0.82
Street No. 3	MH	611	MH	613					0.20		38.00	141.00	450	457.2	0.30	40.5	162.91	13%	0.99	0.68	85.46	85.01	85.34	84.89	85.54	85.52	85.43	86.64	1.12
Street No. 1	MH	612	MH	613				0.12			38.00	38.00	300	299.2	0.34	25.5	55.99	32%	0.80	0.53	85.43	85.13	85.34	85.04	85.47	85.47	85.43	86.24	0.77
Street No. 1	MH	613	MH	623						0.21	38.00	217.00	525	533.4	0.30	55.0	245.74	12%	1.10	0.83	85.34	84.82	85.17	84.65	85.43	85.37	85.24	86.14	0.77
Street No. 2	MH	616	MH	618			0.07			0.10	46.00	46.00	300	299.2	0.34	28.0	55.99	18%	0.80	0.59	85.47	85.17	85.37	85.07	85.47	85.47	85.40	86.34	0.87
Street No. 4	MH	617	MH	618						0.17	38.00	38.00	300	299.2	0.34	45.5	55.99	32%	0.80	0.95	85.52	85.22	85.37	85.07	85.52	85.52	85.40	86.34	0.82
Street No. 2	MH	618	MH	619				0.17			38.00	122.00	450	457.2	0.25	50.0	148.72	18%	0.91	0.92	85.37	84.92	85.24	84.79	85.40	85.37	85.28	86.24	0.87
Street No. 2	MH	619	MH	623								122.00	450	457.2	0.25	17.5	148.72	18%	0.91	0.32	85.21	84.76	85.17	84.72	85.28	85.27	85.24	86.24	0.97
Street No. 1	MH	623	MH	627				0.12		0.07	57.00	396.00	675	685.8	0.25	43.0	438.47	10%	1.19	0.60	85.17	84.50	85.06	84.39	85.24	85.17	85.06	86.14	0.97
Street No. 2	MH	625	MH	626					0.30		56.80	56.80	375	366.4	0.26	73.0	84.05	32%	0.80	1.53	85.32	84.95	85.13	84.76	85.32	85.32	85.13	86.06	0.74
Street No. 2	MH	626	MH	627								56.80	375	366.4	0.26	16.0	84.05	32%	0.80	0.33	85.10	84.73	85.06	84.69	85.11	85.10	85.06	86.06	0.96
Street No. 1	MH	627	MH	628				0.13			38.00	490.80	750	762.0	0.25	36.0	580.71	15%	1.27	0.47	85.06	84.31	84.97	84.22	85.06	85.06	84.99	86.14	1.08
Street No. 1	MH	628	MH	629				0.21			56.80	547.60	825	838.2	0.20	74.5	669.70	18%	1.21	1.02	84.97	84.15	84.82	84.00	84.99	84.97	84.87	86.06	1.09
Street No. 1	MH	629	MH	2								547.60	825	838.2	0.20	4.5	669.70	18%	1.21	0.06	84.79	83.97	84.78	83.96	84.87	84.85	84.84	86.06	1.21
Street No. 1	MH	2	MH	41	0.08	0.15					59.70	607.30	1050	1066.8	0.25	43.0	1424.40	57%	1.59	0.45	84.78	83.73	84.67	83.62	84.84	84.83	84.81	86.06	1.23

Proposed Storm Sewers
Existing Storm Sewers
HGL TAKEN FROM JFSA'S REPORT AT MH 2

Table 3

INLET CONTROL DEVICE TABLE

Project Name : 298 Axis Way
Project number : 240801

Orifice Sizing formula: $r = \sqrt{\frac{Q}{c\pi\sqrt{2gh}}}$

Coefficient of Discharge	0.61
Gravity (9.81 m/s^2)	9.81 m/s^2

RR	Flow, Q (L/s)	Orifice Type	Head (m)	Orifice Size (m)	Orifice Area (m²)
8	8.00	Vortex	1.65	Hydrovex - 75SVHV-1 wall mount type	
10	10.00	Vortex	1.65	Hydrovex - 100SVHV-2 wall mount type	
19	19.00	Round	1.65	Diameter of 0.083	0.0056
28.4	28.40	Round	1.65	Diameter of 0.102	0.0082

Hydrovex®

SVHV Vertical Vortex Flow Regulator

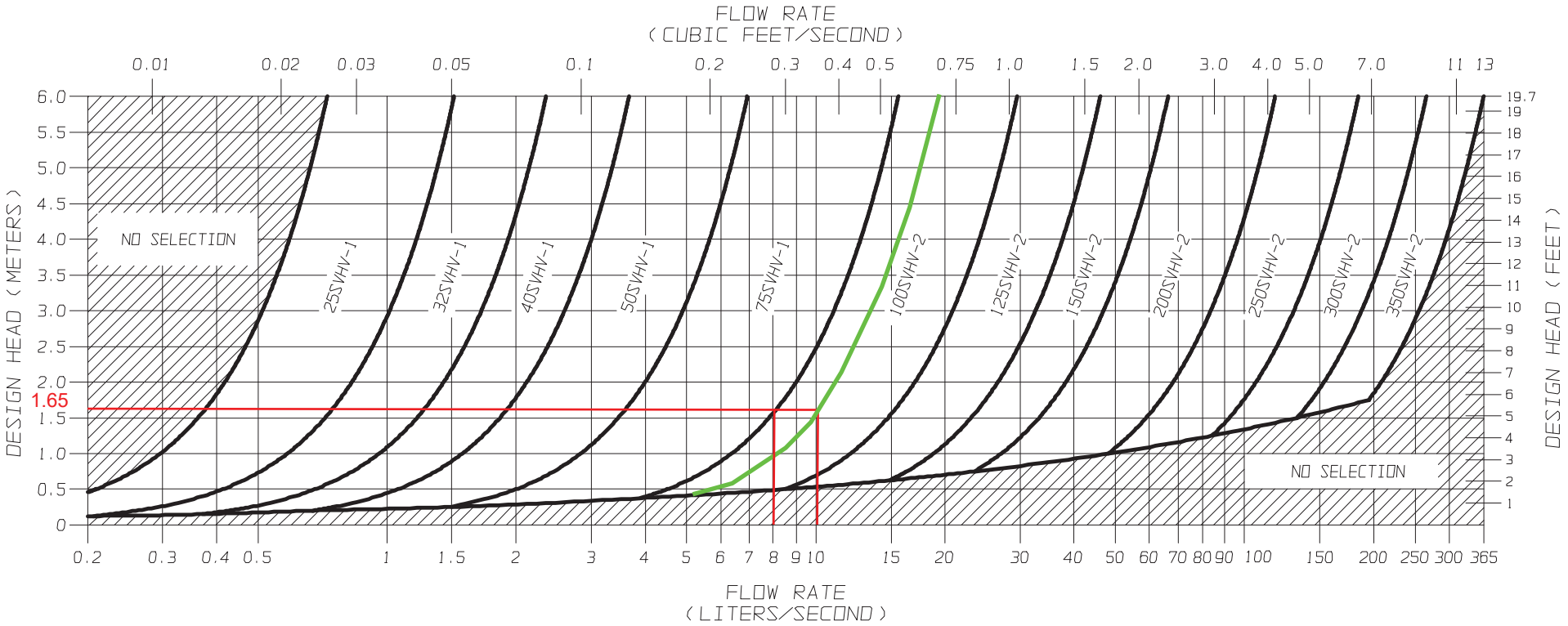


FIGURE 2 - SVHV

John Meunier

Table 4

TEMPORARY CONSTRUCTION ICD FOR STORM MH 2 SOUTH PIPE

ORIFICE SIZING FORMULA

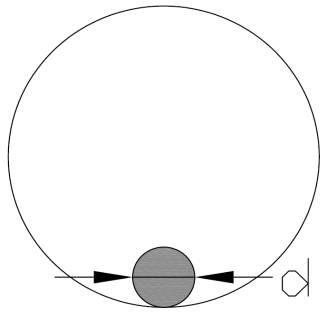
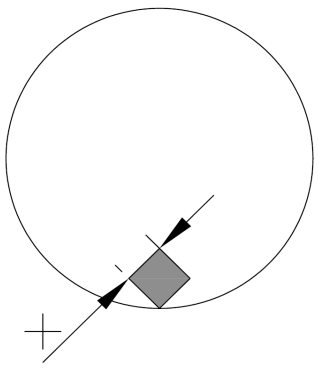
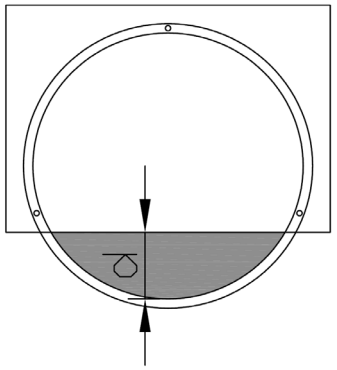
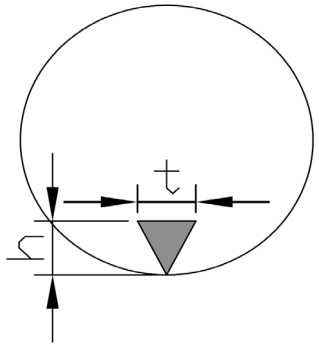
$$Q = CA\sqrt{2gh}$$

WHERE:

Q=	Discharge (m^3/s)	0.547	m^3/s
C=	Coefficient of Discharge	0.61	
A=	Area of Flow (m^2)	unknown	m^2
g=	Gravity (9.81 m/s^2)	9.81	m/s^2
h=	Head (m)	2.000	m
d=	pipe diameter	1.050	m

SOLVE FOR **r** (radius of pipe)

$$r = \sqrt{\frac{Q}{c\pi\sqrt{2gh}}}$$

Circle Orifice	**Diamond Orifice**	**Circle Segment**	**Triangular Orifice**
Radius = 0.213 m	One side = 0.3784 m	Radius = 0.525 m	Height= 264 mm
Diameter= 0.427 m	= 378 mm	θ-sinθ = 1.0387341	Top= 1084 mm
Diameter= 427 mm	Area= 0.14315 m^2		Area= 0.14315 m^2
Inches= 16.8		θ= 1.9540839 rad	
Area= 0.14315 m^2		depth = 231 mm	
		Area= 0.14148 m^2	
			

USE A CIRCLE SEGMENT WITH A BOTTOM OPENING OF 231mm

APPENDIX "B"

Table 5 - Sanitary Sewer Computation Form
Table 6 - Temporary Construction ICD at sanitary MH 2a

SANITARY SEWER COMPUTATION FORM (DESIGN)

TABLE 5

DATE: **DECEMBER 4, 2024**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **298 AXIS WAY**
CLIENT: MINTO COMMUNITIES INC.
PROJECT #: 240801
BY: ATREL ENGINEERING LTD

q= 280 l/cap.day
I= 0.33 l/ha.s
PVC/CONC N= 0.013

Area	LOCATION FROM (Up)		LOCATION TO (Down)		RESIDENTIAL INDIVIDUAL AREA (ha.)	RESIDENTIAL INDIVIDUAL POP.	RESIDENTIAL CUMULATIVE AREA (ha.)	RESIDENTIAL CUMULATIVE POP.	PEAKING FACTOR M	FLOW Q(p) (L/S)	PEAK EXT.FLOW Q(i) (L/S)	**PEAK DES. Q(d) (L/S)**	SEWER DATA TYPE PIPE	Roug Coef "n"	DIA. (N0M) (mm)	SLOPE (%)	LENGTH (M)	CAP. (L/S)	Remaining Capacity (%)	VEL. (M/S)	Up Stream Obv. (M)	Up Stream Inv. (M)	Down Stream Obv. (M)	Down Stream Inv. (M)
Street No. 3	MH	701	MH	709	0.16	25.2	0.16	25	4.00	0.33	0.05	0.38	PVC	0.013	200	0.65	51.5	26.86	99%	0.84	84.69	84.49	84.36	84.16
Block 5	MH	705	MH	706	0.06	16.8	0.06	17	4.00	0.22	0.02	0.24	PVC	0.013	200	0.65	33.0	26.86	99%	0.84	84.92	84.72	84.71	84.51
Block 5	MH	706	MH	708	0.09	8.4	0.15	25	4.00	0.33	0.05	0.38	PVC	0.013	200	0.32	24.0	18.93	98%	0.60	84.68	84.48	84.60	84.40
Block 2	MH	707	MH	708	0.08	25.2	0.08	25	4.00	0.33	0.03	0.35	PVC	0.013	200	0.65	58.5	26.86	99%	0.84	84.98	84.78	84.60	84.40
Street No. 5	MH	708	MH	709	0.09	12.4	0.32	63	4.00	0.81	0.11	0.92	PVC	0.013	200	0.32	36.0	18.93	95%	0.60	84.54	84.34	84.42	84.22
Street No. 3	MH	709	MH	711	0.05	4.2	0.53	92	4.00	1.20	0.17	1.37	PVC	0.013	200	0.32	23.0	18.93	93%	0.60	84.36	84.16	84.29	84.09
Block 3 & 4	MH	710	MH	711	0.14	33.6	0.14	34	4.00	0.44	0.05	0.48	PVC	0.013	200	0.65	44.5	26.86	98%	0.84	84.61	84.41	84.32	84.12
Street No. 3	MH	711	MH	713	0.10	12.6	0.77	138	4.00	1.79	0.25	2.05	PVC	0.013	200	0.32	38.0	18.93	89%	0.60	84.26	84.06	84.14	83.94
Street No. 1	MH	712	MH	713	0.08	12.5	0.08	13	4.00	0.16	0.03	0.19	PVC	0.013	200	0.65	25.0	26.86	99%	0.84	84.24	84.04	84.08	83.88
Street No. 1	MH	713	MH	723	0.21	37.8	1.06	189	4.00	2.45	0.35	2.80	PVC	0.013	200	0.32	59.0	18.93	85%	0.60	84.08	83.88	83.89	83.69
Block 1	MH	715	MH	716	0.07	16.8	0.07	17	4.00	0.22	0.02	0.24	PVC	0.013	200	0.65	47.5	26.86	99%	0.84	84.68	84.48	84.37	84.17
Street No. 2	MH	716	MH	718	0.11	20.3	0.18	37	4.00	0.48	0.06	0.54	PVC	0.013	200	0.32	36.0	18.93	97%	0.60	84.31	84.11	84.19	83.99
Street No. 4	MH	717	MH	718	0.19	33.6	0.19	34	4.00	0.44	0.06	0.50	PVC	0.013	200	0.65	48.5	26.86	98%	0.84	84.57	84.37	84.25	84.05
Street No. 2	MH	718	MH	719	0.17	31.3	0.54	102	4.00	1.32	0.18	1.50	PVC	0.013	200	0.32	50.0	18.93	92%	0.60	84.19	83.99	84.03	83.83
Street No. 2	MH	719	MH	723	0.03		0.57	102	4.00	1.32	0.19	1.51	PVC	0.013	200	0.32	17.0	18.93	92%	0.60	84.00	83.80	83.95	83.75
Block 6 & 7	MH	720	MH	722	0.13	37.8	0.13	38	4.00	0.49	0.04	0.53	PVC	0.013	200	0.65	89.5	26.86	98%	0.84	84.71	84.51	84.13	83.93
Block 8	MH	721	MH	722	0.09	25.2	0.09	25	4.00	0.33	0.03	0.36	PVC	0.013	200	0.32	65.0	18.93	98%	0.60	84.34	84.14	84.13	83.93
Block 7 & 8	MH	722	MH	723	0.06		0.28	63	4.00	0.82	0.09	0.91	PVC	0.013	200	0.32	36.0	18.93	95%	0.60	84.07	83.87	83.95	83.75
Street No. 1	MH	723	MH	727	0.09	12.6	2.00	366	4.00	4.75	0.66	5.41	PVC	0.013	200	0.32	39.0	18.93	71%	0.60	83.89	83.69	83.76	83.56
Street No. 2	MH	725	MH	726	0.30	51.3	0.30	51	4.00	0.67	0.10	0.76	PVC	0.013	200	0.65	73.0	26.86	97%	0.84	84.36	84.16	83.89	83.69
Street No. 2	MH	726	MH	727	0.04	2.7	0.34	54	4.00	0.70	0.11	0.81	PVC	0.013	200	0.32	13.5	18.93	96%	0.60	83.86	83.66	83.82	83.62
Street No.1	MH	727	MH	728	0.10	12.6	2.44	433	4.00	5.61	0.81	6.42	PVC	0.013	200	0.32	37.0	18.93	66%	0.60	83.76	83.56	83.64	83.44
Street No.1	MH	728	MH	729	0.21	24.3	2.65	457	3.99	5.92	0.87	6.79	PVC	0.013	200	0.32	72.0	18.93	64%	0.60	83.58	83.38	83.35	83.15
Street No.1	MH	729	MH	2	0.03	2.7	2.68	460	3.99	5.95	0.88	6.84	PVC	0.013	200	0.32	4.5	18.93	64%	0.60	83.32	83.12	83.31	83.11
Street No.1	MH	2	MH	37			2.68	460	3.99	5.95	0.88	6.84	PVC	0.013	200	0.32	42.5	18.93	64%	0.60	83.28	83.08	83.14	82.94
BLOCK 140 EXISTING																								

Table 6

TEMPORARY CONSTRUCTION ICD FOR SANITARY MH2a

ORIFICE SIZING FORMULA

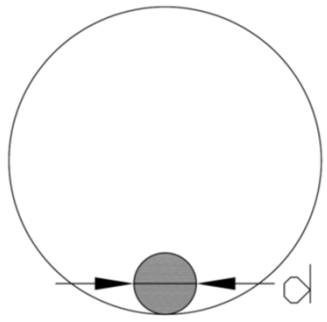
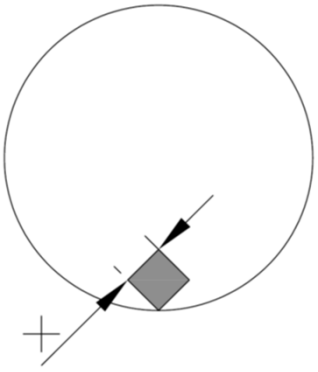
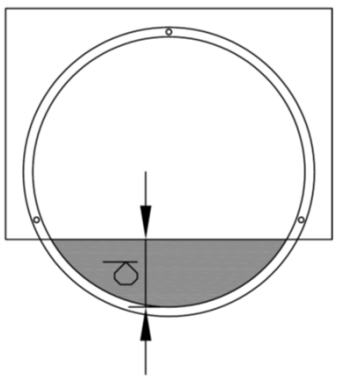
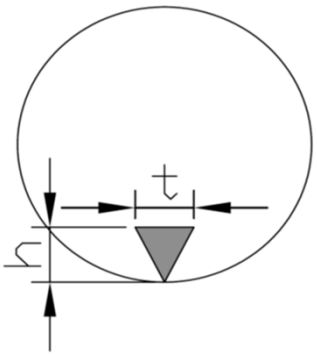
$$Q = CA\sqrt{2gh}$$

WHERE:

Q=	Discharge (m^3/s)	0.0094	m^3/s
C=	Coefficient of Discharge	0.61	
A=	Area of Flow (m^2)	unknown	m^2
g=	Gravity (9.81 m/s^2)	9.81	m/s^2
h=	Head (m)	2.000	m
d=	pipe diameter	0.200	m

SOLVE FOR **r** (radius of pipe)

$$r = \sqrt{\frac{Q}{c\pi\sqrt{2gh}}}$$

Circle Orifice	**Diamond Orifice**	**Circle Segment**	**Triangular Orifice**
Radius = 0.028 m	One side = 0.0496 m	Radius = 0.1 m	Height= 70 mm
Diameter= 0.056 m	= 50 mm	θ-sinθ = 0.4919982	Top= 70 mm
Diameter= 56 mm	Area= 0.00246 m2		Area= 0.00246 m2
Inches= 2.2		θ= 1.4882346 rad	
Area= 0.00246 m2		depth = 26 mm	
		Area= 0.00246 m2	
			

USE AN INVERTED TRIANGULAR RESTRICTOR HAVING A TOP OPENING OF 70mm AND A HEIGHT OF 70mm

APPENDIX "C"

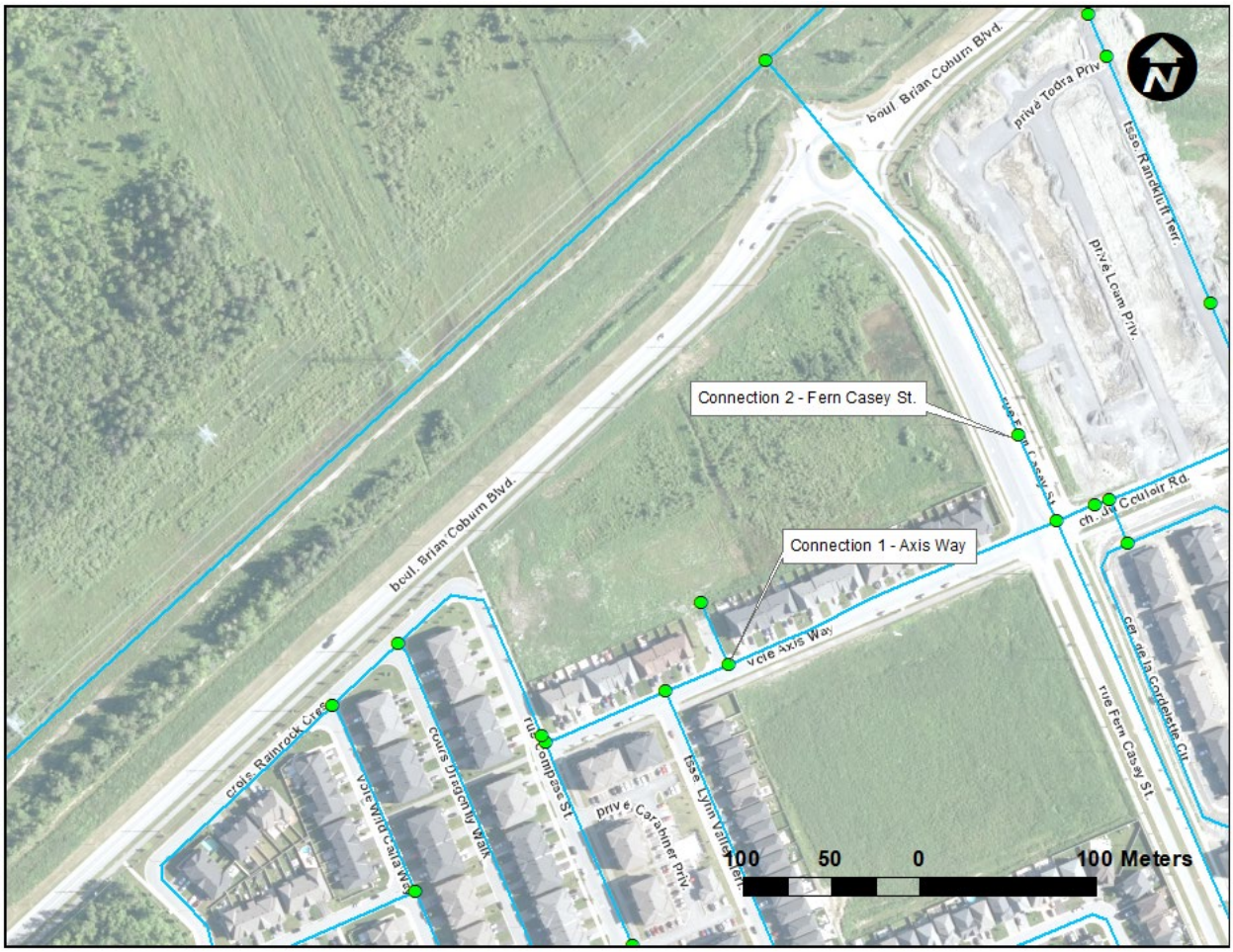
Boundary Condition 298 Axis Way
240801-WA1 - Watermain Size and Alignment
240801-WA2 – Watermain Layout and Demand
240801-WA3 – Fire Flow Areas
Table 7 - Node Data
Table 8 - Pipe Data
Table 9 - Average Day and Peak Hour Demands Results
Table 10 - Maximum Day plus Fire-Flow Results
Table 11 and 15 - Fire-Flow Calculations

Boundary Conditions
298 Axis Way

Provided Information

Scenario	Demand	
	L/min	L/s
Average Daily Demand	89	1.49
Maximum Daily Demand	224	3.73
Peak Hour	492	8.20
Fire Flow Demand #1	10,000	166.67
Fire Flow Demand #2	12,000	200.00
Fire Flow Demand #3	14,000	233.33
Fire Flow Demand #4	15,000	250.00
Fire Flow Demand #5	16,000	266.67
Fire Flow Demand #6	17,000	283.33
Fire Flow Demand #7	18,000	300.00

Location



Results

Connection 1 - Axis Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	61.7
Peak Hour	126.6	56.0
Max Day plus Fire Flow #1	126.4	55.8
Max Day plus Fire Flow #2	125.2	54.0
Max Day plus Fire Flow #3	124.2	52.6
Max Day plus Fire Flow #4	123.6	51.7
Max Day plus Fire Flow #5	123.4	51.4
Max Day plus Fire Flow #6	122.9	50.8
Max Day plus Fire Flow #7	122.4	50.0
[1] Ground Elevation =	87.2	m

Connection 2 - Fern Casey

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	130.6	61.9
Peak Hour	126.6	56.2
Max Day plus Fire Flow #1	127.7	57.8
Max Day plus Fire Flow #2	127.0	56.8
Max Day plus Fire Flow #3	126.6	56.2
Max Day plus Fire Flow #4	126.3	55.7
Max Day plus Fire Flow #5	126.5	56.0
Max Day plus Fire Flow #6	126.3	55.8
Max Day plus Fire Flow #7	126.2	55.6
[1] Ground Elevation =	87.1	m

Notes

1. *Demands for proposed Connection 1 at existing water main stub off Axis Way were assigned to upstream junction at Axis Way off the public looped watermains. The engineer must calculate headloss off the dead-end main.*
2. *Any connection to a watermain 400 mm or larger should be approved by Drinking Water Service as per the Water Design Guidelines.*

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may

be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

LEGEND

51.0	PROPOSED 50mmø WATERMAIN
108.0	PROPOSED 100mmø WATERMAIN
204.0	PROPOSED 200mmø WATERMAIN
297.0	PROPOSED 300mmø WATERMAIN
J30	NODE NUMBER
●	NODE LOCATION
P302	PIPE NUMBER

DRAWN: JSC	DESIGN: AGS
SCALE: 1 : 1000 (10m 0 10 20 30m)	

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

CITY OF OTTAWA

298 AXIS WAY

PROJECT No. 240801

PLAN: WATERMAIN SIZE AND ALIGNMENT

DRAWING No. 240801-WA1

LEGEND

- 51.0 — PROPOSED 50mmø WATERMAIN
- 108.0 — PROPOSED 100mmø WATERMAIN
- 204.0 — PROPOSED 200mmø WATERMAIN
- 297.0 — PROPOSED 300mmø WATERMAIN
- J30 — NODE NUMBER
- NODE LOCATION
- DESIGN AREA BOUNDARY
- R1 — RESERVOIR LOCATION
- NUMBER OF UNITS IN SUB AREA
- 4 | 2.7 / 0.0438 — CAPITA PER UNITS; AVERAGE DAY DEMAND (L/S)

DRAWN: JSC	DESIGN: AGS
SCALE: 1 : 1000 (10m 0 10 20 30m)	

ATREL Engineering Ltd Ltée
Engineers - Ingénieurs

CITY OF OTTAWA

298 AXIS WAY

PROJECT No. 240801

PLAN: WATERMAIN LAYOUT AND DEMAND

DRAWING No. 240801-WA2

LEGEND

51.0	PROPOSED 50mmø WATERMAIN
108.0	PROPOSED 100mmø WATERMAIN
204.0	PROPOSED 200mmø WATERMAIN
297.0	PROPOSED 300mmø WATERMAIN
J30	NODE NUMBER
●	NODE LOCATION
	FIRE FLOW AREA
356	GROUND FLOOR AREA (m^2)
	PROPOSED 2hr FIREWALL

DRAWN: JSC	DESIGN: AGS
SCALE: 1 : 1000 (10m 0 10 20 30m)	

ATREL Engineering Ltd. Ltée
Engineers - Ingénieurs

CITY OF OTTAWA

298 AXIS WAY

PROJECT No. 240801

PLAN: FIRE FLOW AREAS

DRAWING No. 240801-WA3

TABLE 7: NODE DATA

PROJECT: **298 Axis Way**
DATE: **December 2024**
CLIENT: Minto Communities
DESIGNED BY: AGS
PROJECT #: 240801
CHECKED BY: AGS
BY: Atrel Engineering Ltd

NODE. NO.	AVERAGE DAY DEMAND (l/s)	Street C.L. Elevation (m)	X COORDINATE (m)	Y COORDINATE (m)
J190	0.0000	87.86	382214.90	5033691.23
J192	0.0525	87.70	382207.75	5033704.02
J194	0.0486	87.91	382185.42	5033760.02
J196	0.0000	87.80	382202.72	5033777.81
J198	0.1419	87.90	382212.08	5033786.37
J200	0.0856	87.95	382236.18	5033808.60
J202	0.0000	87.92	382246.30	5033817.96
J204	0.0953	88.03	382283.84	5033852.61
J206	0.0000	88.05	382290.69	5033845.28
J208	0.0609	87.89	382304.03	5033830.77
J210	0.0000	88.07	382314.86	5033810.78
J212	0.0000	88.12	382318.25	5033802.70
J214	0.0953	88.13	382329.22	5033777.14
J216	0.0000	88.14	382320.17	5033773.38
J218	0.0000	87.92	382257.27	5033770.45
J220	0.1559	88.08	382265.62	5033750.23
J222	0.0489	87.95	382272.01	5033725.31
J224	0.0875	88.00	382248.21	5033716.70
J226	0.0000	87.97	382243.98	5033719.68
J228	0.0000	88.02	382211.80	5033835.04
J230	0.0408	87.77	382185.32	5033810.56
J232	0.0408	87.77	382169.78	5033796.14
J234	0.0544	88.05	382247.77	5033868.28
J236	0.0745	88.05	382275.65	5033893.81
J238	0.0473	87.89	382297.40	5033865.54
J240	0.0544	88.30	382271.61	5033800.72
J242	0.0544	88.30	382273.74	5033793.34
J244	0.0544	88.30	382322.67	5033742.19
J246	0.0408	87.94	382338.39	5033755.36
J248	0.0000	88.45	382345.16	5033814.15
J250	0.0745	88.60	382316.74	5033862.59
J252	0.0000	88.45	382347.02	5033814.97
J254	0.0817	88.65	382367.11	5033767.55
J64	0.0000	87.75	382229.73	5033656.16

PROPOSED NODES
EXISTING NODES

TABLE 8: PIPE DATA

DATE: **December 2024**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **298 Axis Way**
CLIENT: Minto Communities
PROJECT #: 240801
BY: Atrel Engineering Ltd

PIPE NO.	FROM	TO	LENGTH (m)	INSIDE DIAMETER (mm)	ROUGHNESS	AVERAGE DAY DEMAND				PEAK HOUR DEMAND			
						FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)	FLOW (L/S)	VELOCITY (m/s)	HEADLOSS (m)	HL/1000 (m/km)
P302	J64	J190	38.08	204	110	1.4904	0.0456	0.0009	0.0237	8.1977	0.2508	0.0212	0.5577
P304	J190	J192	14.86	297	120	1.4904	0.0215	0.0000	0.0031	8.1977	0.1183	0.0011	0.0764
P306	J192	J194	60.63	297	120	1.4379	0.0208	0.0002	0.0031	7.9089	0.1142	0.0043	0.0712
P308	J194	J196	25.17	297	120	1.3893	0.0201	0.0001	0.0030	7.6416	0.1103	0.0017	0.0669
P310	J196	J198	12.69	297	120	1.3893	0.0201	0.0000	0.0029	7.6416	0.1103	0.0008	0.0667
P312	J198	J200	32.79	297	120	0.9465	0.0137	0.0000	0.0014	5.2063	0.0752	0.0011	0.0329
P314	J200	J202	13.79	204	110	0.3620	0.0111	0.0000	0.0014	1.9912	0.0609	0.0006	0.0405
P316	J202	J204	51.08	204	110	0.3620	0.0111	0.0001	0.0018	1.9912	0.0609	0.0021	0.0406
P318	J204	J206	10.03	204	110	0.2194	0.0067	0.0000	0.0000	1.2068	0.0369	0.0002	0.0158
P320	J206	J208	19.71	204	110	0.2194	0.0067	0.0000	0.0009	1.2068	0.0369	0.0003	0.0160
P322	J208	J210	23.02	204	110	0.1041	0.0032	0.0000	0.0000	0.5726	0.0175	0.0001	0.0040
P324	J210	J212	8.76	204	110	0.0497	0.0015	0.0000	0.0000	0.2734	0.0084	0.0000	0.0011
P326	J212	J214	27.82	204	110	-0.1065	0.0033	0.0000	0.0000	-0.5858	0.0179	0.0001	0.0040
P328	J214	J216	9.81	204	110	-0.2426	0.0074	0.0000	0.0009	-1.3344	0.0408	0.0002	0.0199
P330	J216	J220	59.26	204	110	-0.2426	0.0074	0.0000	0.0008	-1.3344	0.0408	0.0011	0.0193
P332	J220	J222	27.07	204	110	-0.1101	0.0034	0.0000	0.0003	-0.6053	0.0185	0.0001	0.0045
P334	J222	J224	27.00	204	110	-0.2134	0.0065	0.0000	0.0007	-1.1735	0.0359	0.0004	0.0152
P336	J224	J226	5.54	204	110	-0.3009	0.0092	0.0000	0.0017	-1.6548	0.0506	0.0002	0.0285
P338	J226	J198	74.45	204	110	-0.3009	0.0092	0.0001	0.0011	-1.6548	0.0506	0.0021	0.0289
P340	J200	J228	35.97	108	100	0.2105	0.0230	0.0006	0.0166	1.1578	0.1264	0.0141	0.3928
P342	J228	J230	36.06	108	100	0.0816	0.0089	0.0001	0.0028	0.4488	0.0490	0.0024	0.0678
P344	J230	J232	21.20	51	100	0.0408	0.0200	0.0007	0.0312	0.2244	0.1098	0.0154	0.7272
P346	J228	J234	48.98	108	100	0.1289	0.0141	0.0003	0.0068	0.7090	0.0774	0.0078	0.1584
P348	J234	J236	37.80	51	100	0.0745	0.0365	0.0036	0.0942	0.4098	0.2006	0.0838	2.2179
P350	J204	J238	18.74	51	100	0.0473	0.0232	0.0008	0.0407	0.2602	0.1274	0.0179	0.9562
P352	J220	J218	21.88	204	110	-0.2884	0.0088	0.0000	0.0013	-1.5866	0.0485	0.0006	0.0264
P354	J218	J200	44.14	204	110	-0.2884	0.0088	0.0000	0.0011	-1.5866	0.0485	0.0012	0.0268
P356	J208	J240	44.20	51	100	0.0544	0.0266	0.0023	0.0526	0.2992	0.1465	0.0548	1.2386
P358	J210	J242	44.67	51	100	0.0544	0.0266	0.0024	0.0527	0.2992	0.1465	0.0553	1.2387
P360	J222	J244	54.78	51	100	0.0544	0.0266	0.0029	0.0526	0.2992	0.1465	0.0679	1.2386
P362	J214	J246	23.63	51	100	0.0408	0.0200	0.0007	0.0307	0.2244	0.1098	0.0172	0.7271
P364	J212	J248	29.25	108	100	0.1562	0.0171	0.0003	0.0099	0.8592	0.0938	0.0066	0.2261
P366	J248	J252	2.03	108	100	0.0817	0.0089	0.0000	0.0000	0.4494	0.0491	0.0001	0.0688
P370	J248	J250	57.09	51	100	0.0745	0.0365	0.0054	0.0943	0.4098	0.2006	0.1266	2.2178
P372	J252	J254	51.50	51	100	0.0817	0.0400	0.0058	0.1120	0.4494	0.2200	0.1355	2.6310

PROPOSED PIPES
EXISTING PIPES

TABLE 9: AVERAGE DAY AND PEAK HOUR DEMAND RESULTS

PROJECT: **298 Axis Way**
DATE: **December 2024**
CLIENT: Minto Communities
DESIGNED BY: AGS
PROJECT #: 240801
CHECKED BY: AGS
BY: Atrel Engineering Ltd

NODE NO.	Street C.L. Elevation (m)	AVERAGE DAY DEMAND			PEAK HOUR DEMAND		
		Demand (l/s)	HGL (m)	Pressure (kPa)	Demand (l/s)	HGL (m)	Pressure (kPa)
J190	87.86	0.0000	130.60	418.81	0.0000	126.58	379.41
J192	87.70	0.0525	130.60	420.38	0.2888	126.58	380.96
J194	87.91	0.0486	130.60	418.32	0.2673	126.57	378.86
J196	87.80	0.0000	130.60	419.39	0.0000	126.57	379.93
J198	87.90	0.1419	130.60	418.41	0.7805	126.57	378.94
J200	87.95	0.0856	130.60	417.92	0.4708	126.57	378.44
J202	87.92	0.0000	130.60	418.22	0.0000	126.57	378.72
J204	88.03	0.0953	130.60	417.14	0.5242	126.57	377.63
J206	88.05	0.0000	130.60	416.94	0.0000	126.57	377.43
J208	87.89	0.0609	130.60	418.51	0.3350	126.57	378.99
J210	88.07	0.0000	130.60	416.75	0.0000	126.57	377.23
J212	88.12	0.0000	130.60	416.26	0.0000	126.57	376.74
J214	88.13	0.0953	130.60	416.16	0.5242	126.57	376.64
J216	88.14	0.0000	130.60	416.06	0.0000	126.57	376.55
J218	87.92	0.0000	130.60	418.22	0.0000	126.57	378.72
J220	88.08	0.1559	130.60	416.65	0.8575	126.57	377.15
J222	87.95	0.0489	130.60	417.92	0.2690	126.57	378.42
J224	88.00	0.0875	130.60	417.43	0.4813	126.57	377.93
J226	87.97	0.0000	130.60	417.73	0.0000	126.57	378.23
J228	88.02	0.0000	130.60	417.23	0.0000	126.55	377.61
J230	87.77	0.0408	130.60	419.68	0.2244	126.55	380.04
J232	87.77	0.0408	130.60	419.67	0.2244	126.54	379.89
J234	88.05	0.0544	130.60	416.93	0.2992	126.55	377.24
J236	88.05	0.0745	130.59	416.90	0.4098	126.46	376.42
J238	87.89	0.0473	130.60	418.50	0.2602	126.55	378.82
J240	88.30	0.0544	130.60	414.47	0.2992	126.51	374.44
J242	88.30	0.0544	130.60	414.47	0.2992	126.51	374.43
J244	88.30	0.0544	130.60	414.46	0.2992	126.50	374.33
J246	87.94	0.0408	130.60	418.01	0.2244	126.55	378.34
J248	88.45	0.0000	130.60	413.02	0.0000	126.56	373.44
J250	88.60	0.0745	130.59	411.50	0.4098	126.43	370.73
J252	88.45	0.0000	130.60	413.02	0.0000	126.56	373.44
J254	88.65	0.0817	130.59	411.00	0.4494	126.42	370.15
J64	87.75	0.0000	130.60	419.90	0.0000	126.60	380.69

PROPOSED NODES
EXISTING NODES

TABLE 10: MAXIMUM DAY PLUS FIRE FLOW RESULTS

DATE: **December 2024**
DESIGNED BY: AGS
CHECKED BY: AGS

PROJECT: **298 Axis Way**
CLIENT: Minto Communities
PROJECT #: 240801
BY: Atrel Engineering Ltd

NODE NO.	Static Demand (L/s)	Static Pressure (kPa)	Static Head (m)	Fire-Flow Demand (L/s)	Residual Pressure (kPa)	Available Flow @ Hydrant (L/s)	Available Flow Pressure (kPa)	Total Demand (L/s)	Available Flow @ Hydrant (L/s)	Critical NODE ID	Critical Node Pressure (kPa)	Critical Node Head (m)	Adjusted Available Flow (L/s)	Design Flow (L/s)
J190	0.0000	377.62	126.40	167.00	318.58	357.80	140.0	166.9988	357.80	J254	131.9	102.11	351.17	351.16
J192	0.1155	367.43	125.20	200.00	281.21	340.00	140.0	200.1141	340.00	J254	130.4	101.96	332.12	332.12
J194	0.1069	377.12	126.40	167.00	302.59	314.86	140.0	167.1057	314.86	J254	132.4	102.17	309.37	309.37
J196	0.0000	356.64	124.19	233.00	210.41	288.86	140.0	232.9983	288.86	J254	131.4	102.06	282.55	282.55
J198	0.3122	377.22	126.39	167.00	294.93	298.56	140.0	167.3110	298.56	J254	132.4	102.16	293.30	293.29
J200	0.1883	376.72	126.39	167.00	289.22	288.25	140.0	167.1871	288.25	J254	134.2	102.34	284.35	284.34
J202	0.0000	355.46	124.19	233.00	169.66	252.66	140.0	232.9983	252.66	J202	140.0	102.20	252.66	252.44
J204	0.2097	375.94	126.39	167.00	248.36	233.95	140.0	167.2085	233.95	J204	140.0	102.31	233.95	233.95
J206	0.0000	363.98	125.19	200.00	182.68	224.50	140.0	199.9986	224.50	J206	140.0	102.33	224.50	224.50
J208	0.1340	377.31	126.39	167.00	243.04	228.14	140.0	167.1328	228.14	J240	135.8	102.16	225.98	225.97
J210	0.0000	363.78	125.19	200.00	174.44	219.13	140.0	199.9986	219.13	J242	137.6	102.34	217.87	217.68
J212	0.0000	375.05	126.39	167.00	238.86	225.07	140.0	166.9988	225.07	J254	134.5	102.38	222.20	222.20
J214	0.2097	374.95	126.39	167.00	241.33	227.58	140.0	167.2085	227.58	J214	140.0	102.41	227.58	227.57
J216	0.0000	363.10	125.19	200.00	179.92	222.76	140.0	199.9986	222.76	J216	140.0	102.42	222.76	222.76
J218	0.0000	355.46	124.19	233.00	158.40	244.66	140.0	232.9983	244.66	J218	140.0	102.20	244.66	244.54
J220	0.3430	375.45	126.39	167.00	268.33	257.33	140.0	167.3418	257.33	J220	140.0	102.36	257.33	257.33
J222	0.1076	376.72	126.39	167.00	261.96	248.23	140.0	167.1064	248.23	J244	136.4	102.22	246.19	246.19
J224	0.1925	376.23	126.39	167.00	259.74	245.97	140.0	167.1913	245.97	J224	140.0	102.28	245.97	245.97
J226	0.0000	364.77	125.19	200.00	203.24	239.55	140.0	199.9986	239.55	J226	140.0	102.25	239.55	239.55
J228	0.0000	376.01	126.39	167.00	-1098.28	61.72	140.0	166.9988	61.72	J236	139.5	102.29	61.66	61.66
J230	0.0898	378.46	126.39	167.00	-2481.89	43.46	140.0	167.0886	43.46	J232	139.9	102.05	43.46	43.46
J232	0.0898	378.43	126.39	167.00	-33945.30	11.40	140.0	167.0886	11.40	J232	140.0	102.05	11.40	11.39
J234	0.1197	375.70	126.39	167.00	-2983.57	39.58	140.0	167.1185	39.58	J236	139.8	102.32	39.57	39.57
J236	0.1639	375.55	126.38	167.00	-59140.69	8.42	140.0	167.1627	8.42	J236	140.0	102.33	8.42	8.42
J238	0.1041	377.28	126.39	167.00	-27566.31	12.72	140.0	167.1029	12.72	J238	140.0	102.17	12.72	12.72
J240	0.1197	373.19	126.38	167.00	-65397.18	7.94	140.0	167.1185	7.94	J240	140.0	102.58	7.94	7.94
J242	0.1197	373.19	126.38	167.00	-66088.00	7.90	140.0	167.1185	7.90	J242	140.0	102.58	7.90	7.90
J244	0.1197	373.17	126.38	167.00	-81088.28	7.08	140.0	167.1185	7.08	J244	140.0	102.58	7.08	7.08
J246	0.0898	376.79	126.39	167.00	-34830.70	11.21	140.0	167.0886	11.21	J246	140.0	102.22	11.21	11.21
J248	0.0000	371.81	126.39	167.00	-890.69	66.55	140.0	166.9988	66.55	J254	137.8	102.71	66.20	66.20
J250	0.1639	370.11	126.37	167.00	-85712.61	6.82	140.0	167.1627	6.82	J250	140.0	102.88	6.82	6.82
J252	0.0000	371.81	126.39	167.00	-968.63	64.42	140.0	166.9988	64.42	J254	137.8	102.71	64.09	64.09
J254	0.1797	369.60	126.37	167.00	-77495.57	7.19	140.0	167.1785	7.19	J254	140.0	102.93	7.19	7.19
J64	0.0000	378.74	126.40	167.00	376.96	2392.02	140.0	166.9988	2392.02	J254	130.8	102.00	2342.21	2342.21

FIRE HYDRANT NODE
PROPOSED NODES
EXISTING NODES

FIRE FLOW CALCULATIONS

Table 11

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: DECEMBER, 2024

CLIENT: Minto Communities Inc.
240801
PROJECT NAME: 298 AXIS WAY

(A) C = Coefficient related to type of construction

· **Type V** wood frame construction	1.5	X
· **Type IV-A** Mass Timber Construction	0.8	
· **Type IV-B** Mass Timber Construction	0.9	
· **Type IV-C** Mass Timber Construction	1	
· **Type IV-D** Mass Timber Construction	1.5	
Type III Ordinary Construction	1	
Type II Noncombustible Construction	0.8	
· **Type I** Fire Restrictive Construction	0.6	

A = Area of structure considered (m²)

(B)

Building No.	BLOCK 1A	BLOCK 1B	BLOCK 2A	BLOCK 2B	BLOCK 3A	BLOCK 3B
Location No.						
Ground Floor Area	339	231	231	447	339	231
Number of Storeys	3	3	3	3	3	3
Total Effective Floor Area	1017	693	693	1341	1017	693

(C) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	11000	9000	9000	12000	11000	9000

(D) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%					
· limited combustible	- 15%					
· combustible	- 0%	-15	-15	-15	-15	-15	-15
· free burning	+ 15%					
· rapid burning	+ 25%					
Required Flow (L/min)		9350	7650	7650	10200	9350	7650

(E) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	0	0	0	0	0	0
Reduction (L/min)	0	0	0	0	0	0

(F) Exposure surcharge (% of 2, L/min)

North	Separation Distance	>30	0	0	>30	0	0	FW	-	0	22.0	2	204	11.5	12	1122	11.5	12	918
	Length-Height Factor		41-60			41-60			-			21-40			41-60			41-60	
East	Separation Distance	FW	-	0	28.5	2	153	>30	0	0	>30	0	0	FW	-	0	28.5	2	153
	Length-Height Factor		-			21-40			41-60			>100			-			21-40	
South	Separation Distance	15.0	12	1122	15.0	12	918	12.0	11	842	FW	-	0	>30	0	0	>30	0	0
	Length-Height Factor		41-60			41-60			21-40			-			41-60			41-60	
West	Separation Distance	21.5	4	374	FW	-	0	28.5	4	306	28.5	10	1020	19.0	12	1122	FW	-	0
	Length-Height Factor		41-60			-			41-60			>100			41-60			-	
Exposure surcharge total			1496			1071			1148			1224			2244			1071	

Fire Flow

=(D) +(E) + (F)	10846	8721	8798	11424	11594	8721

(G) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min

	11000	9000	9000	11000	12000	9000
	(183 l/s)	(150 l/s)	(150 l/s)	(183 l/s)	(200 l/s)	(150 l/s)
Fire Flow Required	(183 l/s)	(150 l/s)	(150 l/s)	(183 l/s)	(200 l/s)	(150 l/s)

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings or traditional side-by-side town comply with the provision of the Bulletin; therefore the required fire flow is 10,000 l/min

FIRE FLOW CALCULATIONS

Table 12

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: DECEMBER, 2024

CLIENT: Minto Communities Inc.
240801
PROJECT NAME: 298 AXIS WAY

(A) C = Coefficient related to type of construction

· **Type V** wood frame construction	1.5	X
· **Type IV-A** Mass Timber Construction	0.8	
· **Type IV-B** Mass Timber Construction	0.9	
· **Type IV-C** Mass Timber Construction	1	
· **Type IV-D** Mass Timber Construction	1.5	
Type III Ordinary Construction	1	
Type II Noncombustible Construction	0.8	
· **Type I** Fire Restrictive Construction	0.6	

A = Area of structure considered (m²)

(B)

Building No.	BLOCK 4		BLOCK 5A	BLOCK 5B	BLOCK 6A	BLOCK 6B
Location No.						
Ground Floor Area	462		231	339	231	339
Number of Storeys	3		3	3	3	3
Total Effective Floor Area	1386		693	1017	693	1017

(C) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	12000		9000	11000	9000	11000

(D) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%					
· limited combustible	- 15%					
· combustible	- 0%	-15	-15	-15	-15	-15
· free burning	+ 15%					
· rapid burning	+ 25%					
Required Flow (L/min)		10200	7650	9350	7650	9350

(E) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	0	0	0	0	0	0
Reduction (L/min)		0	0	0	0	0

(F) Exposure surcharge (% of 2, L/min)

North	Separation Distance	>30	0	0				24.5	2	153	FW	-	0	>30	0	0	>30	0	0
	Length-Height Factor		>100						21-40			-			41-60			61-80	
East	Separation Distance	27.0	2	204				>30	0	0	>30	0	0	FW	-	0	>30	0	0
	Length-Height Factor		21-40						41-60			61-80			-			41-60	
South	Separation Distance	12.0	10	1020				FW	-	0	22.0	4	374	25.0	4	306	25.0	6	561
	Length-Height Factor		>100						-			41-60			41-60			61-80	
West	Separation Distance	27.0	2	204				27.0	4	306	27.0	6	561	5.0	16	1224	FW	-	0
	Length-Height Factor		21-40						41-60			61-80			21-40			-	
Exposure surcharge total			1428						459			935			1530			561	

Fire Flow

=(D) +(E) + (F)	11628	8109	10285	9180	9911

(G) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min

	12000	8000	10000	9000	10000
	(200 l/s)	(133 l/s)	(167 l/s)	(150 l/s)	(167 l/s)
Fire Flow Required	(200 l/s)	(133 l/s)	(167 l/s)	(150 l/s)	(167 l/s)

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings or traditional side-by-side town comply with the provision of the Bulletin; therefore the required fire flow is 10,000 l/min

FIRE FLOW CALCULATIONS

Table 13

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: DECEMBER, 2024

CLIENT: Minto Communities Inc.
240801
PROJECT NAME: 298 AXIS WAY

(A) C = Coefficient related to type of construction

· **Type V** wood frame construction	1.5	X
· **Type IV-A** Mass Timber Construction	0.8	
· **Type IV-B** Mass Timber Construction	0.9	
· **Type IV-C** Mass Timber Construction	1	
· **Type IV-D** Mass Timber Construction	1.5	
Type III Ordinary Construction	1	
Type II Noncombustible Construction	0.8	
· **Type I** Fire Restrictive Construction	0.6	

A = Area of structure considered (m²)

(B)

Building No.	BLOCK 7		BLOCK 8A	BLOCK 8B		
Location No.						
Ground Floor Area	462		447	231		
Number of Storeys	3		3	3		
Total Effective Floor Area	1386		1341	693		

(C) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	12000		12000	9000		

(D) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%					
· limited combustible	- 15%					
· combustible	- 0%	-15	-15	-15		
· free burning	+ 15%					
· rapid burning	+ 25%					
Required Flow (L/min)		10200	10200	7650		

(E) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other		0	0	0		
Reduction (L/min)		0	0	0		

(F) Exposure surcharge (% of 2, L/min)

North	Separation Distance	>30	0	0				>30	0	0	>30	0	0						
	Length-Height Factor		>100						>100			41-60							
East	Separation Distance	5.0	16	1632				FW	-	0	25.0	2	153						
	Length-Height Factor		21-40						-			21-40							
South	Separation Distance	>30	0	0				22.5	10	1020	25.5	4	306						
	Length-Height Factor		>100						>100			41-60							
West	Separation Distance	25.0	2	204				13.0	11	1122	FW	-	0						
	Length-Height Factor		21-40						21-40			-							
Exposure surcharge total			1836						2142			459							

Fire Flow

=(D) +(E) + (F)	12036		12342	8109		

(G) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min

	12000		12000	8000		
	(200 l/s)	(0 l/s)	(200 l/s)	(133 l/s)	(0 l/s)	(0 l/s)
Fire Flow Required	(200 l/s)	(0 l/s)	(200 l/s)	(133 l/s)	(0 l/s)	(0 l/s)

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings or traditional side-by-side town comply with the provision of the Bulletin; therefore the required fire flow is 10,000 l/min

FIRE FLOW CALCULATIONS

Table 14

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: DECEMBER, 2024

CLIENT: Minto Communities Inc.
240801
PROJECT NAME: 298 AXIS WAY

(A) C = Coefficient related to type of construction

· **Type V** wood frame construction	1.5	X
· **Type IV-A** Mass Timber Construction	0.8	
· **Type IV-B** Mass Timber Construction	0.9	
· **Type IV-C** Mass Timber Construction	1	
· **Type IV-D** Mass Timber Construction	1.5	
Type III Ordinary Construction	1	
Type II Noncombustible Construction	0.8	
· **Type I** Fire Restrictive Construction	0.6	

A = Area of structure considered (m²)

(B)

Building No.	BLOCK 9	BLOCK 10 A	BLOCK 10B	BLOCK 11	BLOCK 12A	BLOCK 12B
Location No.						
Ground Floor Area	440	331	324	440	324	324
Number of Storeys	3	3	3	3	3	3
Total Effective Floor Area	1320	993	972	1320	972	972

(C) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	12000	10000	10000	12000	10000	10000

(D) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%					
· limited combustible	- 15%					
· combustible	- 0%	-15	-15	-15	-15	-15	-15
· free burning	+ 15%					
· rapid burning	+ 25%					
Required Flow (L/min)		10200	8500	8500	10200	8500	8500

(E) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	0	0	0	0	0	0
Reduction (L/min)	0	0	0	0	0	0

(F) Exposure surcharge (% of 2, L/min)

North	Separation Distance	25.5	4	408	FW	-	0	5.0	17	1445	25.5	4	408	FW	-	0	5.0	17	1445
	Length-Height Factor		41-60			-			41-60			41-60			-			41-60	
East	Separation Distance	21.0	6	612	21.0	6	510	21.0	4	340	21.5	6	612	21.5	4	340	21.5	4	340
	Length-Height Factor		61-80			61-80			41-60			61-80			41-60			41-60	
South	Separation Distance	5.0	17	1734	23.0	4	340	FW	-	0	5.0	17	1734	10.5	12	1020	FW	-	0
	Length-Height Factor		41-60			41-60			-			41-60			41-60			-	
West	Separation Distance	21.5	6	612	21.5	6	510	21.5	4	340	24.0	6	612	25.0	4	340	25.0	4	340
	Length-Height Factor		61-80			61-80			41-60			61-80			41-60			41-60	
Exposure surcharge total			3366			1360			2125			3366			1700			2125	

Fire Flow

=(D) +(E) + (F)	13566	9860	10625	13566	10200	10625

(G) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min

	14000	10000	11000	14000	10000	11000
	(233 l/s)	(167 l/s)	(183 l/s)	(233 l/s)	(167 l/s)	(183 l/s)
Fire Flow Required	(233 l/s)	(167 l/s)	(183 l/s)	(233 l/s)	(167 l/s)	(183 l/s)

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings or traditional side-by-side town comply with the provision of the Bulletin; therefore the required fire flow is 10,000 l/min

FIRE FLOW CALCULATIONS

Table 15

CONSULTANT: Atrel Engineering Ltd
BY: AGS
DATE: DECEMBER, 2024

CLIENT: Minto Communities Inc.
240801
PROJECT NAME: 298 AXIS WAY

(A) C = Coefficient related to type of construction

· **Type V** wood frame construction	1.5	X
· **Type IV-A** Mass Timber Construction	0.8	
· **Type IV-B** Mass Timber Construction	0.9	
· **Type IV-C** Mass Timber Construction	1	
· **Type IV-D** Mass Timber Construction	1.5	
Type III Ordinary Construction	1	
Type II Noncombustible Construction	0.8	
· **Type I** Fire Restrictive Construction	0.6	

A = Area of structure considered (m²)

(B)

Building No.	BLOCK 12A	BLOCK 12B				
Location No.						
Ground Floor Area	324	324				
Number of Storeys	3	3				
Total Effective Floor Area	972	972				

(C) F = The required flow in litres per minutes (L/min)

= 220·C·(A)^½	10000	10000				

(D) Occupancy hazard reduction or surcharge (contents, L/min)

· non-combustible	- 25%						
· limited combustible	- 15%						
· combustible	- 0%	-15	-15				
· free burning	+ 15%						
· rapid burning	+ 25%						
Required Flow (L/min)		8500	8500				

(E) Sprinkler protection reduction (entire building, % of (2), L/min)

· non-comb. - fire resistive construction with very low fire hazard (- 75%)						
· other	0	0				
Reduction (L/min)	0	0				

(F) Exposure surcharge (% of 2, L/min)

North	Separation Distance	23.5	4	340	5.0	18	1530												
	Length-Height Factor		41-60			61-80													
East	Separation Distance	19.0	14	1190	19.0	15	1275												
	Length-Height Factor		81-100			>100													
South	Separation Distance	5.0	18	1530	22.0	6	510												
	Length-Height Factor		61-80			61-80													
West	Separation Distance	16.5	14	1190	16.5	15	1275												
	Length-Height Factor		81-100			>100													
Exposure surcharge total			4250			4590													

Fire Flow

=(D) +(E) + (F)	12750	13090				

(G) Round off fire flow (L/min) Fc

· to nearest 1,000 L/min

	13000	13000				
	(217 l/s)	(217 l/s)	(0 l/s)	(0 l/s)	(0 l/s)	(0 l/s)
Fire Flow Required	(217 l/s)	(217 l/s)	(0 l/s)	(0 l/s)	(0 l/s)	(0 l/s)

As per the "Technical Bulletin ISDTB-2014-02 - Revisions to Ottawa Design Guidelines - Water", single dwellings or traditional side-by-side town comply with the provision of the Bulletin; therefore the required fire flow is 10,000 l/min

APPENDIX "D"

Roll of Plans

Separate from report (Supplied as a roll of plans)

240801 – ESC1	Erosion Sediment Control Plan
240801 – R1	Removal Plan
240801 – S1	General Plan of Service
240801 – GR1	Grading Plan
240801 – SAN1	Sanitary Drainage Area Plan
240801 – STM1	Storm Drainage Area Plan
240801 – PA1	Ponding Area Plan