1437-1455 Queen Street West Redevelopment,

City of Toronto

Site Servicing and Stage 2 Stormwater Management Report

April 19, 2023

Prepared for:
Jameson Plaza Ltd.

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RVA 236773

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1.0 INTRODUCTION

Jameson Plaza Ltd. (the owner), referred to as JPL herein, is proposing the redevelopment of 1437 to 1455 Queen Street West site in the City of Toronto (the site).

R.V. Anderson Associates Limited (RVA) has been retained by JPL to prepare a Site Servicing and Stage 2 Stormwater Management (SWM) Report in support of a zoning bylaw amendment (ZBA) and Site Plan Approval (SPA) application for the proposed site redevelopment.

1.1 Objective

This report outlines a functional servicing plan for the proposed development that includes assessment of the servicing issues and a stormwater management solution for the site.

In addition to the functional servicing options and storm management solutions for this development, this report shall address the following:

- Identify and review of existing municipal storm, sanitary and water services available for the site.
- Identification of the City of Toronto criteria with respect to sanitary, water and storm servicing including stormwater management criteria for the redevelopment of the site, in accordance with the City of Toronto Wet Weather Flow (WWF) Guideline criteria and targets.
- Estimate water, sanitary and storm demands that will result from the redevelopment.
- Investigation of the capacity of the existing municipal watermains and sewers.
- Calculation of allowable post-development peak storm discharge rates.
- Calculation of WWF water balance target criteria and development of appropriate methods to achieve the criteria.
- Provide a summary of proposed servicing of the site with water, sanitary and storm services.
- Recommendation and description of proposed stormwater management (SWM) system for the site to address water balance, water quality, and discharge rate targets.

1.2 Background and Resource Information

In preparing this report, the following information was obtained and reviewed and is applicable to the development of the proposed site.

Design Criteria

- The City of Toronto Design Criteria for Sewers and Watermains, Second Edition, January 2021, as amended.
- The City of Toronto Design Criteria for Wet Weather Flow Management Guidelines (WWFMG), November 2006, as amended.
- The City of Toronto Design Criteria for Manufactured Treatment Devices, April 2023.
- Water Supply for Public Fire Protection, 2020, as amended.

Reports and Investigations Undertaken by Owner

- Plan of Survey showing Topographic Features of Part of Lot 1 and All of Lots 2 to 6, Both Inclusive Registered Plan 1106, City of Toronto. By Schaeffer Dzaldov Purcell Ltd dated March 9th, 2023.
- Subsurface Utility Engineering Mapping study, by 4Sight Utility Engineering dated March 31st, 2023.
- Site plan and project statistics, by Raw Design Ltd. Dated April 14th, 2023.
- Hydrant Flow Tests to be completed upon City issuance of permit (permit application has been submitted and tentatively scheduled for May 16, 2023)
- Storm Capacity Analysis, by Civica Infrastructure Inc. dated April 14th, 2023.
- Combined & Storm Sewer Investigation Report Dye Test, by AquaFlow Technology Inc. dated February 7th, 2023.
- Calculations for water collected and landscape water requirements by Studio TLA dated April 14th, 2023.
- Hydrogeological study report prepared by Grounded Engineering dated March 31st, 2023.
- Digital Map Owners Group (DMOG) Utilities Map, by City of Toronto dated Mach 6th, 2023.
- The City of Toronto Development Applications Website (as of March 31st, 2023).

Additional Materials

- Various Servicing Plan and Profile drawings of existing sewers on Queen Street West provided by the City of Toronto.

2.0 BACKGROUND

2.1 Existing Conditions

The subject site has the municipal addresses of 1437-1455 Queen Street West in the City of Toronto. The 0.3209 -hectare (3,209 m^2) site is surrounded by low-rise commercial/office properties to the north, east and west, and mid to high-rise residential buildings to the south. Refer to Figure 2.1 for the site location.

The site is presently occupied by three (3) low-rise commercial buildings and one (1) parking lot. Please see the table below for a summary of the existing building information. Driveway perpendicular to the Queen Street west right-of-way (ROW) is located on the west side of parking lot providing vehicular access to the shopping plaza.

Figure 2.1 – Site Location

Table 2.1 – Existing Building Summary

Address	Building Height	Building Use	Current Condition
1437	Two and Half Storey	Commercial/ Office	Vacant
1439	One to Two Storey	Commercial	Restaurant
1441 - 1445	One Storey	Commercial	Retail
1449 – 1455	One to Two Storey	Commercial	Retail

2.2 Proposed Redevelopment

The proposed redevelopment site will be designed as a thirteen (13) storey tower with a mixed use of residential/commercial and one (1) level of proposed underground parking. There are two hundred and fifty (250) residential units in total. Retail units are planned to be at ground level. There will be pedestrian access to the at-grade entrances fronting Queen Street West.

Vehicular access into the building will be from a driveway entrance located at the west end of the site fronting Queen Street West. This driveway will continue into the site where it will be covered by the building above. The driveway will provide vehicular access to the loading bay as well as vehicular access to the underground parking garage.

Transformer, bike racks at grade and elevated outdoor amenity area are along the south side of the building. Access to elevated outdoor amenity will be provided either through the bike rack or from inside the building.

Refer to Appendix A for the Architectural Site Plan and a more detailed breakdown of the project statistics.

3.0 SERVICING INVESTIGATION

Information with respect to existing municipal services and utilities was determined from as-built plan and profile drawings and sewer/water atlas maps obtained from the City of Toronto, in March 2023.

3.1 Foundation Drainage

The current City Sewer Code prohibits the discharge of foundation drainage to a municipal sewer except through a Private Water Discharge Agreement (PWDA). A Hydrogeological Investigation prepared by Grounded Engineering Inc., dated March 27, 2023, has been completed for the site. This report indicates that the maximum anticipated groundwater level is approximately 0.7m below the lowest elevation of the proposed structure (P1 underground at 94.1m). As such, foundation drainage consisting only of infiltrated stormwater. Based on samples taken and analyzed for water quality, the groundwater is suitable for discharge to the sanitary sewer but not to storm (i.e., Municipal Code Chapter 681, Table 1, and Table 2 respectively). Therefore, pre-treatment would be required prior to discharge into the storm sewer system. However, discharging into the sanitary sewer system would not require pre-treatment.

The report estimates a short-term discharge rate of 75,000 L/day (0.87 L/s average) and a long-term discharge rate of 1,000 L/day (0.01 L/s average, consisting only of infiltrated stormwater). It is the owner's intent to discharge the short-term into the municipal combined sewer.

There will be no long-term foundation drain discharge required as the development site is above the maximum anticipated groundwater level.

With respect to sanitary sewer capacity related to the private water discharge, refer to Section 3.3.4 of this report.

3.1.1 Construction Dewatering

As mentioned in Section 3.1 above, the short-term discharge is estimated at 75,000 L/day (0.87 L/s average), based on a 25mm design rainfall event. A peak pump rate for construction dewatering will be specified by the Mechanical Engineer and shall be equal or lesser than the peak sanitary discharge of 9.3 L/s, as specified in Section 3.3.3.1.

A short-term Private Water Discharge Agreement (PWDA) application will be submitted to the Environmental Monitoring & Protection (EM&P) Unit of Toronto Water.

3.2 Water Servicing

3.2.1 Water Servicing Criteria

The City of Toronto's Design Criteria for Sewers and Watermains (Jan 2021) was used to analyze the water demand from the proposed development. The City criteria are generally summarized as follows:

- Water supply systems should be designed to satisfy the greater of maximum day demand plus fire flow or peak hour demand.
- Average domestic water demands of 190 litres per capita per day for low-rise apartment buildings and condominiums with greater than six (6) units.
- Maximum day and peak hour factors for apartments are 1.30 and 2.50, respectively.

3.2.2 Existing Water Servicing

Based on City records and Water Atlas Maps, there is one (1) existing 250 mm diameter cast iron watermain running parallel along Queen Street West, on the south side the right-of-way (ROW) which was constructed in 1887. The existing 250 mm Ø watermain converge roughly 40 m to the west of the site boundary to become a single 300 mm Ø ductile cast iron watermain. According to the record drawings and atlas maps obtained from the City,

the 300 mm Ø watermains was built in 1987. Water Atlas Maps for the site can be found in Appendix B of this report.

City of Toronto Infrastructure Viewer (T.O. Inview) map identifies that there will be a construction of new watermains in year 2024 from Dufferin Street to Fuller Avenue along Queen Street West which covers the entirety of development site's frontage. The construction work will also include the replacement of fire hydrants and water valves. It is noted that current record information of the watermain may be outdated by the time of construction of the water service connection.

There is an existing fire hydrant on the south side of the Queen Street West ROW and an existing fire hydrant on the west side of the Jameson Avenue ROW which together encompasses the entire frontage of the site within a 60 m ± radius of the hydrant.

All existing services from the site within the Queen Street West ROW are to be decommissioned by City forces at the owner's expense.

3.2.3 Proposed Water Servicing

3.2.3.1 DOMESTIC WATER DEMAND ANALYSIS

The total estimated average daily flow rates, maximum day, and peak demand rates required for the proposed development are estimated to be as follows:

Table 3.1 – Proposed Water Demand

	Average Day Demand (L/s)	Maximum Day Demand (L/s)	Peak Hour Demand (L/s)
Residential (Condominium)	0.97	1.26	2.42
Retail (ICI)	0.02	0.02	0.02
TOTAL	**0.99**	**1.28**	**2.44**

Refer to Appendix B for water demand analysis calculations.

3.2.3.2 FIRE FLOW ANALYSIS

In accordance with the City of Toronto Design Criteria for Sewers and Watermains, fire flows will not be less than 83.3 L/s (5,000 L/min) for a 4-hour duration for commercial areas. This flow is to be delivered with a residual pressure of not less than 140 kPa (20 psi).

Calculations using the Fire Underwriters Survey (FUS) indicate a maximum required fire flow of approximately 150 L/s (11,000 L/min) for the entire development (based on non-combustible construction with a sprinkler system designed to NFPA).

Refer to Appendix B for fire flow analysis calculations.

As described in Section 3.2.1, the water supply system should be designed to satisfy the greater of peak hour demand or maximum day demand plus fire flow. Therefore, the maximum day demand plus fire flow rate (i.e., 1.28 L/s + 150.00 L/s = 151.28L/s (9,077 L/min)) is the governing requirement.

3.2.3.3 PROPOSED WATERMAIN SERVICE CONNECTIONS

In accordance with the City of Toronto Municipal Watermain Code, new domestic water services are required for every building and existing services are to be removed. With respect to new water services, the City's Servicing Requirements for New Developments document indicates that each point tower shall have its own independent service and any podium shall have its own independent service when there are multiple point towers. As a result, one (1) domestic water service connection is proposed for the development.

A fire service will also be required for the building sprinkler system. The OBC requires two sources of water supply for fire protection to service a building that is 84 m or higher in height. As the subject development will not exceed this height, only a single fire connection is required.

A new 200 mm Ø fire water service will be connected to the existing 250 mm Ø watermain on the south side of the Queen Street West right-of-way (ROW). However, if the new watermain construction (as indicated by T.O. Inview per Section 3.2.2) is completed by the time of the installation of new water service connection, the proposed development shall be connected to the new watermain, in coordination with City forces and Toronto Water. Approximately 2.0 m in front of the property line, a 150 mm Ø PVC domestic water service will be branched off the 200 mm Ø service in an "h" configuration. This configuration will provide the required single domestic service connections and the single fire service connection required for this development.

The location of the water service connection will be roughly immediately east of the building along the Queen Street West frontage, where there will be a water meter room at the P1 level of the building.

It is noted that where there is a risk of contamination at a property, such as non potable water, wastewater, or any other liquid, chemical or substance entering the waterworks that

may affect the quality of the water supply, the owner of the property will install a backflow prevention device. Backflow prevention devices will be selected, supplied, installed, and tested at the owner's expense in accordance with Water Supply Bylaw, Chapter 851 of the Toronto Municipal Code, Ontario Building Code, CSA B64 and NFPA 13/14 standards and specifications.

One (1) siamese connection is proposed along the frontage of the building located 45 m ± away from the nearest relocated hydrant within the Queen Street West ROW.

Refer to Appendix A for the Basement Level Plan and Appendix E for the Proposed Servicing Plan.

3.2.4 Capacity of Existing Watermain System

A hydrant flow test in accordance with NFPA STD 291 is required to analyze the capacity of the existing watermain system. However, as hydrant flow test permits are typically issued seasonally between April and November, the permit is not attainable at the time of the development application and a hydrant flow test will be conducted and provided for a subsequent submission. Based on a cursory review of the development application for 1488 Queen Street West, a hydrant flow test was performed by Jackson Waterworks on November 13, 2020, on the hydrants located directly in front of 1455 Queen Street West ROW. The test result indicates that the existing 250 mm Ø watermain is capable of providing 246.7 L/s (3,910.6 US GPM) at 20 psi.

As discussed in Section 3.2.3.2, the max day flow plus fire flow rate for the site is approximately 151.3 L/s (2,397.8 US GPM).

In conclusion, the record hydrant flow test results indicate that the existing 250 mm Ø on the south side of Queen Street West can support the proposed development. One (1) domestic service and a single fire service connection will be connected to the 250 mm Ø watermain on Queen Street West.

3.3 Sanitary Servicing

3.3.1 Sanitary Servicing Criteria

The City of Toronto's Design Criteria for Sewers and Watermains (Jan 2021) was used to analyze the sanitary demand from the proposed development. The City criteria are generally summarized as follows:

- Average domestic residential sewage flows of 240 litres per capita per day for analysis of existing sewers (separated systems).

- The peak domestic sewage flow to be calculated by utilizing a calculated Harmon Peaking Factor of [$M = 1 + 14 / (4+P^{0.5})$].
- Average commercial/industrial/institutional flows of 180,000 litres per floor hectare per day for new local sewers (peaking factor included in average flow).
- A dry weather peak infiltration allowance of 0.26 L/s/ha is required for all sewers.

3.3.2 Existing Combined Servicing

A review of the City's Sewer Atlas Mapping indicates that the site is located in an area of the City of Toronto that is serviced by a network of storm and combined sewers. Based on City records and city as-built plan and profile drawings, there is one (1) 450 mm Ø vitrified clay combined sewer in front of the site along the Queen Street West ROW. In addition, record indicates the existing 450 mm Ø combined sewer drains west into a 600 mm Ø vitrified clay combined sewer located at a depth of 3.5m±. The sewers converge 200 m± east of the site, then continue to flow east to Dufferin Street. From Dufferin Street, they continue south until discharging to a 1350 mm Ø trunk sewer at Dufferin Street & Liberty Street.

With respect to existing combined sewer connections, a dye test was performed by Aquaflow Technology Inc. dated Feb 7th, 2023. The report stating that all buildings' roof drains and the parking lot catch-basin connect to the 450/600 mm Ø combined sewer. Each building has a combined sewer lateral for sanitary and storm flow connects into the combined sewer. All existing sanitary laterals and combined sewer connections are to be decommissioned by City forces at the Owner's expense.

The T.O.Inview map identifies that there will be sewer rehabilitation project to extend the existing sewer life and performance in year 2024. A site servicing connection shall be coordinated with Toronto Water department prior to construction.

The estimated peak sanitary discharge rate from the existing use is 60.3 L/s (rounded) (refer to Appendix C for calculations).

3.3.3 Proposed Sanitary Servicing

3.3.3.1 SANITARY DEMAND ANALYSIS

Based on a per capita demand of 450 L/capita/day for residential and 250 L/capita/day for retail, the proposed site redevelopment will result in an estimated total peak sanitary flow rate of 9.26 L/s. The estimated breakdown of peak sanitary discharge from the redevelopment is as follows:

Table 3.2 – Proposed Sanitary Demand

	Peak Flow (L/s)
Residential (Condominium)	9.17
Retail (ICI)	0.03
Infiltration Allowance	0.06
TOTAL	**9.26**

Area drains located within the canopied vehicular driveway will be directed into the sanitary system, as stipulated by Ontario Building Code (OBC).

Refer to Appendix C for sanitary servicing analysis calculations.

3.3.3.2 PROPOSED SANITARY SERVICE CONNECTION

With respect to new sanitary services, the City's *Servicing Requirements for New Developments* document indicates that each point tower shall have its own independent service and any podium shall have its own independent service. As a result, one (1) domestic sanitary service connection is proposed for the development.

In accordance with the City Sewer Code, a sanitary control maintenance hole (MH) will be provided near the property line for City sampling purposes. The MH will be incorporated into the basement structure where the basement extends out from the building at grade along the Queen Street West frontage.

The sanitary service connection will connect to the control MHs outlined above. The sanitary service will be 200 mm Ø service connection and will connect to the existing 450 mm Ø combined sewer with a prefabricated "T" and rigid riser on Queen Street West. Refer to Appendix E for the Proposed Servicing Plan showing the proposed sanitary servicing configuration.

The proposed sanitary service that connects to the existing 450 mm Ø sanitary sewer on Queen Street West are designed based on plan and profile information obtained from the City and surveyed inverts. However, further subsurface utility investigation (daylighting) will be undertaken to review the location and depths of buried utilities and the City watermain and sewer. This will identify whether any relocations will be required to facilitate the connection.

3.3.4 Capacity of Existing Combined Sewer System

As indicated in Section 3.3.3.1, the proposed redevelopment will result in an increase of 9.12L/s of sanitary demand, in which case, the City requires an assessment of the impact of

the development on their sewer system. In addition, where combined sewers are involved, the City of Toronto requires the MOECC Procedure F-5-5 be reviewed for compliance.

Procedure F-5-5 outlines the requirements for determining treatment requirements for municipal and private combined sewers. With respect to new sanitary connections to combined sewer systems, the procedure requires that where a system is deficient, additional flow from new development shall be curtailed. In the City of Toronto where combined sewer systems exist without any sewer separation through the existence of dedicated storm sewers, combined sewer systems can often be considered deficient. As a result, in the absence of a combined sewer overflow study, to ensure compliance with Procedure F-5-5 it must be demonstrated that no additional flow is being introduced into the municipal combined sewer system as part of a redevelopment.

In consideration of the above, while the redevelopment of the site will result in an increase in sanitary demand, the implementation of stormwater management as part of the redevelopment will allow the discharge rate of stormwater to be controlled to significantly reduce the storm discharge rate and more than offset the additional sanitary demand.

This site is located in the City's designated Basement Flooding Area 42. According to the City's website, the Environmental Assessment related to basement flooding is scheduled to begin in 2022.

Therefore, the assessment of the existing combined sewer system capacity will be based on a net zero or net negative impact approach in which the redevelopment site will employ measures to mitigate any additional discharge to the combined sewer from the existing condition.

A review of pre- and post-development combined sewer demands was undertaken to assess the impact of the development on the existing combined sewer system and establish the maximum discharge rate for the SWM system and is summarized in the following table.

Table 3.3 – Proposed Discharge Summary

	Pre-Development (L/s)	Post-Development (Residential/ICI Sanitary) (L/s)	Difference (Residential Sanitary @450L/c/d) (L/s)
2 Year Storm Flow	60.19	0	-60.19*
Sanitary Flow	0.14	9.26	+9.12
TOTAL (L/s)	**60.33**	**9.26**	**-51.07**

**Storm flows will be redirected to the existing 1200 mm concrete storm sewer on Queen Street West ROW as outlined in Section 3.4.2.*

Pursuant to MOECC procedure F-5-5, to ensure no additional flow is being introduced into the combined sewer system as part of a redevelopment, the peak storm discharge will be redirected into the existing 1200mm concrete storm sewer on Queen Street West ROW as prescribed in Section 3.4.2. Table 3.3 demonstrates that because of controlling the peak storm discharge from the site to comply with the WWFM guidelines, there is a net negative impact to the total sanitary discharge to the Queen Street West combined system in the post-development condition.

The net negative peak flow impact to the Queen Street West combined sewer reasonably addresses the requirements of Procedure F-5-5.

3.4 Storm Servicing

3.4.1 Existing Storm Servicing and Drainage Conditions

There is an existing 1200 mm Ø concrete storm sewer located on the north side of the Queen Street West ROW. The storm sewer flows east along Queen Street West and outlets into the storm trunk sewer at the intersection of Queen Street West and MacDonell Avenue which eventually empties into Lake Ontario. Based on City Record Drawings, the storm sewer is approximately 3.0m ± below grade in front of the site.

With respect to existing storm service connections, as discussed in Section 3.3.2, all existing storm drainage goes into existing combined sewer system. There is no record of existing storm service connections to existing 1200 mm Ø concrete storm sewer.

The existing Site can be characterized as impervious since the site is comprised almost entirely of hardscaped surfaces and rooftop. Therefore, the site's existing runoff coefficient is C = 0.9. Using the rational method equation Q = CiA, the existing 2-year peak storm discharge rate from the site can be calculated as:

$$Q_{2-Year} = 2.78\ x\ CiA = 2.78\ x\ 0.90\ x\ 88.20\ mm/hr\ x\ 0.32ha = 70.62\ L/s$$

With respect to existing storm drainage condition, a Combined & Storm Sewer Investigation Report and Dye Test was completed by Aquaflow Technology in February 2023, and established that all building roof drains and catch basin within the parking lot are connected to the combined sewer system on Queen Street West. Each building has a combined sewer lateral to service both storm and sanitary flow from the property. Additionally, based on visual observation and a review of the topographic survey, there is no external drainage from adjacent properties that enters the site.

Refer to Appendix D for Combined & Storm Sewer Investigation Report and Dye Test by Aquaflow Technology dated February 7, 2023

Refer to Appendix D for existing drainage capacities discussion and calculations provided by Civica Infrastructure Inc. dated April 13, 2023.

3.4.2 Proposed Storm Servicing

It is noted that the City Municipal Code, Chapter 681 generally prohibits a storm connection from a site to the municipal sewer. However, in the case of site developments that are not individual single-family lots, a storm service connection is required to meet Wet Weather Flow Management (WWFM) Guidelines (November 2006) and implement the required SWM. The SWM plan serves as a request through the City of Toronto for a storm service connection and exemption from the associated requirements in the Sewer Code.

As required by the City municipal code with respect to sewers, a new storm service connection will be required, and any existing service connections are required to be removed.

In accordance with the City Sewer Code, a storm control MH will be provided near the property line for City sampling purposes. This MH will be incorporated into the basement structure where the basement extends out from the finished portion of the above ground building. Refer to Appendix E for the Proposed Site Servicing Plan which shows the proposed location for the control MH.

The new storm sewer service connection will be 300 mm Ø and will be connected to the 1200 mm Ø concrete storm sewer on Queen Street West.

The storm service connection will convey controlled drainage from the on-site SWM facility which will be employed to meet the City's stormwater discharge requirements outlined in Section 3.4.3 of this report. A detailed SWM Plan is presented in Section 4.0 of this report.

The proposed storm service connects to the existing 1200 mm Ø storm sewer on Queen Street West and is designed based on plan and profile information obtained from the City. However, further subsurface utility investigating will be undertaken to identify the location and depths of buried utilities and the city watermain and storm sewer. This will identify whether any relocations will be required to facilitate the connection.

3.4.3 Proposed Drainage Conditions

The proposed redevelopment surfaces are comprised of green roof, amenity landscaping, conventional roof, pervious surfaces at grade, and impervious at grade surfaces.

The above ground building takes up approximately 70 % of the site. The majority of the vehicular driveway area into the site is covered by conventional roof on the top. The at-grade area consists of at grade landscaping/amenity areas, transformer, and bike rack locations along the rear/south side of the site as well as between the front entrance and the property line. These areas will be directed by gravity into the SWM system for the site. There will be a small uncontrolled area along Queen Street West between the front of the building face to the property line draining directly to the ROW.

The total site weighted runoff coefficient has been calculated to be 'C'=0.70. Refer to Table 3.4 for the surface and area breakdown of the site and Appendix D for Figure SWM-1 for an illustration of the various surface types.

Table 3.4 - Proposed Flow Directed to Queen Street West Storm Sewer

Directed to/Catchment	Surface	Runoff Coefficient ('C')	Area (m^2)	% Area of Catchment	Weighted 'C' Component
SWM Tank	**Green Roof**	0.50	864	27.95	0.12
	Conventional Roof	0.90	1561	50.5	0.49
	Pervious at Grade	0.25	212	6.86	0.02
	Impervious at Grade	0.90	441	14.27	0.14
	Intake Shafts	0.90	13	0.42	0.1
	Sub-total		**3093**	**100%**	**0.74**
Uncontrolled			**118**	**100%**	**0.90**
	TOTAL		**3209**		**0.66**

Based on the WWFM Guidelines, the allowed peak discharge from the site is to be based on controlling the discharge rate to the pre-development 2-year storm with a maximum runoff coefficient of C=0.5 or the existing capacity of the receiving storm sewer. Since the existing site has a runoff coefficient of greater than C=0.5, a runoff coefficient of C=0.5 would therefore apply to the site and the allowable peak storm discharge from the redevelopment can be calculated as follows:

$$Q_{allowable\ (Site)} = 2.78\ x\ CiA = 2.78\ x\ 0.50\ x\ 88.20\ mm/hr\ x\ 0.3209\ ha = 39.3\ L/s$$

Therefore, in order to demonstrate that the peak flows to the municipal sewer are not greater in the post-development scenario and meeting the City's allowable release rate

outlined in the WWFM Guidelines, the discharge of the site must be controlled to 39.3 L/s for storms up to and including the 100-year storm. The on-site stormwater detention methods which will be implemented in order to control the allowable peak discharge rate are outlined in Section 4.0 below.

3.4.4 Capacity of Existing Storm Sewer System

As indicated in Section 3.4.3, the proposed redevelopment will divert the existing storm flow from the combined sewer system to the storm system, which will result in an estimated increase of 39.3 L/s to the peak storm flow out to the 1200mm Ø storm sewer on Queen Street West.

This site is located in the City's designated Basement Flooding Area 42. According to the City's website, the Environmental Assessment for this area is currently underway. In the absence of a completed basement flooding study, a downstream capacity analysis for has been prepared by Civica Water Management Solutions (Civica).

Civica's report assumes a 2-year peak flow of 60.0 L/s will be discharged to the 1200mm Ø storm sewer. The analysis shows that under 2-year and 100-year design storm, the storm sewer system can operate under free-flowing conditions, and can support the proposed development without any external upgrades or retrofits.

4.0 STORMWATER MANAGEMENT PLAN

4.1 Storm Drainage Criteria

The City of Toronto Wet Weather Flow Master Management Plan (WWFMMP) policy encourages the use of a "treatment train" approach to stormwater management that considers storm runoff as a resource. This philosophy considers best management measures that can be undertaken at the source, conveyance, and end of pipe locations. Opportunities to allow stormwater runoff to be infiltrated back into the ground at the source either by directing runoff to pervious surfaces or by way of infiltration/exfiltration techniques are a key component of the City's WWFMMP policy.

Based on the City of Toronto WWFM Guidelines the following general SWM criteria would apply to the redevelopment of this site:

- Water Balance: Retain stormwater on-site to the extent practicable to achieve the same level of annual volume of overland runoff from the site in the pre-development

(existing) condition. The maximum allowable annual volume is 50% of the total average annual rainfall depth (this equates to the capture and retention of approximately 5mm of runoff on a daily event basis).

- Water Quality: Provide long-term average removal of 80% of Total Suspended Solids on an annual loading basis from the post-development site.
- Water Quantity (Rate Control): Control flows from the site during all design storm events (2-year through 100-year design storms) to a rate no greater than the peak runoff rate that would be generated on the predeveloped site in a 2-year storm event with a "C" value of C=0.50, or the existing capacity of the receiving sewer, whichever is less.
- Runoff generated on the entire site, in all storm events, up to and including the 100-year event, shall be contained on-site.
- There may be runoff from rainstorms that exceed the capacity of the City's storm service connections. Therefore, the owner shall be responsible to provide flood protection or a safe overland flow route for the proposed development without causing damage to the adjacent public and private properties, up to the 100-year design storm.
- Existing drainage patterns on adjacent properties shall not be altered and stormwater runoff from the subject development shall not be directed to drain onto adjacent properties.

Additionally, the City provides the following table for consistency regarding a number of general SWM criteria:

Table 4.1 – General SWM Criteria

Surface Type	Initial Abstraction (mm)	TSS Removal (%)	Runoff Coefficient
Impervious Roof	1.00	80.00	0.90
Asphalt Pavement	1.00	0.00	0.90
Landscape	5.00	80.00	0.25
Green Roof	7.00 max for intensive roofs, otherwise 5.00	80.00	0.45-0.50
Permeable Pavers	5.00	80.00 with storage bed otherwise 50.00	0.40
Concrete Pavers	1.00	0.00	0.90

Surface Type	Initial Abstraction (mm)	TSS Removal (%)	Runoff Coefficient
Grassed Swale	5.00	50.00 for a min length of 16m	0.25

The IDF curve information for the I_2 to I_{100} storms as obtained from the City of Toronto's WWFM Guidelines are as follows:

I_2 (mm/hr) = 21.8 $(T)^{-0.78}$, where T is in hours

I_5 (mm/hr) = 32.0 $(T)^{-0.79}$, where T is in hours

I_{10} (mm/hr) = 38.7 $(T)^{-0.80}$, where T is in hours

I_{25} (mm/hr) = 45.2 $(T)^{-0.80}$, where T is in hours

I_{50} (mm/hr) = 53.5 $(T)^{-0.80}$, where T is in hours

I_{100} (mm/hr) = 59.7 $(T)^{-0.80}$, where T is in hours

These equations ca he re-expressed in the traditional IDF format (where T is in minutes) as follows:

I_2 (mm/hr) = 531.391/ $(T + 0)^{0.78}$

I_5 (mm/hr) = 812.623 / $(T + 0)^{0.79}$

I_{10} (mm/hr) = 1023.840 / $(T + 0)^{0.80}$

I_{25} (mm/hr) = 1195.800 / $(T + 0)^{0.80}$

I_{50} (mm/hr) = 1415.390 / $(T + 0)^{0.80}$

I_{100} (mm/hr) = 1579.41 / $(T + 0)^{0.80}$

4.2 Proposed Stormwater Management

The configuration of the proposed redevelopment will result in a building footprint that will effectively be extended to the developable limits of the site. A stormwater management tank will be incorporated into the building basement to control the 100-year post development peak discharge rate of the site to the allowable rate in accordance with WWFM Guidelines.

4.2.1 Proposed SWM Plan

The catchment as described in Section 3.4.3 consist of the proposed building, the vehicular entrance from Queen Street West, the at grade amenity space, landscaping area, bike rack

facility, transformer area as well as the area between the front entrance and property line fronting Queen Street West. This area will be graded so that it is captured and conveyed by gravity to the SWM facility. The facility will be designed so that during storm events that exceed the 100-year design storm, overflow of the facility will be directed to the Queen Street West public right-of-way. As such, finished floors are set to be above that spillover elevation to protect the building from flooding.

The SWM tank will be incorporated into the basement level of the building underneath the driveway entrance to provide the detention volume associated with the reduction in the peak storm discharge rate. The tank will have an outlet through an orifice control upstream of the storm control MH accessible by the City. As the storm connection is relatively deep, the water head required above the outlet can efficiently drain to the municipal storm system by gravity.

The proposed SWM tank is located at the northwest corner of the site, extends through P1 level, with access into the tank provided along the Queen Street West frontage of the site at the driveway entrance. A portion of the tank located beneath the driveway, and also between the at-grade building face along the Queen Street West property line will be recessed to accommodate pavement structure on top of the basement slab. Additionally, a gas utility trench is proposed to run north-south along the west property boundary on top of the cistern tank, therefore, a deeper recess is proposed for the trench area. The SWM tank access will be provided through a grated maintenance hole cover so that it will also serve as an emergency spillover to the roadway during storm events where the capacity of the tank is exceeded (i.e., events greater than the 100-year design storm). To control the peak storm discharge from the site into the municipal sewers, the detention tank will have an outlet through an orifice control upstream of the storm control MH accessible by the City. Refer to Appendix D for the storm calculations.

With respect to stormwater quality, green roof, amenity landscape, conventional flat ballasted roofs, and terraced amenity areas are generally considered to be clean from the perspective of being a source for TSS as they are only exposed to minor airborne particles. As a result, it is generally accepted that the City's TSS water quality target is inherently achieved for roof runoff. As a result, no further purposeful stormwater treatment device is proposed to treat roof rainwater before it is discharged into the cistern and then into the detention tank. However, the areas at-grade which are exposed to pedestrian and vehicular traffic are not considered to be clean and will need to be treated before entering the City's sewer system. As a result, a purposeful stormwater treatment device, StormFilter® by Echelon Environment will be required before discharging the rainwater into the City's sewer system. This unit will be incorporated into the basement structure so that the flow path of

storm runoff will pass through it prior to entering the main SWM tank. Surface access openings to the ground surface will facilitate regular maintenance of the treatment unit.

As the area available for green roofs is limited, the water balance target cannot be achieved with green roofs alone. To offset this water balance shortfall, a rainwater harvesting cistern will be provided below the stormwater detention tank. The runoff directed to this tank will be from either relatively "clean" roof surfaces or treated rainwater from the StormFilter. Rainwater that exceeds the design retention volume will spill over into the SWM detention tank. The SWM detention tank will then discharge through an orifice upstream of the storm control maintenance hole at the property line and to the City storm sewer system, via a sewer lateral.

The harvested rainwater will require usage that has sufficient demand to deplete the required volume within 72 hours on average. Based on irrigation demand within 72 hours provided by Studio TLA dated April 14th, 2023, the irrigation demand of 9.3m^3 will be sufficient to use up the entirety of the required harvesting rainwater cistern volume of 8.79m^3.

Refer to Appendix E for the Proposed Servicing Plan.

4.2.2 Calculation Methodology

4.2.2.1 DETENTION VOLUME

For the purpose of calculating the proposed discharge rates and required detention volumes, a Visual Otthymo Model (VO2) was created to simulate the storage and discharge characteristics of the site.

The following commands were used to model the site:

-  (1) The StandHyd command was used to model the portions of the site directed to the Primary SWM tank. IA values of 5mm and 1mm were assigned to the pervious and impervious components, respectively. Furthermore, a CN value of 95 was applied to mimic the high potential for stormwater to be converted to runoff for rainfall events that exceed the assigned IA values.
-  (7) A second StandHyd command was used to model the at grade area of the site which would be directed to the Secondary Tank ("sunken" areas). IA values of 5mm and 1mm were assigned to the green roof components and conventional flat roof portion, respectively. Furthermore, a CN value of 90 was applied to mimic the

high potential for stormwater to be converted to runoff for rainfall events that exceed the assigned IA values.

- (8) The RouteReservoir command was used to simulate the pump discharge characteristics from the secondary tank to the site's primary SWM detention tank.
- (6) The AddHyd command was used to add the roof & at grade portions together, as well as the secondary tank hydrographs to calculate the peak site discharge.
- (8) A second RouteReservoir command was used to simulate the detention and discharge characteristics for the site's primary SWM detention tank.

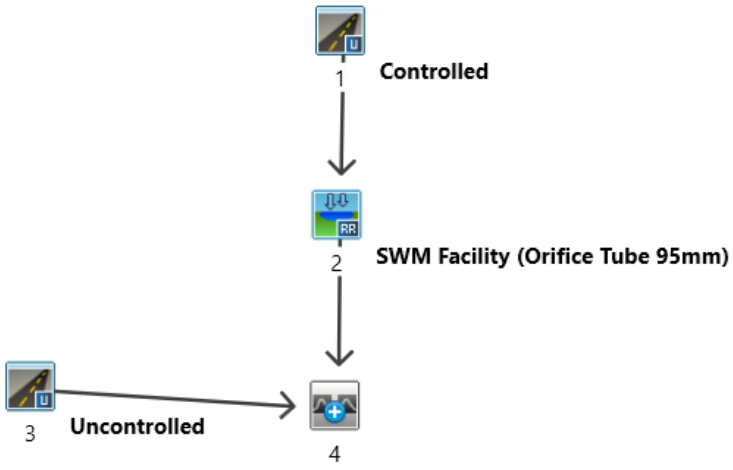


Figure 4.1 – V02 Model Schematic

The City of Toronto requirements outline that an orifice tube with a minimum diameter of 100 mm must be checked, prior to consideration of other orifice systems. As the exterior wall width of the proposed building is less than 1.0 m outlined on the City of Toronto Sewer and Watermain Design Manual (2021), an averaged discharge coefficient (cd) value 0.77 is implemented in the calculation. Based on the tank configuration (i.e., available head in the tank) a 100 mm Ø orifice tube would result in an approximate maximum discharge of 36 L/s from the SWM tank under 100-year storm event. This value would meet the allowable peak discharge rate. Based on the configuration of the tank and the orifice, a stage storage discharge curve was produced to develop the V0 route reservoir module. Table 4.2 summarizes the results for the model simulations for the 2 to 100-year design storms and the site stormwater detention storage volumes.

Refer to Appendix D for the complete VO2 outputs for the pumped and non-pumped condition and the gravity draining condition, as well as input parameters for each area.

Table 4.2 -- Proposed Stormwater Detention Tank

Storm Event	Allowable Peak Discharge Rate (L/s)	Controlled Peak Storm Discharge from SWM Tank (L/s)	Total Storage Provided (m^3)	Total Storage Required (m^3)
2-Year	39.31	19.00	128.5	31.00
5-Year	39.31	24.00	128.5	52.00
10-Year	39.31	25.00	128.5	55.00
25-Year	39.31	31.00	128.5	80.00
50-Year	39.31	34.00	128.5	98.00
100-Year	39.31	36.00	128.5	112.00

As can be seen from Table 4.2, the detention tank and orifice control serve to meet the City's rate control criteria.

4.2.2.2 WATER BALANCE

The City of Toronto WWFM Guidelines target for water balance is to retain stormwater on-site, to the extent practicable, to achieve the same level of annual volume of overland runoff from the site in the pre-development (existing) condition, with a maximum allowable annual volume of overland runoff of 50% of the total average annual rainfall depth, which equates to the capture and retention of approximately 5 mm of runoff on a daily event basis.

Using Figure 2 from the WWFM Guidelines, and an existing imperviousness of almost 90%, greater than 50% of the average annual rainfall depth leaves the site as runoff. As a result, the maximum allowable volume of overland runoff is 50% of the annual depth of rainfall.

Based on the water balance criteria, the minimum on-site runoff retention requires retaining all runoff of the first 5mm from each rainfall through infiltration, evapo-transpiration, or rainwater reuse.

Refer to Table 4.3 for a summary of the surface conditions, initial abstraction values, corresponding areas, and rainfall capture depths for the site.

Table 4.3 – Water Balance

	Surface	Area (m^2)	% Total Site Area	Surface IA (mm)	Depth Directed to Cistern (mm)	Total Effective IA (mm)	% of Total Annual Average Rainfall (%)	% of Total Annual Average Rainfall Over Site	Cistern Size (m^3)
SWM Tank	Green Roof	864	22.92	5.0	0.0	5.0	50.0	13.0	0.00
	Convention al Roof	1561	48.64	1.0	4.5	5.5	53.0	26.0	7.02
	Pervious at Grade	212	6.61	5.0	0.0	5.0	50.0	3.0	0.00
	Impervious at Grade	441	13.74	1.0	4.0	5.0	50.0	7.0	1.76
	Intake Shafts	13	0.41	0.0	0.0	0.0	1.0	0.0	0.00
	Sub-total	**3091**						**49.0**	**8.79**
	Uncontrolled	118	3.68	5.0	0.0	5.0	50.0	2.0	0.0
	Sub-total	**118**	**22.56**					**2.0**	**0.0**
	TOTAL	**3209**	**100.0**					**51.3**	**8.79**

Runoff captured from rooftop and terrace is considered to inherently meet the City's water quality target and therefore is not proposed to be treated for quality, and therefore will directly enter the cistern. It is anticipated that the harvested rainwater will be used up within a 72-hour period for irrigation. Based on irrigation demand within 72 hours provided by Studio TLA dated April 14th, 2023. The Irrigation demand of 9.3m^3 will be sufficient to use up the entirety of the required harvesting rainwater cistern volume of 8.79m^3. For further details on the please refer to Appendix D.

4.2.2.3 WATER QUALITY

The City of Toronto Wet Weather Flow Management (WWFM) Guideline's water quality target is for the long-term average removal of 80% of Total Suspended Solids (TSS) on an annual loading basis from all runoff leaving the proposed development site based on the post-development level of imperviousness. The rationale for effective TSS removal rates corresponding to the surfaces on the site is as follows:

- Conventional Flat Roofs, Green Roofs, & Landscaping: Rooftop areas are subject only to airborne particles and insignificant amounts of sediment transported by foot traffic. As such, an effective removal efficiency of 80% to 90% is often considered to be reasonable on a traditional flat roof or green roof. In this regard, the City of Toronto generally accepts a performance rating of 80% for roof surfaces.
- Pervious & Impervious at Grade: Runoff from ground level surfaces will be directed to the Stormfilter before being directed into the stormwater detention tank. The Stormfilter has been designed to provide 80 % TSS removal from the at grade runoff.

In summary, due to the vast majority of the site surfaces (96.4 %) receiving TSS removal efficiency rates of 80 %, the City's water quality target is met. Please refer to Table 4.4 for a summary of the removal rates.

Table 4.4 – Water Quality

Directed to Catchment	Surface	Area (m^2)	% Area of Catchment	Effective TSS Removal (%)	Weighted TSS Removal (%)
SWM Tank	Green Roof	724	22.56	80.00	19.4
	Conventional Roof	1671	52.07	80.00	44.8
	Pervious at Grade	220	6.86	80.00	5.9
	Impervious at Grade	465	14.49	80.00	12.5
	Intake Shafts	13	0.41	80.00	0.0
	Subtotal	**3093**	**96.4%**		**82.5**

4.2.3 Maintenance

The stormwater management and drainage system for the site does require regular maintenance to ensure that it functions as intended and continues to meet the by-law requirements of the City. Key components of the system and applicable maintenance issues are as follows:

SWM Tanks: The SWM detention tank upper cell, the SWM pumped lower cell, and the rainwater harvesting cistern will receive runoff that is either from a relatively "clean" roof top source or runoff that has passed through a Stormfilter system. Nevertheless, all SWM systems should be inspected annually and cleaned out when sediment accumulates to a

greater depth than 25 mm or as prescribed by the designer/supplier. Any additional requirements set out by the irrigation system supplier/manufacturer should also be met.

Stormwater Treatment Unit: The Stormfilter system will require regular maintenance as well as regular replacement of the individual filter cartridges. The capture and removal of sediment from the stormwater will degrade the filter media to a point where it can no longer function properly and, as a result, regular replacement of the filters will be required. The duration of time between filter changes will depend on the quality of the runoff entering the system and the frequency of rain events. These units should be maintained in accordance with the manufacturer's recommendations, and it is suggested that a maintenance contract for inspection and required change-out of filters be entered into with a qualified contractor.

Area Drains/Catchbasins/Roof Drains: Area drains, and roof drains should be inspected at a minimum semi-annually to ensure that they are free of debris that may clog them. However, the area drains on site shall be designed with a 50% clog factor to ensure that they are capable of capturing up to 100-year storm events.

Green Roofs: As a living system, the plant material will require periodic maintenance in addition to regular watering until plant material is established. Specifics of the green roof maintenance will be identified by the Architect and Landscape Architect. The landscape Architect has provided green roof specifications which are available in Appendix D of the report.

5.0 EROSION AND SEDIMENT CONTROL DURING CONSTRUCTION

Measures are to be taken during construction to ensure that erosion and/or transportation of sediments off-site is controlled. Mitigation measures include:

- Erection of sediment control fence prior to construction, and maintenance throughout construction activities.
- Construction of a clear-stone "mud-mat" at construction site exits to control the tracking of sediments off-site from the tires of vehicles.
- Use of watering for dust control.
- Application to the City for a permit to discharge construction water, including the testing and sediment removal pre-pumping measures required to meet the City permit requirements and sewer use bylaw.

6.0 CONCLUSION

With respect to the proposed redevelopment at 1437-1455 Queen Street West, the proposed site servicing and stormwater management system will address the requirements of the City of Toronto, as follows:

Foundation Drainage

A Hydrogeological Investigation prepared by Grounded Engineering. dated March 27, 2023, indicates the anticipated short-term discharge rates will be 75,000 L/day (0.86 L/s) and a long-term discharge rate of 1,000 L/day (0.01 L/s) from infiltrated stormwater. Additionally, the investigation concluded that the water quality of the foundation drainage is suitable for discharge into the sanitary sewer but not the storm sewer. Short-term discharge will be directed to the 450 mm Ø combined sewer, and there will be no long-term groundwater discharge for the proposed development.

Water

A 200 mm Ø fire water service with a 150 mm Ø domestic branch, are proposed to be connected to the 250 mm Ø watermain on the south side of Queen Street West to supply the buildings sprinkler system as well as domestic water to the condominium and retail portion of the site. A peak water demand of 151.28L/s has been estimated for the proposed development, and a hydrant flow test obtained from City's Development Engineering database indicated the existing municipal watermain system has a capacity of 246.7 L/s which is more than sufficient to support the proposed development. A hydrant flow test will be conducted in spring 2023 to verify the capacity and will be provided in the subsequent development application submission.

Sanitary

One (1) proposed sanitary services will convey drainage from the site to the 450 mm Ø existing combined sewer on the south side of Queen Street West. The service is 200 mm Ø in size and will convey flows from the residential and retail portions of the site.

Storm

A 300 mm Ø storm service connection to the existing 1200 mm Ø storm sewer located on Queen Street West will convey a maximum controlled discharge of less than 40.8 L/s from the proposed building SWM system. This discharge rate was established so that the control flows from the site during all design storm events (2-year through 100-year design storms) are at a rate no greater than the peak runoff rate that would be generated on the

predeveloped site in a 2-year storm event with a "C" value of C=0.50. The existing capacity of the receiving sewer was analyzed by Civica Infrastructure to ensure there is sufficient free flow capacity to receive the proposed flow from the development. A 128.5 m^3 SWM detention tank with a 100 mm Ø orifice tube will provide the required detention volume for that discharge rate.

The implementation of infiltration will serve to meet the City's water balance target and limit the total average annual runoff volume to 50% of the annual average rainfall.

Effectively 99% of the proposed site receives a TSS efficiency removal rate of 80% and, as a result, the clean nature of roof runoff and the filtered at grade surfaces will serve to meet the City's 80% TSS removal water quality requirement.

Summary of Key Servicing and SWM Parameters

Water Connection Size(s): 200 mm Ø fire with 150 mm Ø domestic branch water service.

Sanitary Service Size: 200 mm Ø sanitary service to combined sewer.

Storm Service Size: 300 mm Ø storm service.

Stormwater Detention Volume: 112 m^3 required, 128.5 m^3 provided.

Stormwater discharge control: 100 mm Ø orifice tube.

We trust that this report satisfies the requirements of the City of Toronto with respect to the subject development. Should you have any questions, please do not hesitate to contact the undersigned.

R. V. ANDERSON ASSOCIATES LIMITED

Report Prepared By:
Chloe Cao, EIT, C.E.T.
Project Designer

Report Reviewed By:
Alex Wong, P.Eng.
Project Manager

APPENDIX A

Architectural Plans & Site Statistics

TABLE A1 - Population Calculations

	Proposed Building		
	Units	**Unit Rate (pp/u)**	**Population**
Residential			
1 bedroom+Studo	139	1.4	195
2 bedroom	84	2.1	176
3 bedroom	26	3.1	81
Total Residential	**249**		**452**
		Rounded	**460**
	Floor Area (m^2)	**Unit Rate ($pp/100m^2$)**	**Population**
Retail	789	1.1	9
Office	0	3.3	0
Total ICI	**789**		**9**
		Rounded	**9**
TOTAL PROPOSED			**469**

SITE PLAN NOTES

1. THE BUILDING IS TO BE SPRINKLERED.
2. THE SOLID WASTE ROOMS IS 77 SM AND WILL ACCOMMODATE GARBAGE VIA USE OF 11 CHUTES. GARBAGE CHUTE ACCESS OCCURS ON FLOORS 2 TO 12. ADDITIONAL BULK STORAGE IS PROVIDED AT A MINIMUM OF 10SM ON GROUND FLOOR.
3. REFER TO SITE SERVICING PLAN FOR SEWER AND WATER SERVICE INFORMATION.
4. REFER TO LANDSCAPE DRAWINGS FOR LANDSCAPING.
5. COLLECTION OF WASTE MATERIALS FOR THIS DEVELOPMENT WILL TAKE PLACE ON SITE IN THE LOADING AREA DESIGNATED ON THE GROUND FLOOR PLAN. AN ON-SITE TRAINED STAFF/MAINTENANCE PERSON IS RESPONSIBLE FOR MOVING THE BINS FROM THE SOLID WASTE ROOM TO THE COLLECTION POINT AND PROVIDE VEHICULAR DIRECTIVES TO THE COLLECTION VEHICLE OPERATOR AS REQUIRED. IN THE EVENT THE ON-SITE STAFF IS UNAVAILABLE AT THE TIME THE CITY COLLECTION VEHICLE ARRIVES, THE COLLECTION VEHICLE WILL LEAVE THE SITE AND NOT RETURN UNTIL THE NEXT SCHEDULED COLLECTION DAY.
6. SOLID WASTE MANAGEMENT TO BE NOTIFIED UPON COMPLETION OF THE DEVELOPMENT AND SHOULD PUBLIC WASTE COLLECTION BE USED, ALL NECESSARY APPLICATION AND WAIVER FORMS TO BE COMPLETED PRIOR TO COMMENCEMENT OF CITY REFUSE COLLECTION.
7. SIDEWALKS AND BOULEVARDS WITHIN THE RIGHT OF WAY TO HAVE A MINIMUM 2% AND MAXIMUM 4% SLOPE TOWARDS THE ROADWAY.
8. ALL EXISTING ACCESSES, CURB CUTS, TRAFFIC CONTROL SIGNS, ETC. ALONG THE DEVELOPMENT SITE FRONTAGE THAT ARE NO LONGER REQUIRED ARE TO BE REMOVED. THE BOULEVARD WITHIN THE PUBLIC RIGHT OF WAY, IN ACCORDANCE WITH CITY STANDARDS AND TO THE SATISFACTION OF THE EXECUTIVE DIRECTOR OF TECHNICAL SERVICES ARE TO BE REINSTATED.
9. PROPOSED ACCESS TO THE DRIVEWAY FOR THIS PROJECT TO BE DESIGNED IN ACCORDANCE WITH MUNICIPAL STANDARDS FOR COMBINED CURB AND SIDEWALK VEHICULAR ENTRANCES.
10. NO SPEED BUMPS SHALL BE INSTALLED ON ANY MAIN DRIVE AISLE OR DESIGNATED FIRE ROUTE.
11. ALL ITEMS NEW CONSTRUCTION, UNLESS NOTED OTHERWISE.
12. THIS BUILDING IS DESIGNED WITH A SHARED LOADING SPACE. A FLASHING WARNING LIGHT SYSTEM AND/OR APPROPRIATE SIGNAGE ADJACENT TO THE SPACE, AT NO COST TO THE CITY, WILL BE IN PLACE AND ACTIVATED DURING COLLECTION AND REMAIN ACTIVE UNTIL THE VEHICLE EXITS THE SITE.

SITE PLAN LEGEND

- 000.000 × — EXISTING ELEVATION
- 000.000 TOS × — TOP OF SLAB
- 000.000 TOR × — TOP OF ROOF
- OUTLINE OF BUILDING AT GRADE
- OUTLINE OF BELOW GRADE STRUCTURE
- PRINCIPAL RES ENTRANCE
- PEDESTRIAN EXIT/ENTRANCE
- VEHICULAR EXIT/ENTRANCE
- SIAMESE CONNECTION
- FIRE HYDRANT
- MANHOLE
- CATCH BASIN

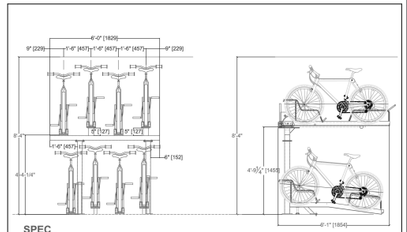
SITE PLAN INFORMATION TAKEN FROM:

TOPOGRAPHIC PLAN SURVEY OF PART OF LOT 1 AND ALL LOTS 2 TO 6, BOTH INCLUSIVE REGISTERED PLAN 1106 CITY OF TORONTO PREPARED BY SCHAEFFER DZALDOV PURCELL LTD. LAND SURVEYORS (MARCH 7TH 2023).

98.110m = ESTABLISHED GRADE
98.160m = TOS GROUND FLOOR AVERAGE

SITE PLAN ABBREVIATIONS

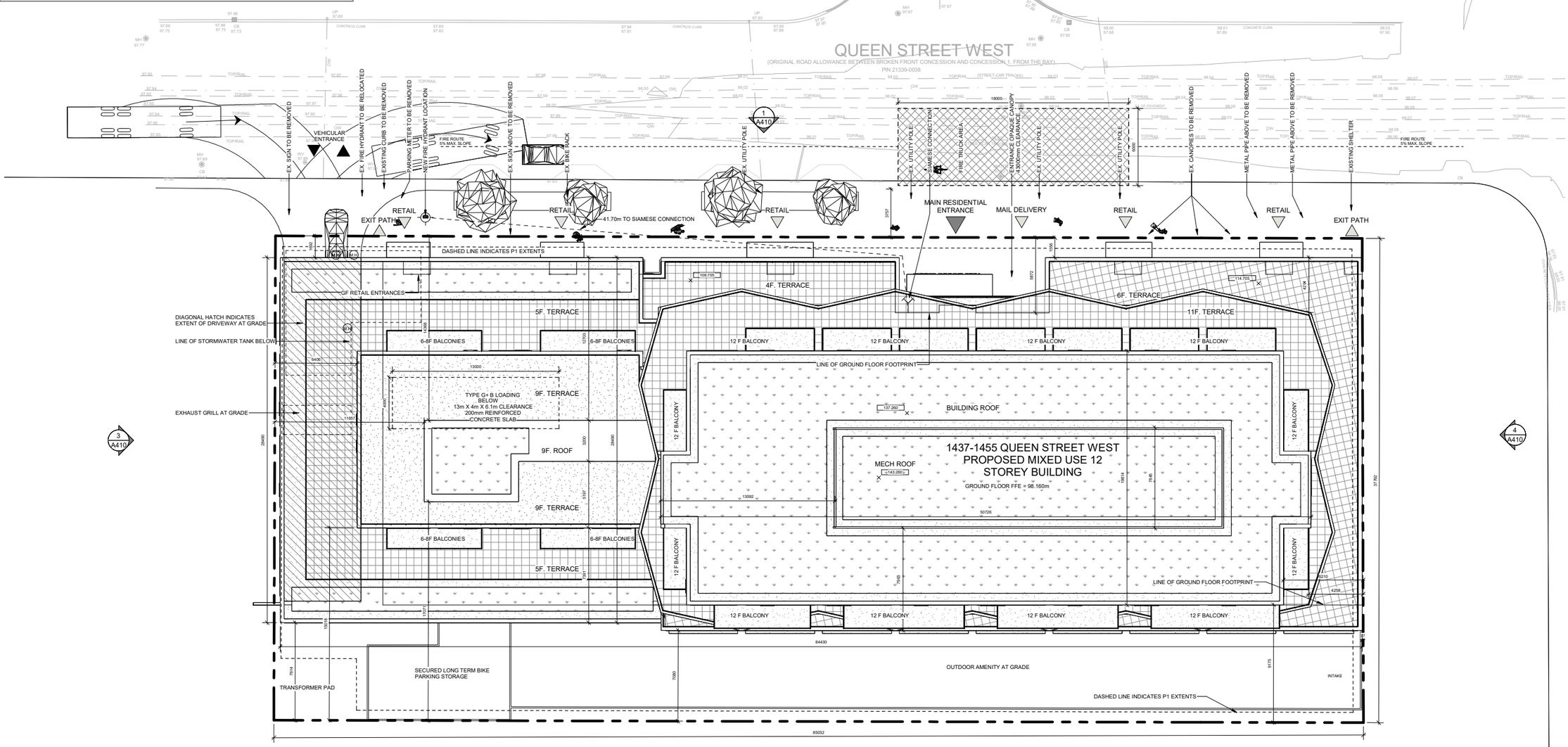
AD	AREA DRAIN
CACF	CENTRAL ALARM CONTROL FACILITY
CB	CATCH BASIN
FH	FIRE HYDRANT
FD	FLOOR DRAIN
HB	HOSE BIB
HLP	HYDRO LIGHT POLE
MH	MAN HOLE
TLS	TRAFFIC LIGHT STANDARD



SPEC_
PRODUCT- The Lock-up stackable bike rack
Multiple stackable bike rack
SECTIONS- 8' sections, 6' sections + Single sections
CAPACITY- 8 bikes, 6 bikes, or 2 bikes
MATERIAL- HSS steel
FINISHES- Hot Dipped Galvanized
SPACE USE/SETBACKS- 18" center to center

Single Stackable Bike Rack Section

Bike Rack MFG Dist.
416-927-7499



ISSUE RECORD

—

REVISION RECORD

—

NORTH

RAW

405-317 ADELAIDE STREET WEST
TORONTO CANADA M5V 1P9
+1 416 599 9729
WWW.RAWDESIGN.CA

21049

Toronto

1437-1455
Queen Street West
Stanford Homes

SITE PLAN

SCALE: As indicated

A100

2023-04-14 1:20:20 PM

405 317 ADELAIDE ST. W.
TORONTO CANADA M5V 1P9
+1 416 599 9729
WWW.RAWDESIGN.CA

SITE STATISTICS

14 April 2023

21049
1437-1455 Queen Street West
Toronto, ON

Official Plan	MIXED USE	Gross Site	3209 sq.m.	34,541 sq.ft.
Avenue Width	20 m	Lane Widening	sq.m.	0 sq.ft.
Current Zoning		Net Site	3209 sq.m.	34,541 sq.ft.
FSI		RETAIL	0.25	
		RESIDENTIAL	5.23	
		TOTAL	5.48	

AREA CALCULATIONS

FLOOR	UNITS					RETAIL		GCA		GFA EXC.		GFA		NSA	
	STUDIO	1B/1B+	2B/2B+	3B/3B+	TOTAL	sq.m.	sq.ft.	sq.m.	sq.ft.	sq.m.	sq.ft.	sq.m.	sq.ft.	sq.m.	sq.ft.
BASEMENT					0										
1					0	789	8,493	1,687	18,159	302.0	3,251	1385.0	14,908	789.0	8,493
2	1	25	5	3	34			2,051	22,077	48.0	517	2003.0	21,560	1849.0	19,902
3		29	6	2	37			2,140	23,035	42.0	452	2098.0	22,583	1978.0	21,291
4		22	10	2	34			2,084	22,432	42.0	452	2042.0	21,980	1916.0	20,624
5	2	17	8		27			1,690	18,191	42.0	452	1648.0	17,739	1490.0	16,038
6	2	7	10	2	21			1,483	15,963	42.0	452	1441.0	15,511	1330.0	14,316
7	2	7	10	2	21			1,483	15,963	42.0	452	1441.0	15,511	1330.0	14,316
8	2	7	10	2	21			1,483	15,963	42.0	452	1441.0	15,511	1330.0	14,316
9		10	6	1	17			1,211	13,035	58.0	624	1153.0	12,411	1029.0	11,076
10		6	5	4	15			1,157	12,454	43.0	463	1114.0	11,991	1041.0	11,205
11			7	4	11			948	10,204	43.0	463	905.0	9,741	832.0	8,956
12			7	4	11			948	10,204	43.0	463	905.0	9,741	831.0	8,945
					0										
	9	130	84	26	249	789	8,493	18,365	197,686	789	8,493	17,576	189,186	15,745	169,478
	4%	52%	34%	10.4%											

AVERAGE UNIT SIZE (Gross)	74	794
NSA/ GCA Ratio	86%	

AMENITY

INDOOR AMENITY			
Required	498 sq.m.		
Provided	499 sq.m.	5,371	sq.ft.
OUTDOOR AMENITY			
Required	498 sq.m.		
Provided	784 sq.m.	8,439	sq.ft.
Total Required	996 sq.m.		
Total Provided	1283 sq.m.	13,810	sq.ft.

PARKING

VEHICLE					Required	Provided			
Zone B						Surface	P1	P2	Total
Resident	0	0	0	0			59		59
Visitor					14		14		14
Retail									
TOTAL						0	73	0	73
BIKE					Required	Provided			0.29
(Short-Term)									
Required Ratio (0.2)					49.8	50			50
(Long-Term)									0
Required Ratio (0.9)					224.1	0	225		225
TOTAL					273.9	50	225	0	275

1 / A001 Site Statistics
1 : 20

TORONTO

Statistics Template – Toronto Green Standard Version 4.0

Mid to High Rise Residential and all New Non-Residential Development

The Toronto Green Standard Version 4.0 Statistics Template is submitted with Site Plan Control Applications and stand-alone Zoning Bylaw Amendment applications. Complete the table and copy it directly onto the Site Plan submitted as part of the application.

For Zoning Bylaw Amendment applications: complete General Project Description and Section 1.
For Site Plan Control applications: complete General Project Description, Section 1 and Section 2.
For further information, please visit www.toronto.ca/greendevelopment

General Project Description	Proposed
Total Gross Floor Area	17,576sm
Breakdown of project components (m²):	
Residential	16,783sm
Retail	793sm
Commercial	
Industrial	
Institutional/Other	
Total number of residential units	

Section 1: For Stand Alone Zoning Bylaw Amendment Applications and Site Plan Control Applications

Low Emissions Transportation	Required	Proposed	Proposed %
Number of Parking Spaces	14	14	100
Number of EV Parking Spaces (Residential)	74	74	100
Number of EV Parking Spaces (non-residential)	-	-	-

Cycling Infrastructure	Required	Proposed	Proposed %
Number of long-term bicycle parking spaces (all-uses)	225	225	100
Number of long-term bicycle parking located on:			
a) first storey of building			
b) second storey of building			
c) first level below-ground	225	225	100
d) second level below-ground			
e) other levels below-ground			

3-1-1 toronto at your service

TORONTO

Statistics Template – Toronto Green Standard Version 4.0

Mid to High Rise Residential and all New Non-Residential Development

Cycling Infrastructure	Required	Proposed	Proposed %
Number of short-term bicycle parking spaces	50	50	
Number of shower and change facilities (non-residential)			

Tree Canopy	Required	Proposed	Proposed %
Total Soil Volume (40% of the site area ÷ 66 m2 x 30 m³)			
Soil volume provided within the site area (m³)			
Soil Volume provided within the public boulevard (m³)			

Section 2: For Site Plan Control Applications

Cycling Infrastructure	Required	Proposed	Proposed %
Number of short-term bicycle parking spaces (all uses) at-grade or on first level below grade	50	50	100
Number of publicly accessible bicycle parking spaces	-	-	-
Number of energized outlets for electric bicycles	-	-	-

Tree Canopy	Required	Proposed	Proposed %
Total site area (m²)			
Total Soil Volume (40% of the site area ÷ 66 m² x 30 m³)			
Total number of trees planted			
Number of surface parking spaces (if applicable)			
Number of shade trees located in surface parking area			

Landscaping & Biodiversity	Required	Proposed	Proposed %
Total non-roof hardscape area (m²)			
Total non-roof hardscape area treated for Urban Heat Island (minimum residential 75% or non-residential 50%) (m²)			
Area of non-roof hardscape treated with: (indicate m²)			
a) high-albedo surface material			
b) open-grid pavement			
c) shade from tree canopy			

TORONTO

Statistics Template – Toronto Green Standard Version 4.0

Mid to High Rise Residential and all New Non-Residential Development

Landscaping & Biodiversity	Required	Proposed	Proposed %
d) shade from high-albedo structures			
e) shade from energy generation structures			
Percentage of Lot Area as Soft Landscaping (non-residential only)			
Total number of plants			
Total number of native plants and % of total plants			
Available Roof Space (m²)		1726.6sm	
Available Roof Space provided as Green Roof (m²)	863.3sm	863.3sm	100
Available Roof Space provided as Cool Roof (m²)			
Available Roof Space provided as Solar Panels (m²)			

Bird Collision Deterrence	Required	Proposed	Proposed %
Total area of glazing of all elevations within 16m above grade		1161.9	
Total area of treated glazing (minimum 85% of total area of glazing within 16m above grade) (m²)		1161.9	100
Percentage of glazing within 16m above grade treated with:			
a) Visual markers		900.4	77.5
b) non-reflective glass		-	
c) Building integrated structures		261.5	22.5

2 / A001 TGS Statistics
1 : 25

ISSUE RECORD

REVISION RECORD

405-317 ADELAIDE STREET WEST
TORONTO CANADA M5V 1P9
+1 416 599 9729
WWW.RAWDESIGN.CA

21049

Toronto

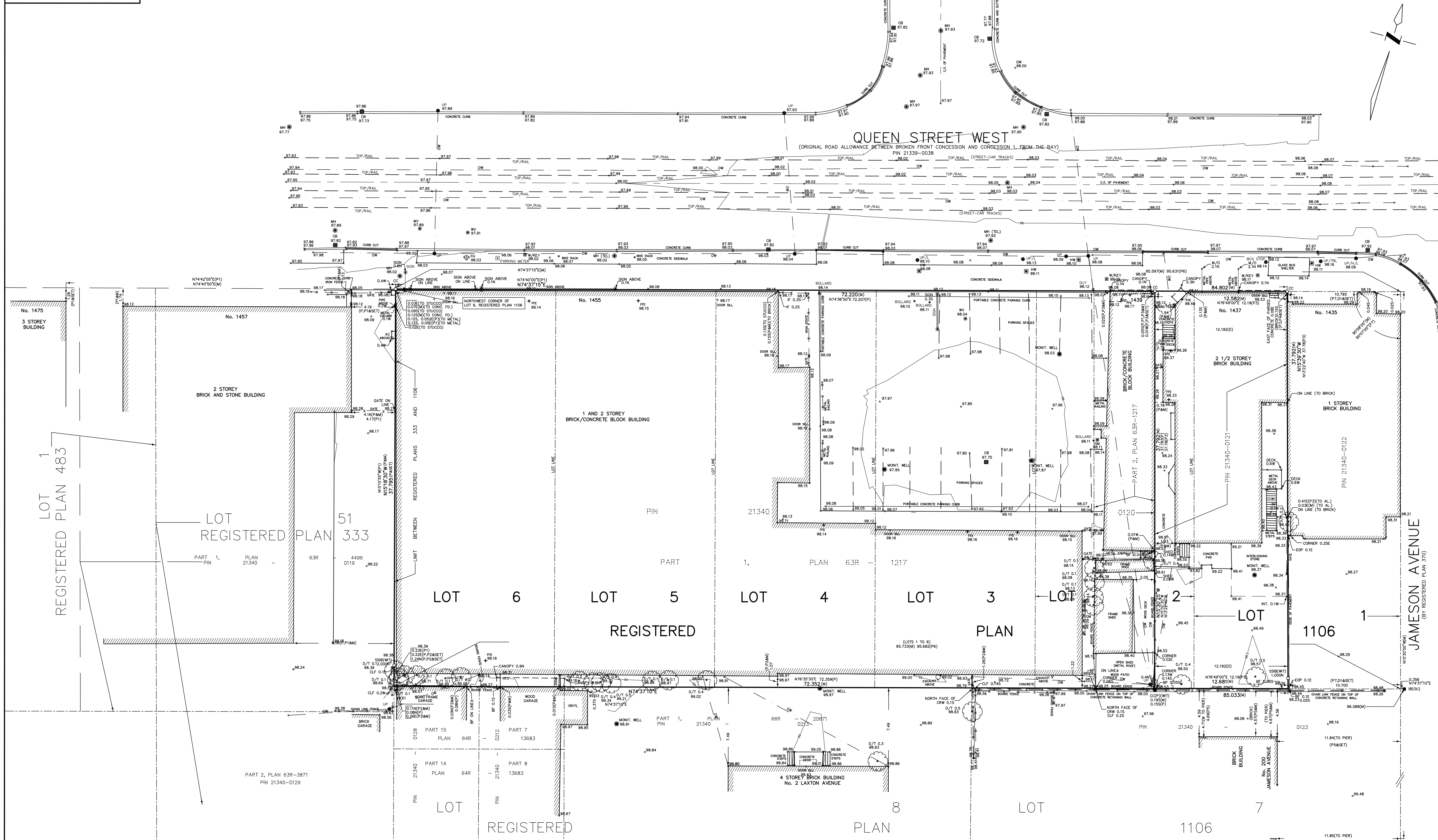
1437-1455
Queen Street West
Stanford Homes

PROJECT STATS

SCALE: As indicated

A001

METRIC: DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048.



TOPOGRAPHIC PLAN OF SURVEY OF

PART OF LOT 1 AND ALL OF LOTS 2 TO 6, BOTH INCLUSIVE REGISTERED PLAN 1106 CITY OF TORONTO

SCALE 1:150

5 2.5 0 5 10 15 METRES

NOTES

□	DENOTES	PLANTED MONUMENT
■	"	FOUND MONUMENT
SSIB	"	SHORT STANDARD IRON BAR
CC	"	CUT CROSS
IB	"	IRON BAR
P	"	PLAN 63R-1217
P1	"	PLAN 63R-4496
P2	"	PLAN 64R-13683
P3	"	VLADIMIR DOSEN SURVEYING, O.L.S., SURVEY DATED OCTOBER 7, 2020
P4	"	J.S. LEITCH, O.L.S., SURVEY DATED MARCH 11, 1953
P5	"	BROWNE, CAVELL AND JACKSON, O.L.S., SURVEY DATED SEPTEMBER 19, 1961
P6	"	REGISTERED PLAN 1106
P7	"	SPEIGHT, VAN NOSTRAND, WARD & ANDERSON, O.L.S., SURVEY DATED NOVEMBER 5, 1947
OU	"	ORIGIN UNKNOWN
M	"	MEASURED
WIT	"	WITNESS
D	"	INST. No. WF27593
D1	"	INST. No. CA534280
CONC.	"	CONCRETE
CLF	"	CHAIN LINK FENCE
BF	"	BOARD FENCE
CRW	"	CONCRETE RETAINING WALL
INT.	"	INTERLOCKING STONE
AL.	"	ALUMINIUM
M/O	"	METAL PIPE FRAME OVERHANG ABOVE
IF	"	IRON FENCE
FD	"	FOUNDATION
EOP	"	EDGE OF PAVEMENT

BEARINGS ARE GRID DERIVED FROM THE 3° MTM CO-ORDINATE SYSTEM ZONE 10, NAD 83 (CSRS)(2010).

FOR COMPARISON PURPOSES A COUNTER-CLOCKWISE ROTATION OF 2°12'10" WAS APPLIED TO THE BEARINGS SHOWN ON (P) PLAN 63R-1217.

TOPOGRAPHIC NOTES

CB	DENOTES	CATCH BASIN
MH	DENOTES	MANHOLE
MH (TEL)	DENOTES	TELEPHONE MANHOLE
HW	DENOTES	HAND WELL
WV	DENOTES	WATER VALVE
GM	DENOTES	GAS METER
AC	DENOTES	AIR CONDITIONING UNIT
W/KEY	DENOTES	WATER KEY
UP	DENOTES	UTILITY POLE
L	DENOTES	LIGHT
H	DENOTES	HYDRO
OW	DENOTES	OVERHEAD WIRES
TRL	DENOTES	TRAFFIC LIGHT
D/T 0.10	DENOTES	DECIDUOUS TREE 0.10m dia.
FH	DENOTES	FIRE HYDRANT
GUY	DENOTES	GUY WIRE/POLE

BENCHMARK

ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO MNRF BENCHMARK No. 12219740328 HAVING A PUBLISHED ELEVATION OF 98.372 METRES (CGVD28:PRE78)

CONTOUR INTERVAL 0.50m

DURING THE SURVEY WE ATTEMPTED TO UNCOVER ALL SURFACE FEATURES, HOWEVER, WE ARE NOT LIABLE FOR ANY SUCH FEATURES THAT WERE COVERED BY SNOW OR ICE AT THE TIME OF THE SURVEY.

SURVEYOR'S CERTIFICATE

I CERTIFY THAT:

1. THIS SURVEY AND PLAN ARE CORRECT AND IN ACCORDANCE WITH THE SURVEYS ACT, THE SURVEYORS ACT AND THE REGULATIONS MADE UNDER THEM.
2. THE SURVEY WAS COMPLETED ON THE 7th DAY OF MARCH, 2023.

DATE: MARCH 9, 2023.

OPHIR N. DZALDOV
ONTARIO LAND SURVEYOR

THIS PLAN OF SURVEY RELATES TO AOLS PLAN SUBMISSION FORM NUMBER 2153501.

SCHAEFFER DZALDOV PURCELL LTD.
ONTARIO LAND SURVEYORS
64 JARDIN DRIVE CONCORD, ONTARIO L4K 3P3 TEL.(905)761-0101

CALC. JZ	DRAWN ACAD/LW	CHECKED: JZ	SCALE 1:150	JOB NO. 23-037-00

PLOT SIZE: 24X42 MARCH 9, 2023

APPENDIX B

Water Demand Analysis

TABLE B1 - RESIDENTIAL PEAK WATER DEMAND

		Proposed
	Unit Rate (L/cap/d)	Flow
Per Capita Demand (L/d)	190	83,600
Equivalent Population Average Demand (L/s)		**0.97**
	Peaking Factor	
Peak Hour Design Demand Rate (L/s)	2.5	**2.42**
Peak Hour Design Demand Rate (m³/d)		209.0
	Peaking Factor	
Maximum Day Design Demand Rate (L/s)	1.3	**1.26**
Maximum Day Design Demand Rate (m³/d)		108.7

* Residential population used in water demand calculations as per Table A1 in Appendix A = 440 people.
* Calculations as per City of Toronto Design Criteria for Sewers and Watermains - Nov.2021.

TABLE B2 - ICI PEAK WATER DEMAND

	Proposed	
	Unit Rate (L/cap/d)	**Flow**
Per Capita Demand (L/d)	191	1,719
Equivalent Population Average Demand (L/s)		**0.02**
	Peaking Factor	
Peak Hour Design Demand Rate (L/s)	1.2	**0.02**
Peak Hour Design Demand Rate (m³/d)		2.1
	Peaking Factor	
Maximum Day Design Demand Rate (L/s)	1.1	**0.02**
Maximum Day Design Demand Rate (m³/d)		1.9

* ICI population used in water demand calculations as per Table A1 in Appendix A = 9 people.
* Calculations as per City of Toronto Design Criteria for Sewers and Watermains - Nov.2021.

TABLE B3 - DOMESTIC PEAK WATER DEMAND SUMMARY

	Proposed		
Proposed Site	**Average Day**	**Max Day**	**Peak Hour**
Total Residential Demand	0.97	1.26	2.42
Total ICI Demand	0.02	0.02	0.02
Total Domestic Demand Flow Rate (L/s)	**0.99**	**1.28**	**2.44**
Total Doemstic Demand Flow Rate (L/min)	59.2	76.8	146.6

TABLE B4 - FIRE FLOW DEMAND

		Proposed	
		Unit	Total
Coefficient for type of construction:		Fire Resistive	0.6
Height in Stories			13
2nd Floor Area (Largest)		m²	2,144.0
1st Floor Area		m²	2,067.0
3rd Floor Area		m²	2,084.0
Stories to Use in Calculation (1 + 25% of each of the floors immediately adjoining the largest floor)			1 + 2 * 25%
Total Area		m²	3,182
Fire Flow Required (√A * C * 220)		L/min	8,000
Reduction for Occupancy Charge		Non-Combustible	-25%
Fire Flow Required		**L/min**	**6,000**
25% Reduction for NFPA Sprinkler System (NFPA 13 Sprinker Std, Std Water Supply, Fully Supervised System)		**L/min**	**-1,500**
Total Charge for Building Separation (Max 75%)			*65%*
North	23	m	10%
West	12.5	m	15%
South	14	m	15%
East	1	m	25%
Charge for Building Separation (Exposure)		**L/min**	**3,900**
Fire Flow Required		**L/min**	**9,000**
Fire Flow Required		**L/s**	**150.0**

* Calculations based on the Fire Underwriters Survey (FUS) 1999 Guidelines

TABLE B5 - GOVERNING WATER DEMAND

PER CITY OF TORONTO DESIGN CRITERIA AND MOE DESIGN GUIDELINES, WATER SUPPLY SYSTEMS SHOULD BE DESIGNED TO SATISFY THE GREATER OF EITHER OF THE FOLLOWING DEMANDS:

- MAX DAY DOMESTIC DEMAND PLUS FIRE FLOW
- PEAK HOUR DOMESTIC DEMAND

	Proposed Flow	
MAX DAY + FIRE FLOWS		
MAX DAY	1.28	L/s
FIRE FLOW	150.00	L/s
TOTAL MAX DAY + FIRE FLOW	151.28	L/s
PEAK HOUR DOMESTIC DEMAND		
PEAK RATE	2.44	L/s
GOVERNING WATER DEMAND		
TOTAL WATER DEMAND REQUIREMENT	**151.28** **9077**	**L/s** **L/min**

Note: Per City of Toronto's Design Criteria for Sewers and Watermains, in accordance with the Fire Underwriters Survey (FUS), fire flows will not be less than 4,800L/minute for a 2-hour duration in addition to maximum daily domestic demand, delivered with a residual pressure of not less than 140kPa (20psi).

Hydrant Test #1 - Front of 1455 Queen St W

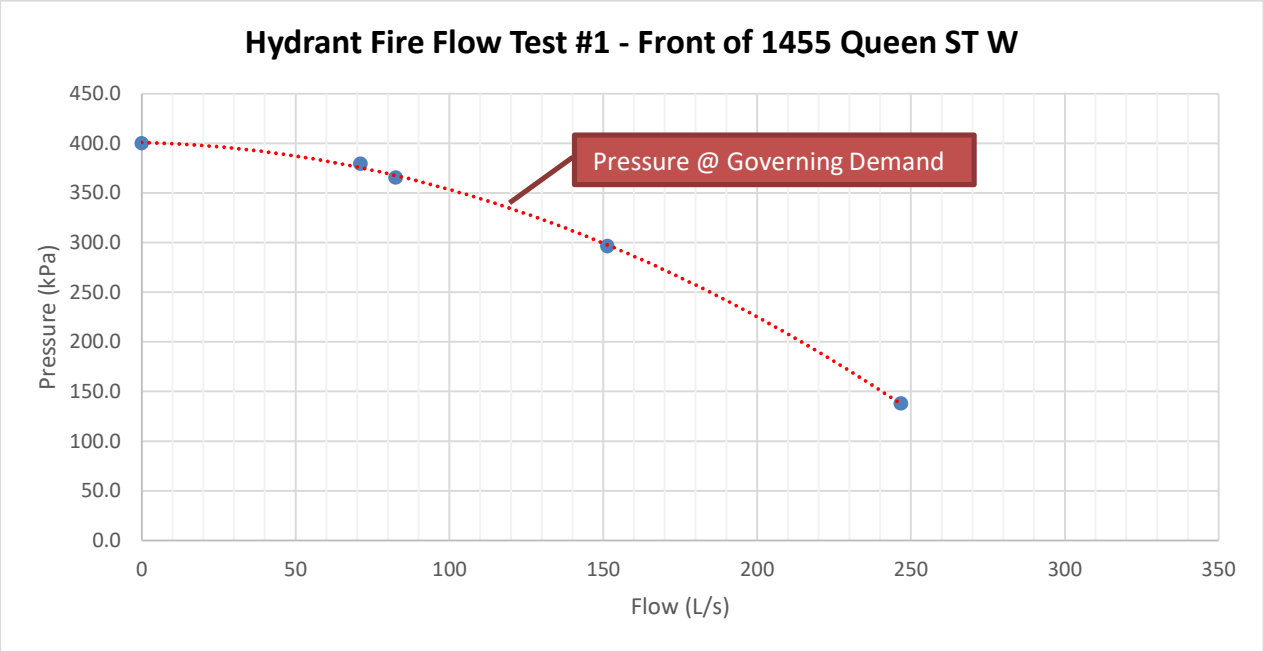
4.10.1.2 The formula that is generally used to compute the discharge at the specified residual pressure or for any desired pressure drop is Equation 4.10.1.2:

$$Q_R = Q_F \times \frac{h_r^{0.54}}{h_f^{0.54}} \qquad (4.10.1.2)$$

where:
Q_R = flow predicted at desired residual pressure
Q_F = total flow measured during test
h_r = pressure drop to desired residual pressure
h_f = pressure drop measured during test

Qf	hr	hf	Qr
83	38	5	246.7

	USGPM	L/s	psi	kPa
Static	0	0	58	399.9
One 2.5" Port	1126	71	55	379.2
Two 2.5" Ports	1308	83	53	365.4
Gov. Demand	2397.8	151.3	43	296.5
Qr, Theoretical Limit @ 20 psi	3910.6	246.7	20	137.9

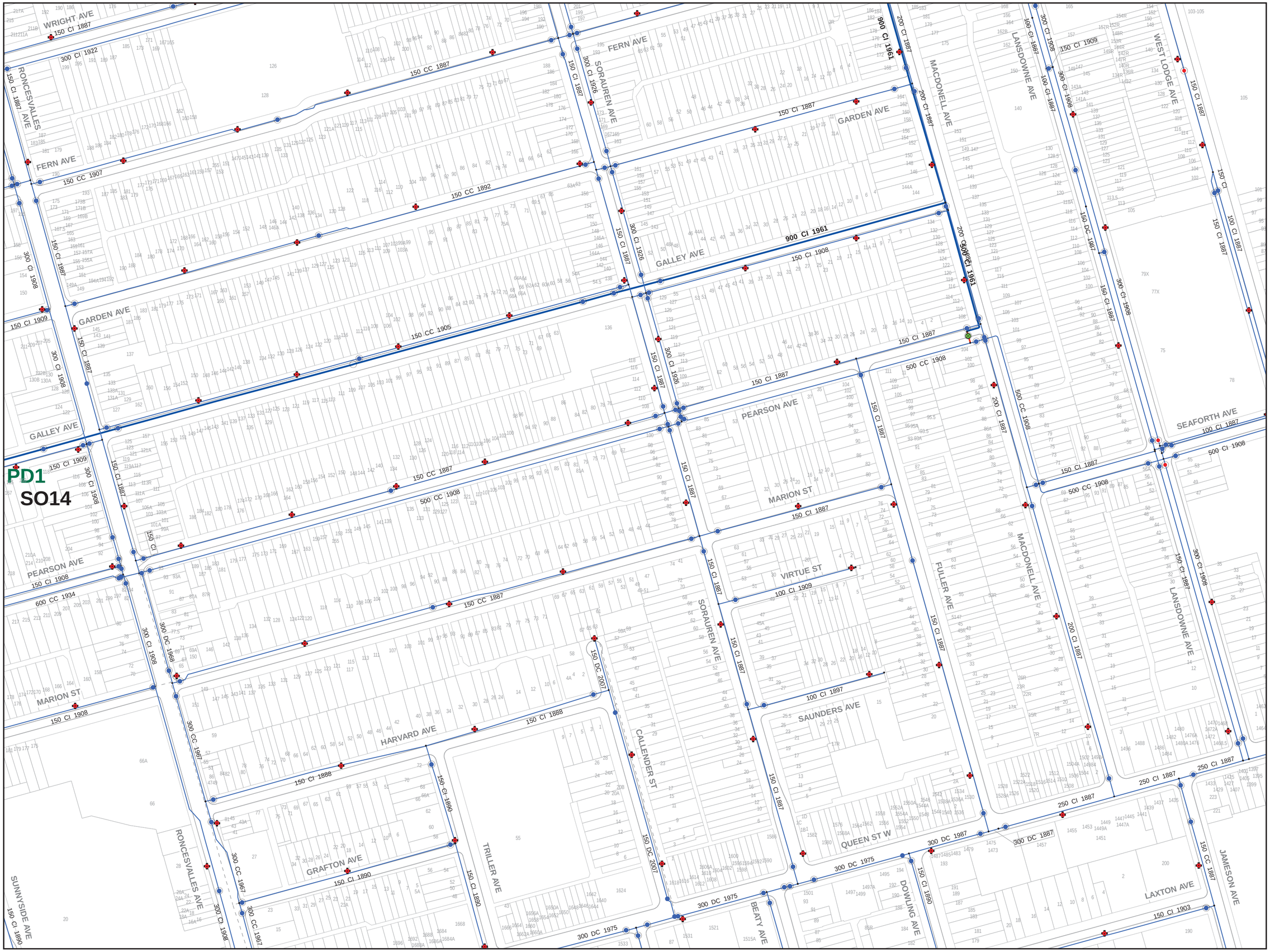


JACKSON WATERWORKS
7104 Canboroug Road
Dunnville, ON N1A 2W1

# of Ports	PORT DIA. (in/mm)	PITOT (psig)	FLOW (usgpm)	RESIDUAL (psig)
1	2.50/63	45	1126	55
2	2.50/63	28/28	1308	53
THEORETICAL FLOW @ 20psi			4434	

General Data	
Test Date	November 13-2020
Test Time	9:40AM
Pipe Dia.	
Static	58

Site Information	
Site or Developer Name	Husson Engineering Management
Site Address/Municipality	1488 Queen Street West, Toronto
Location of Test Hydrant	Front of #1455 Queen Street West, Toronto
Location of Base Hydrant	By 1479 Queen Street West, Toronto
Technician's Comments	On customer map show that the flow hydrant watermain diameter is 250 C.I
	Base hydrant is on a 300 DC watermain diameter
	Verified By : Mark Schmidt



Toronto Water Atlas

Hydrant
- Other
- City of Toronto
- Private

- PRV
- Meter
- Pressure District Valve

Metro Connection Valve
- Open
- Closed

Valve
- Open
- Closed
- Chamber
- Sanitary Pump Station

Watermain
- Distribution
- Transmission
- Metro Connection
- Encasement

- Abandoned Main
- Forcemain
- Reservoir
- Pressure District Boundary

- River
- Highway
- Curb
- Wards Boundary

0 50 100 150 200 Metres

Third Edition
Date: 01/09/2010

General Notes:
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- Any discrepancies, inaccuracies, errors and/or omissions in the maps should be reported to Toronto Water, Water Infrastructure Management. (18th Floor, Metro Hall, 55 John St, Toronto, ON, M5V 3C6) (Tel: 416-392-3957)

N W E S

465	494	524
466	495	525
467	496	526

APPENDIX C

Sanitary Demand Analysis

TABLE C1 - EXISTING COMBINED FLOW ESTIMATE

			Existing
	Unit Rate		Flow
Daily Residential Flow (L/d)	-		0
Daily ICI Flow (L/d)	250	L/c/d	6750
Total Flows (L/s)			0.08
Peaking Factor - ICI			1
Infiltration (L/s)	0.26	L/s/ha	0.06
	Site Area	C	Flow
Storm Flow (Q = 2.78 C I A)	0.3209	0.9	60.19
*per Civica Storm Capacity Analysis report dated March 31st, 2023 85% of total site area drains to existing combined system			
*I (2 year) -88.2mm/hr (10min time of concentration)			
TOTAL EXISTING COMBINED FLOW (L/s)			**60.33**

* Existing population used in sanitary flow calculations as per Table A1 in Appendix A = 27 people.
* Calculations as per City of Toronto Design Criteria for Sewers and Watermains - Jan.2021.

TABLE C2 - RESIDENTIAL SANITARY FLOW ESTIMATE

		Proposed
	Unit Rate (L/cap/d)	Flow
Daily Residential Flow (L/d)	450	198000
Total Flows (L/s)		2.29
Peaking Factor - Harmon		4.00
TOTAL PEAK RESIDENTIAL FLOW (L/s)		**9.17**

* Residential population used in sanitary flow calculations as per Table A1 in Appendix A = 440 people.
* Calculations as per City of Toronto Design Criteria for Sewers and Watermains - Jan.2021.
* Peaking Factor calculated by using Harmon's Formula = 1 + 14/(4 + (P/1000)^0.5)

TABLE C3 - ICI SANITARY FLOW ESTIMATE

		Proposed
	Unit Rate (L/cap/d)	Flow
Daily Retail & Office Flow (L/d)	250	2250
Total Flows (L/s)		0.03
Peaking Factor - ICI		1
TOTAL ICI FLOW (L/s)		**0.03**

* ICI population used in sanitary flow calculations as per Table A1 in Appendix A = 9 people.
* Calculations as per City of Toronto Design Criteria for Sewers and Watermains - Jan.2021.

TABLE C4 - TOTAL COMBINED FLOW ESTIMATE SUMMARY

		Proposed
		Flow
Peak Residential (based on 450 L/c/d)	L/s	9.17
Peak ICI (based on 250 L/c/d)	L/s	0.03
Groundwater Flow	L/s	0.00
Infiltration (0.26 L/s/ha)	L/s	0.06
TOTAL PEAK SANITARY FLOW	**L/s**	**9.3**
Combined Flow Increase from Existing Conditions =	L/s	-51.1

Toronto Sewer Atlas

Large Chamber

Manhole
- Combined
- Dual
- Sanitary
- Storm
- Foundation

Control Manhole
- Combined
- Dual
- Sanitary
- Storm

Outfall
- Outfall

Sewer Pump Station
- Sewer Pump Station

Catchbasin
- Other
- Twin Inlet Catchbasin

Sewer
- Foundation Drain
- Combined
- Sanitary
- Storm
- Combined Trunk
- Sanitary Trunk
- Storm Trunk
- Abandoned Sewer
- River
- Highway
- Curb
- Wards Boundary

0 50 100 150 200 Metres

Third Edition
Date: 01/09/2010

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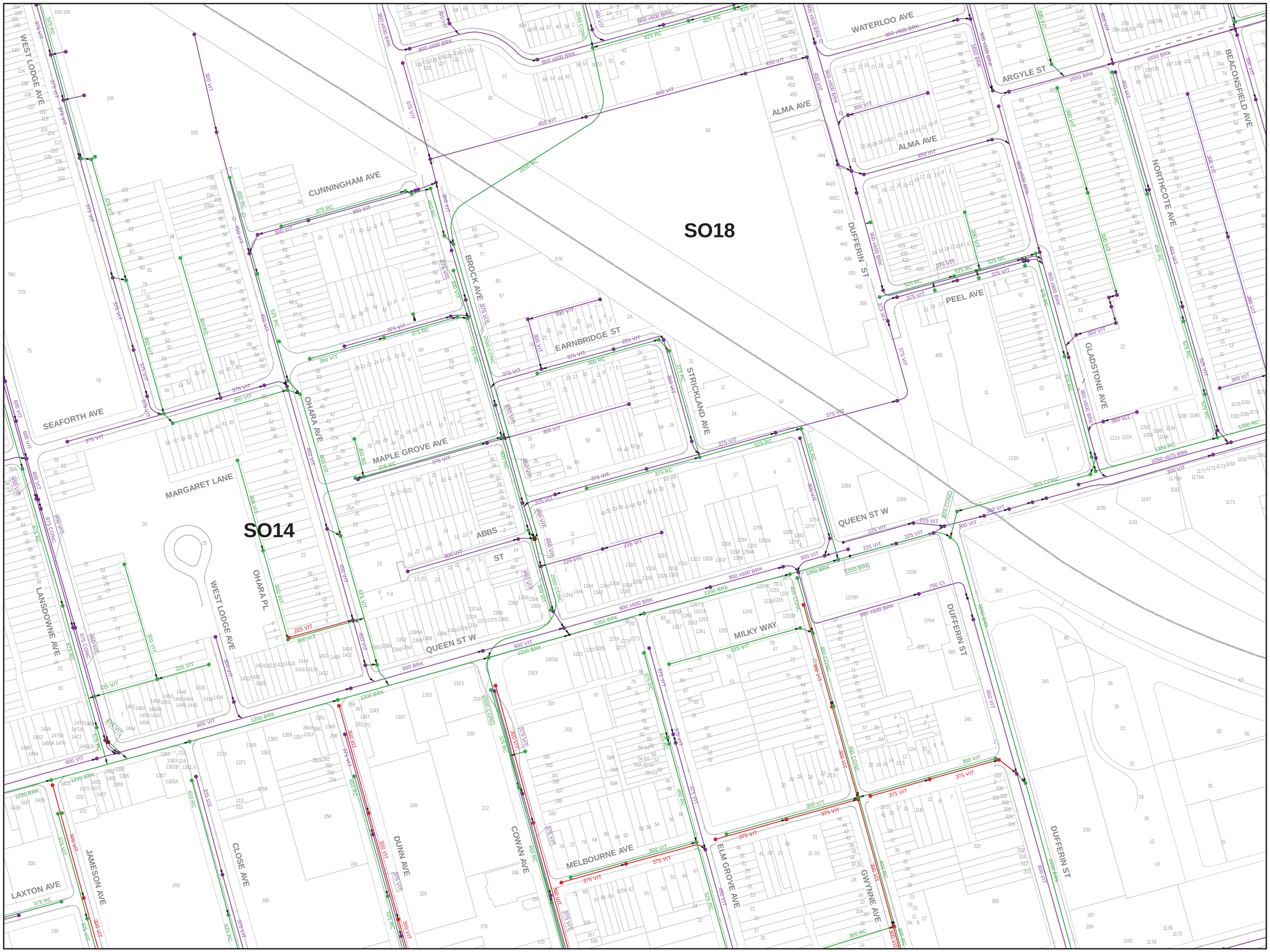
N W E S

465	494	524
466	495	525
467	496	526



Toronto Sewer Atlas

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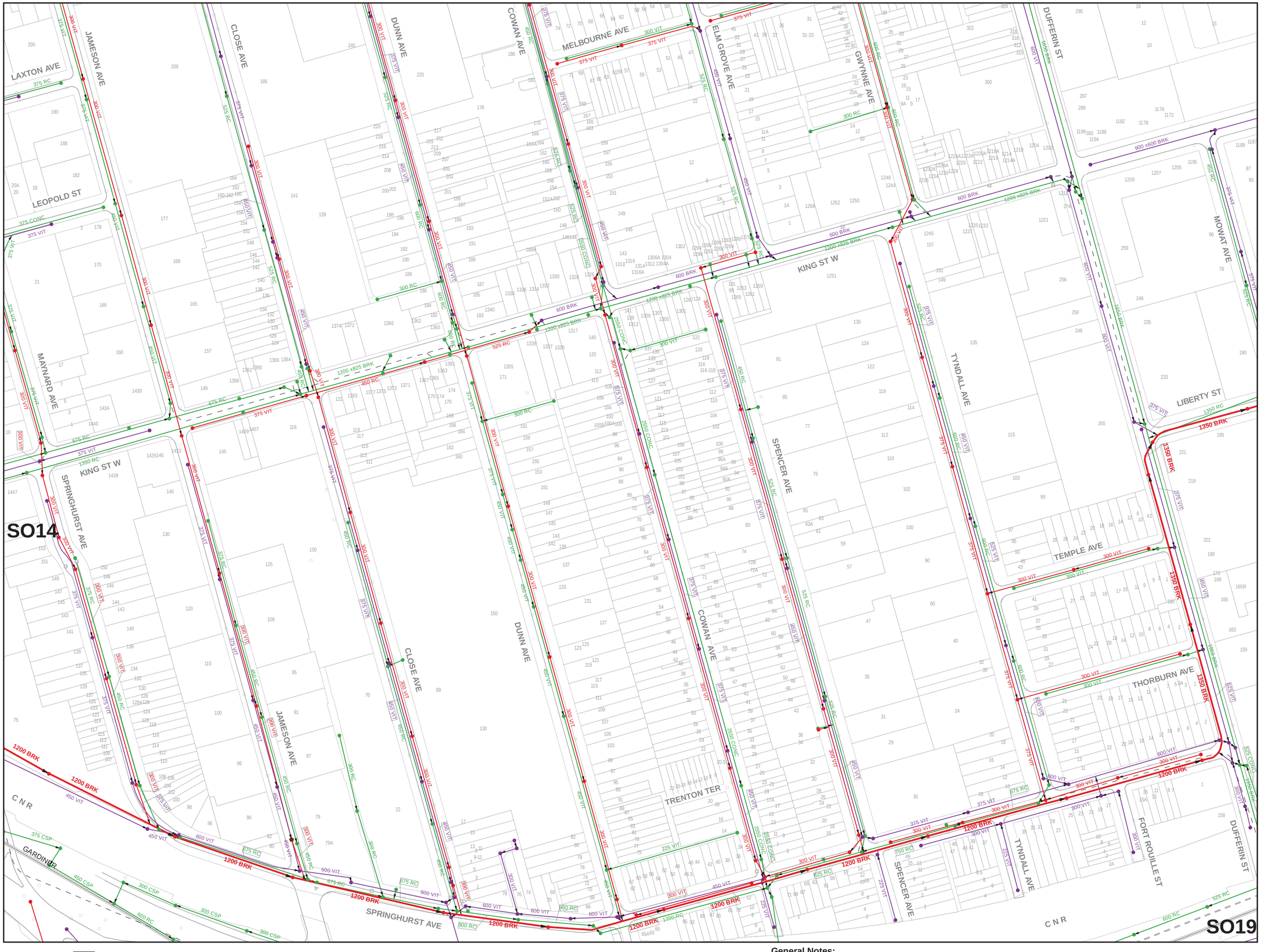
N W E S

494	524	554
495	**525**	555
496	526	556



Toronto Sewer Atlas

Manhole
- Combined
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- Sanitary
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Control Manhole
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Outfall
- Outfall

Sewer Pump Station
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Catchbasin
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Sewer
- Foundation Drain
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- Large Chamber
- River
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N W E S

495	525	555
496	526	556
497	527	557

Toronto Sewer Atlas

Manhole
- Combined
- Dual
- Sanitary
- Storm
- Foundation

Control Manhole
- Combined
- Dual
- Sanitary
- Storm

Outfall
- Outfall

Sewer Pump Station
- Sewer Pump Station

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- Storm
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Large Chamber

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N W E S

525	555	587
526	556	588
527	557	589

APPENDIX D

Storm Demand Analysis

CRITERIA: REDUCE POST DEVELOPMENT FLOWS FROM THE 2 TO 100-YEAR EVENTS TO THE 2-YEAR PRE-DEVELOPMENT PEAK FLOW RATE WITH A MAXIMUM RUNOFF COEFFICIENT OF "C"=0.50

ALLOWABLE FOR SITE TO QUEEN STREET WEST

2-YEAR TORONTO
A= 21.8
B= 0.0
C= -0.78

AREA
3,209 m^2

RUN-OFF COEFFICIENT
C= 0.50

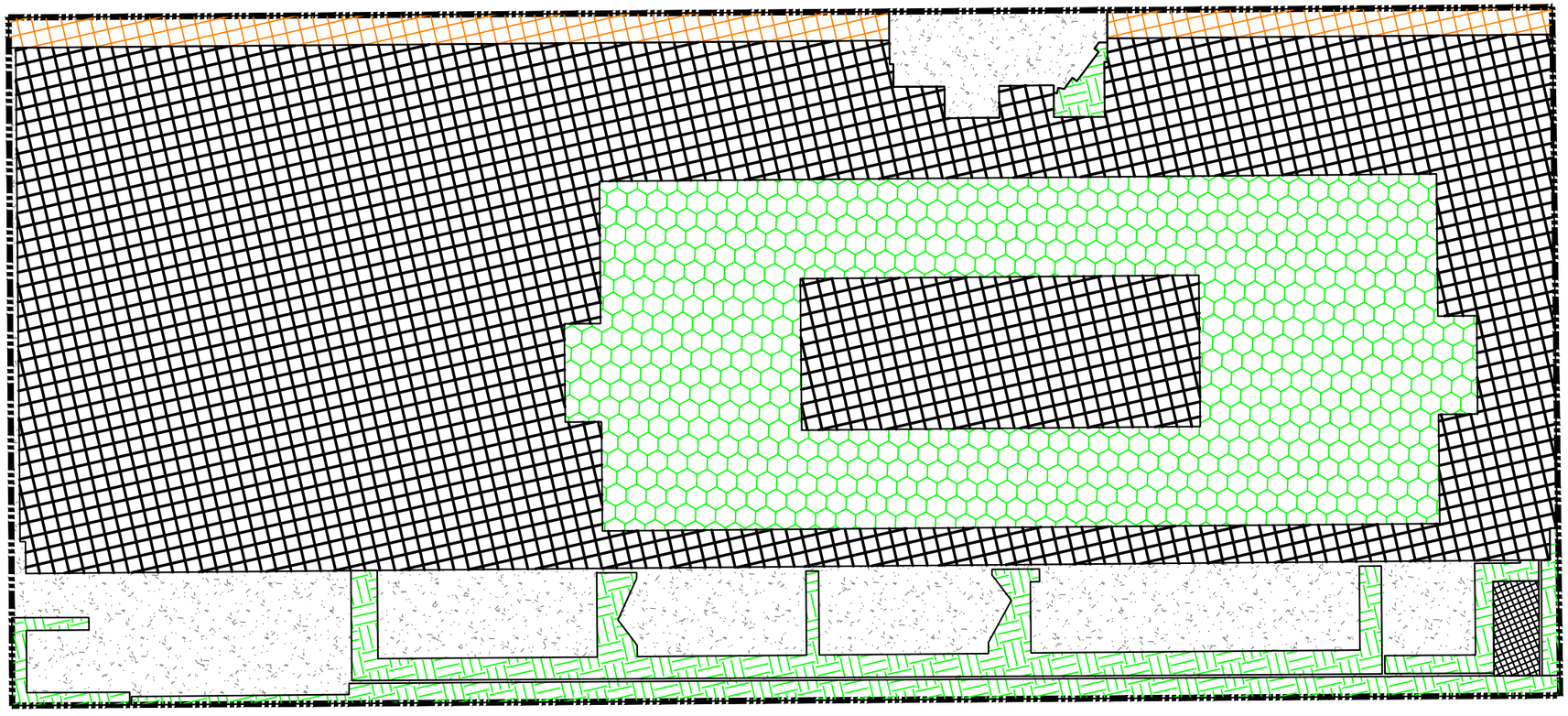
PEAK FLOW
Q = CiA

Q = 39.31 L/s

TIME OF CONCENTRATION (Tc)
10

INTENSITY = A/(t+B)^C
88.2 mm/hr

CRITERIA: REDUCE POST DEVELOPMENT FLOWS FROM THE 2 TO 100-YEAR EVENTS TO THE 2-YEAR PRE-DEVELOPMENT PEAK FLOW RATE WITH A MAXIMUM RUNOFF COEFFICIENT OF "C"=0.50



LEGEND

	SURFACE TYPE	AREA (m2)
DEVELOPMENT AREA		
	GREEN ROOF	724
	CONVENTIONAL ROOF	1671
	LANDSCAPING AT GRADE	220
	IMPERVIOUS AT GRADE	465
	VENT	13
	AT GRADE OVER FLOW DRAINING OUT OF SITE	116
	SUBTOTAL AREA (m²)	3209
	PROPERTY LINE	

R.V. ANDERSON ASSOCIATES LIMITED
Innovative solutions for complex challenges

1437-1455 QUEEN STREET WEST

POST-DEVELOPMENT SURFACE AREA TREATMENT

236773

SWM FIGURE

1: 300

SWM-1

R: \2023\236773 – Stanford Homes–1437–1455 Queen St W\10 CADdwg\01 Linear\04 Sheets\01 Report Figures\226773–F–STM POST.dwg

CRITERIA: REDUCE POST DEVELOPMENT FLOWS FROM THE 2 TO 100-YEAR EVENTS TO THE 2-YEAR PRE-DEVELOPMENT PEAK FLOW RATE WITH A MAXIMUM RUNOFF COEFFICIENT OF "C"=0.50

ALLOWABLE FOR SITE TO QUEEN STREET WEST

2-YEAR TORONTO
A= 21.8
B= 0.0
C= -0.78

AREA
3,209 m^2

RUN-OFF COEFFICIENT
C= 0.50

PEAK FLOW
Q = CiA

Q = 39.31 L/s

TIME OF CONCENTRATION (Tc)
10

INTENSITY = A/(t+B)^C
88.2 mm/hr

CRITERIA: REDUCE POST DEVELOPMENT FLOWS FROM THE 2 TO 100-YEAR EVENTS TO THE 2-YEAR PRE-DEVELOPMENT PEAK FLOW RATE WITH A MAXIMUM RUNOFF COEFFICIENT OF "C"=0.50

1437-1455 QUEEN ST W

POST-DEVELOPMENT SITE CHARACTERISTICS SUMMARY

Surface	Area (sq.m)	I/P	'C'	IA (mm)	Effective TSS removal %	Effective TSS Removal in Extended Detention Rainwater Harvesting Cistern (%)	Total TSS Removal (%)	Weighted TSS removal %
Controlled Areas								
Green Roof	864	P	0.50	5.0 mm	80%	30%	86.00%	23.2%
Conventional Roof	1561	I	0.90	1.0 mm	80%	30%	86.00%	41.8%
Pervious at Grade	212	P	0.25	5.0 mm	80%	30%	86.00%	5.7%
Impervious at Grade	441	I	0.90	1.0 mm	80%	30%	86.00%	11.8%
Intake Shafts	13	I	0.90	0.0 mm	0%			0.0%
Subtotal	***3091***							
Uncontrolled Areas								
Uncontrolled Areas	118	I	0.90	5.0 mm	0%			0.0%
Subtotal	***118***							
Total	**3209**							**82.5%**

1437-1455 QUEEN ST W
POST-DEVELOPMENT v02 SETUP

Surface	Area (sq.m)	% Area	I/P	% Impervious	'C'	Weighted 'C'
Controlled Areas						
Green Roof	864	27.95%	P	0%	0.50	0.140
Conventional Roof	1561	50.50%	I	51%	0.90	0.455
Pervious at Grade	212	6.86%	P	0%	0.25	0.017
Impervious at Grade	441	14.27%	I	14%	0.90	0.128
Intake Shafts	13	0.42%	I	11.0%	0.90	0.004
Subtotal	***3091***	100.00%		**65%**		**0.74**
Uncontrolled Areas						
Uncontrolled Areas	118	100.00%	I	100.0%	0.90	0.900
Subtotal	***118***			**100.0%**		**0.90**
Total	**3209**					**0.66**

Area Imperviousness (based on C imp=0.9, C perv=0.25)	
Total Site	**76%**
uncontolled	**100%**

1437-1455 QUEEN ST W

CISTERN SET-UP

Surface	Area (sq.m)	% of Total Site Area	Surface IA (mm)	% of Average Annual Rain Capture based on Surface IA	% OF Total Annual Average Rainfall Depth Weighted Over Entire Site Based on Surface IA	Depth to Cistern (mm)	Total Effective IA (mm)	% of Total Annual Average Rainfall Depth	% of Total Annual Average Rainfall Depth weighted over entire site	Cistern Size (m3)
Controlled Areas										
Green Roof	864	26.92%	5.0	50%	13.46%	0.00	5.00	50%	13%	0.00
Conventional Roof	1561	48.64%	1.0	15%	7.30%	4.50	5.50	53%	26%	7.02
Pervious at Grade	212	6.61%	5.0	50%	3.30%	0.00	5.00	50%	3%	0.00
Impervious at Grade	441	13.74%	1.0	15%	2.06%	4.00	5.00	50%	7%	1.76
Intake Shafts	13	0.41%	0.0	1%	0.00%	0.0	0.0	1%	0%	0.00
Uncontrolled Areas										
Uncontrolled Areas	118	3.68%	5.0	50%	1.84%	0.0	5.0	50%	2%	0.00
Total	**3209**				**27.96%**				**51.3%**	**8.79**

APPENDIX D - POST-DEVELOPMENT CONTROLLED PEAK DISCHARGE RATE STORAGE CALCULATIONS

STAGE-STORAGE

ELEVATION (m)	STORAGE DEPTH (m)	DETENTION STORAGE (cu.m.)	
95.13	0.00	0.00	MID ORIFICE
95.58	0.45	24.93	
96.03	0.90	49.86	
96.48	1.35	74.79	
96.93	1.80	99.72	
97.15	2.02	111.91	
97.45	2.32	128.53	U/S of Upper Slab

Storm Event Modelling - Storage System Characteristics

1437-1455 - Combined Detention Tank
RVA 226773

Storage System Discharge Details	
Orifice Equation	$Q=C_dA(2g(h_2-h_1))^{0.5}$
Orifice Coefficient (C_d)	0.77 Orifice tube
Orifice Diameter (mm)	100.00
Orifice Invert Elevation (m)	95.08
Mid Orifice Elevation (m)	95.130
Orifice Area 'A' (m^2)	0.008

ELEVATION (m)	Storage Depth (m)	Orifice Head (m)	Storage (m^3)	ORIFICE Discharge (L/s)	Total Discharge (L/s)
95.13	0.00	0.00	0.0	0.00	0.00
95.58	0.45	0.45	24.9	17.97	17.97
96.03	0.90	0.90	49.9	25.41	25.41
96.48	1.35	1.35	74.8	31.12	31.12
96.93	1.80	1.80	99.7	35.94	35.94
97.15	2.02	2.02	112.0	36.00	36.00
97.45	2.32	2.32	128.5	40.80	40.80

```
*******************************
** SIMULATION:100-Yr Storm    **
*******************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1579.410
| Ptotal= 78.75 mm |                          B=   0.001
--------------------                          C=   0.800
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    4.47 |  1.00   26.65 |  2.00    9.76 |  3.00    5.26
                0.17    5.08 |  1.17  250.30 |  2.17    8.46 |  3.17    4.91
                0.33    5.91 |  1.33   33.58 |  2.33    7.50 |  3.33    4.61
                0.50    7.12 |  1.50   19.76 |  2.50    6.75 |  3.50    4.34
                0.67    9.10 |  1.67   14.49 |  2.67    6.16 |  3.67    4.11
                0.83   13.03 |  1.83   11.60 |  2.83    5.67 |  3.83    3.91


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   0.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      39.96        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     250.30       239.95
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       0.83 (ii)    5.80 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.12         0.04          0.156 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      77.75        68.91          75.09
     TOTAL RAINFALL   (mm)=      78.75        78.75          78.75
     RUNOFF COEFFICIENT   =       0.99         0.88           0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  98.0    Ia = Dep. Storage  (Above)
```

```
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   0.07
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.57        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     250.30       146.22
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       0.57 (ii)    6.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.05         0.00          0.049 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      77.75        45.87          77.72
     TOTAL RAINFALL   (mm)=      78.75        78.75          78.75
     RUNOFF COEFFICIENT   =       0.99         0.58           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0021):     0.07   0.049     1.33    77.72
      + ID2= 2 (  0005):     0.24   0.156     1.33    75.09
        ================================================
        ID = 3 (  0022):     0.31   0.205     1.33    75.68

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
```

```
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                         0.0000     0.0000   |   0.0255      0.0075
                         0.0147     0.0025   |   0.0294      0.0100
                         0.0208     0.0050   |   0.0334      0.0129

                                    AREA     QPEAK     TPEAK       R.V.
                                    (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)      0.309      0.205      1.33      75.68
   OUTFLOW: ID= 1 (  0007)      0.309      0.033      1.50      75.60

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.09
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0126

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.01
|ID= 1 DT=10.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.00         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.37        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     250.30       156.34
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       0.32 (ii)    6.23 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.14
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.00          0.004 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      77.75        48.89          49.03
     TOTAL RAINFALL   (mm)=      78.75        78.75          78.75
     RUNOFF COEFFICIENT   =       0.99         0.62           0.62

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
```

```
--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0020):     0.01   0.004     1.33    49.03
      + ID2= 2 (  0007):     0.31   0.033     1.50    75.60
        ================================================
        ID = 3 (  0011):     0.32   0.034     1.50    74.72

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*******************************
** SIMULATION:10-Yr Storm     **
*******************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1023.840
| Ptotal= 50.38 mm |                          B=   4.000
--------------------                          C=   0.800
                       used in:   INTENSITY =  A / (t + B)^C

                       Duration of storm  =  4.00 hrs
                       Storm time step    = 10.00 min
                       Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.07 |  1.00   24.80 |  2.00    7.27 |  3.00    3.66
                0.17    3.52 |  1.17  123.97 |  2.17    6.18 |  3.17    3.40
                0.33    4.15 |  1.33   32.74 |  2.33    5.40 |  3.33    3.17
                0.50    5.10 |  1.50   16.88 |  2.50    4.81 |  3.50    2.98
                0.67    6.72 |  1.67   11.56 |  2.67    4.34 |  3.67    2.81
                0.83   10.21 |  1.83    8.89 |  2.83    3.97 |  3.83    2.66


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   0.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      39.96        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     123.97       112.78
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       1.10 (ii)    7.82 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
```

```
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.02          0.074 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      49.38        40.73          46.77
     TOTAL RAINFALL   (mm)=      50.38        50.38          50.38
     RUNOFF COEFFICIENT   =       0.98         0.81           0.93

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   0.07
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.57        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     123.97        52.05
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       0.76 (ii)    9.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.024 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      49.38        22.83          49.35
     TOTAL RAINFALL   (mm)=      50.38        50.38          50.38
     RUNOFF COEFFICIENT   =       0.98         0.45           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
```

```
| ADD HYD  (  0022)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
-------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0021):     0.07   0.024     1.33    49.35
      + ID2= 2 (  0005):     0.24   0.074     1.33    46.77
        ================================================
        ID = 3 (  0022):     0.31   0.099     1.33    47.35

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
-------------------       (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0255      0.0075
                          0.0147     0.0025   |   0.0294      0.0100
                          0.0208     0.0050   |   0.0334      0.0129

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)      0.309      0.099      1.33       47.35
   OUTFLOW: ID= 1 (  0007)      0.309      0.024      1.50       47.25

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 23.86
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0067

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.01
|ID= 1 DT=10.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.00         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.37        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     123.97        60.00
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       0.43 (ii)    9.09 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.00          0.001 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      49.38        25.50          22.57
     TOTAL RAINFALL   (mm)=      50.38        50.38          50.38
     RUNOFF COEFFICIENT   =       0.98         0.51           0.45
```

```
***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0020):     0.01   0.001     1.33    22.57
      + ID2= 2 (  0007):     0.31   0.024     1.50    47.25
        ================================================
        ID = 3 (  0011):     0.32   0.024     1.50    46.44

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*******************************
** SIMULATION:25-Yr Storm     **
*******************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A=1195.800
| Ptotal= 59.62 mm |                          B=   0.001
--------------------                          C=   0.800
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    3.38 |  1.00   20.18 |  2.00    7.39 |  3.00    3.98
                0.17    3.84 |  1.17  189.51 |  2.17    6.41 |  3.17    3.72
                0.33    4.47 |  1.33   25.42 |  2.33    5.68 |  3.33    3.49
                0.50    5.39 |  1.50   14.96 |  2.50    5.11 |  3.50    3.29
                0.67    6.89 |  1.67   10.97 |  2.67    4.66 |  3.67    3.11
                0.83    9.87 |  1.83    8.78 |  2.83    4.29 |  3.83    2.96


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   0.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
```

```
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      39.96        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     189.51       175.91
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       0.93 (ii)    6.56 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.09         0.03          0.116 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      58.62        49.89          56.00
     TOTAL RAINFALL   (mm)=      59.62        59.62          59.62
     RUNOFF COEFFICIENT   =       0.98         0.84           0.94

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   0.07
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.57        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     189.51        92.53
               over (min)       10.00        10.00
     Storage Coeff.  (min)=       0.64 (ii)    7.92 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.00          0.037 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      58.62        30.00          58.60
     TOTAL RAINFALL   (mm)=      59.62        59.62          59.62
     RUNOFF COEFFICIENT   =       0.98         0.50           0.98
```

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0022)					
1 + 2 = 3		AREA	QPEAK	TPEAK	R.V.
		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0021):		0.07	0.037	1.33	58.60
+ ID2= 2 (0005):		0.24	0.116	1.33	56.00
ID = 3 (0022):		0.31	0.153	1.33	56.58

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

RESERVOIR(0007)		OVERFLOW IS OFF			
IN= 2---> OUT= 1					
DT= 10.0 min		OUTFLOW	STORAGE	OUTFLOW	STORAGE
		(cms)	(ha.m.)	(cms)	(ha.m.)
		0.0000	0.0000	0.0255	0.0075
		0.0147	0.0025	0.0294	0.0100
		0.0208	0.0050	0.0334	0.0129

	AREA	QPEAK	TPEAK	R.V.
	(ha)	(cms)	(hrs)	(mm)
INFLOW : ID= 2 (0022)	0.309	0.153	1.33	56.58
OUTFLOW: ID= 1 (0007)	0.309	0.028	1.50	56.50

PEAK FLOW REDUCTION [Qout/Qin](%)= 18.32
TIME SHIFT OF PEAK FLOW (min)= 10.00
MAXIMUM STORAGE USED (ha.m.)= 0.0091

CALIB	
STANDHYD (0020)	Area (ha)= 0.01
ID= 1 DT=10.0 min	Total Imp(%)= 1.00 Dir. Conn.(%)= 1.00

		IMPERVIOUS	PERVIOUS (i)
Surface Area	(ha)=	0.00	0.01
Dep. Storage	(mm)=	1.00	1.50
Average Slope	(%)=	2.00	2.00
Length	(m)=	8.37	40.00
Mannings n	=	0.013	0.250

```
     Max.Eff.Inten.(mm/hr)=     189.51       102.79
               over (min)       10.00        10.00
     Storage Coeff.  (min)=      0.36 (ii)    7.34 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=      0.17         0.13
                                                        *TOTALS*
     PEAK FLOW       (cms)=      0.00         0.00         0.002 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=     58.62        32.82         30.12
     TOTAL RAINFALL   (mm)=     59.62        59.62         59.62
     RUNOFF COEFFICIENT   =      0.98         0.55          0.51

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0020):     0.01   0.002     1.33    30.12
      + ID2= 2 (  0007):     0.31   0.028     1.50    56.50
        ================================================
        ID = 3 (  0011):     0.32   0.029     1.50    55.63

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
******************************
** SIMULATION:2-Yr Storm      **
******************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 531.391
| Ptotal= 29.57 mm |                          B=   0.001
--------------------                          C=   0.780
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    1.84 |  1.00   10.48 |  2.00    3.94 |  3.00    2.16
```

```
                0.17    2.08 |  1.17   88.18 |  2.17    3.43 |  3.17    2.02
                0.33    2.41 |  1.33   13.13 |  2.33    3.05 |  3.33    1.89
                0.50    2.90 |  1.50    7.84 |  2.50    2.75 |  3.50    1.79
                0.67    3.68 |  1.67    5.79 |  2.67    2.51 |  3.67    1.70
                0.83    5.22 |  1.83    4.66 |  2.83    2.32 |  3.83    1.61


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   0.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      39.96        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      88.18        63.90
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       1.26 (ii)    9.70 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.04         0.01          0.049 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      28.57        20.28          26.07
     TOTAL RAINFALL   (mm)=      29.57        29.57          29.57
     RUNOFF COEFFICIENT   =       0.97         0.69           0.88

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   0.07
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.57        40.00
     Mannings n             =     0.013        0.250
```

```
     Max.Eff.Inten.(mm/hr)=      88.18        13.54
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       0.87 (ii)   16.58 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.08
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.02         0.00          0.017 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      28.57         8.70          28.54
     TOTAL RAINFALL   (mm)=      29.57        29.57          29.57
     RUNOFF COEFFICIENT   =       0.97         0.29           0.97

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0021):     0.07   0.017     1.33    28.54
      + ID2= 2 (  0005):     0.24   0.049     1.33    26.07
        ====================================================
        ID = 3 (  0022):     0.31   0.066     1.33    26.62

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0255      0.0075
                          0.0147     0.0025   |   0.0294      0.0100
                          0.0208     0.0050   |   0.0334      0.0129

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)      0.309      0.066      1.33       26.62
   OUTFLOW: ID= 1 (  0007)      0.309      0.018      1.50       26.51

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 26.43
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0038
```

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.01
|ID= 1 DT=10.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.00         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.37        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=      88.18        18.09
               over (min)        10.00        20.00
     Storage Coeff.  (min)=       0.49 (ii)   14.48 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.07
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.00          0.000 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.50
     RUNOFF VOLUME    (mm)=      28.57        10.81           7.64
     TOTAL RAINFALL   (mm)=      29.57        29.57          29.57
     RUNOFF COEFFICIENT   =       0.97         0.37           0.26

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |          AREA    QPEAK    TPEAK     R.V.
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0020):     0.01   0.000     1.50     7.64
      + ID2= 2 (  0007):     0.31   0.018     1.50    26.51
        ================================================
        ID = 3 (  0011):     0.32   0.018     1.50    25.89

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
********************************
** SIMULATION:50-Yr Storm     **
********************************
--------------------
```

```
| CHICAGO STORM    |    IDF curve parameters: A=1415.390
| Ptotal= 70.57 mm |                          B=   0.001
--------------------                          C=   0.800
                         used in:   INTENSITY =  A / (t + B)^C

                         Duration of storm  =  4.00 hrs
                         Storm time step    = 10.00 min
                         Time to peak ratio =  0.33
```

TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr	TIME hrs	RAIN mm/hr
0.00	4.01	1.00	23.89	2.00	8.74	3.00	4.71
0.17	4.55	1.17	224.31	2.17	7.58	3.17	4.40
0.33	5.29	1.33	30.09	2.33	6.72	3.33	4.13
0.50	6.38	1.50	17.71	2.50	6.05	3.50	3.89
0.67	8.15	1.67	12.98	2.67	5.52	3.67	3.69
0.83	11.68	1.83	10.40	2.83	5.08	3.83	3.50

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   0.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
```

		IMPERVIOUS	PERVIOUS (i)	
Surface Area	(ha)=	0.17	0.07	
Dep. Storage	(mm)=	1.00	5.00	
Average Slope	(%)=	2.00	2.00	
Length	(m)=	39.96	40.00	
Mannings n	=	0.013	0.250	
Max.Eff.Inten.	(mm/hr)=	224.31	212.78	
over	(min)	10.00	10.00	
Storage Coeff.	(min)=	0.87 (ii)	6.08 (ii)	
Unit Hyd. Tpeak	(min)=	10.00	10.00	
Unit Hyd. peak	(cms)=	0.17	0.14	
				TOTALS
PEAK FLOW	(cms)=	0.10	0.03	0.139 (iii)
TIME TO PEAK	(hrs)=	1.33	1.33	1.33
RUNOFF VOLUME	(mm)=	69.57	60.77	66.92
TOTAL RAINFALL	(mm)=	70.57	70.57	70.57
RUNOFF COEFFICIENT	=	0.99	0.86	0.95

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 98.0 Ia = Dep. Storage (Above)

(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.

(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

```
--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   0.07
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.57        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     224.31       122.70
               over (min)       10.00        10.00
     Storage Coeff.  (min)=      0.60 (ii)    7.10 (ii)
     Unit Hyd. Tpeak (min)=     10.00        10.00
     Unit Hyd. peak  (cms)=      0.17         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=      0.04         0.00          0.043 (iii)
     TIME TO PEAK    (hrs)=      1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=     69.57        38.95          69.54
     TOTAL RAINFALL   (mm)=     70.57        70.57          70.57
     RUNOFF COEFFICIENT   =      0.99         0.55           0.99

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0021):     0.07   0.043     1.33    69.54
      + ID2= 2 (  0005):     0.24   0.139     1.33    66.92
        ================================================
        ID = 3 (  0022):     0.31   0.183     1.33    67.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0255      0.0075
```

```
                          0.0147     0.0025   |   0.0294      0.0100
                          0.0208     0.0050   |   0.0334      0.0129

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)      0.309      0.183      1.33       67.52
   OUTFLOW: ID= 1 (  0007)      0.309      0.031      1.50       67.41

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 16.92
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0111

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.01
|ID= 1 DT=10.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.00         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.37        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     224.31       132.93
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       0.34 (ii)    6.64 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.13
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.00          0.003 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
     RUNOFF VOLUME    (mm)=      69.57        41.89          40.44
     TOTAL RAINFALL   (mm)=      70.57        70.57          70.57
     RUNOFF COEFFICIENT   =       0.99         0.59           0.57

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0011)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
```

```
--------------------          (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0020):     0.01   0.003     1.33    40.44
      + ID2= 2 (  0007):     0.31   0.031     1.50    67.41
        ================================================
        ID = 3 (  0011):     0.32   0.032     1.50    66.52

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
*******************************
** SIMULATION:5-Yr Storm      **
*******************************
--------------------
| CHICAGO STORM    |    IDF curve parameters: A= 812.623
| Ptotal= 42.80 mm |                          B=   0.001
--------------------                          C=   0.790
                        used in:   INTENSITY =  A / (t + B)^C

                        Duration of storm  =  4.00 hrs
                        Storm time step    = 10.00 min
                        Time to peak ratio =  0.33

                TIME    RAIN |  TIME    RAIN |'  TIME    RAIN |  TIME    RAIN
                 hrs   mm/hr |   hrs   mm/hr |'   hrs   mm/hr |   hrs   mm/hr
                0.00    2.55 |  1.00   14.84 |  2.00    5.50 |  3.00    2.99
                0.17    2.89 |  1.17  131.78 |  2.17    4.78 |  3.17    2.79
                0.33    3.35 |  1.33   18.65 |  2.33    4.25 |  3.33    2.62
                0.50    4.03 |  1.50   11.05 |  2.50    3.83 |  3.50    2.48
                0.67    5.14 |  1.67    8.13 |  2.67    3.49 |  3.67    2.35
                0.83    7.33 |  1.83    6.53 |  2.83    3.22 |  3.83    2.23


--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0005)|   Area    (ha)=   0.24
|ID= 1 DT=10.0 min |   Total Imp(%)=  70.00   Dir. Conn.(%)=  70.00
--------------------
                               IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.17         0.07
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      39.96        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.78       113.91
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       1.07 (ii)    7.77 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.12
                                                          *TOTALS*
     PEAK FLOW       (cms)=       0.06         0.02          0.078 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33           1.33
```

```
     RUNOFF VOLUME    (mm)=      41.80        33.24          39.22
     TOTAL RAINFALL   (mm)=      42.80        42.80          42.80
     RUNOFF COEFFICIENT   =       0.98         0.78           0.92

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  98.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0021)|   Area    (ha)=   0.07
|ID= 1 DT=10.0 min |   Total Imp(%)=  99.90   Dir. Conn.(%)=  99.90
--------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.07         0.00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         2.00
     Length            (m)=      21.57        40.00
     Mannings n             =     0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.78        48.65
               over (min)       10.00        20.00
     Storage Coeff.  (min)=       0.74 (ii)   10.16 (ii)
     Unit Hyd. Tpeak (min)=      10.00        20.00
     Unit Hyd. peak  (cms)=       0.17         0.09
                                                        *TOTALS*
     PEAK FLOW       (cms)=       0.03         0.00          0.026 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.50           1.33
     RUNOFF VOLUME    (mm)=      41.80        17.29          41.78
     TOTAL RAINFALL   (mm)=      42.80        42.80          42.80
     RUNOFF COEFFICIENT   =       0.98         0.40           0.98

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN*  =  85.0    Ia = Dep. Storage  (Above)
      (ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
           THAN THE STORAGE COEFFICIENT.
     (iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------

--------------------
| ADD HYD  (  0022)|
|   1 +  2 =  3    |         AREA    QPEAK    TPEAK     R.V.
--------------------         (ha)    (cms)    (hrs)     (mm)
        ID1= 1 (  0021):     0.07   0.026     1.33    41.78
```

```
      + ID2= 2 (  0005):     0.24   0.078     1.33    39.22
        ================================================
        ID = 3 (  0022):     0.31   0.103     1.33    39.80

     NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
--------------------------------------------------------------------------------
--------------------
| RESERVOIR(  0007)|     OVERFLOW IS OFF
| IN= 2---> OUT= 1 |
| DT= 10.0 min     |     OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
--------------------      (cms)     (ha.m.)   |   (cms)     (ha.m.)
                          0.0000     0.0000   |   0.0255      0.0075
                          0.0147     0.0025   |   0.0294      0.0100
                          0.0208     0.0050   |   0.0334      0.0129

                                  AREA     QPEAK     TPEAK       R.V.
                                  (ha)     (cms)     (hrs)       (mm)
   INFLOW : ID= 2 (  0022)      0.309      0.103      1.33      39.80
   OUTFLOW: ID= 1 (  0007)      0.309      0.023      1.50      39.68

                  PEAK   FLOW   REDUCTION [Qout/Qin](%)= 21.82
                  TIME SHIFT OF PEAK FLOW         (min)= 10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=  0.0060

--------------------------------------------------------------------------------
--------------------
| CALIB            |
| STANDHYD (  0020)|   Area    (ha)=   0.01
|ID= 1 DT=10.0 min |   Total Imp(%)=   1.00   Dir. Conn.(%)=   1.00
--------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       0.00         0.01
     Dep. Storage     (mm)=       1.00         1.50
     Average Slope     (%)=       2.00         2.00
     Length            (m)=       8.37        40.00
     Mannings n           =      0.013        0.250

     Max.Eff.Inten.(mm/hr)=     131.78        58.23
               over (min)        10.00        10.00
     Storage Coeff.  (min)=       0.42 (ii)    9.18 (ii)
     Unit Hyd. Tpeak (min)=      10.00        10.00
     Unit Hyd. peak  (cms)=       0.17         0.11
                                                      *TOTALS*
     PEAK FLOW       (cms)=       0.00         0.00         0.001 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33          1.33
     RUNOFF VOLUME    (mm)=      41.80        19.81         16.12
     TOTAL RAINFALL   (mm)=      42.80        42.80         42.80
     RUNOFF COEFFICIENT   =       0.98         0.46          0.38

***** WARNING: STORAGE COEFF. IS SMALLER THAN TIME STEP!
***** WARNING:FOR AREAS WITH IMPERVIOUS RATIOS BELOW 20%
              YOU SHOULD CONSIDER SPLITTING THE AREA.
```

(i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
CN* = 85.0 Ia = Dep. Storage (Above)
(ii) TIME STEP (DT) SHOULD BE SMALLER OR EQUAL
THAN THE STORAGE COEFFICIENT.
(iii) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

ADD HYD (0011)		AREA	QPEAK	TPEAK	R.V.
1 + 2 = 3		(ha)	(cms)	(hrs)	(mm)
ID1= 1 (0020):		0.01	0.001	1.33	16.12
+ ID2= 2 (0007):		0.31	0.023	1.50	39.68
ID = 3 (0011):		0.32	0.023	1.50	38.91

NOTE: PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

Determining Number of Cartridges for Flow Based Systems

Date	**22/03/2023**	**Black Cells =**	**Calculation**

Site Information

Project Name	**1437-1455 Queen Street West**		
Project Location	**Toronto, ON**		
OGS ID	**OGS**		
Drainage Area, Ad	**0.79**	ac	(0.32 ha)
Impervious Area, Ai	**0.59**	ac	
Pervious Area, Ap	**0.20**		
% Impervious	**75%**		
Runoff Coefficient, Rc	**0.74**		
Treatment storm flow rate, Q_{treat}	**0.46**	cfs	(13.1 L/s)
Peak storm flow rate, Q_{peak}	**TBD**	cfs	

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**18**	in
Specific Flow Rate	**2.00**	gpm/ft²
Flow rate per cartridge	**15.00**	gpm

SUMMARY

Number of Cartridges	14
Media Type	Perlite

Event Mean Concentration (EMC)	**150**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend SFPD0612 vault or CIP

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825

Determining Number of Cartridges for Flow Based Systems

Date	**22/03/2023**	**Black Cells =**	**Calculation**

Site Information

Project Name	**1437-1455 Queen Street West**		
Project Location	**Toronto, ON**		
OGS ID	**OGS**		
Drainage Area, Ad	**0.79**	ac	(0.32 ha)
Impervious Area, Ai	**0.59**	ac	
Pervious Area, Ap	**0.20**		
% Impervious	**75%**		
Runoff Coefficient, Rc	**0.74**		
Treatment storm flow rate, Q_{treat}	**0.46**	cfs	(13.1 L/s)
Peak storm flow rate, Q_{peak}	**TBD**	cfs	

Filter System

Filtration brand	**StormFilter**	
Cartridge height	**27**	in
Specific Flow Rate	**2.00**	gpm/ft²
Flow rate per cartridge	**22.50**	gpm

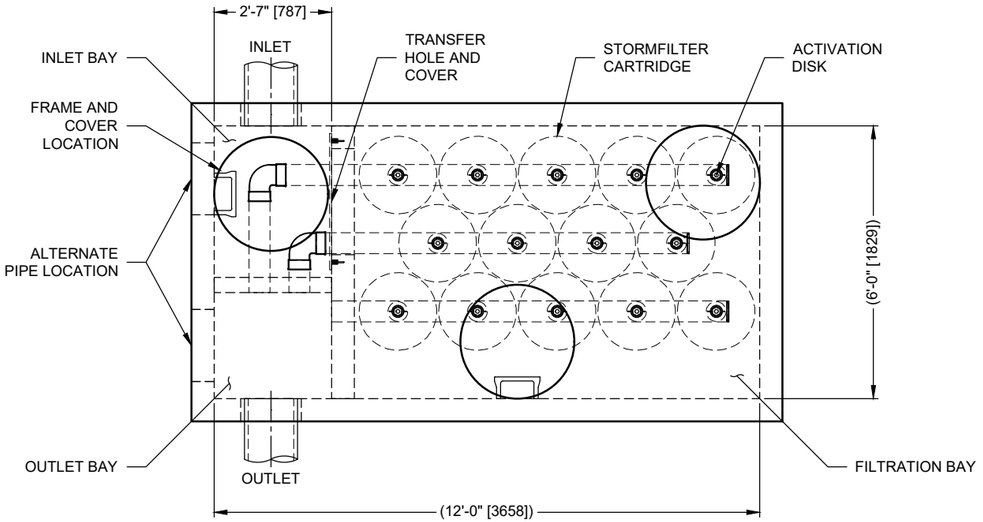
SUMMARY

Number of Cartridges	10
Media Type	Perlite

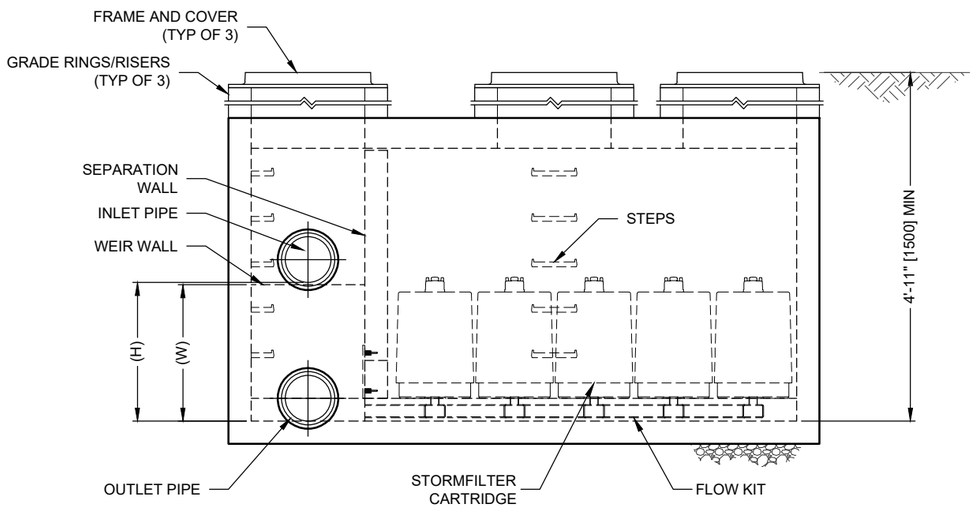
Event Mean Concentration (EMC)	**150**	mg/L
Annual TSS Removal	**80%**	
Percent Runoff Capture	**90%**	

Recommend SFPD0612 vault or CIP

200 Enterprise Drive
Scarborough, ME 04074
Phone 877-907-8676
Fax 207-885-9825



PLAN



ELEVATION

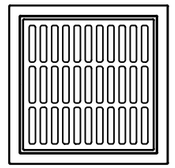
The Stormwater Management StormFilter®

STORMFILTER DESIGN NOTES

- STORMFILTER TREATMENT CAPACITY VARIES BY CARTRIDGE COUNT AND LOCALLY APPROVED SURFACE AREA SPECIFIC FLOW RATE. PEAK CONVEYANCE CAPACITY TO BE DETERMINED BY ENGINEER OF RECORD
- A 6' x 12' [1829 x 3658] PEAK DIVERSION STYLE STORMFILTER IS SHOWN WITH THE MAXIMUM NUMBER OF CARTRIDGES (14) AND IS AVAILABLE IN A LEFT INLET (AS SHOWN) OR A RIGHT INLET CONFIGURATION
- ALL PARTS AND INTERNAL ASSEMBLY PROVIDED BY CONTECH UNLESS NOTED OTHERWISE

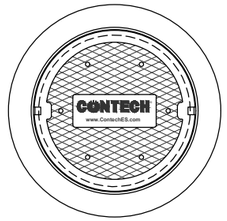
CARTRIDGE SIZE (in. [mm])	27 [686]			18 [457]			LOW DROP		
RECOMMENDED HYDRAULIC DROP (H) (ft. [mm])	3.05 [930]			2.3 [701]			1.8 [549]		
HEIGHT OF WEIR (W) (ft. [mm])	3.00 [914]			2.25 [686]			1.75 [533]		
SPECIFIC FLOW RATE (gpm/sf [L/s/m^2])	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]	2 [1.36]	1.67* [1.13]*	1 [0.68]
CARTRIDGE FLOW RATE (gpm [L/s])	22.5 [1.42]	18.79 [1.19]	11.25 [0.71]	15 [0.95]	12.53 [0.79]	7.5 [0.47]	10 [0.63]	8.35 [0.53]	5 [0.32]

* 1.67 gpm/sf [1.13 L/s/m^2] SPECIFIC FLOW RATE IS APPROVED WITH PHOSPHOSORB® (PSORB) MEDIA ONLY



FRAME AND GRATE

(24" SQUARE)
(NOT TO SCALE)



FRAME AND COVER

(30" ROUND)
(NOT TO SCALE)

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (cfs [L/s])	
PEAK FLOW RATE (cfs [L/s])	
RETURN PERIOD OF PEAK FLOW (yrs)	
CARTRIDGE FLOW RATE	
CARTRIDGE SIZE (27, 18, LOW DROP (LD))	
MEDIA TYPE (PERLITE, ZPG, PSORB)	
NUMBER OF CARTRIDGES REQUIRED	
INLET BAY RIM ELEVATION	
FILTER BAY RIM ELEVATION	

PIPE DATA:	INVERT	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			

NOTES/SPECIAL REQUIREMENTS:

PERFORMANCE SPECIFICATION

FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF CLEANING. **RADIAL MEDIA DEPTH SHALL BE 7" [178].** FILTER MEDIA CONTACT TIME SHALL BE AT LEAST **37 SECONDS**. SPECIFIC FLOW RATE SHALL BE **2 GPM/SF [1.36 L/s/m^2] (MAXIMUM)**. SPECIFIC FLOW RATE IS THE MEASURE OF THE FLOW (GPM) DIVIDED BY THE MEDIA SURFACE CONTACT AREA (SF). MEDIA VOLUMETRIC FLOW RATE SHALL BE **6 GPM/CF [13.39 L/s/m^3] OF MEDIA (MAXIMUM).**

GENERAL NOTES

1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. ALTERNATE DIMENSIONS ARE IN MILLIMETERS [mm] UNLESS NOTED OTHERWISE.
4. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com
5. STORMFILTER WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
6. STRUCTURE SHALL MEET AASHTO HS20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 10' [3048] AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.

INSTALLATION NOTES

A. ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE STORMFILTER STRUCTURE.
C. CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL SECTIONS AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH OUTLET PIPE INVERT WITH OUTLET BAY FLOOR.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO PROTECT CARTRIDGES FROM CONSTRUCTION-RELATED EROSION RUNOFF.
F. CONTRACTOR TO REMOVE THE TRANSFER OPENING COVER WHEN THE SYSTEM IS BROUGHT ONLINE.

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-526-3999 513-645-7000 513-645-7993 FAX

SFPD0612 (6' x 12')
PEAK DIVERSION STORMFILTER
STANDARD DETAIL

CIVICA
Water Management Solutions

Prepared For

Jameson Plaza Limited

Report For

1437-1455 Queen Street West Storm Capacity Analysis

March 30, 2023

330 Rodinea Road, Unit 3
Vaughan, Ontario, Canada L6A 4P5
(905) 417-9792
www.civi.ca

March 30, 2023 **CIVICA Ref: RVA21-0038**

Jameson Plaza Limited
c/o Stanford Homes
2700 Dufferin St., Unit 50
Toronto, ON M6B 4J3

Attention: Alex Wong, P.Eng.
Michael Pirocchi, High Rise Development Manager

RE: 1437 – 1455 Queen Street West Storm Capacity Analysis

Dear Mr. Wong,

Civica Infrastructure Inc. (Civica) is pleased to submit the Storm Sewer Capacity Analysis for the proposed development site on 1437 – 1455 Queen Street West, in the City of Toronto. An InfoWorks ICM model developed by Civica was used to assess the existing and proposed conditions of the storm sewer downstream of the proposed site. The model was used for the hydraulic analysis to determine the peak flow and Hydraulic Grade Line (HGL) elevation within the downstream sanitary sewer.

Based on the analysis and assumptions presented in the report, the findings can be summarized as follows:

1. The existing site currently drains storm flows to the combined sewer on Queen Street West. The proposed development will redirect flows to the 250-mm storm sewer on Queen Street West;
2. The existing 2-year peak flow from the site is 52 L/s. Under proposed conditions, the peak flow will remain at 52 L/s;
3. Under the 2-year design storm, the system operates under free-flowing conditions;
4. Under the 100-year design storm, the system operates under free-flowing conditions; and,
5. The existing municipal storm sewer can support the proposed development site without the need for external upgrades or retrofits.

Do not hesitate to contact us for further clarification and/or comment.

Sincerely,

CIVICA INFRASTRUCTURE INC.

Robert Hughson
Project Manager

Encl. 1437-1455 Queen Street West Storm Capacity Analysis

Document History & QA/QC

Prepared by:

Robert Hughson
Project Manager
Civica Infrastructure Inc.

Reviewed by:

Alan Villalobos
Business Unit Leader
Civica Infrastructure Inc.

Approved by:

Edward Graham, M.A.Sc.Eng., P.Eng.
President
Civica Infrastructure Inc.

Revision History

Name	Date	Reason for Change	Version
Robert Hughson	**2023-03-30**	**Initial Draft**	**Version 1**

Civica Infrastructure Inc. • 330 Rodinea Road, Unit 3, Vaughan, Ontario, Canada, L6A 4P5 • 905-417-9792 | www.civi.ca | info@civi.ca

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Civica Infrastructure Inc. • 330 Rodinea Road, Unit 3, Vaughan, Ontario, Canada, L6A 4P5 • 905-417-9792 | www.civi.ca | info@civi.ca

1.0 Introduction

This memo summarizes the storm servicing analysis for the proposed development ay 1437 – 1455 Queen Street West. The capacity conditions in the existing storm sewer system have been evaluated along Queen Street West to the intersection of Queen Street West and MacDonell Avenue. **Figure 1** shows the location of the tributary area and the proposed development site. **Figure 2** illustrates the conveyance flow path to the study outlet.

The storm flows from the existing site currently drain to the 450-mm combined sewer on Queen Street West. The proposed site will reconnect the storm flows to the 250-mm storm sewer on Queen Street West which connects into the 1200-mm storm sewer also on Queen Street West. The flows outlet into the storm trunk sewer at the intersection of Queen Street West and MacDonell Avenue which eventually empties into Lake Ontario.

2.0 Modeling Approach

The existing site is contained within EA Basement Flooding Area 42 which, at the time that this report was completed, the EA study was still in progress. Since the EA model is currently in the process of being completed, Civica developed its own model in InfoWorks ICM using GIS data provided by the City. The model was developed following the City's InfoWorks Basement Flooding Model Studies Guideline (2020). In summary, storm drainage model was developed based on the following assumptions:

1. Storm networks, manholes, and sewers come from City's Interceptor 2016 model;
2. Subcatchments are delineated from the City's parcel GIS layer. Imperviousness are estimated from ortho-photo;
3. Assumed all CBs type are fishbone type;
4. Assumed all roofs are imperviousness area;
5. Model set-up approach and parameters followed the City's guidelines referenced above;
6. Existing Conditions:
    a. Assume the site storm flow goes to the Combined sewer on Queen St W;
7. Proposed Conditions:
    a. Assume the site storm flow goes to the Storm sewer on Queen St W; and,
8. Model Boundary Conditions:
    a. City's GIS showed the storm sewer on Queen St W is stopped at the intersection of Queen Street West and MacDonell Avenue. The Interceptor model was checked for confirmation, and it was found to be labelled as an outfall. The Interceptor 2016 model also confirmed that the nearby trunk storm system (labelled system type: Other) extends downstream to the Lake Ontario outfall. The upstream system collects storm water from the combined system (CSO);
    b. According to the above information, we define this 'Other' system is the trunk and the 'stopped' manhole MH3316309789 should connect to the 'Other' system. So, the 'stopped' manhole MH3316309789 is our boundary (outlet).

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N

Ln E Roncesvalles N Pearson

Ln W Sorauren N Pearson

Ln E Sorauren N Pearson

Pearson Ave

Ln N Seaforth E Macdonell

West Lodge Ave

Ln E West Lodge N Seaforth

Ln W Sorauren S Pearson

Ln S Pearson E Fuller

Marion St

Seaforth Ave

Ln W Callender N Harvard

Virtue St

Margaret Lane

Ln W Ohara S Seaforth

Harvard Ave

Ln N Queen W Sorauren

Saunders Ave

Fuller Ave

MacDonell Ave

Ln N Queen W Lansdowne

Lansdowne Ave

Ln N Queen E Lansdowne

O'Hara Pl

Callender St

Sorauren Ave

Ln 1 N Queen E Fuller

West Lodge Ave

Storm System Drainage Area 5.4 ha

Ln N Queen E Sorauren

Ln N Queen E Fuller

Ln N Queen E Triller

Outlet

Queen St W

Queen St W

Ln S Queen E Beaty

Ln S Queen E Triller

Dowling Ave

James

Site Location 1437-1455 Queen St W

Triller Ave

Wilson Park Rd

Beaty Ave

Laxton Ave

Jameson Ave

Close Ave

Dunn Ave

Ln N King W Wilson Park

Legend

- Outlet
- Storm System Drainage Area
- Site Location

Manholes

- Combined
- Storm
- Other

Sewers

- Combined
- Storm
- Other

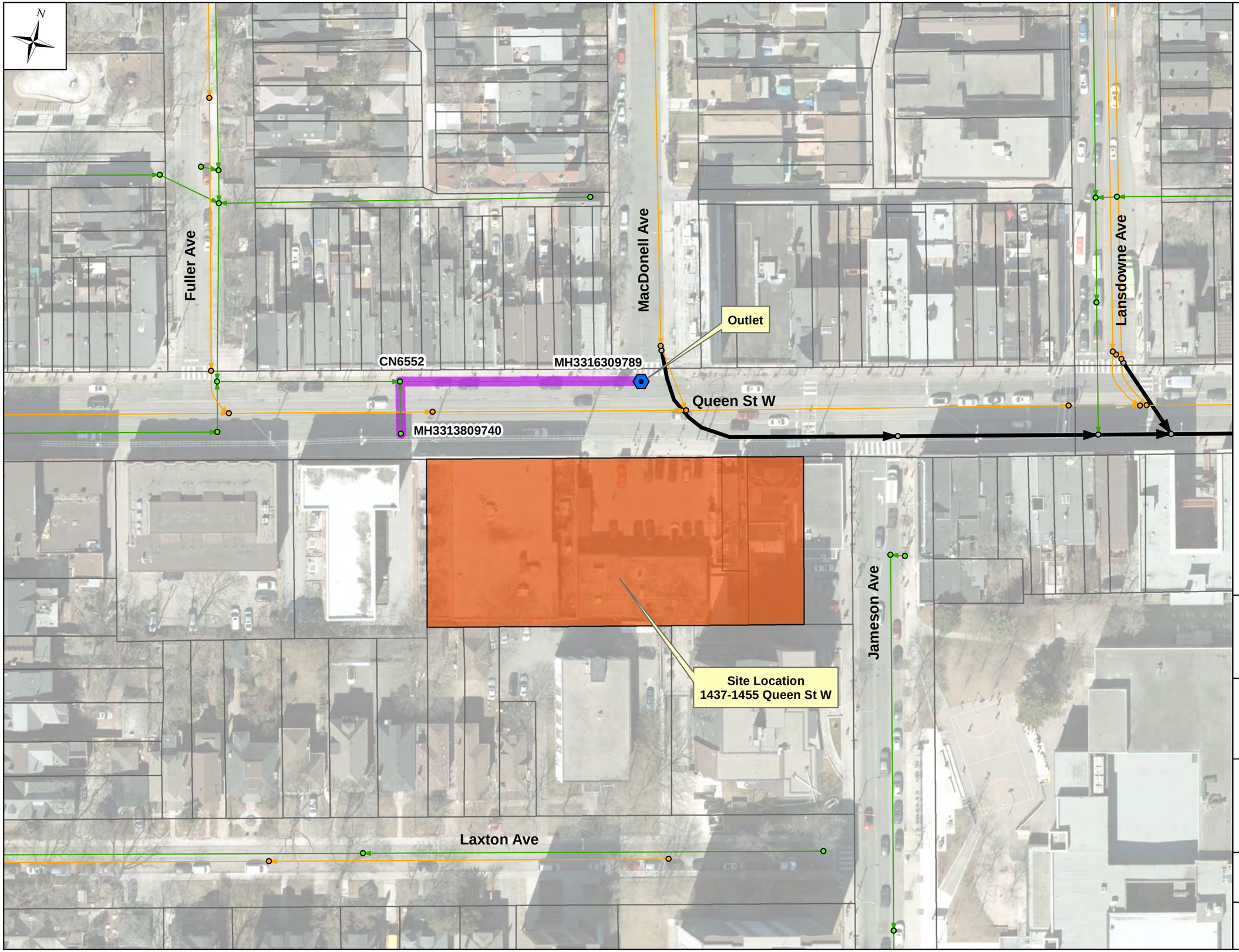
CIVICA

1437-1455 Queen St W
Storm Sewer Capacity

Figure 1-1:
Storm System Drainage Area

Drawn By: J.H. Date: March 28, 2023

0 25 50 100 Meters



Legend

- Outlet
- Downstream Storm Sewer Conveyance Flow
- Site Location

Manholes

- Combined
- Storm
- Other

Sewers

- Combined
- Storm
- Other

CIVICA

1437-1455 Queen St W
Storm Sewer Capacity

Figure 1-2:
Downstream Storm Sewer Conveyance Flow

Drawn By: J.H. Date: March 28, 2023

0 5 10 20 Meters

3.0 Design Storm Flows

3.1 Existing Conditions

For existing conditions, the model was set up to have zero flow contributions from the existing site to the storm sewer on Kingston Road. However, the 2-year pre-development peak flow is calculated to be used as the target controlled peak flow for proposed conditions.

The existing site has a drainage area of 0.32 ha with 85% of the site being comprised of impervious surface area using a runoff coefficient of 0.90. The rational method was used to estimate the peak flow from the existing site.

$$Q_{2yr} = 2.78 \cdot C \cdot I \cdot A$$

Where:
C = 0.90
I = 88.19 mm/hr
A = (0.32 ha · 85%) = 0.27 ha

$$Q_{2yr} = 2.78 \cdot 0.90 \cdot 88.19 mm/hr \cdot 0.27\ ha$$

$$\boldsymbol{Q_{2yr} = 54\ L/s}$$

3.2 Proposed Conditions

For post-development conditions, the 2-year pre-development conditions of 54 L/s will remain the same. However, the flow will be redirected from the combined to the storm sewer system on Queen Street West.

4.0 Results

Based on the assumptions made in our analysis, the existing municipal storm sewer operates under free-flow conditions during both the 2-year and 100-year design storms.

The peak flows and water levels at each sewer legs are shown in **Table 3-1** and **Table 3-2**. **Figure A-1** and **Figure A-2** shows the model results during the 2-year storm event and **Figure A-3** and **Figure A-4** shows the results under the 100-year design storm. The HGL profiles can be seen in **Figures A-5** to **A-8** in the appendices.

The existing municipal storm sewer can support the proposed development site without the need for external upgrades or retrofits.

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Table 3-1: Existing and Proposed Downstream Peak Flows

Street Name	US node ID	DS node ID	Length (m)	Diameter (mm)	US invert level (m)	DS invert level (m)	Slope (m/m)	Pipe capacity (L/s)	2-Year Design Storm				100-Year Design Storm			
									Existing		Proposed		Existing		Proposed	
									Max DS flow (L/s)	Surcharge State[1]	Max DS flow (L/s)	Surcharge State[1]	Max DS flow (L/s)	Surcharge State[1]	Max DS flow (L/s)	Surcharge State[1]
Site to Queen St W	MH3313809740	CN6552	11.7	250	94.385	94.327	0.0050	42	6.1	0.27	6.1	0.27	27.6	0.58	27.6	0.58
Queen St W	CN6552	MH3316309789	54.3	1200	93.426	93.350	0.0014	1459	441.1	0.35	473.0	0.36	1228.5	0.58	1394.1	0.63

Notes: (1) Surcharge State is calculated as the ratio of maximum water depth to pipe height and indicates whether the flow rate in the system has exceeded the capacity of the pipe to the extent that levels rise within manholes, i.e., pipe surcharging
Yellow bolded values highlight areas where **backflow** exist
Red bolded values highlight areas where **bottlenecks** exist.

Table 3-2: Existing and Proposed Downstream Hydraulic Gradelines

Street Name	Node ID	Ground Level (m)	2-Year Design Storm				100-Year Design Storm			
			Existing HGL (m)	Proposed HGL (m)	Change in Water Level (m)	Freeboard (1) under Proposed Conditions (m)	Existing HGL (m)	Proposed HGL (m)	Change in Water Level (m)	Freeboard (1) under Proposed Conditions (m)
Site to Queen St W	MH3313809740	98.100	94.452	94.452	0.000	3.648	94.532	94.532	0.000	3.568
Queen St W	CN6552	98.100	93.843	93.856	0.013	4.244	94.125	94.181	0.056	3.919

[1]Freeboard = Distance from the HGL elevation to the ground surface elevation

5.0 Conclusions and Recommendations

Based on the analysis and assumptions presented in the report, the findings can be summarized as follows.

1. The existing site currently drains storm flows to the combined sewer on Queen Street West. The proposed development will redirect flows to the 250-mm storm sewer on Queen Street West;
2. The existing 2-year peak flow from the site is 52 L/s. Under proposed conditions, the peak flow will remain at 52 L/s;
3. Under the 2-year design storm, the system operates under free-flowing conditions;
4. Under the 100-year design storm, the system operates under free-flowing conditions; and,
5. The existing municipal storm sewer can support the proposed development site without the need for external upgrades or retrofits.

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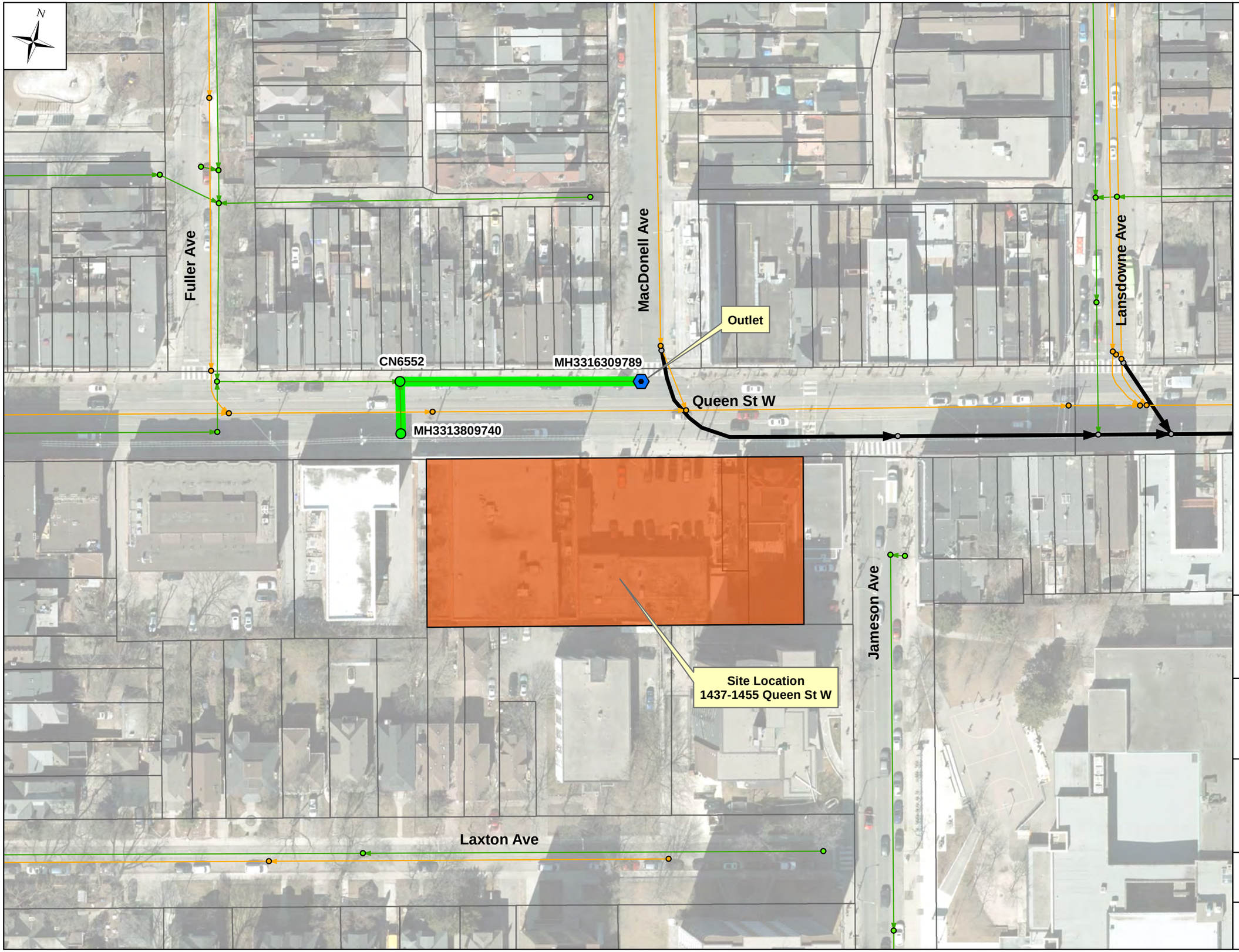
Water Management Solutions

Appendix A
Storm Sewer System Performance

March 30, 2023

330 Rodinea Road, Unit 3
Vaughan, Ontario, Canada L6A 4P5
(905) 417-9792
www.civi.ca



Legend

- Outlet
- Site Location

Manholes

- Combined
- Storm
- Other

Sewers

- Combined
- Storm
- Other

Storm Manholes

- At or Above Surface
- Within Basement Level (0 - 1.8 m)
- Below Basement (> 1.8 m)

Storm Sewers

- Surcharge State=2 (Bottleneck)
- Surcharge State=1 (Backup)
- Within Capacity (No Surcharge)

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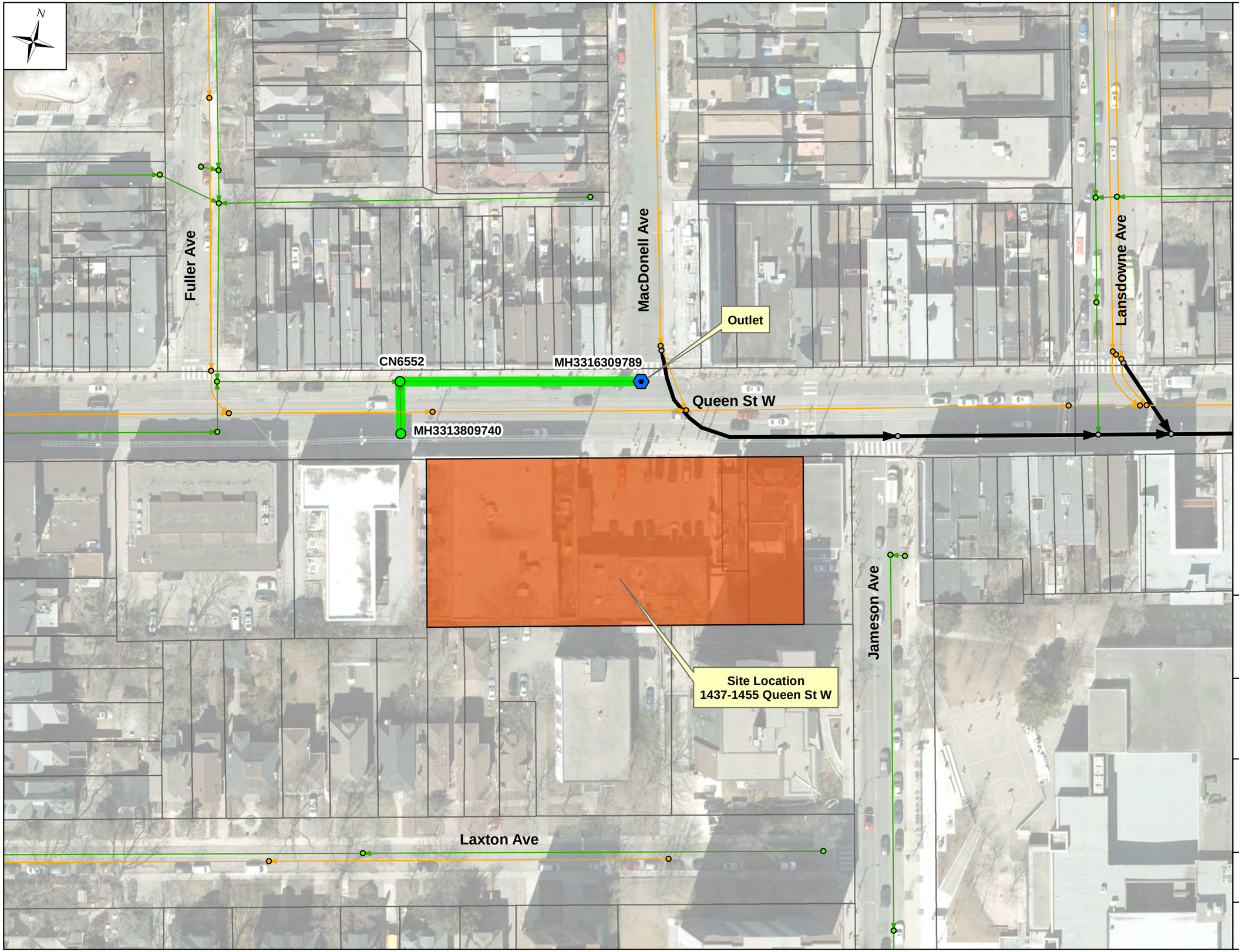
1437-1455 Queen St W
Storm Sewer Capacity

Figure A-1:
Existing Condition Storm System Model Results - 2 Year Design Storm

Drawn By: J.H. Date: March 28, 2023

0 5 10 20 Meters



Legend

- Outlet
- Site Location

Manholes

- Combined
- Storm
- Other

Sewers

- Combined
- Storm
- Other

Storm Manholes

- At or Above Surface
- Within Basement Level (0 - 1.8 m)
- Below Basement (> 1.8 m)

Storm Sewers

- Surcharge State=2 (Bottleneck)
- Surcharge State=1 (Backup)
- Within Capacity (No Surcharge)

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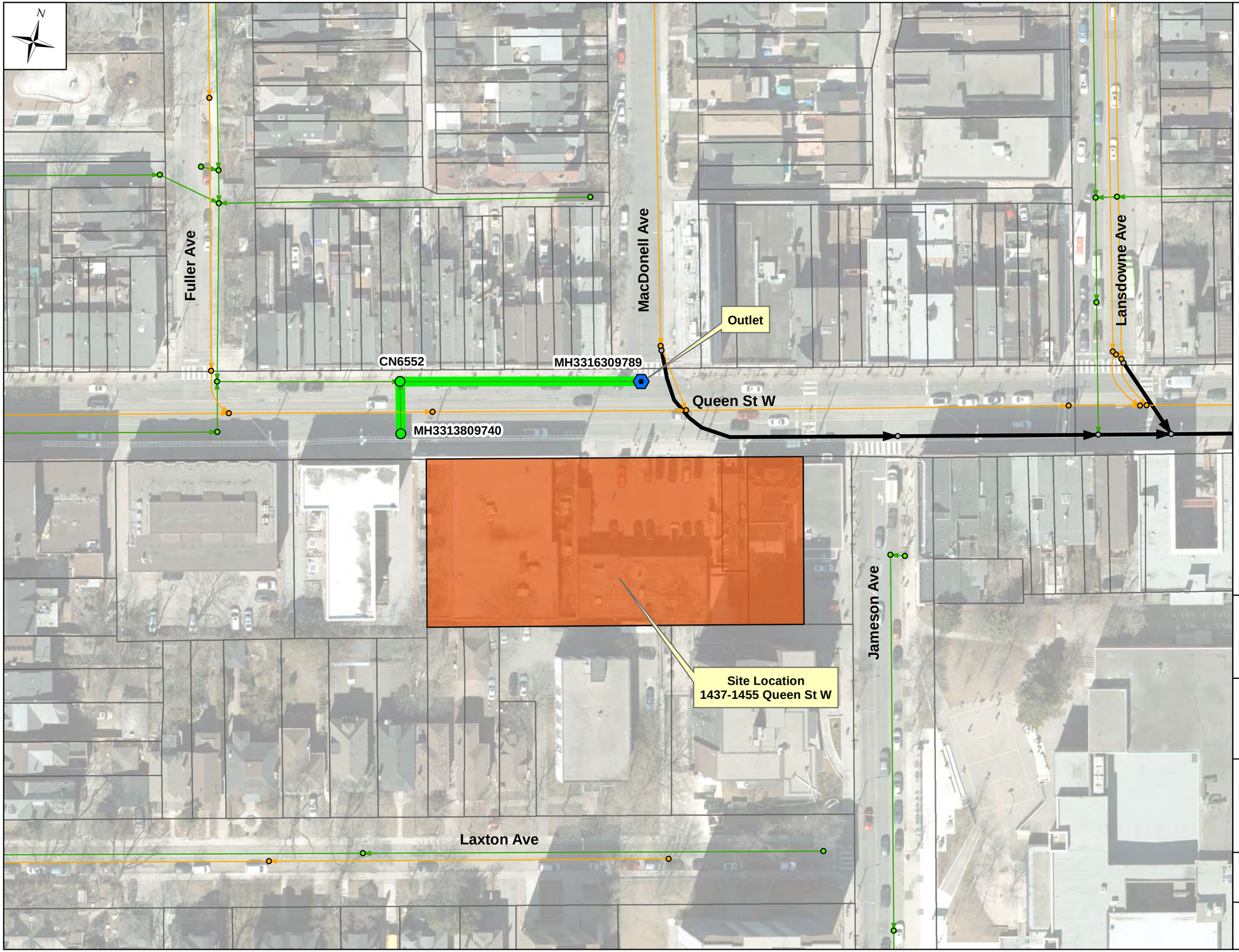
1437-1455 Queen St W
Storm Sewer Capacity

Figure A-2:
Proposed Condition Storm System Model Results - 2 Year Design Storm

Drawn By: J.H. Date: March 28, 2023

0 5 10 20 Meters



Legend

- Outlet
- Site Location

Manholes

- Combined
- Storm
- Other

Sewers

- Combined
- Storm
- Other

Storm Manholes

- At or Above Surface
- Within Basement Level (0 - 1.8 m)
- Below Basement (> 1.8 m)

Storm Sewers

- Surcharge State=2 (Bottleneck)
- Surcharge State=1 (Backup)
- Within Capacity (No Surcharge)

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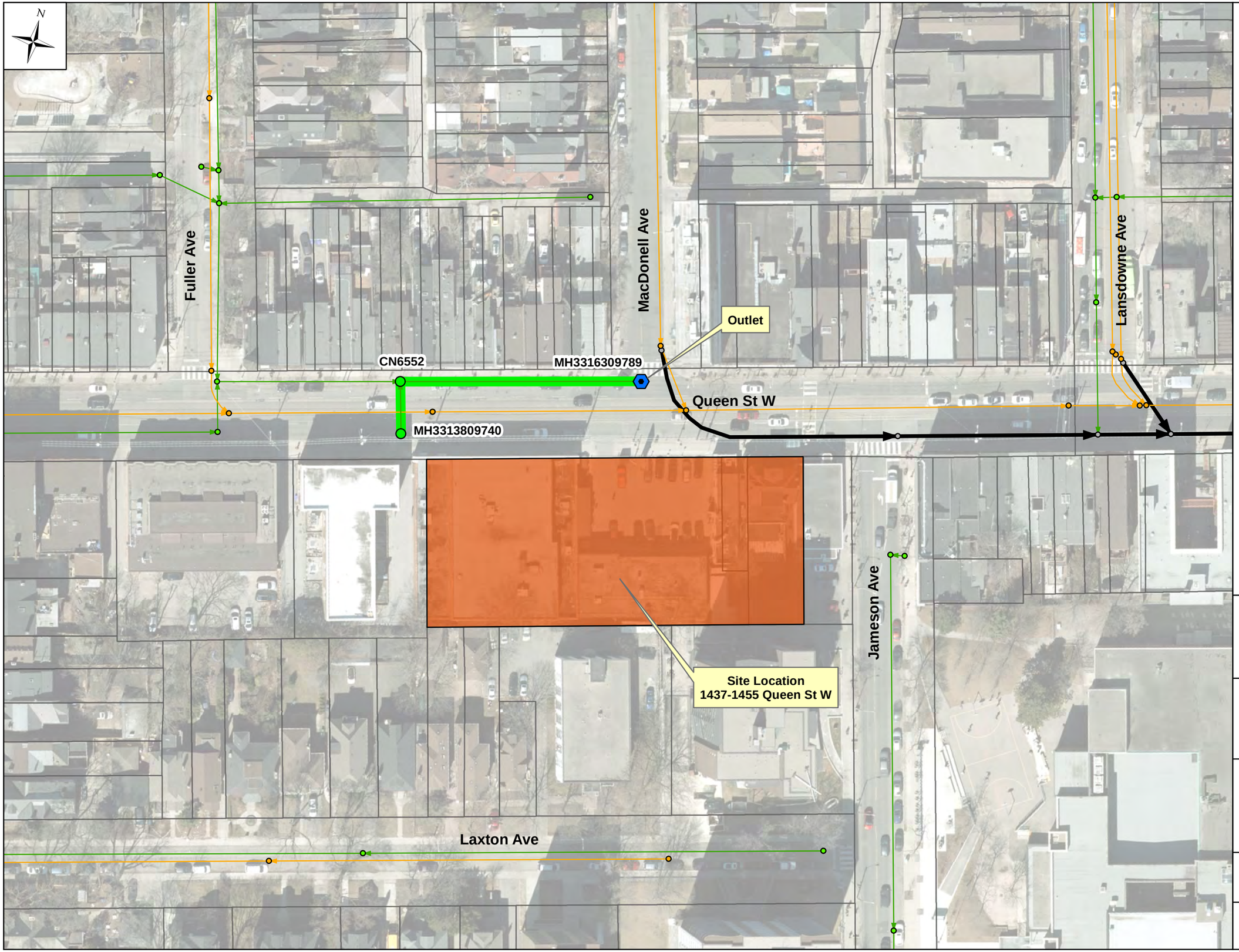
1437-1455 Queen St W
Storm Sewer Capacity

Figure A-3:
Existing Condition Storm System Model Results - 100 Year Design Storm

Drawn By: J.H. Date: March 28, 2023

0 5 10 20 Meters



Legend

- Outlet
- Site Location

Manholes

- Combined
- Storm
- Other

Sewers

- Combined
- Storm
- Other

Storm Manholes

- At or Above Surface
- Within Basement Level (0 - 1.8 m)
- Below Basement (> 1.8 m)

Storm Sewers

- Surcharge State=2 (Bottleneck)
- Surcharge State=1 (Backup)
- Within Capacity (No Surcharge)

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1437-1455 Queen St W
Storm Sewer Capacity

Figure A-4:
Proposed Condition Storm System Model Results - 100 Year Design Storm

Drawn By: J.H. Date: March 28, 2023

0 5 10 20 Meters

Link	MH3313809740.1	CN6552.1
US node ID	MH3313809740	CN6552
ds node	CN6552	MH3316309789
length (m)	11.7	54.3
Shape ID	CIRC	CIRC
height (mm)	250	1200
us inv (m AD)	94.385	93.426
ds inv (m AD)	94.327	93.350
grad (m/m)	0.00496	0.00140
pfc (l/s)	42	1459
surc	0.27	0.35
DS flow (l/s)	6.09	441.13

Node	MH3313809740	CN6552	MH3316309789
ground (m AD)	98.100	98.100	97.990
level (m AD)	94.452	93.843	
flood dep (m)	0.062	0.042	

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Project Code: RVA23-0038
Project Name: 1437-1455 Queen St W
Downstream Capacity Analysis

SCENARIO:
Existing Conditions - 2-year Design Storm
HGL Profile from the proposed site to the outlet

DATE: 3/28/2023

FIGURE A-5

Link	MH3313809740.1	CN6552.1
US node ID	MH3313809740	CN6552
ds node	CN6552	MH3316309789
length (m)	11.7	54.3
Shape ID	CIRC	CIRC
height (mm)	250	1200
us inv (m AD)	94.385	93.426
ds inv (m AD)	94.327	93.350
grad (m/m)	0.00496	0.00140
pfc (l/s)	42	1459
surc	0.27	0.36
DS flow (l/s)	6.09	473.00

Node	MH3313809740	CN6552	MH3316309789
ground (m AD)	98.100	98.100	97.990
level (m AD)	94.452	93.856	
flood dep (m)	0.062	0.042	

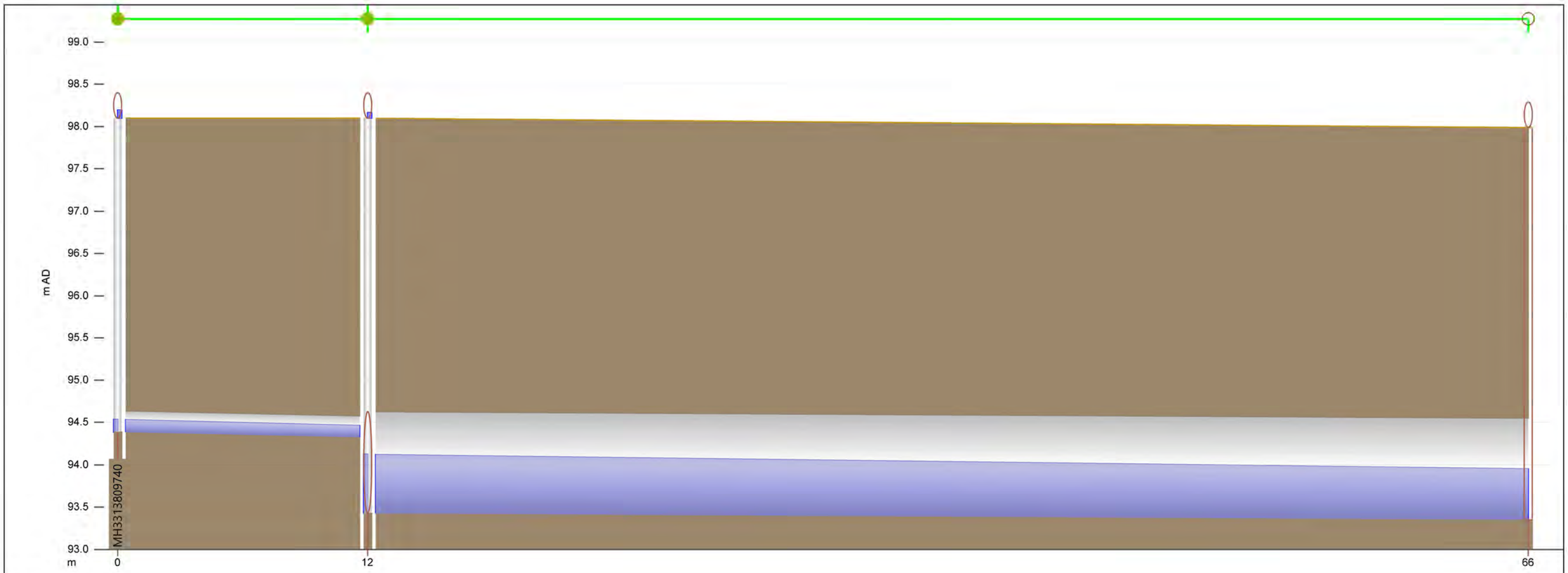
CIVICA
Water Management Solutions

Project Code: RVA23-0038
Project Name: 1437-1455 Queen St W
Downstream Capacity Analysis

SCENARIO:
Proposed Conditions - 2-year Design Storm
HGL Profile from the proposed site to the outlet

DATE: 3/28/2023

FIGURE A-6



Link	MH3313809740.1	CN6552.1
US node ID	MH3313809740	CN6552
ds node	CN6552	MH3316309789
length (m)	11.7	54.3
Shape ID	CIRC	CIRC
height (mm)	250	1200
us inv (m AD)	94.385	93.426
ds inv (m AD)	94.327	93.350
grad (m/m)	0.00496	0.00140
pfc (l/s)	42	1459
surc	0.58	0.58
DS flow (l/s)	27.59	1228.45

Node	MH3313809740	CN6552	MH3316309789
ground (m AD)	98.100	98.100	97.990
level (m AD)	94.532	94.125	
flood dep (m)	0.094	0.066	

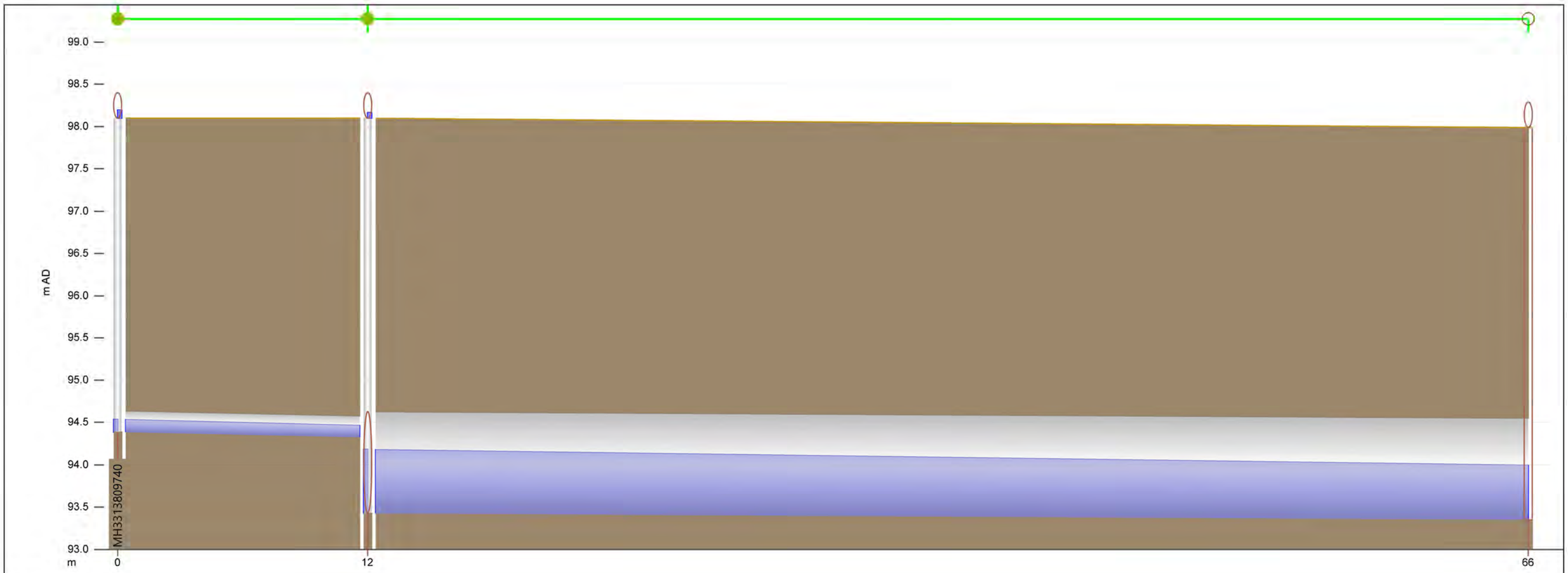
CIVICA
Water Management Solutions

Project Code: RVA23-0038
Project Name: 1437-1455 Queen St W
Downstream Capacity Analysis

SCENARIO:
Existing Conditions - 100-year Design Storm
HGL Profile from the proposed site to the outlet

DATE: 3/28/2023

FIGURE A-7



Link	MH3313809740.1	CN6552.1
US node ID	MH3313809740	CN6552
ds node	CN6552	MH3316309789
length (m)	11.7	54.3
Shape ID	CIRC	CIRC
height (mm)	250	1200
us inv (m AD)	94.385	93.426
ds inv (m AD)	94.327	93.350
grad (m/m)	0.00496	0.00140
pfc (l/s)	42	1459
surc	0.58	0.63
DS flow (l/s)	27.59	1394.06

Node	MH3313809740	CN6552	MH3316309789
ground (m AD)	98.100	98.100	97.990
level (m AD)	94.532	94.181	
flood dep (m)	0.094	0.066	

CIVICA
Water Management Solutions

Project Code: RVA23-0038
Project Name: 1437-1455 Queen St W
Downstream Capacity Analysis

SCENARIO:
Proposed Conditions - 100-year Design Storm
HGL Profile from the proposed site to the outlet

DATE: 3/28/2023

FIGURE A-8

AQUAFLOW TECHNOLOGY INC

226 WILKINSON ROAD, BRAMPTON, ONTARIO L6T 4N7
(905) 792-8169

COMBINED & STORM SEWER INVESTIGATION REPORT
DYE TEST

100 MM - 600 MM DIAMETER COMBINED SEWERS
&
100 MM - 1200 MM DIAMETER STORM SEWERS

FOR

1437 - 1455 QUEEN STREET WEST

CITY OF TORONTO

CONSULTING ENGINEER: R.V. ANDERSON & ASSOCIATES
CONSULTING ENGINEER'S REPRESENTATIVE: ALEX WONG
OWNER: STANFORD HOMES
OWNER'S REPRESENTATIVE: MICHAEL PIROCCHI

TUESDAY, FEBRUARY 7TH, 2023

INDEX:

SEWER CLEANING, VIDEO INSPECTION, INSITU REPAIRS &
MUNICIPAL ENGINEERING SERVICES

2. SUMMARY REPORT AND CONCLUSIONS:

The investigation of the combined and storm sewers at 1437 - 1455 Queen Street West was carried out by Steven Lostracco, P.Eng. of Aquaflow Technology, and was authorized by Michael Pirocchi of Stanford Homes. The investigation was carried out on Tuesday February, 7th, 2023.

The purpose of this report was to determine which municipal sewer the storm drains and sanitary connect to. Dye testing was carried out from each unit to confirm which sewer the buildings connect to.

1. Note, all buildings roof drainage and the parking lot catchbasin (CB-1) connect to the 450 mm / 600 mm combined sewer system on Queen Street West. Each building has combined sewer lateral for both storm and sanitary flow which connects to the combined sewer.

1. 1437


2. 1437


3. 1437, downspout

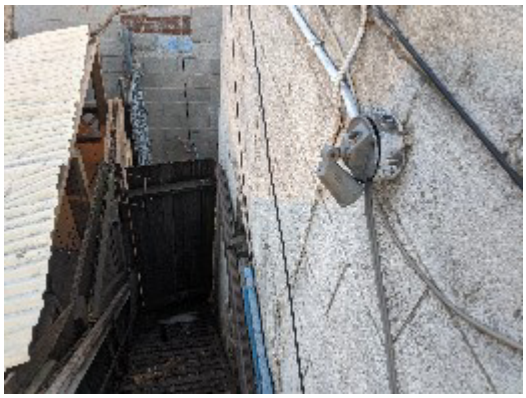

4. 1437, downspout

5. 1437, downspout

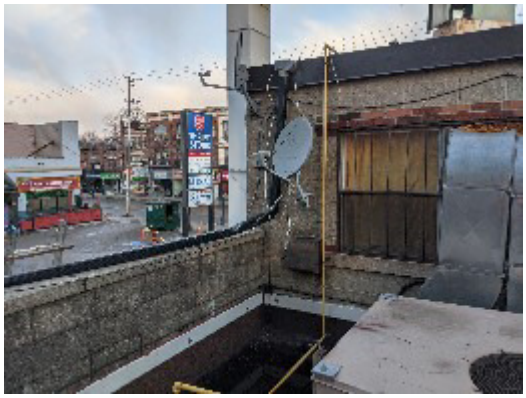
6. 1439

7. 1439

8. 1439, roof drain



9. 1439, downspout



10. 1439 downspout

11. 1441

12. 1445

13. 1441 to 1445

14. 1441 to 1445 Parking lot CB

15. 1441 to 1445 Parking lot cleanout

16. 1441 to 1445 roof drains

17. 1449A

18. 1449A

19. 1449A roof drains

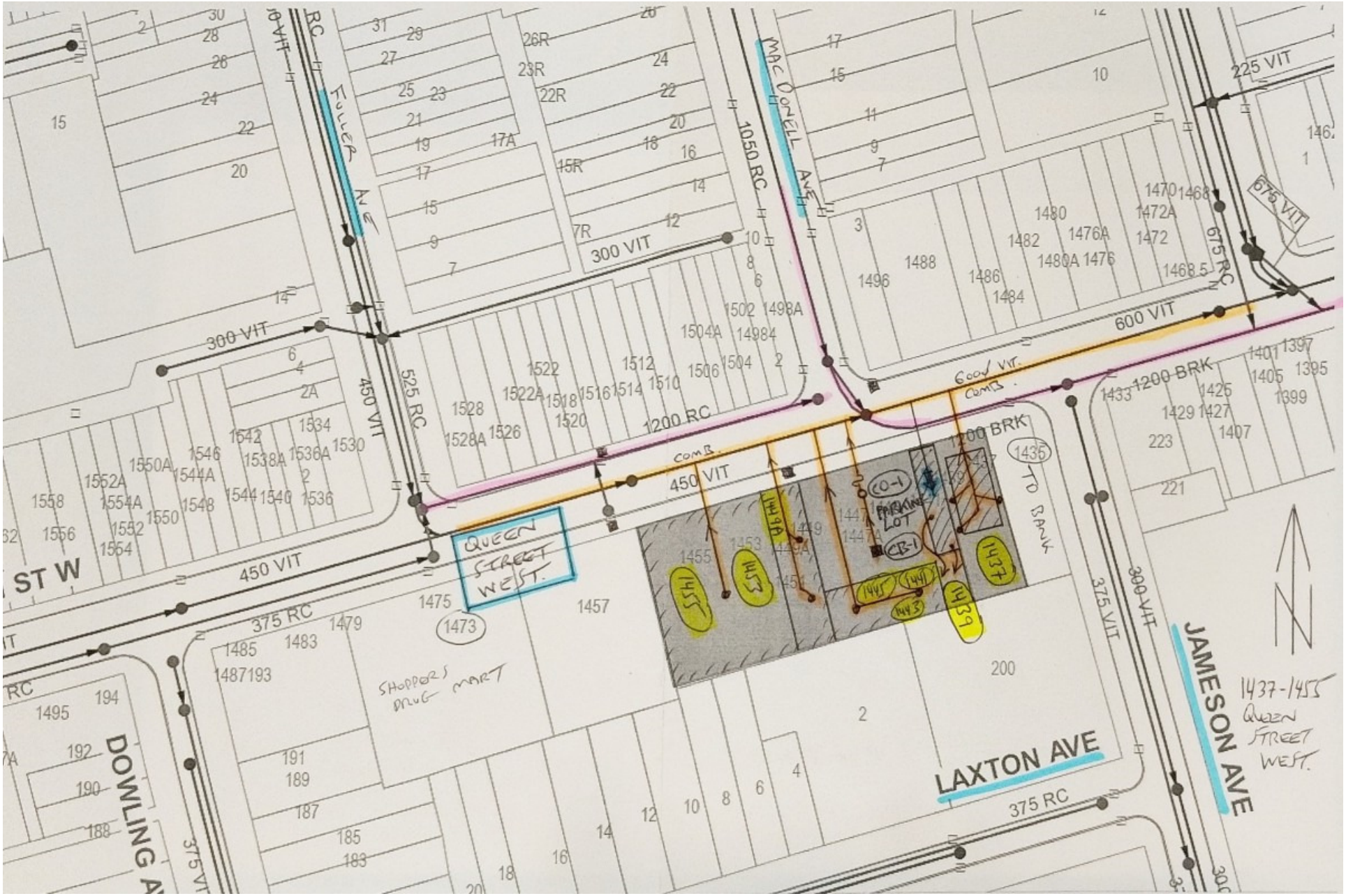
20. 1445

21. 1445

22. 1445, roof drain

Report Prepared by:

Steven Lostracco, P. Eng.


QUEEN STREET WEST.
1437-1455 QUEEN STREET WEST.
SHOPPERS DRUG MART
TD BANK
PARKING LOT
CO-1
CB-1
LAXTON AVE
JAMESON AVE
DOWLING AVE
FULLER AVE
MAC DONELL AVE
1200 BRK
1200 RC
1050 RC
600 VIT
600 VIT COMB.
450 VIT
COMB.
300 VIT
225 VIT
675 VIT
675 RC
525 RC
450 RC
375 RC
375 VIT
300 VIT
1455
1453
1449A
1449
1447
1447A
1445
1443
1441
1439
1437
1435
1475
1473
1457
200
2
4
6
8
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12
14
16
18
20

APPENDIX E

Civil Drawings

C.O.T. GENERAL NOTES

1. ALL WORK TO CONFORM TO THE LATEST CITY OF TORONTO STANDARD DRAWINGS AND SPECIFICATIONS AS WELL AS THE LATEST ADOPTED ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS.
2. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE CURRENT "OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATION FOR CONSTRUCTION PROJECTS". THE GENERAL CONTRACTOR SHALL BE DEEMED TO BE THE CONSTRUCTOR AS DEFINED IN THE ACT.
3. ALL TEMPORARY TRAFFIC CONTROL AND SIGNAGE DURING CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CURRENT ONTARIO TRAFFIC MANUAL BOOK 7: TEMPORARY CONDITIONS FIELD EDITION.
4. ALL TRENCHES WITHIN THE EXISTING RIGHT–OF–WAY SHALL BE BACKFILLED WITH UNSHRINKABLE FILL. TEMPORARY REPAIRS TO UTILITY CUTS WILL BE AS PER MUNICIPAL CONSENT REQUIREMENTS, APPENDIX D, TEMPORARY REPAIRS TO UTILITY CUTS.
5. THE CONTRACTOR SHALL RECTIFY ALL DISTURBED AREAS TO THE ORIGINAL CONDITION OR BETTER AND TO THE SATISFACTION OF THE EXECUTIVE DIRECTOR OF TECHNICAL SERVICES.
6. PRIOR TO COMMENCING ANY WORK WITHIN THE MUNICIPAL RIGHT–OF–WAY THE CONTRACTOR OR DEVELOPER OR CONSULTANT WILL OBTAIN ALL NECESSARY ROAD OCCUPANCY PERMITS FROM THE CITY'S RIGHT–OF–WAY MANAGEMENT SECTION.
7. CONTACT CITY INSPECTOR AND ENGINEER 48 HOURS BEFORE EXCAVATION, INSTALLATION OR BACKFILL.
8. LOCATION AND COMPLETENESS OF EXISTING SERVICES/UTILITIES SHOWN ON THE DRAWINGS ARE NOT GUARANTEED. CONTRACTOR SHALL NOTIFY THE UTILITY COMPANIES AT LEAST FORTY–EIGHT (48) HOURS PRIOR TO COMMENCEMENT OF ANY LOCATION WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS TO LOCATE THE EXIST. SERVICES ON SITE.
9. THE DRAWINGS INDICATE EXISTING SERVICES AND DID NOT ATTEMPT TO LOCATE ANYTHING OTHER THAN THESE SERVICES (I.E. ABANDONED BUILDING FOUNDATIONS AND OTHER EXISTING FACILITIES WERE NOT INVESTIGATED OR SHOWN ON THE DRAWINGS).
10. THE CONTRACTOR SHALL PROVE THE EXACT LOCATION AND SIZE OF ALL SERVICES AND STRUCTURES AND SHALL BE RESPONSIBLE FOR ADEQUATELY PROTECTING THEM AGAINST DAMAGE ASSUMING ALL LIABILITIES FOR DAMAGE.
11. THE CONTRACTOR SHALL REPORT TO THE ENGINEER ANY CONFLICT WHICH THE EXISTING SERVICES MAY CREATE WITH THE PROPOSED WORK AND SHALL SCHEDULE CONSTRUCTION WORK AVOIDING CONSTRUCTION DELAYS CAUSED BY SUCH CONFLICTS.
12. MAINTAIN VEHICULAR AND PEDESTRIAN TRAFFIC AT ALL TIMES.
13. ALL SERVICES TO BE SUPPORTED AS PER CITY STD T–1007.01 TO T–1007.01–10.
14. THE CONTRACTOR SHALL OBTAIN ALL REQUIRED PERMITS AND LICENSES BEFORE PROCEEDING WITH ANY WORK.
15. THE CONTRACTOR SHALL BECOME SOLE OWNER OF ALL EXCESS MATERIAL.
16. WITHIN THE PROPOSED PAVED AREAS AND EASEMENTS GRAN. B SHALL BE USED AS BACKFILL WITHIN 1M FROM MANHOLES, VALVE CHAMBERS AND CATCHBASINS, AND APPROVED NATIVE OR IMPORTED BACKFILL SHALL BE USED FOR ALL OTHER AREAS.
17. PROTECT ALL TREES FROM DAMAGE. SEE LANDSCAPE DRAWINGS FOR DETAILS.
18. REMOVE OBJECT AS PER OPSS 510, INCLUDING APPROVED COMPACTED BACKFILL. AND ABANDON PIPE AS PER OPSS 510 INCLUDING SEALING OF PIPE AND FILLING IT WITH 15MPA CONCRETE OR GROUT.
19. ADJUST ALL EXISTING MANHOLE, CATCHBASIN AND VALVE BOX FRAMES TO PROPOSED FINISHED GRADE.
20. RELOCATE EXISTING SERVICES AS REQUIRED TO CONSTRUCT PROPOSED INFRASTRUCTURE.
21. CONTRACTOR TO WORK IN DRY CONDITIONS. TEMPORARY PLUGGING OF SEWER UP AND DOWN STREAM WILL BE REQUIRED. PROVISION FOR WET WEATHER SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
22. WHERE THE STABILITY, SAFETY OR FUNCTION OF THE EXISTING ROADWAY OR UNDERGROUND FACILITIES MAY BE IMPAIRED DUE TO THE CONTRACTOR'S METHOD OF OPERATIONS, THE CONTRACTOR SHALL PROVIDE SUCH PROTECTION AS MAY BE REQUIRED INCLUDING SHEETING, SHORING AND DRIVING PILES WHERE NECESSARY. CONSTRUCTION OF SHORING, BRACING AND PROTECTION SCHEMES SHALL CONFORM TO OPSS 538 AND OPSS 539.
23. ANY AREA OUTSIDE THE LIMIT OF WORK THAT IS DISTURBED SHALL BE RESTORED TO ITS ORIGINAL CONDITION BY THE CONTRACTOR AT NO COST TO THE OWNER.
24. CONTRACTOR TO PROVIDE SHOP DRAWINGS OF ALL PROPOSED MATERIALS. REQUIRED SHOP DRAWINGS SHALL BE BASED ON FIELD MEASUREMENT AND LAYOUT VERIFICATION BY THE CONTRACTOR.
25. WHERE NEW PAVING OR EARTHWORK MEETS EXISTING PAVING OR EARTHWORK, SMOOTHLY BLEND LINE AND GRADE OF EXISTING WITH NEW.
26. EXPANSION JOINT FILLER SHALL BE PLACED WHERE PAVEMENT MEETS STRUCTURES– INCLUDING WALLS, LIGHT POLES, HYDRANTS, BUILDINGS AND BUILDING COLUMNS, STAIRS AND AT OTHER CONDITIONS SHOWN ON THE DRAWINGS.
27. EXCAVATION REQUIRED WITHIN PROXIMITY OF UTILITY LINES AND WITHIN THE TREE PROTECTION ZONE OF TREES DESIGNATED TO REMAIN SHALL BE DONE BY HAND. CONTRACTOR SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATION AT NO COST TO THE UTILITY COMPANIES OR THE OWNER.

LAYOUT AND MATERIALS

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN METERS, EXCEPT PIPE DIAMETERS, WHICH ARE IN MILLIMETERS, UNLESS OTHERWISE SHOWN.
2. CONSTRUCTION LAYOUT BY CONTRACTOR.
3. ALL HORIZONTAL DIMENSION ARE TO CENTRE OF OBJECT OR TO GUTTER OF CURB.
4. LASER ALIGNMENT CONTROL IS MANDATORY. AS–BUILT OF PIPE INVERT ELEVATIONS WITH CORRESPONDING STATIONS SHALL BE RECORDED PRIOR TO BACK FILLING OF TRENCH.
5. AS–BUILT ELEVATION AND COORDINATES SHALL BE PROVIDED AT 20m INTERVALS, AND AT EVERY HORIZONTAL AND VERTICAL CHANGE OF ALIGNMENT AND UPSTREAM AND DOWNSTREAM OF EACH SANITARY OR STORM MANHOLE, AND WATERMAIN VALVE CHAMBERS.
6. HORIZONTAL AND VERTICAL CONTROL BASED ON THE CITY OF TORONTO PUBLISHED BENCHMARKS AND HORIZONTAL CONTROL MARKERS.
7. ALL LINE AND GRADE WORK PER DRAWING AND SPECIFICATION SHALL BE LAID OUT BY A REGISTERED CIVIL ENGINEER OR SURVEYOR.

DEWATERING AND SOIL STABILIZATION

1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEWATERING AND SOIL STABILIZATION.

SANITARY AND STORM SEWERS

1. MAIN LINE PVC PIPE AS PER DR 35 CSA B182.2–06 CERTIFIED ASTM D3034–04A, F679–03. SERVICE CONNECTION PVC PIPE TO BE AS PER DR 28 CSA B182.2–06 CERTIFIED ASTM D3034–04A.
2. BEDDING FOR FLEXIBLE PIPE SHALL BE AS PER OPSD 802.010, 802.013 OR 802.014.
3. ULTRA–RIB PIPE IS NOT PERMITTED.
4. MAINTENANCE HOLES AS PER CITY OF TORONTO STANDARD, T–701.010 (1200MM), T–701.011 (1500MM), T–701.012–1(1800MM), T–701.013 (2400MM) OR OPSD 701.014(3000MM). FRAME AND COVER AS PER OPSD 401.010 TYPE A CLOSED (SANITARY) TYPE B OPEN (STORM).
5. BENCHING SHALL BE AS PER CITY OF TORONTO STANDARD T–701.021.
6. DROP STRUCTURES TO BE AS PER CITY OF TORONTO STANDARD T–1003.01 (EXTERNAL) AND T–1003.01–2 (INTERNAL).
7. SANITARY SERVICE CONNECTIONS SHALL BE SINGLE, 150mmø MINIMUM, PVC CLASS DR 28 INSTALLED AT 2 PERCENT AND THE COLOUR SHALL BE GREEN, FOR SINGLE RESIDENTIAL DWELLINGS.
8. SANITARY MAINTENANCE HOLE SHALL HAVE WATERTIGHT FRAME AND COVER IN PONDING AREAS AS PER OPSD 401.030.
9. REINFORCED CONCRETE PIPE SHALL BE AS PER CSA A257.2–03 (MINIMUM 65–D). HEIGHT OF FILL TO BE VERIFIED USING OPSD TABLES 807.010 AND 807.030.
10. NON–REINFORCED CONCRETE PIPE 150 MM TO 250 MM SHALL BE AS PER CSA A257.1–03 CLASS 3. HEIGHT OF FILL TO BE VERIFIED USING OPSD TABLES 807.040.
11. BEDDING FOR RIGID PIPE SHALL BE CLASS B AS PER OPSD 802.030, 802.031, 802.032 OR 802.033.
12. SINGLE CATCHBASINS SHALL BE AS PER CITY OF TORONTO STANDARD T–705.010 COMPLETE WITH GOSS TRAP. FRAME AND COVER AS PER OPSD 400.070. MODIFY GOSS TRAP AS PER DETAIL.
13. DOUBLE CATCHBASINS SHALL BE AS PER CITY OF TORONTO STANDARD T–705.020 COMPLETE WITH GOSS TRAP. FRAME AND COVER AS PER OPSD 400.070.
14. SERVICE CONNECTIONS AND UTILITY CUTS TO BE BACKFILLED WITH UNSHRINKABLE FILL.
15. CATCHBASIN LEADS TO BE 200mmø PVC DR 35 FOR SINGLE CATCHBASINS AND 250mmø PVC DR 35 FOR DOUBLE CATCHBASINS UNLESS OTHERWISE NOTED.

GRADING & ROAD / PAVEMENTS

1 ALL AREA GRADING AND RESULTING DRAINAGE PATTERNS SHALL NOT ADVERSELY AFFECT ADJACENT LANDS.
2 THE STORM DRAINAGE SHALL BE SELF CONTAINED WITHIN THE SUBJECT PROPERTY UNTIL IT CAN BE DISCHARGED, REUSED, INFILTRATED AND/OR EVAPOTRANSPIRATED IN A MANNER ACCEPTABLE TO THE CITY.
3. MINIMUM GENERALLY ACCEPTED GRADIENT – 2.0%.
4. MAXIMUM GENERALLY ACCEPTABLE GRADIENT – 5.0%.
5. MAXIMUM ACCEPTABLE SLOPE 3 PARTS HORIZONTAL TO 1 PART VERTICAL (3:1).
6. NO ALTERATIONS TO EXISTING BOUNDARY ELEVATIONS OR ADJACENT LANDS SHALL BE UNDERTAKEN UNLESS WRITTEN AGREEMENT WITH THE ADJACENT PROPERTY OWNER IS OBTAINED AND SUBMITTED IN A FORMAT ACCEPTABLE TO THE CITY.
7. MINIMUM SWALE GRADIENT – 2.0%.
8. MINIMUM SWALE DEPTH – 150mm.
9. ALL SWALES OR DITCHES HAVING A VELOCITY IN EXCESS OF 1.5m/s SHALL BE DESIGNED TO INCORPORATE EROSION PROTECTION.
10. THE MINIMUM GRADIENT ON ANY DRIVEWAY SHALL BE 2.0%. THE MAXIMUM DRIVEWAY GRADIENT IS 8.0%.
11. RETAINING WALLS SHALL BE CONSTRUCTED ENTIRELY ON THE UPPER PROPERTY SO THAT TIE BACKS (IF REQUIRED) DO NOT CROSS PROPERTY BOUNDARIES.
12. MAXIMUM PONDING DEPTH 0.3 METERS.
13. PROPOSED SPOT ELEVATIONS WILL BE SHOWN FOR ASPHALT, LANDSCAPE OR CONCRETE AREAS. UNLESS OTHERWISE NOTED, TOP OF CURB ELEVATIONS ARE 0.15M ABOVE ASPHALT ELEVATIONS EXCEPT AT CURB DEPRESSIONS AND WHEEL CHAIR RAMPS.
14. WHERE NEW ASPHALT MATCHES EXISTING ASPHALT, GRIND EXISTING ASPHALT A MINIMUM OF 300mm WIDE AND 40MM DEEP FOR KEYING. APPLY HOT RUBBER SEALING COMPOUND IN ACCORDANCE WITH OPSS 1212. ALL SURFACES TO BE TACK COATED WITH SS–1.
15. THE CONCRETE CURB, CONCRETE SIDEWALK (IF APPLICABLE) AND ALL RESTORATION ALONG FRONTING ROADWAYS TO THE SITE MUST BE CONSTRUCTED AND CARRIED OUT IN ACCORDANCE WITH ALL APPLICABLE AND CURRENT CITY OF TORONTO STANDARDS.
    – CITY OF TORONTO STANDARDS INCLUDE BUT ARE NOT LIMITED TO:
    - T–350.01 – URBAN ENTRANCES
    - T–310.010–4 – COMBINED CONCRETE CURB AND SIDEWALK
    - T–600.11–1 – CONCRETE CURB (BORDERING DRIVEWAY RETURN CURB AT ENTRANCES)
16. CRUSHED LIME STONE SHALL BE USED FOR ALL GRANULAR BASE MATERIAL BELOW ASPHALT SURFACES.
17. GRANULAR ROAD BASE SHALL BE COMPACTED TO 100% SPMDD.
18. ASPHALT SHALL BE COMPACTED TO 92.0% TO 96.5% MRD.
19. REFER TO TORONTO STANDARD SPECIFICATION 310 FOR PAVEMENT COMPACTION REQUIREMENTS.
20. SET EXISTING AND PROPOSED MANHOLES, CATCHBASINS, VALVES, ETC. TO BASE ASPHALT IF TOP ASPHALT WILL BE PAVED AFTER THE UPCOMING WINTER AND RAISE THEM PRIOR TO PLACING TOP ASPHALT.
21. SAW CUT EXISTING PAVED SURFACES FULL DEPTH AND IN STRAIGHT LINES, WHERE PROPOSED AND EXISTING PAVED SURFACES MEET.
22. SUPPLY AND PLACE 150mm SUB DRAIN AS PER CITY STANDARD T–216.02–8.

EROSION AND SEDIMENT CONTROL

1. SEDIMENT BARRIERS, CHECK DAMS, AND TEMPORARY CONSTRUCTION ACCESS TO BE INSTALLED PRIOR TO THE BEGINNING OF CONSTRUCTION.
2. IF NECESSARY, TRUCKS WILL BE WASHED DOWN BEFORE LEAVING THE SITE.
3. THE SITE WILL BE WET DOWN IF NECESSARY TO CONTROL DUST.
4. ALL CONSTRUCTION EQUIPMENT MUST BE PARKED ON–SITE.
5. ALL CONSTRUCTION ACTIVITY WILL COMPLY WITH CITY OF TORONTO NOISE BYLAW.
6. SEDIMENT CONTROL FENCE TO BE AS PER CITY OF TORONTO STANDARD T–219.130–1.
7. ALL CONSTRUCTION VEHICLES TO ENTER AND EXIT SITE FROM TEMPORARY CONSTRUCTION ACCESS.
8. ALL TOPSOIL STOCKPILES TO BE SURROUNDED WITH SEDIMENT CONTROL FENCING.
9. FILTER FABRIC TO BE PLACED UNDER GRATES ON ALL CATCHBASINS TO TRAP SEDIMENT. SILT TRAPS ARE TO BE CLEANED REGULARLY AND ARE NOT TO BE REMOVED UNTIL SUCH TIME AS THE CURBS ARE CONSTRUCTED AND THE BOULEVARDS ARE SODDED OR BACKYARDS GRADED AND SODDED. FILTER FABRIC FOR SILT CONTROL TO BE TERRA FIX 270R OR APPROVED EQUIVALENT.
10. FILTER CLOTH WILL BE PLACED ON THE CATCHBASINS ON PUBLIC STREET ACROSS THE PROPERTY'S FRONTAGE.
11. IN THE CASE OF ANY CONFLICT WITH ANOTHER PLAN, THIS PLAN PREVAILS ONLY IN RESPECT TO CONSTRUCTION MEASURES AND ACTIVITIES SUCH AS THE CONSTRUCTION ACCESS, SILT FENCE, SECURITY FENCING, SEDIMENT CONTROL, AND MUD MATS.
12. STREET SWEEPING, CATCH BASIN CLEANING AND DUST CONTROL ARE THE RESPONSIBILITY OF THE DEVELOPER AND MUST BE KEPT UNDER CONTROL ON ALL ROADWAYS TO THE SATISFACTION OF THE CITY.
13. MUD MATS TO BE INSTALLED AT ALL TEMPORARY CONSTRUCTION ACCESS POINTS.
14. THE CONTRACTOR WILL BE RESPONSIBLE TO DETERMINE LOCATIONS OF TOPSOIL AND/OR GRANULAR STOCKPILES WITHIN THE SITE. LOCATION OF STOCKPILES MAY CHANGE TO SUIT VARIOUS STAGES OF CONSTRUCTION.
15. THE CONTRACTOR SHALL PROVIDE SEPARATE STORAGE AREAS WITHIN THE SITE FOR HAZARDOUS AND WASTE MATERIALS. THE STORAGE AREAS SHALL BE LOCATED AWAY FROM ANY RECEIVING WATER BODIES, INCLUDING PONDS, SEWERS, DITCHES, ETC. AND INCLUDE SPILL CONTAINMENT AREAS WITH IMPERVIOUS SURFACES. THE CONTRACTOR SHALL KEEP PROPER EMERGENCY SPILL KITS ON SITE AND PROVIDE PROPER TRAINING TO STAFF IN THE USE OF SPILL KITS. TO THE CONTRACTOR IS RESPONSIBLE FOR ADDRESSING AND REPORTING ANY HAZARDOUS WASTE SPILLS TO THE APPROPRIATE LOCAL AGENCIES, INCLUDING THE MINISTRY OF ENVIRONMENT (SPILL ACTION CENTRE) 1–800–268–6060.
16. CONTRACTOR TO ENSURE THAT PORTABLE TOILETS ARE LOCATED OFF PAVED ROADWAYS AND AWAY FROM ANY RECEIVING WATERS SUCH AS PONDS AND SEWERS.
17. THE SEDIMENT CONTROLS, INCLUDING SEDIMENTS, SHALL BE REMOVED OFF SITE AFTER GRASS SURFACES HAVE BEEN RESTORED TO THE SATISFACTION OF THE ENGINEER.
18. THE CONTRACTOR WILL BE RESPONSIBLE FOR ADDITIONAL SEDIMENT AND EROSION CONTROLS, AS DESCRIBED IN THE "GTA CA's EROSION & SEDIMENT CONTROL GUIDELINES FOR URBAN CONSTRUCTION" AND/OR OTHER CITY OF TORONTO REQUIREMENTS ON A SITE–BY–SITE BASIS SUCH AS INTERCEPTOR SWALES/DIKES, ROCK CHECK DAMS, SEDIMENT TRAPS, ETC. TO PREVENT SEDIMENTS FROM THEIR CONSTRUCTION OPERATIONS FROM ENTERING THE EXISTING AND PROPOSED STORM DRAINAGE SYSTEMS.
18. AFTER ROAD CONSTRUCTION AND PRIOR TO LANDSCAPE OR SODDING OF SITE, CONTRACTOR TO INSTALL SEDIMENT CONTROLS, SUCH AS SEDIMENT FENCING, ALONG DOWNSTREAM EDGES OF INDIVIDUAL BLOCKS.
19. THE CONTRACTOR SHALL PROVIDE SEPARATE DESIGNATED AREAS FOR CONCRETE TRUCK WASHOUT. THE CONTRACTOR SHALL PROVIDE MEASURES TO ENSURE THAT NO CONCRETE MATERIAL SHALL ENTER EXISTING OR PROPOSED STORM DRAINAGE SYSTEMS AND NATURAL WATERCOURSES.
20. THE CONTRACTOR SHALL BE MONITOR AND EVALUATE THE EROSION AND SEDIMENT CONTROL MEASURES ON A WEEKLY BASIS AND AFTER ANY STORM EVENT. ANY REPAIRS REQUIRED ARE TO BE RECTIFIED IMMEDIATELY.
21. ADDITIONAL EROSION AND SEDIMENT CONTROL MATERIALS (I.E. SEDIMENT FENCE, CLEAR STONE, ETC.) ARE TO BE KEPT ON–SITE FOR EMERGENCIES AND REPAIRS.
22. THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF DELETERIOUS SUBSTANCES , THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. ADDITIONAL E&SC ARE TO BE KEPT ON SITE AND USED AS NECESSARY. MODIFICATIONS TO THE PLAN MUST RECEIVE APPROVAL BY THE DESIGNER AND APPROPRIATE MUNICIPAL OFFICIALS.

WATERMAINS

1. ALL SERVICE CONNECTIONS SHALL BE CONSTRUCTED IN ACCORDANCE WITH T–1104.01, T–1104.02–1, T–1104.02–2, T–1105.02–1 AND T–1105.02–2.
2. WATERMAIN AND WATERMAIN APPURTENANCES SHALL CONFORM TO CITY OF TORONTO MATERIAL / MANUFACTURER SPECIFICATIONS. SEE CHAPTER 6, MATERIAL SPECIFICATIONS.
3. ALL POLYVINYL CHLORIDE (PVC) PIPES, RANGING IN SIZE FROM 100 MM THROUGH 300 MM IN DIAMETER SHALL BE PRESSURE CLASS 235, DR 18 AND MANUFACTURED IN ACCORDANCE AWWA C900–07 AND TO CSA B137.3–05 AND SHALL HAVE CAST IRON OUTSIDE DIAMETER DIMENSIONS. ALL PVC PIPE LARGER THAN 350 MM THROUGH 400 MM IN DIAMETER, SHALL BE PRESSURE CLASS 235, DR 18 AND MANUFACTURED IN ACCORDANCE TO AWWA C905–97 STANDARD AND CSA B137.3–05 AND SHALL HAVE CAST IRON OUTSIDE DIAMETER DIMENSIONS.
4. BEDDING FOR FLEXIBLE PIPE SHALL BE AS PER OPSD 802.010, 802.013 OR 802.014.
5. MINIMUM COVER ON WATERMAINS WILL BE 1.8 METRES.
6. PROVISIONS FOR FLUSHING THE WATER LINE PRIOR TO TESTING AND SO FORTH MUST BE PROVIDED WITH AT LEAST A 50 MM OUTLET ON 100 MM AND LARGER LINES AS PER T–1104.03–1. COPPER LINES ARE TO HAVE FLUSHING POINTS AT THE END, THE SAME SIZE AS THE LINE. ON FIRE LINES, FLUSHING OUTLET TO BE 100 MM DIAMETER MINIMUM OR A HYDRANT.
7. ALL HYDRANTS TO BE AS PER CITY OF TORONTO STANDARD T–1105.01. IT SHALL CONFORM TO CITY OF TORONTO MATERIAL /MANUFACTURER SPECIFICATIONS. SEE CHAPTER 6, MATERIAL SPECIFICATIONS.
8. SINGLE WATER SERVICE CONNECTIONS SHALL BE A MINIMUM OF 19 MM DIAMETER AND CONFORM TO ASTM B88–03 (ASTM B88M–05 FOR METRIC SIZES) TYPE "K" SOFT COPPER AS PER T–1104.01.
9. ALL CURB AND VALVE BOXES TO BE LOCATED AT STREET LINE.
10. MECHANICAL THRUST RESTRAINTS SHALL BE INSTALLED AT ALL FITTINGS, BENDS, TEES, CROSSES, REDUCERS AND VALVES FOR ALL WATERMAIN SIZES. MECHANICAL RESTRAINTS AT JOINTS SHALL BE INSTALLED WITHIN 6.1 METERS OF EITHER SIDE OF THE VALVE FOR WATERMAINS 300 MM DIAMETER OR LARGER. MECHANICAL THRUST RESTRAINTS SHALL CONFORM TO THE MATERIAL SPECIFICATIONS CONTAINED IN CITY OF TORONTO MATERIAL/MANUFACTURER SPECIFICATIONS. SEE CHAPTER 6, MATERIAL SPECIFICATIONS.
11. ALL TEES, PLUGS, HORIZONTAL, VERTICAL BENDS, REDUCERS AND HYDRANTS TO HAVE CONCRETE THRUST BLOCKS AS PER CITY OF TORONTO STANDARD T–1103.01, T–1103.020.
12. WATERMAINS MUST FOLLOW THE MINISTRY OF THE ENVIRONMENT PROCEDURES THAT GOVERN THE SEPARATION OF SEWERS AND WATERMAINS F–6–1. A MINIMUM VERTICAL CLEARANCE OF 0.50 METER OVER, 0.5 METER UNDER SEWERS AND ALL OTHER UTILITIES WHEN CROSSING. MUST ALSO MAINTAIN 2.5 METERS HORIZONTAL SEPARATION WITH SEWERS.
13. ALL VALVES LESS THAN 400 MM WILL BE IN A VALVE AND BOX AS PER CITY OF TORONTO STANDARD T–1101.02–2. ALL VALVES 400 MM AND LARGER WILL BE IN A CHAMBER.
14. SACRIFICIAL ANODES TO BE INSTALLED FOR ALL METAL PIPES AND APPURTENANCES, WATER SERVICES AND FITTINGS AS PER CITY OF TORONTO STANDARD T–1106.04, T–1106.05 AND T–1106.06 CONSTRUCTION SPECIFICATION T.S. 7.22.
15. TRACER WIRE INSTALLATION AS PER CITY OF TORONTO CONSTRUCTION SPECIFICATION T.S. 7.40.
16. ALL PROPOSED WATER PIPING MUST BE ISOLATED FROM EXISTING LINES IN ORDER TO ALLOW INDEPENDENT PRESSURE TESTING AND CHLORINATING FROM THE EXISTING SYSTEM. FLUSHING, SWABBING, AND TESTING OF WATERMAIN AS PER ONTARIO PROVINCIAL STANDARDS AND SPECIFICATIONS (OPSS), AS WELL AS CITY OF TORONTO SPECIFICATION TS 7.30 OR LATEST AMENDMENT.
17. AFTER PASSING THE HYDROSTATIC PRESSURE TEST AND LEAKAGE TEST, CHLORINATION CAN PROCEED. SAMPLING OF THE NEW MAINS IS TO BE DONE AT THE REQUIRED LOCATIONS PRIOR TO CONNECTING TO THE CITY WATERMAIN SYSTEM. THE TEE FITTING IS TO BE CUT INTO THE EXISTING WATERMAIN TO MAKE THE CONNECTION. TO MAINTAIN THE PRESSURE IN THE NEW MAIN DURING INSTALLATION OF SERVICE, A 50 MM BY–PASS WITH AN APPROVED PRESSURE DIFFERENTIAL BACKFLOW PREVENTER, MOUNTED ABOVE GROUND LEVEL IS TO BE INSTALLED AROUND THE CLOSED ISOLATING VALVE.
18. CITY IN–SERVICE WATER VALVES CAN ONLY BE OPERATED BY TORONTO WATER STAFF.
19. WATERMAINS TO BE INSTALLED TO GRADE AS SHOWN ON APPROVED PLANS, COPY OF GRADE SHEET MUST BE SUPPLIED TO INSPECTOR PRIOR TO COMMENCEMENT OF WORK, WHEN REQUESTED BY INSPECTOR.

WATERMAIN – FILL AREAS

1. PIPES ARE NOT TO BE LAID ON FILL UNTIL THE FIELD DENSITY TEST REPORTS HAVE BEEN SUBMITTED AND APPROVED BY THE ENGINEER.
2. FILL TO BE PLACED TO A MINIMUM OF 600 MM ABOVE THE WATERMAIN GRADES AND TO 3 METRES MINIMUM ON EACH SIDE PRIOR TO WATERMAIN LAYING COMPACTED TO A MINIMUM OF 100 PERCENT STANDARD PROCTOR DENSITY IN 300 MM LIFTS.
3. SOIL DENSITY TESTS SHALL BE TAKEN ALONG CENTRELINE OF THE WATERMAIN AND ON LINES 1.5 METRES ON EITHER SIDE OF SAME AT A MAXIMUM INTERVAL OF 30 METRES. TESTS TO BE TAKEN AT EACH 600 MM LIFT.
4. ALL HYDRANTS, TEES, VALVES, BENDS, PLUGS AND EACH PIPE JOINT ARE TO BE MECHANICALLY RESTRAINED.
5. PIPE JOINT DEFLECTIONS ARE NOT ALLOWED.

FILL

1. FILL SHALL BE NATIVE MATERIAL UNLESS OTHERWISE SHOWN. THE NATIVE MATERIAL SHALL BE FREE OF ORGANICS AND DEBRIS AND WITH A NATURAL MOISTURE CONTENT WHICH IS WITHIN 2% OF THE OPTIMUM MOISTURE CONTENT. WET MATERIAL MAY REQUIRE AERATION FOR PROPER COMPACTION BY SPREADING THEM THINLY ON THE GROUND.
2. ALL PIPE BEDDING MATERIAL SHALL BE COMPACTED TO 95% OF SPMDD.
3. FILL SHALL BE COMPACTED TO 95% SPMDD, EXCEPT UNDER PAVED SURFACES, WHERE THE UPPER 1.0m OF THE SUBGRADE SHALL BE COMPACTED TO 98% SPMDD. THE LIFT OF EACH LAYER SHALL BE LIMITED TO 200mm OR THE LIFT THICKNESS SHALL BE DETERMINED BY TEST STRIPS.
4. STONES GREATER THAN 75mm IN ANY DIMENSION WILL NOT BE PERMITTED IN BACKFILL PLACED WITHIN 300mm OF UTILITIES AND PAVEMENT SUBGRADE.
5. FILL SHALL BE PLACED AS FOLLOWS:
    - 1.1 THE AREA SHALL BE STRIPPED OF ALL EXISTING TOPSOIL AND OTHER UNSUITABLE MATERIALS. ALL SOFT SPOTS SHALL BE SUB–EXCAVATED. THE EXPOSED NATIVE SUBGRADE SHALL BE EXAMINED BY THE SOILS CONSULTANT PRIOR TO PLACEMENT OF FILL.
    - 1.2 THE FILL SHALL BE PLACED, SUCH THAT THE SPECIFIED FILL GEOMETRY IS ACHIEVED.
    - 1.3 TYPICALLY THE FILL MUST NOT BE PLACED BETWEEN THE PERIOD BETWEEN LATE NOVEMBER AND EARLY APRIL, AS IT IS DIFFICULT TO ENSURE THAT THE FILL IS FREE OF FROZEN SOILS. IF GRANULAR MATERIAL/RECYCLED CONCRETE IS USED, THE ABOVE PRECAUTIONARY MEASURES ARE NOT NECESSARY.
6. REFER TO "WATERMAIN–FILL AREAS" NOTES FOR FILL REQUIREMENTS AT PROPOSED WATERMAINS.
7. FILL SHALL MEET THE REMEDIATION PLAN REQUIREMENTS.

BENCH MARK:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO MNRF BENCHMARK No. 12219740328 HAVING A PUBLISHED ELEVATION OF 98.372 METRES (CGVD28:PRE78)

BEARING NOTE:
BEARINGS ARE GRID DERIVED FROM THE 3° MTM CO–ORDINATE SYSTEM ZONE 10, NAD 83 (CSRS)(2010).

LIST OF CIVIL DRAWINGS	
Sheet Number	Sheet Title
C1	GENERAL NOTES
C2	SITE SERVICING
C3	GENERAL SITE GRADING
C4	CROSS SECTIONS & DETAILS
C5	SWM TANK SECTIONS & DETAILS
C6	ESC
SWM-1	SWM FIGURE
SWM-2	PRE-DEV STM DRAINAGE FIGURE

ALL RVA DRAWINGS ARE TO BE READ IN CONJUNCTION WITH DRAWINGS PREPARED BY OTHER CONSULTANTS FOR THIS PROJECT, INCLUDING BUT NOT LIMITED TO:
- ARCHITECT – RAW DESIGN INC
- LANDSCAPE – STUDIO TLA
- HYDROGEOLOGICAL INVESTIGATION – GROUNDED ENGINEERING
- PROPERTY BOUNDARY/TOPO SURVEYS – SCHAEFFER DZALDOV PURCELL LTD.

R.V.A. ADDITIONAL NOTES

ADDITIONAL ROAD IMPROVEMENT NOTES:

1. UNLESS INDICATED OTHERWISE, ALL WORK WITHIN THE CITY RIGHT–OF–WAY SHALL BE CONSTRUCTED IN ACCORDANCE WITH CITY OF TORONTO DESIGN STANDARDS AND SPECIFICATION AND THE UNDERTAKING. ONTARIO PROVINCIAL STANDARDS MAY, SUBJECT TO THE APPROVAL OF THE CITY OF TORONTO, BE USED WHERE NO STANDARD OR SPECIFICATION IS NOTED.
2. ANY DISCREPANCIES BETWEEN SITE CONDITIONS AND THE DRAWINGS MUST BE REPORTED TO THE CONSULTING ENGINEER/CITY PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE CITY OF TORONTO.
3. ALL SURVEY POINTS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE LAYOUT SHALL BE REPORTED TO THE CONSULTING ENGINEER/CITY AND THE CONSULTING ENGINEER/CITY SHALL NOTIFY THE CITY OF THE NECESSARY CHANGES.
4. NO PORTION OF THE WORK SHALL BE CARRIED OUT WITHOUT FIRST HAVING OBTAINED APPROVED CONSTRUCTION DRAWINGS, APPROVED PROJECT SCHEDULE(S), APPROVED TRAFFIC STAGING PLANS AND PERMITS FOR SUCH PORTION OF THE INFRASTRUCTURE WORK IN ACCORDANCE WITH THE PROVISIONS HEREOF AND GIVING 10 WORKING DAYS PRIOR WRITTEN NOTICE TO THE EXECUTIVE DIRECTOR, TECHNICAL SERVICES THAT SUCH WORK IS TO BE CARRIED OUT WITH SUCH NOTICE TO SPECIFY THE ANTICIPATED DATE OF COMMENCEMENT OF THE WORK. A PRE–CONSTRUCTION COORDINATION MEETING WITH CITY STAFF IS TO BE HELD A MINIMUM OF FIVE WORKING DAYS PRIOR TO THE COMMENCEMENT OF ANY OF THE WORK.
5. THE REMOVAL OF TREES REQUIRES THE APPROVAL OF PARKS, FORESTRY AND RECREATION DIVISION.
6. ALL AREAS DISTURBED DURING CONSTRUCTION WITHIN THE CITY'S RIGHT–OF–WAY (INCLUDING BUT NOT LIMITED TO ROADWAYS, CURBS, BOULEVARDS, ETC) SHALL BE RESTORED TO ORIGINAL OR BETTER CONDITION. GRASSED AREAS SHALL BE PROVIDED WITH 100 MM OF TOPSOIL AND SHALL BE SODDED AS PER T.S. 5.00 AND T.S. 5.10.
7. PAVEMENT STRUCTURE REINSTATEMENT TO BE SUPERPAVE AS PER TORONTO STANDARD TS–1151 FOR COLLECTOR ROADWAYS COMPOSITION AS PER LATEST TORONTO 'PAVEMENT STRUCTURAL DESIGN MATRIX' MINIMUM 10,000 AADT AND 30 MPa COMMERCIAL OR LOCAL COLLECTOR BUS/TRUCK ROUTE FOR COMPOSITE PAVEMENT. ANY DISCREPANCIES BETWEEN EXISTING AND LATEST STANDARD PAVEMENT STRUCTURE SHALL BE REPORTED TO THE CONSULTANT PRIOR TO COMMENCEMENT OF CONSTRUCTION AND APPROPRIATE ACTION TAKEN TO THE SATISFACTION OF THE CITY OF TORONTO. THE MORE STRINGENT DESIGN SHALL GOVERN THE REQUIRED REINSTATEMENT.
8. SAWCUT MAXIMUM 0.3m ASPHALT STRIP AS REQUIRED FROM GUTTERLINE OF CURB FOR CURB REINSTATMENT WITHIN ROW. ASPHALT AND ROAD BASE RESTORATION AS PER NOTE 7. CONCRETE ROAD BASE RESTORATION INCLUDES REINSTATEMENT OF DOWELS AND GROUT AND SEAL AT JOINTS AS PER TORONTO STANDARDS TS–3.40 AND TS–3.45.
7. THE CONTRACTOR SHALL REFER TO THE ONTARIO TRAFFIC MANUAL BOOK 7, TEMPORARY CONDITIONS FOR TEMPORARY CONSTRUCTION SIGNAGE.
8. ANY DAMAGE TO PROPERTY ADJACENT TO THE CONSTRUCTION SITE SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
9. CONCRETE SIDEWALK TO BE COMPLETE WITH 150 MM GRANULAR BASE OR AS DIRECTED BY THE CITY INSPECTOR.
10. SUBSOIL IN POOR OR UNSUITABLE CONDITION AT THE BASE OF ALL SEWER AND WATERMAIN TRENCHES IS TO BE REPLACED WITH 200mm DEPTH OF GRANULAR 'A' MATERIAL AS DIRECTED BY THE GEOTECHNICAL CONSULTANT. SEWER OR WATERMAIN PIPES SHOULD THEN BE BACKFILLED WITH SAND FILL UP TO A DEPTH OF 300mm ABOVE THE TOP OF THE PIPES. THE CITY OF TORONTO SPECIFICATIONS FOR SEWER AND WATER MAIN INSTALLATION SHOULD BE CLOSELY FOLLOWED. TRENCH BACKFILL ABOVE PIPE COVER MATERIAL SHALL BE UNSHRINKABLE CONCRETE FILL AS PER TORONTO STANDARD TS–13.10 WITHIN PUBLIC RIGHT–OF–WAYS. APPROVED CLEAN FILL MATERIAL COMPACTED TO 95% OF THE STANDARD PROCTOR MAXIMUM DRY DENSITY IN 200mm LAYERS MAY BE USED ON PRIVATE LANDS.
11. REFER TO LANDSCAPE DRAWINGS FOR SURFACE WORKS AND BOULEVARD/SIDEWALK BASE DETAILS/SUBGRADE PREPARATION BEHIND CURB TO BUILDING.

NOTES FOR SITE STORMWATER MANAGEMENT SYSTEMS:

1. DESIGN / CONSTRUCTION RESPONSIBILITIES FOR SWM SYSTEMS WITHIN BUILDING FOOTPRINT:

THE STORMWATER MANAGEMENT (SWM) SYSTEM DEPICTED ON THIS DRAWING ESTABLISHES THE FUNCTIONAL PARAMETERS TO MEET THE OBJECTIVES OF THE APPROVED SWM PLAN. THESE PARAMETERS INCLUDE SIZE AND SHAPE OF THE TANK(S), ORIFICE SIZE(S), PROPRIETARY TREATMENT UNIT(S), PIPE SIZE(S), INVERT(S) AND ACCESS OPENING LOCATION(S).

ALL OPENINGS TO THE STORM TANK (OR SWM TANK), INCLUDING FOR PIPE OPENINGS, ACCESS HATCHES, ETC ARE TO BE WATERTIGHT (DESIGN BY MECHANICAL/STRUCTURAL). ALL ACCESS HATCHES AND INCOMING AND OUTGOING PIPES AND JOINTS ARE TO BE DESIGNED TO RESIST A MINIMUM 12m INTERNAL PRESSURE HEAD IN THE EMERGENCY SCENARIO WHERE DISCHARGE PUMPING FAILS AND THE TANK BECOMES SUBMERGED. AN EMERGENCY OUTLET TO GRADE EXTERNAL TO THE BUILDING IS REQUIRED TO ALLOW FOR SPILLOVER TO THE ADJACENT ROW.

PLUMBING CONVEYING RUNOFF FROM ROOFTOP SOURCES MUST BE CAPABLE OF CONVEYING UP TO THE 100–YEAR STORM EVENT FLOWS TO THE STORM TANK.

THE HYDROLOGIC FUNCTION OF THE SWM SYSTEM IS BASED ON THE GROUND AND BUILDING SURFACES AND AREA MATERIALS (I.E. EXTENT OF GREEN ROOF, PAVING STONES AND OTHER LANDSCAPING) OUTLINED IN THE APPROVED SWM REPORT. CHANGES TO THESE MATERIALS WILL AFFECT THE SWM SYSTEM.

HOWEVER, SINCE THE SWM TANK AND THE ASSOCIATED PIPING, IN ADDITION TO THE PRESCRIBED BUILDING SURFACES (I.E. GREEN ROOFS, ROOFTOP LANDSCAPING AND ROOF DRAIN CONVEYANCE) ARE BUILDING SYSTEMS, DETAILED DESIGN OF THESE SYSTEMS ARE UNDERTAKEN BY OTHERS. IN THAT REGARD, THE FOLLOWING PARTIES AND THEIR RESPECTIVE DESIGN DRAWINGS AND DOCUMENTATION SHOULD BE REFERRED TO WITH RESPECT TO THE CONSTRUCTION AND OPERATION OF THE SWM SYSTEM.

DETAILED DESIGN AND SPECIFICATIONS FOR THE FOLLOWING ITEMS ASSOCIATED WITH THE SWM SYSTEM ARE PROVIDED BY OTHERS:

- LANDSCAPE SURFACES
- AREA AND ROOF DRAINS
- PIPING WITHIN THE BUILDING ENVELOPE
- TANK INLET PIPING LOCATIONS
- PUMPING SYSTEMS AND ASSOCIATED PIPING, VALVES, UNIONS, CHECK VALVES, FILTERS, ETC.
- CONTROL SYSTEMS
- ELECTRICAL SUPPLY, DISTRIBUTION AND CLASSIFICATION OF AREAS
- TANK VENTING
- TANK STRUCTURAL DESIGN
- WATERPROOFING
- TANK ACCESS OPENINGS, COVERS, DOORS AND LADDERS.
- PROPRIETARY SWM EQUIPMENT/FILTRATION

DURING CONSTRUCTION, THE CONTRACTOR IS TO IDENTIFY ANY DISCREPANCIES BETWEEN THE VARIOUS DESIGN INFORMATION PERTAINING TO THE SWM SYSTEM TO R.V.ANDERSON ASSOCIATES LIMITED FOR COORDINATION OF RESOLUTION.

2. MAINTENANCE BY BUILDING OWNER

a. THE SWM SYSTEM DEPICTED ON THE SITE SERVICING DRAWINGS REQUIRES ONGOING MAINTENANCE IN ORDER TO PRESERVE THE INTENDED FUNCTION.

b. CATCHBASINS, ROOF DRAINS AND OTHER INLETS REQUIRE ONGOING ROUTINE CONDITION INSPECTION AND CLEANING TO ENSURE THAT THEY REMAIN FREE OF ANY BLOCKAGE OR OBSTRUCTIONS.

c. THE SWM TANK, CATCHBASINS AND AREA DRAIN SUMPS WILL ACCUMULATE SEDIMENT AND DEBRIS AND ONGOING ROUTINE INSPECTION AND CLEANING MUST BE PERFORMED BY A QUALIFIED/LICENSED SERVICE PROVIDER.

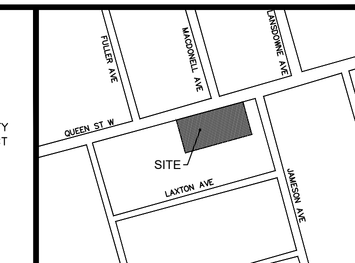
d. OTHER MAINTENANCE REQUIREMENTS PRESCRIBED BY THE STRUCTURAL ENGINEER, ARCHITECT, MECHANICAL ENGINEER AND IRRIGATION CONSULTANT SHOULD ALSO BE ADHERED TO.

e. THE SWM TANK IS A CONFINED SPACE UNDER OHSA, AND THEREFORE APPLICABLE CONFINED SPACE ENTRY PROCEDURES APPLY FOR TANK ENTRY.

f. THE BUILDING OWNER IS CAUTIONED THAT CHANGES TO THE BUILDING AND SITE SURFACE MATERIALS MAY ALTER THE PERFORMANCE OF THE SWM SYSTEMS AND SHOULD BE REVIEWED BY A QUALIFIED PROFESSIONAL ENGINEER.

TORONTO ENGINEERING & CONSTRUCTION SERVICES
ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS.
THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.

MANAGER, DEVELOPMENT ENGINEERING | DATE



KEY PLAN
N.T.S.

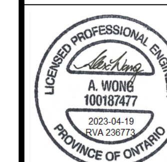
No.	Revision	Comments
1	2023–04–19	ISSUED FOR SPA

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PREPARED BY RVA.

BENCH MARK:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO MNRF BENCHMARK No. 12219740328 HAVING A PUBLISHED ELEVATION OF 98.372 METRES (CGVD28:PRE78)

BEARING NOTE:
BEARINGS ARE GRID DERIVED FROM THE 3° MTM CO–ORDINATE SYSTEM ZONE 10, NAD 83 (CSRS)(2010).

NOTE:
THE INFORMATION DENOTED IN BOXES [ ] WITHIN THE DRAWING DETAILS ON THIS SHEET ARE CONSIDERED TO BE PROPOSED DESIGN/SPECIFICATIONS. ALL OTHER INFORMATION IS SHOWN FOR CONTEXT ONLY. REFER TO THE APPROPRIATE DRAWINGS BY THE ARCHITECT, LANDSCAPE ARCHITECT, STRUCTURAL ENGINEER, AND MECHANICAL ENGINEER FOR DETAIL DESIGN AND SPECIFICATION OF OTHER DESIGN ELEMENTS.



Drawing Prepared By:
R.V. ANDERSON ASSOCIATES LIMITED

Client:
STANFORD HOMES

Project Name:
1437-1455
QUEEN ST W
TORONTO, ONTARIO

Drawing Title:
GENERAL NOTES

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Checked: AW	Approved: SDF	Scale: 1:150
CADD File: 236773–S–GENERAL NOTES.dwg		Dwg. No.: C1
Project No.: 236773		

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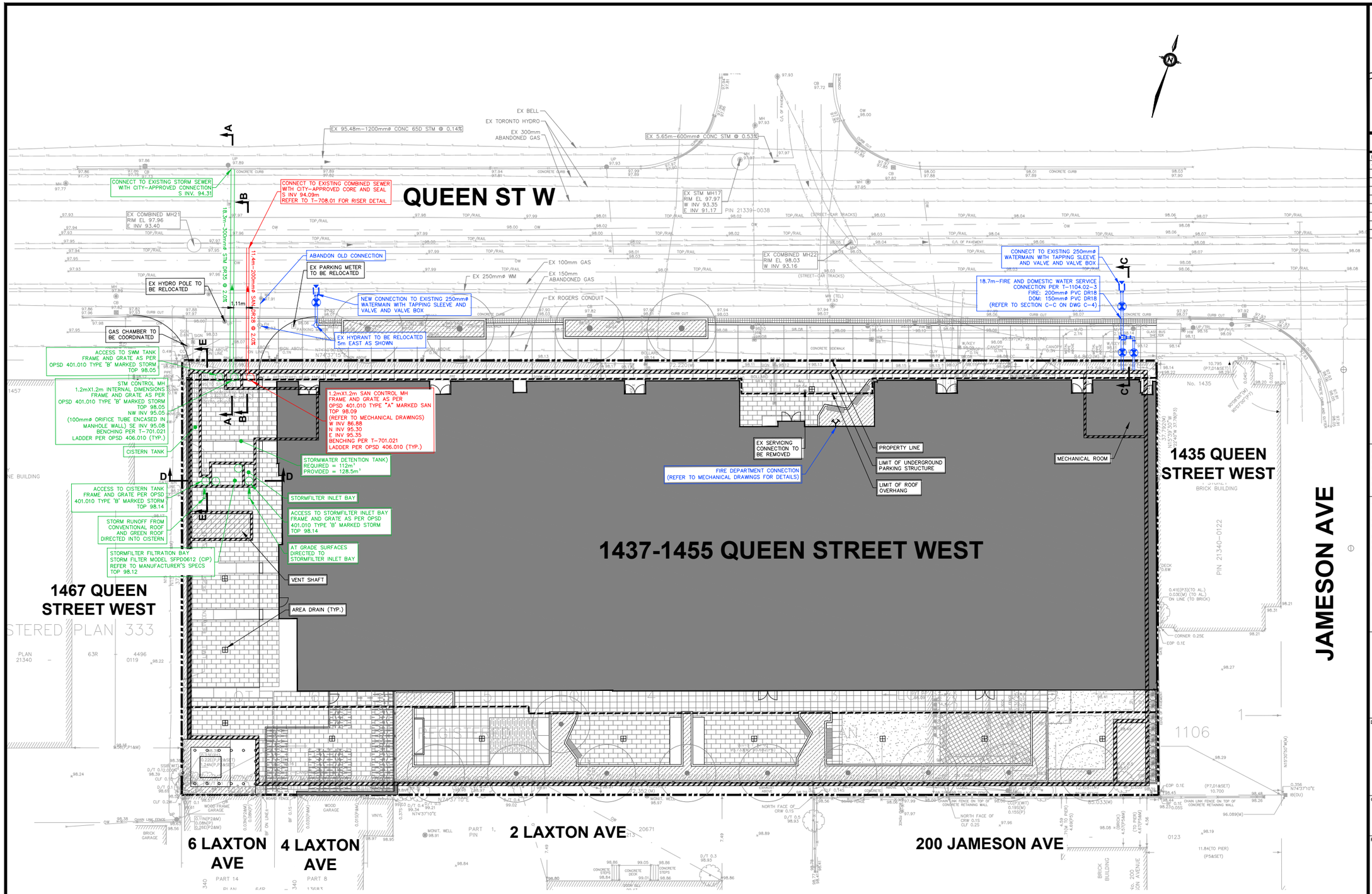


NOTE:

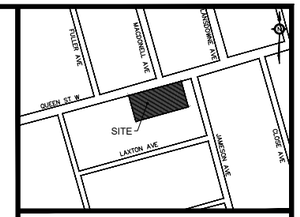
1. THE OWNER IS REQUIRED TO INSTALL AND MAINTAIN A PREMISE ISOLATION DEVICE FOR ALL APPLICABLE WATER SERVICES IN ACCORDANCE WITH TORONTO MUNICIPAL CODE. CHAPTER 851 WATER SUPPLY. THE ONTARIO BUILDING CODE AND CSA B64 SERIES STANDARDS.
2. ALL SERVICE CONNECTIONS WITHIN THE MUNICIPAL RIGHT-OF-WAY MUST BE CONSTRUCTED BY CITY FORCES AT THE OWNER'S EXPENSE.

NOTE:

THE SIGNED ACCEPTANCE BY ENGINEERING AND CONSTRUCTION SERVICES PERTAINS TO THE PROPOSED SERVICE CONNECTIONS LOCATED WITHIN THE MUNICIPAL RIGHT-OF-WAY. SERVICING ON PRIVATE PROPERTY REQUIRES PLUMBING APPROVAL UNDER THE ONTARIO BUILDING CODE IN CONJUNCTION WITH THE PERMIT APPLICATION PROCESS ADMINISTERED BY THE BUILDING DIVISION.

TORONTO ENGINEERING & CONSTRUCTION SERVICES
ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS.
THIS ACCEPTANCE IS NOT TO BE CONSTRUED AS VERIFICATION OF ENGINEERING CONTENT.

MANAGER, DEVELOPMENT ENGINEERING _____ DATE _____



KEY PLAN
N.T.S.

No.	Revision	Comments
1	2023-04-19	ISSUED FOR SPA

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PREPARED BY RVA.

LEGEND

- PROPERTY LINE
- LIMIT OF ROOF OVERHANG
- LIMIT OF UNDERGROUND PARKING STRUCTURE
- PROPOSED STORM MH
- PROPOSED SAN MH
- PROPOSED STM SERVICE CONNECTION & FLOW DIRECTION
- PROPOSED SAN SERVICE CONNECTION & FLOW DIRECTION
- PROPOSED WATER SERVICE CONNECTION
- EXISTING STM SERVICE & FLOW DIRECTION
- EXISTING SAN SERVICE & FLOW DIRECTION
- EXISTING WATER SERVICE
- AREA DRAIN (AD)
- PROPOSED RETAINING WALL
- SIAMESE CONNECTION
- PROPOSED HYDRANT
- PROPOSED VALVE & BOX

BENCH MARK:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO MNRF BENCHMARK No. 12219740328 HAVING A PUBLISHED ELEVATION OF 98.372 METRES (CGVD28:PRE78)

BEARING NOTE:
BEARINGS ARE GRID DERIVED FROM THE 3° MTM CO-ORDINATE SYSTEM ZONE 10, NAD 83 (CSRS)(2010).

NOTE:
THE INFORMATION DENOTED IN BOXES [ ] WITHIN THE DRAWING DETAILS ON THIS SHEET ARE CONSIDERED TO BE PROPOSED DESIGN/SPECIFICATIONS. ALL OTHER INFORMATION IS SHOWN FOR CONTEXT ONLY. REFER TO THE APPROPRIATE DRAWINGS BY THE ARCHITECT, LANDSCAPE ARCHITECT, STRUCTURAL ENGINEER, AND MECHANICAL ENGINEER FOR DETAIL DESIGN AND SPECIFICATION OF OTHER DESIGN ELEMENTS.

LICENSED PROFESSIONAL ENGINEER
A. WONG
100187477
2023-04-19
RVA 236773
PROVINCE OF ONTARIO

Drawing Prepared By:

R.V. ANDERSON ASSOCIATES LIMITED

Client:

STANFORD HOMES

Project Name:

1437-1455
QUEEN ST W
TORONTO, ONTARIO

Drawing Title:

GENERAL SITE SERVICING

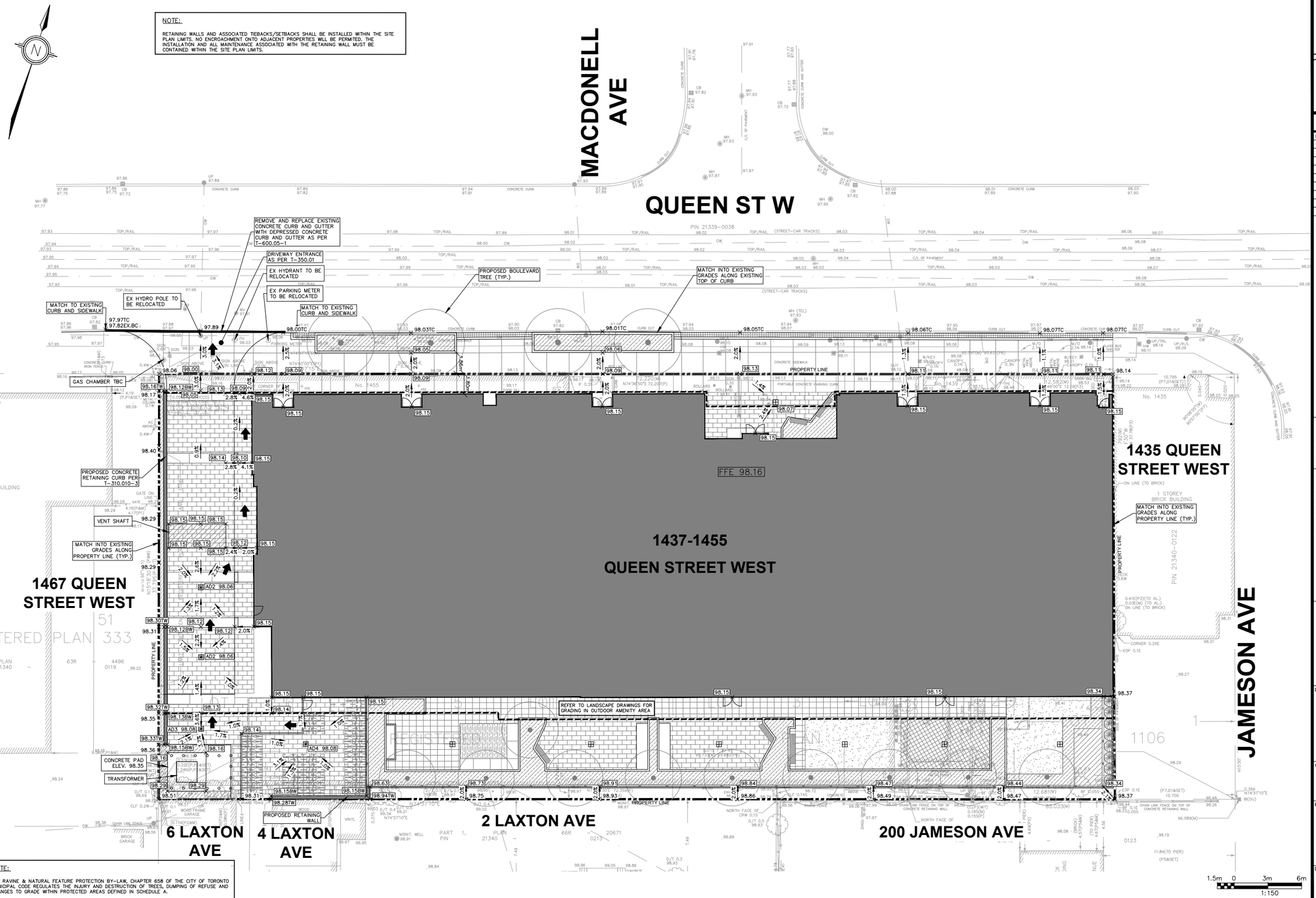
Drawn:	Design:	Date:
SO/CC	SO/CC	2021-10-26
Checked:	Approved:	Scale:
AW	SDF	1:150

CADD File: 236773-S-SITE SERVICING.dwg
Dwg. No.: C2
Project No.: 236773

R:\2023\236773 - Stanford Homes-1437-1455 Queen St W\10 CADdwg\01 Linear\04 Sheets

NOTE:

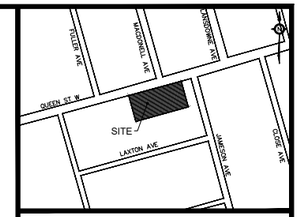
RETAINING WALLS AND ASSOCIATED TIEBACKS/SETBACKS SHALL BE INSTALLED WITHIN THE SITE PLAN LIMITS. NO ENCROACHMENT ONTO ADJACENT PROPERTIES WILL BE PERMITED. THE INSTALLATION AND ALL MAINTENANCE ASSOCIATED WITH THE RETAINING WALL MUST BE CONTAINED WITHIN THE SITE PLAN LIMITS.



NOTE:

THE RAVINE & NATURAL FEATURE PROTECTION BY-LAW, CHAPTER 658 OF THE CITY OF TORONTO MUNICIPAL CODE REGULATES THE INJURY AND DESTRUCTION OF TREES, DUMPING OF REFUSE AND CHANGES TO GRADE WITHIN PROTECTED AREAS DEFINED IN SCHEDULE A.

UNDER THIS BY-LAW PROTECTED TREES MAY NOT BE REMOVED, INJURED OR DESTROYED, AND PROTECTED GRADES MAY NOT BE ALTERED, WITHOUT WRITTEN AUTHORIZATION FROM URBAN FORESTRY RAVINE & NATURAL FEATURE PROTECTION, ON BEHALF OF THE GENERAL MANAGER OF PARKS, FORESTRY & RECREATION.
CONVICTIONS OF OFFENCES RESPECTING THE REGULATIONS IN THE RAVINE & NATURAL FEATURE PROTECTION BY-LAW ARE SUBJECT TO FINES, AND THE LANDOWNER MAY BE ORDERED BY THE COURT TO RESTORE THE AREA TO THE SATISFACTION OF THE CITY. A PERSON CONVICTED OF AN OFFENCE UNDER THIS BY-LAW IS LIABLE TO A MINIMUM FINE OF $500 AND A MAXIMUM FINE OF $100,000 FOR EACH TREE DESTROYED, A MAXIMUM FINE OF $100,000 FOR ANY OTHER OFFENCE COMMITTED UNDER THIS CHAPTER, AND/OR A SPECIAL FINE OF $100,000. A PERSON CONVICTED OF A CONTINUING OFFENCE, INCLUDING FAILURE TO COMPLY WITH RAVINE PERMIT CONDITIONS IS LIABLE TO A MAXIMUM FINE OF NOT MORE THAN $10,000 FOR EACH DAY OR PART OF A DAY THAT THE OFFENCE CONTINUES. RNFP 0608



KEY PLAN
N.T.S.

No.	Revision	Comments
1	2023-04-19	ISSUED FOR SPA

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PREPARED BY RVA.

LEGEND

- PROPERTY LINE
- LIMIT OF ROOF OVERHANG
- × 123.00 PROPOSED ELEVATION
- × 123.00 EXISTING ELEVATION
- 2.5% PROPOSED SLOPE
- AREA DRAIN (AD)
- STRIP DRAIN (SD)
- ACCESS OPENING FRAME & GRATE (MH)
- PROPOSED RETAINING WALL
- H.P. PROPOSED HIGH POINT
- F.F.E. PROPOSED FINISHED FLOOR ELEVATION
- PROPOSED OVERLAND FLOW ROUTE (GREATER THAN 100-YR STORM)

BENCH MARK:
ELEVATIONS SHOWN HEREON ARE GEODETIC AND ARE REFERRED TO MNRF BENCHMARK No. 122197403328 HAVING A PUBLISHED ELEVATION OF 98.372 METRES (CGVD28:PRE78)

BEARING NOTE:
BEARINGS ARE GRID DERIVED FROM THE 3° MTM CO-ORDINATE SYSTEM ZONE 10, NAD 83 (CSRS)(2010).

NOTE:
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LICENSED PROFESSIONAL ENGINEER
A. WONG
100167477
2023-04-19
PROVINCE OF ONTARIO

Drawing Prepared By:

R.V. ANDERSON ASSOCIATES LIMITED

Client:

STANFORD HOMES

Project Name:

1437-1455
QUEEN ST W
TORONTO, ONTARIO

Drawing Title:

GENERAL SITE GRADING

Drawn:	Design:	Date:
SO/CC	SO/CC	2021-10-26
Checked:	Approved:	Scale:
AW	SDF	1:150

CADD File: 236773-S-GENERAL SITE GRADING.dwg
Dwg. No.: C3
Project No.: 236773

TORONTO ENGINEERING & CONSTRUCTION SERVICES
ACCEPTED TO BE IN ACCORDANCE WITH THE CITY OF TORONTO STANDARDS.
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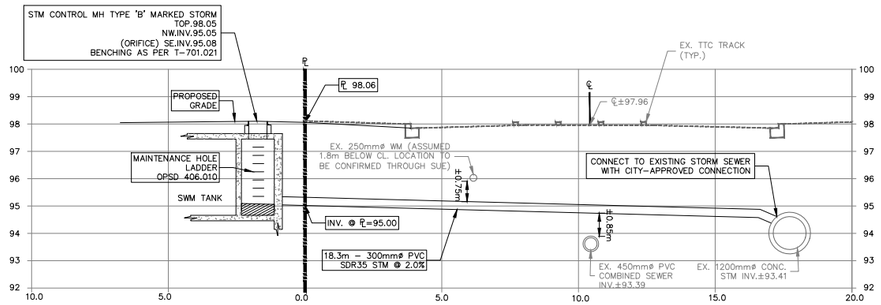
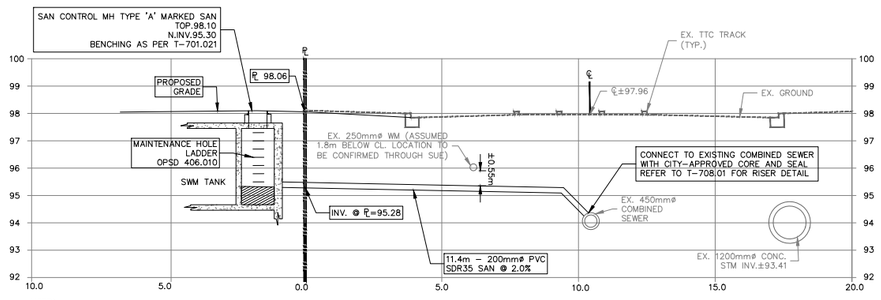
MANAGER, DEVELOPMENT ENGINEERING — DATE



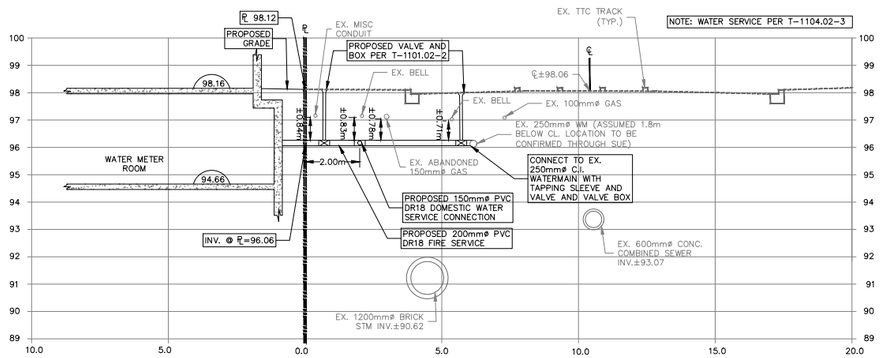
NOTE*
ALL UTILITY LOCATIONS APPROXIMATE. TO BE VERIFIED BY SUE.

SECTION A–A
PROPOSED STM SERVICE
SCALE 1:100



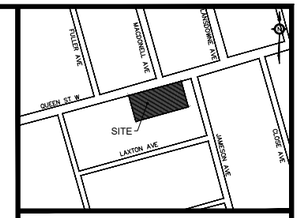
NOTE*
ALL UTILITY LOCATIONS APPROXIMATE. TO BE VERIFIED BY SUE.

SECTION B–B
PROPOSED SAN SERVICE
SCALE 1:100



NOTE*
ALL UTILITY LOCATIONS APPROXIMATE. TO BE VERIFIED BY SUE.

SECTION C–C
PROPOSED WM SERVICE
SCALE 1:100



KEY PLAN
N.T.S.

No.	Revision	Comments
1	2023-04-19	ISSUED FOR SPA

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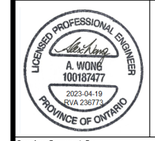

Drawing Prepared By:
R.V. ANDERSON ASSOCIATES LIMITED

Client:
STANFORD HOMES

Project Name:
1437-1455
QUEEN ST W
TORONTO, ONTARIO

Drawing Title:
CROSS SECTIONS & DETAILS

Drawn:	Design:	Date:
SO/CC	SO/CC	2021-10-26
Checked:	Approved:	Scale:
AW	SDF	1:100
CADD File:		Dwg. No.:
		C4
Project No.:		
236773		

TORONTO ENGINEERING & CONSTRUCTION SERVICES
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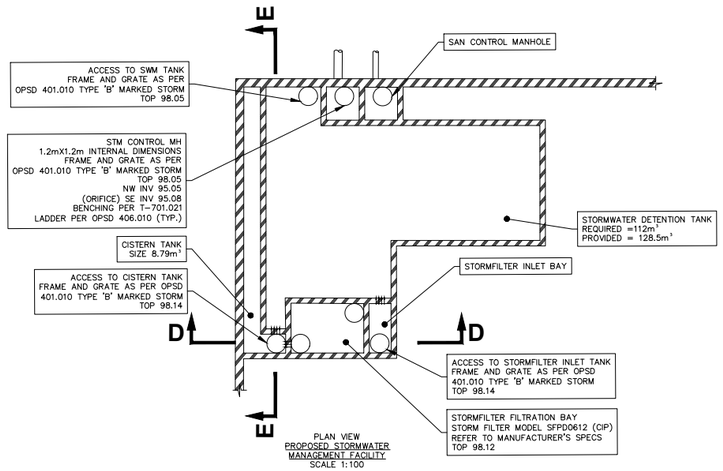
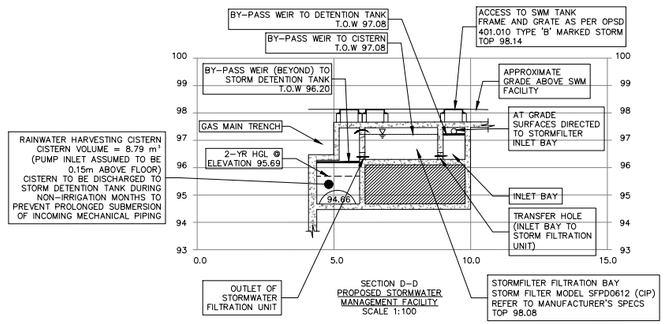
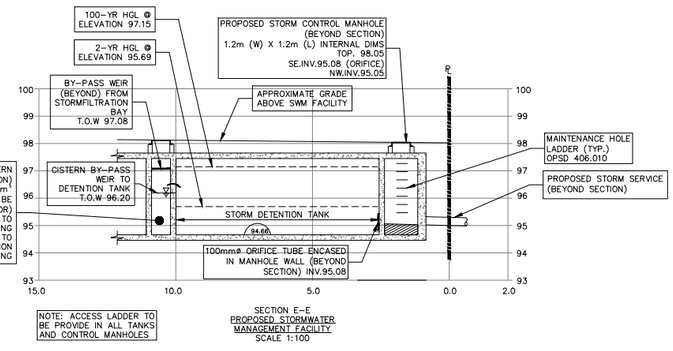
MANAGER, DEVELOPMENT ENGINEERING — DATE



PLAN VIEW
PROPOSED STORMWATER MANAGEMENT FACILITY
SCALE 1:100

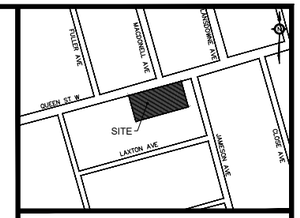


SECTION D-D
PROPOSED STORMWATER MANAGEMENT FACILITY
SCALE 1:100



NOTE: ACCESS LADDER TO BE PROVIDE IN ALL TANKS AND CONTROL MANHOLES

SECTION E-E
PROPOSED STORMWATER MANAGEMENT FACILITY
SCALE 1:100



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N.T.S.

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Drawing Prepared By:

R.V. ANDERSON ASSOCIATES LIMITED

Client:

STANFORD HOMES

Project Name:

1437-1455
QUEEN ST W
TORONTO, ONTARIO

Drawing Title:

SWM TANK SECTIONS & DETAILS

Drawn:	Design:	Date:
SO/CC	SO/CC	2021-10-26
Checked:	Approved:	Scale:
AW	SDF	1:100
CADD File:		Dwg. No.:
		C5
Project No.:		
236773		

TORONTO ENGINEERING & CONSTRUCTION SERVICES
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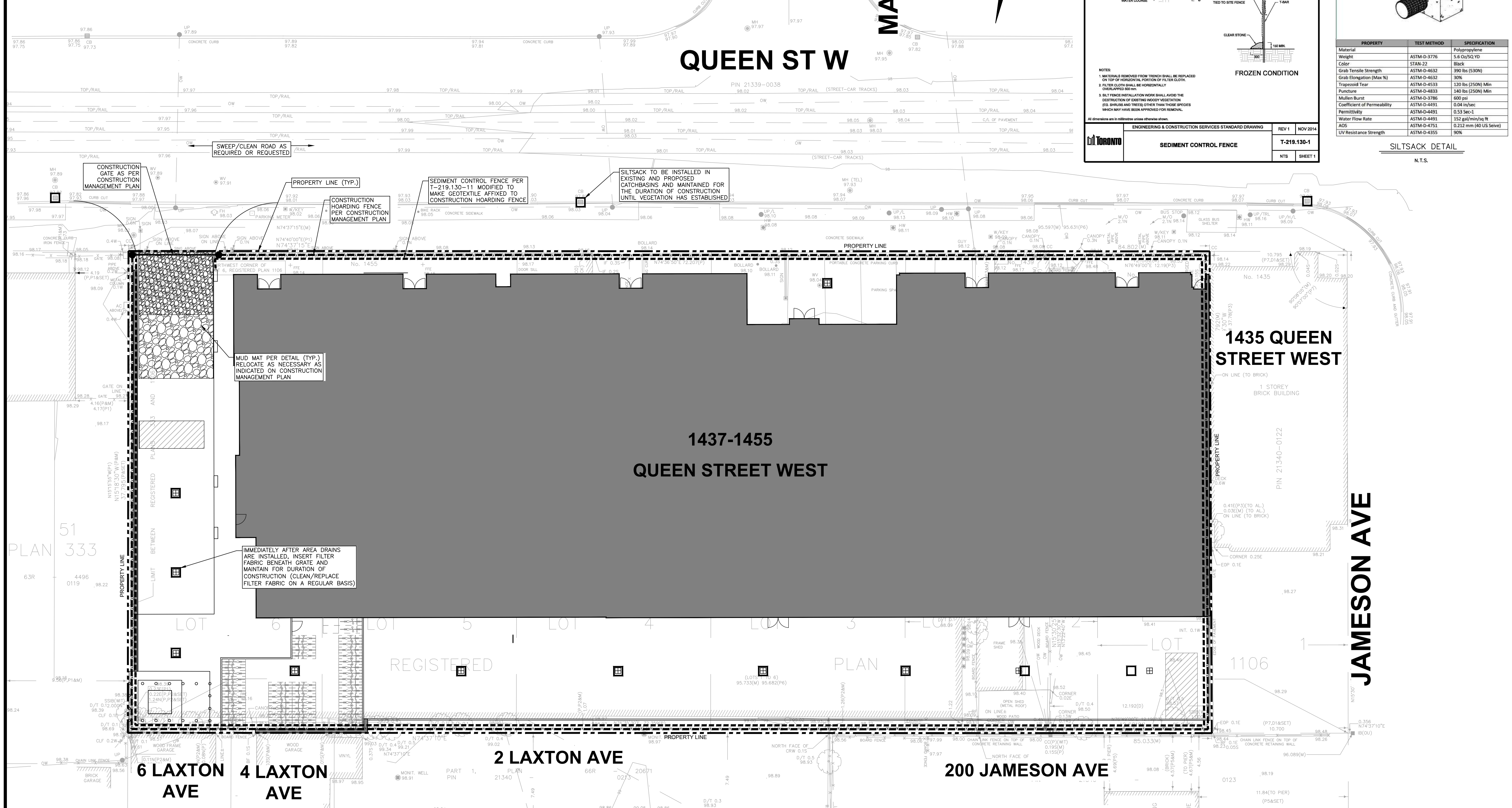
MANAGER, DEVELOPMENT ENGINEERING _____ DATE _____

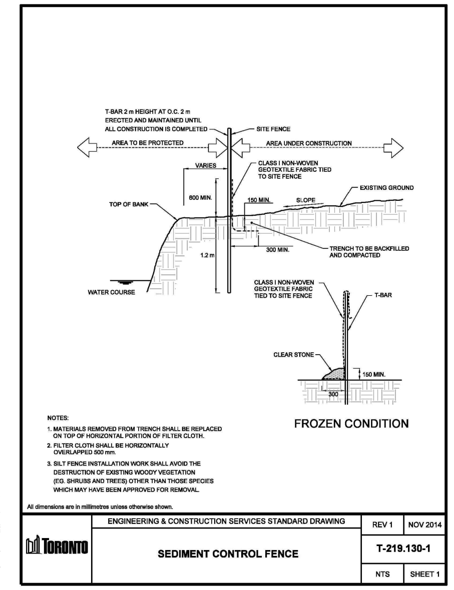
EROSION AND SEDIMENT CONTROL PLAN

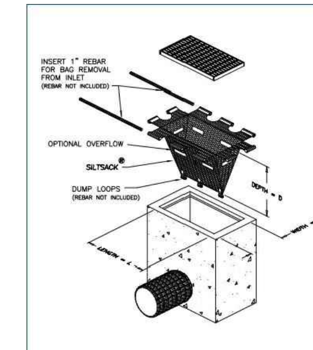
1. PRIOR TO ANY BUILDING DEMOLITION AND/OR EXCAVATION, HOARDING FENCE IS TO BE INSTALLED AROUND PERIMETER IN ACCORDANCE WITH THE CONSTRUCTION MANAGEMENT PLAN.
2. MUD MAT PER DETAIL ON THIS DRAWING IS TO BE INSTALLED AT SITE EXIT POINT(S) PRIOR TO THEIR USE. MUD MAT IS TO BE REFURBISHED BY ADDING AND/OR REPLACING STONE AS REQUIRED.

   NOTE: ALTERNATIVE TO MUD MATS OR IN COMBINATION, WHEEL WASHING STATIONS CAN BE EMPLOYED.
3. SEDIMENT CONTROL FENCE TO BE INSTALLED AT LOCATIONS SHOWN ON THIS DRAWING PER MODIFIED DETAIL WITH GEOTEXTILE AFFIXED TO CONSTRUCTION HOARDING FENCE. REPAIR RIPS OR TEARS, BROKEN STAKES AND BLOWOUTS. SILT TO BE REMOVED WHEN IT REACHES 30% OF THE HEIGHT OF THE FENCE OR COMPROMISES THE FENCE FUNCTION.
4. WATERING SHOULD BE PERFORMED AS REQUIRED TO MINIMIZE DISPERSION OF DUST FROM THE SITE INCLUDING FREQUENT APPLICATION TO ANY STOCKPILES ON SITE TO PREVENT LOSS OF SOIL BY WIND EROSION.
5. STREET SWEEPERS ON ADJACENT ROADS ARE TO BE EMPLOYED REGULARLY AS SEDIMENT ACCUMULATES.
6. CATCHBASIN SEDIMENT FILTERS TO BE TERRAFIX SILTSACK OR EQUIVALENT (AS/IF DIRECTED), AND TO BE MAINTAINED UNTIL FINISHED GROUND COVER IS ESTABLISHED, INCLUDING REGULAR INSPECTION AND EMPTYING/REPLACING AS REQUIRED. NOTE REBAR CAN BE REMOVED AFTER CLOSED GRATE HAS BEEN SECURED, AND REINSERTED FOR MAINTENANCE AND REMOVAL OF THE FILTER.
7. REGULAR INSPECTIONS AND EROSION AND SEDIMENT CONTROL MAINTENANCE ACTIVITIES ARE TO BE RECORDED IN A LOG BOOK ALONG WITH DATE STAMPED PHOTOGRAPHS.

   INSPECTION OF THE PROPOSED EROSION AND SEDIMENT CONTROL MEASURES WILL OCCUR:
   - ON A WEEKLY BASIS
   - AFTER EVERY SIGNIFICANT RAINFALL EVENT
   - AFTER SIGNIFICANT SNOW MELT EVENTS
   - DAILY DURING EXTENDED RAIN OR SNOW MELT PERIODS
8. SEDIMENT CONTROLS ARE TO BE REMOVED OFF SITE AFTER ALL FINISHED SURFACES HAVE BEEN ESTABLISHED TO THE SATISFACTION OF THE CITY AND ENGINEER.
9. THE EROSION AND SEDIMENT CONTROL (ESC) MEASURES OUTLINED ON THIS DRAWING ARE NOT STATIC AND MAY NEED TO BE UPGRADED/ AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASE INTO THE NATURAL ENVIRONMENT. THE ENGINEER SHALL BE CONTACTED IMMEDIATELY SHOULD THE EROSION AND SEDIMENT CONTROL PLANS CHANGE FROM THE APPROVED PLANS. FAILED ESC MEASURES WILL BE REPAIRED IMMEDIATELY.
10. AN AFTER HOURS CONTACT NUMBER IS TO BE VISIBLY POSTED ON SITE FOR EMERGENCIES. ANY SEDIMENT SPILL FROM THE SITE SHOULD BE REPORTED TO THE MINISTRY OF ENVIRONMENT AND CLIMATE CHANGE (SPILL ACTION CENTER) AT 1-800-268-6060



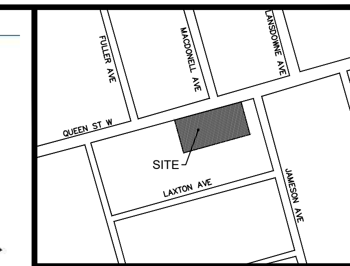




PROPERTY	TEST METHOD	SPECIFICATION
Material		Polypropylene
Weight	ASTM-D-3776	5.6 Oz/SQ YD
Color	STAN-22	Black
Grab Tensile Strength	ASTM-D-4632	390 lbs (530N)
Grab Elongation (Max %)	ASTM-D-4632	30%
Trapezoid Tear	ASTM-D-4533	120 lbs (250N) Min
Puncture	ASTM-D-4833	140 lbs (250N) Min
Mullen Burst	ASTM-D-3786	600 psi
Coefficient of Permeability	ASTM-D-4491	0.04 in/sec
Permittivity	ASTM-D-4491	0.53 Sec-1
Water Flow Rate	ASTM-D-4491	152 gal/min/sq ft
AOS	ASTM-D-4751	0.212 mm (40 US Seive)
UV Resistance Strength	ASTM-D-4355	90%

SILTSACK DETAIL

N.T.S.



KEY PLAN
N.T.S.

No.	Revision	Comments
1	2023-04-19	ISSUED FOR SPA

THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS PREPARED BY RVA.

LEGEND

- PROPERTY LINE
- PROPOSED HOARDING FENCE
- PROPOSED SEDIMENT CONTROL FENCE
- PROPOSED SILTSACK IN CATCHBASIN
- PROPOSED FILTER FABRIC IN AREA DRAIN
- PROPOSED FILTER FABRIC IN MH LID
- PROPOSED MUD MAT
- PROPOSED CONSTRUCTION ACCESS GATE

BENCH MARK:
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BEARING NOTE:
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Contractor Must Check And Verify All Dimensions On The Job.

This Drawing Is Not To Be Used For Construction Until Signed By The Engineer.

NOTE:
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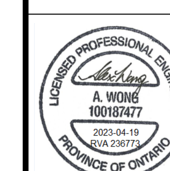


Drawing Prepared By:

R.V. ANDERSON ASSOCIATES LIMITED

Client:

STANFORD HOMES

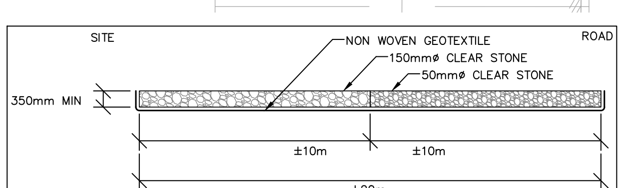
Project Name:

1437-1455
QUEEN ST W
TORONTO, ONTARIO

Drawing Title:

EROSION & SEDIMENT CONTROL PLAN

Drawn:	Design:	Date:
SO/CC	SO/CC	2021-10-26
Checked: AW	Approved: SDF	Scale: 1:150
CADD File: 236773-S-ESC.dwg		Dwg. No.: C6
Project No.: 236773		



MUD MAT DETAIL

N.T.S.

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MANAGER, DEVELOPMENT ENGINEERING DATE

R:\2023\236773 - Stanford Homes-1437-1455 Queen St W\10 CADdwg\01 Linear\04 Sheets

APPENDIX F

City Record Drawings & Correspondence

CITY OF TORONTO
DEPARTMENT OF PUBLIC WORKS

ROAD STORM SEWER

QUEEN STREET WEST

FROM MACDONELL AVENUE TO FULLER AVENUE

DRAWING NO. Q-72
SCALES HORIZ. 1:200 VERT. 1:100
SENIOR DESIGN ENG.
DESIGN BY
SENIOR PROJECT ENG.
DRAWN BY M.P. VALADE CHECKED BY R.K.
DIRECTOR
CONTRACT NO.
COMMISSIONER
DATE

2' x 7' = 14 SQ. FT. (1.30m²)

WORK COMMENCED
WORK COMPLETED
FINAL MEASUREMENT BOOK PAGE DATE
INSPECTOR
LAYOUT
SUPERVISING ENGINEER

SEE LOOSE LEAF NOTES NO. 449.
GEODETIC BENCH MARK NO. 328 ELEV. 98.372.
GEODETIC BENCH MARK NO. 329 ELEV. 98.588.

APPROVED BY
MINISTRY OF THE ENVIRONMENT
PROVINCE OF ONTARIO
APPROVAL NO. 3-0593-82-006
DATE JULY 6, 1982

REGISTERED PROFESSIONAL ENGINEER
CIVIL
R. M. BREMNER
PROVINCE OF ONTARIO

Q-72