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2510 St. Laurent Boulevard

Servicing and

Stormwater Management Report

Prepared for: Claridge Homes

Engineering excellence. Planning progress. Liveable landscapes.

2510 St. Laurent Boulevard

City of Ottawa

Servicing and Stormwater Management Report

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

November 1st, 2022
Revised: May 30,2023
Revised: September 29, 2023
Revised: January 31, 2024

Novatech File: 122040
Ref: R-2022-191

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January 31, 2024

City of Ottawa
Planning, Infrastructure and Economic Development Department
Planning and Infrastructure Approvals Branch
110 Laurier Avenue West, 4th Floor
Ottawa ON, K1P 1J1

Attention: **Kelby Lodoen Unseth, Planner II**

Reference: **2510 St. Laurent Boulevard**
Servicing and Stormwater Management Report
Our File No.: 122040

Please find enclosed the 'Servicing and Stormwater Management Report' for the above noted development located in the City of Ottawa. This report is being submitted in support of the site plan application, and Plan of Condominium for the proposed development.

Should you have any questions or require additional information, please contact the undersigned.

Yours truly,

NOVATECH

Greg MacDonald, P. Eng.
Director, Land Development and Public Sector Infrastructure

cc: Vincent Denomme, Claridge Homes

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

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Appendices

Tables

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1.0 INTRODUCTION

Novatech has been retained to prepare a Servicing and Stormwater Management Report for the proposed condominium development located at 2510 St. Laurent Boulevard, within the City of Ottawa. The proposed site is denoted as part of lots A and 1, concession 4, City of Ottawa. This report is submitted in support the zoning application, site plan application and draft plan of condominium for the subject development. **Figure 1** - Key Plan shows the site location.

1.1 Existing Conditions

The subject site is approximately 5.9 hectares (ha.) in size and consists of multiple properties namely 1890, 1900 & 1920 Walkley Road, 2502 & 2510 St. Laurent Boulevard, 2990 & 3000 Conroy Road, and 2425 Don Reid Drive. Historically the site contained four (4) commercial buildings complete with asphalt parking areas. Presently the site is vacant, and covered with vegetation, broken asphalt, and foundation remnants. In the north-east corner of the site there is a private commercial road on the property that provides access to the neighboring commercial buildings addressed 1950 Walkley Road, 1970 Walkley Road, and 2980 Conroy Road.

The site is bound by Walkley Road to the north, an existing commercial plaza to the north-east, Conroy Road to the east, an apartment development to the south-east, St Laurent Boulevard to the south, a commercial office building to the south-west, and Don Reid Drive to the west. The drainage path of the site is not well defined and contains localized depression storage in multiple locations. Overall, the site has a gradual slope from the northwest to the southeast. **Figure 2** shows the existing site conditions.

1.2 Proposed Development

It is proposed to develop the site with a private condominium development, a future retirement home/apartment building, and a public park. The future retirement home/apartment block is located in the northwest corner of the site at the intersection of Walkley Road and Don Reid Drive. The future retirement home/apartment will be detailed as part of a separate site plan application and will not be detailed within the following report.

The proposed condominium development will include a total of 160 town home units consisting of seventy-one (71) - 3 storey town homes and eighty-nine (89)-standard 2 storey town homes. The development will include the construction of three (3) new private roads presently named Streets 1 though 3, with a minimum street width of 7.0m. Each unit will have its own garage and driveway to accommodate site vehicle demands in addition to street parking provided on Streets 1 and 3. Access to the site will be provided in three (3) locations, by two (2) entrances on St Laurent Boulevard, and one (1) entrance on Don Reid Drive. The proposed public park will be located in the southwest corner of the property with access from the existing Don Reid Drive and the proposed Street 1. **Figure 3** shows the concept plan for the proposed development, and **Figures 4-6** depict the typical road cross-sections.

Correspondence from the City pre-consultation meeting for the proposed development is included in **Appendix A** for reference.

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

KEY PLAN

SCALE		
N.T.S		
DATE	JOB	FIGURE
OCT. 2022	122040	FIGURE 1

LEGEND

PROPOSED DEVELOPMENT BOUNDARY

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

EXISTING CONDITIONS

SCALE 1 : 1500 (0, 15, 30, 45, 60)

DATE	JOB	FIGURE
OCT. 2022	122040	FIGURE 2

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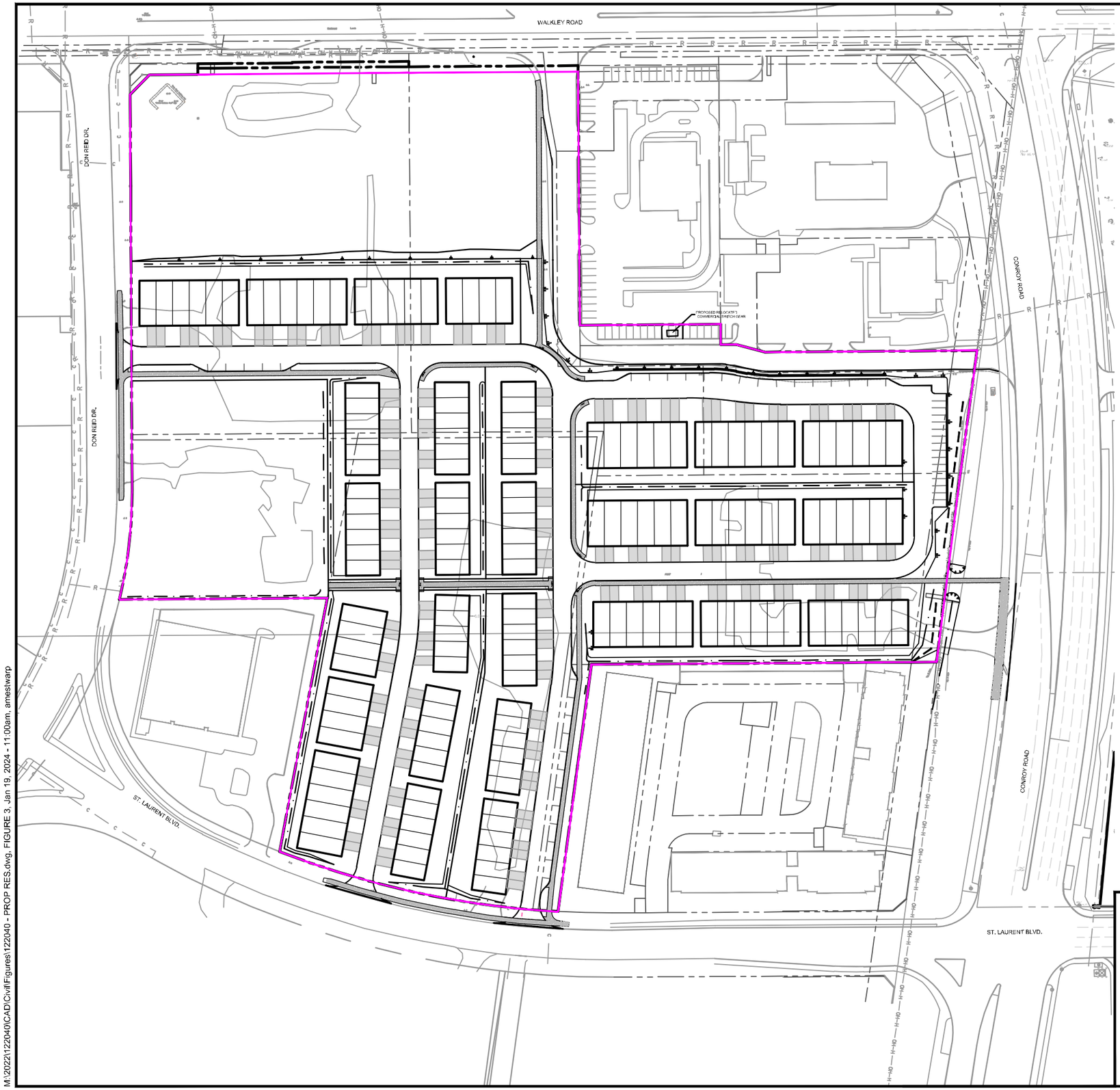

LEGEND

PROPOSED DEVELOPMENT BOUNDARY

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

PROPOSED SITE PLAN

SCALE 1 : 1500 (0, 15, 30, 45, 60)

DATE JAN 2024 | JOB 122040 | FIGURE FIGURE 3

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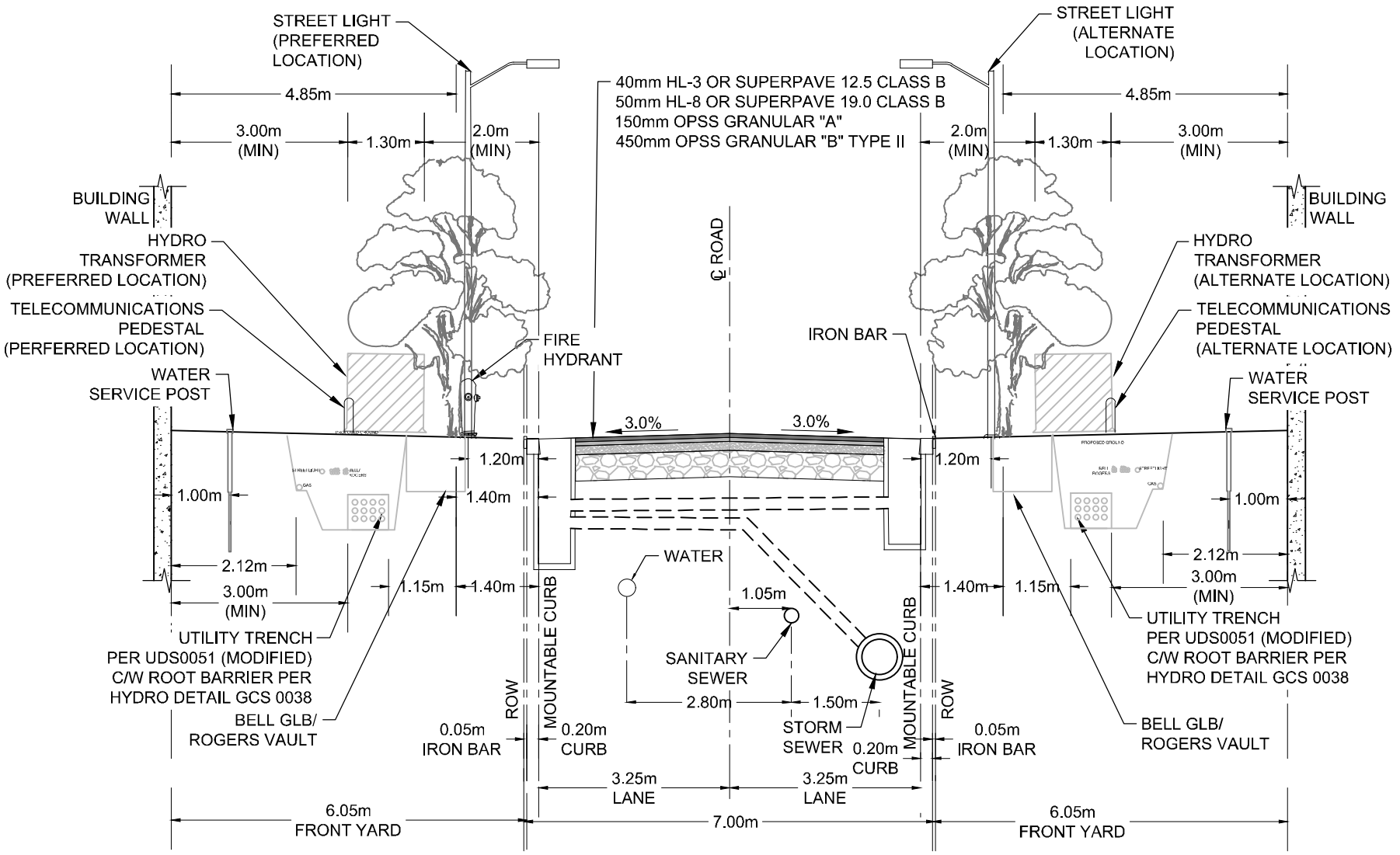

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NOTE:

1. BARRIER CURB IS PROPOSED ADJACENT TO ON STREET PARKING AREAS. MOUNTABLE CURB IS PROPOSED IN ALL OTHER AREAS
2. ALL CURB TO BE AS PER CITY DETAIL SC1.1
3. PRIVATE STREETLIGHT CABLES TO MAINTAIN MIN. 300mm HORIZONTAL CLEARANCE FROM HOL DUCT BANK
4. GLB TO MAINTAIN 300mm (MIN) HORIZONTAL CLEARANCE TO HOL DUCT BANK

CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

TYPICAL CROSS-SECTION - 7.0m (STREET 2)

SCALE		
N.T.S		
DATE	JOB	FIGURE
JAN 2024	122040	FIGURE 4

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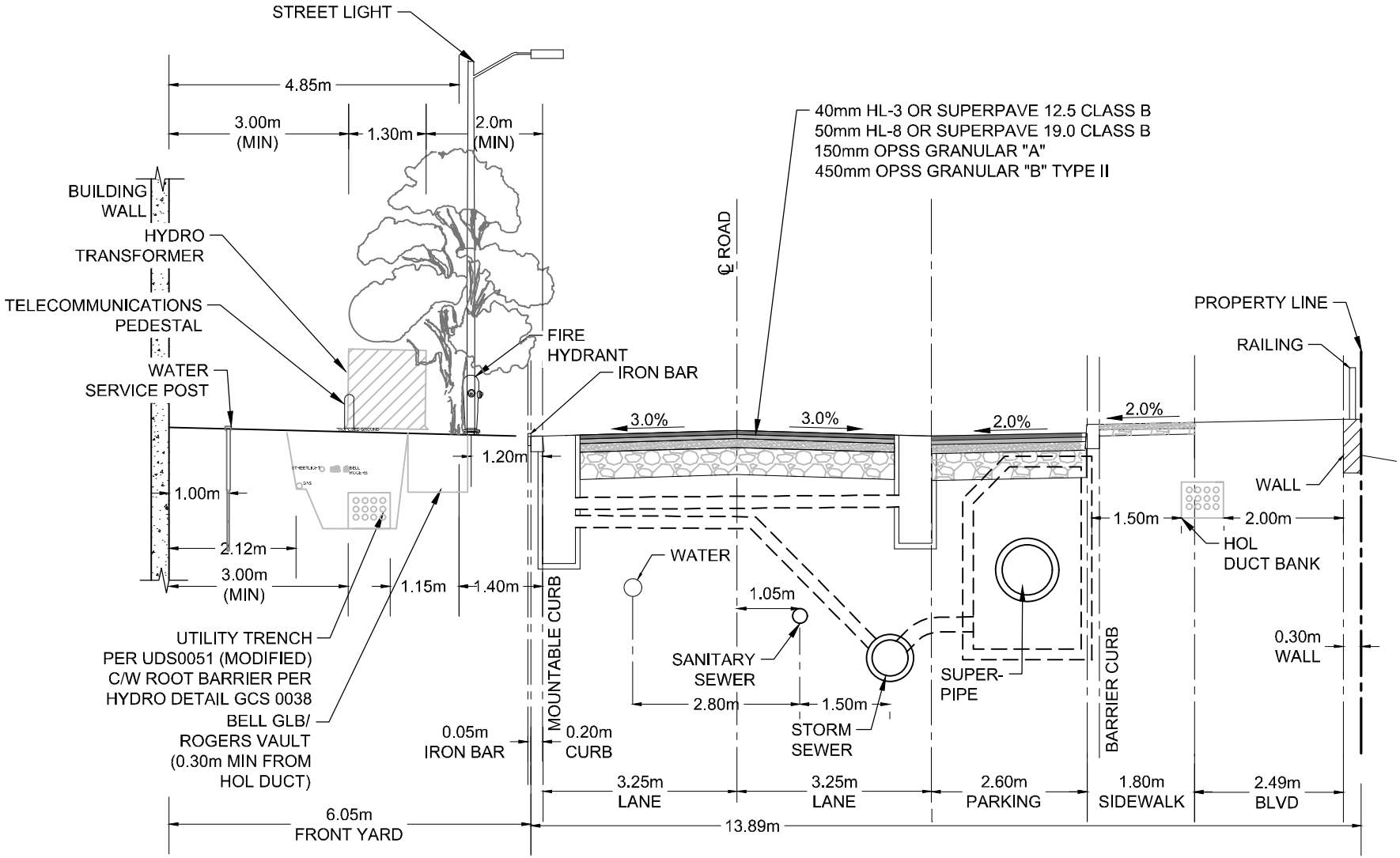

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

TYPICAL CROSS-SECTION - STREET
1- PARALLEL PARKING

SCALE		
N.T.S		
DATE	JOB	FIGURE
JAN 2024	122040	FIGURE 5

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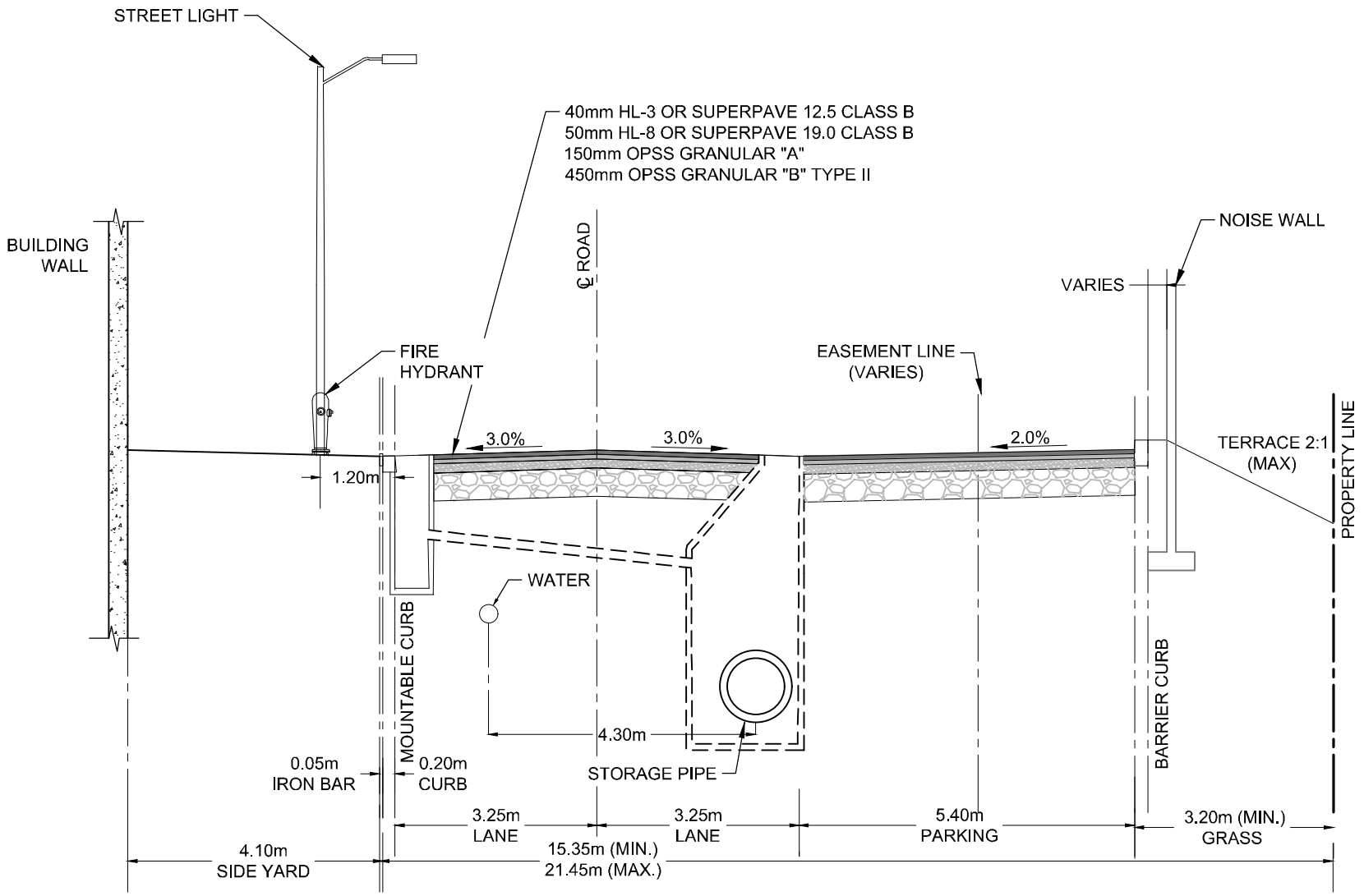

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

TYPICAL CROSS-SECTION - STREET 3 - PERPENDICULAR PARKING

SCALE	
N.T.S	

DATE	JOB	FIGURE
JAN 2024	122040	FIGURE 6

2.0 SITE CONSTRAINTS

A geotechnical investigation was completed for the subject development and a report was prepared entitled 'Geotechnical Investigation, Proposed Development, 1890, 1900 & 1920 Walkley Road, 2502 & 2510 St. Laurent Boulevard, 2990 & 3000 Conroy Road, and 2425 Don Reid Drive, City of Ottawa, Ontario, by Paterson Group Inc. dated May 24, 2023 (Report: PG6149-1, Rev 2). The following is a summary of the findings of the report:

- Based on observations at the borehole locations, the groundwater table is expected at an approximate depth between 2.5 and 3.5 m below ground surface. However, it should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could be different at the time of construction.
- Under paved areas, existing construction remnants, such as foundation walls, should be excavated to a minimum of 1 m below final grade.
- Due to the presence of a silty clay deposit, a permissible grade raise restriction of 2.0 m is recommended for the grading at the subject site.
- The excavation side slopes above the groundwater level extending to a maximum depth of approximately 3 m should be stable cut back at 1H:1V. Flatter slopes could be required for deeper excavations or for excavations below the groundwater level. Where such side slopes are not permissible or practical, temporary shoring systems should be used.
- The subsoil at this site is considered to be mainly a Type 2 or 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.
- Clay seals should be placed at the site boundaries and at strategic locations at no more than 60 m intervals in the service trenches.
- A temporary Ministry of the Environment, Conservation and Parks (MECP) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MECP.
- For typical ground or surface water volumes being pumped during the construction phase, typically between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MECP review of the PTTW application.
- Tree planting setback limits may be reduced to 4.5 m for small (mature height up to 7.5 m) and medium size trees (mature tree height 7.5 to 14 m), provided that the conditions listed in the geotechnical report are met.

3.0 WATER SERVICING

The subject property is within the City of Ottawa 2W2C pressure zone. There are existing City watermains in all rights-of-way fronting the proposed site. There is an existing 400mm diameter (dia.) cast iron watermain within Walkley Road, a 400mm dia. ductile Iron watermain in Conroy Road, a 300mm dia. ductile iron watermain in St. Laurent Avenue, and 300mm dia. ductile iron watermain in Don Reid Drive.

The proposed development will be serviced with a proposed private 200mm diameter watermain system within the proposed rights-of-way. The watermain system will connect to the existing City owned watermain system in three (3) locations for redundancy. There will be two (2) 200mm dia. connections to the existing 300mm dia. watermain within St. Laurent Boulevard, and one (1) connection to the existing 300mm dia. watermain within Don Reid Drive. Additionally, there will be one (1) 50mm dia. water service provided to the proposed parkland block from the existing 300mm dia. watermain within Don Reid Drive for the City to utilize for future park infrastructure. Refer to the General Plan of Services drawing (122040-GP) for servicing details.

3.1 Watermain Design Parameters

Water demands have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines, and ISTB-2021-03 as follows:

Table 3.1: Watermain Design Parameters and Criteria

Domestic Demand Design Parameters	**Design Parameters**
Unit Population: Semi-Detached /Townhomes	2.7 people/unit
Basic Day Residential Demand (BSDY)	280 L/c/d
Maximum Day Demand (MXDY)	Residential: 2.5 x Basic Day
Peak Hour Demand (PKHR)	Residential: 2.2 x Maximum Day
Fire Demand (FF) Design	**Design Flows**
Conventional single/town units, unless otherwise noted. Hydrant spacing and coding	10,000L/min per FUS / OWDG TB-2014-02 90m spacing per OWDG
System Pressure Criteria Design Parameters	**Criteria**
Maximum Pressure (BSDY) Condition	< 80 psi occupied areas < 100 psi unoccupied areas
Minimum Pressure (PKHR) Condition	> 40 psi
Minimum Pressure (MXDY+FF) Condition	> 20 psi

3.2 Fire Demand

The required fire demand was calculated using the Fire Underwriters Survey 2020 (FUS) Guidelines and City of Ottawa ITSB-2014-02. Through correspondence with the builder, it is understood that the proposed buildings are residential occupancy (Limited Combustible) and are composed of wood frame construction.

3.2.1 2- Storey Townhomes

For the 2-story townhomes the traditional FUS Table 5 was utilized. The "worst case" for the 2-story townhomes had a building footprint of 457.5 m^2 and a total fire flow requirement of **250L/s** based on the FUS design parameters. Reviewing the site layout and building parameters it was determined that the fire flow demand of the 2-storey Townhomes can be capped at a demand of **167L/s** as per the City of Ottawa guidelines.

The **167 L/s** is in accordance with City of Ottawa water distribution design guidelines (ISTB-2014-02) which outlines the following:

- Where there is a potential for less than 3m of separation between the single family, semi-detached, and row townhome wood-framed buildings, the FUS estimate would require the fire area for multiple buildings to be treated as a contiguous block area and would results in a high fire flow demand which is difficult to attain from existing systems;
- Moreover, to meet the high fire flow demand it would trigger larger diameter watermain size, creating system vulnerabilities such as water age issues;
- As such, fire flows may be capped at 167 L/s (10,000 L/min) for single family, semi-detached, and row townhome, provided certain site criteria are met. The criteria are:
    - For singles: a min separation of 10 m between the backs of adjacent units.
    - Traditional side-by-side semi-detached or row townhomes:
        a. Firewalls with a min two-hour rating to separate the block into fire areas of no more than the lesser of 7 dwelling units, or 600 m2 of building area; and
        b. Min. separation of 10 m between the backs of adjacent units.

Refer to **Appendix B** for detailed Fire flow calculations and building separation figures.

3.2.2 3- Storey Townhomes

For the 3-story townhomes FUS Table 6 and ITSB-2014-02 were utilized to calculate the required demands. Table 6 can be utilized when the type of construction of all buildings surrounding the subject building is known.

By using Table 6 the equivalent stories of the 3-level townhome (8.15m from ground to top floor) was determined to be 2.04 stories and the equivalent stories of a 2-level townhome (5.88m from ground to top floor) was calculated to be 1.47 stories. The "worst case" for the 3-story townhomes had a building footprint of 457.5 m^2 and a total fire flow requirements of **267L/s**.

Refer to **Appendix B** for detailed Fire flow calculations, building separation figures and dwelling cross-sections.

3.3 Water Demand

The water demand calculations are provided in **Appendix B** for reference. A summary of the calculated water demand and fire flows are provided below in **Table 3.2**.

Table 3.2: Domestic Water Demand Summary

Units	Population	Ave. Daily Demand (L/s)	Max. Daily Demand (L/s)	Peak Hour Demand (L/s)	Fire Flow (L/s)
160	432	1.40	3.50	7.70	267

The above water demand information was submitted to the City of Ottawa for boundary conditions from the City's water model. Refer to **Table 3.3** for a summary of the boundary conditions.

Table 3.3: Water Boundary Conditions

Criteria	Head (m)
Connection 1 (Don Reid Drive)	
Max HGL	130.3
Min HGL	124.5
Max Day + Fire Flow (167L/s)	125.4
Max Day + Fire Flow (267L/s)	123.3
Connection 2 (St. Laurent)	
Max HGL	130.3
Min HGL	124.4
Max Day + Fire Flow (167L/s)	125.2
Max Day + Fire Flow (267L/s)	122.9
Connection 3 (St. Laurent)	
Max HGL	130.3
Min HGL	124.4
Max Day + Fire Flow (167L/s)	125.2
Max Day + Fire Flow (267L/s)	122.9

3.4 System Pressure Modeling and Results

The above boundary conditions were used to create a hydraulic model using EPANET for analyzing the performance of the proposed watermain system for three theoretical conditions: 1) High Pressure check under Average Day conditions, 2) Peak Hour Demand, 3) Maximum Day + Fire Flow Demand. The following **Table 3.3** provides a summary of the results from the hydraulic water model.

Table 3.4: Water Analysis Summary

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)	Age (hrs)
High Pressure	1.40L/s	80psi (Max)	55.78psi	2.38
Maximum Daily Demand and Fire Flow	270.50 L/s	20psi (Min)	27.90psi	N/A
Peak Hour	7.70 L/s	40psi (Min)	61.91psi	N/A

The above table lists the worst-case pressures from the water model analysis.
The water age was calculated with a boundary age of 0.00hrs

The hydraulic analysis indicates that the system can provide adequate pressures and flow to meet the domestic and fire flow requirements for the site. Refer to **Appendix B** for detailed water demand calculations, model schematic, and City of Ottawa boundary conditions.

4.0 SANITARY SERVICING

There are existing sanitary sewers within all rights-of-way fronting the proposed development. There is a 450mm dia. concrete sanitary sewer in the Walkley Road right-of-way, a 750mm dia. concrete sanitary sewer within the Conroy Road right-of-way, a 375mm dia. PVC sanitary sewer in the St. Laurent Boulevard right-of-way, and a 250mm dia. PVC sanitary sewer in the Don Reid Drive right-of-way. It is proposed to service the development with two (2) 250mm dia. PVC sanitary sewers, with independent connections to the existing 375mm sanitary sewer within the St. Laurent Boulevard right-of-way. Additionally, it is proposed to service the park with a 150mm dia. PVC connection to the existing 250mm dia. sanitary sewer within Don Reid Drive for the City to utilize for future park infrastructure.

Sanitary flows for the proposed development were calculated using criteria from Section 4 of the City of Ottawa Sewer Design Guidelines, ITSB-2018-01, and the Ontario Building Code as follows:

Table 4.1: Sanitary Sewer Design Parameters

Design Component	Design Parameter
Unit Population: Semis-Detached /Townhomes	2.7 people/unit
Residential Flow Rate	Design = 280 L/cap/day Annual / Rare = 200 L/cap/day
Residential Peaking Factor	Harmon Equation (min=2.0, max=4.0) Harmon Correction Factor = 0.8m (Design)
Extraneous Flow Rate	Design = 0.33 L/s/ha
Minimum Pipe Size	250mm (Res)
Minimum Velocity[1]	0.6 m/s
Maximum Velocity	3.0 m/s
Minimum Pipe Cover	2.0 m (Unless frost protection provided)

[1]A minimum gradient of 0.65% is required for any initial sewer run with less than 10 residential connections.

The West connection will have a flow of **2.91 L/s** and the East connection will have a flow of **3.25 L/s**. The total peak sanitary flow including infiltration for the development will be **6.16 L/s**. It is understood that there is adequate capacity within the neighboring City infrastructure to service the development.

Detailed sanitary flow calculations are provided in **Appendix C** for reference.

5.0 STORM SERVICING

There are existing storm sewers located within all rights-of-way (ROW) fronting the proposed development:

- 1500mm – 2100mm dia. storm sewers within the Walkley Road ROW;
- 2100mm trunk & 375mm – 450mm dia. storm sewers within the Conroy Road ROW;
- 1500mm dia. storm sewer within the St. Laurent Boulevard ROW; and,
- 375mm – 900mm dia. storm sewers within the Don Reid Drive ROW.

The proposed development area will have five (5) storm outlets connecting to the existing storm sewer systems:

- Residential Component - two (2) storm sewer connections from Streets 1 & 2 to the 1500mm dia. storm sewer on St. Laurent Blvd.
- Park Block – one (1) storm connection to the dia. diameter storm sewer on Don Reid Dr.
- Retirement Residence – future storm connection to the 375mm dia. storm sewer on Don Reid Dr.
- Commercial Rd. – one (1) storm connection to the 450mm diameter storm sewer within the Conroy Rd. ROW.

The proposed development will include underground and surface storage to adhere to the allowable release rate. No surface storage has been assumed in the park block. The proposed storm sewer in the park block is a 375mm PVC storm sewer and provides the only storage required to meet the allowable release rate.

The residential component of the site will include underground storage in the rear yards (600mm dia. perforated pipe / stone trench) and in the roadway (offline upsized storm sewers – 'superpipe'). Portions of the residential (front / road) drainage will not have underground storage (superpipe) due to infrastructure constraints with the narrow ROW. Due to the infrastructure constraints the 'pairs' of roadway catchbasins will need to be interconnected.

The proposed residential and commercial roadways have been graded in a 'saw-toothed' pattern to promote surface storage that will be utilized during large storm events. Inlet control devices (ICDs) will be installed within the roadway inlets or structure downstream the superpipe systems. All on-site storm sewers are private. The proposed storm sewer sizes range from 1) 250mm to 600mm dia. for the 'free-flowing' storm sewer systems; and, 2) 450mm – 1050mm dia. for the superpipe systems. Refer to the General Plan of Services (drawings 122040-GP1&2) for more details.

The release rate from the commercial road will be controlled via a single ICD installed in the downstream structure. The storm sewer servicing the commercial road has been upsized to provide underground storage.

The retirement residence will require a future site plan approval. It is assumed that the retirement residence will connect to the 375mm dia. storm sewer on Don Reid Drive. The proposed development of this Block will need to adhere to the allocated allowable release rate provided in this report.

6.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The stormwater management (SWM) strategy for the site is based on the established criteria provided by the City of Ottawa.

6.1 Design Criteria

The following SWM criteria was established based on correspondence with the City of Ottawa:

- Control post-development peak flows for all storms up to and including the 100-year design event to a 5-year allowable release rate calculated using a runoff coefficient (C) equal to existing conditions but in no case greater than 0.50 and a calculated time of concentration (T_c) no less than 10 minutes.
- Ensure the 100-year hydraulic grade line is min. 0.30m from the lowest Underside-of-Footing elevation.
- Limit 100-year dynamic ponding depths within the roadway to 0.35m.
- Ensure the product of the 100-year dynamic flow depth x velocity is less than 0.60.
- Ensure no surface ponding during the 2-year storm event.
- Provide an *Enhanced* level of water quality treatment corresponding to a long-term 80% TSS removal rate.
- Provide source controls which are in conformity with the City of Ottawa requirements, where possible.
- Provide guidelines to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

6.2 Stormwater Management Modeling

The City of Ottawa Sewer Design Guidelines (October 2012) requires hydrologic / hydraulic modeling for all dual drainage systems. The performance of the proposed storm drainage system was evaluated using the PCSWMM hydrologic / hydraulic model. The results of the analysis were used to:

- Estimate pre-development peak flows (100-year allowable release rate).
- Determine the total runoff from the site.
- Size the required ICDs to ensure no ponding during the 2-year storm event and no off-site major system flows during the 100-year storm event.
- Determine the required underground storage volumes.
- Calculate the storm sewer hydraulic grade line and ponding elevations for the 100-year storm event.

The pre-development & post-development PCSWMM model schematics and 100-year output are provided in **Appendix E**.

6.2.1 Design Storms

The PCSWMM model uses synthetic design storms created using the IDF parameters provided in the City of Ottawa Sewer Design Guidelines (October 2012). The hydrologic analysis was completed using the 4-hour Chicago synthetic design storms for the 2-year, 5-year, and 100-year return periods. The model was 'stress tested' using a 100-year (+20%) storm event that corresponds to a 100-year storm with a 20% increase in rainfall intensity and volume.

6.2.2 Pre-Development Model – 100-year Allowable Release Rate

The 100-year allowable release rate for the site was calculated using a pre-development PCSWMM model. The SCS Curve Number runoff method was used to estimate pre-development peak flows for the total existing undeveloped site area (approx. 5.9 ha).

Under existing conditions the site consists of remnants of parking lots for old buildings that were demolished (circa 2005). Portions of the paved areas are still in place; however, are heavily 'cracked' with overgrown vegetation. The existing percent impervious is 39%, which corresponds to a runoff coefficient of 0.47. This is less than the 0.50 runoff coefficient per the SWM criteria.

The surficial soils of the subject site consists of 'silty clay' (Hydrologic Soil Group 'D'), per the Geotechnical Report referenced in Section 2.0. An assumed Curve Number of 86 was chosen based on the existing land use / soils. The Initial Abstraction value was assumed to be 5mm. A time-of-concentration (Tc) of 17 min. was estimated for the overall site using Uplands Method.

The pre-development drainage area plan (**Drawing 122040-EXSWM**), pre-development model parameters & results are provided in **Appendix E**.

Based on the above, pre-development peak runoff for the 5-year storm event (4-hour Chicago) was estimated to be 597 L/s. Per the SWM criteria, this corresponds to the overall 100-year allowable release for the overall subject site.

The overall subject site is divided into four (4) parts. If the overall release rate was equally shared, based on drainage area, each part would have the 100-year allowable release rate shown in **Table 6.1**.

Table 6.1: 100-year Allowable Release Rate

Development (Block)	Drainage Area		100-year Allowable Release Rate
	(ha)	% of Overall	(L/s)
Future Retirement Residence & Commercial Road			
Retirement Residence	1.022	17.4%	103.9
Commercial Road	0.290	4.9%	29.4
SUB-TOTAL	**1.312**	**22.3%**	**133.3**
Residential Subdivision & Park			
Residential Subdivision	3.966	67.5%	403.0
Park Block(1)	0.597	10.2%	60.7
SUB-TOTAL	**4.563**	**77.7%**	**463.7**
OVERALL TOTAL(1)	***5.875***	***100.0%***	***597.0***

1) Overall total does not include existing (off-site) areas (EX-01 = 0.024 ha).

Retirement Residence & Commercial Road

The 100-year allowable release rates for the future Retirement Residence Block and Commercial Road are based on area-weighting the overall allowable release rate (597 L/s) based on the drainage area, as summarized below:

Development Block	*100-year Allowable Release Rate*
Retirement Residence	103.9 L/s
Commercial Road	29.4 L/s

The storm servicing and stormwater management design of the future retirement residence will need to adhere to the above 100-year allowable release rate. The storm servicing and stormwater management design for the commercial road is included in this report submission.

Residential Subdivision & Park Block

The 100-year allowable release rates for the residential subdivision and park block are based on area-weighting the overall allowable release rate (597 L/s) based on the drainage area, as summarized below:

Development Block	*100-year Allowable Release Rate*
Residential Subdivision	403.0 L/s
Park Block	60.7 L/s

6.2.3 Post-Development Model Parameters

The proposed subject site has been divided into subcatchments based on the drainage areas tributary to each inlet of the proposed stormwater management system, delineated based on the proposed grading plan. Refer to the Post-Development Storm Drainage Area Plan (**Drawing 122040-SWM**). A summary of the subcatchment model parameters is provided in **Table 6.2**.

Table 6.2: Subcatchment Parameters

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero-Imperv. (%)	Flow Length / Equivalent Width[(1)] (m)	Average Slope (%)
Outlet 'A' – MH201						
A-01	0.151	0.53	47.1	100	12 / 125.8	2
A-02	0.166	0.76	80.0	50	13 / 127.7	2
A-03	0.153	0.76	80.0	50	14 / 109.3	2
A-04	0.263	0.45	35.7	100	14 / 187.9	2
A-05	0.104	0.51	44.3	100	10 / 104	2
A-06	0.149	0.73	75.7	50	12 / 124.2	2
A-07	0.142	0.75	78.6	50	14 / 101.4	2
A-08	0.254	0.53	47.1	100	13 / 195.4	2
A-09	0.065	0.77	81.4	0	7 / 92.9	2
A-10	0.190	0.75	78.6	50	15 / 126.7	2
A-11	0.234	0.53	47.1	100	14 / 167.1	2
Total Outlet 'A'	**1.871**	**0.62**	**60.0**	**68**	**-**	**-**
Outlet 'B' – MH401						
B-01	0.153	0.76	80.0	50	12 / 127.5	2
B-02	0.097	0.72	74.3	0	10 / 97.0	2
B-05	0.212	0.5	42.9	100	13 / 163.1	2
B-06	0.116	0.75	78.6	50	9 / 128.9	2
B-07	0.118	0.77	81.4	50	14 / 84.3	2
B-08	0.107	0.75	78.6	50	14 / 76.4	2
B-09	0.137	0.76	80.0	50	14 / 97.9	2
B-10	0.153	0.77	81.4	50	14 / 109.3	2
B-11	0.349	0.57	52.9	100	14 / 249.3	2
B-12	0.100	0.71	72.9	50	16 / 62.5	2
B-13	0.064	0.65	64.3	50	6 / 106.7	2
B-14	0.021	0.73	75.7	0	5 / 42	2
B-15	0.059	0.78	82.9	50	10 / 59	2
B-16	0.048	0.87	95.7	0	5 / 96	2
B-17	0.140	0.74	77.1	50	15 / 93.3	2
B-18	0.062	0.69	70.0	50	10 / 62	2
B-19	0.067	0.78	82.9	0	8 / 83.8	2
Total Outlet 'B'	**2.003**	**0.69**	**70.0**	**39**	**-**	**-**
Direct Runoff Areas						
D-01	0.012	0.38	25.7	0	4 / 30	2
D-02	0.013	0.46	37.1	0	7 / 18.6	2

Area ID	Catchment Area (ha)	Runoff Coefficient (C)	Percent Impervious (%)	Zero-Imperv. (%)	Flow Length / Equivalent Width[1] (m)	Average Slope (%)
D-03	0.007	0.53	47.1	0	6 / 11.7	2
D-04	0.002	0.20	0.0	0	4 / 5	5
D-05	0.054	0.29	12.9	0	8 / 67.5	5
Total Direct Runoff	**0.088**	**0.34**	**20.0**	**0**	**-**	**-**
Commercial Road – MH600						
C-01	0.081	0.77	81.4	0	15 / 54	2
C-02	0.071	0.71	72.9	0	13 / 54.6	2
C-03	0.037	0.68	68.6	0	10 / 37	2
C-04	0.035	0.71	72.9	0	10 / 35	2
C-05	0.031	0.73	75.7	0	10 / 31	2
C-06	0.035	0.72	74.3	0	10 / 35	2
Total Commercial Rd.	**0.290**	**0.73**	**75.2**	**0**	**-**	**-**
Park Block – MH801						
PARK	0.597	0.25	7.1	0	75 / 79.6	2
Retirement Residence						
RETIREMENT	1.022	0.80	85.7	50	65 / 157.2	2
Existing (Off-Site) Areas						
EX-01	0.024	0.20	0.0	0	4 / 60	5
Overall						
TOTAL	**5.964**	**0.63**	**61.3**	**54**	**-**	**-**

[1] Equivalent widths are calculated using the methods described in the City of Ottawa Sewer Design Guidelines (October 2012).

Infiltration

Infiltration losses for all proposed subcatchments were modeled using Horton's infiltration equation, which defines the infiltration capacity of soil over the duration of a precipitation event using a decay function that ranges from an initial maximum infiltration rate to a minimum rate as the storm progresses. The default values provided in the Ottawa Sewer Design Guidelines were used for all catchments.

Horton's Equation:
$f(t) = f_c + (f_o - f_c)e^{-k(t)}$

Initial infiltration rate: f_o = 76.2 mm/hr
Final infiltration rate: f_c = 13.2 mm/hr
Decay Coefficient: k = 4.14/hr

Depression Storage

The default values for depression storage provided in the Ottawa Sewer Design Guidelines were used for all catchments. Rooftops were assumed to provide no depression storage (zero-impervious parameter).

Depression Storage (pervious areas):	4.67 mm
Depression Storage (impervious areas):	1.57 mm

Equivalent Width

'Equivalent Width' refers to the width of the subcatchment flow path. This parameter is calculated as described in Section 5.4.5.6 of the Ottawa Sewer Design Guidelines.

Impervious Values

Runoff coefficients for each subcatchment were determined based on the proposed site plan. Refer to the Storm Drainage Area Plan (Drawing 122040-SWM) for details. Percent impervious values were calculated using the following equation:

$$\%imp = (C - 0.20) / 0.70$$

Exit Losses (Bend Losses)

The storm sewer network includes exit losses (i.e. bend losses) based on the friction and bend loss coefficients per the Ottawa Sewer Design Guidelines (Appendix 6-B, Hydraulic Losses at Bends).

Boundary Conditions (Outfalls)

The 100-year Hydraulic Grade Line (HGL) elevations for the existing off-site storm sewer systems was provided by the City of Ottawa (refer to correspondence / HGL profiles provided in **Appendix E)**. The 100-year HGL was estimated for each of the proposed storm sewer outlet connections based on the slope of the HGL and connection distance, as shown in **Table 6.3**.

Table 6.3: 100-year HGL Elevations at Minor System Outfalls

Connection	Length (m)	City of Ottawa MH ID's		100-year HGL Elevations (m)		
		U/S MH	D/S MH	U/S MH	D/S MH	HGL Slope (%)
Commercial Road (MH600) Outlet to Conroy Road Storm Sewer						
450mm on Conroy Rd.	113.2	MHST32436	MHST32437	84.11	83.71	0.35%
MH600 Connection	70.5	Connection	MHST32437	**83.96**	83.71	0.35%
Residential (MH401) Connection to St. Laurent Boulevard Storm Sewer						
1500mm on St. Laurent Blvd.	85.7	MHST31837	MHST31838	82.35	82.31	0.05%
MH401 Connection	29.2	Connection	MHST31838	**82.33**	82.31	0.05%
Residential (MH201) Connection to St. Laurent Boulevard Storm Sewer						
1500mm on St. Laurent Blvd.	73.6	MHST31836	MHST31837	82.38	82.35	0.04%
MH201 Connection	9.1	Connection	MHST31837	**82.36**	82.35	0.04%
Park Outlet (MH801) to Don Reid Drive Storm Sewer						
375mm on Don Reid Dr.	47.8	MHST31833	MHST31834	82.44	82.43	0.00%
MH801 Connection	12.5	Connection	MHST31834	**82.43**	82.43	0.00%

[1] Highlighted HGL elevations are 'fixed' outfall boundary conditions, with initial depths in upstream nodes.

For the 100-year storm event, the HGL boundary condition was applied as a fixed water elevation at the minor system outfalls. Each of the upstream nodes included an initial depth to account for the fixed downstream HGL.

For the 2-year and 5-year storm events, the model was run using a 'normal' outfall condition for the minor system outfalls. A 'free' outfall condition issued for the major system outfalls and outfalls for direct runoff areas.

A 'normal' outfall condition for the minor system outfalls was used to compare with the 100-year allowable release rate.

Catchbasins (On-Grade)

The inlet capture rate for the catchbasins on-grade is represented using an outlet rating curve. Outlet rating curves were generated based on the inlet curves in Appendix 7a of the City of Ottawa Sewer Design Guidelines (October 2012). Outlet rating curves are provided in **Appendix E**.

6.3 PCSWMM Model Results

The results of the post-development PCSWMM model demonstrate that the overall stormwater management strategy for the subject site will conform to the stormwater management criteria outlined in this report.

6.3.1 Summary of Peak Flows

The PCSWMM model was used to evaluate the performance of the proposed storm servicing and stormwater management strategy and ensure that peak flows are controlled to the 100-year allowable release rates (**Section 6.2.2**).

Table 6.4 compares the minor system release rates to the downstream storm sewer systems to the 100-year allowable release rates. For this scenario a 'Normal' outfall condition was used for the minor system outfalls (i.e. no downstream boundary condition).

Table 6.4: Peak Flow Comparison

Development (Block)	Peak Flow[1] (L/s)			100-year Allowable Release Rate (L/s)
	2-year	5-year	100-year	
Future Retirement Residence & Commercial Road				
Retirement Residence	83.2	92.0	103.7	103.9
Commercial Road *(MH600)*	17.2	20.3	29.5	29.4
SUB-TOTAL	**100.4**	**112.3**	**133.2**	**133.3**
Residential Subdivision				
Residential Subdivision Minor System *(MH201 + MH401)*	155.1 +119.4 274.5	190.8 +130.3 321.1	225.1 +139.7 364.8	403.0
Residential Subdivision Major System *(All Outfalls)*	0.0	0.0	0.0	
Direct Runoff Areas *(All Outfalls)*	4.9	15.5	38.1	
SUB-TOTAL	**279.4**	**336.6**	**402.9**	**403.0**
Park				
Park Block *(MH801)*	9.2	19.3	60.5	60.7
SUB-TOTAL	**9.2**	**19.3**	**60.5**	**60.7**
OVERALL TOTAL	***389.0***	***468.2***	***596.6***	***597.0***

[1] PCSWMM model results for a 4-hour Chicago storm distribution with 'Normal' minor system outfall condition; values measured at outfalls.

As shown in **Table 6.4**, the overall controlled and uncontrolled peak flows will be less than the overall 100-year allowable release rates. The PCSWMM model output is provided in **Appendix E**.

Future Retirement Residence (Storage Assumption

The future Retirement Residence is conceptually represented in the PCSWMM model as a single subcatchment outletting to a storage node with an outlet rating curve. The storage curve and outlet rating curve include the assumed storage and release for the 2-year & 100-year storm events. The release rate for the 2-year storm event was assumed to be 80% of the 100-year allowable release rate to account for the additional 'head' within a flow control structure / ICD. The required storage for the 2-year & 100-year storm events is summarized below:

Storm Event	*Release Rate*	*Required Storage*
2-year	83.1 L/s	93 m^3 (91 m^3/ha)
100-year	103.7 L/s	309 m^3 (302 m^3/ha)

The estimated total required storage for the future Retirement Residence is 309 m^3 (302 m^3/ha) to adhere to the 100-year allowable release rate. The proposed site plan is currently unknown, but it is assumed that the proposed buildings will include a combination of underground, surface, and rooftop storage.

The stormwater management requirements for the future Retirement Residence (Block) will be dependent on the impervious area of the site and will be re-evaluated and confirmed as part of a future separate site plan application.

6.3.2 Stormwater Management Systems (Storage)

Stormwater management is required to adhere to the overall allowable release rate. The PCSWMM model represents both underground and surface storage as summarized below:

Underground storage: roadway (superpipe) & rear yards (perforated pipe / trench system)

Surface storage: roadway (road sags)

The model does not provide any surface storage within the Park Block or surface storage in the rear yards. The storage provided for the Future Retirement Residence has been conceptually provided to adhere to the 100-year allowable release rate.

Superpipe

Underground storage will be provided via offline / upsized storm sewers (superpipe system). There will be no foundation drain connections to the superpipe. In areas adjacent the superpipe system the road catchbasins will be directly connected to the superpipe. The remaining road catchbasins connect to the free-flowing storm sewer system. No underground storage is provided for the road catchbasins connecting to the free-flowing storm sewer.

An inlet control device will be installed within the downstream structure of the superpipe system to control peak flows. A summary of the provided storage and 100-year release rate is provided in **Table 6.5**.

Table 6.5: Superpipe Storage

Development (Block)	Storm Sewer Info		Storage Provided (m^3)			100-year Release Rate[(1)]
	Size (mm)	Length (mm)	Pipes	Structures[1]	TOTAL	(L/s)
Commercial Road	450	198.3	31.5	1	32.5	29.5
Street 1	825	75.5	40.4	6	46.4	9.0
Street 1	600	29.5	8.3	6.4	14.7	28.0
Street 3	1050	160.2	138.7	10	148.7	12.4
TOTAL	**-**	**463.5**	**218.9**	**23.4**	**242.3**	**78.9**

[1)]Based on PCSWMM model results for a 4-hour Chicago Storm with 'Normal' minor system outfall condition.

Rear Yard Perforated Pipe / Trench System

A perforated pipe / clearstone trench system will be provided in the rear yards. The perforated pipe will be either 600mm or 250mm and surrounded by 25-50mm dia. clearstone that will be wrapped in geotextile.

The primary purpose of the perforated pipe / trench system is to store runoff from the rear yards and rear building rooftops. No additional water quality treatment is required as the runoff is considered 'clean'. Although this system will promote infiltration through the bottom (and sides) of the trench, infiltration has not been accounted for in the PCSWMM model. This includes the storage provided within the 150mm of clearstone below the perforated pipe.

The groundwater table is expected to be at an approximate depth between 2.5m and 3.5m below the ground surface, per the geotechnical report. The invert elevations of the rear yard perforated pipe / clearstone trenches are set higher, as such the estimated groundwater table will not affect the system's storage capacity.

Refer to the Notes and Details (Drawing 122040-ND) for a cross-section of the perforated pipe / trench system.

The rear yard perforated pipe / trench system is represented in the PCSWMM model as rectangular conduits. The conduits have the equivalent length & height as the proposed trenches. The conduit widths are modified to provide the 'equivalent storage' as the perforated pipe / trench system.

A summary of the storage provided in the perforated pipe / trench system is shown in **Table 6.6**.

Table 6.6: Perforated Pipe / Trench System (Rear Yards)

RYCB ID *(STM Area ID)*	Perf. Pipe Dia.	Trench Dimensions				Storage Volumes			Equiv. Width For Model
		Length	Width	Height	Area	Perf. Pipe	Stone	TOTAL	
	(mm)	(m)	(m)	(m)	(m^2)	(m^3)	(m^3)	(m^3)	(m)
Outlet 'A'									
RYCB701 (A-04)	600	73.9	1.20	0.90	89	20.9	23.6	44.5	0.67
RYCB702 (A-01)	250	93.8	0.85	0.55	80	4.6	15.7	20.3	0.39
RYCB703 (A-08)	600	100.5	1.20	0.90	121	28.4	32.0	60.5	0.67
RYCB704 (A-05)	250	61.0	0.85	0.55	52	3.0	10.2	13.2	0.39
RYCB705 (A-11)	600	141.2	1.20	0.90	169	39.9	45.0	85.0	0.67
TOTAL (Outlet A)	**-**	**470.4**	**-**	**-**	**564**	**96.8**	**126.6**	**223.4**	**-**
Outlet 'B'									
RYCB708 (B-05)	600	118.5	1.20	0.90	142	33.5	37.8	71.3	0.67
RYCB709 (B-11)	600	115.3	1.20	0.90	138	32.6	36.8	69.4	0.67
TOTAL (Outlet B)	**600**	**233.8**	**1.20**	**0.90**	**281**	**66.1**	**74.6**	**140.7**	**0.67**
OVERALL TOTAL	***-***	***704.2***	***-***	***-***	***845***	***162.9***	***201.1***	***364.1***	***-***

[1] Height of trench does not include 0.15m of clearstone below the subdrain.
[2] Assumed 40% void ratio for storage provided in the clearstone.
[3] The total storage volume is represented in the PCSWMM model as rectangular conduits.
[4] Equivalent width for model = total storage (subdrain & clearstone) divided by the length and height of the rectangular conduit.

6.3.3 Inlet Control Devices

Inlet control devices (ICDs) are provided for road catchbasins outletting to the free-flowing storm sewer, downstream rear yard catchbasins, park flow outletting to the existing storm sewer and for the superpipe systems. The ICDs have been sized to ensure no 2-year surface ponding during and no 100-year major system flows offsite. Standard City of Ottawa ICD sizes (83, 94, 102, 108, 127, 152, 178mm) have been used where possible; however, as the proposed development is a private site custom ICD sizes are required for some structures. Tempest LMF (or approved equivalent) vortex type ICDs are used for sizes smaller than 83mm. The Tempest LMF ICDs are sized to ensure a minimum 100-year release rate of approximately 10 L/s for rear-yard areas. ICD sizes and design flows are provided in **Table 6.7**.

Table 6.7: Inlet Control Devices

Structure ID	ICD Diameter / Model (mm)	2-year Event[1]		100-year Event[1]	
		Head (m)	Inlet Capture Rate (L/s)	Head (m)	Inlet Capture Rate (L/s)
Superpipe					
MH601 (Commercial Rd.)	102mm	0.67	17.2	1.88	29.5
MH501	83mm	1.93	20.1	3.70	28.0
MH503	Tempest LMF	1.53	6.5	2.92	9.0
MH505	Tempest LMF	1.47	7.7	3.73	12.4
Road Catchbasins					
CB01/02	178mm	0.77	55.3	1.49	79.5
CB03/04	145mm	1.25	48.5	1.51	53.6
CB09	94mm	1.13	19.5	1.32	21.1
CB10/11	121mm	1.56	38.1	1.81	41.1
CB12/13	145mm	1.35	50.5	1.74	57.6
Rear Yard Catchbasins					
RYCB701	83mm	0.43	9.2	1.50	17.7
RYCB702	Tempest LMF	0.43	7.4	1.25	13.1
RYCB703	Tempest LMF	0.50	7.1	1.41	12.2
RYCB704	Tempest LMF	0.29	6.0	0.96	11.5
RYCB705	Tempest LMF	0.49	7.8	1.13	12.2
Park Block					
MH801	137mm	0.13	9.2	2.38	60.5

[1] Based on PCSWMM results for a 4-hour Chicago storm distribution with 'Normal' minor system outfall condition.

6.3.4 Hydraulic Grade Line (HGL)

The PCSWMM model has been used to perform an HGL analysis of the proposed storm sewer network.

There is no foundation drain connections to the superpipe system. The foundation drains are connected to the 'free-flowing' storm sewer.

The 100-year HGL profile is shown on the Plan and Profile Drawings. The 100-year HGL elevations at each STMMH are provided in **Table 6.8**.

Table 6.8: 100-year HGL Elevations

MH ID	Obvert Elev. (m)	T/G Elev. (m)	HGL Elev.[1] (m)	Surcharge (m)	Clearance from T/G (m)	HGL in Stress Test[1] (m)	Proposed USF Elev. (m)
Free Flowing Sewers *(With Foundation Drain Connections)*							
MH201	81.54	85.09	82.46	0.92	2.63	82.47	83.35
MH202	82.30	86.00	82.71	0.41	3.29	82.74	83.82
MH203	82.60	86.74	82.88	0.28	3.86	82.92	84.52
MH204	83.27	86.49	82.89	0.00	3.60	82.94	84.67
MH205	82.87	86.51	82.89	0.02	3.62	82.93	84.52
MH401	81.29	85.17	82.35	1.06	2.82	82.35	83.40
MH402	81.97	86.15	82.40	0.43	3.75	82.40	84.02
MH403	82.07	86.11	82.43	0.36	3.68	82.43	83.97
MH404	82.34	85.89	82.56	0.22	3.33	82.57	83.77
MH405	82.57	85.87	82.69	0.12	3.18	82.70	83.77
MH406	82.27	86.63	82.43	0.16	4.20	82.44	84.11
MH407	82.54	86.13	82.43	0.00	3.70	82.44	84.11
MH408	82.78	85.91	82.53	0.00	3.38	82.53	84.11
MH801	82.31	86.35	84.57	2.26	1.78	85.62	-
MH802	84.13	86.48	84.65	0.52	1.83	85.74	-
Superpipe Storage *(No Foundation Drain Connections)*							
MH501	83.85	86.42	86.39	2.54	0.03	86.44	-
MH502	83.94	86.33	86.39	2.45	-0.06	86.44	-
MH503	83.25	85.11	84.81	1.56	0.30	85.13	-
MH504	83.48	86.08	84.80	1.32	1.28	85.11	-
MH505	83.32	86.57	85.73	2.41	0.84	85.90	-
MH506	83.35	86.44	85.73	2.38	0.71	85.90	-
MH507	83.60	86.16	85.73	2.13	0.43	85.90	-
MH508	83.74	86.15	85.73	1.99	0.42	85.90	-
MH509	83.88	85.69	85.73	1.85	-0.04	85.90	-
MH510	84.00	85.79	85.73	1.73	0.06	85.87	-
MH600	83.58	85.45	83.96	0.38	1.49	83.96	-
MH601	83.62	85.41	85.44	1.82	-0.03	85.47	-
MH602	83.98	85.55	85.44	1.46	0.11	85.48	-
MH603	84.06	85.58	85.44	1.38	0.14	85.48	-
MH604	84.28	85.56	85.45	1.17	0.11	85.49	-

[1] Based on PCSWMM results for a 4-hour Chicago storm distribution with 'Fixed' minor system outfall condition.

The results of the HGL analysis demonstrate that the proposed storm sewers have sufficient capacity to convey the controlled minor system peak flows up to the 100-year design event. The HGL elevations within the 'free-flowing' storm sewer are more than 0.30m below the minimum underside-of-footing elevation. This minimum clearance is also provided during the 'stress test' event.

6.3.5 Major System (Overland Flow)

A major overland flow route will be provided for storms greater than the 100-year storm event to provide conveyance of overland flows. The major overland system is depicted on the Grading Plan (**Drawing 122040-GR**).

The major system network was evaluated using the PCSWMM model to ensure that the overland flow depths and velocities conform to the SWM design criteria. The results of the analysis indicate that the 100-year overland flow depths on all streets will be less than 0.35m (static ponding + dynamic flow), and the product of depth and velocity will be less than 0.60 – refer to **Table 6.9**.

Table 6.9: Overland Flow Results

ID	100-year Event[1]					100-year (+20%) 'Stress Test' Event[1]			
	Peak Flow (L/s)	Velocity (m/s)	Static Depth (m)	Dynamic Depth (m)	Velocity x Depth (m^2/s)	Peak Flow (L/s)	Velocity (m/s)	Dynamic Depth (m)	Velocity x Depth (m^2/s)
Catchbasins at Low Points									
CB01/02	0	0	0.17	0.17	0	23.1	0.08	0.20	0.02
CB03/04	0	0	0.20	0.18	0	43.1	0.11	0.21	0.02
CB05/06	0	0	0.24	0.15	0	0	0	0.20	0
CB07/08	0	0	0.10	0.00	0	67.9	0.09	0.17	0.02
CB09	19.1	0.13	0.07	0.12	0.02	35.7	0.21	0.13	0.03
CB10/11	25.7	0.10	0.24	0.25	0.03	88.2	0.15	0.27	0.04
CB12/13	20.9	0.13	0.17	0.18	0.02	31.8	0.40	0.21	0.08
CB14/15	0	0	0.20	0.00	0	0	0	0.00	0
CB16	0	0	0.14	0.00	0	0	0	0.00	0
CB19	0	0	0.26	0.04	0	50.7	0.24	0.21	0.05
CB20	1.4	0.02	0.15	0.16	<0.01	15.9	0.05	0.19	0.01
CB21	0	0	0.11	0.10	0	3.1	0.05	0.13	0.01
CB22	0	0	0.15	0.06	0	0	0	0.11	0
CB23	0	0	0.12	0.04	0	0	0	0.09	0
CB24	0	0	0.17	0.04	0	0	0	0.10	0
CB25	0	0	0.14	0.04	0	0	0	0.11	0
High Points									
HP-CB01/02	-	-	-	-	-	23.1	0.08	0.03	<0.01
HP-CB03/04	-	-	-	-	-	43.1	0.11	0.02	<0.01
HP-CB05/06	-	-	-	-	-	-	-	-	-
HP-CB07/08	-	-	-	-	-	67.9	0.09	0.06	<0.01
HP-CB09	19.1	0.13	-	0.01	<0.01	35.7	0.21	0.02	<0.01
HP-CB10/11	25.7	0.10	-	0.01	<0.01	88.2	0.15	0.04	<0.01
HP-CB12/13	20.9	0.13	-	0.01	<0.01	31.8	0.40	0.04	0.02
HP-CB14/15	-	-	-	-	-	-	-	-	-
HP-CB16	-	-	-	-	-	-	-	-	-
HP-CB19	-	-	-	-	-	50.7	0.24	0.11	0.03
HP-CB20	1.4	0.02	-	0.01	<0.01	15.8	0.05	0.04	<0.01
HP-CB21	-	-	-	-	-	3.1	0.05	0.02	<0.01
HP-CB22	-	-	-	-	-	-	-	-	-
HP-CB23	-	-	-	-	-	-	-	-	-
HP-CB24	-	-	-	-	-	-	-	-	-
HP-CB25	-	-	-	-	-	-	-	-	-

[1] Based on PCSWMM results for a 4-hour Chicago storm distribution with 'Fixed' minor system outfall condition.

The road sags, superpipe and rear yard perforated pipe / trench system will provide sufficient storage to contain all runoff from storms up to and including the 100-year storm event, and there will be no major system flows offsite during this event.

Runoff from commercial road is directed towards catchbasins that are connected to the proposed minor system (superpipes). In case catch basins are blocked, overland flow from the existing

commercial road (Drainage areas C-01 and C-02) will spill towards adjacent property located in the northeast of the proposed site. Referring to the "General Plan of Services for Walkley-Conroy Commercial Site" drawing designed by Cumming Cockburn Limited on February 2000 (**Appendix E),** the stormwater management design of the adjacent property had accounted for the runoff from the commercial road. Therefore, the proposed development will not cause adverse impacts to the stormwater management of the commercial site.

6.4 Stormwater Quality Treatment

Through correspondence with the Rideau Valley Conservation Authority (RVCA), it is understood that the site will require an 'Enhanced' level of water quality treatment (80% long-term TSS removal). No water quality controls are provided for the Park Block. The future Retirement Residence will need to provide water quality treatment.

Water Quality Treatment Units (Contech CDS units or approved equivalent) will be provided upstream the minor system connection to the off-site storm sewer. The Water Quality Treatment units have been sized to treat 90% of the runoff and provide 80% long-term TSS removal (based on the 'fine' particle size distribution). Refer to correspondence and documentation provided in **Appendix E**. The sizing parameters and corresponding Water Quality Treatment Units are summarized in **Table 6.10**.

Table 6.10: Water Quality Treatment Units

Outlet	MH	Drainage Area (ha)	Runoff Coef.	Percent Impervious (%)	Peak Flow[1]		WQT Unit Model
					25mm (L/s)	100-year (L/s)	
Conroy Rd.	MH600[2]	0.290	0.73	75.2	15.4	29.5	CDS PMSU2015-4-C
St. Laurent Blvd.	MH201	1.871	0.62	60.6	120.6	225.1	CDS PMSU2025-5-C
St. Laurent Blvd.	MH401	2.003	0.69	70.0	90.5	139.7	CDS PMSU3020-6-C

[1] Based on PCSWMM model results for a 4-hour Chicago storm with 'Normal' outfall condition.
[2] MH600 on the Commercial Road is downstream an ICD / Superpipe system.

7.0 EROSION AND SEDIMENT CONTROL

Temporary erosion and sediment control measures will be implemented on-site during construction in accordance with the Best Management Practices for Erosion and Sediment Control. This includes the following temporary measures:

- Filter socks (catchbasin inserts) will be placed in existing and proposed catchbasins and catchbasin manholes, and will remain in place until vegetation has been established and construction is completed;
- Silt fencing will be placed along the surrounding construction limits;
- Mud mats will be installed at the site entrances;
- Strawbale or rock check dams will be installed in swales and ditches;
- The contractor will be required to perform regular street sweeping and cleaning as required, to suppress dust and to provide safe and clean roadways adjacent to the construction site;

Erosion and sediment control measures should be inspected daily and after every rain event to determine maintenance, repair or replacement requirements. Sediments or granulars that enter site sewers shall be removed immediately by the contractor. These measures will be implemented prior to the commencement of construction and maintained in good order until vegetation has been established. Refer to the Erosion and Sediment Control Plan (drawing 122040-ESC) for additional information.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Watermain

The analysis of the existing and proposed watermain network confirms the following:

- The three (3) proposed 200mm dia. watermain services which connect to Don Reid Drive, and St. Laurent Boulevard can service the proposed development.
- There are adequate pressures in the existing watermain infrastructure to meet the required domestic demands for the development.
- There is adequate flow to service the proposed fire protections system.

Sanitary Servicing

The analysis of the existing and proposed sanitary system confirms the following:

- It is proposed to service the development with a proposed 250mm Sanitary service which will connect to existing sewers within the Don Reid Drive and St. Laurent Boulevard rights-of-way.
- There is adequate capacity within city infrastructure downstream from the development.

Stormwater Management

The following provides a summary of the storm sewer and stormwater management system:

- The proposed storm sewer system will consist of a 'free-flowing' storm sewer and offline superpipe system.
    - A perforated pipe / trench system will be provided in the rear yards to provide additional storage.
    - The roadway has also been graded to promote surface ponding in the road sags.
    - Inlet control devices will be used to adhere to the 100-year allowable release rate.
    - There will be no offsite major system flows for all storms up-to and including the 100-year storm event.
- There will be no offsite major system flows for all storms up-to and including the 100-year storm event.
- As per the proposed grading plans, major overland flow routes have been provided to the surrounding rights-of-way.
- Stormwater water quality treatment will be provided via Water Quality Treatment Units (Contech CDS units or approved equivalent) installed in the downstream MH for the Commercial Road to Conroy Road and the two (2) residential road connections to St. Laurent Boulevard.

Erosion and Sediment control

- Erosion and sediment control measures (i.e. filter fabric, catchbasin inserts, silt fences, etc.) will be implemented prior to construction and are to remain in place until vegetation is established.

9.0 CLOSURE

This report is respectfully submitted for review and approval. Please contact the undersigned should you have questions or require additional information.

NOVATECH

Prepared by:

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Project Manager
Land Development Engineering

Lucas Wilson, P.Eng.
Project Manager
Engineering

Report Reviewed by:

Greg MacDonald, P.Eng.
Director, Land Development and Public Sector Infrastructure

Appendix A
Pre - Consultation Meeting Minutes

Pre-consultation Notes – Updated June 1, 2022

Meeting: Thursday April 14, 2022 @ 1:30pm

City Attendees:

Kelby Lodoen Unseth - Planner
Sharif Sharif – Project Manager
Mike Giampa – Transportation Project Manager
Environmental Planner – Matthew Hayley
Mark Richardson – Forestry
Phil Castro – Parks and Facilities Planning
Selma Hassan – Urban Design

Location:

2510 St. Laurent Blvd. (Conroy & Walkley)

Property Overview and Discussion:

The properties located on the southwest corner of Conroy Road and Walkley Road, collectively referred to as 2510 St. Laurent Blvd, are currently zoned GM[1327]. The site is also located within the General Urban Area as shown on Schedule B of the Official Plan.
The intent of the GM zone is to:

1. *allow residential, commercial and institutional uses, or mixed use development in the **General Urban Area** and in the **Upper Town, Lowertown and Sandy Hill West Character Areas** of the **Central Area** designations of the Official Plan;*

2. *limit commercial uses to individual occupancies or in groupings in well defined areas such that they do not affect the development of the designated Traditional and Arterial Mainstreets as viable mixed-use areas;*

3. *permit uses that are often large and serve or draw from broader areas than the surrounding community and which may generate traffic, noise or other impacts provided the anticipated impacts are adequately mitigated or otherwise addressed; and*

4. *impose development standards that will ensure that the uses are compatible and complement surrounding land uses.*

Urban Exception 1327 also outlines additional performance standards for the site.

The redevelopment of the subject properties proposes a mix of townhome and back-to-back townhome units, a public park, and retirement home block. All of these uses are permitted within the GM zone, as well as Planned Unit Development.

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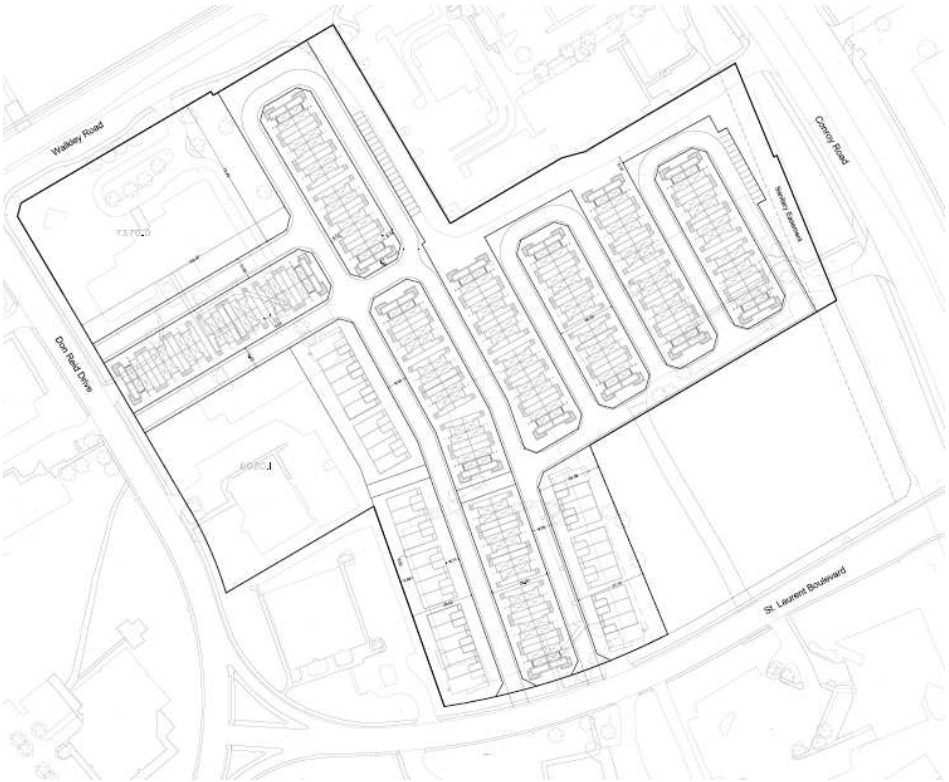
Property:

Site Plan Concept:



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Parks

1) Parks and Facilities Planning is currently undertaking a legislated review for the replacement of the Parkland Dedication By-law, with the new by-law to be considered by City Council in early July 2022. To ensure you are aware of parkland dedication requirements for your proposed development, we encourage you to familiarize yourself with the existing Parkland Dedication By-law and to sign up for project notifications on the Engage Ottawa project page or by emailing the project lead at Kersten.Nitsche@ottawa.ca

2) Parkland dedication will be required as a condition of subdivision approval. The determination of the parkland area to be dedicated will be in accordance with the City's Parkland Dedication By-law and would be capped at 10 percent of the land area under consideration for residential apartment purposes. As discussed during the pre-application consultation meeting, the final parkland area to be dedicated will depend upon the future proposed uses and densities. How this is determined and addressed will require further discussion during the review of a formal submission. However, the initial proposed location is appropriate.

Environment:

3) RSC
In this property, it appears there was some sort of commercial office building (note this is solely based on our discussion today and would need to be confirmed through the appropriate Phase I ESA). Change such land use to a more sensitive land use (ie. Residential) requires filing an RSC. The requirement for filing an RSC is based on the actual use rather than the formal zoning.

4) Bird Safe Design Guidelines
If a portion of the development proposal includes any mid to high rise buildings then that part of the proposal will need to review and incorporate bird safe design elements. Some of the risk factors include glass and related design traps such as corner glass and fly-through conditions, ventilation grates and open pipes, landscaping, light pollution. More guidance and solutions are available in the guidelines which can be found here: https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/guide-preparing-studies-and-plans .

5) Butternut trees
Other then potential butternut trees, there does not seem to be a trigger for an EIS, if butternut are present, it is recommended that they be addressed through the TCR and any potential permit requirements be addressed that way. If that is not possible, the butternut tree, if present, can be addressed through an EIS.

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Forestry:

TCR requirements:

6) A Tree Conservation Report (TCR) must be supplied for review along with the suite of other plans/reports required by the City
   a) an approved TCR is a requirement of Site Plan approval.
   b) The TCR may be combined with the LP provided all information is supplied.

7) Any removal of privately-owned trees 10cm or larger in diameter, or city-owned trees of any diameter requires a tree permit issued under the Tree Protection Bylaw (Bylaw 2020 – 340); the permit will be based on an approved TCR and made available at or near plan approval.

8) The Planning Forester from Planning and Growth Management as well as foresters from Forestry Services will review the submitted TCR
   a) If tree removal is required, both municipal and privately-owned trees will be addressed in a single permit issued through the Planning Forester
   b) Compensation may be required for city owned trees – if so, it will need to be paid prior to the release of the tree permit

9) The TCR must list all trees on site, as well as off-site trees if the CRZ extends into the developed area, by species, diameter and health condition

10) Please identify trees by ownership – private onsite, private on adjoining site, city owned, co-owned (trees on a property line)

11) If trees are to be removed, the TCR must clearly show where they are, and document the reason they cannot be retained

12) All retained trees must be shown and all retained trees within the area impacted by the development process must be protected as per City guidelines available at Tree Protection Specification or by searching Ottawa.ca
   a) the location of tree protection fencing must be shown on a plan
   b) show the critical root zone of the retained trees
   c) if excavation will occur within the critical root zone, please show the limits of excavation

13) The City encourages the retention of healthy trees; if possible, please seek opportunities for retention of trees that will contribute to the design/function of the site.

14) For more information on the process or help with tree retention options, contact Mark Richardson mark.richardson@ottawa.ca or on City of Ottawa

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LP tree planting requirements:

For additional information on the following please contact tracy.smith@Ottawa.ca

15) Minimum Setbacks
   a) Maintain 1.5m from sidewalk or MUP/cycle track.
   b) Maintain 2.5m from curb
   c) Coniferous species require a minimum 4.5m setback from curb, sidewalk or MUP/cycle track/pathway.
   d) Maintain 7.5m between large growing trees, and 4m between small growing trees. Park or open space planting should consider 10m spacing, except where otherwise approved in naturalization / afforestation areas. Adhere to Ottawa Hydro's planting guidelines (species and setbacks) when planting around overhead primary conductors.

16) Tree specifications
   a) Minimum stock size: 50mm tree caliper for deciduous, 200cm height for coniferous.
   b) Maximize the use of large deciduous species wherever possible to maximize future canopy coverage
   c) Tree planting on city property shall be in accordance with the City of Ottawa's Tree Planting Specification; and include watering and warranty as described in the specification (can be provided by Forestry Services).
   d) Plant native trees whenever possible
   e) No root barriers, dead-man anchor systems, or planters are permitted.
   f) No tree stakes unless necessary (and only 1 on the prevailing winds side of the tree)

17) Hard surface planting
   a) Curb style planter is highly recommended
   b) No grates are to be used and if guards are required, City of Ottawa standard (which can be provided) shall be used.
   c) Trees are to be planted at grade

18) Soil Volume
   a) Please ensure adequate soil volumes are met:

Tree Type/Size	Single Tree Soil Volume (m3)	Multiple Tree Soil Volume (m3/tree)
Ornamental	15	9
Columnar	15	9
Small	20	12
Medium	25	15
Large	30	18

Conifer	25	15

Please note that these soil volumes are not applicable in cases with Sensitive Marine Clay.

19) Sensitive Marine Clay
   a) Please follow the City's 2017 Tree Planting in Sensitive Marine Clay guidelines

Tree Canopy Cover

a) The landscape plan shall show how the proposed tree planting will replace and increase canopy cover on the site over time, to support the City's 40% urban forest canopy cover target.
b) At a site level, efforts shall be made to provide as much canopy cover as possible, through tree planting and tree retention, with an aim of 40% canopy cover at 40 years, as appropriate.
c) Indicate on the plan the projected future canopy cover at 40 years for the site.

Urban Design:

20) The application says it is for "a mix of Back to Back and Standard Freehold Townhomes on Public streets, a public park and a Retirement Home block"
   - Where is the public park?
   - Where is the retirement home block?
   - The largest ROWs appear to be 10m? Is this a City ROW standard? 192 Back to back units, 36 Standard Townhomes

21) A Design Brief will be required with the application. I have attached a Terms of Reference. All the highlighted items must be addressed, in addition to the comments and questions in this email.

22) It is not clear from the submitted drawing if / where there are sidewalks. The submission needs to show the location of all internal sidewalks. At minimum, there should be sidewalks on the public ROWs and on any roads entering the site from St. Laurent Blvd. or other streets.

23) The road network is circuitous for pedestrians and cyclists without mid-block and pathway connections. These should be added or people will create them anyways. See the purple dashed lines on the attached sketch for locations; these are suggested based on the drawing provided. If the locations of the public park and retirement home block were shown, other connections would likely be warranted and these should be added on the submission with the application.

24) The two roadway entries from St. Laurent Blvd. are only 26m apart. Is this sufficient if both are proposed to be full movement intersections and not right-in

right-out access? The applicant could consider a single 20 – 22M ROW access from St. Laurent, that then splits in two (see red lines on attached sketch)

25) Can there be vehicular access to the site from Conroy, Don Reid and/or Walkley?

26) What traffic calming methods are being proposed for the long, straight stretches of street.

27) The development form suggests that there will be little room for trees. The submission is to include a landscape plan that shows tree locations given the locations of all driveways and the information on the composite utility plan.

Engineering:

List of Reports and Plans (Site Plan Control/ Condo):

i. Site Servicing Plan
ii. Grading Plan
iii. Erosion and Sediment Control Plan
iv. Storm Drainage and Ponding Plan
v. Sanitary Drainage Plan
vi. Stormwater Management and Site Servicing Report
vii. Geotechnical Investigation Report

Please note the following information regarding the engineering design submissions for the above noted site:

28) The Servicing Study Guidelines for Development Applications are available at the following address: https://ottawa.ca/en/city-hall/planning-and-development/how-develop-property/development-application-review-process-2/guide-preparing-studies-and-plans

29) Servicing and site works shall be in accordance with the following documents:

- Ottawa Sewer Design Guidelines, Second Edition, (October 2012), including Technical Bulletins, ISDTB-2014-01, PIEDTB-2016-01, ISTB 2018-01, ISTB-2018-04, and ISTB-2019-02
- Ottawa Design Guidelines – Water Distribution, First Edition, (July 2010), including Technical Bulletins ISD-2010-2, ISDTB-2014-02, ISTB-2018-02, and ISTB-2021-03
- Geotechnical Investigation and Reporting Guidelines for Development Applications in the City of Ottawa (Revised 2008)
- City of Ottawa Slope Stability Guidelines for Development Applications (Revised 2012)
- City of Ottawa Environmental Noise Control Guidelines (January, 2016)

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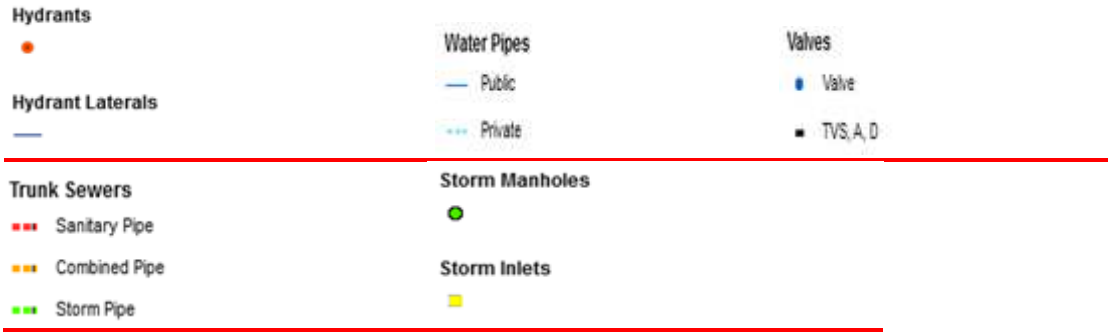
- City of Ottawa Hydrogeological and Terrain Analysis Guidelines (March 2021)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works (2013)

30) Record drawings and utility plans are also available for purchase from the City (Contact the City's Information Centre by email at InformationCentre@ottawa.ca or by phone at (613) 580-2424 x 44455

31) The Stormwater Management Criteria for the subject site is to be based on the following:
- The pre-development runoff coefficient or a maximum equivalent 'C' of 0.5, whichever is less (§ 8.3.7.3).
- For separated sewer system built pre-1970 the design of the storm sewers are based on a 2 year storm.
- Flows to the storm sewer in excess of the 5-year pre-development storm release rate, up to and including the 100-year storm event, must be detained on site
- Ensure no overland flow for all storms up to and including the 100-year event.
- The 5-yr storm event using the IDF information derived from the Meteorological Services of Canada rainfall data, taken from the MacDonald Cartier Airport, collected 1966 to 1997.
- A calculated time of concentration (Cannot be less than 10 minutes).
- No ponding during 2-yr storm event onsite.
- There might be specific design criteria from the "Master Servicing Study" of this area. Consultant to investigate and verify those requirements.
- Quality control requirements to be provided by Rideau Valley Conservation Authority (RVCA)

32) Deep Services:



i. A plan view of the approximate services may be seen above. Services should ideally be grouped in a common trench to minimize the number of road cuts. The sizing of available future services is:

a) Connections (St laurent):

i. 300 mm dia. Watermain (DI)
ii. 375 mm dia. SAN (PVC)
iii. 1500 mm dia. STM (Conc)

b) Connections (Don Reid):
i. 300 mm dia. Watermain (DI)
ii. 250 mm dia. SAN (PVC)
iii. 750/900 mm dia. STM (Conc)

ii. *Because of the size of this development, it is highly recommended to verify the sanitary and storm discharge with the City to confirm the capacity before finalize the design and submit for review.*
iii. *Provide existing servicing information and the recommended location for the proposed connections. Services should ideally be grouped in a common trench to minimize the number of road cuts.*
iv. *Connections to trunk sewers and easement sewers are typically not permitted.*
v. *Provide information on the monitoring manhole requirements – should be located in an accessible location on private property near the property line (ie. Not in a parking area).*
vi. *Review provision of a high-level sewer.*
vii. *Provide information on the type of connection permitted*
Sewer connections to be made above the springline of the sewermain as per:
a) Std Dwg S11.1 for flexible main sewers – *connections made using approved tee or wye fittings.*
b) Std Dwg S11 (For rigid main sewers) – *lateral must be less that 50% the diameter of the sewermain,*
c) Std Dwg S11.2 (for rigid main sewers using bell end insert method) – *for larger diameter laterals where manufactured inserts are not available; lateral must be less than 50% the diameter of the sewermain,*
d) Connections to manholes permitted when the connection is to rigid main sewers where the lateral exceeds 50% the diameter of the sewermain. – Connect obvert to obvert with the outlet pipe unless pipes are a similar size.
e) No submerged outlet connections.

33) Civil consultant must request boundary conditions from the City's assigned Project Manager prior to first submission. Water Boundary condition requests must include the location of the service and the expected loads required by the proposed development. Please provide the following information:
i. Location of service(s)
ii. Type of development and the amount of fire flow required (as per FUS, 1999).
iii. Average daily demand: ___ l/s.

iv. Maximum daily demand: ___l/s.
v. Maximum hourly daily demand: ___ l/s.
vi. Hydrant location and spacing to meet City's Water Design guidelines.
vii. Water supply redundancy will be required for more than 50 m3/day water demand.

34) Phase 1 ESAs and Phase 2 ESAs must conform to clause 4.8.4 of the Official Plan that requires that development applications conform to Ontario Regulation 153/04.

35) All development applications should be considered for an Environmental Compliance Approval (ECA) by the Ministry of the Environment, Conservation, and Parks (MECP);
    a. The consultants determine if an approval for sewage works under Section 53 of OWRA is required and determines what type of application. The City's project manager may help confirm and coordinate with the MECP as required.
    b. The project will be either transfer of review (standard), transfer of review (additional), direct submission, or exempt as per O. Reg. 525/98.
    c. Pre-consultation is not required if applying for standard or additional works (Schedule A of the Agreement) under Transfer Review.
    d. Pre-consultation with local District office of MECP is recommended for direct submission.
    e. Consultant completes an MECP request form for a pre-consultation. Send request to moeccottawasewage@ontario.ca
    f. ECA applications are required to be submitted online through the MECP portal. A business account required to submit ECA application. For more information visit https://www.ontario.ca/page/environmental-compliance-approval

NOTE: Site Plan Approval, or Draft Approval, is required before an application is sent to the MECP.

36) General Engineering Submission requirements:
    a. As per section 53 of the Professional Engineers Act, O. Reg 941/40, R.S.O. 1990, all documents prepared by engineers must be signed and dated on the seal.
    b. All required plans are to be submitted on standard A1 size sheets (594mm x 841mm) sheets, utilizing a reasonable and appropriate metric scale as per City of Ottawa Servicing and Grading Plan Requirements: title blocks are to be placed on the right of the sheets and not along the bottom. Engineering plans may be combined, but the Site Plans must be provided separately. Plans shall include the survey monument used to confirm datum. Information shall be provided to enable a non-surveyor to locate the survey monument presented by the consultant.

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c. All required plans & reports are to be provided in *.pdf format (at application submission and for any, and all, re-submissions)

Planning:

37) As the property is adjacent to business park and light industrial zones further consideration may be required to separate/buffer the two types of uses.

38) The site is not subject to a CDP or Secondary Plan. Within the OP Schedule B identifies the site as General Urban, Schedule C identifies a cross-town bikeway and cycling spine route, and Schedule D identifies a proposed BRT station at Conroy and Walkley.

39) It is noted within the New OP under section 5.3.2.4) In the Outer Urban Transect, the Zoning By-law shall provide for a range of dwelling unit sizes in: a) Multi-unit dwellings in Hubs and on Corridors; b) Predominantly ground-oriented forms in Neighbourhoods located away from frequent street transit and Corridors, with Low-rise multi-unit dwellings permitted near rapid transit and frequent street transit routes; and c) In Hubs, a range of housing

40) Within the new OP, further policy states:

Table 3b

Neighbourhood and Minor Corridor Residential Density and Large Dwelling Targets			
Applicable Area		**Target Residential Density Range for Intensification, Dwellings per Net Hectare[1]**	**Minimum Proportion of Large-household Dwellings within Intensification**
Outer Urban Transect		40 to 60	Existing lots with a frontage 15 metres or wider: - Target of 50 per cent for Low-rise buildings; - Target of 5 per cent for Mid-rise or taller buildings; Minor Corridors: No minimum
Outer Urban Transect	**5.3.3(1)**	**Hubs**	Low-rise, Mid-rise and High-rise: minimum 3 storeys and maximum 40 storeys
	5.3.3(3)	**Mainstreet Corridors**	Low-rise, Mid-rise and High-rise: minimum 2 storeys and maximum 40 storeys, dependent on road width and transition
	5.3.3(4)	**Minor Corridors**	Low-rise: minimum 2 storeys and maximum 4 storeys
	5.3.4(1)	**Neighbourhoods**	Low-rise: no minimum and generally, zoning will permit at least 3 storeys but no more than 4 storeys

5.2.3

4) All buildings along Mainstreets or Minor Corridors shall have active entrances facing the Mainstreet or Minor Corridor, regardless of use.

41) The application appears to be a Complex Site Plan Control Application.

42) City of Ottawa Accessibility Design Standards: https://documents.ottawa.ca/sites/documents/files/documents/accessibility_design_standards_en.pdf

43) Please ensure that the Parking, Queuing and Loading Provisions are following and appropriate vehicle and bicycle parking is provided on-site (https://ottawa.ca/en/part-4-parking-queuing-and-loading-provisions-sections-100-114#bicycle-parking-space-rates-and-provisions-sec-111).

44) Please ensure that the Landscaping Provisions for Parking Lots is followed (https://ottawa.ca/en/part-4-parking-queuing-and-loading-provisions-sections-100-114#section-110-landscaping-provisions-parking-lots).

45) The Planning Rationale Terms of Reference may be found here.

46) For information on Applications, including fees, please visit: https://ottawa.ca/en/planning-development-and-construction/developing-property/development-application-review-process/development-application-submission/development-application-forms#site-plan-control

47) The application processing timeline generally depends on the quality of the submission. For more information on standard processing timelines, please visit: https://ottawa.ca/en/city-hall/planning-and-development/information-developers/development-application-review-process/development-application-submission/development-application-forms#site-plan-control

Transportation:

48) A TIA is warranted, therefore proceed to Step 2-scoping.

49) The application will not be deemed complete until the submission of the draft step 2-4, including the functional draft RMA package (if applicable) and/or monitoring report (if applicable).

50) Although a full review of the TIA Strategy report (Step 4) is not required prior to an application, it is strongly recommended. Synchro files are required at Step 4.

51) ROW protections on both Walkley and Conroy is 44.5 m.

52) Corner sight triangle: 5m x 5m. A Road Noise Impact Study is required.

Pre-consultation Notes – Updated June 1, 2022

Meeting: Thursday April 14, 2022 @ 1:30pm

Prior attachments:

- Plan and study list
- Urban Design Terms of Reference
- Urban Design Sketch

For any questions, please feel free to contact me at the information below. Please provide all submission documents electronically as paper copies of plans and reports are not being requested at this time.

Best regards,

Kelby Lodoen Unseth MCIP, RPP
Planner II | Urbaniste II
Development Review (South Services) | Examen des projets d'aménagement (services sud)
Planning, Infrastructure and Economic Development | Services de planification, d'infrastructure et de développement économique

City of Ottawa | Ville d'Ottawa
☎ 613.580.2424 ext./poste 12852
ottawa.ca/planning / ottawa.ca/urbanisme

Enc.

Appendix B
Water Servicing

NOVATECH
Engineers, Planners & Landscape Architects

Node	Unit Type	Population	Residential Demand (L/s)		
	Townhouse		Avg Day	Max. Daily	Peak Hour
1	13	35	0.11	0.28	0.63
2 (HYD)	18	49	0.16	0.39	0.87
3 (HYD)	18	49	0.16	0.39	0.87
4	13	35	0.11	0.28	0.63
5 (HYD)	6	16	0.05	0.13	0.29
6	3	8	0.03	0.07	0.14
7 (HYD)	4	11	0.04	0.09	0.19
8	7	19	0.06	0.15	0.34
9 (HYD)	6	16	0.05	0.13	0.29
10	10	27	0.09	0.22	0.48
11 (HYD)	6	16	0.05	0.13	0.29
12 (HYD)	8	22	0.07	0.18	0.39
13	3	8	0.03	0.07	0.14
14 (HYD)	6	16	0.05	0.13	0.29
15 (HYD)	9	24	0.08	0.20	0.43
16 (HYD)	12	32	0.11	0.26	0.58
17 (HYD)	18	49	0.16	0.39	0.87
Total	**160**	**432**	**1.40**	**3.50**	**7.70**

Design Parameters:

- Townhouse **2.7** **persons/unit**

- Average Domestic Flow **280** **L/person/day**

Residential Peaking Factors City of Ottawa Water Distrubution Guidelines:

Conditions	Peaking Factor		Units
Maximum Day	2.5	x avg day	L/c/day
Peak Hour	2.2	x max day	L/c/day

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 122040
Project Name: 2510 St. Lawrence Blvd. (Walkely Conroy)
Date: 7/12/2023
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng

Legend: Input by User; No Information or Input Required

Building Description: Block 1 - 3 Storey Townhomes
Type V - Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	457.5			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**1,373**	
	F	**Base fire flow without reductions**				**12,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**10,200**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 6**		**Surcharge**	
	(3)	North Side	3.1 - 10 m		16%	**5,814**
		East Side	10.1 - 20 m		13%	
		South Side	3.1 - 10 m		16%	
		West Side	10.1 - 20 m		12%	
				Cumulative Total	**57%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**16,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**267**
				or	USGPM	4,227

Novatech Project #:	122040A
Project Name:	Walkley Conroy
Date:	7/11/2023
Input By:	Curtis Ferguson, E.I.T.
Reviewed By:	Anthony Mestwarp, P.Eng
Building Description:	6 Unit - 3 Storey Townhouse
	Type V - Wood Frame
Automatic Sprinklers	No

FUS - Table 6 worksheet

To be used only if adjacent *Exposed Building* construction is known

NOVATECH
Engineers, Planners & Landscape Architects

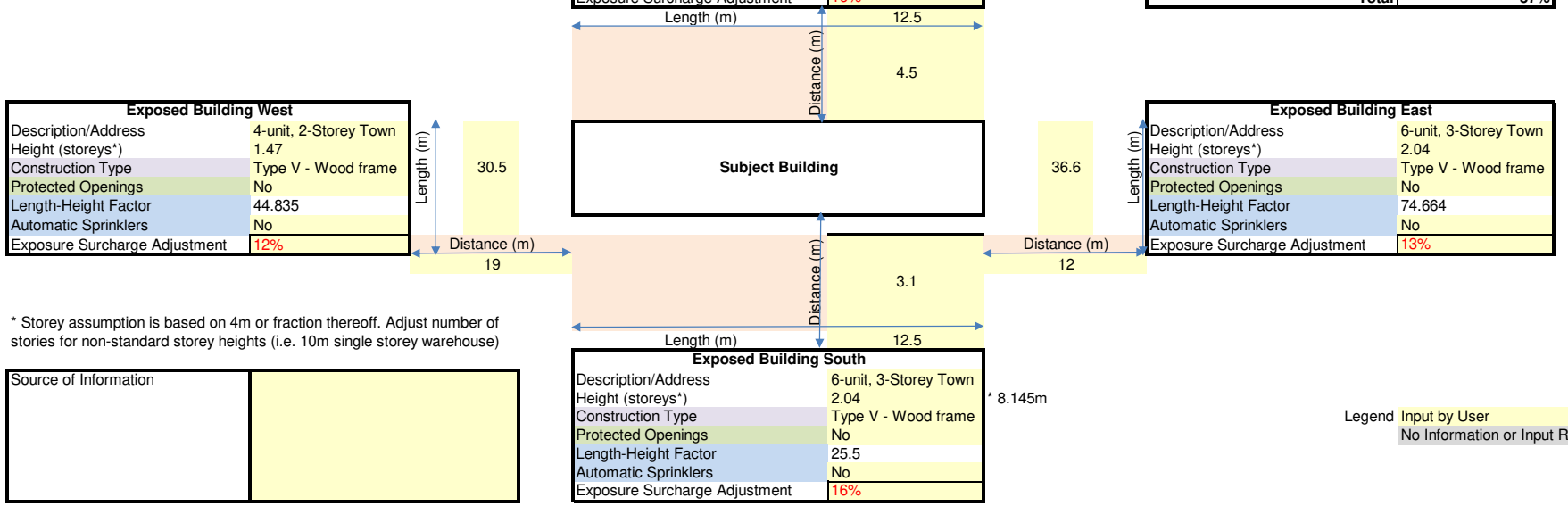
Exposed Building North	
Description/Address	4-unit, 3-Storey Town
Height (storeys*)	2.04
Construction Type	Type V - Wood frame
Protected Openings	No
Length-Height Factor	25.5
Automatic Sprinklers	No
Exposure Surcharge Adjustment	16%

Calculated Exposure Charges	
	Table 6
North Side	16%
East Side	13%
South Side	16%
West Side	12%
Total	**57%**

Exposed Building West	
Description/Address	4-unit, 2-Storey Town
Height (storeys*)	1.47
Construction Type	Type V - Wood frame
Protected Openings	No
Length-Height Factor	44.835
Automatic Sprinklers	No
Exposure Surcharge Adjustment	12%

Exposed Building East	
Description/Address	6-unit, 3-Storey Town
Height (storeys*)	2.04
Construction Type	Type V - Wood frame
Protected Openings	No
Length-Height Factor	74.664
Automatic Sprinklers	No
Exposure Surcharge Adjustment	13%

Exposed Building South	
Description/Address	6-unit, 3-Storey Town
Height (storeys*)	2.04
Construction Type	Type V - Wood frame
Protected Openings	No
Length-Height Factor	25.5
Automatic Sprinklers	No
Exposure Surcharge Adjustment	16%



* Storey assumption is based on 4m or fraction thereoff. Adjust number of stories for non-standard storey heights (i.e. 10m single storey warehouse)

Source of Information	

Legend: Input by User; No Information or Input Required

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

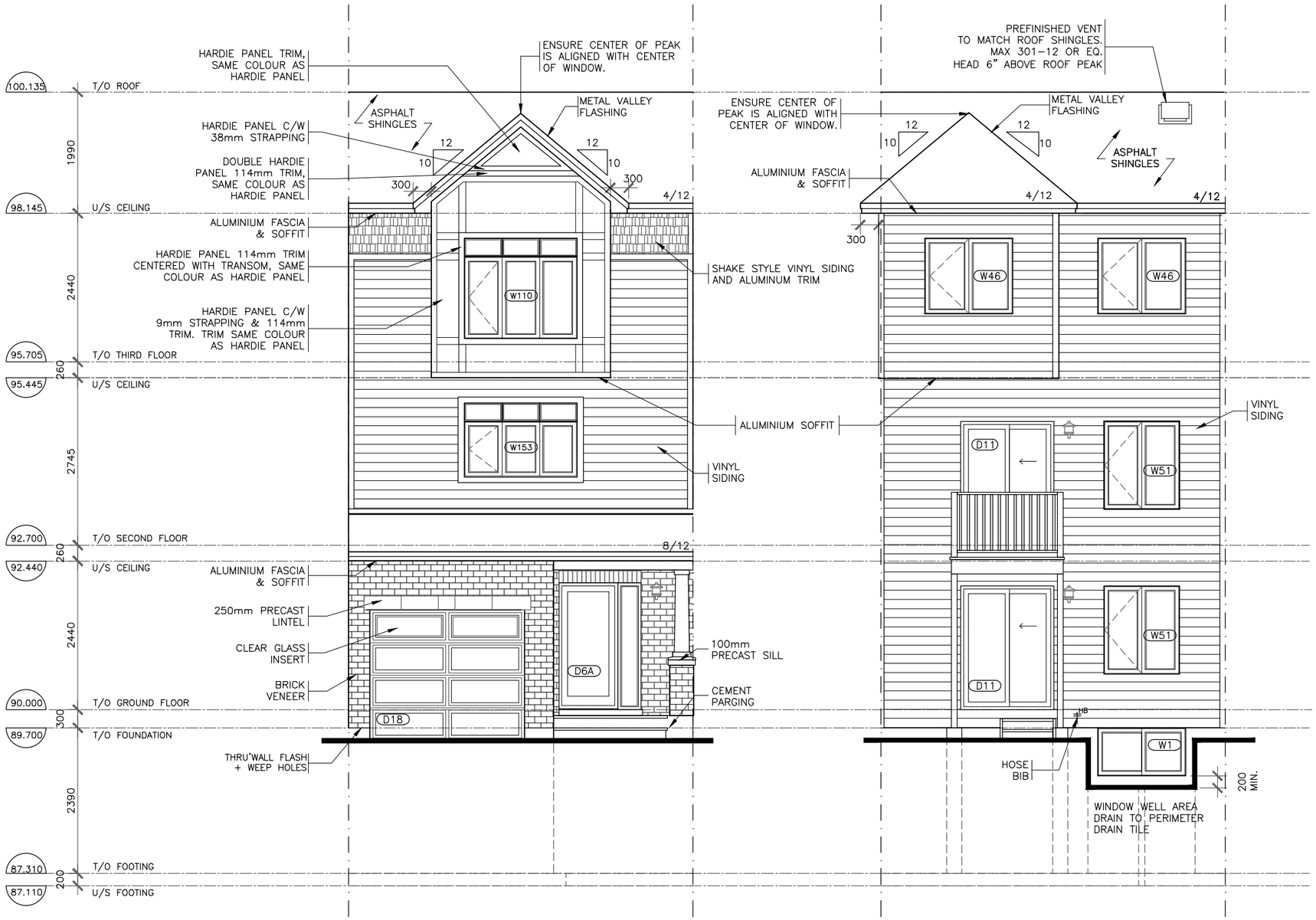
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 122040
Project Name: 2510 St. Lawrence Blvd. (Walkely Conroy)
Date: 7/11/2023
Revised 1/16/2024
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng

Legend: Input by User; No Information or Input Required

Building Description: Block 2 - Standard Townhomes (2 Storey)
Type V - Wood frame

Step			Input		Value Used	Total Fire Flow (L/min)
Base Fire Flow						
1	**Construction Material**			**Multiplier**		
	Coefficient related to type of construction **C**	Type V - Wood frame	Yes	1.5	1.5	
		Type IV - Mass Timber		Varies		
		Type III - Ordinary construction		1		
		Type II - Non-combustible construction		0.8		
		Type I - Fire resistive construction (2 hrs)		0.6		
2	**Floor Area**					
	A	Building Footprint (m^2)	457.5			
		Number of Floors/Storeys	2			
		Area of structure considered (m^2)			**915**	
	F	**Base fire flow without reductions**				**10,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**		**FUS Table 3**	**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**8,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction**		**FUS Table 4**	**Reduction**		
	(2)	Adequately Designed System (NFPA 13)	No	-30%		**0**
		Standard Water Supply	No	-10%		
		Fully Supervised System	No	-10%		
				Cumulative Sub-Total	**0%**	
		Area of Sprinklered Coverage (m^2)	0	0%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge**		**FUS Table 5**		**Surcharge**	
	(3)	North Side	10.1 - 20 m		15%	**6,375**
		East Side	0 - 3 m		25%	
		South Side	20.1 - 30 m		10%	
		West Side	0 - 3 m		25%	
				Cumulative Total	**75%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**15,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**250**
				or	USGPM	3,963
Flow to be capped at 10,000 L/min (167L/s) per ITSB-2014-02						



FRONT ELEVATION
MID UNIT

REAR ELEVATION
MID UNIT

NOTE:

1 REFER TO DRAWINGS A7, A8 FOR GENERAL NOTES, TABLES SCHEDULES, CONSTRUCTION ASSEMBLY NOTES APPLICABLE TO ALL DRAWINGS AND LEGENDS APPLICABLE TO ALL DRAWINGS.

2 ALL CLOSET TO HAVE DROPPED HEADERS.

3 ALL VENTILATION FANS TO EXHAUST TO THE EXTERIOR. 6" SMOOTH DUCT, 7" FLEX DUCT.

4 BASEMENT: PROVIDE ONE LINE OF PASSAGE FROM UTILITY ROOM TO EXTERIOR WITH ALL DOORWAYS BEING A MINIMUM OF 32" IN WIDTH.

5 CERAMIC TILE TO BE INSTALLED AS PER 9.30.6 OF O.B.C, REQUIRES 5/8" UNDERLAY

6 FIRE PROTECTION FOR GAS AND ELECTRIC RANGES AS PER 9.10.21 OF O.B.C.

7 BATHROOMS: PROVIDE WATERPROOF WALL FINISH AS PER 9.29.2 OF O.B.C.

8 PROVIDE STUD WALL REINFORCING IN MAIN BATHROOM FOR FUTURE GRAB BARS, AS PER 9.5.2.3. SEE DWG D1

9 TOILET PAPER DISPENSER HEIGHT 660 AFF. TOWEL BAR HEIGHT 762 TO 1220 AFF.

10 ATTIC HATCH SHALL BE LOCATED SO AS TO PROVIDE UNOBSTRUCTED ACCES TO ATTIC SPACE

11 PROVIDE WARM AIR SUPPLY GRILLE IN W.I.C. WHEN ADJACENT TO UNHEATED SPACE, EXTERIOR AIR, OR EXTERIOR SOIL

12 SMOKE ALARMS LOCATION AND POWER SUPPLY IN DWELLING UNITS WILL COMPLY WITH 9.10.19.3 AND 9.10.19.4. (1).

13 INSTALLATION HEIGHT OF CARBON MONOXIDE DETECTORS WILL COMPLY WITH 9.33.4.2.

14 THE HEIGHT OF HANDRAILS ON STAIRS AND RAMPS SHALL BE NOT LESS THAN 865 AND NOT MORE THAN 965, AS PER 9.8.7.4. (2).

No.	REVISION	DATE
3	X	X
2	SPEC UNIT SI UPDATED TO #8	X
1	STRUCTURAL REVIEW	AUG.03.16

Missing or invalid reference
File: C:\Users\lmotta\Box Sync\DRAFTING DEPARTMENT\01_Drawings\02_STANDARD FOOTPRINTS\CLARKE HOMES Logo01
Level: 1

Model Title:
ADELAIDE 2016
FLOOR AREA: 1638 SQ.FT = 152.17 SQ.M
BSMT: 0 SQ.FT = 0 SQ.M
OTB: 6 SQ.FT = 0.56 SQ.M

Project:
SUMMERHILL VILLAGE
BLOCK 7 MID UNIT 32

Title:
FRONT AND REAR ELEVATIONS
MID UNIT

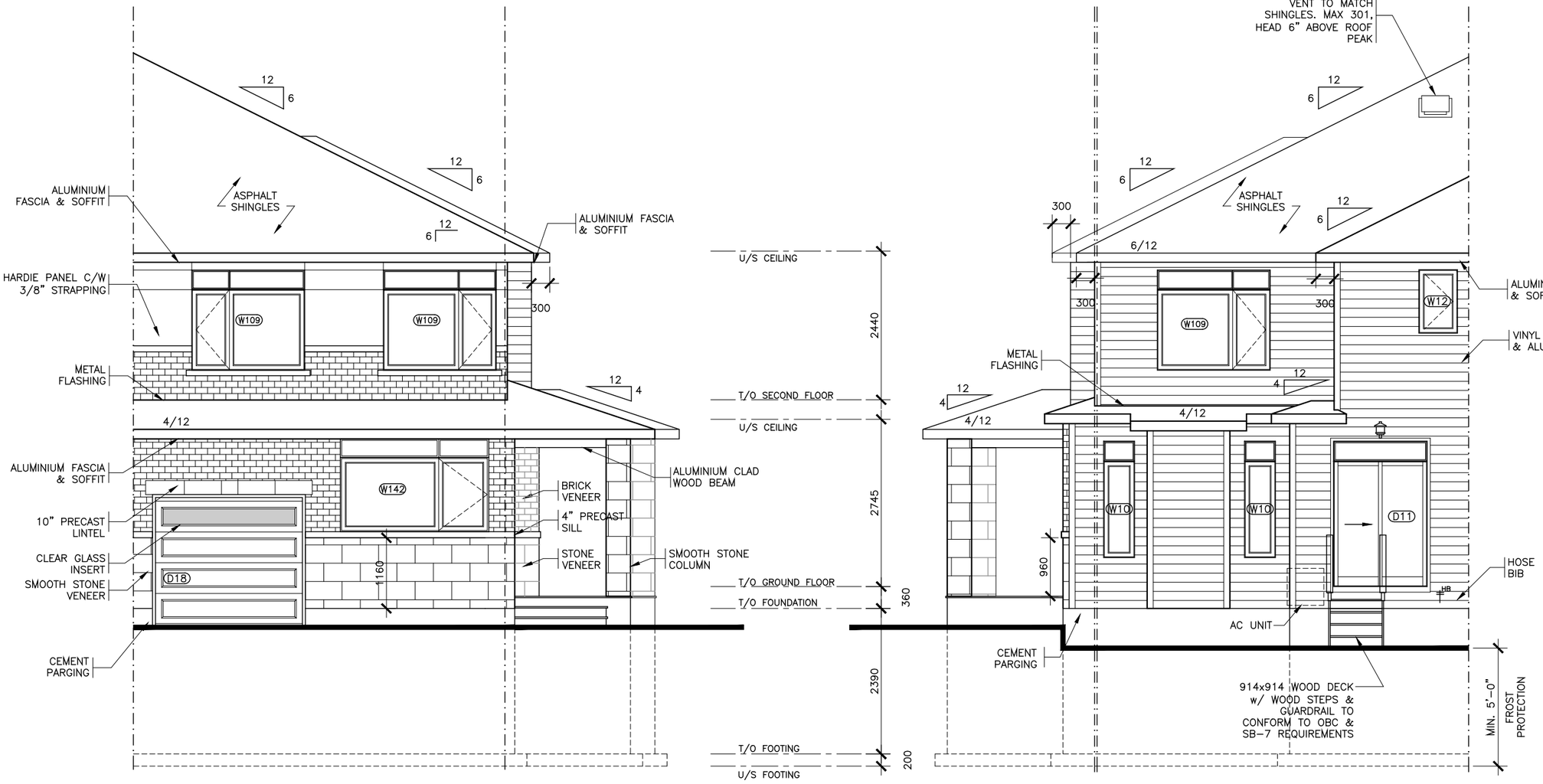
AS-BUILT RELEASE
No. X DATE

BROCHURE DATE
XX

Scale: 1:75

Drawing No.
A-6a

Drawn by: DCA



FRONT ELEVATION

STREET END
CONTEMPORARY

REAR ELEVATION

STREET END
CONTEMPORARY

NOTE:

1 REFER TO DRAWING A7 AND DETAIL PAGES FOR GENERAL NOTES, TABLES SCHEDULES, CONSTRUCTION ASSEMBLY NOTES APPLICABLE TO ALL DRAWINGS AND LEGENDS APPLICABLE TO ALL DRAWINGS.

2 ALL CLOSET TO HAVE DROPPED HEADERS.

3 ALL VENTILATION FANS TO EXHAUST TO THE EXTERIOR. 6" SMOOTH DUCT, 7" FLEX DUCT.

4 BASEMENT: PROVIDE ONE LINE OF PASSAGE FROM UTILITY ROOM TO EXTERIOR WITH ALL DOORWAYS BEING A MINIMUM OF 32" IN WIDTH.

5 CERAMIC TILE TO BE INSTALLED AS PER 9.30.6 OF O.B.C, REQUIRES 5/8" UNDERLAY

6 FIRE PROTECTION FOR GAS AND ELECTRIC RANGES AS PER 9.10.21 OF O.B.C.

7 BATHROOMS: PROVIDE WATERPROOF WALL FINISH AS PER 9.29.2 OF O.B.C.

8 PROVIDE STUD WALL REINFORCING IN MAIN BATHROOM FOR FUTURE GRAB BARS, AS PER 9.5.2.3. SEE DWG D1

9 TOILET PAPER DISPENSER HEIGHT 660 AFF. TOWEL BAR HEIGHT 762 TO 1220 AFF.

10 ATTIC HATCH SHALL BE LOCATED SO AS TO PROVIDE UNOBSTRUCTED ACCES TO ATTIC SPACE

11 PROVIDE WARM AIR SUPPLY GRILLE IN W.I.C. WHEN ADJACENT TO UNHEATED SPACE, EXTERIOR AIR, OR EXTERIOR SOIL

12 SMOKE ALARMS LOCATION AND POWER SUPPLY IN DWELLING UNITS WILL COMPLY WITH 9.10.19.3 AND 9.10.19.4. (1).

13 INSTALLATION HEIGHT OF CARBON MONOXIDE DETECTORS WILL COMPLY WITH 9.33.4.2.

14 THE HEIGHT OF HANDRAILS ON STAIRS AND RAMPS SHALL BE NOT LESS THAN 865 AND NOT MORE THAN 965, AS PER 9.8.7.4. (2).

No.	REVISION	DATE
6	X	X
5	X	X
4	X	X
3	X	X
2	X	X
1	STRUCTURAL REVIEW	AUG.01.22

CLARIDGE HOMES

Model Title:
REED 2022
FLOOR AREA: 2029 SQ.FT = 188.47 SQ.M
BSMT: 418 SQ.FT = 38.80 SQ.M
OTB: 14 SQ.FT = 1.23 SQ.M

Project:
PROJECT NAME
BLOCK # UNIT #

Title:
FRONT & REAR ELEVATIONS

AS-BUILT RELEASE No. X DATE

BROCHURE DATE DATE

Scale: 1 : 75

Drawing No. A-5

Drawn by: DR/IM

2-STOREY TOWNHOUSE

12.0m

± EDGE OF ASPHALT

BROKEN ASPHALT

± EDGE OF ASPHALT

2-STOREY TOWNHOUSE

3.0m

2-STOREY TOWNHOUSE

2-STOREY TOWNHOUSE

3.0m

2-STOREY TOWNHOUSE

CONCRETE PAD

± Edge of Asphalt

21.0m

PART

1

± EDGE OF ASPHALT

BROKEN ASPHALT

2-STOREY TOWNHOUSE

± EDGE OF ASPHALT

LEGEND

- PROPERTY LINE
- CURB
- SIDEWALK
- DRIVEWAY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6

Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
CONROY WALKLEY

FUS SEPARATION

SCALE 1 : 250 (0 2 4 6 8 10)

DATE JULY 2022 | JOB 122040 | FIGURE SEP2

SHT11X17.DWG - 279mmX432mm

M:\2022\122040\CAD\Civil\Figures\Hydraulic\122040-FUS Seperation.dwg, SEP2, Jul 06, 2023 - 11:36am, cferguson

3-STOREY TOWNHOUSE

4.8m

14.0m

BROKEN ASPHALT

± EDGE OF ASPHALT

GRASS

CHAIN LINK FENCE

2-STOREY TOWNHOUSE

3-STOREY TOWNHOUSE

PART

3-STOREY TOWNHOUSE

19.0m

GRASS AND ASPHALT

3.0m

3-STOREY TOWNHOUSE

± EDGE OF ASPHALT

Ø0.20

Ø0.40

Ø0.45

Ø0.45

Ø0.40

Ø0.40

Ø0.30

LEGEND

- PROPERTY LINE
- CURB
- SIDEWALK
- DRIVEWAY

NOVATECH
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Ottawa, Ontario, Canada K2M 1P6

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CITY OF OTTAWA
CONROY WALKLEY

FUS SEPARATION

SCALE 1 : 250 (0 2 4 6 8 10)

DATE JUL 2023 | JOB 122040 | FIGURE SEP1

SHT11X17.DWG - 279mmX432mm

M:\2022\122040\CAD\Civil\Figures\Hydraulic\122040-FUS Seperation.dwg, SEP1, Jul 06, 2023 - 11:36am, dferguson

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Thursday, July 27, 2023 2:14 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Good afternoon Anthony,

Please see the boundary conditions and fire flow response below.

As per City's Water Master Plan, system-level planning objective for Fire Flow is 13,000 L/min. I would advise reducing the Fire Demand from the 16,020 L/m to City's design objective.

The following are boundary conditions, HGL, for hydraulic analysis at 2510 St-Laurent Boulevard (zone 2W2C) assumed to be a connected at the locations on the figure (see attached PDF for location).

	Connection 1	Connection 2	Connection 3
Min HGL	124.5	124.4	124.4
Max HGL	130.3	130.3	130.3
Max Day + FF (167 L/s)	125.4	125.2	125.2
Max Day + FF (267 L/s)	123.3	122.9	122.9

These are for current conditions and are based on computer model simulation.

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

Regards,
--
Bruce Bramah, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: July 12, 2023 9:53 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Bruce,

I understand that you are now the City Engineer overseeing the Conroy-Walkley project.

Based on City comments and the current market conditions the client has made some revisions to the proposed site plan. The proposed development is now a combination of traditional 2-storey townhomes, and 3-storey townhomes.
Can you please provide updated water boundary conditions based on the info provided below and attached.

i. Three (3) water connections are proposed. Two (2) connections to ST. Laurent, and one (1) connections to Don Reid Dr.
ii. Required fire flows: 167 L/s (for the 2 -storey town homes, Cap applied) and 267 L/s (3-storey townhomes – cap not applicable). Refer to FUS calcs attached.
iii. Average demand: 1.36 L/s.
iv. Maximum demand: 3.39 L/s.
v. Peak hour demand: 7.46L/s.

If you have any questions, or require additional information, let me know.

Regards,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Wednesday, October 19, 2022 5:32 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <G.Winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

Here is the requested water boundary condition:

The following are boundary conditions, HGL, for hydraulic analysis at 2510 St-Laurent Boulevard (zone 2W2C) assumed to be a connected at the locations on the figure (see attached PDF for location).

	Connection 1	Connection 2	Connection 3	Connection 4	Connection 5
BSDY - Min	126.2	126.2	126.2	126.1	126.1
BSDY - Max	130.0	130.0	130.0	130.0	130.0
Peak hr- Min	124.5	124.4	124.4	124.3	124.3
Peak hr- Max	130.3	130.3	130.3	130.4	130.4
Max Day + FF (233 L/s)	125.5	124.5	124.4	124.4	124.5

These are for current conditions and are based on computer model simulation.

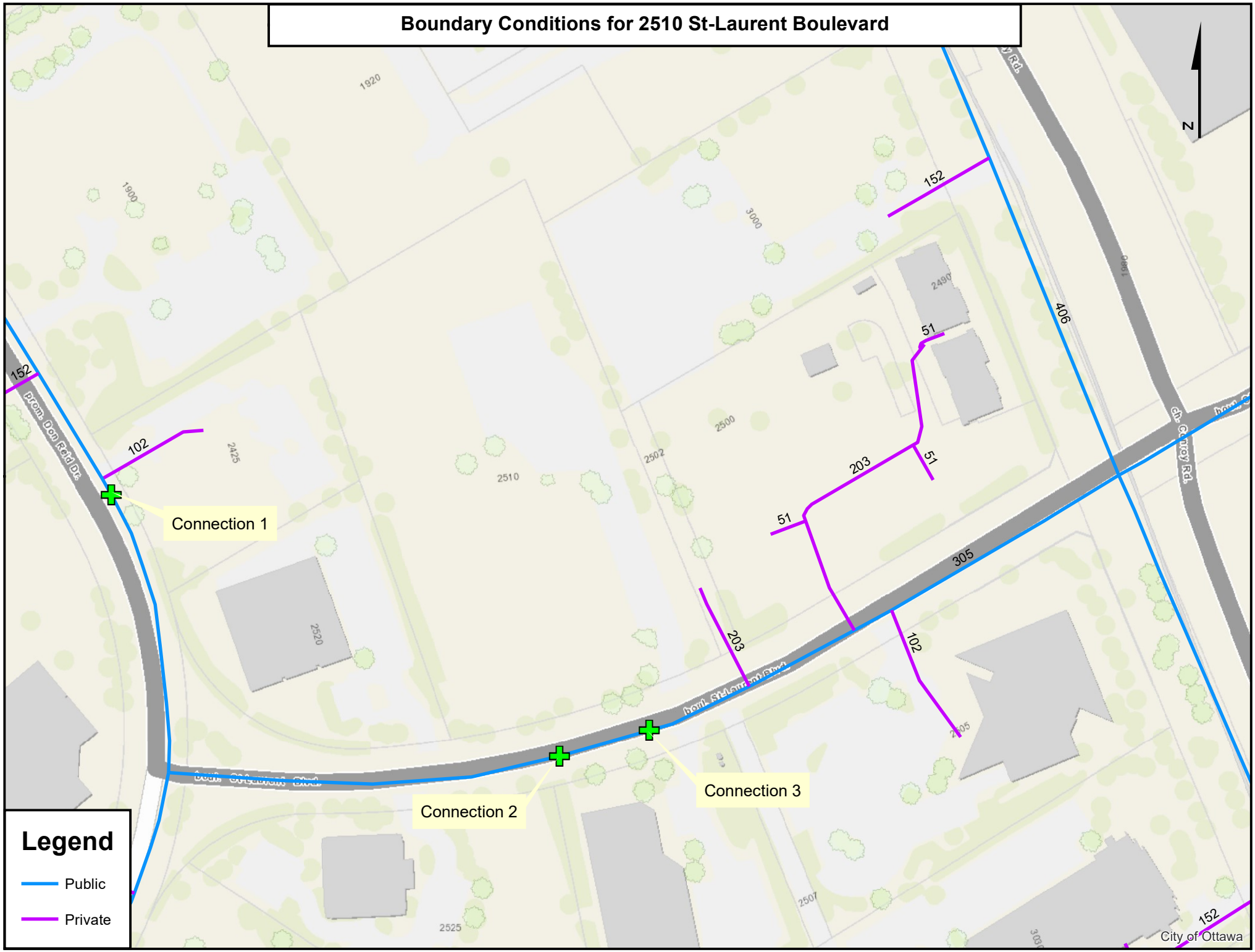
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation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

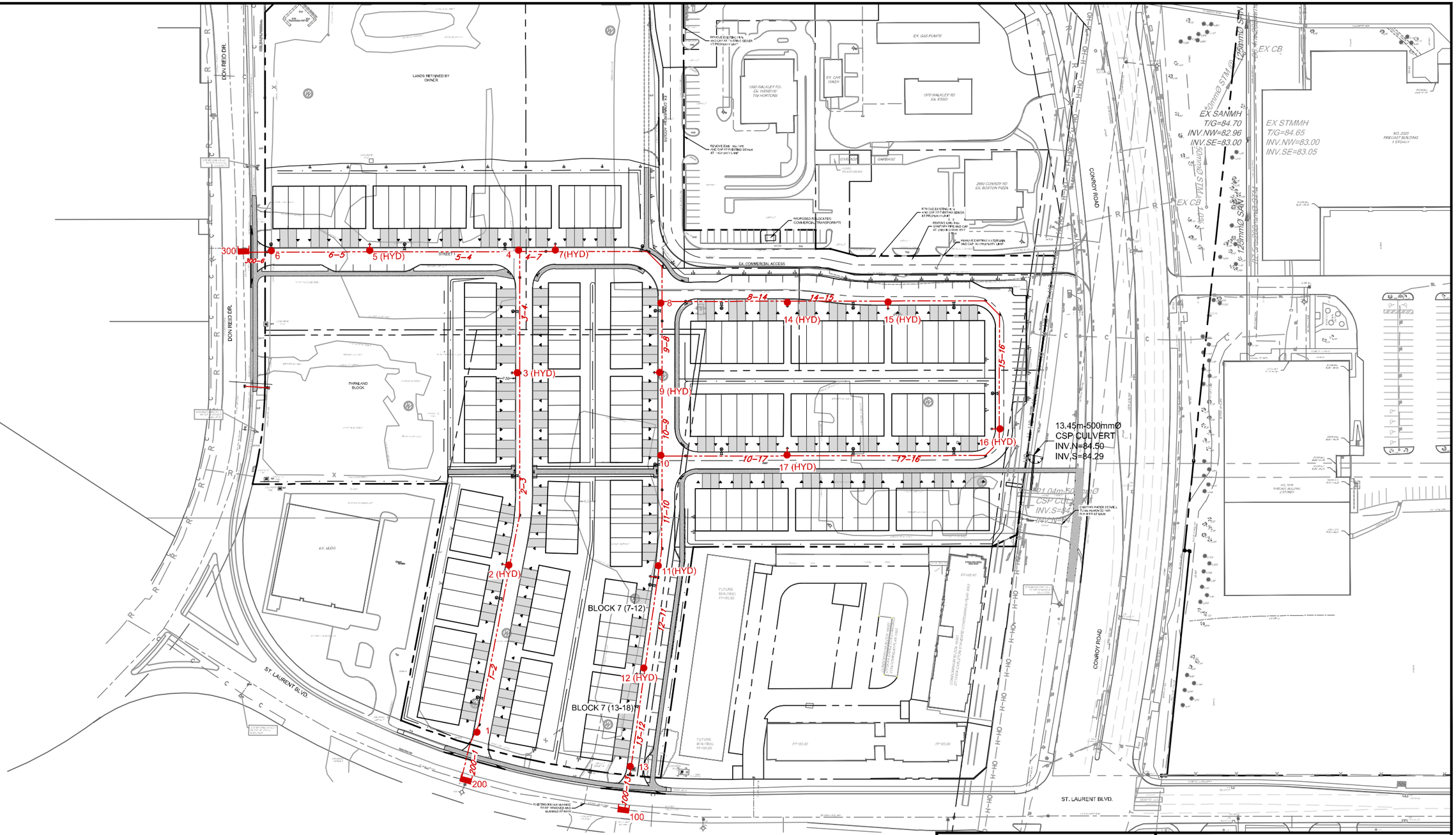
Let me know if you need anything else. Thanks.

Sharif

'

Boundary Conditions for 2510 St-Laurent Boulevard





LEGEND

- 5–4 — 200mmØ WATERMAIN PIPE
- 4 — WATERMAIN NODE
- 400 — RESERVOIR

NOVATECH
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CITY OF OTTAWA

2510 ST. LAURENT BLVD

WATERMAIN LAYOUT PLAN

SCALE 1 : 1500 (0, 15, 30, 45, 60)

DATE AUGUST 2023 | JOB 122040 | FIGURE EPA

SHT11X17.DWG - 279mmX432mm

Pipe Data

Pipe	Length (m)	Diameter (mm)	Roughness Coefficient
1-200	13.2	200	110
1-2	66.9	200	110
2-3	76.1	200	110
3-4	48.3	200	110
4-5	59.1	200	110
5-6	38.7	200	110
6-300	11	200	110
4-7	14	200	110
7-9	57.7	200	110
9-8	30.1	200	110
9-10	32.9	200	110
10-11	43.4	200	110
11-12	40.7	200	110
12-13	39.3	200	110
13-100	17.2	200	110
8-14	49.1	200	110
14-15	39.8	200	110
15-16	90.9	200	110
16-17	90.6	200	110
10-17	49.2	200	110

High Pressure Check

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	Age* (hrs)	
1	85.17	0.11	124.4	39.23	55.78	0.54	**Maximum Pressure**
2(HYD)	85.59	0.16	124.41	38.82	55.20	0.38	
3(HYD)	86.05	0.16	124.42	38.37	54.56	0.22	
4	86.75	0.11	124.43	37.68	53.58	0.11	
5(HYD)	86.31	0.05	124.47	38.16	54.26	0.05	
6	86.50	0.03	124.49	37.99	54.02	0.01	
7(HYD)	86.67	0.04	124.43	37.76	53.69	0.15	
8	86.68	0.06	124.42	37.74	53.67	0.27	
9(HYD)	86.37	0.05	124.42	38.05	54.11	0.37	
10	86.10	0.09	124.42	38.32	54.49	1.08	
11(HYD)	86.01	0.05	124.41	38.40	54.60	1.19	
12(HYD)	85.21	0.07	124.41	39.20	55.74	1.30	
13	85.18	0.03	124.40	39.22	55.77	1.40	
14(HYD)	86.56	0.05	124.42	37.86	53.84	0.61	
15(HYD)	86.19	0.08	124.42	38.23	54.36	0.90	
16(HYD)	85.88	0.11	124.42	38.54	54.80	1.60	
17(HYD)	86.15	0.16	124.42	38.27	54.42	2.38	**Maximum Age**
100 (RES)	85.26	3.22	124.40	0.00	0.00	0.00	
200 (RES)	85.05	3.69	124.40	0.00	0.00	0.00	
300 (RES)	86.46	-8.32	124.50	0.00	0.00	0.00	

* Age is based on a boundary age of 0 hrs

1m of head = 1.42197 PSI

1.41

PROJECT #: 122040
PROJECT NAME: 2510 ST.LAURENT BOULEVARD
LOCATION: OTTAWA, ONTARIO

NOVATECH
Engineers, Planners & Landscape Architects

Date: May 15, 2023
Revised: August 28th, 2023

Maximum Daily Demand and Fire Flow

Node 2 (HYD) - 267L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	120.92	35.75	50.84	
2(HYD)	85.59	267.00	110.90	25.31	35.99	**Minimum Pressure**
3(HYD)	86.05	0.39	116.40	30.35	43.16	
4	86.75	0.28	119.91	33.16	47.15	
5(HYD)	86.31	0.13	121.75	35.44	50.39	
6	86.50	0.07	122.96	36.46	51.85	
7(HYD)	86.67	0.09	120.07	33.40	47.49	
8	86.68	0.15	120.74	34.06	48.43	
9(HYD)	86.37	0.13	120.93	34.56	49.14	
10	86.10	0.22	121.14	35.04	49.83	
11(HYD)	86.01	0.13	121.68	35.67	50.72	
12(HYD)	85.21	0.18	122.19	36.98	52.58	
13	85.18	0.07	122.68	37.50	53.32	
14(HYD)	86.56	0.13	120.80	34.24	48.69	
15(HYD)	86.19	0.20	120.85	34.66	49.29	
16(HYD)	85.88	0.26	120.96	35.08	49.88	
17(HYD)	86.15	0.39	121.07	34.92	49.66	
100 (RES)	85.26	-41.96	122.90	0.00	0.00	
200 (RES)	85.05	-159.71	122.90	0.00	0.00	
300 (RES)	86.46	-68.43	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 3 (HYD) - 267L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	121.83	36.66	52.13	
2(HYD)	85.59	0.39	116.42	30.83	43.84	
3(HYD)	86.05	267.00	110.31	24.26	34.50	**Minimium Pressure**
4	86.75	0.28	117.02	30.27	43.04	
5(HYD)	86.31	0.13	120.43	34.12	48.52	
6	86.50	0.07	122.66	36.16	51.42	
7(HYD)	86.67	0.09	117.34	30.67	43.61	
8	86.68	0.15	118.68	32.00	45.50	
9(HYD)	86.37	0.13	119.06	32.69	46.48	
10	86.10	0.22	119.47	33.37	47.45	
11(HYD)	86.01	0.13	120.52	34.51	49.07	
12(HYD)	85.21	0.18	121.51	36.30	51.62	
13	85.18	0.07	122.48	37.30	53.04	
14(HYD)	86.56	0.13	118.80	32.24	45.84	
15(HYD)	86.19	0.20	118.89	32.70	46.50	
16(HYD)	85.88	0.26	119.11	33.23	47.25	
17(HYD)	86.15	0.39	119.34	33.19	47.20	
100 (RES)	85.26	-60.11	122.90	0.00	0.00	
200 (RES)	85.05	-114.56	122.90	0.00	0.00	
300 (RES)	86.46	-95.43	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

PROJECT #: 122040
PROJECT NAME: 2510 ST.LAURENT BOULEVARD
LOCATION: OTTAWA, ONTARIO

NOVATECH
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Revised: August 28th, 2023

Maximum Daily Demand and Fire Flow

Node 5 (HYD) - 267L/s Fire Demand

Node	Elevation	Demand	Head	Pressure		
	(m)	(LPS)	(m)	(m)	(PSI)	
1	85.17	0.28	122.63	37.46	53.27	
2(HYD)	85.59	0.39	121.30	35.71	50.78	
3(HYD)	86.05	0.39	119.81	33.76	48.01	
4	86.75	0.28	118.88	32.13	45.69	
5(HYD)	86.31	267.00	115.17	28.86	41.04	**Minimium Pressure**
6	86.50	0.07	121.50	35.00	49.77	
7(HYD)	86.67	0.09	119.10	32.43	46.11	
8	86.68	0.15	120.01	33.33	47.39	
9(HYD)	86.37	0.13	120.26	33.89	48.19	
10	86.10	0.22	120.54	34.44	48.97	
11(HYD)	86.01	0.13	121.26	35.25	50.12	
12(HYD)	85.21	0.18	121.95	36.74	52.24	
13	85.18	0.07	122.61	37.43	53.22	
14(HYD)	86.56	0.13	120.08	33.52	47.66	
15(HYD)	86.19	0.20	120.15	33.96	48.29	
16(HYD)	85.88	0.26	120.30	34.42	48.94	
17(HYD)	86.15	0.39	120.45	34.30	48.77	
100 (RES)	85.26	-49.13	122.90	0.00	0.00	
200 (RES)	85.05	-53.89	122.90	0.00	0.00	
300 (RES)	86.46	-167.35	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 7 (HYD) - 267L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.39	37.22	52.93	
2(HYD)	85.59	0.39	119.85	34.26	48.72	
3(HYD)	86.05	0.39	116.98	30.93	43.98	
4	86.75	0.28	115.17	28.42	40.41	
5(HYD)	86.31	0.13	119.58	33.27	47.31	
6	86.50	0.07	122.48	35.98	51.16	
7(HYD)	86.67	267.00	112.43	25.76	36.63	**Minimum Pressure**
8	86.68	0.15	114.98	28.30	40.24	
9(HYD)	86.37	0.13	115.68	29.31	41.68	
10	86.10	0.22	116.46	30.36	43.17	
11(HYD)	86.01	0.13	118.44	32.43	46.11	
12(HYD)	85.21	0.18	120.30	35.09	49.90	
13	85.18	0.07	122.11	36.93	52.51	
14(HYD)	86.56	0.13	115.20	28.64	40.73	
15(HYD)	86.19	0.20	115.38	29.19	41.51	
16(HYD)	85.88	0.26	115.79	29.91	42.53	
17(HYD)	86.15	0.39	116.22	30.07	42.76	
100 (RES)	85.26	-84.34	122.90	0.00	0.00	
200 (RES)	85.05	-76.40	122.90	0.00	0.00	
300 (RES)	86.46	-109.66	123.30	0.00	0.00	

Notes

1m of head = 1.42197 **PSI**

Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 9 (HYD) - 267L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.59	37.42	53.21	
2(HYD)	85.59	0.39	121.02	35.43	50.38	
3(HYD)	86.05	0.39	119.27	33.22	47.24	
4	86.75	0.28	118.16	31.41	44.66	
5(HYD)	86.31	0.13	120.95	34.64	49.26	
6	86.50	0.07	122.78	36.28	51.59	
7(HYD)	86.67	0.09	116.45	29.78	42.35	
8	86.68	0.15	109.41	22.73	32.32	
9(HYD)	86.37	267.00	105.99	19.62	27.90	**Minimium Pressure**
10	86.10	0.22	109.34	23.24	33.05	
11(HYD)	86.01	0.13	113.52	27.51	39.12	
12(HYD)	85.21	0.18	117.44	32.23	45.83	
13	85.18	0.07	121.24	36.06	51.28	
14(HYD)	86.56	0.13	109.40	22.84	32.48	
15(HYD)	86.19	0.20	109.39	23.20	32.99	
16(HYD)	85.88	0.26	109.37	23.49	33.40	
17(HYD)	86.15	0.39	109.35	23.20	32.99	
100 (RES)	85.26	-125.95	122.90	0.00	0.00	
200 (RES)	85.05	-58.79	122.90	0.00	0.00	
300 (RES)	86.46	-85.62	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

PROJECT #: 122040
PROJECT NAME: 2510 ST.LAURENT BOULEVARD
LOCATION: OTTAWA, ONTARIO

NOVATECH
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Date: May 15, 2023
Revised: August 28th, 2023

Maximum Daily Demand and Fire Flow

Node 11 (HYD) - 267L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.71	37.54	53.38	
2(HYD)	85.59	0.39	121.74	36.15	51.40	
3(HYD)	86.05	0.39	120.66	34.61	49.21	
4	86.75	0.28	119.99	33.24	47.27	
5(HYD)	86.31	0.13	121.78	35.47	50.44	
6	86.50	0.07	122.96	36.46	51.85	
7(HYD)	86.67	0.09	118.91	32.24	45.84	
8	86.68	0.15	114.47	27.79	39.52	
9(HYD)	86.37	0.13	113.27	26.90	38.25	
10	86.10	0.22	111.96	25.86	36.77	
11(HYD)	86.01	267.00	108.70	22.69	32.26	**Minimium Pressure**
12(HYD)	85.21	0.18	114.64	29.43	41.85	
13	85.18	0.07	120.38	35.20	50.05	
14(HYD)	86.56	0.13	114.08	27.52	39.13	
15(HYD)	86.19	0.20	113.76	27.57	39.20	
16(HYD)	85.88	0.26	113.04	27.16	38.62	
17(HYD)	86.15	0.39	112.33	26.18	37.23	
100 (RES)	85.26	-157.46	122.90	0.00	0.00	
200 (RES)	85.05	-45.33	122.90	0.00	0.00	
300 (RES)	86.46	-67.57	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 12 (HYD) - 267L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.78	37.61	53.48	
2(HYD)	85.59	0.39	122.20	36.61	52.06	
3(HYD)	86.05	0.39	121.54	35.49	50.47	
4	86.75	0.28	121.14	34.39	48.90	
5(HYD)	86.31	0.13	122.31	36.00	51.19	
6	86.50	0.07	123.08	36.58	52.02	
7(HYD)	86.67	0.09	120.46	33.79	48.05	
8	86.68	0.15	117.65	30.97	44.04	
9(HYD)	86.37	0.13	116.89	30.52	43.40	
10	86.10	0.22	116.07	29.97	42.62	
11(HYD)	86.01	0.13	114.02	28.01	39.83	
12(HYD)	85.21	267.00	112.11	26.90	38.25	**Minimium Pressure**
13	85.18	0.07	119.61	34.43	48.96	
14(HYD)	86.56	0.13	117.40	30.84	43.85	
15(HYD)	86.19	0.20	117.20	31.01	44.10	
16(HYD)	85.88	0.26	116.74	30.86	43.88	
17(HYD)	86.15	0.39	116.30	30.15	42.87	
100 (RES)	85.26	-181.85	122.90	0.00	0.00	
200 (RES)	85.05	-34.73	122.90	0.00	0.00	
300 (RES)	86.46	-53.74	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 14 (HYD) - 167L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.77	37.6	53.47	
2(HYD)	85.59	0.39	122.11	36.52	51.93	
3(HYD)	86.05	0.39	121.38	35.33	50.24	
4	86.75	0.28	120.92	34.17	48.59	
5(HYD)	86.31	0.13	122.21	35.90	51.05	
6	86.50	0.07	123.06	36.56	51.99	
7(HYD)	86.67	0.09	120.16	33.49	47.62	
8	86.68	0.15	117.05	30.37	43.19	
9(HYD)	86.37	0.13	117.22	30.85	43.87	
10	86.10	0.22	117.40	31.30	44.51	
11(HYD)	86.01	0.13	119.09	33.08	47.04	
12(HYD)	85.21	0.18	120.68	35.47	50.44	
13	85.18	0.07	122.22	37.04	52.67	
14(HYD)	86.56	167.13	112.81	26.25	37.33	**Minimium Pressure**
15(HYD)	86.19	0.20	113.48	27.29	38.81	
16(HYD)	85.88	0.26	115.00	29.12	41.41	
17(HYD)	86.15	0.87	116.54	30.39	43.21	
100 (RES)	85.26	-77.47	122.90	0.00	0.00	
200 (RES)	85.05	-36.93	122.90	0.00	0.00	
300 (RES)	86.46	-56.57	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 15 (HYD) - 167L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.77	37.6	53.47	
2(HYD)	85.59	0.39	122.13	36.54	51.96	
3(HYD)	86.05	0.39	121.41	35.36	50.28	
4	86.75	0.28	120.96	34.21	48.65	
5(HYD)	86.31	0.13	122.23	35.92	51.08	
6	86.50	0.07	123.06	36.56	51.99	
7(HYD)	86.67	0.09	120.22	33.55	47.71	
8	86.68	0.15	117.17	30.49	43.36	
9(HYD)	86.37	0.13	117.22	30.85	43.87	
10	86.10	0.22	117.27	31.17	44.32	
11(HYD)	86.01	0.13	119.00	32.99	46.91	
12(HYD)	85.21	0.18	120.63	35.42	50.37	
13	85.18	0.07	122.21	37.03	52.66	
14(HYD)	86.56	0.13	113.80	27.24	38.73	
15(HYD)	86.19	167.20	111.07	24.88	35.38	**Minimium Pressure**
16(HYD)	85.88	0.26	113.49	27.61	39.26	
17(HYD)	86.15	0.87	115.92	29.77	42.33	
100 (RES)	85.26	-78.43	122.90	0.00	0.00	
200 (RES)	85.05	-36.51	122.90	0.00	0.00	
300 (RES)	86.46	-56.03	123.30	0.00	0.00	

Notes
1m of head = 1.42197 **PSI**
Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 16 (HYD) - 167L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.77	37.6	53.47	
2(HYD)	85.59	0.39	122.14	36.55	51.97	
3(HYD)	86.05	0.39	121.43	35.38	50.31	
4	86.75	0.28	120.99	34.24	48.69	
5(HYD)	86.31	0.13	122.24	35.93	51.09	
6	86.50	0.07	123.07	36.57	52.00	
7(HYD)	86.67	0.09	120.26	33.59	47.76	
8	86.68	0.15	117.25	30.57	43.47	
9(HYD)	86.37	0.13	117.22	30.85	43.87	
10	86.10	0.22	117.18	31.08	44.19	
11(HYD)	86.01	0.13	118.94	32.93	46.83	
12(HYD)	85.21	0.18	120.59	35.38	50.31	
13	85.18	0.07	122.20	37.02	52.64	
14(HYD)	86.56	0.13	115.27	28.71	40.82	
15(HYD)	86.19	0.20	113.67	27.48	39.08	
16(HYD)	85.88	167.26	110.02	24.14	34.33	**Minimum Pressure**
17(HYD)	86.15	0.87	114.63	28.48	40.50	
100 (RES)	85.26	-79.11	122.90	0.00	0.00	
200 (RES)	85.05	-36.21	122.90	0.00	0.00	
300 (RES)	86.46	-55.64	123.30	0.00	0.00	

Notes

1m of head = 1.42197 **PSI**

Fire demand based on FUS 2020

Maximum Daily Demand and Fire Flow

Node 17 (HYD) - 167L/s Fire Demand

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)	
1	85.17	0.28	122.78	37.61	53.48	
2(HYD)	85.59	0.39	122.18	36.59	52.03	
3(HYD)	86.05	0.39	121.50	35.45	50.41	
4	86.75	0.28	121.09	34.34	48.83	
5(HYD)	86.31	0.13	122.29	35.98	51.16	
6	86.50	0.07	123.08	36.58	52.02	
7(HYD)	86.67	0.09	120.39	33.72	47.95	
8	86.68	0.15	117.51	30.83	43.84	
9(HYD)	86.37	0.13	117.21	30.84	43.85	
10	86.10	0.22	116.88	30.78	43.77	
11(HYD)	86.01	0.13	118.73	32.72	46.53	
12(HYD)	85.21	0.18	120.47	35.26	50.14	
13	85.18	0.07	122.16	36.98	52.58	
14(HYD)	86.56	0.13	116.62	30.06	42.74	
15(HYD)	86.19	0.20	115.91	29.72	42.26	
16(HYD)	85.88	0.26	114.29	28.41	40.40	
17(HYD)	86.15	167.87	112.69	26.54	37.74	**Minimium Pressure**
100 (RES)	85.26	-81.30	122.90	0.00	0.00	
200 (RES)	85.05	-35.26	122.90	0.00	0.00	
300 (RES)	86.46	-54.41	123.30	0.00	0.00	

Notes

1m of head = 1.42197 **PSI**

Fire demand based on FUS 2020

PEAK HOUR

Node	Elevation (m)	Demand (LPS)	Head (m)	Pressure (m)	Pressure (PSI)
1	85.17	0.63	130.3	45.13	64.17
2(HYD)	85.59	0.87	130.30	44.71	63.58
3(HYD)	86.05	0.87	130.29	44.24	62.91
4	86.75	0.63	130.29	43.54	61.91
5(HYD)	86.31	0.29	130.30	43.99	62.55
6	86.50	0.14	130.30	43.80	62.28
7(HYD)	86.67	0.19	130.29	43.62	62.03
8	86.68	0.34	130.29	43.61	62.01
9(HYD)	86.37	0.29	130.29	43.92	62.45
10	86.10	0.48	130.29	44.19	62.84
11(HYD)	86.01	0.29	130.29	44.28	62.96
12(HYD)	85.21	0.39	130.30	45.09	64.12
13	85.18	0.14	130.30	45.13	64.17
14(HYD)	86.56	0.29	130.29	43.73	62.18
15(HYD)	86.19	0.43	130.29	44.10	62.71
16(HYD)	85.88	0.58	130.29	44.41	63.15
17(HYD)	86.15	0.87	130.29	44.14	62.77
100 (RES)	85.26	-2.62	130.30	0.00	0.00
200 (RES)	85.05	-2.68	130.30	0.00	0.00
300 (RES)	86.46	-2.42	130.30	0.00	0.00

Minimum Pressure

Notes
1m of head = 1.42197 PSI

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******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
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Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
200-1	200	1	13.2	200
1-2	1	2(HYD)	66.9	200
2-3	2(HYD)	3(HYD)	76.1	200
4	3(HYD)	4	48.3	200
5-4	4	5(HYD)	59.1	200
5-6	5(HYD)	6	38.7	200
300-6	6	300	11	200
4-7	4	7(HYD)	14.0	200
7-8	7(HYD)	8	57.7	200
9-8	8	9(HYD)	30.1	200
10-9	9(HYD)	10	32.9	200
11-10	10	11(HYD)	43.4	200
12-11	11(HYD)	12(HYD)	40.7	200
13-12	12(HYD)	13	39.3	200
100-13	13	100	17.2	200
8-14	8	14(HYD)	49.1	200
14-15	14(HYD)	15(HYD)	39.8	200
15-16	15(HYD)	16(HYD)	90.9	200
17-16	16(HYD)	17(HYD)	90.6	200
10-17	17(HYD)	10	49.2	200

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
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Node Results (Average Day):

Node ID	Demand LPS	Head m	Pressure m	Quality hours	
1	0.11	124.40	39.23	0.54	
2(HYD)	0.16	124.41	38.82	0.38	
3(HYD)	0.16	124.42	38.37	0.22	
4	0.11	124.43	37.68	0.11	
5(HYD)	0.05	124.47	38.16	0.05	
6	0.03	124.49	37.99	0.01	
7(HYD)	0.04	124.43	37.76	0.15	
8	0.06	124.42	37.74	0.27	
9(HYD)	0.05	124.42	38.05	0.37	
10	0.09	124.42	38.32	1.08	
11(HYD)	0.05	124.41	38.40	1.19	
12(HYD)	0.07	124.41	39.20	1.30	
13	0.03	124.40	39.22	1.40	
14(HYD)	0.05	124.42	37.86	0.61	
15(HYD)	0.08	124.42	38.23	0.90	
16(HYD)	0.11	124.42	38.54	1.60	
17(HYD)	0.16	124.42	38.27	2.38	
100	3.22	124.40	0.00	0.00	Reservoir
200	3.69	124.40	0.00	0.00	Reservoir
300	-8.32	124.50	0.00	0.00	Reservoir

```
 ******************************************************************
 *                          E P A N E T                           *
 *                  Hydraulic and Water Quality                   *
 *                  Analysis for Pipe Networks                    *
 *                       Version 2.2                              *
 ******************************************************************
Link Results (Average Day):
 ------------------------------------------------------------------
 Link                Flow  VelocityUnit Headloss    Status
 ID                   LPS       m/s      m/km
 ------------------------------------------------------------------
 200-1               3.69      0.12      0.14      Open
 1-2                 3.80      0.12      0.15      Open
 2-3                 3.96      0.13      0.16      Open
 4                   4.12      0.13      0.17      Open
 5-4                 8.24      0.26      0.62      Open
 5-6                 8.29      0.26      0.63      Open
 300-6               8.32      0.26      0.63      Open
 4-7                 4.01      0.13      0.16      Open
 7-8                 3.97      0.13      0.16      Open
 9-8                 2.65      0.08      0.08      Open
 10-9                2.60      0.08      0.07      Open
 11-10               3.37      0.11      0.12      Open
 12-11               3.32      0.11      0.11      Open
 13-12               3.25      0.10      0.11      Open
 100-13              3.22      0.10      0.11      Open
 8-14                1.26      0.04      0.02      Open
 14-15               1.21      0.04      0.02      Open
 15-16               1.13      0.04      0.02      Open
 17-16               1.02      0.03      0.01      Open
 10-17               0.86      0.03      0.01      Open
```

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*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
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Node Results (Max Day + Fire Flow - Node 2):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	120.92	35.75	0.00	
2	267.00	110.90	25.31	0.00	
3	0.39	116.40	30.35	0.00	
4	0.28	119.91	33.16	0.00	
5	0.13	121.75	35.44	0.00	
6	0.07	122.96	36.46	0.00	
7	0.09	120.07	33.40	0.00	
8	0.15	120.74	34.06	0.00	
9	0.13	120.93	34.56	0.00	
10	0.22	121.14	35.04	0.00	
11	0.13	121.68	35.67	0.00	
12	0.18	122.19	36.98	0.00	
13	0.07	122.68	37.50	0.00	
14	0.13	120.80	34.24	0.00	
15	0.20	120.85	34.66	0.00	
16	0.26	120.96	35.08	0.00	
17	0.39	121.07	34.92	0.00	
100	-41.96	122.90	0.00	0.00	Reservoir
200	-159.71	122.90	0.00	0.00	Reservoir
300	-68.43	123.30	0.00	0.00	Reservoir

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*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
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Link Results (Max Day + Fire Flow - Node 2):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	159.71	5.08	150.19	Open
1-2	159.43	5.07	149.70	Open
2-3	-107.57	3.42	72.23	Open
4	-107.96	3.44	72.72	Open
5-4	-68.23	2.17	31.09	Open
5-6	-68.36	2.18	31.19	Open
300-6	-68.43	2.18	31.25	Open
4-7	-40.01	1.27	11.57	Open
7-8	-40.10	1.28	11.62	Open
9-8	-28.71	0.91	6.26	Open
10-9	-28.84	0.92	6.31	Open
11-10	-41.58	1.32	12.42	Open
12-11	-41.71	1.33	12.50	Open
13-12	-41.89	1.33	12.60	Open
100-13	-41.96	1.34	12.63	Open
8-14	-11.54	0.37	1.16	Open
14-15	-11.67	0.37	1.18	Open
15-16	-11.87	0.38	1.22	Open
17-16	-12.13	0.39	1.27	Open
10-17	-12.52	0.40	1.35	Open

```
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*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
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Node Results (Max Day + Fire Flow - Node 3):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	121.83	36.66	0.00	
2	0.39	116.42	30.83	0.00	
3	267.00	110.31	24.26	0.00	
4	0.28	117.02	30.27	0.00	
5	0.13	120.43	34.12	0.00	
6	0.07	122.66	36.16	0.00	
7	0.09	117.34	30.67	0.00	
8	0.15	118.68	32.00	0.00	
9	0.13	119.06	32.69	0.00	
10	0.22	119.47	33.37	0.00	
11	0.13	120.52	34.51	0.00	
12	0.18	121.51	36.30	0.00	
13	0.07	122.48	37.30	0.00	
14	0.13	118.80	32.24	0.00	
15	0.20	118.89	32.70	0.00	
16	0.26	119.11	33.23	0.00	
17	0.39	119.34	33.19	0.00	
100	-60.11	122.90	0.00	0.00	Reservoir
200	-114.56	122.90	0.00	0.00	Reservoir
300	-95.43	123.30	0.00	0.00	Reservoir

```
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*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
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Link Results (Max Day + Fire Flow - Node 3):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	114.56	3.65	81.17	Open
1-2	114.28	3.64	80.80	Open
2-3	113.89	3.63	80.29	Open
4	-153.11	4.87	138.89	Open
5-4	-95.23	3.03	57.64	Open
5-6	-95.36	3.04	57.79	Open
300-6	-95.43	3.04	57.86	Open
4-7	-58.16	1.85	23.13	Open
7-8	-58.25	1.85	23.19	Open
9-8	-41.52	1.32	12.39	Open
10-9	-41.65	1.33	12.46	Open
11-10	-59.73	1.90	24.30	Open
12-11	-59.86	1.91	24.39	Open
13-12	-60.04	1.91	24.53	Open
100-13	-60.11	1.91	24.58	Open
8-14	-16.88	0.54	2.34	Open
14-15	-17.01	0.54	2.37	Open
15-16	-17.21	0.55	2.42	Open
17-16	-17.47	0.56	2.49	Open
10-17	-17.86	0.57	2.60	Open

```
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*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
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Node Results (Max Day + Fire Flow - Node 5):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.63	37.46	0.00	
2	0.39	121.30	35.71	0.00	
3	0.39	119.81	33.76	0.00	
4	0.28	118.88	32.13	0.00	
5	267.00	115.17	28.86	0.00	
6	0.07	121.50	35.00	0.00	
7	0.09	119.10	32.43	0.00	
8	0.15	120.01	33.33	0.00	
9	0.13	120.26	33.89	0.00	
10	0.22	120.54	34.44	0.00	
11	0.13	121.26	35.25	0.00	
12	0.18	121.95	36.74	0.00	
13	0.07	122.61	37.43	0.00	
14	0.13	120.08	33.52	0.00	
15	0.20	120.15	33.96	0.00	
16	0.26	120.30	34.42	0.00	
17	0.39	120.45	34.30	0.00	
100	-49.13	122.90	0.00	0.00	Reservoir
200	-53.89	122.90	0.00	0.00	Reservoir
300	-167.35	123.30	0.00	0.00	Reservoir

```
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*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
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Link Results (Max Day + Fire Flow - Node 5):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	53.89	1.72	20.08	Open
1-2	53.61	1.71	19.89	Open
2-3	53.22	1.69	19.62	Open
4	52.83	1.68	19.35	Open
5-4	99.72	3.17	62.78	Open
5-6	-167.28	5.32	163.63	Open
300-6	-167.35	5.33	163.75	Open
4-7	-47.18	1.50	15.70	Open
7-8	-47.27	1.50	15.75	Open
9-8	-33.77	1.07	8.45	Open
10-9	-33.90	1.08	8.51	Open
11-10	-48.75	1.55	16.68	Open
12-11	-48.88	1.56	16.76	Open
13-12	-49.06	1.56	16.88	Open
100-13	-49.13	1.56	16.92	Open
8-14	-13.65	0.43	1.58	Open
14-15	-13.78	0.44	1.61	Open
15-16	-13.98	0.44	1.65	Open
17-16	-14.24	0.45	1.71	Open
10-17	-14.63	0.47	1.79	Open

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******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
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Node Results (Max Day + Fire Flow - Node 7):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.39	37.22	0.00	
2	0.39	119.85	34.26	0.00	
3	0.39	116.98	30.93	0.00	
4	0.28	115.17	28.42	0.00	
5	0.13	119.58	33.27	0.00	
6	0.07	122.48	35.98	0.00	
7	267.00	112.43	25.76	0.00	
8	0.15	114.98	28.30	0.00	
9	0.13	115.68	29.31	0.00	
10	0.22	116.46	30.36	0.00	
11	0.13	118.44	32.43	0.00	
12	0.18	120.30	35.09	0.00	
13	0.07	122.11	36.93	0.00	
14	0.13	115.20	28.64	0.00	
15	0.20	115.38	29.19	0.00	
16	0.26	115.79	29.91	0.00	
17	0.39	116.22	30.07	0.00	
100	-84.34	122.90	0.00	0.00	Reservoir
200	-76.40	122.90	0.00	0.00	Reservoir
300	-109.66	123.30	0.00	0.00	Reservoir

```
******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
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Link Results (Max Day + Fire Flow - Node 7):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	76.40	2.43	38.33	Open
1-2	76.12	2.42	38.07	Open
2-3	75.73	2.41	37.71	Open
4	75.34	2.40	37.35	Open
5-4	-109.46	3.48	74.61	Open
5-6	-109.59	3.49	74.77	Open
300-6	-109.66	3.49	74.86	Open
4-7	184.52	5.87	196.23	Open
7-8	-82.48	2.63	44.17	Open
9-8	-58.63	1.87	23.48	Open
10-9	-58.76	1.87	23.58	Open
11-10	-83.96	2.67	45.65	Open
12-11	-84.09	2.68	45.78	Open
13-12	-84.27	2.68	45.96	Open
100-13	-84.34	2.68	46.03	Open
8-14	-24.00	0.76	4.49	Open
14-15	-24.13	0.77	4.53	Open
15-16	-24.33	0.77	4.60	Open
17-16	-24.59	0.78	4.69	Open
10-17	-24.98	0.79	4.83	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
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Node Results (Max Day + Fire Flow - Node 9):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.59	37.42	0.00	
2	0.39	121.02	35.43	0.00	
3	0.39	119.27	33.22	0.00	
4	0.28	118.16	31.41	0.00	
5	0.13	120.95	34.64	0.00	
6	0.07	122.78	36.28	0.00	
7	0.09	116.45	29.78	0.00	
8	0.15	109.41	22.73	0.00	
9	267.00	105.99	19.62	0.00	
10	0.22	109.34	23.24	0.00	
11	0.13	113.52	27.51	0.00	
12	0.18	117.44	32.23	0.00	
13	0.07	121.24	36.06	0.00	
14	0.13	109.40	22.84	0.00	
15	0.20	109.39	23.20	0.00	
16	0.26	109.37	23.49	0.00	
17	0.39	109.35	23.20	0.00	
100	-125.95	122.90	0.00	0.00	Reservoir
200	-58.79	122.90	0.00	0.00	Reservoir
300	-85.62	123.30	0.00	0.00	Reservoir

```
******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
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Link Results (Max Day + Fire Flow - Node 9):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	58.79	1.87	23.59	Open
1-2	58.51	1.86	23.39	Open
2-3	58.12	1.85	23.10	Open
4	57.73	1.84	22.81	Open
5-4	-85.42	2.72	47.13	Open
5-6	-85.55	2.72	47.27	Open
300-6	-85.62	2.73	47.34	Open
4-7	142.87	4.55	122.19	Open
7-8	142.78	4.54	122.04	Open
9-8	137.46	4.38	113.76	Open
10-9	-129.54	4.12	101.91	Open
11-10	-125.57	4.00	96.20	Open
12-11	-125.70	4.00	96.38	Open
13-12	-125.88	4.01	96.64	Open
100-13	-125.95	4.01	96.74	Open
8-14	5.17	0.16	0.26	Open
14-15	5.04	0.16	0.25	Open
15-16	4.84	0.15	0.23	Open
17-16	4.58	0.15	0.21	Open
10-17	4.19	0.13	0.18	Open

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*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
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Node Results (Max Day + Fire Flow - Node 11):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.71	37.54	0.00	
2	0.39	121.74	36.15	0.00	
3	0.39	120.66	34.61	0.00	
4	0.28	119.99	33.24	0.00	
5	0.13	121.78	35.47	0.00	
6	0.07	122.96	36.46	0.00	
7	0.09	118.91	32.24	0.00	
8	0.15	114.47	27.79	0.00	
9	0.13	113.27	26.90	0.00	
10	0.22	111.96	25.86	0.00	
11	267.00	108.70	22.69	0.00	
12	0.18	114.64	29.43	0.00	
13	0.07	120.38	35.20	0.00	
14	0.13	114.08	27.52	0.00	
15	0.20	113.76	27.57	0.00	
16	0.26	113.04	27.16	0.00	
17	0.39	112.33	26.18	0.00	
100	-157.46	122.90	0.00	0.00	Reservoir
200	-45.33	122.90	0.00	0.00	Reservoir
300	-67.57	123.30	0.00	0.00	Reservoir

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******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
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Link Results (Max Day + Fire Flow - Node 11):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	45.33	1.44	14.58	Open
1-2	45.05	1.43	14.41	Open
2-3	44.66	1.42	14.18	Open
4	44.27	1.41	13.95	Open
5-4	-67.37	2.14	30.36	Open
5-6	-67.50	2.15	30.47	Open
300-6	-67.57	2.15	30.53	Open
4-7	111.36	3.54	77.02	Open
7-8	111.27	3.54	76.90	Open
9-8	78.19	2.49	40.01	Open
10-9	78.06	2.48	39.88	Open
11-10	109.79	3.49	75.02	Open
12-11	-157.21	5.00	145.86	Open
13-12	-157.39	5.01	146.17	Open
100-13	-157.46	5.01	146.29	Open
8-14	32.93	1.05	8.07	Open
14-15	32.80	1.04	8.01	Open
15-16	32.60	1.04	7.92	Open
17-16	32.34	1.03	7.80	Open
10-17	31.95	1.02	7.63	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Node Results (Max Day + Fire Flow - Node 12):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.78	37.61	0.00	
2	0.39	122.20	36.61	0.00	
3	0.39	121.54	35.49	0.00	
4	0.28	121.14	34.39	0.00	
5	0.13	122.31	36.00	0.00	
6	0.07	123.08	36.58	0.00	
7	0.09	120.46	33.79	0.00	
8	0.15	117.65	30.97	0.00	
9	0.13	116.89	30.52	0.00	
10	0.22	116.07	29.97	0.00	
11	0.13	114.02	28.01	0.00	
12	267.00	112.11	26.90	0.00	
13	0.07	119.61	34.43	0.00	
14	0.13	117.40	30.84	0.00	
15	0.20	117.20	31.01	0.00	
16	0.26	116.74	30.86	0.00	
17	0.39	116.30	30.15	0.00	
100	-181.85	122.90	0.00	0.00	Reservoir
200	-34.73	122.90	0.00	0.00	Reservoir
300	-53.74	123.30	0.00	0.00	Reservoir

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Link Results (Max Day + Fire Flow - Node 12):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	34.73	1.11	8.90	Open
1-2	34.45	1.10	8.77	Open
2-3	34.06	1.08	8.59	Open
4	33.67	1.07	8.40	Open
5-4	-53.54	1.70	19.84	Open
5-6	-53.67	1.71	19.93	Open
300-6	-53.74	1.71	19.98	Open
4-7	86.92	2.77	48.68	Open
7-8	86.83	2.76	48.59	Open
9-8	60.93	1.94	25.21	Open
10-9	60.80	1.94	25.11	Open
11-10	85.35	2.72	47.06	Open
12-11	85.22	2.71	46.93	Open
13-12	-181.78	5.79	190.86	Open
100-13	-181.85	5.79	191.00	Open
8-14	25.75	0.82	5.12	Open
14-15	25.62	0.82	5.07	Open
15-16	25.42	0.81	4.99	Open
17-16	25.16	0.80	4.90	Open
10-17	24.77	0.79	4.76	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Node Results (Max Day + Fire Flow - Node 14):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.77	37.60	0.00	
2	0.39	122.11	36.52	0.00	
3	0.39	121.38	35.33	0.00	
4	0.28	120.92	34.17	0.00	
5	0.13	122.21	35.90	0.00	
6	0.07	123.06	36.56	0.00	
7	0.09	120.16	33.49	0.00	
8	0.15	117.05	30.37	0.00	
9	0.13	117.22	30.85	0.00	
10	0.22	117.40	31.30	0.00	
11	0.13	119.09	33.08	0.00	
12	0.18	120.68	35.47	0.00	
13	0.07	122.22	37.04	0.00	
14	167.13	112.81	26.25	0.00	
15	0.20	113.48	27.29	0.00	
16	0.26	115.00	29.12	0.00	
17	0.87	116.54	30.39	0.00	
100	-77.47	122.90	0.00	0.00	Reservoir
200	-36.93	122.90	0.00	0.00	Reservoir
300	-56.57	123.30	0.00	0.00	Reservoir

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Link Results (Max Day + Fire Flow - Node 14):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	36.93	1.18	9.97	Open
1-2	36.65	1.17	9.83	Open
2-3	36.26	1.15	9.64	Open
4	35.87	1.14	9.45	Open
5-4	-56.37	1.79	21.83	Open
5-6	-56.50	1.80	21.92	Open
300-6	-56.57	1.80	21.97	Open
4-7	91.96	2.93	54.03	Open
7-8	91.87	2.92	53.93	Open
9-8	-26.70	0.85	5.47	Open
10-9	-26.83	0.85	5.52	Open
11-10	-77.09	2.45	38.97	Open
12-11	-77.22	2.46	39.09	Open
13-12	-77.40	2.46	39.26	Open
100-13	-77.47	2.47	39.33	Open
8-14	118.42	3.77	86.31	Open
14-15	-48.71	1.55	16.65	Open
15-16	-48.91	1.56	16.78	Open
17-16	-49.17	1.56	16.94	Open
10-17	-50.04	1.59	17.50	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Node Results (Max Day + Fire Flow - Node 15):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.77	37.60	0.00	
2	0.39	122.13	36.54	0.00	
3	0.39	121.41	35.36	0.00	
4	0.28	120.96	34.21	0.00	
5	0.13	122.23	35.92	0.00	
6	0.07	123.06	36.56	0.00	
7	0.09	120.22	33.55	0.00	
8	0.15	117.17	30.49	0.00	
9	0.13	117.22	30.85	0.00	
10	0.22	117.27	31.17	0.00	
11	0.13	119.00	32.99	0.00	
12	0.18	120.63	35.42	0.00	
13	0.07	122.21	37.03	0.00	
14	0.13	113.80	27.24	0.00	
15	167.20	111.07	24.88	0.00	
16	0.26	113.49	27.61	0.00	
17	0.87	115.92	29.77	0.00	
100	-78.43	122.90	0.00	0.00	Reservoir
200	-36.51	122.90	0.00	0.00	Reservoir
300	-56.03	123.30	0.00	0.00	Reservoir

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Link Results (Max Day + Fire Flow - Node 15):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	36.51	1.16	9.77	Open
1-2	36.23	1.15	9.63	Open
2-3	35.84	1.14	9.44	Open
4	35.45	1.13	9.25	Open
5-4	-55.83	1.78	21.44	Open
5-6	-55.96	1.78	21.53	Open
300-6	-56.03	1.78	21.58	Open
4-7	91.00	2.90	53.00	Open
7-8	90.91	2.89	52.90	Open
9-8	-13.86	0.44	1.62	Open
10-9	-13.99	0.45	1.65	Open
11-10	-78.05	2.48	39.87	Open
12-11	-78.18	2.49	40.00	Open
13-12	-78.36	2.49	40.17	Open
100-13	-78.43	2.50	40.23	Open
8-14	104.62	3.33	68.61	Open
14-15	104.49	3.33	68.45	Open
15-16	-62.71	2.00	26.59	Open
17-16	-62.97	2.00	26.79	Open
10-17	-63.84	2.03	27.48	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
Node Results (Max Day + Fire Flow - Node 16):
------------------------------------------------------------------
Node                Demand      Head  Pressure   Quality
ID                     LPS         m         m
------------------------------------------------------------------
1                      0.28    122.77     37.60      0.00
2                      0.39    122.14     36.55      0.00
3                      0.39    121.43     35.38      0.00
4                      0.28    120.99     34.24      0.00
5                      0.13    122.24     35.93      0.00
6                      0.07    123.07     36.57      0.00
7                      0.09    120.26     33.59      0.00
8                      0.15    117.25     30.57      0.00
9                      0.13    117.22     30.85      0.00
10                     0.22    117.18     31.08      0.00
11                     0.13    118.94     32.93      0.00
12                     0.18    120.59     35.38      0.00
13                     0.07    122.20     37.02      0.00
14                     0.13    115.27     28.71      0.00
15                     0.20    113.67     27.48      0.00
16                   167.26    110.02     24.14      0.00
17                     0.87    114.63     28.48      0.00
100                  -79.11    122.90      0.00      0.00 Reservoir
200                  -36.21    122.90      0.00      0.00 Reservoir
300                  -55.64    123.30      0.00      0.00 Reservoir
```

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Link Results (Max Day + Fire Flow - Node 16):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	36.21	1.15	9.62	Open
1-2	35.93	1.14	9.48	Open
2-3	35.54	1.13	9.29	Open
4	35.15	1.12	9.10	Open
5-4	-55.44	1.76	21.17	Open
5-6	-55.57	1.77	21.26	Open
300-6	-55.64	1.77	21.31	Open
4-7	90.32	2.87	52.26	Open
7-8	90.23	2.87	52.16	Open
9-8	11.49	0.37	1.15	Open
10-9	11.36	0.36	1.12	Open
11-10	-78.73	2.51	40.53	Open
12-11	-78.86	2.51	40.65	Open
13-12	-79.04	2.52	40.82	Open
100-13	-79.11	2.52	40.89	Open
8-14	78.58	2.50	40.38	Open
14-15	78.45	2.50	40.26	Open
15-16	78.25	2.49	40.07	Open
17-16	-89.01	2.83	50.86	Open
10-17	-89.88	2.86	51.79	Open

```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
```

Node Results (Max Day + Fire Flow - Node 17):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.28	122.78	37.61	0.00	
2	0.39	122.18	36.59	0.00	
3	0.39	121.50	35.45	0.00	
4	0.28	121.09	34.34	0.00	
5	0.13	122.29	35.98	0.00	
6	0.07	123.08	36.58	0.00	
7	0.09	120.39	33.72	0.00	
8	0.15	117.51	30.83	0.00	
9	0.13	117.21	30.84	0.00	
10	0.22	116.88	30.78	0.00	
11	0.13	118.73	32.72	0.00	
12	0.18	120.47	35.26	0.00	
13	0.07	122.16	36.98	0.00	
14	0.13	116.62	30.06	0.00	
15	0.20	115.91	29.72	0.00	
16	0.26	114.29	28.41	0.00	
17	167.87	112.69	26.54	0.00	
100	-81.30	122.90	0.00	0.00	Reservoir
200	-35.26	122.90	0.00	0.00	Reservoir
300	-54.41	123.30	0.00	0.00	Reservoir

```
******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
*                         Version 2.2                            *
******************************************************************
```

Link Results (Max Day + Fire Flow - Node 17):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	35.26	1.12	9.15	Open
1-2	34.98	1.11	9.02	Open
2-3	34.59	1.10	8.83	Open
4	34.20	1.09	8.65	Open
5-4	-54.21	1.73	20.30	Open
5-6	-54.34	1.73	20.39	Open
300-6	-54.41	1.73	20.44	Open
4-7	88.13	2.81	49.94	Open
7-8	88.04	2.80	49.84	Open
9-8	37.03	1.18	10.02	Open
10-9	36.90	1.17	9.96	Open
11-10	-80.92	2.58	42.64	Open
12-11	-81.05	2.58	42.76	Open
13-12	-81.23	2.59	42.94	Open
100-13	-81.30	2.59	43.01	Open
8-14	50.86	1.62	18.04	Open
14-15	50.73	1.61	17.96	Open
15-16	50.53	1.61	17.83	Open
17-16	50.27	1.60	17.66	Open
10-17	-117.60	3.74	85.20	Open

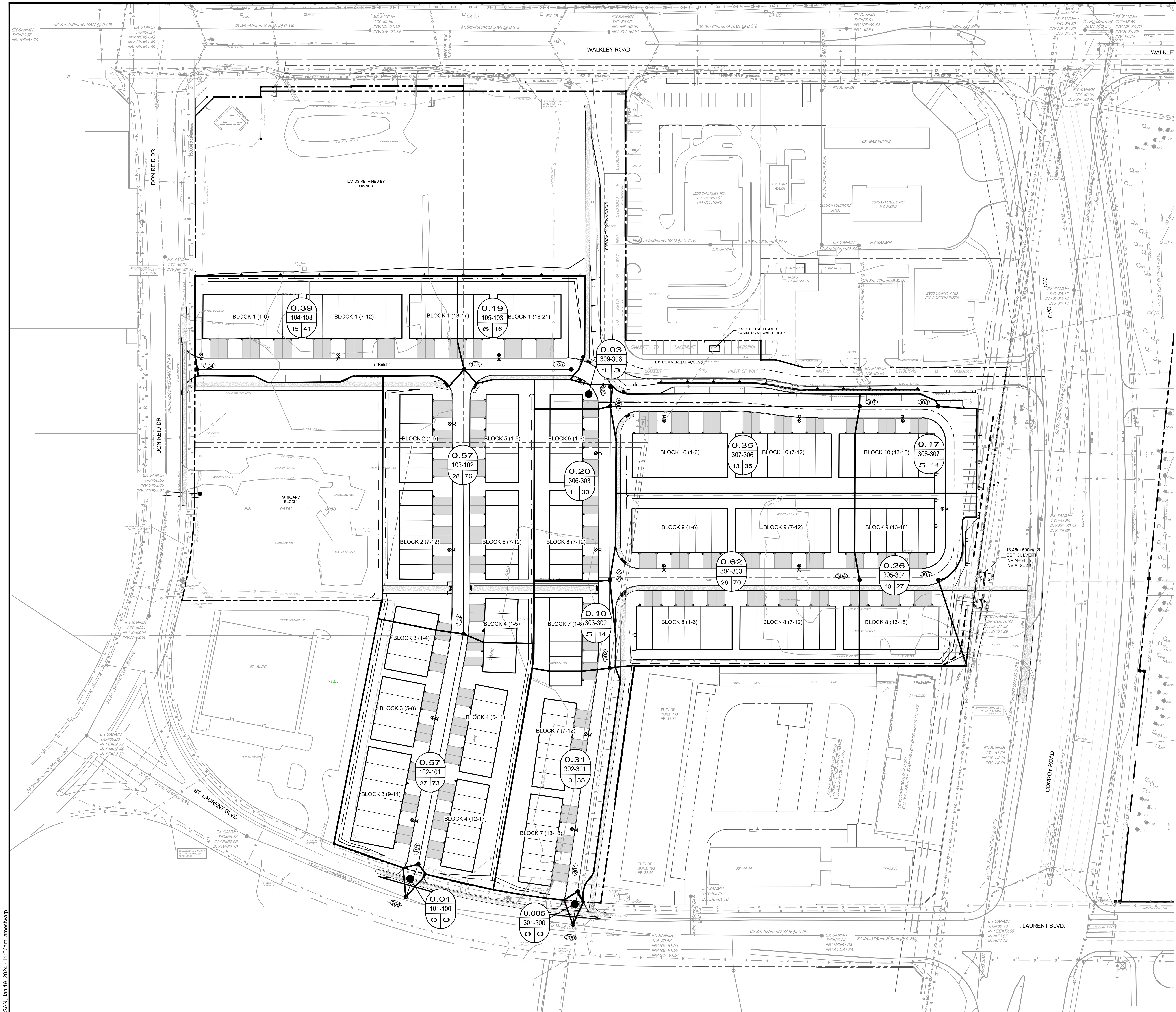
```
******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
*                         Version 2.2                            *
******************************************************************
Node Results (Peak Hour):
------------------------------------------------------------------
Node                Demand      Head  Pressure   Quality
ID                     LPS         m         m
------------------------------------------------------------------
1                      0.63    130.30     45.13      0.00
2                      0.87    130.30     44.71      0.00
3                      0.87    130.29     44.24      0.00
4                      0.63    130.29     43.54      0.00
5                      0.29    130.30     43.99      0.00
6                      0.14    130.30     43.80      0.00
7                      0.19    130.29     43.62      0.00
8                      0.34    130.29     43.61      0.00
9                      0.29    130.29     43.92      0.00
10                     0.48    130.29     44.19      0.00
11                     0.29    130.29     44.28      0.00
12                     0.39    130.30     45.09      0.00
13                     0.14    130.30     45.13      0.00
14                     0.29    130.29     43.73      0.00
15                     0.43    130.29     44.10      0.00
16                     0.58    130.29     44.41      0.00
17                     0.87    130.29     44.14      0.00
100                   -2.62    130.30      0.00      0.00 Reservoir
200                   -2.68    130.30      0.00      0.00 Reservoir
300                   -2.42    130.30      0.00      0.00 Reservoir
```

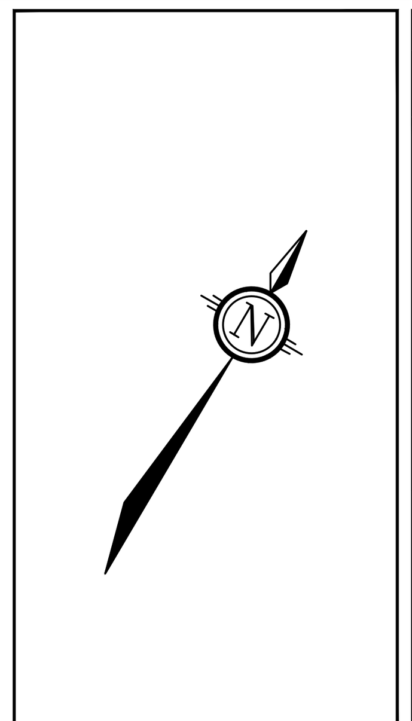
```
******************************************************************
*                           E P A N E T                          *
*                    Hydraulic and Water Quality                 *
*                    Analysis for Pipe Networks                  *
*                         Version 2.2                            *
******************************************************************
```

Link Results (Peak Hour):

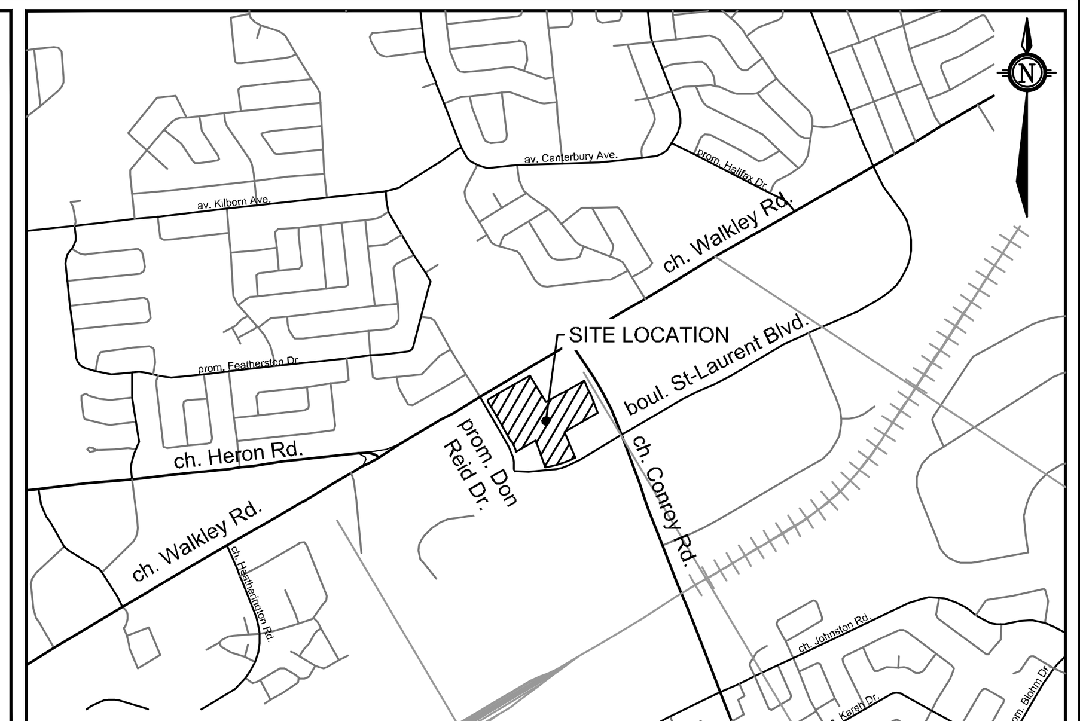
Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
200-1	2.68	0.09	0.08	Open
1-2	2.05	0.07	0.05	Open
2-3	1.18	0.04	0.02	Open
4	0.31	0.01	0.00	Open
5-4	-1.99	0.06	0.04	Open
5-6	-2.28	0.07	0.06	Open
300-6	-2.42	0.08	0.06	Open
4-7	1.67	0.05	0.03	Open
7-8	1.48	0.05	0.03	Open
9-8	0.15	0.00	0.00	Open
10-9	-0.14	0.00	0.00	Open
11-10	-1.80	0.06	0.04	Open
12-11	-2.09	0.07	0.05	Open
13-12	-2.48	0.08	0.07	Open
100-13	-2.62	0.08	0.07	Open
8-14	0.99	0.03	0.01	Open
14-15	0.70	0.02	0.01	Open
15-16	0.27	0.01	0.00	Open
17-16	-0.31	0.01	0.00	Open
10-17	-1.18	0.04	0.02	Open

Appendix C
Sanitary Servicing





NORTH



KEY PLAN
N.T.S.

LEGEND

- SITE PROPERTY LINE
- MISC LEGAL LINE (EASEMENT, PROPERTY LINES) REFER TO LEGAL PLAN FOR DETAILS
- TACTILE WALKING SURFACE INDICATOR (TWSI) PER CITY DETAIL SC7.3
- PROPOSED SIDEWALK
- PROPOSED RETAINING WALL C/W RAILING
- PROPOSED CURB
- DC — PROPOSED DEPRESSED CURB
- PROPOSED ASPHALT DRIVEWAY
- SWALE c/w SUBDRAIN AND DIRECTION OF FLOW
- 101 — PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY SEWER AND FLOW DIRECTION
- PROPOSED SERVICE LATERALS REFER TO DETAIL ON DWG. 122040 ND1
- SANITARY DRAINAGE AREA BOUNDARY
- AREA / 110-108 / 24 51 — AREA IN HECTARES; MANHOLE TO MANHOLE; POPULATION EQUIVALENT
- SAN MH — EXISTING SANITARY MANHOLE & SEWER

M:\2022\122040\CAD\Civil\122040-SAN.dwg, SAN, Jan 19, 2024 - 11:00am, arnestwarp

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

CLARIDGE HOMES

CLARIDGE HOMES
505 PRESTON STREET,
2ND FLOOR
OTTAWA , ONTARIO
K1S 4N7.

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
5.	REVISED PER CITY COMMENTS	JAN 31/24	ARM
4	REVISED SITE PLAN	SEPT 29/23	ARM
3	ISSUED FOR UTILITY COORDINATION	SEPT 20/23	ARM
2.	REVISED PER CITY COMMENTS	MAY 26/23	GJM
1.	ISSUED IN SUPPORT OF DEVELOPMENT APPLICATIONS	NOV 01/22	GJM

SCALE
1:750
1:750
0 10 20 30

DESIGN	ARM
CHECKED	GJM
DRAWN	CJF/ARM
CHECKED	ARM
APPROVED	GJM

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

DRAWING NAME
SANITARY DRAINAGE PLAN

PROJECT No. 122040
REV REV#5
DRAWING No. 122040-SAN

PLANA1.DWG - 841mmx594mm

SANITARY SEWER DESIGN SHEET

Novatech Project #: 122040
Project Name: Conroy Walkey
Date Prepared: 9/7/2022
Date Revised: 10/24/2022
Date Revised: 5/30/2022
Date Revised: 7/11/2023
Date Revised: 9/27/2023
Input By: Curtis Ferguson
Reviewed By: Anthony Mestwarp
Drawing Reference: 122040-SAN

Legend:
PROJECT SPECIFIC INFO
USER DESIGN INPUT
CUMULATIVE CELL
CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION		DEMAND											DESIGN CAPACITY							
		RESIDENTIAL FLOW						EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN							
FROM MH	TO MH	Townhomes	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap
West Connection (St. Laurent Boulevard)																			
105	103	6	0.016	0.016	3.71	0.05	0.19	0.19	0.19	0.06	0.26	41.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.5%
104	103	15	0.041	0.041	3.67	0.13	0.48	0.39	0.39	0.13	0.61	102.2	250 PVC	0.254	0.013	0.65	50.0	0.99	1.2%
103	102	28	0.076	0.132	3.57	0.43	1.53	0.57	1.15	0.38	1.91	101.2	250 PVC	0.254	0.013	0.30	34.0	0.67	5.6%
102	101	27	0.073	0.205	3.52	0.67	2.34	0.57	1.72	0.57	2.91	89.9	250 PVC	0.254	0.013	0.30	34.0	0.67	8.5%
101	100	0	0.000	0.205	3.52	0.67	2.34	0.01	1.73	0.57	2.91	13.4	250 PVC	0.254	0.013	0.30	34.0	0.67	8.6%
East Connection (St. Laurent Bouldevard)																			
309	306	1	0.003	0.003	3.76	0.01	0.03	0.03	0.03	0.01	0.04	7.5	250 PVC	0.254	0.013	0.65	50.0	0.99	0.1%
308	307	5	0.014	0.014	3.72	0.04	0.16	0.17	0.17	0.06	0.22	30.1	250 PVC	0.254	0.013	0.65	50.0	0.99	0.4%
307	306	13	0.035	0.049	3.65	0.16	0.58	0.35	0.52	0.17	0.75	95.5	250 PVC	0.254	0.013	0.30	34.0	0.67	2.2%
306	303	11	0.030	0.081	3.61	0.26	0.95	0.20	0.75	0.25	1.20	66.4	250 PVC	0.254	0.013	0.30	34.0	0.67	3.5%
305	304	10	0.027	0.027	3.69	0.09	0.32	0.26	0.26	0.09	0.41	30.1	250 PVC	0.254	0.013	0.65	50.0	0.99	0.8%
304	303	26	0.070	0.097	3.60	0.32	1.13	0.62	0.88	0.29	1.42	95.7	250 PVC	0.254	0.013	0.30	34.0	0.67	4.2%
303	302	5	0.014	0.192	3.52	0.62	2.19	0.10	1.73	0.57	2.76	33.8	250 PVC	0.254	0.013	0.30	34.0	0.67	8.1%
302	301	13	0.035	0.227	3.50	0.74	2.57	0.31	2.04	0.67	3.25	86.4	250 PVC	0.254	0.013	0.30	34.0	0.67	9.6%
301	300	0	0.000	0.227	3.50	0.74	2.57	0.01	2.05	0.68	3.25	12.8	250 PVC	0.254	0.013	0.30	34.0	0.67	9.6%
TOTAL		160	0.432	0.432				3.78											

Design Parameters:

1. Residential Flows
   - Townhome 2.7 Person/ Unit
3. q Avg capita flow 280 L/per/day
4. M = Harmon Formula (maximum of 4.0)
5. K = 0.8
6. Commercial Peak Factor
   - -area > 20% of development 1.5
   - -area < 20% of development 1.0
8. Extraneous Flows = 0.33 L/sec/ha

CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2)

Where : Q full = Capacity (L/s)

n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

SANITARY SEWER DESIGN SHEET

Project Name: Conroy Walkey
Date Prepared: 9/7/2022
Date Revised: 10/24/2022
Date Revised: 5/30/2022
Date Revised: 7/11/2023
Date Revised: 9/27/2023
Input By: Curtis Ferguson
Reviewed By: Anthony Mestwarp
Drawing Reference: 122040-SAN

USER DESIGN INPUT
CUMULATIVE CELL
CALCULATED DESIGN CELL OUTPUT

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION		DEMAND										DESIGN CAPACITY							
		RESIDENTIAL FLOW						EXTRANEOUS FLOW				PROPOSED SEWER PIPE SIZING / DESIGN							
FROM MH	TO MH	Townhomes	POPULATION (in 1000's)	CUMULATIVE POPULATION (in 1000's)	PEAK FACTOR M	AVG POPULATION FLOW (L/s)	PEAKED DESIGN POP FLOW (L/s)	Total Area (ha.)	Accum. Area (ha.)	DESIGN EXTRAN. FLOW (L/s)	TOTAL DESIGN FLOW (L/s)	PIPE LENGTH (m)	PIPE SIZE (mm) AND MATERIAL	PIPE ID ACTUAL (m)	ROUGH. (n)	DESIGN GRADE (%)	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	Qpeak Design / Qcap

Appendix D
Storm Servicing

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 122040
Project Name: 2510 St. Laurent Blvd.
Date Prepared: 5/31/2023
Date Revised: 9/27/2023
Date Revised: 1/16/2024
Input By: Anthony Mestwarp, P.Eng
Reviewed By: Greg MacDonald, P.Eng
Drawing Reference: 122040-SWM

Legend:
- PROJECT SPECIFIC INFO
- USER DESIGN INPUT
- CUMILATIVE CELL
- CALCULATED DESIGN CELL OUTPUT
- USER AS-BUILT INPUT

LOCATION			DEMAND												CAPACITY						
			AREA							FLOW					PROPOSED SEWER PIPE SIZING / DESIGN						
From MH	To MH	Area ID	Hardscape	Landscaping	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 2yr	5yr	100yr	Peak Flow	TOTAL UNRESTRICTED PEAK FLOW (QDesign)	PIPE PROPERTIES LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
			0.90	0.20	(ha)				(min.)				(L/s)	(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
West System (200 - Series)'																							
205	203	A-11	0.111	0.123	0.234	0.53	0.35	0.35	10.00	76.81			26.62	**26.6**	41.6	300 PVC	0.3048	0.013	0.65	81.3	1.11	0.62	32.7%
			0.000				0.00	0.00	10.00				0.00										
			0.000				0.00	0.00	10.00				0.00										
205	203	A-10	0.149	0.042	0.190	0.75	0.40																
			0.000				0.00																
			0.000				0.00																
		A-09	0.053	0.012	0.065	0.77	0.14	0.53	10.00	76.81			41.00	**41.0**	102.2	375 PVC	0.381	0.013	0.65	147.5	1.29	1.32	27.8%
			0.000				0.00	0.00	10.00				0.00										
			0.000				0.00	0.00	10.00				0.00										
203	202	A-08	0.119	0.134	0.254	0.53	0.37																
			0.000				0.00																
			0.000				0.00																
		A-07	0.111	0.031	0.142	0.75	0.30																
			0.000				0.00																
			0.000				0.00																
		A-06	0.112	0.036	0.149	0.73	0.30																
			0.000				0.00																
			0.000				0.00																
		A-05	0.046	0.058	0.104	0.51	0.15	2.00	11.32	72.09			143.97	**144.0**	100.9	450 PVC	0.4572	0.013	0.30	162.9	0.99	1.69	88.4%
			0.000				0.00	0.00	11.32				0.00										
			0.000				0.00	0.00	11.32				0.00										
202	201	A-04	0.095	0.168	0.263	0.45	0.33																
			0.000				0.00																
			0.000				0.00																
		A-03	0.122	0.031	0.153	0.76	0.32																
			0.000				0.00																
			0.000				0.00																
		A-02	0.132	0.034	0.166	0.76	0.35																
			0.000				0.00																
			0.000				0.00																
		A-01	0.071	0.080	0.151	0.53	0.22	3.22	13.01	66.90			215.68	**215.7**	90.8	525 CONC	0.5334	0.013	0.30	245.7	1.10	1.38	87.8%
			0.000				0.00	0.00	13.01				0.00										
			0.000				0.00	0.00	13.01				0.00										
201	EX		0.000				0.00	3.22	14.39	63.25			203.93	**203.9**	3.7	525 CONC	0.5334	0.013	0.30	245.7	1.10	0.06	83.0%
			0.000				0.00	0.00	14.39				0.00										
			0.000				0.00	0.00	14.39				0.00										

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			DEMAND													CAPACITY								
			AREA							FLOW						PROPOSED SEWER PIPE SIZING / DESIGN								
From MH	To MH	Area ID	Hardscape	Landscaping	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 2yr	5yr	100yr	Peak Flow	TOTAL UNRESTRICTED PEAK FLOW (QDesign)	PIPE PROPERTIES LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
			0.90	0.20	(ha)				(min.)				(L/s)	(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
East System (400 - Series)'																								
408	407		0.000				0.00	0.00	10.00				0.00										
			0.000				0.00	0.00	10.00				0.00	**0.0**	35.5	250 PVC	0.254	0.013	0.65	50.0	0.99	0.60	0.0%
			0.000				0.00	0.00	10.00				0.00										
407	406		0.000				0.00	0.00	10.65				0.00										
			0.000				0.00	0.00	10.65				0.00	**0.0**	91.6	250 PVC	0.254	0.013	0.30	34.0	0.67	2.28	0.0%
			0.000				0.00	0.00	10.65				0.00										
505	406	B-19	0.056	0.011	0.067	0.78	0.15																
			0.000				0.00																
			0.000				0.00																
		B-18	0.044	0.018	0.062	0.69	0.12																
			0.000				0.00																
			0.000				0.00																
		B-17	0.108	0.033	0.140	0.74	0.29																
			0.000				0.00																
			0.000				0.00																
		B-16	0.046	0.002	0.048	0.87	0.12																
			0.000				0.00																
			0.000				0.00																
		B-15	0.049	0.010	0.059	0.78	0.13																
			0.000				0.00																
			0.000				0.00																
		B-14	0.016	0.005	0.021	0.73	0.04																
			0.000				0.00																
			0.000				0.00																
		B-13	0.042	0.023	0.064	0.65	0.12																
			0.000				0.00																
			0.000				0.00																
		B-12	0.073	0.027	0.100	0.71	0.20	1.15	10.00	76.81			88.57										
			0.000				0.00	0.00	10.00				0.00	**88.6**	10.3	375 PVC	0.381	0.013	1.00	182.9	1.60	0.11	48.4%
			0.000				0.00	0.00	10.00				0.00										
406	403	B-06	0.092	0.024	0.116	0.75	0.24	1.40	12.93	67.14			93.74										
			0.000				0.00	0.00	12.93				0.00	**93.7**	69.4	450 PVC	0.4572	0.013	0.30	162.9	0.99	1.17	57.5%
			0.000				0.00	0.00	12.93				0.00										
405	404	B-10	0.125	0.029	0.153	0.77	0.33																
			0.000				0.00																
			0.000				0.00																
		B-09	0.110	0.027	0.137	0.76	0.29	0.62	10.00	76.81			47.41										
			0.000				0.00	0.00	10.00				0.00	**47.4**	35.5	300 PVC	0.3048	0.013	0.65	81.3	1.11	0.53	58.3%
			0.000				0.00	0.00	10.00				0.00										
404	403	B-08	0.084	0.022	0.107	0.75	0.22																
			0.000				0.00																
			0.000				0.00																
		B-07	0.095	0.023	0.118	0.77	0.25	1.09	10.53	74.83			81.68										
			0.000				0.00	0.00	10.53				0.00	**81.7**	91.8	450 PVC	0.4572	0.013	0.30	162.9	0.99	1.54	50.1%
			0.000				0.00	0.00	10.53				0.00										
403	402		0.000				0.00	2.49	14.09	64.00			159.22										
			0.000				0.00	0.00	14.09				0.00	**159.2**	30.4	525 CONC	0.5334	0.013	0.30	245.7	1.10	0.46	64.8%
			0.000				0.00	0.00	14.09				0.00										

STORM SEWER DESIGN SHEET

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION		DEMAND												CAPACITY						
		AREA				FLOW								PROPOSED SEWER PIPE SIZING / DESIGN						
From MH	To MH	Area ID	Hardscape	Landscaping	Total Area	Weighted Runoff Coefficient	Indivi 2.78 AR	Accum 2.78 AR	Time of Concentration	Rain Intensity (mm/hr) 2yr	5yr	100yr	Peak Flow	TOTAL UNRESTRICTED PEAK FLOW (QDesign)	PIPE PROPERTIES LENGTH	SIZE / MATERIAL	ID ACTUAL	ROUGHNESS	DESIGN GRADE	CAPACITY	FULL FLOW VELOCITY	TIME OF FLOW	QPEAK DESIGN / QFULL
			0.90	0.20	(ha)				(min.)				(L/s)	(L/s)	(m)	(mm / type)	(m)		(%)	(L/s)	(m/s)	(min.)	(%)
402	401	EX-01	0.000	0.024	0.024	0.20	0.01																
			0.000				0.00																
			0.000				0.00																
		B-05	0.092	0.120	0.212	0.50	0.30																
			0.000				0.00																
			0.000				0.00																
		B-02	0.072	0.025	0.097	0.72	0.19																
			0.000				0.00																
			0.000				0.00																
		B-01	0.122	0.031	0.153	0.76	0.32	3.31	14.55	62.84			208.32										
			0.000				0.00	0.00	14.55				0.00	**208.3**	90.7	600 CONC	0.6096	0.013	0.30	350.8	1.20	1.26	59.4%
			0.000				0.00	0.00	14.55				0.00										
401	400		0.000				0.00	3.31	15.81	59.92			198.63										
			0.000				0.00	0.00	15.81				0.00	**198.6**	9.0	600 CONC	0.6096	0.013	0.30	350.8	1.20	0.12	56.6%
			0.000				0.00	0.00	15.81				0.00										
Commercial Road System (600 - Series)'																							
601	600	C-01	0.066	0.015	0.081	0.77	0.17																
			0.000				0.00																
			0.000				0.00																
		C-02	0.051	0.020	0.071	0.71	0.14																
			0.000				0.00																
			0.000				0.00																
		C-03	0.025	0.012	0.037	0.68	0.07																
			0.000				0.00																
			0.000				0.00																
		C-04	0.026	0.010	0.035	0.71	0.07																
			0.000				0.00																
			0.000				0.00																
		C-05	0.023	0.008	0.031	0.73	0.06																
			0.000				0.00																
			0.000				0.00																
		C-06	0.026	0.009	0.035	0.72	0.07	0.58	10.00	76.81			44.92										
			0.000				0.00	0.00	10.00				0.00	**44.9**	4.7	375 PVC	0.381	0.013	0.50	129.3	1.13	0.07	34.7%
			0.000				0.00	0.00	10.00				0.00										
600	599		0.000				0.00	0.58	10.07	76.54			44.77										
			0.000				0.00	0.00	10.07				0.00	**44.8**	26.0	375 PVC	0.381	0.013	0.50	129.3	1.13	0.38	34.6%
			0.000				0.00	0.00	10.07				0.00										

DEMAND EQUATION

Q = 2.78 AIR

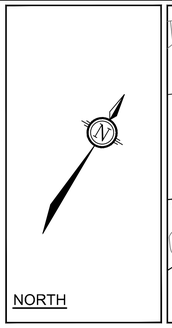
Where : Q = Peak flow in litres per second (L/s)
A = Area in hectares (ha)
R = Weighted runoff coefficient (increased by 25% for 100-year)
I = Rainfall intensity in millimeters per hour (mm/hr)
Rainfall Intensity (I) is based on City of Ottawa IDF data presented in the City of Ottawa Sewer Design Guidelines (Oct. 2012)

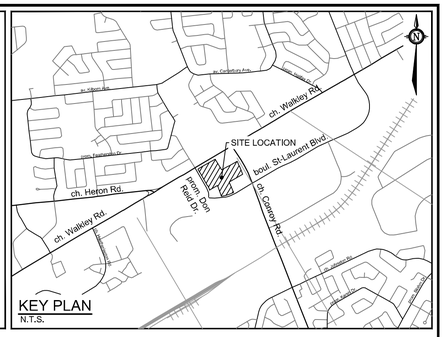
CAPACITY EQUATION

Q full= (1/n) A R^(2/3)So^(1/2

Where : Q full = Capacity (L/s)
n = Manning coefficient of roughness (0.013)
A = Flow area (m^2)
R = Wetter perimenter (m)
So = Pipe Slope/gradient

Appendix E
Stormwater Management





LEGEND

- PROPERTY LINE
- STM MH — EXISTING STORM MANHOLE & SEWER
- CB 1 — EXISTING CATCHBASIN
- STORM SEWER DRAINAGE AREA BOUNDARY
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha) / DRAINAGE AREA ID / RUNOFF COEFFICIENT
- EXISTING ASPHALT AREA
- EXISTING GRAVEL/ BROKEN ASPHALT AREA

NOTE: EQUIVALENT COEFFICIENT CALCULATED USING SCS. REFER TO PCSWM OUTPUT FOR DETAILS.

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

CLARIDGE HOMES

CLARIDGE HOMES
505 PRESTON STREET,
2ND FLOOR
OTTAWA , ONTARIO
K1S 4N7.

CLARIDGE HOMES

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
4	REVISED SITE PLAN	SEPT 29/23	ARM
3	ISSUED FOR UTILITY COORDINATION	SEPT 20/23	ARM
2.	REVISED PER CITY COMMENTS	MAY 26/23	GJM
1.	ISSUED IN SUPPORT OF DEVELOPMENT APPLICATIONS	NOV 01/22	GJM

SCALE
1:750
1:750
0 10 20 30

DESIGN ARM
CHECKED GJM
DRAWN CJF/ARM
CHECKED ARM
APPROVED GJM

FOR REVIEW ONLY
ISSUED FOR REVIEW
ISSUED FOR REVIEW

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

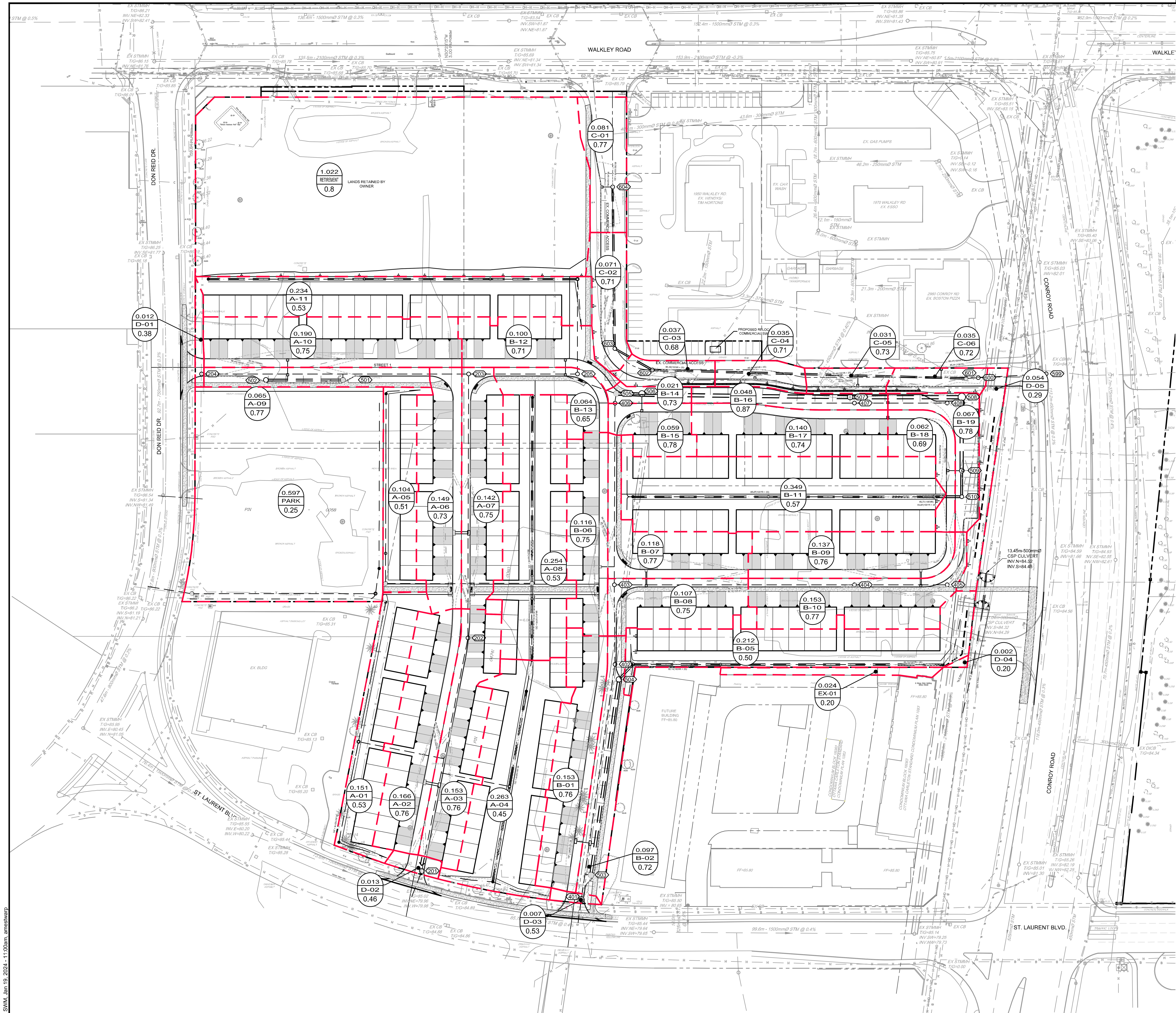
LOCATION
CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

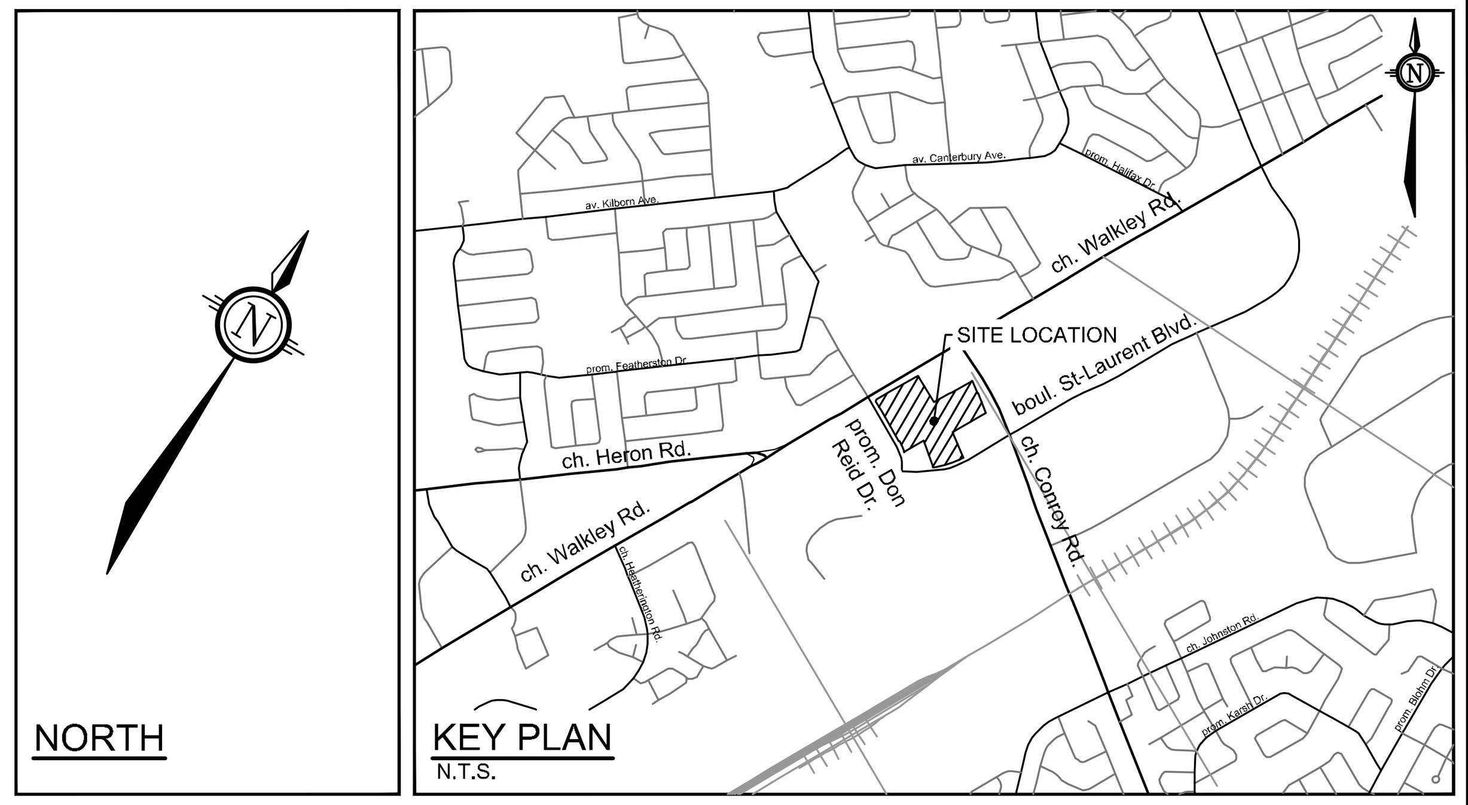
DRAWING NAME
PRE-DEVELOPMENT
STORM DRAINAGE AREA
PLAN

PROJECT No. 122040
REV REV#4
DRAWING No. 122040-EXSWM

M:\2022\122040\CAD\Civil\122040-EXSWM.dwg, EXSWM, May 30, 2023 - 3:45pm, amestwarp

PLEASE PRINT - SVP IMPRIMER





LEGEND

- PROPERTY LINE
- MISC LEGAL LINE (EASEMENT, PROPERTY LINES) REFER TO LEGAL PLAN FOR DETAILS
- TACTILE WALKING SURFACE INDICATOR (TWSI) PER CITY DETAIL SC7.3
- PROPOSED SIDEWALK
- PROPOSED RETAINING WALL C/W RAILING
- PROPOSED CURB
- DC PROPOSED DEPRESSED CURB
- PROPOSED ASPHALT DRIVEWAY
- SWALE c/w SUBDRAIN AND DIRECTION OF FLOW
- TERRACING 3:1 SLOPE MAX (UNLESS OTHERWISE INDICATED)
- STORM SEWER DRAINAGE AREA BOUNDARY
- 0.085 / A-16 / 0.78 — DRAINAGE AREA (ha), DRAINAGE AREA ID, RUNOFF COEFFICIENT
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED STORM MANHOLE C/W ICD
- PROPOSED STORMWATER MANAGEMENT PIPE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN MANHOLE C/W ICD
- PROPOSED CATCHBASIN
- PROPOSED CATCHBASIN C/W ICD
- PROPOSED CATCHBASIN
- PROPOSED CATCHBASIN C/W ICD
- PROPOSED LANDSCAPE DRAIN
- 99.06 — 1:100 YEAR PONDING AREA AND ELEVATION
- 98.01 — 1:100 YEAR (+20%) PONDING AREA AND ELEVATION
- MAJOR OVERLAND FLOW ROUTE
- STM MH — EXISTING STORM MANHOLE & SEWER
- CB 1 — EXISTING CATCHBASIN
- EXISTING DITCH CENTRELINE

NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

CLARIDGE HOMES

CLARIDGE HOMES
505 PRESTON STREET,
2ND FLOOR
OTTAWA , ONTARIO
K1S 4N7.

NOT FOR CONSTRUCTION

No.	REVISION	DATE	BY
5.	REVISED PER CITY COMMENTS	JAN 31/24	ARM
4	REVISED SITE PLAN	SEPT 29/23	ARM
3	ISSUED FOR UTILITY COORDINATION	SEPT 20/23	ARM
2.	REVISED PER CITY COMMENTS	MAY 26/23	GJM
1.	ISSUED IN SUPPORT OF DEVELOPMENT APPLICATIONS	NOV 01/22	GJM

SCALE 1:750

DESIGN ARM
CHECKED GJM
DRAWN CJF/ARM
CHECKED ARM
APPROVED GJM

FOR REVIEW ONLY

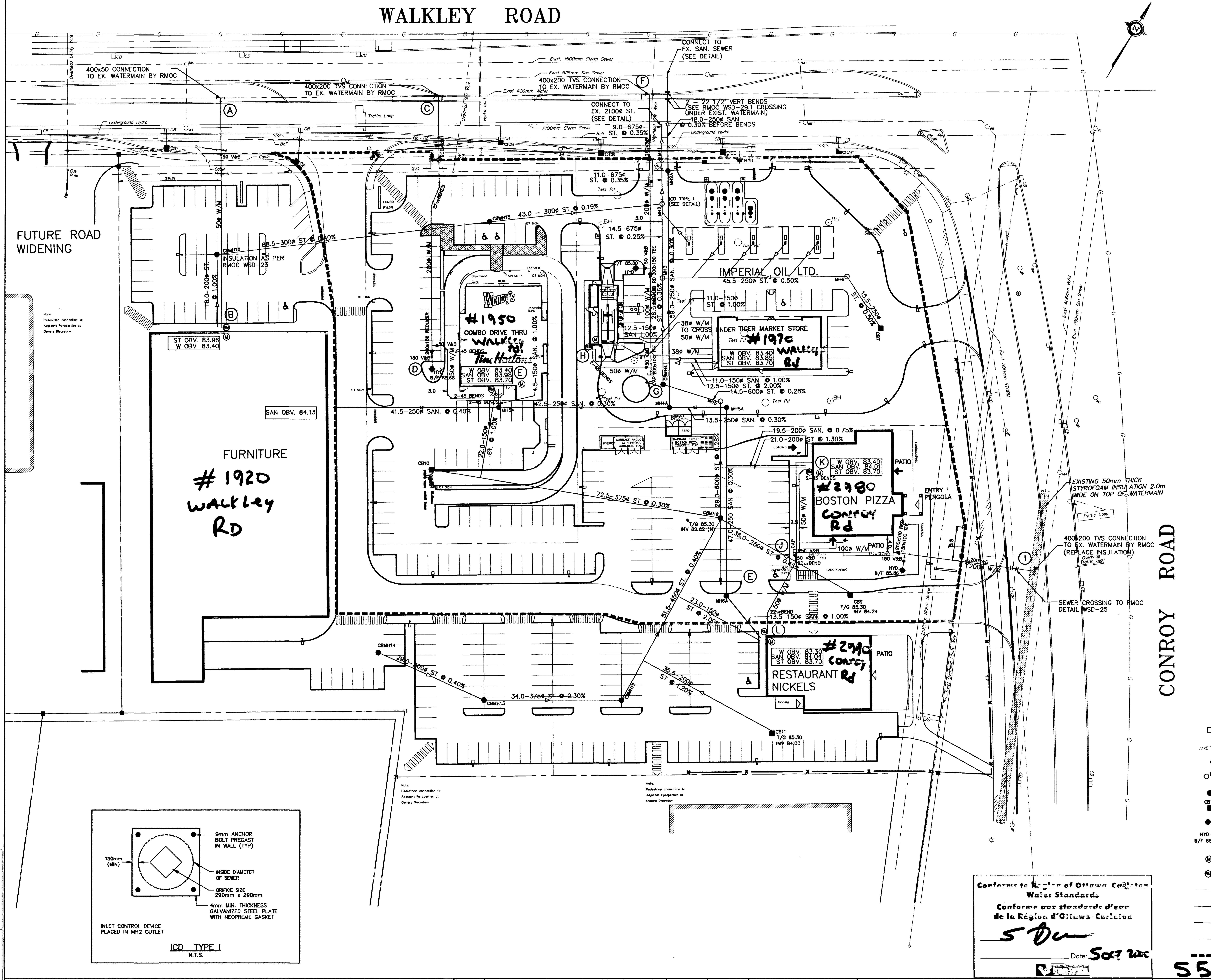
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

DRAWING NAME
STORMWATER MANAGEMENT PLAN

PROJECT No. 122040
REV REV#5
DRAWING No. 122040-SWM

M:\2022\122040\CAD\Civil\122040-SWM.dwg, SWM, Jan 19, 2024 - 11:00am, arnestwarp



LEGEND:

- EXISTING LIGHT STANDARD
- EXISTING UTILITY POLE
- EXISTING HANDHOLE
- EXISTING TRAFFIC MANHOLE
- EXISTING BELL MANHOLE
- EXISTING CATCHBASIN
- EXISTING HYDRANT
- EXISTING MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED SANITARY MANHOLE
- PROPOSED HYDRANT C/W BOTTOM OF FLANGE
- PROPOSED WATER METER
- PROPOSED WATER REMOTE METER
- EXISTING UNDERGROUND HYDRO
- EXISTING BELL CABLE
- EXISTING CATV CABLE
- EXISTING GAS MAIN
- PHASE 1 LIMIT

WATERMAIN SCHEDULE				
LOCATION		ELEVATIONS (m)		
STA.	DESCRIPTION	PROPOSED GRADE	TOP OF W/M	ASBUILT TOP OF W/M
(A) 0+000	400x50TVS	±86.00	±83.80	
0+014	50 V&B	85.90	83.50	
0+025	-	85.70	83.30	
0+039	STORM SEWER CROSSING	85.31	82.91	
(B) 0+057	BUILDING ENTRANCE	85.80	83.40	
(C) 0+000	400x200 TVS	±86.23	±83.80	
0+016	200 V&B	86.10	83.70	
0+023	22 1/2° BEND	85.76	83.36	
0+028	22 1/2° BEND	85.61	83.21	
0+034	STORM SEWER CROSSING	85.45	83.05	
0+050	-	85.60	83.20	
(D) 0+063	50ø W/M SERVICE	85.63	83.23	
0+065	200x150 REDUCER	85.63	83.23	
(D) 0+000	50ø W/M SERVICE	85.63	83.23	
0+003	45° BEND	85.69	83.29	
0+004.5	45° BEND	85.71	83.31	
0+016.5	45° BEND	85.60	83.20	
0+018	45° BEND	85.60	83.20	
0+028.5	45° BEND	85.70	83.30	
0+030	45° BEND	85.72	83.32	
(E) 0+032	BUILDING ENTRANCE	85.75	83.35	
(F) 0+000	400x200 TVS	±86.00	±83.80	
0+016	200 V&B	85.85	83.32	
0+027.5	STORM SEWER CROSSING	85.72	83.32	
0+043	200x150 TEE	85.54	83.14	
0+045.5	200x100 REDUCER	85.54	83.14	
0+068	50ø WATER SERVICE	85.39	82.99	
(G) 0+070	100ø CAP	85.38	82.98	
(G) 0+000	50ø WATER SERVICE	85.39	82.99	
0+013	45° BEND	85.60	83.20	
0+015.5	45° BEND	85.75	83.35	
(H) 0+019	BUILDING ENTRANCE	85.80	83.40	
(I) 0+000	400x200 TVS	84.80	82.90	
0+004.5	STORM SEWER CROSSING	84.70	82.70	
0+017	200 V&B	85.48	83.08	
0+032	200x150 TEE	85.78	83.38	
0+034	200x100 REDUCER	85.78	83.38	
0+036	11 1/4° BEND	85.78	83.38	
0+059	50° WATER SERVICE	85.75	83.35	
0+060	50° WATER SERVICE	85.75	83.35	
(J) 0+061	100 ø CAP	85.75	83.35	
(J) 0+000	50ø WATER SERVICE	85.75	83.35	
0+019.5	45° BEND	85.77	83.37	
0+021	45° BEND	85.77	83.37	
(K) 0+023	BUILDING ENTRANCE	85.78	83.38	
(J) 0+000	50ø WATER SERVICE	85.75	83.35	
0+002.5	22 1/2° BEND	85.73	83.33	
0+017	22 1/2° BEND	85.55	83.15	
(L) 0+022.5	BUILDING ENTRANCE	85.70	83.30	

NOTE:

1. FOR SURFACE PONDING REFER TO DWG. 3305-LD-300
2. SEE DRAWING 3305-LD-100A FOR DETAILS, STORM AND SANITARY SCHEDULES.
3. REFER TO DRAWING 3268-T-03 FOR WIDENING DETAILS ON WALKLEY ROAD
4. REFER TO VINCE P. COLIZZA ARCHITECT DRAWING FOR SITE PLAN INFORMATION.
5. ALL ROAD CUTS IN WALKLEY ROAD AND CONROY ROAD TO BE REPAIRED WITH P.G. GRADE ASPHALT AND ALL ASPHALT RESTORATION WORK TO RMOC REQUIREMENTS AND STANDARDS.

PHASE I TO INCLUDE SERVICING FOR IMPERIAL OIL, WENDY'S AND TIM HORTONS. ALL WATER AND SEWER SERVICING TO BE CAPPED AT LIMIT OF PHASE 1 CONSTRUCTION LINE FOR FUTURE EXTENSIONS.

5528

THE LOCATION OF UTILITIES IS APPROXIMATE ONLY, AND THE EXACT LOCATION SHOULD BE DETERMINED BY CONSULTING THE MUNICIPAL AUTHORITIES AND UTILITY COMPANIES CONCERNED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE DURING CONSTRUCTION.

NO.	REVISIONS	DATE	INITIAL
8.	REVISED AS PER RMOC COMMENTS	00/10/02	J.I.M.
7.	REVISED WATERMAIN AS PER COMMENTS	00/09/19	J.I.M.

REGISTERED PROFESSIONAL ENGINEER — J. I. MOFFATT — 00:08:21 — PROVINCE OF ONTARIO

NO.	REVISIONS	DATE	INITIAL
6.	REVISED SANTARY CONNECTION WALKLEY RD.	00/09/11	J.I.M.
5.	REVISED AS PER RMOC COMMENTS	00/09/06	J.I.M.
4.	REVISED PHASE 1 LIMITS	00/08/25	J.I.M.
3.	REVISED AS PER CITY COMMENTS	00/08/21	J.I.M.
2.	REVISED AS PER CITY COMMENTS	00/08/04	J.I.M.
1.	REVISED AS PER JUNE SITE PLAN	00/06/07	J.I.M.
0.	ISSUED FOR SITE PLAN APPROVAL	00/02/08	J.I.M.

1374441 ONTARIO INC.

COMMERCIAL SITE
WALKLEY – CONROY
GENERAL PLAN OF SERVICES

Cumming Cockburn Limited
Consulting Engineers and Planners
Ottawa, Kingston, Toronto, Waterloo, London

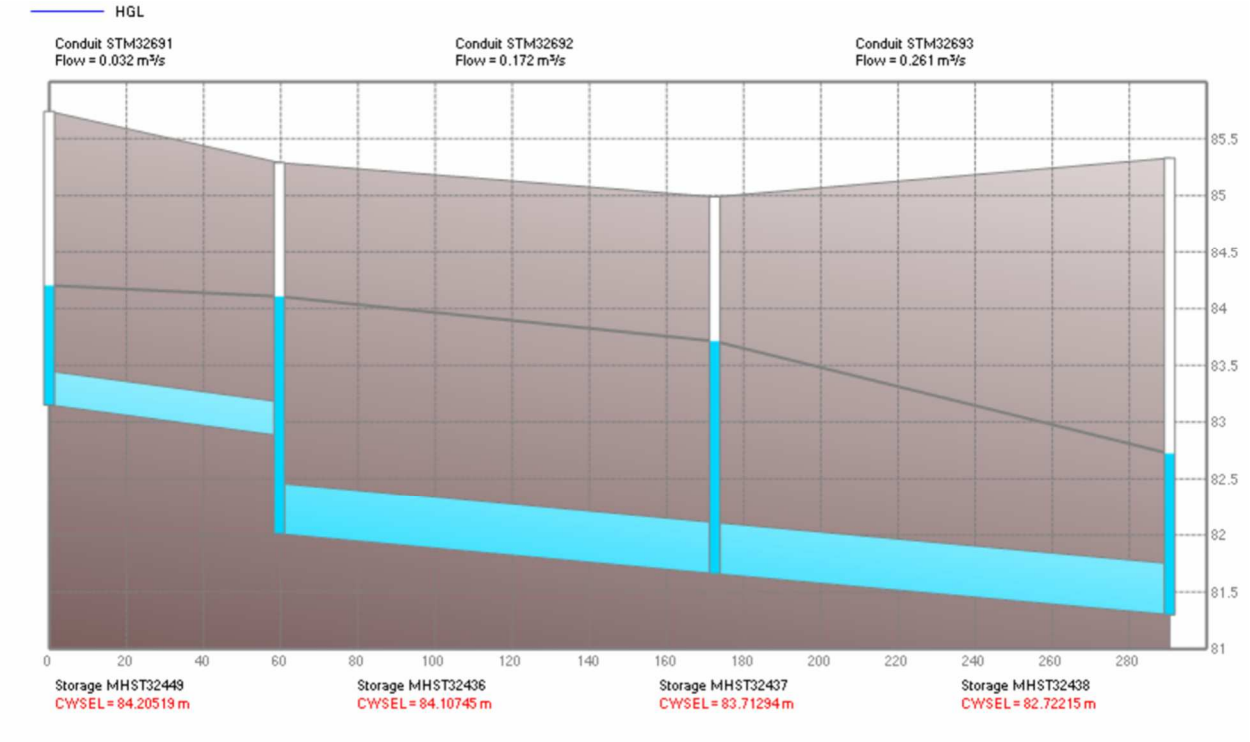
SCALE:	1:500
DRAWN BY:	D.D.
DESIGN:	J.I.M.
CHECKED:	J.I.M.
DATE:	FEB 2000
DRWG No.:	3305-LD-100

954

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Thursday, September 21, 2023 11:07 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

Asset Management would prefer a connection to the 450mm rather than the 2100mm trunk on Conroy. Please see the 100yr HGL for the 450mm pipe below:



Thanks,

--

Bruce Bramah, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: September 20, 2023 9:23 AM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Thanks Bruce.

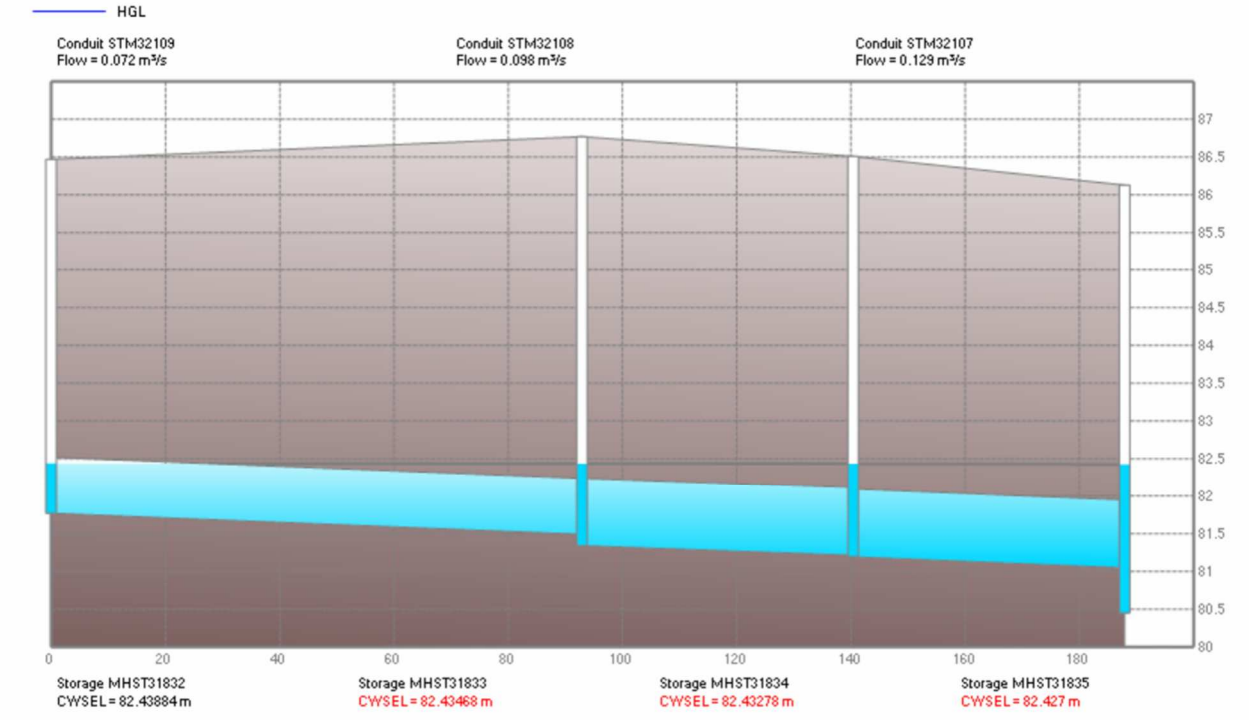
Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Bramah, Bruce <bruce.bramah@ottawa.ca>
Sent: Tuesday, September 19, 2023 1:39 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

I am still waiting for the HGL connection at the road. Please see the park connection below:

The 5 year HGL remains in the pipe. Below is the 100 year.



I will forward the remaining information once provided.
Thanks,

--

Bruce Bramah, P.Eng
Project Manager
Planning, Real Estate and Economic Development Department
Development Review - South Branch
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West Ottawa, ON | 110, avenue. Laurier Ouest. Ottawa (Ontario) K1P 1J1
613.580.2424 ext./poste 29686, Bruce.Bramah@ottawa.ca

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: September 19, 2023 1:28 PM
To: Bramah, Bruce <bruce.bramah@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Bruce,

I hope you are doing well.
I am following up on the HGL request. Can you please provide a status.

Regards,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Anthony Mestwarp
Sent: Thursday, September 7, 2023 5:11 PM
To: bruce.bramah@ottawa.ca
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>; Vahid Mehdipour <v.mehdipour@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Bruce,

Can you please provide the stormwater HGL for the 100 and 5-yr storm events commercial road connection as indicated below, and on the attached?
Additionally would you be able to provide the HGL boundary condition for the proposed park connection? The park connection between MHST31833 and MHST31832 as depicted on the attached?

Thanks,

Anthony Mestwarp, P.Eng., Project Manager | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Anthony Mestwarp
Sent: Wednesday, July 12, 2023 10:17 AM
To: bruce.bramah@ottawa.ca
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Bruce,

In addition to the water calculation update can you also provide the existing HGL in the 2100 storm sewer running along Conroy road as highlighted in the attached.

We would like to explore the option of providing an independent storm sewer system for the existing commercial roadway connecting to the 2100 storm sewer. This will eliminate the need to convey the commercial road flows through the proposed Condo system, and avoid any future issues if the client ever decided to sever the Commercial road from the proposed Condo lands.

The connection would be between manholes MHST31492 AND MHST31839, as depicted in the attached.
Please let me know if you require any further information.

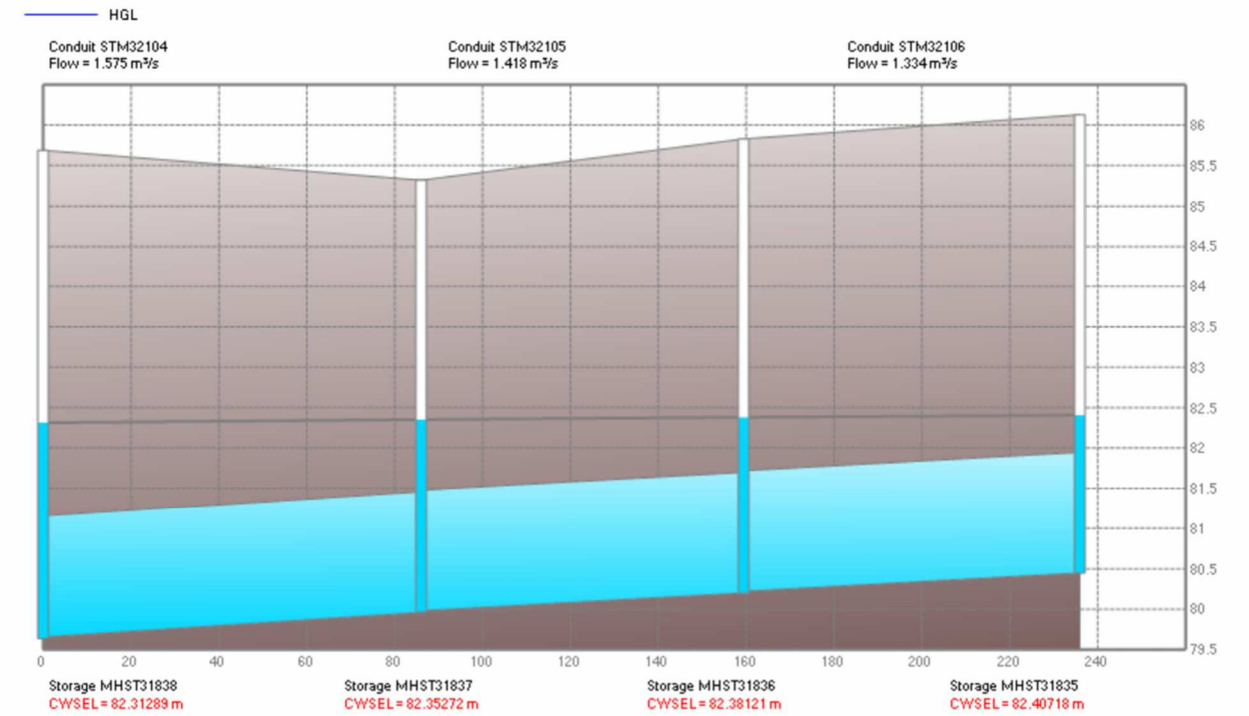
Regards,

Anthony Mestwarp, P.Eng., Project Engineer | Land Development Engineering
NOVATECH
Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Wednesday, October 26, 2022 9:42 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <G.Winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>; Vahid Mehdipour <v.mehdipour@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

Here is the HGL information:



Regards,

Sharif

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: October 20, 2022 10:45 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <g.winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>; Vahid Mehdipour <v.mehdipour@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Sharif,

Thanks for getting back to me. Did the STM team comment on the elevation of the 100-yr grade line in the STM sewer St. Laurent Blvd (e.g. is it above the obvert of the pipe). We are looking to confirm the downstream conditions for our SWM model.

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Wednesday, October 19, 2022 11:25 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <G.Winters@novatech-eng.com>; Curtis Ferguson

<c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

I will follow up with the water boundary condition request. Usually, the water group requires 2 weeks, which will be end of this week.

By the way, I have received the confirmation about the sewers and the proposed sanitary and storm flows are acceptable.

Sharif.

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: October 19, 2022 10:43 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <g.winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Sharif,

Following-up the client is really pushing on this one. Do you have an approximate timeline for the water boundary conditions?

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Monday, October 17, 2022 11:05 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <G.Winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

Sorry, my bad I sent out the request for water boundary condition but never sent out for the sewers capacity! It was just buried under all the emails! I have sent out the request right now. I will follow up as soon as I get something.

Thanks.

Sharif

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: October 17, 2022 10:46 AM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <g.winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flows

Hi Sharif,

Can you provide a status update regarding the HGL in the surrounding sewers?

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

From: Anthony Mestwarp
Sent: Tuesday, September 20, 2022 3:00 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <G.Winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flows

Thanks Sharif,

We have already requested road profiles from the City for the surrounding roadways to verify the connection inverts.

Regards,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Tuesday, September 20, 2022 9:34 AM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <G.Winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flows

Good morning, Anthony,

Please contact our Geoinformation Center for the as built drawings to verify the inverts. I will coordinate with our modelling group to find out about the capacity.

I do not know the RVCA reviewer on this project. However, you could contact Eric Lalande (eric.lalande@rvca.ca) at RVCA to find out about it. Thanks.

Sharif

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: September 19, 2022 3:12 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Greg Winters <g.winters@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: 2510 St. Laurent Blvd - Confirmation of Flows

I am working on the project located at 2510 St. Laurent Blvd. Can you please confirm the existing STM sewer HGL in between manholes : MHST31836 – MHST31838 as shown on the attached GeoOttawa stm connection PDF.

The pre-con notes also recommended that we should verify capacities for the development with the City prior to submitting the design for review, please refer to the below:.

Storm:
The proposed development will have the STM flows controlled to the 5-year storm, with a Pre-existing coefficient of **0.43.** Resulting in an allowable stm flow from the site of **490.40 L/s**.
The proposed condo development will be controlled to **432.02L/s**, and the remaining allowable release rate of **58.38 L/s** will be reserved for the future retirement residence proposed in the North-West corner of the site which will have its own individual controls.
The Pre-existing 100-yr flow was approximately **999.1L/s**. The development will be serviced by two (2) connections to the existing 1500 stm sewer within the St. Laurent Right-of-way.

Sanitary:
The proposed sanitary servicing for the site will be provided by 2 connections to the existing 375mm sanitary sewer within the St. Laurent Right-of-way. The overall sanitary flow from the development will be **8.19L/s.**
Please refer to the proposed sanitary connection figure for the proposed connection locations.

Can you please confirm that there is capacity for the proposed development.

Could you also please provide the contact information for the reviewer at RVCA for this project so that we can discuss the Quality control requirements for the site.

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Monday, November 7, 2022 3:53 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Anthony,

No concern with the 597 L/s discharge. Thanks.

Sharif

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: November 04, 2022 2:02 PM
To: Sharif, Golam <sharif.sharif@ottawa.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Curtis Ferguson <c.ferguson@novatech-eng.com>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow

Hi Sharif,

We have just recently sent the first submission to the City (Vincent from Claridge sent the submission), which includes detailed calculations.

The overall site is a combination of lands namely: 1890, 1900 & 1920 Walkley Road, 2502 & 2510 St. Laurent Boulevard, 2990 & 3000 Conroy Road, and 2425 Don Reid Drive, for a total area of +/- 5.9 hectares.

Refer to the below for an explanation of the calculation which is also summarized in the recently submitted report:

"The allowable release rate for the site was calculated using PCSWMM using the SCS analysis method. The existing site has an area of +/-5.9 ha and is undeveloped. As noted within the Geotechnical report, the soils on the subject site consist of Silty Clay. The time of concentration for the site was calculated utilizing the Uplands method. A summary of the pre-development model parameters is provided below:

Table 6.1: Pre-Development Parameters

Design Parameter	*Value*
Drainage Area	*5.9 ha*
Time of Concentration	*17 min*
Hydrologic Soil Group	*D*
Weighted CN	*86*
Impervious Percentage	*39%*
Equivalent Run-off Coefficient	*0.47*

Based on the above, the pre-development Runoff Coefficient is less than 0.5 and the allowable release rate for the site was calculated to be 597 L/s based on the PCSWMM model results for the 5-year storm event.

I hopes this helps provide clarification.

Regards,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

From: Eric Lalande <eric.lalande@rvca.ca>
Sent: Tuesday, October 4, 2022 4:14 PM
To: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>; Jamie Batchelor <jamie.batchelor@rvca.ca>
Subject: RE: 2510 St. Laurent Blvd - Confirmation of quality controls

Hi Anthony,

The RVCA typically requires enhanced water quality control (80% TSS removal) for all projects, without further design details I would suggest this will be the requirement from our offices, I would suggest when you have a site plan available, please reach out to Jamie Batchelor, Planner from our office, as he will be the point person on the file if/when it is to be submitted for rezoning/site plan.

Cheers,

Eric Lalande, MCIP, RPP
Planner, RVCA
613-692-3571 x1137

From: Anthony Mestwarp <a.mestwarp@novatech-eng.com>
Sent: Tuesday, September 20, 2022 4:50 PM
To: Eric Lalande <eric.lalande@rvca.ca>
Cc: Greg MacDonald <g.Macdonald@novatech-eng.com>
Subject: 2510 St. Laurent Blvd - Confirmation of quality controls

Hi Eric,

I am working on the project located at 2510 St. Laurent Blvd within the RVCA boundary.

It was noted in the Pre-Con minutes that we should contact the RVCA to confirm the Quality control requirements for the site. The site is Bound by Walkley Road to the North, Conroy Road to the East, St. Laurent Boulevard to the South, and Don Reid Drive to the West.
I have included a copy of the legal plan outlining the limits of the site for your referance.

Can you please advise on the quality control requiments for the site? Please let me know if you require additional information.

Thanks,

Anthony Mestwarp, **P.Eng.**, Project Engineer | Land Development Engineering
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 Ext. 216 | Fax: 613.254.5867

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: Walkley-Conroy Project
Location: Ottawa, ON
OGS #: OGS 201

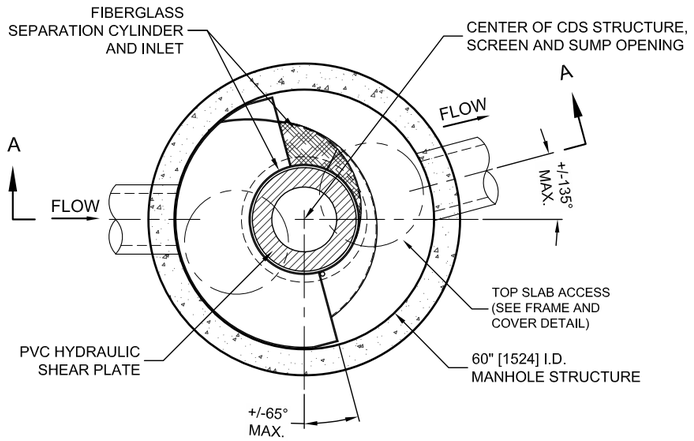
Engineer: **NOVATECH**
Contact: Vahid Mehdipour
Report Date: 5-Oct-23

Area	1.859	ha	**Rainfall Station #**	215	
Weighted C	0.62		**Particle Size Distribution**	FINE	
CDS Model	2025		**CDS Treatment Capacity**	45	l/s

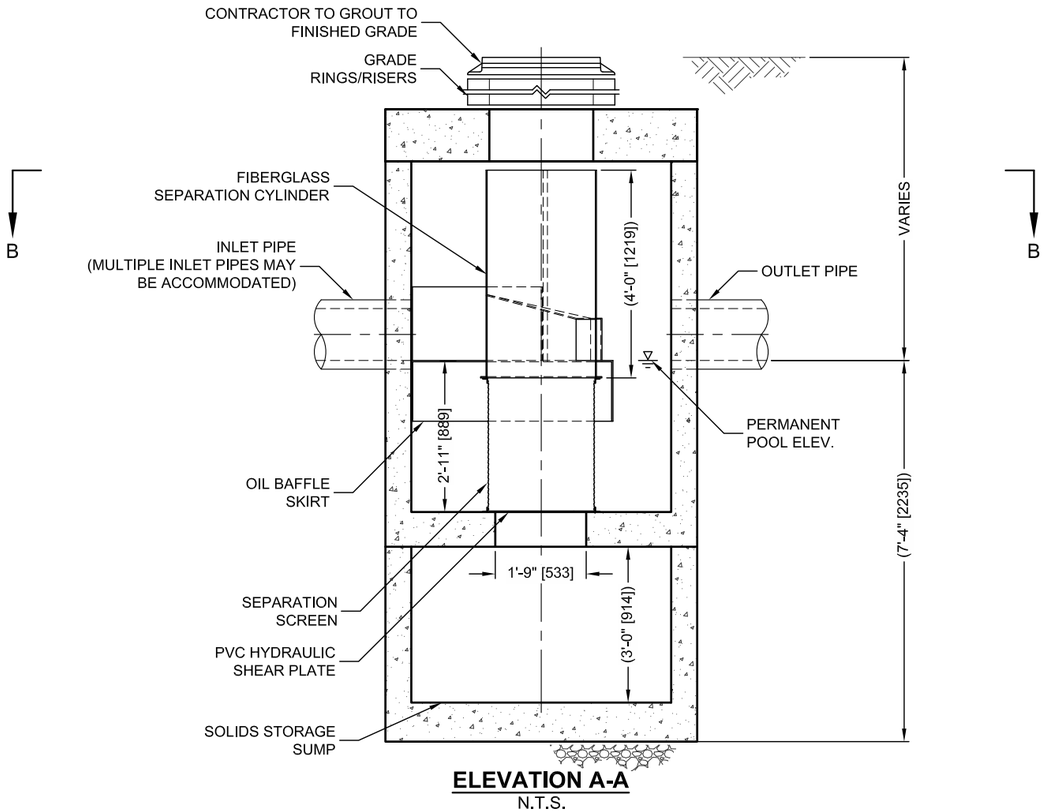
Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	1.6	1.6	3.5	97.8	9.0
1.0	10.6%	19.8%	3.2	3.2	7.1	96.8	10.3
1.5	9.9%	29.7%	4.8	4.8	10.6	95.8	9.5
2.0	8.4%	38.1%	6.4	6.4	14.1	94.8	7.9
2.5	7.7%	45.8%	8.0	8.0	17.7	93.8	7.2
3.0	5.9%	51.7%	9.6	9.6	21.2	92.8	5.5
3.5	4.4%	56.1%	11.2	11.2	24.7	91.8	4.0
4.0	4.7%	60.7%	12.8	12.8	28.3	90.7	4.2
4.5	3.3%	64.0%	14.4	14.4	31.8	89.7	3.0
5.0	3.0%	67.1%	16.0	16.0	35.4	88.7	2.7
6.0	5.4%	72.4%	19.2	19.2	42.4	86.7	4.7
7.0	4.4%	76.8%	22.4	22.4	49.5	84.7	3.7
8.0	3.5%	80.3%	25.6	25.6	56.6	82.6	2.9
9.0	2.8%	83.2%	28.8	28.8	63.6	80.6	2.3
10.0	2.2%	85.3%	32.0	32.0	70.7	78.6	1.7
15.0	7.0%	92.3%	48.1	45.3	100.0	66.2	4.6
20.0	4.5%	96.9%	64.1	45.3	100.0	49.6	2.3
25.0	1.4%	98.3%	80.1	45.3	100.0	39.7	0.6
30.0	0.7%	99.0%	96.1	45.3	100.0	33.1	0.2
35.0	0.5%	99.5%	112.1	45.3	100.0	28.4	0.1
40.0	0.5%	100.0%	128.2	45.3	100.0	24.8	0.1
45.0	0.0%	100.0%	144.2	45.3	100.0	22.1	0.0
50.0	0.0%	100.0%	160.2	45.3	100.0	19.9	0.0
							86.5

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual Load Removal Efficiency = 80%
Predicted Annual Rainfall Treated = 97%

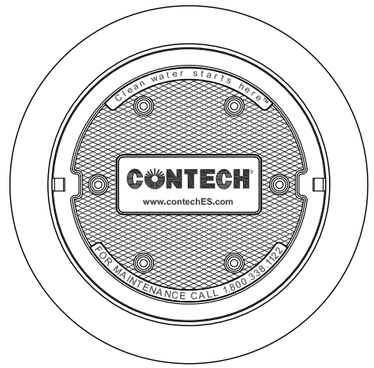
1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS efficiency based on testing conducted at the University of Central Florida.
4 - CDS design and scaling based on original manufacturer model and product specifications.



PLAN VIEW B-B
N.T.S.



ELEVATION A-A
N.T.S.



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

CDS PMSU2025-5-C DESIGN NOTES

THE STANDARD CDS PMSU2025-5-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
CUSTOMIZABLE SUMP DEPTH AVAILABLE
ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
3. FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.contechES.com
4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

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 CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH ENGINEERED SOLUTIONS LLC
www.contechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU2025-5-C
INLINE CDS
STANDARD DETAIL

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: Walkley-Conroy Project
Location: Ottawa, ON
OGS #: OGS 401

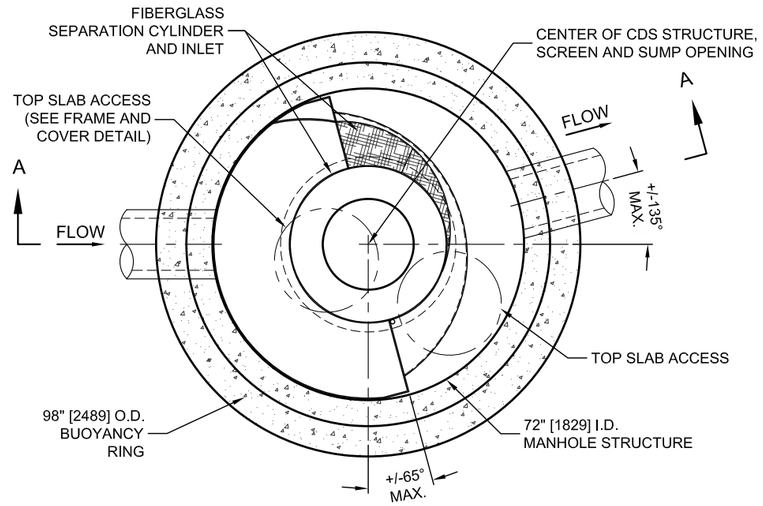
Engineer: **NOVATECH**
Contact: Vahid Mehdipour
Report Date: 5-Oct-23

Area	2.01	ha	**Rainfall Station #**	215	
Weighted C	0.68		**Particle Size Distribution**	FINE	
CDS Model	3020		**CDS Treatment Capacity**	57	l/s

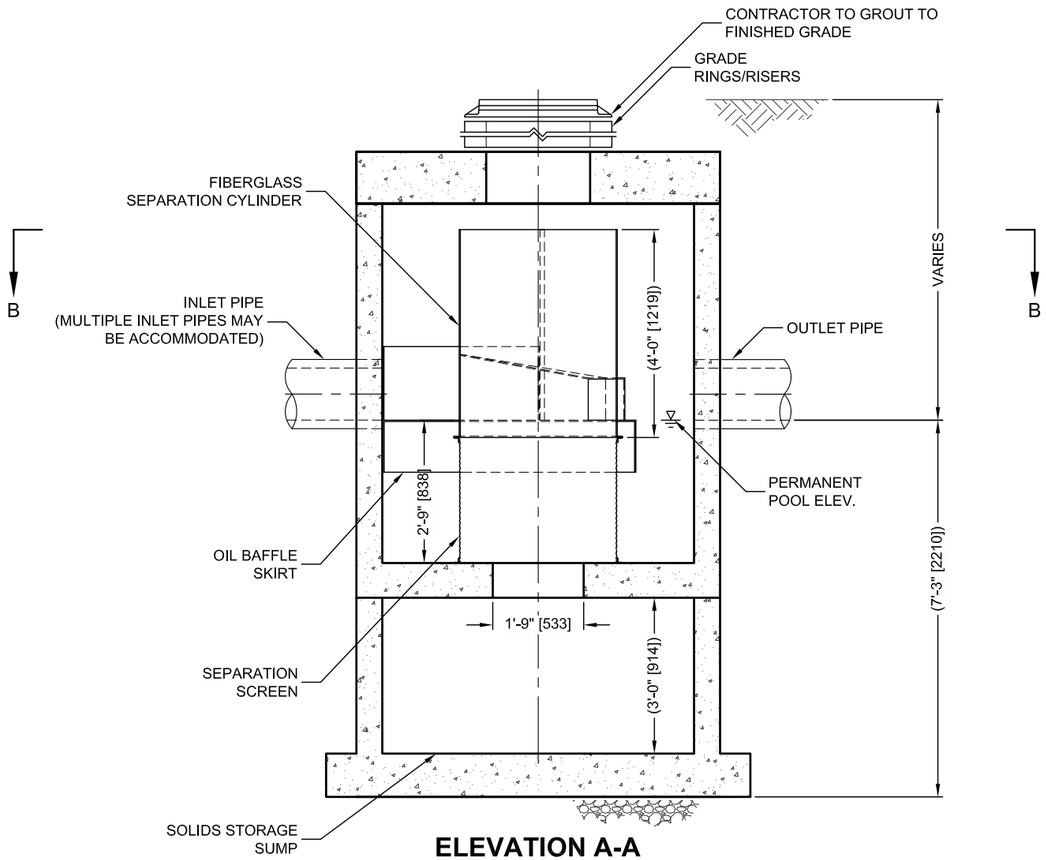
Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	1.9	1.9	3.3	97.9	9.0
1.0	10.6%	19.8%	3.8	3.8	6.7	96.9	10.3
1.5	9.9%	29.7%	5.7	5.7	10.0	96.0	9.5
2.0	8.4%	38.1%	7.6	7.6	13.4	95.0	8.0
2.5	7.7%	45.8%	9.5	9.5	16.7	94.1	7.2
3.0	5.9%	51.7%	11.4	11.4	20.1	93.1	5.5
3.5	4.4%	56.1%	13.3	13.3	23.4	92.1	4.0
4.0	4.7%	60.7%	15.2	15.2	26.8	91.2	4.3
4.5	3.3%	64.0%	17.1	17.1	30.1	90.2	3.0
5.0	3.0%	67.1%	19.0	19.0	33.5	89.3	2.7
6.0	5.4%	72.4%	22.8	22.8	40.2	87.3	4.7
7.0	4.4%	76.8%	26.6	26.6	46.9	85.4	3.7
8.0	3.5%	80.3%	30.4	30.4	53.6	83.5	3.0
9.0	2.8%	83.2%	34.1	34.1	60.3	81.6	2.3
10.0	2.2%	85.3%	37.9	37.9	67.0	79.7	1.7
15.0	7.0%	92.3%	56.9	56.6	100.0	69.9	4.9
20.0	4.5%	96.9%	75.9	56.6	100.0	52.4	2.4
25.0	1.4%	98.3%	94.9	56.6	100.0	41.9	0.6
30.0	0.7%	99.0%	113.8	56.6	100.0	34.9	0.2
35.0	0.5%	99.5%	132.8	56.6	100.0	29.9	0.1
40.0	0.5%	100.0%	151.8	56.6	100.0	26.2	0.1
45.0	0.0%	100.0%	170.7	56.6	100.0	23.3	0.0
50.0	0.0%	100.0%	189.7	56.6	100.0	21.0	0.0
							87.3

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual Load Removal Efficiency = 81%
Predicted Annual Rainfall Treated = 97%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS efficiency based on testing conducted at the University of Central Florida.
4 - CDS design and scaling based on original manufacturer model and product specifications.



PLAN VIEW B-B
N.T.S.

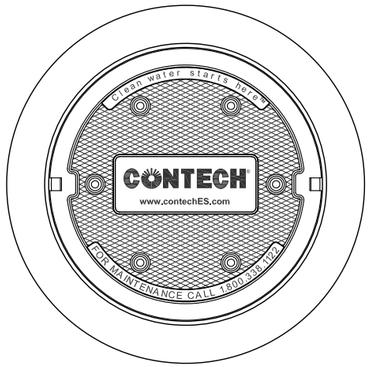


ELEVATION A-A
N.T.S.

CDS PMSU3020-6-C DESIGN NOTES

THE STANDARD CDS PMSU3020-6-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
CUSTOMIZABLE SUMP DEPTH AVAILABLE
ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

GENERAL NOTES
1. CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
2. DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
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4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

INSTALLATION NOTES
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B. CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
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800-338-1122 513-645-7000 513-645-7993 FAX

CDS PMSU3020-6-C
INLINE CDS
STANDARD DETAIL

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: Walkley-Conroy Project
Location: Ottawa, ON
OGS #: OGS 600

Engineer: **NOVATECH**
Contact: Vahid Mehdipour
Report Date: 5-Oct-23

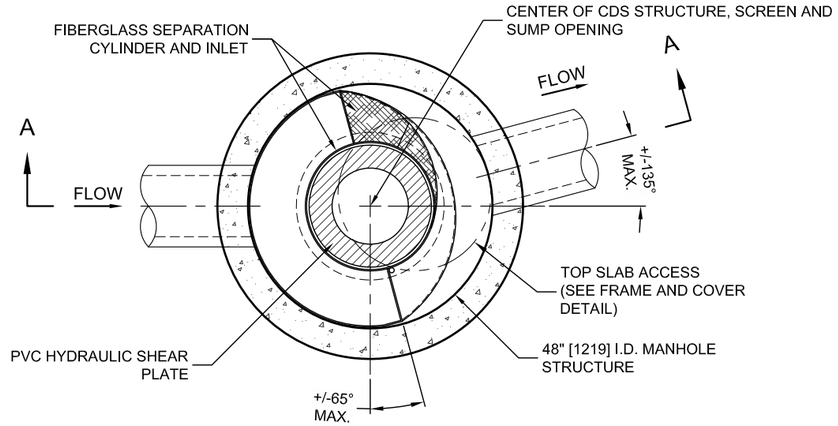
Area 0.290 ha
Weighted C 0.73
CDS Model 2015-4

Rainfall Station # 215
Particle Size Distribution FINE
CDS Treatment Capacity 20 l/s

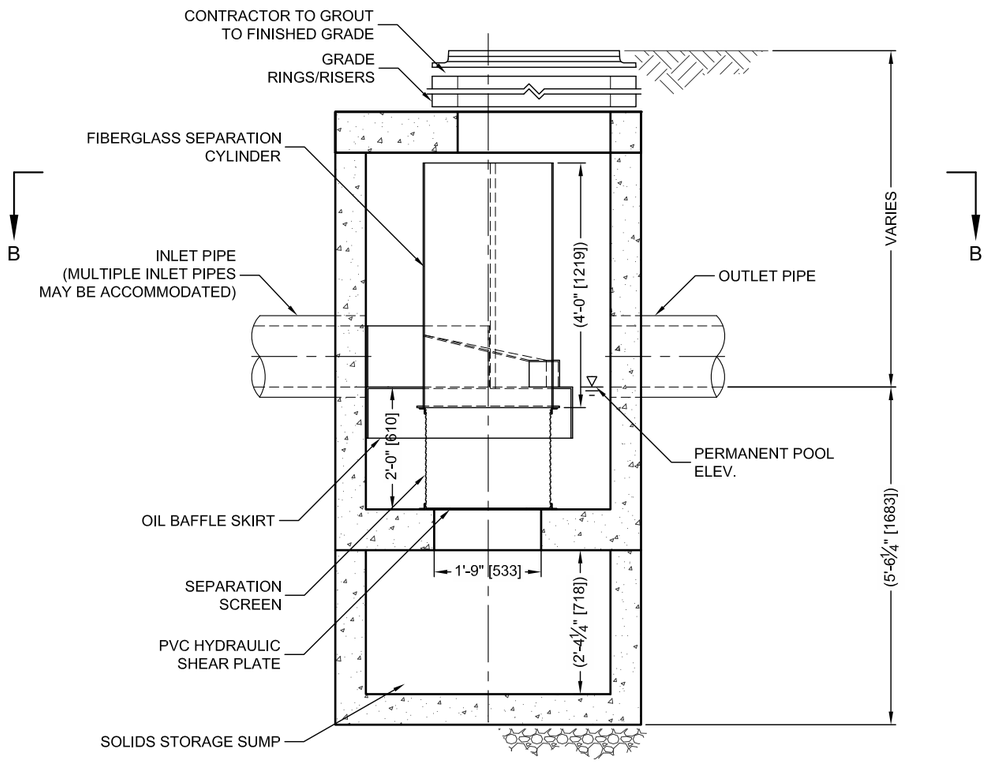
Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
0.5	9.2%	9.2%	0.3	0.3	1.5	98.4	9.0
1.0	10.6%	19.8%	0.6	0.6	3.0	98.0	10.4
1.5	9.9%	29.7%	0.9	0.9	4.5	97.6	9.7
2.0	8.4%	38.1%	1.2	1.2	5.9	97.2	8.1
2.5	7.7%	45.8%	1.5	1.5	7.4	96.7	7.4
3.0	5.9%	51.7%	1.8	1.8	8.9	96.3	5.7
3.5	4.4%	56.1%	2.1	2.1	10.4	95.9	4.2
4.0	4.7%	60.7%	2.4	2.4	11.9	95.5	4.5
4.5	3.3%	64.0%	2.6	2.6	13.4	95.0	3.2
5.0	3.0%	67.1%	2.9	2.9	14.8	94.6	2.9
6.0	5.4%	72.4%	3.5	3.5	17.8	93.8	5.1
7.0	4.4%	76.8%	4.1	4.1	20.8	92.9	4.0
8.0	3.5%	80.3%	4.7	4.7	23.8	92.0	3.3
9.0	2.8%	83.2%	5.3	5.3	26.7	91.2	2.6
10.0	2.2%	85.3%	5.9	5.9	29.7	90.3	2.0
15.0	7.0%	92.3%	8.8	8.8	44.5	86.1	6.0
20.0	4.5%	96.9%	11.8	11.8	59.4	81.8	3.7
25.0	1.4%	98.3%	14.7	14.7	74.2	77.6	1.1
30.0	0.7%	99.0%	17.7	17.7	89.1	73.3	0.5
35.0	0.5%	99.5%	20.6	19.8	100.0	67.6	0.3
40.0	0.5%	100.0%	23.5	19.8	100.0	59.1	0.3
45.0	0.0%	100.0%	26.5	19.8	100.0	52.5	0.0
50.0	0.0%	100.0%	29.4	19.8	100.0	47.3	0.0
							93.9

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual Load Removal Efficiency = 87%
Predicted Annual Rainfall Treated = 100%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS efficiency based on testing conducted at the University of Central Florida.
4 - CDS design and scaling based on original manufacturer model and product specifications.



PLAN VIEW B-B
N.T.S.



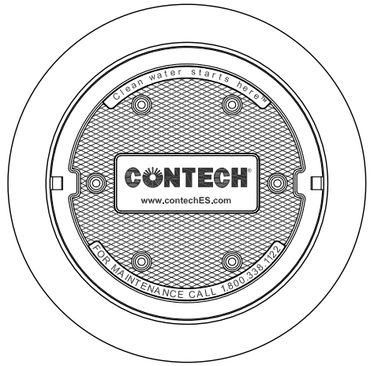
ELEVATION A-A
N.T.S.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,848; 6,641,720; 8,511,500; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

CDS PMSU2015-4-C DESIGN NOTES

THE STANDARD CDS PMSU2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.

CONFIGURATION DESCRIPTION
GRATED INLET ONLY (NO INLET PIPE)
GRATED INLET WITH INLET PIPE OR PIPES
CURB INLET ONLY (NO INLET PIPE)
CURB INLET WITH INLET PIPE OR PIPES
CUSTOMIZABLE SUMP DEPTH AVAILABLE
ANTI-FLOTATION DESIGN AVAILABLE UPON REQUEST



FRAME AND COVER
(DIAMETER VARIES)
N.T.S.

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
WATER QUALITY FLOW RATE (CFS OR L/s)	*
PEAK FLOW RATE (CFS OR L/s)	*
RETURN PERIOD OF PEAK FLOW (YRS)	*
SCREEN APERTURE (2400 OR 4700)	*

PIPE DATA:	I.E.	MATERIAL	DIAMETER
INLET PIPE 1	*	*	*
INLET PIPE 2	*	*	*
OUTLET PIPE	*	*	*

RIM ELEVATION	*

ANTI-FLOTATION BALLAST	WIDTH	HEIGHT
	*	*

NOTES/SPECIAL REQUIREMENTS:

* PER ENGINEER OF RECORD

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4. CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
5. STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET HS20 (AASHTO M 306) LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
6. PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

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C. CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
D. CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
E. CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH® ENGINEERED SOLUTIONS LLC
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CDS PMSU2015-4-C INLINE CDS STANDARD DETAIL

Walkley-Conroy (122040)
Pre-Development Subcatchment Parameters

ARM Subcatchments

Pre-Development

Name	Area (ha)	Flow Length (m)	Slope (%)	Imperv (%)	SCS Curve Number	Time of Concentration (min)	Intial Abstraction (mm)
E-01	5.854	300	0.78	39	86	17	5

Walkley-Conroy (122040)
Pre-Development PCSWMM Model Schematic

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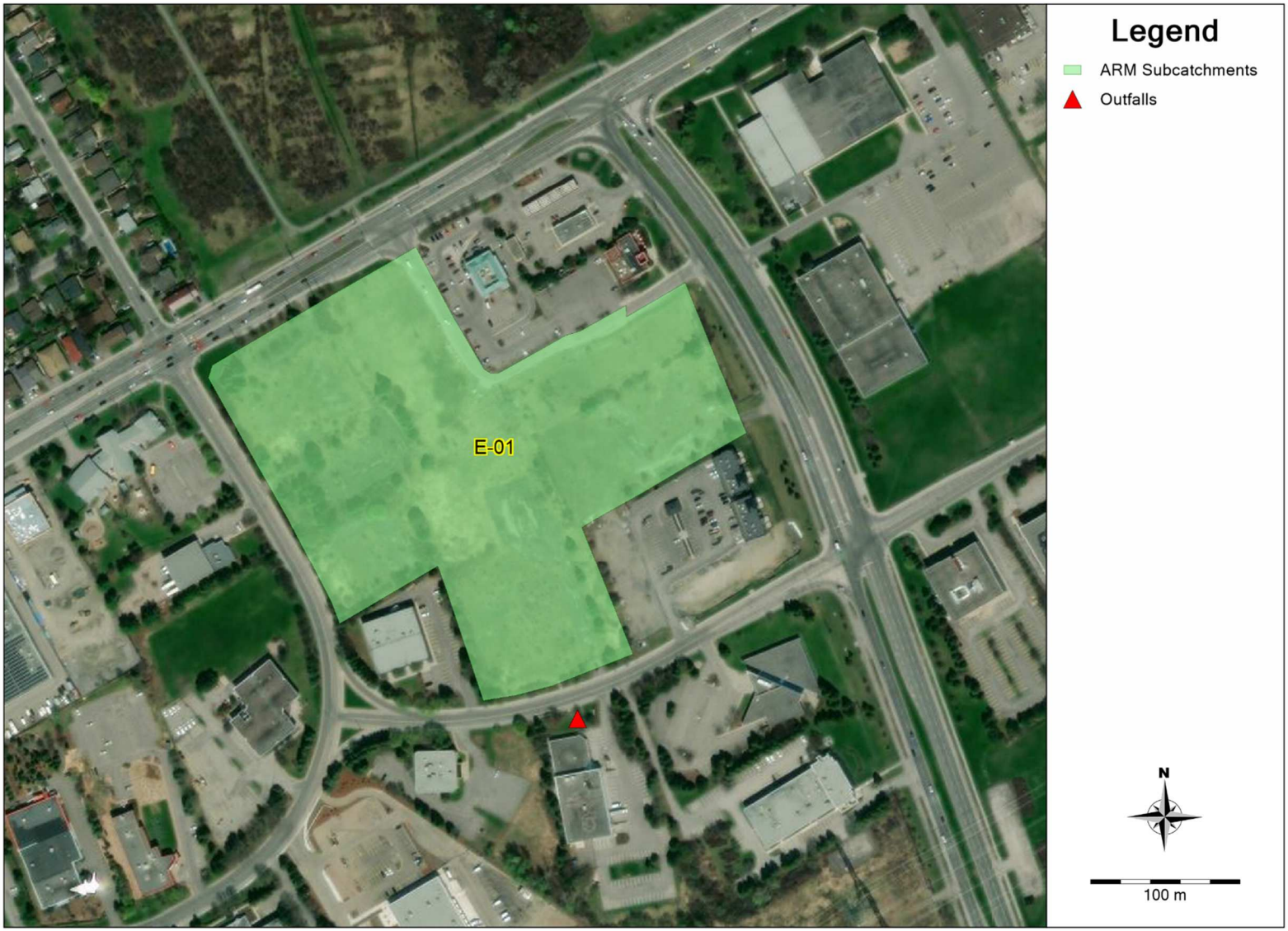
Pre-Development Model Schematic



Date: 2023-09-29
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Pre-Development Model Output

ALTERNATIVE RUNOFF METHOD (ARM) - PCSWMM VERSION 7.4.3202

This is a new version of ARM - your feedback and suggestions are solicited.
Create a ticket, post on the PCSWMM feature request forum, or email us directly!

Simulation start time: 10/18/2022 00:00:00
Simulation end time: 10/19/2022 00:00:00
Runoff wet weather time steps: 300 seconds
Report time steps: 60 seconds
Number of data points: 1441

****
Unit Hydrographs Runoff Method
****

Subcatchment	Runoff Method	Raingage	Area (ha)	Time of Concentration (min)	Time to Peak (min)	Time after Peak (min)	Peak UH Flow ($m^3/s/mm$)	UH Depth (mm)
E-01	Nash IUH	RG	5.854	17	11.33	78.67	0.0466	0.998

****
ARM Runoff Summary
****

Subcatchment	Total Precip (mm)	Total Losses (mm)	Total Runoff (mm)	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff (fraction)
E-01	45.162	15.478	29.604	1.733	596.748	0.655

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.015)

Walkley-Conroy (Existing Condition)
Created By Vahid Mehdipour
October 25, 2022

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 0

Number of nodes 1
Number of links 0
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
RG	C4hr-5yr	INTENSITY	10 min.

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
StLaurentBlvd	OUTFALL	0.00	0.00	0.0	

****
NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.
****

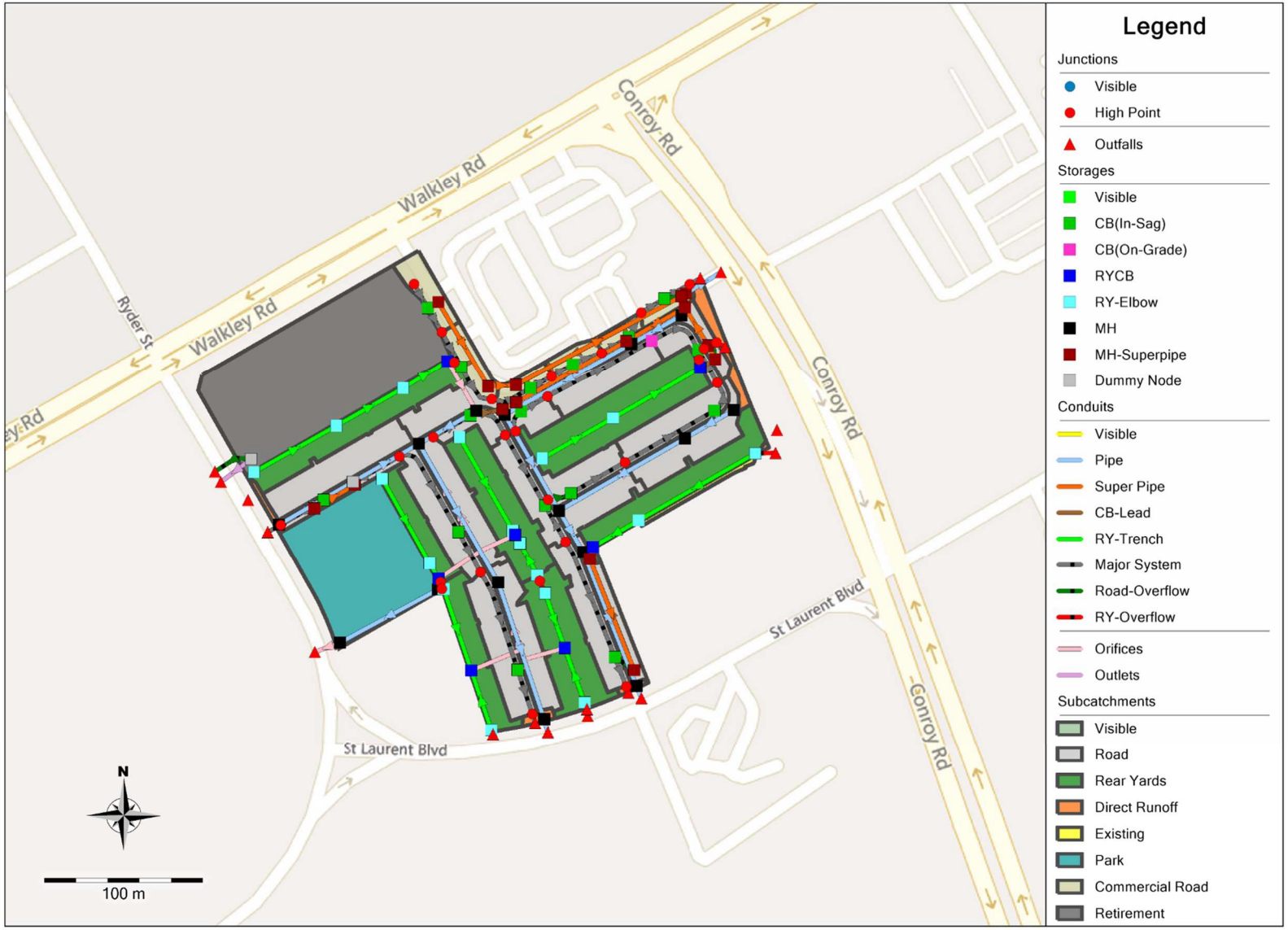
****
Analysis Options
****
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... NO
  Water Quality ..... NO
Surcharge Method ..... EXTRAN
Starting Date 10/18/2022 00:00:00
Ending Date 10/19/2022 00:00:00
Antecedent Dry Days 0.0
Report Time Step 00:01:00

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.000	0.000
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.173	1.734
External Outflow	0.173	1.734
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000

```
Continuity Error (%) .....         0.000


Analysis begun on:  Tue Oct 25 15:26:54 2022
Analysis ended on:  Tue Oct 25 15:26:55 2022
Total elapsed time: 00:00:01
```

Overall Model Schematic



Date: 2024-01-18
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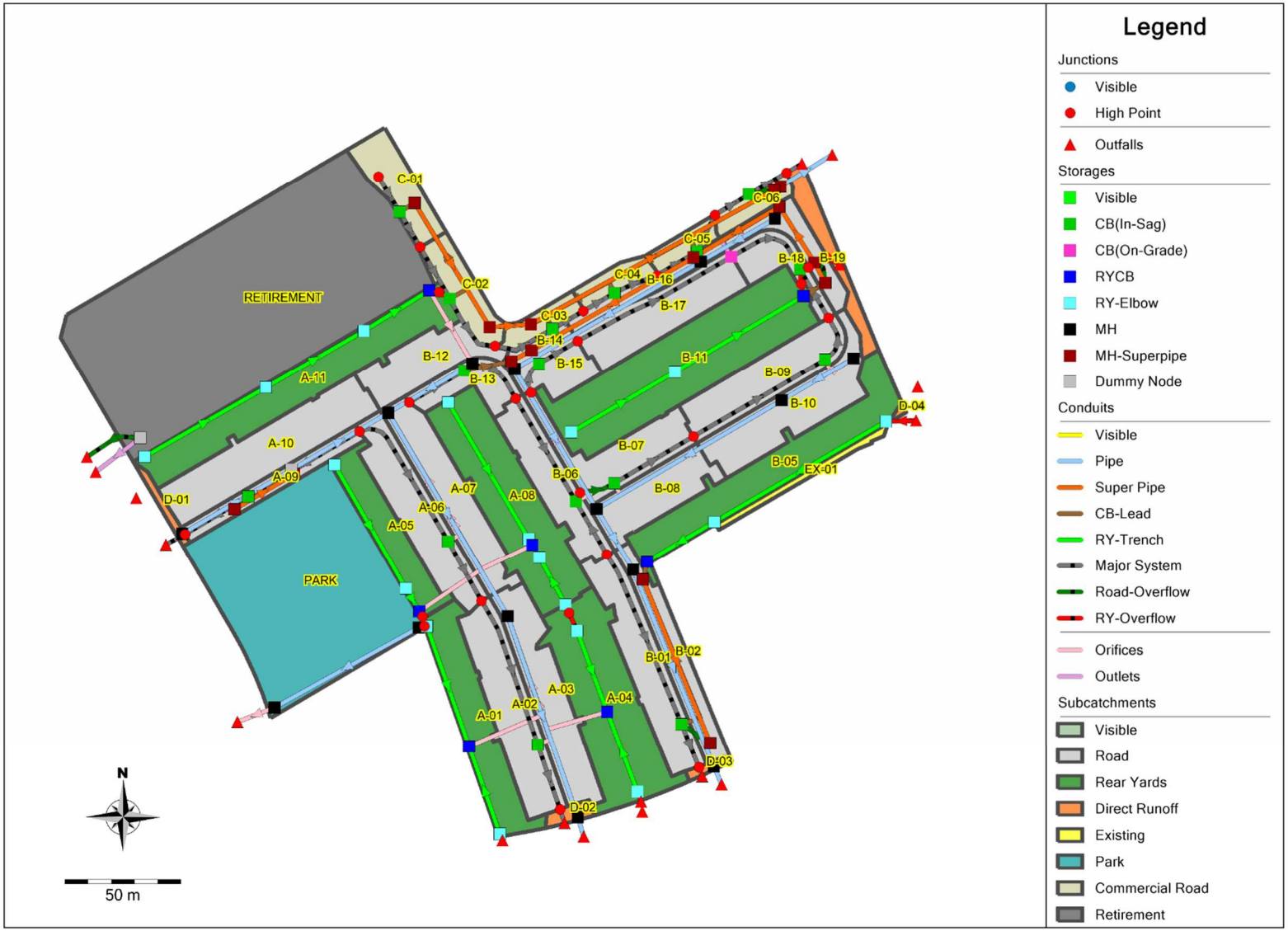
Subcatchments



Date: 2024-01-18
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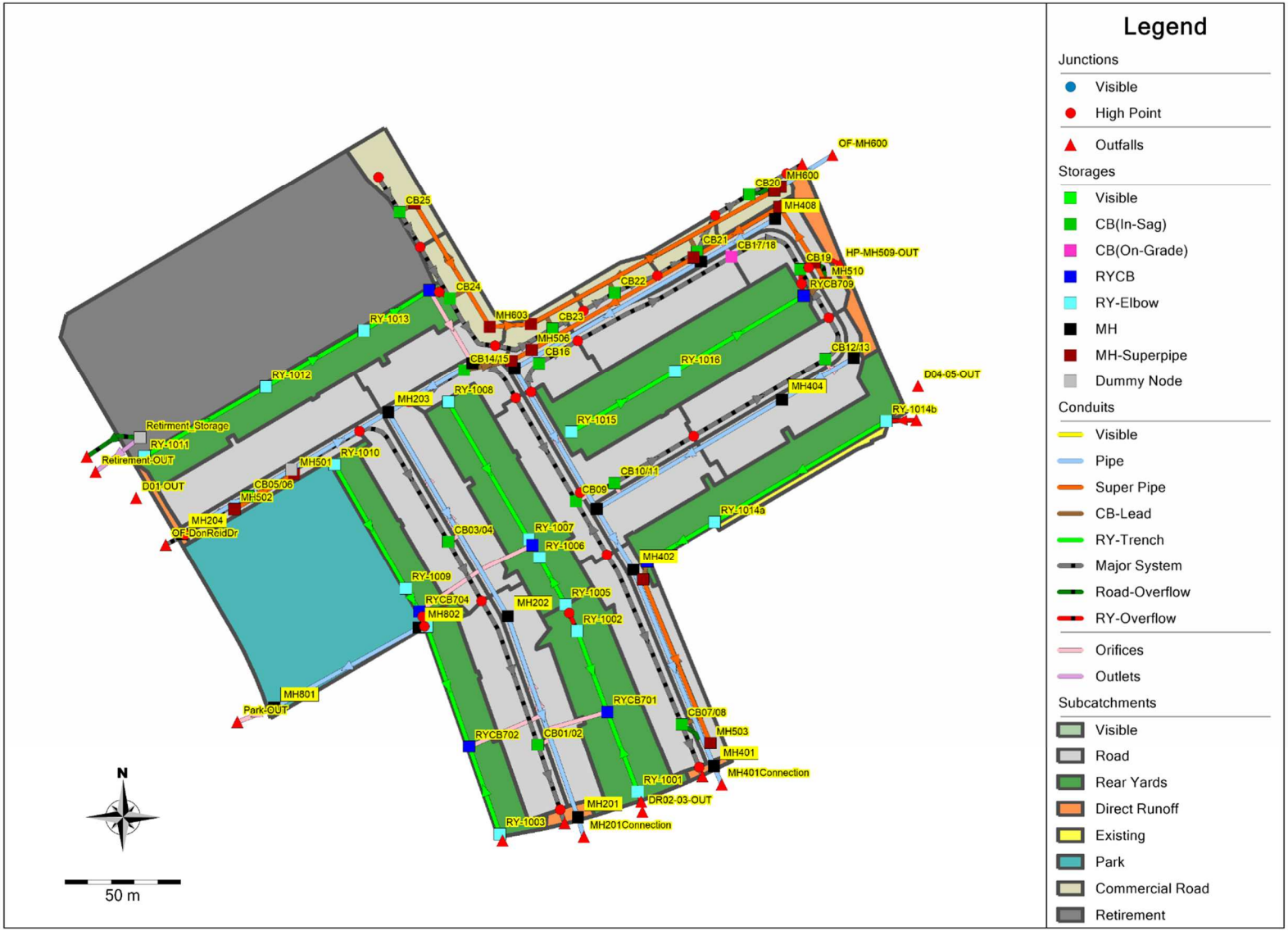
Storage Nodes & Outfalls



Walkley-Conroy (122040)
PCSWMM Model Output
100yr 4-Hour Chicago, Fixed

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EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)
  ----------------------------------------------------------

  Walkley-Conroy Subdivision

  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 42
  Number of nodes ........... 117
  Number of links ........... 133
  Number of pollutants ...... 0
  Number of land uses ....... 0


  ****************
  Raingage Summary
  ****************
                                                 Data       Recording
  Name                 Data Source               Type       Interval
  ----------------------------------------------------------------
  RG                   C4hr-100yr                INTENSITY   10 min.


  ********************
  Subcatchment Summary
  ********************
  Name                        Area     Width   %Imperv    %Slope Rain Gage           Outlet
  ----------------------------------------------------------------------------------------
---
  A-01                        0.15    125.83     47.10    2.0000 RG                  RYCB702
  A-02                        0.17    127.69     80.00    2.0000 RG                  CB01/02
  A-03                        0.15    109.29     80.00    2.0000 RG                  CB01/02
  A-04                        0.26    187.86     35.70    2.0000 RG                  RYCB701
  A-05                        0.10    104.00     44.30    2.0000 RG                  RYCB704
  A-06                        0.15    124.17     75.70    2.0000 RG                  CB03/04
  A-07                        0.14    101.43     78.60    2.0000 RG                  CB03/04
  A-08                        0.25    195.38     47.10    2.0000 RG                  RYCB703
  A-09                        0.07     92.86     81.40    2.0000 RG                  CB05/06
  A-10                        0.19    126.67     78.60    2.0000 RG                  CB05/06
  A-11                        0.23    167.14     47.10    2.0000 RG                  RYCB705
  B-01                        0.15    127.50     80.00    2.0000 RG                  CB07/08
  B-02                        0.10     97.00     74.30    2.0000 RG                  CB07/08
  B-05                        0.21    163.08     42.90    2.0000 RG                  RY-1014b
  B-06                        0.12    128.89     78.60    2.0000 RG                  CB09
  B-07                        0.12     84.29     81.40    2.0000 RG                  CB10/11
  B-08                        0.11     76.43     78.60    2.0000 RG                  CB10/11
  B-09                        0.14     97.86     80.00    2.0000 RG                  CB12/13
  B-10                        0.15    109.29     81.40    2.0000 RG                  CB12/13
  B-11                        0.35    249.29     52.90    2.0000 RG                  RYCB709
  B-12                        0.10     62.50     72.90    2.0000 RG                  CB14/15
  B-13                        0.06    106.67     64.30    2.0000 RG                  CB14/15
  B-14                        0.02     42.00     75.70    2.0000 RG                  CB16
  B-15                        0.06     59.00     82.90    2.0000 RG                  CB16
  B-16                        0.05     96.00     95.70    2.0000 RG                  CB17/18
  B-17                        0.14     93.33     77.10    2.0000 RG                  CB17/18
  B-18                        0.06     62.00     70.00    2.0000 RG                  CB19
  B-19                        0.07     83.75     82.90    2.0000 RG                  CB19
  C-01                        0.08     54.00     81.40    2.0000 RG                  CB25
  C-02                        0.07     54.62     72.90    2.0000 RG                  CB24
  C-03                        0.04     37.00     68.60    2.0000 RG                  CB23
  C-04                        0.04     35.00     72.90    2.0000 RG                  CB22
  C-05                        0.03     31.00     75.70    2.0000 RG                  CB21
  C-06                        0.04     35.00     74.30    2.0000 RG                  CB20
  D-01                        0.01     30.00     25.70    2.0000 RG                  D01-OUT
  D-02                        0.01     18.57     37.10    2.0000 RG                  DR02-03-OUT
  D-03                        0.01     11.67     47.10    2.0000 RG                  DR02-03-OUT
  D-04                        0.00      5.00      0.00    5.0000 RG                  D04-05-OUT
  D-05                        0.05     67.50     12.90    5.0000 RG                  D04-05-OUT
  EX-01                       0.02     60.00      0.00    5.0000 RG                  RY-1014a
  PARK                        0.60     79.60      7.10    2.0000 RG                  MH802
  RETIREMENT                  1.02    157.23     85.70    2.0000 RG                  Retirment_Storage


  ************
  Node Summary
  ************
                                      Invert      Max.    Ponded    External
  Name                 Type             Elev.     Depth      Area    Inflow
  ----------------------------------------------------------------------------
  HP-CB01/02           JUNCTION         85.16      1.00       0.0
  HP-CB03/04           JUNCTION         86.09      1.00       0.0
  HP-CB05/06           JUNCTION         86.64      1.00       0.0
  HP-CB05/06(2)        JUNCTION         86.48      1.00       0.0
  HP-CB07/08           JUNCTION         85.12      1.00       0.0
  HP-CB09              JUNCTION         86.16      1.00       0.0
  HP-CB09(2)           JUNCTION         86.21      1.00       0.0
  HP-CB10/11           JUNCTION         86.15      1.00       0.0
  HP-CB12/13           JUNCTION         85.86      1.00       0.0
  HP-CB14/15           JUNCTION         86.64      1.00       0.0
  HP-CB14/15(2)        JUNCTION         86.64      1.00       0.0
  HP-CB16              JUNCTION         86.58      1.00       0.0
  HP-CB16(2)           JUNCTION         86.64      1.00       0.0
  HP-CB19              JUNCTION         85.79      1.00       0.0
  HP-CB20              JUNCTION         85.43      1.00       0.0
  HP-CB21              JUNCTION         85.46      1.00       0.0
  HP-CB22              JUNCTION         85.53      1.00       0.0
  HP-CB23              JUNCTION         85.52      1.00       0.0
  HP-CB24              JUNCTION         85.58      1.00       0.0
  HP-CB25              JUNCTION         85.59      1.00       0.0
  HP-CB25(2)           JUNCTION         85.77      1.00       0.0
  HP-MH509             JUNCTION         85.95      1.00       0.0
  HP-RY-1005           JUNCTION         85.94      1.00       0.0
  HP-RYCB09            JUNCTION         86.00      1.00       0.0
  HP-RYCB704           JUNCTION         85.89      1.00       0.0
  HP-RYCB705           JUNCTION         85.97      1.00       0.0
  Hp-RYCB802           JUNCTION         85.68      1.00       0.0
  D01-OUT              OUTFALL          86.40      0.00       0.0
  D04-05-OUT           OUTFALL          85.30      0.00       0.0
  DR02-03-OUT          OUTFALL          85.00      0.00       0.0
  HP-MH509-OUT         OUTFALL          85.25      1.00       0.0
  HP-RY-1001           OUTFALL          85.20      1.00       0.0
  HP-RY-1003           OUTFALL          85.44      1.00       0.0
  MH201Connection      OUTFALL          80.98      0.53       0.0
  MH401Connection      OUTFALL          80.66      0.60       0.0
  OF-DonReidDr         OUTFALL          86.41      1.00       0.0
  OF-MH600             OUTFALL          83.00      0.45       0.0
  OF-MJ-CommercialRoad OUTFALL          85.13      1.00       0.0
  OF-Retirement        OUTFALL          87.25      1.00       0.0
  OF-RYCB708           OUTFALL          85.16      1.00       0.0
  OF-StLaurent1        OUTFALL          85.05      1.00       0.0
  OF-StLaurent2        OUTFALL          85.07      1.00       0.0
  Park-OUT             OUTFALL          81.76      0.00       0.0
  Retirement-OUT       OUTFALL          86.00      0.00       0.0
  CB01/02              STORAGE          83.67      2.32       0.0
  CB03/04              STORAGE          84.56      2.33       0.0
  CB05/06              STORAGE          84.97      2.27       0.0
  CB07/08              STORAGE          83.75      2.27       0.0
  CB09                 STORAGE          84.86      2.20       0.0
  CB10/11              STORAGE          84.35      2.56       0.0
  CB12/13              STORAGE          84.13      2.56       0.0
  CB14/15              STORAGE          85.11      2.33       0.0
  CB16                 STORAGE          85.24      2.20       0.0
  CB17/18              STORAGE          86.02      1.00       0.0
  CB19                 STORAGE          84.49      2.20       0.0
  CB20                 STORAGE          84.08      2.20       0.0
  CB21                 STORAGE          84.15      2.20       0.0
  CB22                 STORAGE          84.18      2.20       0.0
  CB23                 STORAGE          84.20      2.20       0.0
  CB24                 STORAGE          84.21      2.20       0.0
  CB25                 STORAGE          84.25      2.20       0.0
  MH201                STORAGE          81.01      4.08       0.0
  MH202                STORAGE          81.77      4.23       0.0
  MH203                STORAGE          82.15      4.59       0.0
  MH204                STORAGE          82.89      3.60       0.0
  MH205                STORAGE          82.57      3.94       0.0
  MH401                STORAGE          80.69      4.48       0.0
  MH402                STORAGE          81.37      4.78       0.0
  MH403                STORAGE          81.54      4.57       0.0
  MH404                STORAGE          81.89      4.00       0.0
  MH405                STORAGE          82.27      3.60       0.0
  MH406                STORAGE          81.82      4.81       0.0
  MH407                STORAGE          82.29      3.84       0.0
  MH408                STORAGE          82.53      3.38       0.0
  MH501                STORAGE          82.69      4.73       0.0
  MH501Connection      STORAGE          82.54      3.91       0.0
  MH502                STORAGE          83.34      3.99       0.0
  MH503                STORAGE          81.82      4.29       0.0
  MH504                STORAGE          82.65      3.43       0.0
  MH505                STORAGE          81.97      4.60       0.0
  MH506                STORAGE          82.30      4.14       0.0
  MH507                STORAGE          82.55      3.61       0.0
  MH508                STORAGE          82.69      3.46       0.0
```

MH509	STORAGE	82.83	3.86	0.0
MH510	STORAGE	83.40	3.39	0.0
MH600	STORAGE	83.13	2.32	0.0
MH601	STORAGE	83.16	3.25	0.0
MH602	STORAGE	83.53	2.02	0.0
MH603	STORAGE	83.61	1.97	0.0
MH604	STORAGE	83.83	1.73	0.0
MH801	STORAGE	81.93	4.42	0.0
MH802	STORAGE	84.10	2.38	0.0
Retirment_Storage	STORAGE	86.00	2.30	0.0
RY-1001	STORAGE	83.79	2.31	0.0
RY-1002	STORAGE	84.08	2.27	0.0
RY-1003	STORAGE	84.15	2.00	0.0
RY-1004	STORAGE	84.44	2.00	0.0
RY-1005	STORAGE	84.60	2.24	0.0
RY-1006	STORAGE	84.47	2.23	0.0
RY-1007	STORAGE	84.59	2.26	0.0
RY-1008	STORAGE	84.94	2.51	0.0
RY-1009	STORAGE	84.39	2.27	0.0
RY-1010	STORAGE	84.71	2.58	0.0
RY-1011	STORAGE	85.20	2.20	0.0
RY-1012	STORAGE	84.89	2.56	0.0
RY-1013	STORAGE	84.64	2.66	0.0
RY-1014a	STORAGE	83.27	2.93	0.0
RY-1014b	STORAGE	83.70	2.30	0.0
RY-1015	STORAGE	84.90	2.23	0.0
RY-1016	STORAGE	84.63	2.22	0.0
RYCB701	STORAGE	83.55	2.57	0.0
RYCB702	STORAGE	83.89	2.36	0.0
RYCB703	STORAGE	84.38	2.66	0.0
RYCB704	STORAGE	84.27	2.52	0.0
RYCB705	STORAGE	84.40	2.40	0.0
RYCB708	STORAGE	83.05	3.35	0.0
RYCB709	STORAGE	83.95	2.75	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	HP-CB25(2)	CB25	CONDUIT	17.7	1.8082	0.0350
C10	CB21	HP-CB21	CONDUIT	17.4	-0.6322	0.0350
C11	HP-CB21	CB20	CONDUIT	17.1	1.0527	0.0350
C12	CB20	HP-CB20	CONDUIT	17.9	-0.8380	0.0350
C13	HP-CB20	OF-MJ-CommercialRoad	CONDUIT	8.1	3.7062	0.0350
C14	CB05/06	HP-CB05/06(2)	CONDUIT	31.4	-0.7644	0.0350
C15	HP-CB05/06	CB05/06	CONDUIT	55.0	0.7273	0.0350
C16	HP-CB05/06	CB03/04	CONDUIT	64.8	1.1575	0.0160
C17	CB03/04	HP-CB03/04	CONDUIT	29.1	-0.6873	0.0160
C18	HP-CB03/04	CB01/02	CONDUIT	66.2	1.6619	0.0160
C19	CB01/02	HP-CB01/02	CONDUIT	29.1	-0.5842	0.0160
C2	CB25	HP-CB25	CONDUIT	17.2	-0.8140	0.0350
C20	HP-CB01/02	OF-StLaurent1	CONDUIT	6.1	1.8036	0.0160
C21	MH601	CB20	CONDUIT	3.3	4.0032	0.0160
C21_1	CB19	HP-CB19	CONDUIT	3.3	-3.0784	0.0160
C21_2	HP-CB19	MH509	CONDUIT	3.3	3.0784	0.0160
C21_3	MH509	HP-MH509	CONDUIT	5.0	-5.2070	0.0160
C22	HP-CB14/15(2)	CB14/15	CONDUIT	27.3	0.7326	0.0160
C23	CB14/15	HP-CB14/15	CONDUIT	29.0	-0.6897	0.0160
C24	HP-CB14/15	CB09	CONDUIT	51.1	1.1351	0.0160
C25	CB09	HP-CB09	CONDUIT	4.0	-1.7503	0.0160
C26	RY-1011	RY-1012	CONDUIT	59.7	0.5025	0.0130
C27	HP-CB09(2)	CB09	CONDUIT	26.3	0.5704	0.0160
C28	HP-MH509	HP-MH509-OUT	CONDUIT	7.0	10.0504	0.0350
C29	CB07/08	HP-CB07/08	CONDUIT	19.8	-0.5051	0.0350
C3	HP-CB25	CB24	CONDUIT	25.5	0.7059	0.0350
C30	HP-CB07/08	OF-StLaurent2	CONDUIT	4.1	1.2196	0.0350
C31	CB12/13	HP-CB12/13	CONDUIT	20.9	-0.8134	0.0160
C32	CB10/11	HP-CB10/11	CONDUIT	39.2	-0.6123	0.0160
C33	HP-CB10/11	CB12/13	CONDUIT	65.3	0.7045	0.0160
C34	HP-CB09	CB10/11	CONDUIT	10.0	2.5008	0.0160
C35	HP-CB12/13	CB19	CONDUIT	23.9	0.7113	0.0350
C36	CB17/18	CB19	CONDUIT	38.1	0.8662	0.0350
C37	HP-CB16	CB17/18	CONDUIT	74.9	0.7477	0.0350
C38	CB16	HP-CB16	CONDUIT	19.2	-0.7292	0.0350
C39	HP-CB16(2)	CB16	CONDUIT	14.3	1.3987	0.0350
C4	CB24	HP-CB24	CONDUIT	30.0	-0.5667	0.0350
C40	HP-CB05/06(2)	OF-DonReidDr	CONDUIT	9.4	0.7447	0.0350
C41	MH502	CB05/06	CONDUIT	3.3	2.7703	0.0160
C42	RY-1014a	RYCB708	CONDUIT	33.4	0.4790	0.0130
C43	MH401	MH401Connection	CONDUIT	9.0	0.3333	0.0130
C44	MH510	MH509	CONDUIT	3.3	3.0784	0.0160
C45	RY-1004	RYCB702	CONDUIT	54.2	0.4982	0.0130
C46	RY-1012	RY-1013	CONDUIT	48.1	0.4990	0.0130
C47	RY-1013	RYCB705	CONDUIT	33.4	0.5389	0.0130
C47_1	MH802	Hp-RYCB802	CONDUIT	2.0	-10.0504	0.0350
C48	RY-1003	RYCB702	CONDUIT	39.1	0.5115	0.0130
C49	RY-1003	HP-RY-1003	CONDUIT	2.0	-14.6549	0.0350
C5	HP-CB24	CB23	CONDUIT	27.1	0.6642	0.0350
C50	RY-1001	HP-RY-1001	CONDUIT	2.0	-7.5212	0.0350
C51	RY-1005	HP-RY-1005	CONDUIT	2.0	-5.0063	0.0350
C52	HP-RY-1005	RY-1002	CONDUIT	2.0	30.8740	0.0350
C53	Hp-RYCB802	RY-1004	CONDUIT	2.0	12.0873	0.0350
C54	RYCB705	HP-RYCB705	CONDUIT	2.0	-8.5309	0.0350
C55	HP-RYCB705	CB24	CONDUIT	2.0	29.1667	0.0350
C56	RYCB709	HP-RYCB09	CONDUIT	3.0	-10.0504	0.0350
C57	HP-RYCB09	CB19	CONDUIT	5.0	6.2120	0.0350
C58	OF-RYCB708	RY-1014b	CONDUIT	2.0	8.0257	0.0350
C6	CB23	HP-CB23	CONDUIT	15.2	-0.7895	0.0350
C64	RY-1015	RY-1016	CONDUIT	51.8	0.5019	0.0130
C65	RY-1016	RYCB709	CONDUIT	63.5	0.5039	0.0130
C66	RY-1014b	RY-1014a	CONDUIT	85.2	0.4930	0.0130
C67	RY-1001	RYCB701	CONDUIT	37.0	0.4865	0.0130
C68	RY-1002	RYCB701	CONDUIT	36.9	0.4878	0.0130
C69	RY-1005	RY-1006	CONDUIT	23.3	0.5150	0.0130
C7	HP-CB23	CB22	CONDUIT	15.4	0.9091	0.0350
C70	RY-1006	RYCB703	CONDUIT	6.1	0.4918	0.0130
C71	RY-1007	RYCB703	CONDUIT	3.0	0.3333	0.0130
C72	RY-1008	RY-1007	CONDUIT	68.1	0.4993	0.0130
C73	RYCB704	HP-RYCB704	CONDUIT	2.0	-5.0063	0.0350
C74	HP-RYCB704	RY-1004	CONDUIT	2.0	23.0921	0.0350
C75	RY-1010	RY-1009	CONDUIT	61.0	0.5082	0.0130
C76	RY-1009	RYCB704	CONDUIT	11.5	0.5217	0.0130
C77	MH503	CB07/08	CONDUIT	3.3	2.7703	0.0160
C8	CB22	HP-CB22	CONDUIT	19.7	-0.7614	0.0350
C9	HP-CB22	CB21	CONDUIT	19.9	0.9046	0.0350
HP01	HP-CB09(2)	CB07/08	CONDUIT	79.4	1.4989	0.0350
OR-CB05/06	CB05/06	MH502	CONDUIT	1.6	1.2580	0.0130
OR-CB07/08	CB07/08	MH504	CONDUIT	1.1	0.9091	0.0130
OR-CB14/15	CB14/15	MH505	CONDUIT	20.6	1.0195	0.0130
OR-CB16	CB16	MH506	CONDUIT	6.5	0.9231	0.0130
OR-CB19	CB19	MH509	CONDUIT	6.5	1.0770	0.0130
OR-CB20	CB20	MH602	CONDUIT	3.7	1.0753	0.0130
OR-CB21	CB21	MH602	CONDUIT	4.2	0.9524	0.0130
OR-CB22	CB22	MH602	CONDUIT	2.4	0.8265	0.0130
OR-CB23	CB23	MH602	CONDUIT	3.3	0.9175	0.0130
OR-CB24	CB24	MH604	CONDUIT	5.0	1.0021	0.0130
OR-CB25	CB25	MH604	CONDUIT	4.5	0.8929	0.0130
OR-RYCB708	RYCB708	MH504	CONDUIT	7.9	0.5063	0.0130
OR-RYCB709	RYCB709	MH510	CONDUIT	10.5	0.4766	0.0130
OVF-Retirement	Retirment_Storage	OF-Retirement	CONDUIT	5.0	1.0001	0.0160
STM-213_(STM)	MH802	MH801	CONDUIT	70.3	0.4979	0.0130
STM-253_(STM)	MH405	MH404	CONDUIT	35.5	0.6479	0.0130
STM-254_(STM)	MH404	MH403	CONDUIT	91.8	0.2941	0.0130
STM-255_(STM)	MH403	MH402	CONDUIT	30.4	0.3289	0.0130
STM-256_(STM)	MH402	MH401	CONDUIT	90.7	0.2977	0.0130
STM-257_(STM)	MH406	MH403	CONDUIT	69.4	0.2882	0.0130
STM-258_(STM)	MH407	MH406	CONDUIT	91.6	0.2948	0.0130
STM-260_(STM)	MH509	MH508	CONDUIT	28.1	0.2847	0.0130
STM-261_(1)_(1)_(STM)	MH506	MH505	CONDUIT	9.8	0.3061	0.0130
STM-261_(1)_(STM)	MH507	MH506	CONDUIT	79.7	0.3011	0.0130
STM-261_(STM)	MH508	MH507	CONDUIT	42.7	0.3045	0.0130
STM-267_(STM)	MH408	MH407	CONDUIT	35.5	0.6479	0.0130
STM-269_(STM)	MH510	MH509	CONDUIT	10.0	0.5000	0.0130
STM-291_(STM)	MH504	MH503	CONDUIT	75.5	0.3046	0.0130
STM-302_(1)_(STM)	MH603	MH602	CONDUIT	16.6	0.3021	0.0130
STM-302_(STM)	MH604	MH603	CONDUIT	61.8	0.3076	0.0130
STM-304_(STM)	MH602	MH601	CONDUIT	120.0	0.3000	0.0130
STM-316_(STM)_1	MH204	MH501Connection	CONDUIT	54.1	0.6470	0.0130
STM-316_(STM)_2	MH501Connection	MH203	CONDUIT	48.1	0.6445	0.0130
STM-317_(STM)	MH203	MH202	CONDUIT	100.9	0.2973	0.0130
STM-318_(1)_(STM)	MH202	MH201	CONDUIT	90.8	0.2974	0.0130
STM-319_(STM)	MH201	MH201Connection	CONDUIT	10.5	0.2857	0.0130
STM-324_(STM)	MH502	MH501	CONDUIT	29.5	0.3051	0.0130
STM-332_(STM)	MH205	MH203	CONDUIT	41.6	0.6491	0.0130
STM-400	MH600	OF-MH600	CONDUIT	26.0	0.4998	0.0130
OR-CB01/02	CB01/02	MH202	ORIFICE			
OR-CB03/04	CB03/04	MH203	ORIFICE			
OR-CB09	CB09	MH406	ORIFICE			
OR-CB10/11	CB10/11	MH404	ORIFICE			
OR-CB12/13	CB12/13	MH405	ORIFICE			
OR-MH501	MH501	MH501Connection	ORIFICE			
OR-MH503	MH503	MH402	ORIFICE			

OR-MH505	MH505	MH406	ORIFICE
OR-MH601	MH601	MH600	ORIFICE
OR-MH801	MH801	Park-OUT	ORIFICE
OR-RYCB701	RYCB701	MH202	ORIFICE
OR-RYCB702	RYCB702	MH202	ORIFICE
OR-RYCB703	RYCB703	MH203	ORIFICE
OR-RYCB704	RYCB704	MH203	ORIFICE
OR-RYCB705	RYCB705	MH205	ORIFICE
OR-CB17/18	CB17/18	MH508	OUTLET
OR-RetirementStorage	Retirment_Storage	Retirement-OUT	OUTLET

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Cross Section Summary
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Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	CommercialAccess(North)	1.00	13.36	1.26	15.60	1	59764.25
C10	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	16869.13
C11	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	21767.92
C12	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	19421.97
C13	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	40844.52
C14	Street-1(Park)	1.00	16.22	1.15	18.65	1	44394.46
C15	Street-1(Park)	1.00	16.22	1.15	18.65	1	43304.80
C16	Street-2	1.00	16.17	0.46	19.00	1	64462.93
C17	Street-2	1.00	16.17	0.46	19.00	1	49673.64
C18	Street-2	1.00	16.17	0.46	19.00	1	77241.32
C19	Street-2	1.00	16.17	0.46	19.00	1	45796.68
C2	CommercialAccess(North)	1.00	13.36	1.26	15.60	1	40098.17
C20	Street-2	1.00	16.17	0.46	19.00	1	80467.24
C21	RECT_OPEN	1.00	3.00	0.60	3.00	1	26688.99
C21_1	RECT_OPEN	1.00	3.00	0.60	3.00	1	23403.96
C21_2	RECT_OPEN	1.00	3.00	0.60	3.00	1	23403.96
C21_3	RECT_OPEN	1.00	3.00	0.60	3.00	1	30438.55
C22	Street-2	1.00	16.17	0.46	19.00	1	51285.18
C23	Street-2	1.00	16.17	0.46	19.00	1	49759.21
C24	Street-2	1.00	16.17	0.46	19.00	1	63836.62
C25	RECT_OPEN	1.00	3.00	0.60	3.00	1	17647.39
C26	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1094.55
C27	Street-2	1.00	16.17	0.46	19.00	1	45250.53
C28	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	18784.58
C29	Street-3(North)	1.00	13.88	0.85	15.55	1	25249.97
C3	CommercialAccess(North)	1.00	13.36	1.26	15.60	1	37341.28
C30	Street-3(North)	1.00	13.88	0.85	15.55	1	39237.37
C31	Street-3(South)	1.00	17.40	0.45	20.50	1	57366.89
C32	Street-3(South)	1.00	17.40	0.45	20.50	1	49770.21
C33	Street-3(South)	1.00	17.40	0.45	20.50	1	53386.39
C34	RECT_OPEN	1.00	3.00	0.60	3.00	1	21094.35
C35	Street-3(East)	1.00	14.87	0.86	16.40	1	32511.44
C36	Street-3(East)	1.00	14.87	0.86	16.40	1	35876.31
C37	Street-3(North)	1.00	13.88	0.85	15.55	1	30722.02
C38	Street-3(North)	1.00	13.88	0.85	15.55	1	30339.60
C39	Street-3(North)	1.00	13.88	0.85	15.55	1	42020.27
C4	CommercialAccess(North)	1.00	13.36	1.26	15.60	1	33456.84
C40	Street-1(Park)	1.00	16.22	1.15	18.65	1	43820.04
C41	RECT_OPEN	1.00	3.00	0.60	3.00	1	22201.95
C42	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1068.68
C43	CIRCULAR	0.60	0.28	0.15	0.60	1	354.52
C44	RECT_OPEN	1.00	3.00	0.60	3.00	1	23403.96
C45	RECT_CLOSED	0.55	0.21	0.11	0.39	1	273.97
C46	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1090.67
C47	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1133.51
C47_1	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	18784.58
C48	RECT_CLOSED	0.55	0.21	0.11	0.39	1	277.62
C49	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	22683.04
C5	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	17291.12
C50	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	16250.00
C51	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	13257.66
C52	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	32923.54
C53	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	20600.40
C54	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	17306.41
C55	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	32000.27
C56	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	18784.58
C57	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	14768.09
C58	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	16786.20
C6	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	18851.34
C64	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1093.91
C65	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1096.10
C66	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1084.09
C67	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1076.95
C68	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1078.41
C69	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1108.09
C7	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	20229.22
C70	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1082.82
C71	RECT_CLOSED	0.90	0.60	0.19	0.67	1	891.45
C72	RECT_CLOSED	0.90	0.60	0.19	0.67	1	1091.01
C73	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	13257.66
C74	TRAPEZOIDAL	1.00	3.30	0.50	6.30	1	28473.57
C75	RECT_CLOSED	0.55	0.21	0.11	0.39	1	276.72
C76	RECT_CLOSED	0.55	0.21	0.11	0.39	1	280.38
C77	RECT_OPEN	1.00	3.00	0.60	3.00	1	22201.95
C8	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	18513.37
C9	CommercialAccess(South)	1.00	7.95	0.90	9.90	1	20178.33
HP01	Street-3(North)	1.00	13.88	0.85	15.55	1	43498.90
OR-CB05/06	CIRCULAR	0.30	0.07	0.07	0.30	1	108.47
OR-CB07/08	CIRCULAR	0.30	0.07	0.07	0.30	1	92.21
OR-CB14/15	CIRCULAR	0.30	0.07	0.07	0.30	1	97.64
OR-CB16	CIRCULAR	0.30	0.07	0.07	0.30	1	92.91
OR-CB19	CIRCULAR	0.30	0.07	0.07	0.30	1	100.36
OR-CB20	CIRCULAR	0.20	0.03	0.05	0.20	1	34.01
OR-CB21	CIRCULAR	0.20	0.03	0.05	0.20	1	32.01
OR-CB22	CIRCULAR	0.20	0.03	0.05	0.20	1	29.82
OR-CB23	CIRCULAR	0.20	0.03	0.05	0.20	1	31.42
OR-CB24	CIRCULAR	0.20	0.03	0.05	0.20	1	32.83
OR-CB25	CIRCULAR	0.20	0.03	0.05	0.20	1	30.99
OR-RYCB708	CIRCULAR	0.60	0.28	0.15	0.60	1	436.94
OR-RYCB709	CIRCULAR	0.60	0.28	0.15	0.60	1	423.94
OVF-Retirement	RECT_OPEN	1.00	3.00	0.60	3.00	1	13339.49
STM-213_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	123.72
STM-253_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	77.84
STM-254_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	154.63
STM-255_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	246.67
STM-256_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	335.03
STM-257_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	153.06
STM-258_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	32.29
STM-260_(STM)	CIRCULAR	1.05	0.87	0.26	1.05	1	1457.13
STM-261_(1)_(1)_(STM)	CIRCULAR	1.05	0.87	0.26	1.05	1	1510.96
STM-261_(1)_(STM)	CIRCULAR	1.05	0.87	0.26	1.05	1	1498.59
STM-261_(STM)	CIRCULAR	1.05	0.87	0.26	1.05	1	1506.83
STM-267_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	47.87
STM-269_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	434.20
STM-291_(STM)	CIRCULAR	0.82	0.53	0.21	0.82	1	792.32
STM-302_(1)_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	156.72
STM-302_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	158.13
STM-304_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	156.17
STM-316_(STM)_1	CIRCULAR	0.38	0.11	0.09	0.38	1	141.03
STM-316_(STM)_2	CIRCULAR	0.38	0.11	0.09	0.38	1	140.77
STM-317_(STM)	CIRCULAR	0.45	0.16	0.11	0.45	1	155.47
STM-318_(1)_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	234.53
STM-319_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	229.89
STM-324_(STM)	CIRCULAR	0.60	0.28	0.15	0.60	1	339.17
STM-332_(STM)	CIRCULAR	0.30	0.07	0.07	0.30	1	77.91
STM-400	CIRCULAR	0.45	0.16	0.11	0.45	1	201.58

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Transect Summary
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Transect CommercialAccess(North)
Area:

0.0008	0.0031	0.0069	0.0123	0.0192
0.0277	0.0376	0.0494	0.0639	0.0808
0.0992	0.1192	0.1407	0.1630	0.1853
0.2076	0.2300	0.2532	0.2766	0.2999
0.3232	0.3465	0.3699	0.3932	0.4165
0.4398	0.4632	0.4865	0.5098	0.5332
0.5565	0.5798	0.6032	0.6265	0.6498
0.6732	0.6965	0.7199	0.7432	0.7665
0.7899	0.8132	0.8366	0.8599	0.8833
0.9066	0.9300	0.9533	0.9767	1.0000

Hrad:

0.0079	0.0158	0.0236	0.0315	0.0394
0.0473	0.0551	0.0629	0.0702	0.0854
0.1011	0.1175	0.1345	0.1567	0.1800
0.2039	0.2232	0.2429	0.2676	0.2924
0.3173	0.3421	0.3669	0.3916	0.4163
0.4409	0.4654	0.4898	0.5141	0.5383
0.5624	0.5864	0.6104	0.6342	0.6578
0.6814	0.7049	0.7283	0.7515	0.7746
0.7977	0.8206	0.8434	0.8661	0.8887
0.9112	0.9335	0.9558	0.9780	1.0000

Width:

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            0.0658      0.1316      0.1974      0.2632      0.3291
            0.3949      0.4607      0.5588      0.6892      0.7556
            0.8220      0.8884      0.9548      0.9549      0.9550
            0.9551      0.9770      0.9988      0.9989      0.9989
            0.9989      0.9990      0.9990      0.9990      0.9991
            0.9991      0.9991      0.9992      0.9992      0.9993
            0.9993      0.9993      0.9994      0.9994      0.9994
            0.9995      0.9995      0.9996      0.9996      0.9996
            0.9997      0.9997      0.9997      0.9998      0.9998
            0.9999      0.9999      0.9999      1.0000      1.0000

Transect CommercialAccess(South)
Area:
            0.0013      0.0050      0.0113      0.0202      0.0315
            0.0453      0.0617      0.0794      0.0972      0.1153
            0.1340      0.1528      0.1718      0.1910      0.2104
            0.2300      0.2497      0.2696      0.2897      0.3100
            0.3304      0.3511      0.3719      0.3929      0.4141
            0.4354      0.4570      0.4787      0.5006      0.5227
            0.5449      0.5674      0.5900      0.6128      0.6358
            0.6590      0.6823      0.7058      0.7295      0.7534
            0.7775      0.8017      0.8261      0.8508      0.8755
            0.9004      0.9253      0.9502      0.9751      1.0000
Hrad:
            0.0108      0.0217      0.0325      0.0433      0.0541
            0.0650      0.0758      0.0970      0.1182      0.1361
            0.1572      0.1782      0.1992      0.2201      0.2411
            0.2621      0.2831      0.3041      0.3251      0.3462
            0.3672      0.3882      0.4093      0.4304      0.4515
            0.4726      0.4937      0.5148      0.5360      0.5572
            0.5784      0.5996      0.6208      0.6421      0.6633
            0.6846      0.7059      0.7273      0.7486      0.7700
            0.7914      0.8128      0.8342      0.8557      0.8772
            0.9018      0.9265      0.9510      0.9756      1.0000
Width:
            0.1011      0.2023      0.3034      0.4046      0.5057
            0.6069      0.7080      0.7121      0.7197      0.7453
            0.7526      0.7598      0.7671      0.7743      0.7815
            0.7888      0.7960      0.8033      0.8105      0.8178
            0.8250      0.8322      0.8395      0.8467      0.8540
            0.8612      0.8685      0.8757      0.8830      0.8902
            0.8974      0.9047      0.9119      0.9192      0.9264
            0.9337      0.9409      0.9482      0.9554      0.9626
            0.9699      0.9771      0.9844      0.9916      0.9989
            0.9991      0.9993      0.9995      0.9998      1.0000

Transect NoCurbStreet
Area:
            0.0009      0.0035      0.0081      0.0153      0.0252
            0.0363      0.0485      0.0617      0.0760      0.0914
            0.1078      0.1253      0.1438      0.1634      0.1841
            0.2055      0.2275      0.2499      0.2729      0.2963
            0.3197      0.3431      0.3666      0.3900      0.4135
            0.4369      0.4604      0.4838      0.5073      0.5307
            0.5542      0.5776      0.6011      0.6246      0.6480
            0.6715      0.6949      0.7184      0.7419      0.7653
            0.7888      0.8122      0.8357      0.8592      0.8826
            0.9061      0.9296      0.9531      0.9765      1.0000
Hrad:
            0.0172      0.0344      0.0508      0.0641      0.0841
            0.1094      0.1327      0.1544      0.1746      0.1937
            0.2117      0.2289      0.2453      0.2610      0.2762
            0.2939      0.3117      0.3294      0.3470      0.3660
            0.3867      0.4076      0.4286      0.4498      0.4711
            0.4924      0.5138      0.5352      0.5566      0.5780
            0.5994      0.6208      0.6422      0.6635      0.6849
            0.7062      0.7274      0.7487      0.7698      0.7910
            0.8121      0.8332      0.8542      0.8751      0.8961
            0.9170      0.9378      0.9586      0.9793      1.0000
Width:
            0.0754      0.1507      0.2485      0.3686      0.4512
            0.4964      0.5416      0.5867      0.6319      0.6770
            0.7222      0.7674      0.8125      0.8577      0.9029
            0.9242      0.9454      0.9667      0.9880      0.9987
            0.9987      0.9988      0.9988      0.9989      0.9989
            0.9990      0.9990      0.9990      0.9991      0.9991
            0.9992      0.9992      0.9993      0.9993      0.9993
            0.9994      0.9994      0.9995      0.9995      0.9996
            0.9996      0.9997      0.9997      0.9997      0.9998
            0.9998      0.9999      0.9999      1.0000      1.0000

Transect OnesideCurb-17m
Area:
            0.0009      0.0037      0.0085      0.0173      0.0301
            0.0461      0.0642      0.0835      0.1038      0.1251
            0.1470      0.1688      0.1907      0.2126      0.2344
            0.2563      0.2781      0.3000      0.3219      0.3437
            0.3656      0.3875      0.4093      0.4312      0.4531
            0.4749      0.4968      0.5187      0.5406      0.5624
            0.5843      0.6062      0.6280      0.6499      0.6718
            0.6937      0.7156      0.7374      0.7593      0.7812
            0.8031      0.8249      0.8468      0.8687      0.8906
            0.9125      0.9343      0.9562      0.9781      1.0000
Hrad:
            0.0161      0.0321      0.0464      0.0553      0.0646
            0.0844      0.1034      0.1230      0.1420      0.1605
            0.1815      0.2029      0.2245      0.2462      0.2679
            0.2897      0.3115      0.3333      0.3550      0.3767
            0.3983      0.4199      0.4414      0.4629      0.4843
            0.5057      0.5270      0.5482      0.5694      0.5905
            0.6115      0.6325      0.6534      0.6743      0.6951
            0.7159      0.7365      0.7572      0.7777      0.7982
            0.8187      0.8390      0.8594      0.8796      0.8998
            0.9200      0.9401      0.9601      0.9801      1.0000
Width:
            0.0836      0.1673      0.3040      0.4939      0.6809
            0.7820      0.8563      0.9038      0.9513      0.9989
            0.9989      0.9989      0.9989      0.9990      0.9990
            0.9990      0.9991      0.9991      0.9991      0.9991
            0.9992      0.9992      0.9992      0.9993      0.9993
            0.9993      0.9993      0.9994      0.9994      0.9994
            0.9995      0.9995      0.9995      0.9995      0.9996
            0.9996      0.9996      0.9997      0.9997      0.9997
            0.9997      0.9998      0.9998      0.9998      0.9999
            0.9999      0.9999      0.9999      1.0000      1.0000

Transect OnseSideCurb-20.6m
Area:
            0.0009      0.0035      0.0080      0.0151      0.0249
            0.0361      0.0484      0.0617      0.0760      0.0914
            0.1077      0.1252      0.1436      0.1631      0.1836
            0.2052      0.2277      0.2508      0.2742      0.2976
            0.3210      0.3444      0.3678      0.3912      0.4146
            0.4381      0.4615      0.4849      0.5083      0.5317
            0.5551      0.5785      0.6019      0.6253      0.6487
            0.6721      0.6956      0.7190      0.7424      0.7658
            0.7892      0.8126      0.8361      0.8595      0.8829
            0.9063      0.9297      0.9532      0.9766      1.0000
Hrad:
            0.0172      0.0343      0.0511      0.0649      0.0845
            0.1094      0.1326      0.1542      0.1745      0.1937
            0.2118      0.2292      0.2457      0.2616      0.2770
            0.2918      0.3075      0.3244      0.3446      0.3652
            0.3860      0.4070      0.4282      0.4494      0.4708
            0.4922      0.5136      0.5351      0.5565      0.5780
            0.5994      0.6208      0.6422      0.6636      0.6849
            0.7062      0.7275      0.7487      0.7699      0.7911
            0.8122      0.8332      0.8542      0.8752      0.8961
            0.9170      0.9378      0.9586      0.9793      1.0000
Width:
            0.0757      0.1514      0.2375      0.3644      0.4537
            0.5016      0.5456      0.5897      0.6337      0.6778
            0.7218      0.7659      0.8099      0.8540      0.8980
            0.9421      0.9757      0.9991      0.9991      0.9991
            0.9991      0.9992      0.9992      0.9992      0.9993
            0.9993      0.9993      0.9993      0.9994      0.9994
            0.9994      0.9995      0.9995      0.9995      0.9996
            0.9996      0.9996      0.9996      0.9997      0.9997
            0.9997      0.9998      0.9998      0.9998      0.9999
            0.9999      0.9999      0.9999      1.0000      1.0000

Transect Street-1(Park)
Area:
            0.0008      0.0032      0.0074      0.0144      0.0244
            0.0365      0.0500      0.0648      0.0810      0.0986
            0.1171      0.1363      0.1561      0.1765      0.1976
            0.2193      0.2417      0.2646      0.2875      0.3105
            0.3335      0.3565      0.3794      0.4024      0.4254
            0.4484      0.4713      0.4943      0.5173      0.5403
            0.5632      0.5862      0.6092      0.6322      0.6552
            0.6782      0.7011      0.7241      0.7471      0.7701
            0.7931      0.8161      0.8391      0.8621      0.8850
            0.9080      0.9310      0.9540      0.9770      1.0000
Hrad:
```

```
            0.0085    0.0169    0.0242    0.0323    0.0423
            0.0587    0.0753    0.0919    0.1085    0.1252
            0.1466    0.1677    0.1885    0.2088    0.2287
            0.2481    0.2670    0.2883    0.3123    0.3361
            0.3598    0.3834    0.4069    0.4302    0.4535
            0.4766    0.4996    0.5225    0.5453    0.5680
            0.5906    0.6130    0.6354    0.6576    0.6798
            0.7018    0.7238    0.7456    0.7673    0.7890
            0.8105    0.8320    0.8533    0.8745    0.8957
            0.9167    0.9377    0.9586    0.9793    1.0000
Width:
            0.0701    0.1403    0.2397    0.3686    0.4974
            0.5565    0.6157    0.6748    0.7339    0.7930
            0.8205    0.8480    0.8754    0.9029    0.9304
            0.9578    0.9853    0.9990    0.9991    0.9991
            0.9991    0.9992    0.9992    0.9992    0.9993
            0.9993    0.9993    0.9993    0.9994    0.9994
            0.9994    0.9995    0.9995    0.9995    0.9996
            0.9996    0.9996    0.9996    0.9997    0.9997
            0.9997    0.9998    0.9998    0.9998    0.9999
            0.9999    0.9999    0.9999    1.0000    1.0000

Transect Street-2
Area:
            0.0008    0.0032    0.0074    0.0141    0.0234
            0.0346    0.0467    0.0599    0.0742    0.0894
            0.1057    0.1230    0.1414    0.1607    0.1811
            0.2025    0.2250    0.2483    0.2718    0.2953
            0.3188    0.3422    0.3657    0.3892    0.4127
            0.4362    0.4597    0.4831    0.5066    0.5301
            0.5536    0.5771    0.6006    0.6241    0.6476
            0.6710    0.6945    0.7180    0.7415    0.7650
            0.7885    0.8120    0.8355    0.8590    0.8825
            0.9060    0.9295    0.9530    0.9765    1.0000
Hrad:
            0.0213    0.0425    0.0627    0.0781    0.0925
            0.1226    0.1499    0.1747    0.1975    0.2186
            0.2383    0.2566    0.2739    0.2902    0.3056
            0.3203    0.3344    0.3504    0.3692    0.3885
            0.4082    0.4281    0.4482    0.4685    0.4889
            0.5094    0.5299    0.5505    0.5711    0.5917
            0.6124    0.6330    0.6536    0.6742    0.6948
            0.7154    0.7359    0.7565    0.7769    0.7974
            0.8178    0.8382    0.8586    0.8789    0.8992
            0.9194    0.9396    0.9598    0.9799    1.0000
Width:
            0.0688    0.1377    0.2282    0.3403    0.4525
            0.4962    0.5399    0.5836    0.6273    0.6711
            0.7148    0.7585    0.8022    0.8459    0.8896
            0.9334    0.9771    0.9990    0.9990    0.9990
            0.9991    0.9991    0.9991    0.9992    0.9992
            0.9992    0.9993    0.9993    0.9993    0.9994
            0.9994    0.9994    0.9994    0.9995    0.9995
            0.9995    0.9996    0.9996    0.9996    0.9997
            0.9997    0.9997    0.9998    0.9998    0.9998
            0.9999    0.9999    0.9999    1.0000    1.0000

Transect Street-3(East)
Area:
            0.0015    0.0061    0.0139    0.0250    0.0396
            0.0566    0.0742    0.0922    0.1106    0.1294
            0.1487    0.1684    0.1885    0.2090    0.2298
            0.2511    0.2727    0.2947    0.3167    0.3388
            0.3608    0.3828    0.4049    0.4269    0.4489
            0.4710    0.4930    0.5150    0.5371    0.5591
            0.5811    0.6032    0.6252    0.6473    0.6693
            0.6913    0.7134    0.7354    0.7575    0.7795
            0.8016    0.8236    0.8457    0.8677    0.8897
            0.9118    0.9338    0.9559    0.9779    1.0000
Hrad:
            0.0114    0.0229    0.0338    0.0447    0.0559
            0.0748    0.0957    0.1162    0.1362    0.1558
            0.1751    0.1940    0.2126    0.2314    0.2499
            0.2681    0.2861    0.3063    0.3288    0.3513
            0.3736    0.3960    0.4182    0.4405    0.4626
            0.4847    0.5068    0.5288    0.5508    0.5727
            0.5945    0.6163    0.6381    0.6598    0.6814
            0.7030    0.7245    0.7460    0.7675    0.7889
            0.8102    0.8315    0.8527    0.8739    0.8951
            0.9161    0.9372    0.9582    0.9791    1.0000
Width:
            0.1394    0.2788    0.4267    0.5832    0.7398
            0.7879    0.8068    0.8258    0.8447    0.8637
            0.8826    0.9015    0.9205    0.9379    0.9553
            0.9727    0.9901    0.9989    0.9989    0.9989
            0.9990    0.9990    0.9990    0.9991    0.9991
            0.9992    0.9992    0.9992    0.9993    0.9993
            0.9993    0.9994    0.9994    0.9994    0.9995
            0.9995    0.9995    0.9996    0.9996    0.9996
            0.9997    0.9997    0.9998    0.9998    0.9998
            0.9999    0.9999    0.9999    1.0000    1.0000

Transect Street-3(North)
Area:
            0.0017    0.0068    0.0151    0.0260    0.0395
            0.0545    0.0702    0.0865    0.1035    0.1210
            0.1392    0.1580    0.1774    0.1974    0.2180
            0.2392    0.2610    0.2833    0.3057    0.3280
            0.3504    0.3728    0.3952    0.4176    0.4400
            0.4624    0.4848    0.5072    0.5296    0.5519
            0.5743    0.5967    0.6191    0.6415    0.6639
            0.6863    0.7087    0.7311    0.7535    0.7759
            0.7983    0.8207    0.8431    0.8655    0.8880
            0.9104    0.9328    0.9552    0.9776    1.0000
Hrad:
            0.0117    0.0233    0.0365    0.0506    0.0640
            0.0829    0.1024    0.1213    0.1397    0.1576
            0.1754    0.1929    0.2100    0.2269    0.2434
            0.2596    0.2756    0.2950    0.3179    0.3408
            0.3636    0.3863    0.4090    0.4316    0.4541
            0.4766    0.4991    0.5215    0.5438    0.5661
            0.5883    0.6104    0.6325    0.6546    0.6766
            0.6985    0.7204    0.7422    0.7640    0.7857
            0.8074    0.8290    0.8506    0.8721    0.8935
            0.9149    0.9363    0.9576    0.9788    1.0000
Width:
            0.1507    0.3015    0.4328    0.5448    0.6567
            0.6850    0.7134    0.7417    0.7701    0.7984
            0.8251    0.8518    0.8786    0.9053    0.9320
            0.9587    0.9855    0.9989    0.9989    0.9989
            0.9990    0.9990    0.9990    0.9991    0.9991
            0.9991    0.9992    0.9992    0.9992    0.9993
            0.9993    0.9994    0.9994    0.9994    0.9995
            0.9995    0.9995    0.9996    0.9996    0.9996
            0.9997    0.9997    0.9997    0.9998    0.9998
            0.9999    0.9999    0.9999    1.0000    1.0000

Transect Street-3(South)
Area:
            0.0008    0.0031    0.0071    0.0136    0.0226
            0.0335    0.0455    0.0585    0.0725    0.0876
            0.1038    0.1210    0.1393    0.1586    0.1790
            0.2004    0.2229    0.2463    0.2698    0.2934
            0.3169    0.3405    0.3640    0.3876    0.4111
            0.4347    0.4582    0.4818    0.5053    0.5289
            0.5524    0.5760    0.5995    0.6231    0.6466
            0.6702    0.6937    0.7173    0.7408    0.7644
            0.7879    0.8115    0.8351    0.8586    0.8822
            0.9057    0.9293    0.9529    0.9764    1.0000
Hrad:
            0.0217    0.0435    0.0639    0.0792    0.0935
            0.1236    0.1507    0.1752    0.1978    0.2185
            0.2378    0.2558    0.2727    0.2886    0.3038
            0.3182    0.3319    0.3477    0.3666    0.3859
            0.4056    0.4255    0.4457    0.4660    0.4865
            0.5070    0.5276    0.5482    0.5689    0.5896
            0.6103    0.6310    0.6517    0.6724    0.6931
            0.7138    0.7344    0.7550    0.7756    0.7962
            0.8167    0.8372    0.8577    0.8782    0.8986
            0.9189    0.9392    0.9595    0.9798    1.0000
Width:
            0.0658    0.1315    0.2194    0.3296    0.4397
            0.4844    0.5292    0.5739    0.6187    0.6634
            0.7082    0.7529    0.7977    0.8424    0.8872
            0.9319    0.9767    0.9990    0.9991    0.9991
            0.9991    0.9992    0.9992    0.9992    0.9992
            0.9993    0.9993    0.9993    0.9994    0.9994
            0.9994    0.9995    0.9995    0.9995    0.9995
            0.9996    0.9996    0.9996    0.9997    0.9997
            0.9997    0.9998    0.9998    0.9998    0.9998
            0.9999    0.9999    0.9999    1.0000    1.0000


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Analysis Options
****************
Flow Units ............... LPS
Process Models:
  Rainfall/Runoff ........ YES
  RDII ................... NO
  Snowmelt ............... NO
  Groundwater ............ NO
  Flow Routing ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
Surcharge Method ......... EXTRAN
Starting Date ............ 07/13/2023 00:00:00
Ending Date .............. 07/14/2023 00:00:00
Antecedent Dry Days ...... 0.0
Report Time Step ......... 00:05:00
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 1.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 8
Head Tolerance ........... 0.001500 m


**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
Total Precipitation ......         0.448        76.002
Evaporation Loss .........         0.000         0.000
Infiltration Loss ........         0.108        18.291
Surface Runoff ...........         0.338        57.333
Final Storage ............         0.003         0.465
Continuity Error (%) .....        -0.115


**************************        Volume        Volume
Flow Routing Continuity        hectare-m      10^6 ltr
**************************     ---------      ---------
Dry Weather Inflow .......         0.000         0.000
Wet Weather Inflow .......         0.338         3.381
Groundwater Inflow .......         0.000         0.000
RDII Inflow ..............         0.000         0.000
External Inflow ..........         0.002         0.016
External Outflow .........         0.340         3.397
Flooding Loss ............         0.000         0.000
Evaporation Loss .........         0.000         0.000
Exfiltration Loss ........         0.000         0.000
Initial Stored Volume ....         0.015         0.146
Final Stored Volume ......         0.014         0.145
Continuity Error (%) .....         0.029


***************************
Time-Step Critical Elements
***************************
Link OR-CB07/08 (6.22%)


*********************************
Highest Flow Instability Indexes
*********************************
Link OR-MH801 (120)
Link OR-MH601 (5)


*********************************
Most Frequent Nonconverging Nodes
*********************************
Convergence obtained at all time steps.


*************************
Routing Time Step Summary
*************************
Minimum Time Step           :     0.44 sec
Average Time Step           :     0.98 sec
Maximum Time Step           :     1.00 sec
% of Time in Steady State   :     0.00
Average Iterations per Step :     2.00
% of Steps Not Converging   :     0.00
Time Step Frequencies       :
    1.000 -  0.871 sec      :    93.61 %
    0.871 -  0.758 sec      :     1.01 %
    0.758 -  0.660 sec      :     1.73 %
    0.660 -  0.574 sec      :     1.05 %
    0.574 -  0.500 sec      :     2.60 %


***************************
Subcatchment Runoff Summary
***************************

-----------------------------------------------------------------------------------------------------------------------
                                  Total      Total      Total      Total      Imperv       Perv      Total      Total
Peak  Runoff                     Precip      Runon       Evap      Infil     Runoff     Runoff     Runoff     Runoff
Runoff  Coeff                       mm         mm         mm         mm         mm         mm         mm     10^6 ltr
Subcatchment                 LPS
-----------------------------------------------------------------------------------------------------------------------
A-01                           76.00       0.00       0.00      25.19      35.85      15.05      50.90       0.08
 66.79  0.670
A-02                           76.00       0.00       0.00       9.45      60.26       5.77      66.04       0.11
 80.06  0.869
A-03                           76.00       0.00       0.00       9.45      60.26       5.77      66.03       0.10
 73.76  0.869
A-04                           76.00       0.00       0.00      30.79      27.17      18.12      45.29       0.12
108.18  0.596
A-05                           76.00       0.00       0.00      26.49      33.72      15.89      49.61       0.05
 46.19  0.653
A-06                           76.00       0.00       0.00      11.49      57.03       7.01      64.03       0.10
 71.36  0.843
A-07                           76.00       0.00       0.00      10.12      59.21       6.17      65.37       0.09
 68.28  0.860
A-08                           76.00       0.00       0.00      25.22      35.85      15.02      50.87       0.13
111.55  0.669
A-09                           76.00       0.00       0.00       8.76      60.68       5.41      66.09       0.04
 31.46  0.870
A-10                           76.00       0.00       0.00      10.13      59.20       6.16      65.37       0.12
 91.31  0.860
A-11                           76.00       0.00       0.00      25.25      35.85      14.99      50.84       0.12
102.02  0.669
B-01                           76.00       0.00       0.00       9.45      60.26       5.78      66.04       0.10
 73.81  0.869
B-02                           76.00       0.00       0.00      12.14      55.39       7.42      62.81       0.06
 46.40  0.826
B-05                           76.00       0.00       0.00      27.25      32.65      16.18      48.83       0.10
 91.40  0.643
B-06                           76.00       0.00       0.00      10.10      59.21       6.20      65.41       0.08
 55.89  0.861
B-07                           76.00       0.00       0.00       8.79      61.31       5.37      66.69       0.08
 57.02  0.877
B-08                           76.00       0.00       0.00      10.12      59.21       6.17      65.37       0.07
 51.45  0.860
B-09                           76.00       0.00       0.00       9.45      60.26       5.77      66.03       0.09
 66.04  0.869
B-10                           76.00       0.00       0.00       8.79      61.31       5.37      66.69       0.10
 73.93  0.877
B-11                           76.00       0.00       0.00      22.44      40.27      13.39      53.65       0.19
155.97  0.706
B-12                           76.00       0.00       0.00      12.85      54.91       7.77      62.68       0.06
 47.41  0.825
B-13                           76.00       0.00       0.00      16.85      48.43      10.33      58.76       0.04
 30.22  0.773
B-14                           76.00       0.00       0.00      11.45      56.42       7.07      63.49       0.01
 10.09  0.835
B-15                           76.00       0.00       0.00       8.06      62.45       4.96      67.41       0.04
 28.60  0.887
B-16                           76.00       0.00       0.00       2.02      71.34       1.27      72.61       0.03
 23.68  0.955
B-17                           76.00       0.00       0.00      10.84      58.08       6.59      64.66       0.09
 67.08  0.851
B-18                           76.00       0.00       0.00      14.19      52.73       8.65      61.38       0.04
 29.43  0.808
B-19                           76.00       0.00       0.00       8.06      61.80       4.97      66.77       0.04
 32.49  0.879
C-01                           76.00       0.00       0.00       8.79      60.67       5.37      66.04       0.05
 39.13  0.869
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C-02		76.00	0.00	0.00	12.83	54.34	7.79	62.14
0.04	33.79	0.818						
C-03		76.00	0.00	0.00	14.85	51.14	9.04	60.19
0.02	17.52	0.792						
C-04		76.00	0.00	0.00	12.81	54.35	7.82	62.17
0.02	16.70	0.818						
C-05		76.00	0.00	0.00	11.48	56.43	7.02	63.45
0.02	14.86	0.835						
C-06		76.00	0.00	0.00	12.14	55.39	7.42	62.81
0.02	16.74	0.826						
D-01		76.00	0.00	0.00	35.14	19.14	21.42	40.55
0.00	5.32	0.534						
D-02		76.00	0.00	0.00	29.84	27.64	18.03	45.67
0.01	5.78	0.601						
D-03		76.00	0.00	0.00	25.03	35.10	15.24	50.33
0.00	3.20	0.662						
D-04		76.00	0.00	0.00	47.24	0.00	28.88	28.88
0.00	0.86	0.380						
D-05		76.00	0.00	0.00	41.32	9.60	24.96	34.56
0.02	22.95	0.455						
EX-01		76.00	0.00	0.00	47.24	0.00	28.88	28.88
0.01	10.26	0.380						
PARK		76.00	0.00	0.00	48.70	5.29	21.92	27.21
0.16	81.58	0.358						
RETIREMENT		76.00	0.00	0.00	6.85	64.51	4.03	68.53
0.70	486.41	0.902						

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Node Depth Summary
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Node	Type	Average Depth Meters	Maximum Depth Meters	Maximum HGL Meters	Time of Max Occurrence days hr:min	Reported Max Depth Meters
HP-CB01/02	JUNCTION	0.00	0.00	85.16	0 00:00	0.00
HP-CB03/04	JUNCTION	0.00	0.00	86.09	0 00:00	0.00
HP-CB05/06	JUNCTION	0.00	0.00	86.64	0 00:00	0.00
HP-CB05/06(2)	JUNCTION	0.00	0.00	86.48	0 00:00	0.00
HP-CB07/08	JUNCTION	0.00	0.00	85.12	0 00:00	0.00
HP-CB09	JUNCTION	0.00	0.01	86.17	0 01:30	0.01
HP-CB09(2)	JUNCTION	0.00	0.00	86.21	0 00:00	0.00
HP-CB10/11	JUNCTION	0.00	0.01	86.16	0 01:32	0.01
HP-CB12/13	JUNCTION	0.00	0.01	85.87	0 01:31	0.01
HP-CB14/15	JUNCTION	0.00	0.00	86.64	0 00:00	0.00
HP-CB14/15(2)	JUNCTION	0.00	0.00	86.64	0 00:00	0.00
HP-CB16	JUNCTION	0.00	0.00	86.58	0 00:00	0.00
HP-CB16(2)	JUNCTION	0.00	0.00	86.64	0 00:00	0.00
HP-CB19	JUNCTION	0.00	0.00	85.79	0 00:00	0.00
HP-CB20	JUNCTION	0.00	0.01	85.44	0 01:42	0.01
HP-CB21	JUNCTION	0.00	0.00	85.46	0 00:00	0.00
HP-CB22	JUNCTION	0.00	0.00	85.53	0 00:00	0.00
HP-CB23	JUNCTION	0.00	0.00	85.52	0 00:00	0.00
HP-CB24	JUNCTION	0.00	0.00	85.58	0 00:00	0.00
HP-CB25	JUNCTION	0.00	0.00	85.59	0 00:00	0.00
HP-CB25(2)	JUNCTION	0.00	0.00	85.77	0 00:00	0.00
HP-MH509	JUNCTION	0.00	0.00	85.95	0 00:00	0.00
HP-RY-1005	JUNCTION	0.00	0.00	85.94	0 00:00	0.00
HP-RYCB09	JUNCTION	0.00	0.00	86.00	0 00:00	0.00
HP-RYCB704	JUNCTION	0.00	0.00	85.89	0 00:00	0.00
HP-RYCB705	JUNCTION	0.00	0.00	85.97	0 00:00	0.00
Hp-RYCB802	JUNCTION	0.00	0.00	85.68	0 00:00	0.00
D01-OUT	OUTFALL	0.00	0.00	86.40	0 00:00	0.00
D04-05-OUT	OUTFALL	0.00	0.00	85.30	0 00:00	0.00
DR02-03-OUT	OUTFALL	0.00	0.00	85.00	0 00:00	0.00
HP-MH509-OUT	OUTFALL	0.00	0.00	85.25	0 00:00	0.00
HP-RY-1001	OUTFALL	0.00	0.00	85.20	0 00:00	0.00
HP-RY-1003	OUTFALL	0.00	0.00	85.44	0 00:00	0.00
MH201Connection	OUTFALL	1.38	1.38	82.36	0 00:00	1.38
MH401Connection	OUTFALL	1.67	1.67	82.33	0 00:00	1.67
OF-DonReidDr	OUTFALL	0.00	0.00	86.41	0 00:00	0.00
OF-MH600	OUTFALL	0.96	0.96	83.96	0 00:00	0.96
OF-MJ-CommercialRoad	OUTFALL	0.00	0.01	85.14	0 01:42	0.00
OF-Retirement	OUTFALL	0.00	0.00	87.25	0 00:00	0.00
OF-RYCB708	OUTFALL	0.00	0.00	85.16	0 00:00	0.00
OF-StLaurent1	OUTFALL	0.00	0.00	85.05	0 00:00	0.00
OF-StLaurent2	OUTFALL	0.00	0.00	85.07	0 00:00	0.00
Park-OUT	OUTFALL	0.68	0.68	82.44	0 00:00	0.68
Retirement-OUT	OUTFALL	0.00	0.00	86.00	0 00:00	0.00
CB01/02	STORAGE	0.05	1.49	85.16	0 01:30	1.48
CB03/04	STORAGE	0.06	1.51	86.07	0 01:31	1.51
CB05/06	STORAGE	0.07	1.42	86.39	0 01:40	1.42
CB07/08	STORAGE	0.18	1.05	84.80	0 02:18	1.05
CB09	STORAGE	0.05	1.32	86.18	0 01:30	1.31
CB10/11	STORAGE	0.08	1.81	86.16	0 01:31	1.80
CB12/13	STORAGE	0.07	1.74	85.87	0 01:31	1.74
CB14/15	STORAGE	0.09	0.62	85.73	0 02:50	0.62
CB16	STORAGE	0.07	0.49	85.73	0 02:49	0.49
CB17/18	STORAGE	0.00	0.05	86.07	0 01:30	0.05
CB19	STORAGE	0.25	1.24	85.73	0 02:50	1.24
CB20	STORAGE	0.08	1.36	85.44	0 01:42	1.36
CB21	STORAGE	0.07	1.29	85.44	0 01:41	1.29
CB22	STORAGE	0.07	1.26	85.44	0 01:41	1.26
CB23	STORAGE	0.07	1.24	85.44	0 01:40	1.24
CB24	STORAGE	0.07	1.24	85.45	0 01:40	1.24
CB25	STORAGE	0.07	1.24	85.49	0 01:30	1.24
MH201	STORAGE	1.35	1.45	82.46	0 01:43	1.45
MH202	STORAGE	0.60	0.94	82.71	0 01:42	0.94
MH203	STORAGE	0.23	0.73	82.88	0 01:44	0.73
MH204	STORAGE	0.00	0.00	82.89	0 01:45	0.00
MH205	STORAGE	0.02	0.32	82.89	0 01:45	0.32
MH401	STORAGE	1.64	1.66	82.35	0 01:41	1.66
MH402	STORAGE	0.96	1.03	82.40	0 01:41	1.03
MH403	STORAGE	0.79	0.89	82.43	0 01:41	0.89
MH404	STORAGE	0.45	0.67	82.56	0 01:35	0.67
MH405	STORAGE	0.07	0.42	82.69	0 01:35	0.42
MH406	STORAGE	0.51	0.61	82.43	0 01:40	0.61
MH407	STORAGE	0.04	0.14	82.43	0 01:32	0.14
MH408	STORAGE	0.00	0.00	82.53	0 00:00	0.00
MH501	STORAGE	0.22	3.70	86.39	0 01:40	3.70
MH501Connection	STORAGE	0.02	0.35	82.89	0 01:44	0.35
MH502	STORAGE	0.16	3.05	86.39	0 01:40	3.05
MH503	STORAGE	1.25	2.99	84.81	0 02:20	2.98
MH504	STORAGE	0.57	2.15	84.80	0 02:18	2.15
MH505	STORAGE	1.72	3.76	85.73	0 02:49	3.76
MH506	STORAGE	1.39	3.43	85.73	0 02:49	3.43
MH507	STORAGE	1.18	3.18	85.73	0 02:42	3.18
MH508	STORAGE	1.08	3.04	85.73	0 02:49	3.04
MH509	STORAGE	0.98	2.90	85.73	0 02:51	2.90
MH510	STORAGE	0.66	2.33	85.73	0 02:48	2.33
MH600	STORAGE	0.83	0.83	83.96	0 01:29	0.83
MH601	STORAGE	0.89	2.28	85.44	0 01:42	2.28
MH602	STORAGE	0.52	1.91	85.44	0 01:41	1.91
MH603	STORAGE	0.44	1.83	85.44	0 01:40	1.83
MH604	STORAGE	0.22	1.62	85.45	0 01:40	1.62
MH801	STORAGE	0.56	2.64	84.57	0 01:41	2.62
MH802	STORAGE	0.01	0.55	84.65	0 01:41	0.53
Retirment_Storage	STORAGE	0.11	1.30	87.30	0 01:42	1.30
RY-1001	STORAGE	0.06	1.26	85.05	0 01:46	1.26
RY-1002	STORAGE	0.04	0.97	85.05	0 01:45	0.97
RY-1003	STORAGE	0.04	0.99	85.14	0 01:41	0.98
RY-1004	STORAGE	0.02	0.70	85.14	0 01:42	0.69
RY-1005	STORAGE	0.10	1.19	85.79	0 01:51	1.18
RY-1006	STORAGE	0.12	1.32	85.79	0 01:51	1.31
RY-1007	STORAGE	0.10	1.20	85.79	0 01:51	1.19
RY-1008	STORAGE	0.05	0.85	85.79	0 01:50	0.84
RY-1009	STORAGE	0.03	0.84	85.23	0 01:39	0.84
RY-1010	STORAGE	0.01	0.53	85.24	0 01:40	0.52
RY-1011	STORAGE	0.01	0.34	85.54	0 01:50	0.33
RY-1012	STORAGE	0.04	0.64	85.53	0 01:51	0.64
RY-1013	STORAGE	0.07	0.89	85.53	0 01:51	0.88
RY-1014a	STORAGE	0.31	1.53	84.80	0 02:21	1.53
RY-1014b	STORAGE	0.18	1.10	84.80	0 02:19	1.10
RY-1015	STORAGE	0.13	0.83	85.73	0 02:44	0.83
RY-1016	STORAGE	0.20	1.10	85.73	0 02:45	1.10
RYCB701	STORAGE	0.09	1.50	85.05	0 01:45	1.50
RYCB702	STORAGE	0.07	1.25	85.14	0 01:41	1.24
RYCB703	STORAGE	0.14	1.41	85.79	0 01:51	1.40
RYCB704	STORAGE	0.04	0.96	85.23	0 01:39	0.96
RYCB705	STORAGE	0.11	1.13	85.53	0 01:51	1.12
RYCB708	STORAGE	0.40	1.75	84.80	0 02:18	1.75
RYCB709	STORAGE	0.44	1.78	85.73	0 02:48	1.78

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Node Inflow Summary
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	Maximum Lateral Inflow	Maximum Total Inflow	Time of Max Occurrence	Lateral Inflow Volume	Total Inflow Volume	Flow Balance Error

Node	Type	LPS	LPS	days	hr:min	10^6 ltr	10^6 ltr	Percent
HP-CB01/02	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB03/04	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB05/06	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB05/06(2)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB07/08	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB09	JUNCTION	0.00	19.09	0	01:30	0	0.00479	0.031
HP-CB09(2)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB10/11	JUNCTION	0.00	25.68	0	01:31	0	0.00194	88.725
HP-CB12/13	JUNCTION	0.00	20.85	0	01:30	0	0.00135	27.893
HP-CB14/15	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB14/15(2)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB16	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB16(2)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB19	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB20	JUNCTION	0.00	1.39	0	01:37	0	0.000264	19.441
HP-CB21	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB22	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB23	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB24	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB25	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-CB25(2)	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-MH509	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RY-1005	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB09	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB704	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RYCB705	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
Hp-RYCB802	JUNCTION	0.00	0.00	0	00:00	0	0	0.000 ltr
D01-OUT	OUTFALL	5.32	5.32	0	01:30	0.00487	0.00487	0.000
D04-05-OUT	OUTFALL	23.80	23.80	0	01:30	0.0193	0.0193	0.000
DR02-03-OUT	OUTFALL	8.99	8.99	0	01:30	0.00946	0.00946	0.000
HP-MH509-OUT	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RY-1001	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
HP-RY-1003	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
MH201Connection	OUTFALL	0.00	223.57	0	01:43	0	1.08	0.000
MH401Connection	OUTFALL	0.00	138.06	0	01:41	0	1.24	0.000
OF-DonReidDr	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
OF-MH600	OUTFALL	0.00	26.82	0	01:42	0	0.184	0.000
OF-MJ-CommercialRoad	OUTFALL	0.00	0.23	0	01:42	0	0.000157	0.000
OF-Retirement	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
OF-RYCB708	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
OF-StLaurent1	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
OF-StLaurent2	OUTFALL	0.00	0.00	0	00:00	0	0	0.000 ltr
Park-OUT	OUTFALL	0.00	58.14	0	01:41	0	0.171	0.000
Retirement-OUT	OUTFALL	0.00	103.73	0	01:42	0	0.701	0.000
CB01/02	STORAGE	153.81	153.81	0	01:30	0.211	0.211	-0.006
CB03/04	STORAGE	139.64	139.64	0	01:30	0.188	0.188	-0.073
CB05/06	STORAGE	122.76	122.76	0	01:30	0.167	0.167	-0.008
CB07/08	STORAGE	120.22	120.22	0	01:30	0.162	0.162	-0.000
CB09	STORAGE	55.89	55.89	0	01:30	0.0759	0.0759	-0.006
CB10/11	STORAGE	108.47	125.25	0	01:30	0.149	0.154	-0.297
CB12/13	STORAGE	139.98	139.98	0	01:30	0.193	0.194	-0.454
CB14/15	STORAGE	77.63	77.63	0	01:30	0.1	0.1	0.207
CB16	STORAGE	38.69	38.69	0	01:30	0.0531	0.0531	0.069
CB17/18	STORAGE	90.76	90.76	0	01:30	0.125	0.125	0.163
CB19	STORAGE	61.92	83.77	0	01:30	0.0828	0.105	0.071
CB20	STORAGE	16.74	33.24	0	01:29	0.022	0.0342	-0.226
CB21	STORAGE	14.86	17.60	0	01:30	0.0197	0.02	-0.016
CB22	STORAGE	16.70	16.70	0	01:30	0.0218	0.0218	0.001
CB23	STORAGE	17.52	17.52	0	01:30	0.0223	0.0223	-0.027
CB24	STORAGE	33.79	33.79	0	01:30	0.0441	0.0441	0.018
CB25	STORAGE	39.13	39.13	0	01:30	0.0535	0.0535	0.010
MH201	STORAGE	0.00	223.57	0	01:43	0	1.09	0.000
MH202	STORAGE	0.00	223.65	0	01:41	0	1.08	0.011
MH203	STORAGE	0.00	126.25	0	01:48	0	0.664	0.003
MH204	STORAGE	0.00	0.32	0	01:42	0	2.3e-05	3.322 ltr
MH205	STORAGE	0.00	12.17	0	01:51	0	0.119	0.014
MH401	STORAGE	0.00	138.06	0	01:41	0	1.24	0.000
MH402	STORAGE	0.00	138.06	0	01:41	0	1.24	0.000
MH403	STORAGE	0.00	130.24	0	01:41	0	0.967	-0.000
MH404	STORAGE	0.00	98.60	0	01:31	0	0.347	-0.019
MH405	STORAGE	0.00	57.63	0	01:31	0	0.194	-0.001
MH406	STORAGE	0.00	32.07	0	01:46	0	0.624	0.003
MH407	STORAGE	0.00	7.60	0	01:23	0	0.00363	0.008
MH408	STORAGE	0.00	0.00	0	00:00	0	0	0.000 ltr
MH501	STORAGE	0.00	68.47	0	01:23	0	0.167	-0.139
MH501Connection	STORAGE	0.00	27.87	0	01:57	0	0.167	-0.001
MH502	STORAGE	0.00	111.90	0	01:23	0	0.167	0.137
MH503	STORAGE	0.00	80.98	0	01:27	0	0.278	0.016
MH504	STORAGE	0.00	147.98	0	01:23	0	0.324	-0.048
MH505	STORAGE	0.00	77.51	0	01:30	0	0.587	-0.036
MH506	STORAGE	0.00	129.50	0	01:30	0	0.511	0.052
MH507	STORAGE	0.00	181.68	0	01:24	0	0.426	-0.098
MH508	STORAGE	0.00	254.07	0	01:27	0	0.413	-0.079
MH509	STORAGE	0.00	221.14	0	01:27	0	0.328	-0.036
MH510	STORAGE	0.00	146.38	0	01:27	0	0.232	-0.039
MH600	STORAGE	0.00	26.82	0	01:42	0	0.184	0.004
MH601	STORAGE	0.00	52.61	0	01:28	0	0.184	0.016
MH602	STORAGE	0.00	85.28	0	01:28	0	0.184	-0.014
MH603	STORAGE	0.00	50.28	0	01:28	0	0.0986	-0.007
MH604	STORAGE	0.00	66.84	0	01:28	0	0.0979	-0.090
MH801	STORAGE	0.00	78.83	0	01:30	0	0.167	-0.479
MH802	STORAGE	81.58	81.58	0	01:30	0.162	0.162	0.455
Retirment_Storage	STORAGE	486.41	486.41	0	01:30	0.701	0.701	0.001
RY-1001	STORAGE	0.00	35.93	0	01:28	0	0.0196	0.011
RY-1002	STORAGE	0.00	36.07	0	01:29	0	0.0161	0.028
RY-1003	STORAGE	0.00	14.90	0	01:26	0	0.0077	-0.014
RY-1004	STORAGE	0.00	22.04	0	01:25	0	0.00769	0.001
RY-1005	STORAGE	0.00	14.68	0	01:28	0	0.0103	0.005
RY-1006	STORAGE	0.00	32.21	0	01:28	0	0.0344	0.008
RY-1007	STORAGE	0.00	76.74	0	01:29	0	0.0748	0.007
RY-1008	STORAGE	0.00	48.44	0	01:29	0	0.0264	0.023
RY-1009	STORAGE	0.00	33.07	0	01:29	0	0.0244	0.022
RY-1010	STORAGE	0.00	20.74	0	01:25	0	0.00634	-0.025
RY-1011	STORAGE	0.00	34.68	0	01:29	0	0.016	0.038
RY-1012	STORAGE	0.00	66.60	0	01:29	0	0.0504	0.005
RY-1013	STORAGE	0.00	84.28	0	01:30	0	0.0881	-0.000
RY-1014a	STORAGE	10.26	150.37	0	01:26	0.00694	0.169	-0.974
RY-1014b	STORAGE	91.40	91.40	0	01:30	0.104	0.125	1.969
RY-1015	STORAGE	0.00	54.75	0	01:38	0	0.0312	0.041
RY-1016	STORAGE	0.00	157.78	0	01:31	0	0.0922	0.012
RYCB701	STORAGE	108.18	108.18	0	01:30	0.119	0.155	-0.005
RYCB702	STORAGE	66.79	66.79	0	01:30	0.0769	0.0923	0.001
RYCB703	STORAGE	111.55	111.55	0	01:30	0.129	0.202	-0.008
RYCB704	STORAGE	46.19	46.19	0	01:30	0.0516	0.0697	-0.007
RYCB705	STORAGE	102.02	102.02	0	01:30	0.119	0.173	-0.005
RYCB708	STORAGE	0.00	120.36	0	01:28	0	0.197	-0.300
RYCB709	STORAGE	155.97	206.56	0	01:31	0.187	0.27	0.271

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Node Surcharge Summary
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No nodes were surcharged.

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Node Flooding Summary
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No nodes were flooded.

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Storage Volume Summary
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Storage Unit	Average Volume 1000 m³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 m³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow LPS
CB01/02	0.000	2.1	0.0	0.0	0.001	64.0	0 01:30	79.46
CB03/04	0.000	2.7	0.0	0.0	0.001	65.0	0 01:31	53.57
CB05/06	0.000	3.0	0.0	0.0	0.001	62.7	0 01:40	111.90
CB07/08	0.000	7.7	0.0	0.0	0.000	46.3	0 02:18	119.89
CB09	0.000	2.3	0.0	0.0	0.000	59.8	0 01:30	40.22
CB10/11	0.000	3.0	0.0	0.0	0.001	70.5	0 01:31	66.73
CB12/13	0.000	2.7	0.0	0.0	0.001	68.0	0 01:31	78.46
CB14/15	0.000	4.0	0.0	0.0	0.000	26.8	0 02:50	77.51
CB16	0.000	3.0	0.0	0.0	0.000	22.4	0 02:49	38.68
CB17/18	0.000	0.3	0.0	0.0	0.000	5.4	0 01:30	89.00
CB19	0.000	11.5	0.0	0.0	0.000	56.4	0 02:50	83.96
CB20	0.000	3.5	0.0	0.0	0.000	61.8	0 01:42	13.86
CB21	0.000	3.2	0.0	0.0	0.000	58.8	0 01:41	13.20
CB22	0.000	3.1	0.0	0.0	0.000	57.5	0 01:41	15.58
CB23	0.000	3.0	0.0	0.0	0.000	56.5	0 01:40	16.59
CB24	0.000	3.1	0.0	0.0	0.000	56.5	0 01:40	30.68
CB25	0.000	3.0	0.0	0.0	0.000	56.6	0 01:30	36.17
MH201	0.002	33.2	0.0	0.0	0.003	35.5	0 01:43	223.57
MH202	0.001	14.2	0.0	0.0	0.001	22.2	0 01:42	223.57
MH203	0.000	5.0	0.0	0.0	0.001	15.9	0 01:44	134.72

MH204	0.000	0.0	0.0	0.0	0.000	0.1	0	01:45	0.02
MH205	0.000	0.4	0.0	0.0	0.000	8.1	0	01:45	18.29
MH401	0.003	36.6	0.0	0.0	0.003	37.1	0	01:41	138.06
MH402	0.001	20.1	0.0	0.0	0.001	21.5	0	01:41	138.06
MH403	0.001	17.4	0.0	0.0	0.001	19.4	0	01:41	130.24
MH404	0.001	11.2	0.0	0.0	0.001	16.8	0	01:35	98.64
MH405	0.000	2.0	0.0	0.0	0.000	11.6	0	01:35	57.56
MH406	0.001	10.7	0.0	0.0	0.001	12.8	0	01:40	32.15
MH407	0.000	1.2	0.0	0.0	0.000	3.8	0	01:32	6.24
MH408	0.000	0.0	0.0	0.0	0.000	0.0	0	00:00	0.00
MH501	0.000	4.7	0.0	0.0	0.004	78.3	0	01:40	27.86
MH501Connection	0.000	0.4	0.0	0.0	0.000	9.0	0	01:44	41.49
MH502	0.000	4.0	0.0	0.0	0.003	76.5	0	01:40	68.47
MH503	0.003	29.0	0.0	0.0	0.008	69.7	0	02:20	32.52
MH504	0.001	16.6	0.0	0.0	0.005	62.7	0	02:18	131.51
MH505	0.004	37.3	0.0	0.0	0.010	81.8	0	02:49	66.49
MH506	0.004	33.5	0.0	0.0	0.009	82.9	0	02:49	61.45
MH507	0.003	32.7	0.0	0.0	0.008	88.2	0	02:42	58.73
MH508	0.003	31.1	0.0	0.0	0.008	88.0	0	02:49	177.71
MH509	0.002	25.4	0.0	0.0	0.007	75.2	0	02:51	189.54
MH510	0.001	19.6	0.0	0.0	0.003	68.8	0	02:48	139.85
MH600	0.001	35.8	0.0	0.0	0.001	36.0	0	01:29	26.82
MH601	0.001	27.4	0.0	0.0	0.003	70.1	0	01:42	27.99
MH602	0.001	25.8	0.0	0.0	0.002	94.7	0	01:41	63.67
MH603	0.000	22.4	0.0	0.0	0.002	93.1	0	01:40	41.00
MH604	0.000	12.8	0.0	0.0	0.002	93.4	0	01:40	50.28
MH801	0.001	12.7	0.0	0.0	0.003	59.7	0	01:41	58.14
MH802	0.000	0.6	0.0	0.0	0.000	22.9	0	01:41	78.83
Retirment_Storage	0.016	5.2	0.0	0.0	0.309	96.8	0	01:42	103.73
RY-1001	0.000	2.8	0.0	0.0	0.000	54.7	0	01:46	13.12
RY-1002	0.000	1.7	0.0	0.0	0.000	42.9	0	01:45	13.17
RY-1003	0.000	2.1	0.0	0.0	0.000	49.5	0	01:41	3.17
RY-1004	0.000	1.1	0.0	0.0	0.000	35.0	0	01:42	4.37
RY-1005	0.000	4.4	0.0	0.0	0.000	53.1	0	01:51	3.06
RY-1006	0.000	5.4	0.0	0.0	0.000	59.1	0	01:51	14.68
RY-1007	0.000	4.4	0.0	0.0	0.000	53.0	0	01:51	48.44
RY-1008	0.000	2.1	0.0	0.0	0.000	33.9	0	01:50	10.87
RY-1009	0.000	1.3	0.0	0.0	0.000	37.2	0	01:39	20.74
RY-1010	0.000	0.5	0.0	0.0	0.000	20.4	0	01:40	4.17
RY-1011	0.000	0.6	0.0	0.0	0.000	15.3	0	01:50	13.80
RY-1012	0.000	1.5	0.0	0.0	0.000	24.9	0	01:51	34.68
RY-1013	0.000	2.6	0.0	0.0	0.000	33.5	0	01:51	66.60
RY-1014a	0.000	10.7	0.0	0.0	0.000	52.1	0	02:21	62.63
RY-1014b	0.000	7.8	0.0	0.0	0.000	48.0	0	02:19	99.78
RY-1015	0.000	5.9	0.0	0.0	0.000	37.4	0	02:44	26.77
RY-1016	0.000	9.2	0.0	0.0	0.000	49.7	0	02:45	54.75
RYCB701	0.000	3.7	0.0	0.0	0.001	58.3	0	01:45	74.29
RYCB702	0.000	3.0	0.0	0.0	0.000	52.9	0	01:41	41.63
RYCB703	0.000	5.2	0.0	0.0	0.001	52.9	0	01:51	106.34
RYCB704	0.000	1.7	0.0	0.0	0.000	38.3	0	01:39	43.41
RYCB705	0.000	4.5	0.0	0.0	0.000	47.2	0	01:51	95.08
RYCB708	0.000	11.8	0.0	0.0	0.001	52.2	0	02:18	97.44
RYCB709	0.000	15.9	0.0	0.0	0.001	64.9	0	02:48	157.78

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Outfall Loading Summary
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Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
D01-OUT	17.27	0.48	5.32	0.005
D04-05-OUT	17.35	1.83	23.80	0.019
DR02-03-OUT	17.39	0.91	8.99	0.009
HP-MH509-OUT	0.00	0.00	0.00	0.000
HP-RY-1001	0.00	0.00	0.00	0.000
HP-RY-1003	0.00	0.00	0.00	0.000
MH201Connection	95.56	14.91	223.57	1.085
MH401Connection	90.37	16.99	138.06	1.239
OF-DonReidDr	0.00	0.00	0.00	0.000
OF-MH600	19.86	11.63	26.82	0.184
OF-MJ-CommercialRoad	1.42	0.09	0.23	0.000
OF-Retirement	0.00	0.00	0.00	0.000
OF-RYCB708	0.00	0.00	0.00	0.000
OF-StLaurent1	0.00	0.00	0.00	0.000
OF-StLaurent2	0.00	0.00	0.00	0.000
Park-OUT	97.23	2.23	58.14	0.171
Retirement-OUT	31.25	28.37	103.73	0.701
System	22.81	77.44	558.74	3.413

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Link Flow Summary
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Link	Type	Maximum |Flow| LPS	Time of Max Occurrence days hr:min	Maximum |Veloc| m/sec	Max/ Full Flow	Max/ Full Depth
C1	CHANNEL	0.00	0 00:00	0.00	0.00	0.02
C10	CHANNEL	0.00	0 00:00	0.00	0.00	0.05
C11	CHANNEL	0.00	0 00:00	0.00	0.00	0.08
C12	CHANNEL	1.39	0 01:37	0.02	0.00	0.08
C13	CHANNEL	0.23	0 01:42	0.19	0.00	0.01
C14	CHANNEL	0.00	0 00:00	0.00	0.00	0.08
C15	CHANNEL	0.00	0 00:00	0.00	0.00	0.08
C16	CHANNEL	0.00	0 00:00	0.00	0.00	0.09
C17	CHANNEL	0.00	0 00:00	0.00	0.00	0.09
C18	CHANNEL	0.00	0 00:00	0.00	0.00	0.08
C19	CHANNEL	0.00	0 00:00	0.00	0.00	0.08
C2	CHANNEL	0.00	0 00:00	0.00	0.00	0.02
C20	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C21	CONDUIT	11.32	0 01:54	0.05	0.00	0.09
C21_1	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C21_2	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C21_3	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C22	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C23	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C24	CHANNEL	0.00	0 00:00	0.00	0.00	0.06
C25	CONDUIT	19.09	0 01:30	0.13	0.00	0.05
C26	CONDUIT	34.68	0 01:29	0.23	0.03	0.53
C27	CHANNEL	0.00	0 00:00	0.00	0.00	0.06
C28	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C29	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C3	CHANNEL	0.00	0 00:00	0.00	0.00	0.02
C30	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C31	CHANNEL	20.85	0 01:30	0.13	0.00	0.10
C32	CHANNEL	25.68	0 01:31	0.10	0.00	0.13
C33	CHANNEL	0.22	0 01:32	0.12	0.00	0.09
C34	CONDUIT	19.00	0 01:30	0.05	0.00	0.13
C35	CHANNEL	0.44	0 01:31	0.07	0.00	0.02
C36	CHANNEL	21.86	0 01:30	0.21	0.00	0.04
C37	CHANNEL	0.00	0 00:00	0.00	0.00	0.03
C38	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C39	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C4	CHANNEL	0.00	0 00:00	0.00	0.00	0.02
C40	CHANNEL	0.00	0 00:00	0.00	0.00	0.00
C41	CONDUIT	23.22	0 01:30	0.11	0.00	0.11
C42	CONDUIT	97.44	0 01:28	0.72	0.09	1.00
C43	CONDUIT	138.06	0 01:41	0.49	0.39	1.00
C44	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C45	CONDUIT	22.04	0 01:25	0.26	0.08	1.00
C46	CONDUIT	66.60	0 01:29	0.33	0.06	0.84
C47	CONDUIT	84.28	0 01:30	0.25	0.07	0.99
C47_1	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C48	CONDUIT	14.90	0 01:26	0.16	0.05	1.00
C49	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C5	CHANNEL	0.00	0 00:00	0.00	0.00	0.02
C50	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C51	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C52	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C53	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C54	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C55	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C56	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C57	CONDUIT	0.00	0 00:00	0.00	0.00	0.02
C58	CONDUIT	0.00	0 00:00	0.00	0.00	0.00
C6	CHANNEL	0.00	0 00:00	0.00	0.00	0.02
C64	CONDUIT	54.75	0 01:38	0.35	0.05	0.96
C65	CONDUIT	157.78	0 01:31	0.56	0.14	1.00
C66	CONDUIT	99.78	0 01:30	0.88	0.09	1.00
C67	CONDUIT	35.93	0 01:28	0.19	0.03	1.00
C68	CONDUIT	36.07	0 01:29	0.27	0.03	1.00
C69	CONDUIT	14.68	0 01:28	0.08	0.01	1.00
C7	CHANNEL	0.00	0 00:00	0.00	0.00	0.03
C70	CONDUIT	32.21	0 01:28	0.12	0.03	1.00
C71	CONDUIT	76.74	0 01:29	0.25	0.09	1.00
C72	CONDUIT	48.44	0 01:29	0.26	0.04	0.97
C73	CONDUIT	0.00	0 00:00	0.00	0.00	0.00

C74	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C75	CONDUIT	20.74	0	01:25	0.24	0.07	0.98
C76	CONDUIT	33.07	0	01:29	0.32	0.12	1.00
C77	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C8	CHANNEL	0.00	0	00:00	0.00	0.00	0.03
C9	CHANNEL	0.00	0	00:00	0.00	0.00	0.05
HP01	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
OR-CB05/06	CONDUIT	111.90	0	01:23	1.63	1.03	1.00
OR-CB07/08	CONDUIT	119.89	0	01:28	1.74	1.30	1.00
OR-CB14/15	CONDUIT	77.51	0	01:30	1.41	0.79	1.00
OR-CB16	CONDUIT	38.68	0	01:30	1.02	0.42	1.00
OR-CB19	CONDUIT	83.96	0	01:29	1.30	0.84	1.00
OR-CB20	CONDUIT	16.70	0	01:30	0.58	0.49	1.00
OR-CB21	CONDUIT	13.20	0	01:29	0.56	0.41	1.00
OR-CB22	CONDUIT	15.58	0	01:29	0.55	0.52	1.00
OR-CB23	CONDUIT	16.59	0	01:29	0.63	0.53	1.00
OR-CB24	CONDUIT	30.68	0	01:28	0.98	0.93	1.00
OR-CB25	CONDUIT	36.17	0	01:28	1.15	1.17	1.00
OR-RYCB708	CONDUIT	120.36	0	01:28	0.65	0.28	1.00
OR-RYCB709	CONDUIT	146.38	0	01:27	1.09	0.35	1.00
OVF-Retirement	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
STM-213_(STM)	CONDUIT	78.83	0	01:30	1.10	0.64	1.00
STM-253_(STM)	CONDUIT	57.56	0	01:31	0.81	0.74	1.00
STM-254_(STM)	CONDUIT	98.64	0	01:35	0.62	0.64	1.00
STM-255_(STM)	CONDUIT	130.24	0	01:40	0.60	0.53	1.00
STM-256_(STM)	CONDUIT	138.06	0	01:41	0.49	0.41	1.00
STM-257_(STM)	CONDUIT	32.15	0	01:47	0.20	0.21	1.00
STM-258_(STM)	CONDUIT	7.60	0	01:23	0.20	0.24	0.79
STM-260_(STM)	CONDUIT	189.54	0	01:27	0.67	0.13	1.00
STM-261_(1)_(1)_(STM)	CONDUIT	57.17	0	01:29	0.07	0.04	1.00
STM-261_(1)_(STM)	CONDUIT	61.45	0	01:23	0.22	0.04	1.00
STM-261_(STM)	CONDUIT	177.71	0	01:26	0.55	0.12	1.00
STM-267_(STM)	CONDUIT	0.00	0	00:00	0.00	0.00	0.27
STM-269_(STM)	CONDUIT	139.85	0	01:27	1.32	0.32	1.00
STM-291_(STM)	CONDUIT	80.98	0	01:27	0.38	0.10	1.00
STM-302_(1)_(STM)	CONDUIT	41.00	0	01:29	0.26	0.26	1.00
STM-302_(STM)	CONDUIT	50.28	0	01:28	0.32	0.32	1.00
STM-304_(STM)	CONDUIT	52.61	0	01:28	0.33	0.34	1.00
STM-316_(STM)_1	CONDUIT	0.32	0	01:42	0.01	0.00	0.48
STM-316_(STM)_2	CONDUIT	41.49	0	02:00	0.52	0.29	0.97
STM-317_(STM)	CONDUIT	134.72	0	01:48	0.85	0.87	1.00
STM-318_(1)_(STM)	CONDUIT	223.57	0	01:43	1.03	0.95	1.00
STM-319_(STM)	CONDUIT	223.57	0	01:43	1.03	0.97	1.00
STM-324_(STM)	CONDUIT	68.47	0	01:23	0.62	0.20	1.00
STM-332_(STM)	CONDUIT	18.29	0	02:00	0.69	0.23	1.00
STM-400	CONDUIT	26.82	0	01:42	0.17	0.13	1.00
OR-CB01/02	ORIFICE	79.46	0	01:30			1.00
OR-CB03/04	ORIFICE	53.57	0	01:31			1.00
OR-CB09	ORIFICE	21.13	0	01:30			1.00
OR-CB10/11	ORIFICE	41.05	0	01:31			1.00
OR-CB12/13	ORIFICE	57.63	0	01:31			1.00
OR-MH501	ORIFICE	27.86	0	01:57			1.00
OR-MH503	ORIFICE	8.35	0	02:16			1.00
OR-MH505	ORIFICE	11.84	0	02:53			1.00
OR-MH601	ORIFICE	26.82	0	01:42			1.00
OR-MH801	ORIFICE	58.14	0	01:41			1.00
OR-RYCB701	ORIFICE	17.66	0	01:45			1.00
OR-RYCB702	ORIFICE	13.14	0	01:41			1.00
OR-RYCB703	ORIFICE	12.19	0	01:51			1.00
OR-RYCB704	ORIFICE	11.49	0	01:39			1.00
OR-RYCB705	ORIFICE	12.17	0	01:51			1.00
OR-CB17/18	DUMMY	67.14	0	01:30			
OR-RetirementStorage	DUMMY	103.73	0	01:42			

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Flow Classification Summary
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	Adjusted	Fraction of Time in Flow Class							
	/Actual		Up	Down	Sub	Sup	Up	Down	Norm	Inlet
Conduit	Length	Dry	Dry	Dry	Crit	Crit	Crit	Crit	Ltd	Ctrl
C1	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C10	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12	1.00	0.06	0.01	0.00	0.02	0.00	0.00	0.91	0.02	0.00
C13	1.00	0.07	0.00	0.00	0.71	0.22	0.00	0.00	0.00	0.00
C14	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C15	1.00	0.96	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C17	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C18	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C19	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.99	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21	1.00	0.97	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00
C21_1	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21_2	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21_3	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C22	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C23	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C24	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C25	1.00	0.98	0.01	0.00	0.01	0.00	0.00	0.00	0.93	0.00
C26	1.00	0.72	0.00	0.00	0.10	0.00	0.00	0.18	0.04	0.00
C27	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C28	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C29	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C30	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31	1.00	0.06	0.01	0.00	0.02	0.00	0.00	0.92	0.02	0.00
C32	1.00	0.06	0.01	0.00	0.02	0.00	0.00	0.92	0.02	0.00
C33	1.00	0.06	0.01	0.00	0.02	0.00	0.00	0.92	0.02	0.00
C34	1.00	0.97	0.02	0.00	0.01	0.00	0.00	0.00	0.94	0.00
C35	1.00	0.06	0.00	0.00	0.07	0.00	0.00	0.86	0.07	0.00
C36	1.00	0.73	0.00	0.00	0.07	0.00	0.00	0.20	0.07	0.00
C37	1.00	0.73	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C38	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C39	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C40	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C41	1.00	0.96	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00
C42	1.00	0.34	0.00	0.00	0.38	0.00	0.00	0.27	0.03	0.00
C43	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C44	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C45	1.00	0.70	0.00	0.00	0.07	0.00	0.00	0.23	0.01	0.00
C46	1.00	0.62	0.01	0.00	0.12	0.00	0.00	0.25	0.02	0.00
C47	1.00	0.55	0.03	0.00	0.14	0.00	0.00	0.28	0.01	0.00
C47_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C48	1.00	0.73	0.02	0.00	0.08	0.00	0.00	0.17	0.01	0.00
C49	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C50	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C51	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C52	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C53	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C54	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C55	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C56	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C57	1.00	0.93	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C58	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C6	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C64	1.00	0.61	0.00	0.00	0.29	0.00	0.00	0.10	0.05	0.00
C65	1.00	0.46	0.00	0.00	0.34	0.00	0.00	0.20	0.04	0.00
C66	1.00	0.42	0.00	0.00	0.35	0.00	0.00	0.23	0.08	0.00
C67	1.00	0.71	0.02	0.00	0.10	0.00	0.00	0.16	0.01	0.00
C68	1.00	0.76	0.00	0.00	0.08	0.00	0.00	0.16	0.01	0.00
C69	1.00	0.73	0.01	0.00	0.16	0.00	0.00	0.10	0.01	0.00
C7	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C70	1.00	0.71	0.02	0.00	0.17	0.00	0.00	0.10	0.00	0.00
C71	1.00	0.61	0.00	0.00	0.15	0.00	0.00	0.24	0.00	0.00
C72	1.00	0.61	0.01	0.00	0.14	0.00	0.00	0.24	0.03	0.00
C73	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C74	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C75	1.00	0.67	0.01	0.00	0.05	0.00	0.00	0.27	0.01	0.00
C76	1.00	0.66	0.01	0.00	0.06	0.00	0.00	0.27	0.00	0.00
C77	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C8	1.00	0.98	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	0.97	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HP01	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
OR-CB05/06	1.00	0.01	0.00	0.00	0.04	0.00	0.00	0.95	0.00	0.00
OR-CB07/08	1.00	0.01	0.00	0.00	0.27	0.00	0.00	0.73	0.00	0.00
OR-CB14/15	1.00	0.01	0.00	0.00	0.25	0.00	0.00	0.75	0.09	0.00
OR-CB16	1.00	0.01	0.00	0.00	0.19	0.00	0.00	0.80	0.01	0.00
OR-CB19	1.00	0.01	0.00	0.00	0.32	0.00	0.00	0.67	0.01	0.00
OR-CB20	1.00	0.02	0.00	0.00	0.10	0.00	0.00	0.88	0.00	0.00
OR-CB21	1.00	0.02	0.00	0.00	0.09	0.00	0.00	0.89	0.00	0.00
OR-CB22	1.00	0.02	0.00	0.00	0.08	0.00	0.00	0.90	0.00	0.00
OR-CB23	1.00	0.02	0.00	0.00	0.08	0.00	0.00	0.90	0.00	0.00
OR-CB24	1.00	0.02	0.00	0.00	0.08	0.00	0.00	0.90	0.00	0.00
OR-CB25	1.00	0.02	0.00	0.00	0.08	0.00	0.00	0.90	0.00	0.00
OR-RYCB708	1.00	0.01	0.00	0.00	0.40	0.00	0.00	0.59	0.01	0.00
OR-RYCB709	1.00	0.01	0.00	0.00	0.39	0.00	0.00	0.61	0.01	0.00

OVF-Retirement	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM-213_(STM)	1.00	0.02	0.00	0.00	0.02	0.00	0.00	0.96	0.00	0.00
STM-253_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.01	0.00
STM-254_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-255_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-256_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-257_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-258_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-260_(STM)	1.00	0.01	0.00	0.00	0.70	0.00	0.00	0.29	0.04	0.00
STM-261_(1)_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-261_(1)_(STM)	1.00	0.00	0.04	0.00	0.96	0.00	0.00	0.00	0.22	0.00
STM-261_(STM)	1.00	0.01	0.00	0.00	0.78	0.00	0.00	0.21	0.07	0.00
STM-267_(STM)	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM-269_(STM)	1.00	0.01	0.00	0.00	0.48	0.00	0.00	0.51	0.03	0.00
STM-291_(STM)	1.00	0.01	0.00	0.00	0.52	0.00	0.00	0.47	0.05	0.00
STM-302_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-302_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-304_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-316_(STM)_1	1.00	0.35	0.57	0.00	0.08	0.00	0.00	0.00	0.93	0.00
STM-316_(STM)_2	1.00	0.00	0.35	0.00	0.65	0.00	0.00	0.00	0.96	0.00
STM-317_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-318_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-319_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-324_(STM)	1.00	0.01	0.00	0.00	0.07	0.00	0.00	0.92	0.00	0.00
STM-332_(STM)	1.00	0.00	0.42	0.00	0.58	0.00	0.00	0.00	0.92	0.00
STM-400	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00

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Conduit Surcharge Summary
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Conduit	Hours Full: Both Ends	Hours Full: Upstream	Hours Full: Dnstream	Hours Above Full Normal Flow	Hours Capacity Limited
C42	4.40	4.40	5.14	0.01	0.01
C43	24.00	24.00	24.00	0.01	0.01
C45	0.47	0.47	0.86	0.01	0.01
C47	0.01	0.01	1.00	0.01	0.01
C48	0.89	0.89	1.19	0.01	0.01
C64	0.01	0.01	2.87	0.01	0.01
C65	2.92	2.92	4.49	0.01	0.01
C66	2.38	2.38	4.36	0.01	0.01
C67	0.81	0.81	1.05	0.01	0.01
C68	0.31	0.31	0.65	0.01	0.01
C69	1.15	1.15	1.45	0.01	0.01
C70	1.48	1.48	1.55	0.01	0.01
C71	1.18	1.18	1.21	0.01	0.01
C72	0.01	0.01	1.15	0.01	0.01
C75	0.01	0.01	0.60	0.01	0.01
C76	0.61	0.61	0.70	0.01	0.01
OR-CB05/06	1.02	1.07	1.02	0.01	0.04
OR-CB07/08	4.95	5.09	4.99	0.14	0.19
OR-CB14/15	3.54	3.54	4.54	0.01	0.01
OR-CB16	2.88	2.88	3.19	0.01	0.01
OR-CB19	6.41	6.50	6.69	0.01	0.01
OR-CB20	1.80	1.80	1.87	0.01	0.01
OR-CB21	1.69	1.69	1.75	0.01	0.01
OR-CB22	1.65	1.65	1.68	0.01	0.01
OR-CB23	1.62	1.62	1.66	0.01	0.01
OR-CB24	1.62	1.62	1.68	0.01	0.13
OR-CB25	1.56	1.58	1.61	0.10	0.17
OR-RYCB708	6.85	6.85	7.00	0.01	0.01
OR-RYCB709	7.33	7.33	7.49	0.01	0.01
STM-213_(STM)	0.19	0.19	0.39	0.01	0.01
STM-253_(STM)	0.58	0.58	0.99	0.01	0.01
STM-254_(STM)	0.99	0.99	24.00	0.01	0.01
STM-255_(STM)	24.00	24.00	24.00	0.01	0.01
STM-256_(STM)	24.00	24.00	24.00	0.01	0.01
STM-257_(STM)	24.00	24.00	24.00	0.01	0.01
STM-258_(STM)	0.01	0.01	24.00	0.01	0.01
STM-260_(STM)	9.37	9.37	9.62	0.01	0.01
STM-261_(1)_(1)_(STM)	11.62	11.62	11.81	0.01	0.01
STM-261_(1)_(STM)	10.33	10.33	11.56	0.01	0.01
STM-261_(STM)	9.82	9.82	10.29	0.01	0.01
STM-269_(STM)	9.02	9.02	9.17	0.01	0.01
STM-291_(STM)	7.57	7.57	8.63	0.01	0.01
STM-302_(1)_(STM)	2.42	2.42	2.81	0.01	0.01
STM-302_(STM)	1.80	1.80	2.30	0.01	0.01
STM-304_(STM)	3.38	3.38	24.00	0.01	0.01
STM-316_(STM)_2	0.01	0.01	0.65	0.01	0.01
STM-317_(STM)	0.65	0.65	24.00	0.01	0.01
STM-318_(1)_(STM)	24.00	24.00	24.00	0.01	0.01
STM-319_(STM)	24.00	24.00	24.00	0.01	0.71
STM-324_(STM)	1.29	1.29	1.32	0.01	0.01
STM-332_(STM)	0.18	0.18	0.65	0.01	0.01
STM-400	24.00	24.00	24.00	0.01	0.01

Analysis begun on: Thu Jan 18 13:46:16 2024
Analysis ended on: Thu Jan 18 13:46:21 2024
Total elapsed time: 00:00:05