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- Environmental Restoration

39 Years

2510 St. Laurent Boulevard

Servicing and

Stormwater Management Report

Prepared for: Claridge Homes

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

Novatech File: 122040
Ref: R-2022-191

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November 1, 2022

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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Figures

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 depressional 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, and a public park. The future retirement home block is located in the northwest corner of the site at the intersection of Walkley Road and Don Reid Drive. The future retirement home will be detailed as part of a separate site plan application and will not be detailed within this report. The proposed condominium development will include a total of 228 town home units consisting of a combination of back-to-back units and standard town homes. The development will involve the construction of seven (7) new private roads presently named Streets 1 though 7, with proposed right of way widths of 9.0 – 10.5m. Each unit will have its own garage and driveway to accommodate site vehicle demands in addition to street parking provided on Streets 3,5, and 6. Access to the site will be provided by two (2) entrances on St Laurent Boulevard, and two (2) entrances 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 3. **Figure 3** shows the concept plan for the proposed development, and **Figures 4-7** 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 OCT. 2022 | JOB 122040 | FIGURE FIGURE 2

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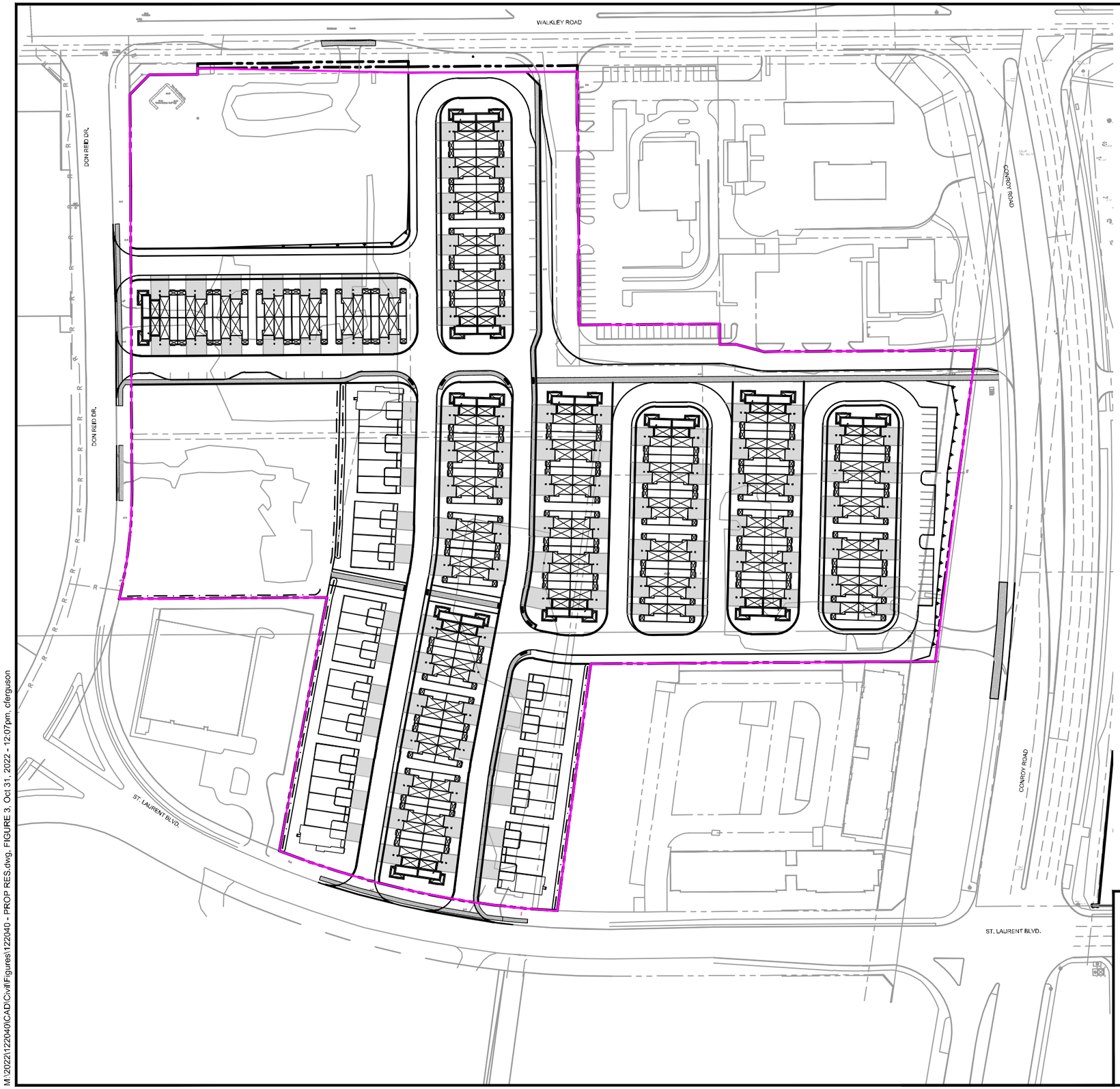

LEGEND

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 OCT. 2022 | JOB 122040 | FIGURE FIGURE 3

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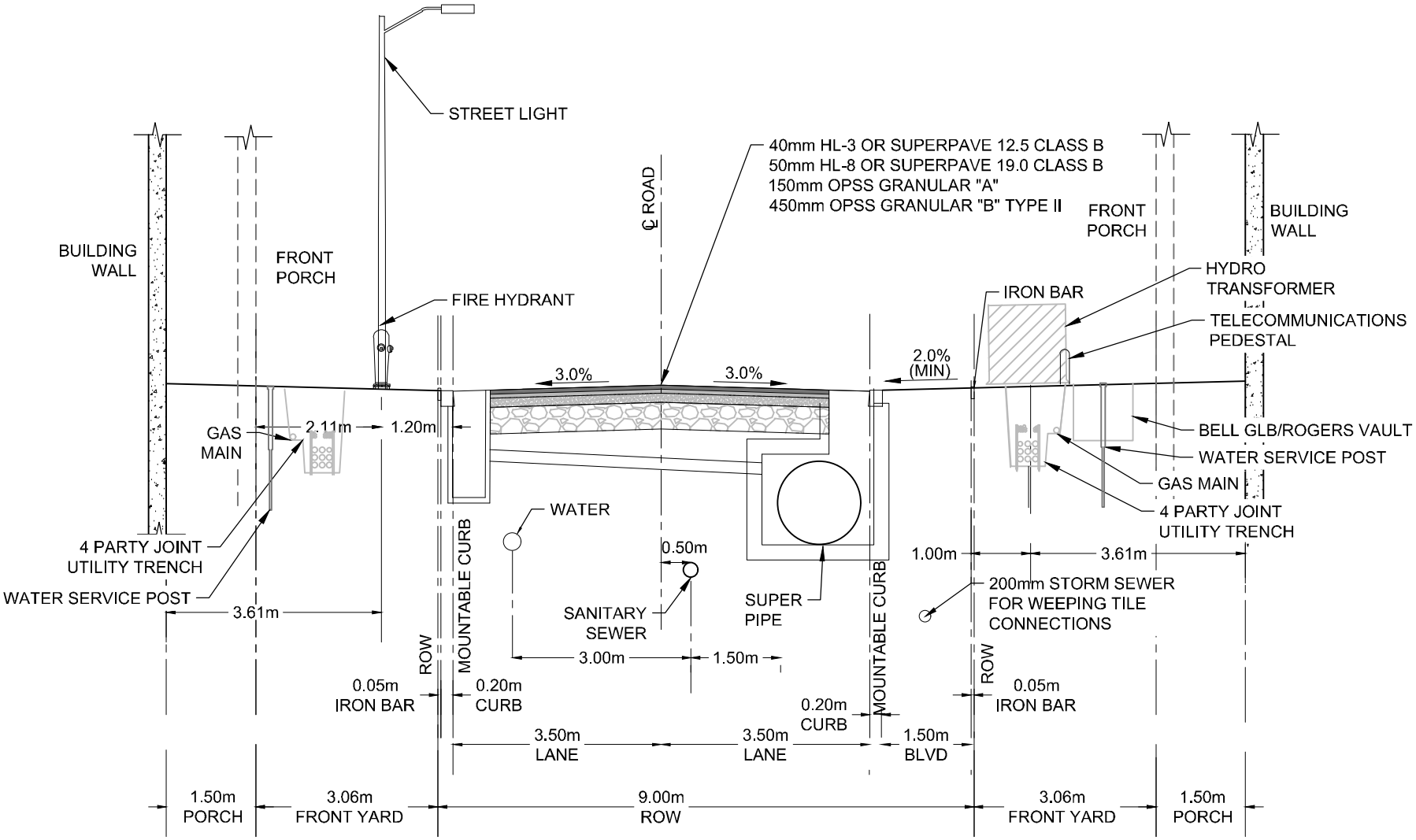

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

TYPICAL CROSS-SECTION (9.0m ROW)

SCALE		
N.T.S		
DATE	JOB	FIGURE
NOV 2022	122040	FIGURE 4

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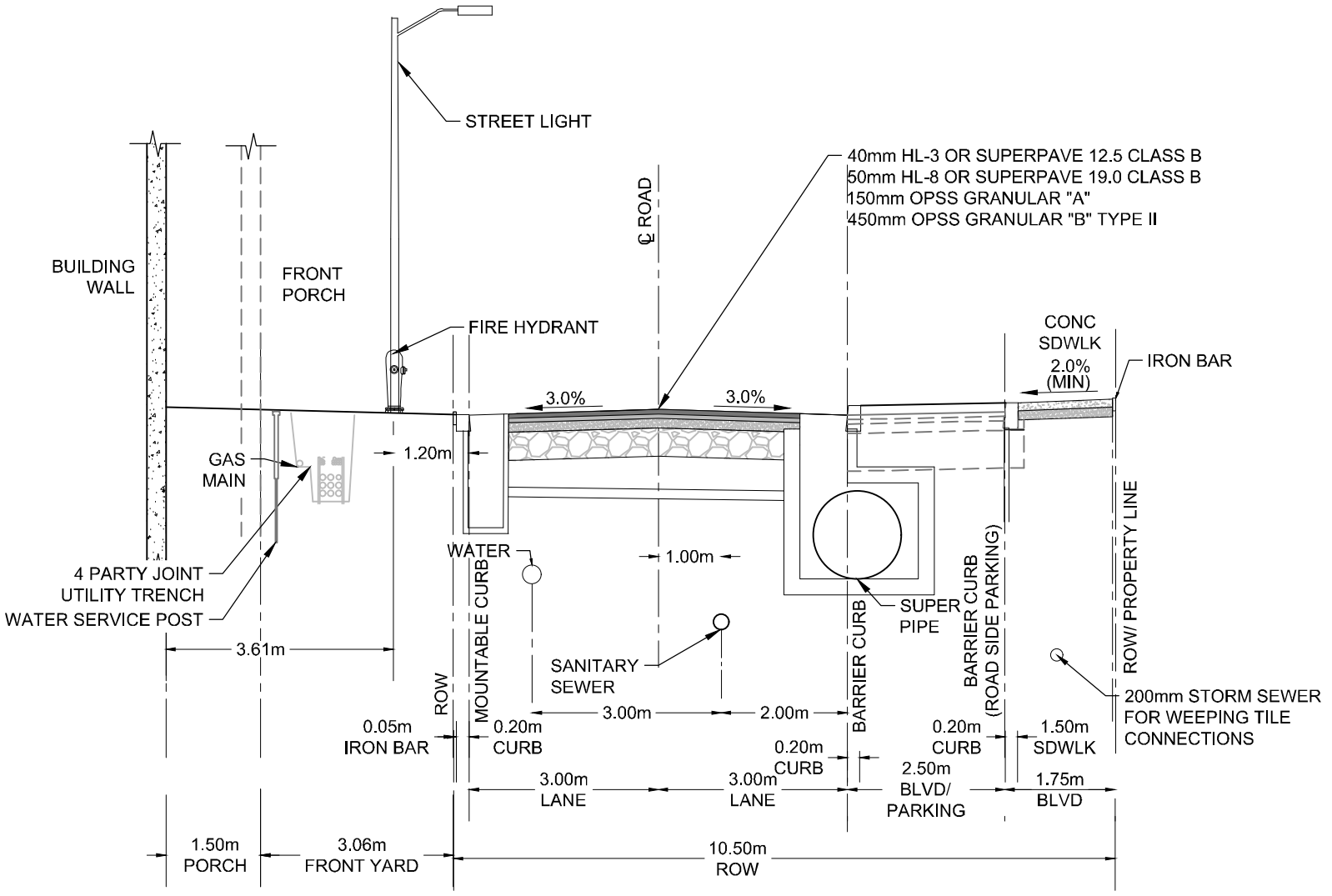

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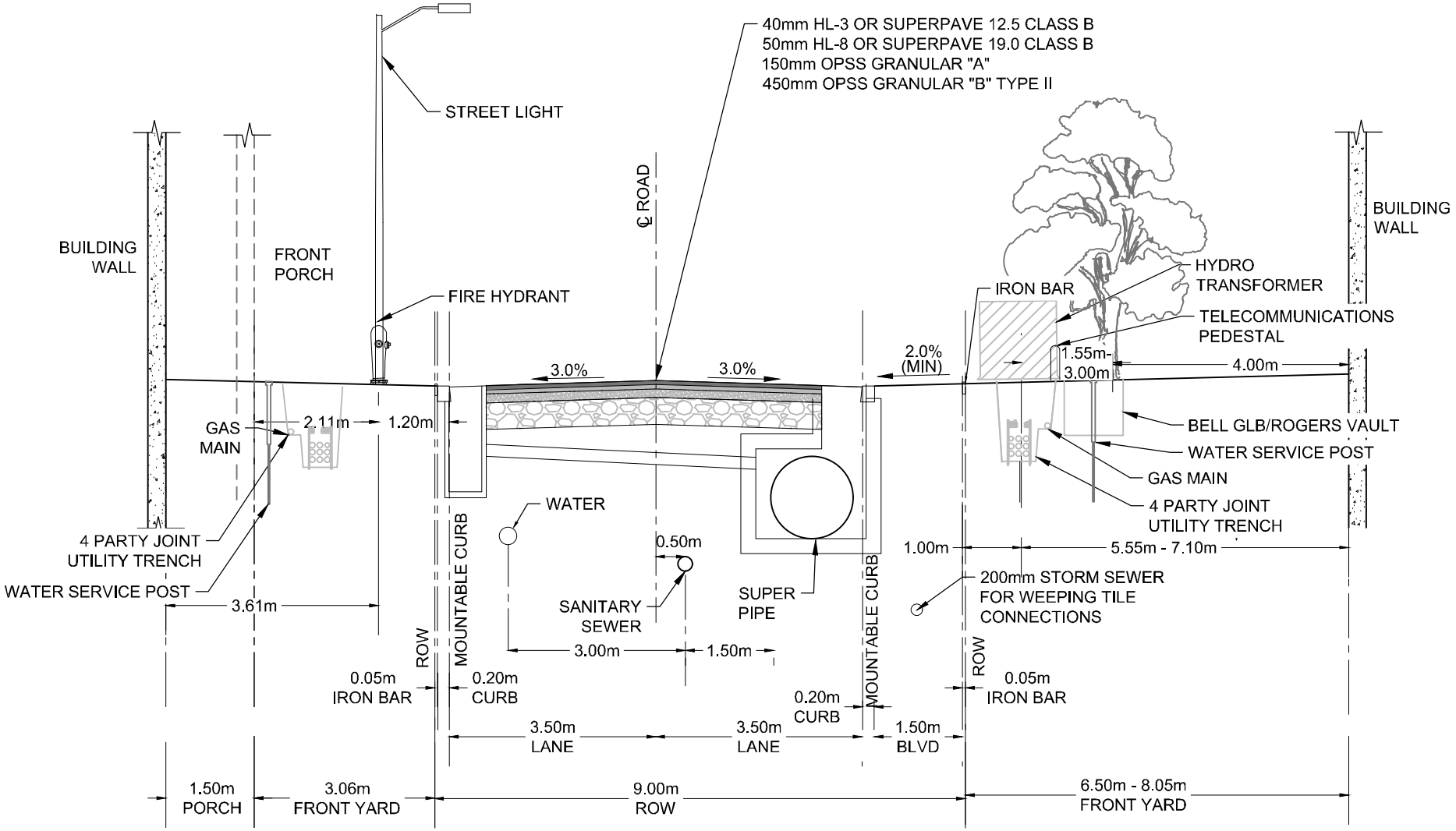
NOTE:
1. BARRIER CURB IS PROPOSED ADJACENT TO ON STREET PARKING AREAS. MOUNTABLE CURB IS PROPOSED IN ALL OTHER AREAS
2. ALL CURB TO BE AS PER CITY DETAIL SC1.1

CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

TYPICAL CROSS-SECTION (10.5m ROW)

SCALE: N.T.S

DATE	JOB	FIGURE
NOV 2022	122040	FIGURE 5



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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

CROSS -SECTION STREET 1 - BB LEFT, TOWNS RIGHT

SCALE		
N.T.S		
DATE	JOB	FIGURE
NOV 2022	122040	FIGURE 6

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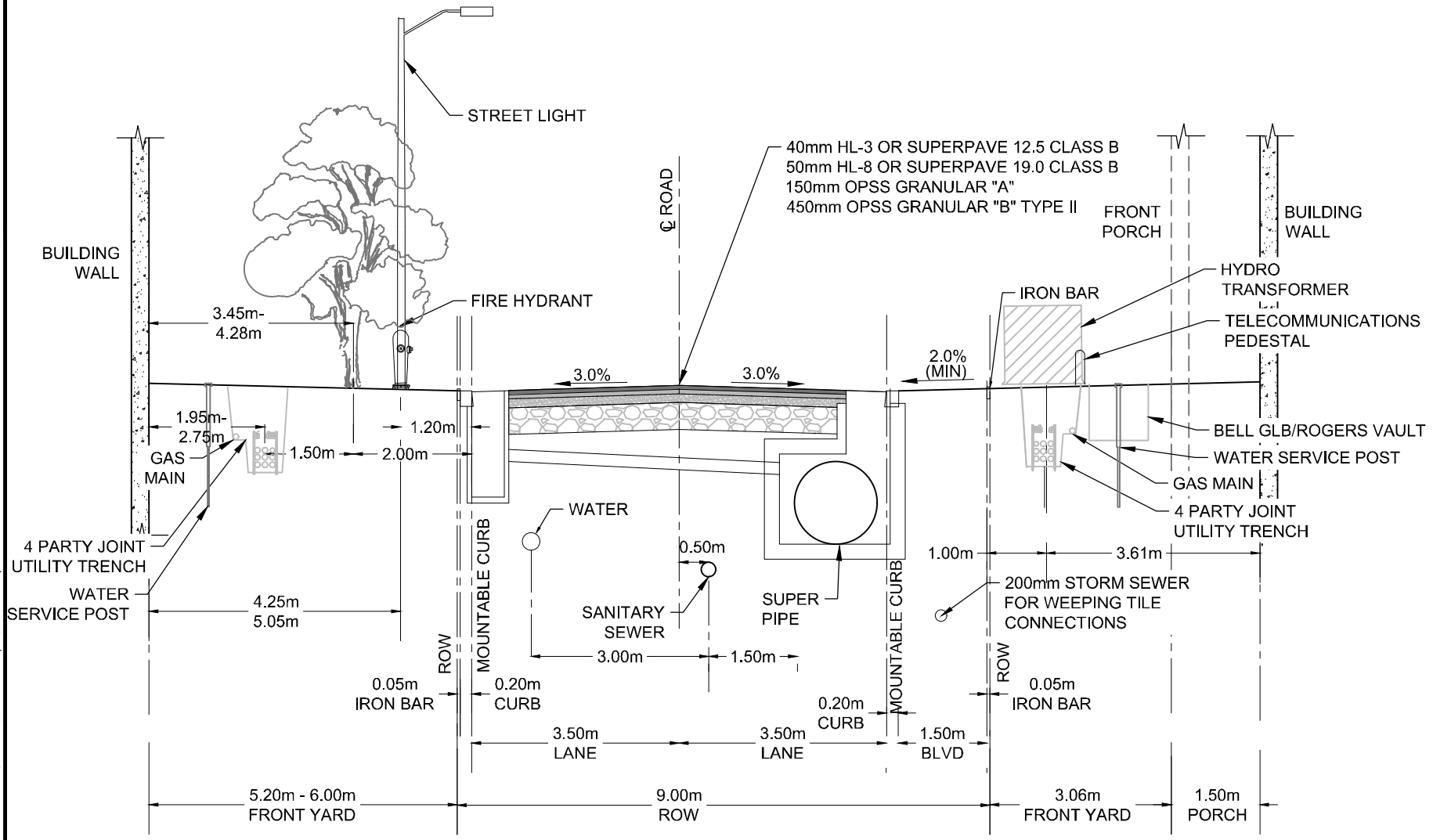

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CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

CROSS-SECTION STREET 2 - TOWNS LEFT, BB RIGHT

SCALE		
N.T.S		
DATE	JOB	FIGURE
NOV 2022	122040	FIGURE 7

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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 April 7, 2022 (Report: PG6149-1). 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.) watermain within Walkley Road, a 400mm diameter ductile Iron watermain in Conroy Road, a 300mm diameter watermain in St. Laurent Avenue, and 300mm diameter watermain in Don Reid Drive.

The proposed development will be serviced a proposed private 200mm diameter watermain system within the proposed roadways. The watermain system will connect to the surrounding watermain system in five (5) locations for redundancy. There will be two (2) 200mm connections to the existing 300mm watermain within St. Laurent Boulevard, two (2) connections to the existing 300mm watermain within Don Reid Drive, and one (1) 200mm connection to the existing 150mm service from Conroy Road by the means of a reducer. Refer to the General Plan of Services drawing (122040-GP) for servicing details.

Water demand calculations have been calculated using criteria from Section 4 of the City of Ottawa Water Distribution Guidelines and the Ontario Building Code. The required fire demand was calculated using the Fire Underwriters Survey (FUS) Guidelines. The water demand and fire flow calculations are provided in **Appendix B** for reference. A summary of the water demand and fire flows are provided in **Table 3.1**.

Table 3.1: 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)
228	616	2.00	4.99	10.97	233

The above water demand information was submitted to the City of Ottawa for boundary conditions from the City's water model. Refer to **Table 3.2** for a summary of the boundary conditions.

Table 3.2: Water Boundary Conditions

Criteria	Head (m)
Connection 1 (Conroy Road)	
Max HGL	130.0
Min HGL	124.5
Max Day + Fire Flow	125.5
Connection 2 (St. Laurent)	
Max HGL	130.0
Min HGL	124.4
Max Day + Fire Flow	124.5
Connection 3 (St. Laurent)	
Max HGL	130.0
Min HGL	124.4
Max Day + Fire Flow	124.4
Connection 4 (Don Reid Dr)	
Max HGL	130.0
Min HGL	124.3
Max Day + Fire Flow	124.4
Connection 5 (Don Reid Dr)	
Max HGL	130.0
Min HGL	124.3
Max Day + Fire Flow	124.5

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 3.3: Water Analysis Summary

Condition	Demand (L/s)	Min/Max Allowable Operating Pressures (psi)	Limits of Design Operating Pressures (psi)
High Pressure	2.00 L/s	80psi (Max)	44.90psi
Maximum Daily Demand and Fire Flow	237.99 L/s	20psi (Min)	21.91psi
Peak Hour	10.97 L/s	40psi (Min)	37.71psi

The above table lists the worst-case pressures from the water model analysis.

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, 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 diameter sanitary sewer in the Walkley Road right-of-way, a 750mm sanitary sewer within the Conroy Road right-of-way, a 375mm diameter sanitary sewer in the St. Laurent Boulevard right-of-way, and a 250mm sanitary sewer in the Don Reid Drive right-of-way. It is proposed to service the development with two (2) 250mm dia. sanitary connections to the existing 375mm sanitary sewer in the St. Laurent Boulevard right-of-way.

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

- Residential Average Flow = 280 L/capita/day
- Townhome = 2.7 Person/unit
- Residential Peaking Factor = Harmon Equation (max peaking factor = 4.0)
- Commercial Peaking Factor = 1.0
- Peak Extraneous Flows (Infiltration) = 0.33L/s/ha

The West connection will have a flow of **3.23 L/s** and the East connection will have a flow of **4.95 L/s**. The total peak sanitary flow including infiltration for the development will be **8.18 L/s**. It is understood that there is adequate capacity within the neighboring city infrastructure to service the development. Detailed sanitary flow calculations provided in **Appendix C** for reference.

5.0 STORM SERVICING

There are existing storm sewers located within all rights-of-way fronting the proposed development. There are 1500mm and 2100mm diameter storm sewers within the Walkley Road right-of-way, 2100mm, 450mm and 375mm diameter storm sewers within the Conroy Road right-of-way, 1500mm diameter storm sewer within the St. Laurent Boulevard right of way, and 750-900mm diameter storm sewers within the Don Reid Drive right-of-way.

It is proposed to service the site with two (2) 525mm private storm sewer connections located within the proposed Street 2, and Street 1. Inside the site the storm connections will be split into a controlled stormwater superpipe storage system, and a free draining foundation drain system. Both private sewer systems will connect to the existing 1500mm dia. sewer within St. Laurent Boulevard. Refer to the General Plan of Services drawings (122040 – GP1&2) for more details.

5.1 Foundation Drainage

The design criteria used in sizing the foundation drains is as per sections 5.2.5, and 5.4.7 of the Ottawa Sewer Guidelines. The criteria are summarized below in **Table 5.1** for reference.

Table 5.1: Storm Sewer Design Parameters

Parameter	Design Criteria
Storm Sewer Design	Rational Method
Minimum Diameter	250 mm
Foundation Drain Flow	0.45 L/s/unit

Based on the above the west foundation drain system will have a design flow of 39.6 L/s, and the east system will have a design flow of 63.0 L/s. Note that the above flows are for use in the sizing of the foundation drain system only as the flows are also accounted for within the stormwater management calculations.

Refer to **Appendix D** for detailed foundation drainage plans and design sheets.

6.0 STORM DRAINAGE AND STORMWATER MANAGEMENT

The stormwater management strategy for the site is based on the established criteria from the City of Ottawa.

6.1 Design Criteria

Through correspondence with the City of Ottawa and our knowledge of development requirements in the area, the following criteria have been adopted to control post-development stormwater discharge from the site:

- Control proposed development flows, up to and including the 100-year storm 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;
- Provide enhanced water quality control (80% TSS removal)
- Provide source controls which are in conformity with the City of Ottawa requirements, where possible.
- Limit ponding to 0.30 m for all roadway storage areas; and
- 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 Existing Site Drainage

As mentioned previously the drainage path of the site is not well defined and contains localized depressional storage in multiple locations. Overall, the site has a gradual slope from the northwest to the southeast.

6.3 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:

- Determine the total runoff from the site and allowable release rates.
- Size the required ICDs.
- Determine the required underground storage volumes.
- Calculate the storm sewer hydraulic grade line and ponding elevations for 100-year event.

The PCSWMM model schematics and output files are provided in **Appendix E**.

6.3.1 Quantity Control – Predevelopment Flows

The predevelopment flows were calculated using PCSWMM, through the SCS analysis method. The existing site has an area of +/-5.9 ha and is currently undeveloped. As noted within the Geotechnical report the subject site consists of Silty Clay. The time of concentration for the site was calculated utilizing the uplands method. A summary of the predevelopment model is provided below:

Table 6.1: Pre-Development Parameters

Design Parameter	Value
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 predevelopment flow for the 5-year storm event was calculated to be 597 L/s. The predevelopment drainage area plan (**Drawing 122040-EXSWM**), and Model results are summarized within **Appendix E**.

6.3.2 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, due to the high impervious percentage of the proposed site. The model was run 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.

6.3.3 Model Parameters

The site has been divided into subcatchments based on the drainage areas tributary to each inlet of the proposed stormwater management system. Refer to the Storm Drainage Area Plan (**Drawing 122040-SWM**) included within **Appendix E** for details.

The hydrologic parameters for each subcatchment were developed based on the proposed land use and grading. Subcatchments were modeled using the standard SWMM5 runoff module with Horton's Equation.

Infiltration

Infiltration losses for all 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 for the City of Ottawa 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 in the City of Ottawa 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 *City of Ottawa Sewer Design Guidelines* (October 2012).

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:

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

Storm Sewers

The storm sewer network (pipes / MHs) was created using Autodesk Civil3D and imported into the PCSWMM model.

Boundary Condition

Hydraulic Grade Line during the 100year storm event was provided by the City of Ottawa (see **Appendix E)** in the existing downstream manholes and was used as the boundary conditions in the model. The model was run using the provided elevations as outfall boundary conditions for the 100-year storm event. For the 2-year and 5-year storm events, the model was run using a "normal" outlet condition. The provided HGL elevations are summarized in **Table 6.2** below:

Table 6.2: Boundary Conditions

Outlet Location	Elevation (m)
St Laurent Blvd	82.35

6.4 PCSWMM Model Results

The results of the hydrologic and hydraulic analysis demonstrate that the overall stormwater management strategies for the subject site will conform to the stormwater management criteria outlined in this report.

Based on pre-development results, the allowable runoff from the site is 597 L/s. The "Retirement" subcatchment consists of 11% of the entire site area, therefore 100-year post-development allowable release rate for the future retirement development will be 65.7 L/s (11% of 597 L/s). Preliminary results show that the "Retirement" subcatchment will need storage with 157m^3 capacity and an outlet to control a 100-year storm on site.

Catchbasins are represented in the PCSWMM model as nodes, and they are connected to the underground pipe network by 200mm catchbasin leads.

Two inlet control devices (ICD) are located upstream of the 525mm pipes to control the release rate from the site to 5-year pre-development runoff. **Table 6.3.** provides a summary of the ICD flow rates and heads during the design storm events.

Table 6.3: Inlet Control Devices

Orifice Name	Location	Size (mm)	Head (m)*				Flow rate (L/s)			
			2yr	5yr	100yr	100yr +20%	2yr	5yr	100yr	100yr +20%
ICD-303	303_(STM)	250	0.73	0.93	1.65	2.26	102	117	159	189
ICD-503	503_(STM)	325	0.77	0.97	1.67	2.46	171	194	261	323

**Equal to Max. HGL depth to the middle of the orifice.*

Table 6.4 summarizes the results of the quantity control designs and calculations. Results show that total runoff from the proposed site under a 100-year storm is slightly above the allowable release rate.

Table 6.4: Post-Development Run-off Summary

Sections of the Site		100-year Runoff (L/S)
Runoff to 1500mm Sewer	to MH 502	261.6
	to MH 302	159.5
Direct Runoff	D-01	4.8
	D-02	11.9
	D-03	1.3
	D-04	6.1
Park		90.1
Retirement		65.7
Total		**601**

Hydraulic Grade Line (HGL)

The PCSWMM model has been used to perform an HGL analysis of the proposed storm sewer network. The results of the HGL analysis demonstrate that the proposed storm sewers have sufficient capacity to store and convey the controlled minor system flows up to the 100-year design event. Two profiles of the most downstream storm sewers extracted from the PCSWMM model showing HGL elevations for the 100year 4hr Chicago distributions are provided in **Appendix E**. For further information about HGL in other junctions refer to the packaged model included with the submission package**.**

Major System (Overland Flow)

A major overland flow route will be provided for storms greater than the 100-year storm event and provides the safe conveyance of overland flows. There will be no ponding up to and including the 100-year event, and ponding that occurs during larger storm events will not be present by the end of the event. The roads have been graded to ensure that ponding does not exceed a maximum depth of 0.35m (static ponding + dynamic flow) as per city guidelines. During large storm events, stormwater will pond on the surface and be conveyed to the surrounding right-of-way. The major overland system is depicted on the Grading Plan (**Drawing 122040-GR**).

The model was also run using the stress test to determine how the major system functions during extreme events and ensure that ponding does not impact the proposed dwellings. The stress test generated the highest peak flows and runoff volumes compared to the historical storms. Flow depth and velocity in the major system for the stress test event are added to **Appendix E** where the product of velocity × Depth does not exceed 0.6 m^2/s.

6.5 Quality Control

Through correspondence with the Rideau Valley Conservation Authority (RVCA), it is understood that the site will require enhanced water quality control (80% TSS removal). It is proposed to install two (2) oil grit separator (OGS) units, one on each private storm sewer connection. The OGS units will be installed after the flow controls for each storm connection, and before the free-flowing foundation drain connections. The OGS units are indicated as stormwater manholes 302 and 502 on the engineering drawings. Preliminary sizes and types provided by Contech Engineered Solutions are added the **Appendix E.**

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 five (5) proposed 200mm dia. watermain services which connect to Don Reid Drive St. Laurent Boulevard, and Conroy Road 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 is to connect to the 1500mm diameter storm sewer in the St. Laurent Boulevard right-of-way.
- Stormwater control is to be provided through the use of super pipes as storages and two ICDs in manholes 303 & 503.
- Stormwater quality control will be attenuated through the implementation of Continues Deflective Separator (CDS) units in manholes 302 & 502.
- As per the proposed grading plans, major overland flow routes have been provided to the surrounding right-of-ways.

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:

Anthony Mestwarp, P.Eng
Project Engineer
Land Development Engineering

Stormwater Modeling by:

Vahid Mehdipour, M.Sc. (Civil Engineering)
Water Resources

EPA Net Watermain Modeling by:

Curtis Ferguson, B.A.Sc., EIT
Land Development

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:

Pre-consultation Notes – Updated June 1, 2022

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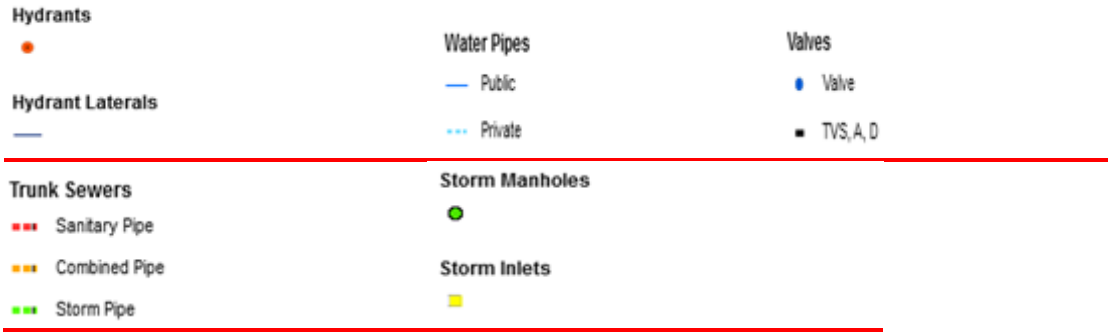
- City of Ottawa Hydrogeological and Terrain Analysis Guidelines (March 2021)
- City of Ottawa Park and Pathway Development Manual (2012)
- City of Ottawa Accessibility Design Standards (2012)
- Ottawa Standard Tender Documents (latest version)
- Ontario Provincial Standards for Roads & Public Works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

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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

	Unit Type	Population	Residential Demand (L/s)		
Node	**Townhouse**		**Avg Day**	**Max. Daily**	**Peak Hour**
1	9	24	0.08	0.20	0.43
2 (HYD)	13	35	0.11	0.28	0.63
3 (HYD)	14	38	0.12	0.31	0.67
4 (HYD)	12	32	0.11	0.26	0.58
5	5	14	0.04	0.11	0.24
6 (HYD)	8	22	0.07	0.18	0.39
7	3	8	0.03	0.07	0.14
8	8	22	0.07	0.18	0.39
9 (HYD)	7	19	0.06	0.15	0.34
10	5	14	0.04	0.11	0.24
11 (HYD)	5	14	0.04	0.11	0.24
12 (HYD)	8	22	0.07	0.18	0.39
13	5	14	0.04	0.11	0.24
14 (HYD)	14	38	0.12	0.31	0.67
15	7	19	0.06	0.15	0.34
16 (HYD)	13	35	0.11	0.28	0.63
17 (HYD)	12	32	0.11	0.26	0.58
18	6	16	0.05	0.13	0.29
19 (HYD)	14	38	0.12	0.31	0.67
20 (HYD)	16	43	0.14	0.35	0.77
21 (HYD)	0	0	0.00	0.00	0.00
22	10	27	0.09	0.22	0.48
23	6	16	0.05	0.13	0.29
24 (HYD)	12	32	0.11	0.26	0.58
25 (HYD)	11	30	0.10	0.24	0.53
26	5	14	0.04	0.11	0.24
27 (HYD)	0	0	0.00	0.00	0.00
Total	**228**	**616**	**2.00**	**4.99**	**10.97**

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: Walkley Conroy
Date: 10/4/2022
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 - Back-back Townhome
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)	323			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**969**	
	F	**Base fire flow without reductions**				**10,000**
		F = 220 C (A)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**8,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjustment Charge Used)**				**Surcharge**	
	(3)	North Side	2Hr Fire Wall		10%	**5,525**
		East Side	10.1 - 20 m		15%	
		South Side	0 - 3 m		25%	
		West Side	10.1 - 20 m		15%	
				Cumulative Total	**65%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2520

FUS - Fire Flow Calculations

As per 2020 Fire Underwriter's Survey Guidelines

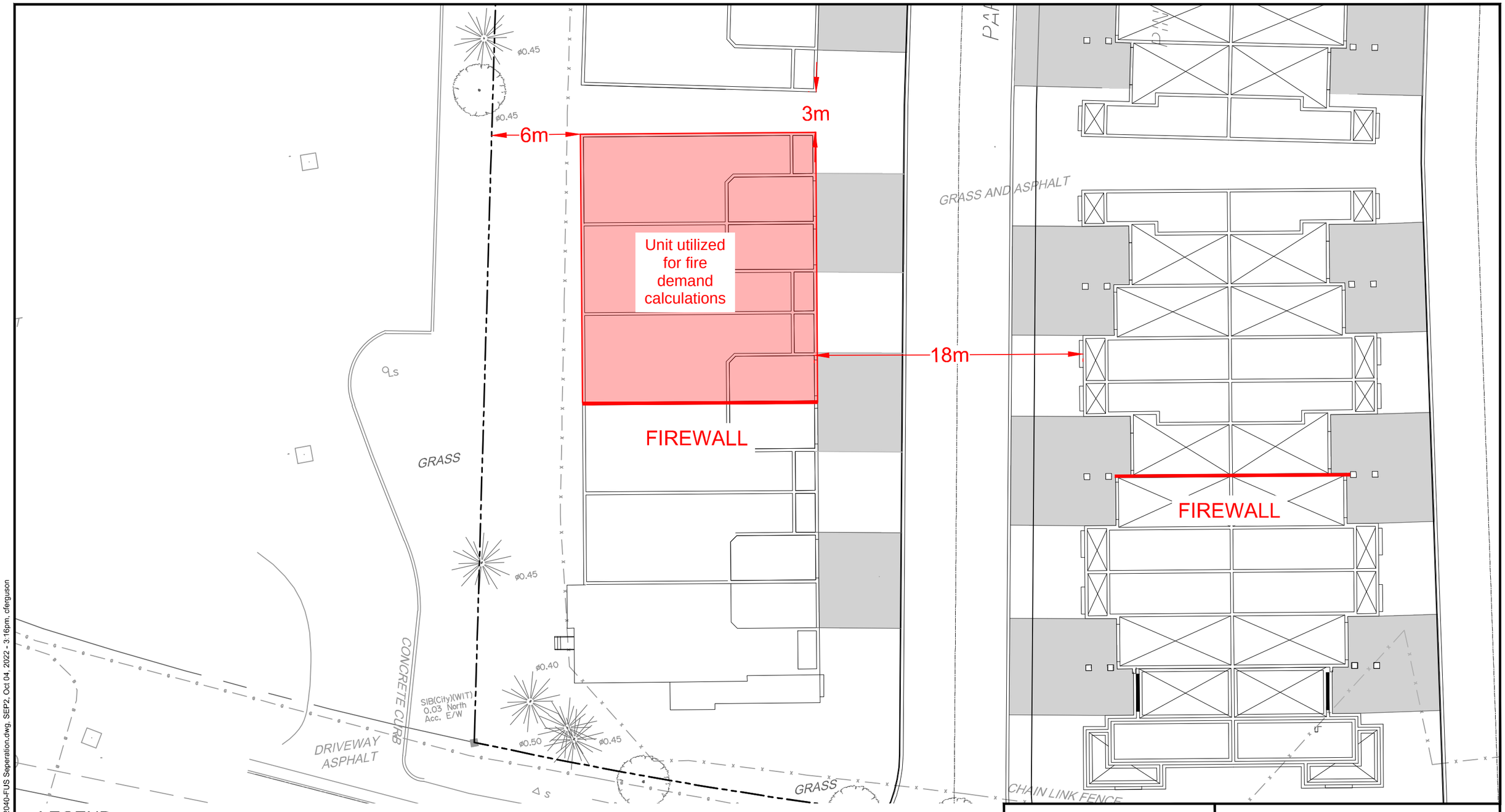
NOVATECH
Engineers, Planners & Landscape Architects

Novatech Project #: 122040
Project Name: Walkley Conroy
Date: 10/4/2022
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 Townhome
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)	293			
		Number of Floors/Storeys	3			
		Area of structure considered (m^2)			**879**	
	F	**Base fire flow without reductions**				**10,000**
		F = 220 **C** (**A**)$^{0.5}$				
Reductions or Surcharges						
3	**Occupancy hazard reduction or surcharge**			**Reduction/Surcharge**		
	(1)	Non-combustible		-25%	-15%	**8,500**
		Limited combustible	Yes	-15%		
		Combustible		0%		
		Free burning		15%		
		Rapid burning		25%		
4	**Sprinkler Reduction (100% sprinkler coverage of building used)**			**Reduction**		
	(2)	Adequately Designed System (NFPA 13)		-30%		**0**
		Standard Water Supply		-10%		
		Fully Supervised System		-10%		
				Cumulative Total	**0%**	
5	**Exposure Surcharge (cumulative %, Maximum Exposure Adjustment Charge Used)**				**Surcharge**	
	(3)	North Side	0 - 3 m		25%	**5,950**
		East Side	10.1 - 20 m		15%	
		South Side	2Hr Fire Wall		10%	
		West Side	3.1 - 10 m		20%	
				Cumulative Total	**70%**	
Results						
6	**(1) + (2) + (3)**	**Total Required Fire Flow, rounded to nearest 1000L/min**			**L/min**	**14,000**
		(2,000 L/min < Fire Flow < 45,000 L/min)		or	L/s	**233**
				or	USGPM	3,699
7	**Storage Volume**	Required Duration of Fire Flow (hours)			Hours	3
		Required Volume of Fire Flow (m^3)			m^3	2520



NOVATECH
Engineers, Planners & Landscape Architects
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Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

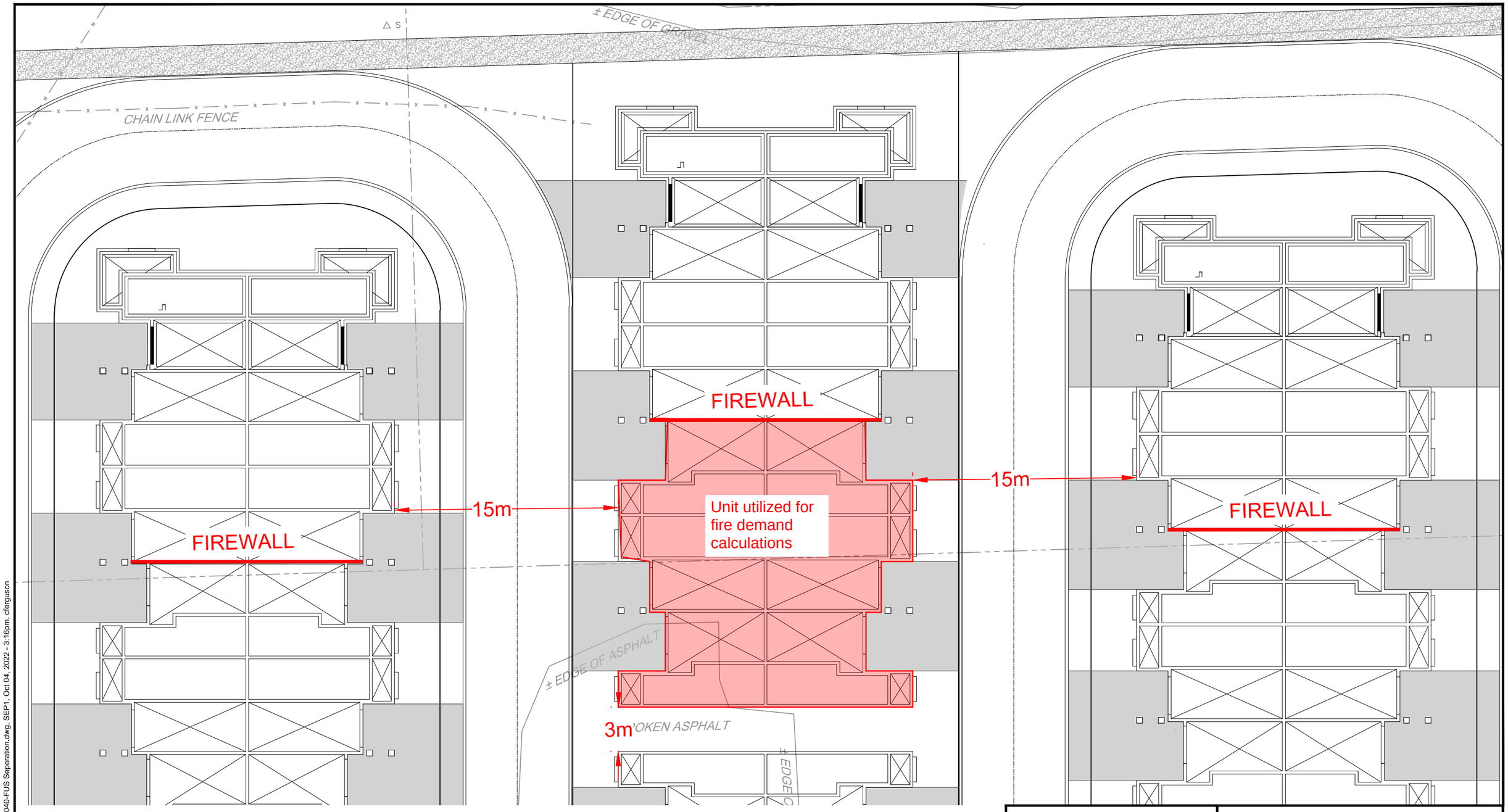
CITY OF OTTAWA
CONROY WALKLEY

FUS SEPARATION
(STANDARD TOWNHOME UNIT)

SCALE 1 : 250 (0 2 4 6 8 10)
DATE OCT 2022
JOB 122040
FIGURE SEP2

M:\2022\122040\CAD\Civil\Figures\Hydraulic\122040-FUS Seperation.dwg, SEP2, Oct 04, 2022 - 3:16pm, dferguson

SHT11X17.DWG - 279mmX432mm



LEGEND

- PROPERTY LINE
- CURB
- SIDEWALK
- DRIVEWAY

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CITY OF OTTAWA
CONROY WALKLEY

FUS SEPARATION
(BACK-BACK TOWNHOME UNIT)

SCALE 1 : 250 (0, 2, 4, 6, 8, 10)
DATE OCT 2022 | JOB 122040 | FIGURE SEP1

SHT11X17.DWG - 279mmX432mm

M:\2022\122040\CAD\Civil\Figures\Hydraulic\122040-FUS Seperation.dwg, SEP1, Oct 04, 2022 - 3:16pm, dferguson

Curtis Ferguson

From: Sharif, Golam <sharif.sharif@ottawa.ca>
Sent: Wednesday, October 19, 2022 5:32 PM
To: Anthony Mestwarp
Cc: Greg MacDonald; Greg Winters; Curtis Ferguson
Subject: RE: 2510 St. Laurent Blvd - Confirmation of Flow
Attachments: 2510 St-Laurent Boulevard October 2022.pdf

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

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

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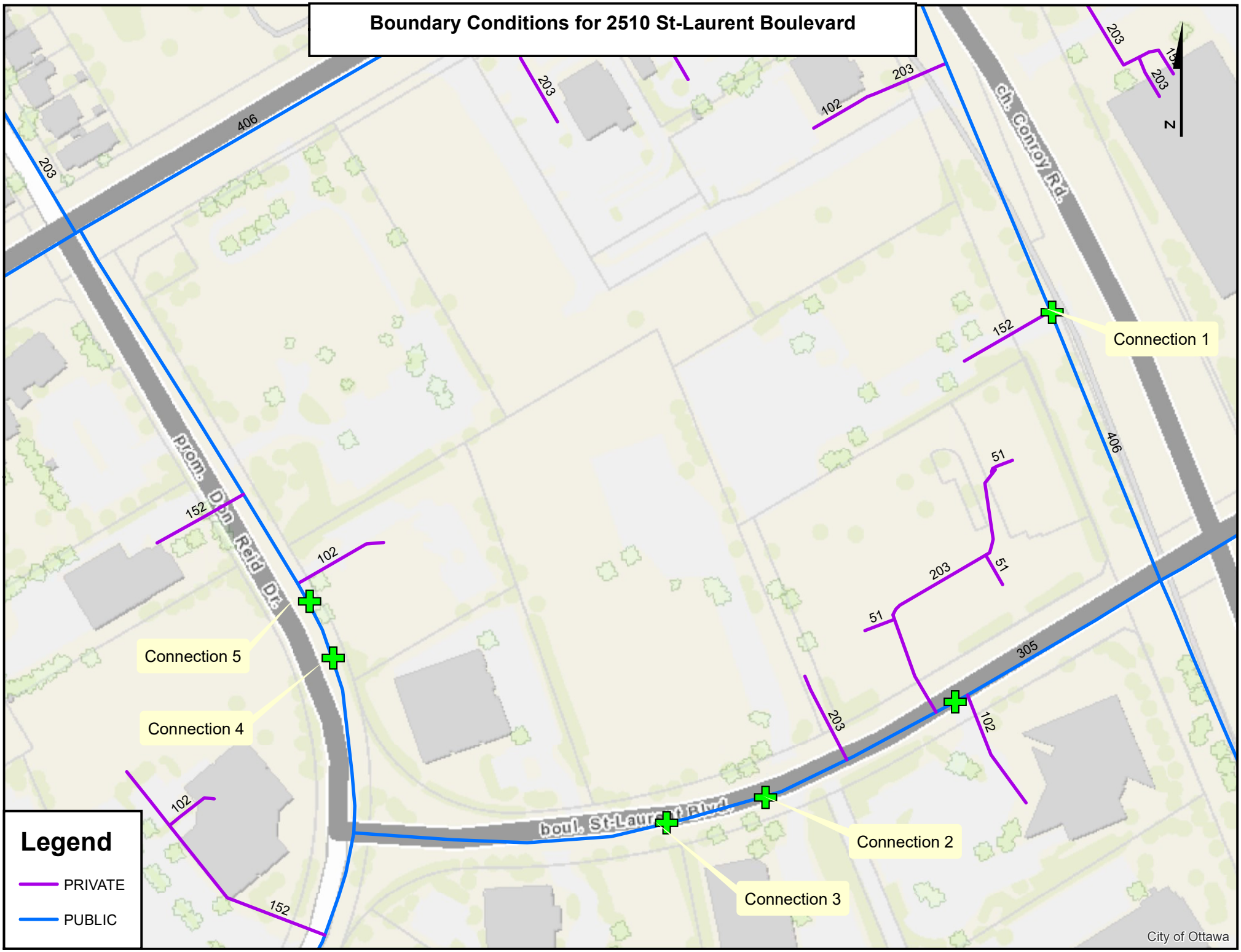
Boundary Conditions for 2510 St-Laurent Boulevard



```
******************************************************************
*                            E P A N E T                         *
*                     Hydraulic and Water Quality                *
*                     Analysis for Pipe Networks                 *
*                          Version 2.2                           *
******************************************************************
2510 St. Laurent Blvd
```

Link - Node Table:

Link ID	Start Node	End Node	Length m	Diameter mm
1-300	30	1	19.38	200
1-2	1	2(HYD)	56	200
2-3	2(HYD)	3(HYD)	41	200
3-4	3(HYD)	4(HYD)	78.8	200
4-5	4(HYD)	5	11.5	200
6-5	5	6(HYD)	61.9	200
7-6	6(HYD)	7	39.5	200
7-400	7	31	14.1	200
5-8	5	8	37	200
9-8	8	9(HYD)	32.8	200
10-9	9(HYD)	10	68.9	200
10-500	10	32	13.1	200
8-11	8	11(HYD)	41.6	200
11-12	11(HYD)	12(HYD)	99.5	200
12-13	12(HYD)	13	48.1	200
5-13	13	5	35.2	200
14-13	13	14(HYD)	42.1	200
15-14	14(HYD)	15	56.9	200
16-15	15	16(HYD)	12.1	200
17-16	16(HYD)	17(HYD)	87.6	200
17-200	17(HYD)	29	16.4	200
15-18	15	18	40.5	200
18-19	18	19(HYD)	47.7	200
19-20	19(HYD)	20(HYD)	91.3	200
22-20	20(HYD)	22	76.4	200
18-21	18	21(HYD)	27.4	200
21-22	21(HYD)	22	15	200
22-23	22	23	28.6	200
23-24	23	24(HYD)	48.1	200
24-25	24(HYD)	25(HYD)	96.4	200
26-25	25(HYD)	26	61.9	200
27-26	26	27(HYD)	16.6	200
23-27	23	27(HYD)	21	200
26-RD1	26	RD-1	18.2	200
RD1-100	RD-1	28	15.8	150

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

Node Results (Average Day (MAX):
----------------------------------------------------------------
Node                Demand      Head  Pressure   Quality
ID                     LPS         m         m
----------------------------------------------------------------
1                     0.08    130.00     44.85      0.00
 2(HYD)               0.11    130.00     44.66      0.00
 3(HYD)               0.12    130.00     44.50      0.00
 4(HYD)               0.11    130.00     44.26      0.00
 5                    0.04    130.00     44.19      0.00
 6(HYD)               0.07    130.00     43.76      0.00
 7                    0.03    130.00     43.41      0.00
 8                    0.07    130.00     44.07      0.00
 9(HYD)               0.06    130.00     44.11      0.00
 10                   0.04    130.00     43.66      0.00
 11(HYD)              0.04    130.00     43.89      0.00
 12(HYD)              0.07    130.00     43.93      0.00
 13                   0.04    130.00     44.10      0.00
 14(HYD)              0.12    130.00     44.25      0.00
 15                   0.06    130.00     44.47      0.00
 16(HYD)              0.11    130.00     44.54      0.00
 17(HYD)              0.11    130.00     44.90      0.00
 18                   0.05    130.00     44.54      0.00
 19(HYD)              0.12    130.00     44.39      0.00
 20(HYD)              0.14    130.00     44.13      0.00
 21(HYD)              0.00    130.00     44.36      0.00
 22                   0.09    130.00     44.30      0.00
 23                   0.05    130.00     44.38      0.00
 24(HYD)              0.11    130.00     44.29      0.00
 25(HYD)              0.10    130.00     44.17      0.00
 26                   0.04    130.00     44.45      0.00
 27(HYD)              0.00    130.00     44.51      0.00
 RD-1                 0.00    130.00     44.69      0.00
 28                  -0.42    130.00      0.00      0.00 Reservoir
 29                  -0.46    130.00      0.00      0.00 Reservoir
 30                  -0.39    130.00      0.00      0.00 Reservoir
 31                  -0.36    130.00      0.00      0.00 Reservoir
 32                  -0.35    130.00      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 MAX):
----------------------------------------------------------------------
Link                 Flow  VelocityUnit Headloss    Status
ID                    LPS       m/s      m/km
----------------------------------------------------------------------
1-300               0.39      0.01      0.00      Open
 1-2                 0.31      0.01      0.00      Open
 2-3                 0.20      0.01      0.00      Open
 3-4                 0.08      0.00      0.00      Open
 4-5                -0.03      0.00      0.00      Open
 6-5                -0.26      0.01      0.00      Open
 7-6                -0.33      0.01      0.00      Open
 7-400              -0.36      0.01      0.00      Open
 5-8                -0.04      0.00      0.00      Open
 9-8                -0.25      0.01      0.00      Open
 10-9               -0.31      0.01      0.00      Open
 10-500             -0.35      0.01      0.00      Open
 8-11                0.14      0.00      0.00      Open
 11-12               0.10      0.00      0.00      Open
 12-13               0.03      0.00      0.00      Open
 5-13               -0.23      0.01      0.00      Open
 14-13               0.21      0.01      0.00      Open
 15-14               0.09      0.00      0.00      Open
 16-15              -0.24      0.01      0.00      Open
 17-16              -0.35      0.01      0.00      Open
 17-200             -0.46      0.01      0.00      Open
 15-18               0.28      0.01      0.00      Open
 18-19               0.15      0.00      0.00      Open
 19-20               0.03      0.00      0.00      Open
 22-20              -0.11      0.00      0.00      Open
 18-21               0.08      0.00      0.00      Open
 21-22               0.08      0.00      0.00      Open
 22-23              -0.12      0.00      0.00      Open
 23-24               0.05      0.00      0.00      Open
 24-25              -0.06      0.00      0.00      Open
 26-25              -0.16      0.01      0.00      Open
 27-26               0.22      0.01      0.00      Open
 23-27              -0.22      0.01      0.00      Open
 26-RD1             -0.42      0.01      0.00      Open
 RD1-100            -0.42      0.02      0.01      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD+FF NODE 2):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    122.18     37.03      0.00
  2(HYD)              233.28    115.78     30.44      0.00
  3(HYD)                0.31    118.15     32.65      0.00
  4(HYD)                0.26    122.74     37.00      0.00
  5                     0.11    123.41     37.60      0.00
  6(HYD)                0.18    123.94     37.70      0.00
  7                     0.07    124.28     37.69      0.00
  8                     0.18    123.67     37.74      0.00
  9(HYD)                0.15    123.91     38.02      0.00
  10                    0.11    124.40     38.06      0.00
  11(HYD)               0.11    123.67     37.56      0.00
  12(HYD)               0.18    123.67     37.60      0.00
  13                    0.11    123.67     37.77      0.00
  14(HYD)               0.31    123.99     38.24      0.00
  15                    0.15    124.43     38.90      0.00
  16(HYD)               0.28    124.44     38.98      0.00
  17(HYD)               0.26    124.49     39.39      0.00
  18                    0.13    124.63     39.17      0.00
  19(HYD)               0.31    124.65     39.04      0.00
  20(HYD)               0.35    124.69     38.82      0.00
  21(HYD)               0.00    124.70     39.06      0.00
  22                    0.22    124.74     39.04      0.00
  23                    0.13    124.88     39.26      0.00
  24(HYD)               0.26    124.91     39.20      0.00
  25(HYD)               0.24    124.96     39.13      0.00
  26                    0.11    124.99     39.44      0.00
  27(HYD)               0.00    124.94     39.45      0.00
  RD-1                  0.00    125.09     39.78      0.00
  28                  -26.51    125.50      0.00      0.00 Reservoir
  29                   -8.15    124.50      0.00      0.00 Reservoir
  30                 -138.04    124.40      0.00      0.00 Reservoir
  31                  -34.17    124.40      0.00      0.00 Reservoir
  32                  -31.13    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 (MD+FF NODE 2):
  ----------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ----------------------------------------------------------------
  1-300              138.04      4.39    114.64      Open
  1-2                137.84      4.39    114.33      Open
  2-3                -95.44      3.04     57.88      Open
  3-4                -95.75      3.05     58.23      Open
  4-5                -96.01      3.06     58.52      Open
  6-5                -33.92      1.08      8.52      Open
  7-6                -34.10      1.09      8.61      Open
  7-400              -34.17      1.09      8.64      Open
5-8                -30.68      0.98      7.07      Open
  9-8                -30.87      0.98      7.16      Open
  10-9               -31.02      0.99      7.22      Open
  10-500             -31.13      0.99      7.27      Open
  8-11                 0.01      0.00      0.00      Open
  11-12               -0.10      0.00      0.00      Open
  12-13               -0.28      0.01      0.00      Open
  5-13                31.52      1.00      7.44      Open
  14-13              -31.91      1.02      7.61      Open
  15-14              -32.22      1.03      7.74      Open
  16-15               -7.61      0.24      0.54      Open
  17-16               -7.89      0.25      0.57      Open
  17-200              -8.15      0.26      0.61      Open
  15-18              -24.76      0.79      4.75      Open
  18-19               -7.05      0.22      0.46      Open
  19-20               -7.36      0.23      0.50      Open
  22-20               -7.71      0.25      0.55      Open
  18-21              -17.84      0.57      2.59      Open
  21-22              -17.84      0.57      2.59      Open
  22-23              -25.77      0.82      5.12      Open
  23-24               -7.19      0.23      0.48      Open
  24-25               -7.45      0.24      0.51      Open
  26-25               -7.69      0.24      0.55      Open
  27-26               18.71      0.60      2.83      Open
  23-27              -18.71      0.60      2.83      Open
  26-RD1             -26.51      0.84      5.40      Open
  RD1-100            -26.51      1.50     26.14      Open
```

```
  ******************************************************************************
  *                              E P A N E T                                   *
  *                      Hydraulic and Water Quality                           *
  *                      Analysis for Pipe Networks                            *
  *                            Version 2.2                                     *
  ******************************************************************************
Node Results (MD + FF NODE 3):
  ------------------------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ------------------------------------------------------------------------------
  1                     0.20    122.82     37.67      0.00
  2(HYD)                0.28    118.29     32.95      0.00
  3(HYD)              233.31    114.98     29.48      0.00
  4(HYD)                0.26    121.86     36.12      0.00
  5                     0.11    122.87     37.06      0.00
  6(HYD)                0.18    123.69     37.45      0.00
  7                     0.07    124.21     37.62      0.00
  8                     0.18    123.25     37.32      0.00
  9(HYD)                0.15    123.61     37.72      0.00
  10                    0.11    124.36     38.02      0.00
  11(HYD)               0.11    123.25     37.14      0.00
  12(HYD)               0.18    123.25     37.18      0.00
  13                    0.11    123.25     37.35      0.00
  14(HYD)               0.31    123.71     37.96      0.00
  15                    0.15    124.33     38.80      0.00
  16(HYD)               0.28    124.35     38.89      0.00
  17(HYD)               0.26    124.47     39.37      0.00
  18                    0.13    124.54     39.08      0.00
  19(HYD)               0.31    124.57     38.96      0.00
  20(HYD)               0.35    124.62     38.75      0.00
  21(HYD)               0.00    124.62     38.98      0.00
  22                    0.22    124.66     38.96      0.00
  23                    0.13    124.82     39.20      0.00
  24(HYD)               0.26    124.85     39.14      0.00
  25(HYD)               0.24    124.90     39.07      0.00
  26                    0.11    124.94     39.39      0.00
  27(HYD)               0.00    124.89     39.40      0.00
  RD-1                  0.00    125.05     39.74      0.00
  28                  -27.85    125.50      0.00      0.00 Reservoir
  29                  -13.43    124.50      0.00      0.00 Reservoir
  30                 -114.64    124.40      0.00      0.00 Reservoir
  31                  -43.25    124.40      0.00      0.00 Reservoir
  32                  -38.83    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 (MD +FF NODE 3):
 ----------------------------------------------------------------
 Link                 Flow  VelocityUnit Headloss    Status
 ID                    LPS       m/s      m/km
 ----------------------------------------------------------------
 1-300              114.64      3.65     81.28      Open
 1-2                114.44      3.64     81.02      Open
 2-3                114.16      3.63     80.65      Open
 3-4               -119.15      3.79     87.29      Open
 4-5               -119.41      3.80     87.64      Open
 6-5                -43.00      1.37     13.22      Open
 7-6                -43.18      1.37     13.32      Open
 7-400              -43.25      1.38     13.36      Open
 5-8                -37.76      1.20     10.39      Open
 9-8                -38.57      1.23     10.81      Open
 10-9               -38.72      1.23     10.89      Open
 10-500             -38.83      1.24     10.94      Open
 8-11                 0.63      0.02      0.01      Open
 11-12                0.52      0.02      0.00      Open
 12-13                0.34      0.01      0.00      Open
 5-13                38.76      1.23     10.91      Open
 14-13              -38.53      1.23     10.79      Open
 15-14              -38.84      1.24     10.95      Open
 16-15              -12.89      0.41      1.42      Open
 17-16              -13.17      0.42      1.48      Open
 17-200             -13.43      0.43      1.53      Open
 15-18              -26.10      0.83      5.25      Open
 18-19               -7.44      0.24      0.51      Open
 19-20               -7.75      0.25      0.55      Open
 22-20               -8.10      0.26      0.60      Open
 18-21              -18.79      0.60      2.85      Open
 21-22              -18.79      0.60      2.85      Open
 22-23              -27.11      0.86      5.63      Open
 23-24               -7.57      0.24      0.53      Open
 24-25               -7.83      0.25      0.56      Open
 26-25               -8.07      0.26      0.60      Open
 27-26               19.67      0.63      3.11      Open
 23-27              -19.67      0.63      3.11      Open
 26-RD1             -27.85      0.89      5.92      Open
 RD1-100            -27.85      1.58     28.66      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD + FF NODE 4):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    123.89     38.74      0.00
  2(HYD)                0.28    122.42     37.08      0.00
  3(HYD)                0.31    121.35     35.85      0.00
  4(HYD)              233.26    119.32     33.58      0.00
  5                     0.11    121.29     35.48      0.00
  6(HYD)                0.18    122.95     36.71      0.00
  7                     0.07    124.02     37.43      0.00
  8                     0.18    122.03     36.10      0.00
  9(HYD)                0.15    122.73     36.84      0.00
  10                    0.11    124.22     37.88      0.00
  11(HYD)               0.11    122.03     35.92      0.00
  12(HYD)               0.18    122.02     35.95      0.00
  13                    0.11    122.02     36.12      0.00
  14(HYD)               0.31    122.85     37.10      0.00
  15                    0.15    123.98     38.45      0.00
  16(HYD)               0.28    124.04     38.58      0.00
  17(HYD)               0.26    124.43     39.33      0.00
  18                    0.13    124.26     38.80      0.00
  19(HYD)               0.31    124.29     38.68      0.00
  20(HYD)               0.35    124.36     38.49      0.00
  21(HYD)               0.00    124.36     38.72      0.00
  22                    0.22    124.42     38.72      0.00
  23                    0.13    124.63     39.01      0.00
  24(HYD)               0.26    124.66     38.95      0.00
  25(HYD)               0.24    124.73     38.90      0.00
  26                    0.11    124.78     39.23      0.00
  27(HYD)               0.00    124.71     39.22      0.00
  RD-1                  0.00    124.92     39.61      0.00
  28                  -31.94    125.50      0.00      0.00 Reservoir
  29                  -24.15    124.50      0.00      0.00 Reservoir
  30                  -62.49    124.40      0.00      0.00 Reservoir
  31                  -63.31    124.40      0.00      0.00 Reservoir
  32                  -56.11    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 (MD + FF NODE 4):
  ------------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ------------------------------------------------------------------
  1-300               62.49      1.99     26.42      Open
  1-2                 62.29      1.98     26.26      Open
  2-3                 62.01      1.97     26.04      Open
  3-4                 61.70      1.96     25.80      Open
  4-5               -171.56      5.46    171.47      Open
  6-5                -63.06      2.01     26.87      Open
  7-6                -63.24      2.01     27.01      Open
  7-400              -63.31      2.02     27.06      Open
  5-8                -53.72      1.71     19.96      Open
  9-8                -55.85      1.78     21.46      Open
  10-9               -56.00      1.78     21.56      Open
  10-500             -56.11      1.79     21.64      Open
  8-11                 1.95      0.06      0.04      Open
  11-12                1.84      0.06      0.04      Open
  12-13                1.66      0.05      0.03      Open
  5-13                54.89      1.75     20.78      Open
  14-13              -53.34      1.70     19.70      Open
  15-14              -53.65      1.71     19.92      Open
  16-15              -23.61      0.75      4.36      Open
  17-16              -23.89      0.76      4.45      Open
  17-200             -24.15      0.77      4.54      Open
  15-18              -30.19      0.96      6.87      Open
  18-19               -8.64      0.28      0.68      Open
  19-20               -8.95      0.28      0.72      Open
  22-20               -9.30      0.30      0.78      Open
  18-21              -21.67      0.69      3.72      Open
  21-22              -21.67      0.69      3.72      Open
  22-23              -31.20      0.99      7.30      Open
  23-24               -8.74      0.28      0.69      Open
  24-25               -9.00      0.29      0.73      Open
  26-25               -9.24      0.29      0.77      Open
  27-26               22.59      0.72      4.01      Open
  23-27              -22.59      0.72      4.01      Open
  26-RD1             -31.94      1.02      7.62      Open
  RD1-100            -31.94      1.81     36.92      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD + FF NODE 6):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    124.26     39.11      0.00
  2(HYD)                0.28    123.88     38.54      0.00
  3(HYD)                0.31    123.60     38.10      0.00
  4(HYD)                0.26    123.07     37.33      0.00
  5                     0.11    122.99     37.18      0.00
  6(HYD)              233.18    118.88     32.64      0.00
  7                     0.07    122.95     36.36      0.00
  8                     0.18    123.35     37.42      0.00
  9(HYD)                0.15    123.68     37.79      0.00
  10                    0.11    124.37     38.03      0.00
  11(HYD)               0.11    123.35     37.24      0.00
  12(HYD)               0.18    123.35     37.28      0.00
  13                    0.11    123.35     37.45      0.00
  14(HYD)               0.31    123.77     38.02      0.00
  15                    0.15    124.35     38.82      0.00
  16(HYD)               0.28    124.37     38.91      0.00
  17(HYD)               0.26    124.48     39.38      0.00
  18                    0.13    124.56     39.10      0.00
  19(HYD)               0.31    124.59     38.98      0.00
  20(HYD)               0.35    124.63     38.76      0.00
  21(HYD)               0.00    124.64     39.00      0.00
  22                    0.22    124.68     38.98      0.00
  23                    0.13    124.84     39.22      0.00
  24(HYD)               0.26    124.86     39.15      0.00
  25(HYD)               0.24    124.92     39.09      0.00
  26                    0.11    124.95     39.40      0.00
  27(HYD)               0.00    124.90     39.41      0.00
  RD-1                  0.00    125.06     39.75      0.00
  28                  -27.53    125.50      0.00      0.00 Reservoir
  29                  -12.34    124.50      0.00      0.00 Reservoir
  30                  -30.57    124.40      0.00      0.00 Reservoir
  31                 -130.38    124.40      0.00      0.00 Reservoir
  32                  -37.18    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 (MD + FF NODE 6):
  ----------------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ----------------------------------------------------------------------
  1-300               30.57      0.97      7.03      Open
  1-2                 30.37      0.97      6.94      Open
  2-3                 30.09      0.96      6.82      Open
  3-4                 29.78      0.95      6.69      Open
  4-5                 29.52      0.94      6.59      Open
  6-5                102.87      3.27     66.50      Open
  7-6               -130.31      4.15    103.04      Open
  7-400             -130.38      4.15    103.14      Open
  5-8                -36.25      1.15      9.63      Open
  9-8                -36.92      1.18      9.97      Open
  10-9               -37.07      1.18     10.05      Open
  10-500             -37.18      1.18     10.10      Open
  8-11                 0.50      0.02      0.00      Open
  11-12                0.39      0.01      0.00      Open
  12-13                0.21      0.01      0.00      Open
  5-13                37.21      1.18     10.12      Open
  14-13              -37.12      1.18     10.07      Open
  15-14              -37.43      1.19     10.22      Open
  16-15              -11.80      0.38      1.20      Open
  17-16              -12.08      0.38      1.26      Open
  17-200             -12.34      0.39      1.31      Open
  15-18              -25.78      0.82      5.13      Open
  18-19               -7.35      0.23      0.50      Open
  19-20               -7.66      0.24      0.54      Open
  22-20               -8.01      0.25      0.59      Open
  18-21              -18.56      0.59      2.79      Open
  21-22              -18.56      0.59      2.79      Open
  22-23              -26.79      0.85      5.50      Open
  23-24               -7.48      0.24      0.52      Open
  24-25               -7.74      0.25      0.55      Open
  26-25               -7.98      0.25      0.58      Open
  27-26               19.44      0.62      3.04      Open
  23-27              -19.44      0.62      3.04      Open
  26-RD1             -27.53      0.88      5.79      Open
  RD1-100            -27.53      1.56     28.05      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD + FF NODE 9):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    124.24     39.09      0.00
  2(HYD)                0.28    123.79     38.45      0.00
  3(HYD)                0.31    123.46     37.96      0.00
  4(HYD)                0.26    122.85     37.11      0.00
  5                     0.11    122.76     36.95      0.00
  6(HYD)                0.18    123.63     37.39      0.00
  7                     0.07    124.20     37.61      0.00
  8                     0.18    121.01     35.08      0.00
  9(HYD)              233.15    118.08     32.19      0.00
  10                    0.11    123.47     37.13      0.00
  11(HYD)               0.11    121.40     35.29      0.00
  12(HYD)               0.18    122.33     36.26      0.00
  13                    0.11    122.78     36.88      0.00
  14(HYD)               0.31    123.38     37.63      0.00
  15                    0.15    124.20     38.67      0.00
  16(HYD)               0.28    124.23     38.77      0.00
  17(HYD)               0.26    124.46     39.36      0.00
  18                    0.13    124.44     38.98      0.00
  19(HYD)               0.31    124.46     38.85      0.00
  20(HYD)               0.35    124.52     38.65      0.00
  21(HYD)               0.00    124.52     38.88      0.00
  22                    0.22    124.57     38.87      0.00
  23                    0.13    124.75     39.13      0.00
  24(HYD)               0.26    124.78     39.07      0.00
  25(HYD)               0.24    124.84     39.01      0.00
  26                    0.11    124.88     39.33      0.00
  27(HYD)               0.00    124.82     39.33      0.00
  RD-1                  0.00    125.00     39.69      0.00
  28                  -29.42    125.50      0.00      0.00 Reservoir
  29                  -18.05    124.50      0.00      0.00 Reservoir
  30                  -33.17    124.40      0.00      0.00 Reservoir
  31                  -44.88    124.40      0.00      0.00 Reservoir
  32                 -112.47    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 (MD + FF NODE 9):
 ------------------------------------------------------------------
 Link                 Flow  VelocityUnit Headloss    Status
 ID                    LPS       m/s      m/km
 ------------------------------------------------------------------
 1-300               33.17      1.06      8.18      Open
 1-2                 32.97      1.05      8.09      Open
 2-3                 32.69      1.04      7.96      Open
 3-4                 32.38      1.03      7.82      Open
 4-5                 32.12      1.02      7.70      Open
 6-5                -44.63      1.42     14.16      Open
 7-6                -44.81      1.43     14.27      Open
 7-400              -44.88      1.43     14.31      Open
 5-8                 85.43      2.72     47.15      Open
 9-8                120.79      3.84     89.53      Open
 10-9              -112.36      3.58     78.31      Open
 10-500            -112.47      3.58     78.45      Open
 8-11               -35.53      1.13      9.29      Open
 11-12              -35.64      1.13      9.34      Open
 12-13              -35.82      1.14      9.43      Open
 5-13                 8.79      0.28      0.70      Open
 14-13              -44.72      1.42     14.22      Open
 15-14              -45.03      1.43     14.40      Open
 16-15              -17.51      0.56      2.50      Open
 17-16              -17.79      0.57      2.58      Open
 17-200             -18.05      0.57      2.65      Open
 15-18              -27.67      0.88      5.84      Open
 18-19               -7.90      0.25      0.57      Open
 19-20               -8.21      0.26      0.62      Open
 22-20               -8.56      0.27      0.67      Open
 18-21              -19.90      0.63      3.17      Open
 21-22              -19.90      0.63      3.17      Open
 22-23              -28.68      0.91      6.25      Open
 23-24               -8.02      0.26      0.59      Open
 24-25               -8.28      0.26      0.63      Open
 26-25               -8.52      0.27      0.66      Open
 27-26               20.79      0.66      3.44      Open
 23-27              -20.79      0.66      3.44      Open
 26-RD1             -29.42      0.94      6.55      Open
 RD1-100            -29.42      1.67     31.72      Open
```

```
 ******************************************************************************
 *                              E P A N E T                                   *
 *                      Hydraulic and Water Quality                           *
 *                      Analysis for Pipe Networks                            *
 *                            Version 2.2                                     *
 ******************************************************************************
Node Results (MD + FF NODE 11):
 ------------------------------------------------------------------------------
 Node                Demand      Head  Pressure   Quality
 ID                     LPS         m         m
 ------------------------------------------------------------------------------
 1                     0.20    124.14     38.99      0.00
 2(HYD)                0.28    123.39     38.05      0.00
 3(HYD)                0.31    122.85     37.35      0.00
 4(HYD)                0.26    121.83     36.09      0.00
 5                     0.11    121.68     35.87      0.00
 6(HYD)                0.18    123.14     36.90      0.00
 7                     0.07    124.07     37.48      0.00
 8                     0.18    120.31     34.38      0.00
 9(HYD)                0.15    121.50     35.61      0.00
 10                    0.11    124.02     37.68      0.00
 11(HYD)             233.11    114.79     28.68      0.00
 12(HYD)               0.18    119.31     33.24      0.00
 13                    0.11    121.51     35.61      0.00
 14(HYD)               0.31    122.49     36.74      0.00
 15                    0.15    123.83     38.30      0.00
 16(HYD)               0.28    123.90     38.44      0.00
 17(HYD)               0.26    124.40     39.30      0.00
 18                    0.13    124.14     38.68      0.00
 19(HYD)               0.31    124.18     38.57      0.00
 20(HYD)               0.35    124.25     38.38      0.00
 21(HYD)               0.00    124.25     38.61      0.00
 22                    0.22    124.31     38.61      0.00
 23                    0.13    124.54     38.92      0.00
 24(HYD)               0.26    124.58     38.87      0.00
 25(HYD)               0.24    124.66     38.83      0.00
 26                    0.11    124.71     39.16      0.00
 27(HYD)               0.00    124.64     39.15      0.00
 RD-1                  0.00    124.86     39.55      0.00
 28                  -33.57    125.50      0.00      0.00 Reservoir
 29                  -27.66    124.50      0.00      0.00 Reservoir
 30                  -43.36    124.40      0.00      0.00 Reservoir
 31                  -58.83    124.40      0.00      0.00 Reservoir
 32                  -74.57    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 (MD + FF NODE 11):
 ------------------------------------------------------------------
 Link                 Flow  VelocityUnit Headloss    Status
 ID                    LPS       m/s      m/km
 ------------------------------------------------------------------
 1-300               43.36      1.38     13.43      Open
 1-2                 43.16      1.37     13.31      Open
 2-3                 42.88      1.36     13.15      Open
 3-4                 42.57      1.36     12.98      Open
 4-5                 42.31      1.35     12.83      Open
 6-5                -58.58      1.86     23.44      Open
 7-6                -58.76      1.87     23.57      Open
 7-400              -58.83      1.87     23.63      Open
 5-8                 75.21      2.39     37.23      Open
 9-8                -74.31      2.37     36.41      Open
 10-9               -74.46      2.37     36.55      Open
 10-500             -74.57      2.37     36.65      Open
 8-11               149.35      4.75    132.64      Open
 11-12              -83.76      2.67     45.45      Open
 12-13              -83.94      2.67     45.63      Open
 5-13               -25.57      0.81      5.05      Open
 14-13              -58.48      1.86     23.37      Open
 15-14              -58.79      1.87     23.60      Open
 16-15              -27.12      0.86      5.63      Open
 17-16              -27.40      0.87      5.74      Open
 17-200             -27.66      0.88      5.84      Open
 15-18              -31.82      1.01      7.57      Open
 18-19               -9.12      0.29      0.75      Open
 19-20               -9.43      0.30      0.80      Open
 22-20               -9.78      0.31      0.85      Open
 18-21              -22.83      0.73      4.09      Open
 21-22              -22.83      0.73      4.09      Open
 22-23              -32.83      1.04      8.02      Open
 23-24               -9.20      0.29      0.76      Open
 24-25               -9.46      0.30      0.80      Open
 26-25               -9.70      0.31      0.84      Open
 27-26               23.76      0.76      4.41      Open
 23-27              -23.76      0.76      4.41      Open
 26-RD1             -33.57      1.07      8.36      Open
 RD1-100            -33.57      1.90     40.48      Open
```

```
 ******************************************************************
 *                            E P A N E T                         *
 *                     Hydraulic and Water Quality                *
 *                     Analysis for Pipe Networks                 *
 *                          Version 2.2                           *
 ******************************************************************
Node Results (MD + FF NODE 12):
 ----------------------------------------------------------------
 Node                Demand      Head  Pressure   Quality
 ID                     LPS         m         m
 ----------------------------------------------------------------
 1                     0.20    124.14     38.99      0.00
 2(HYD)                0.28    123.38     38.04      0.00
 3(HYD)                0.31    122.83     37.33      0.00
 4(HYD)                0.26    121.79     36.05      0.00
 5                     0.11    121.64     35.83      0.00
 6(HYD)                0.18    123.11     36.87      0.00
 7                     0.07    124.06     37.47      0.00
 8                     0.18    121.44     35.51      0.00
 9(HYD)                0.15    122.31     36.42      0.00
 10                    0.11    124.15     37.81      0.00
 11(HYD)               0.11    119.33     33.22      0.00
 12(HYD)             233.18    114.31     28.24      0.00
 13                    0.11    120.31     34.41      0.00
 14(HYD)               0.31    121.65     35.90      0.00
 15                    0.15    123.48     37.95      0.00
 16(HYD)               0.28    123.59     38.13      0.00
 17(HYD)               0.26    124.35     39.25      0.00
 18                    0.13    123.86     38.40      0.00
 19(HYD)               0.31    123.90     38.29      0.00
 20(HYD)               0.35    123.99     38.12      0.00
 21(HYD)               0.00    123.99     38.35      0.00
 22                    0.22    124.07     38.37      0.00
 23                    0.13    124.34     38.72      0.00
 24(HYD)               0.26    124.39     38.68      0.00
 25(HYD)               0.24    124.48     38.65      0.00
 26                    0.11    124.54     38.99      0.00
 27(HYD)               0.00    124.46     38.97      0.00
 RD-1                  0.00    124.73     39.42      0.00
 28                  -37.16    125.50      0.00      0.00 Reservoir
 29                  -34.71    124.50      0.00      0.00 Reservoir
 30                  -43.78    124.40      0.00      0.00 Reservoir
 31                  -59.41    124.40      0.00      0.00 Reservoir
 32                  -62.94    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 (MD + FF NODE 12):
 ----------------------------------------------------------------
 Link                 Flow  VelocityUnit Headloss    Status
 ID                    LPS       m/s      m/km
 ----------------------------------------------------------------
 1-300               43.78      1.39     13.67      Open
 1-2                 43.58      1.39     13.55      Open
 2-3                 43.30      1.38     13.39      Open
 3-4                 42.99      1.37     13.22      Open
 4-5                 42.73      1.36     13.07      Open
 6-5                -59.16      1.88     23.87      Open
 7-6                -59.34      1.89     24.00      Open
 7-400              -59.41      1.89     24.06      Open
 5-8                 26.26      0.84      5.30      Open
 9-8                -62.68      2.00     26.57      Open
 10-9               -62.83      2.00     26.69      Open
 10-500             -62.94      2.00     26.77      Open
 8-11                88.76      2.83     50.60      Open
 11-12               88.65      2.82     50.49      Open
 12-13             -144.53      4.60    124.82      Open
 5-13               -75.52      2.40     37.52      Open
 14-13              -69.12      2.20     31.84      Open
 15-14              -69.43      2.21     32.10      Open
 16-15              -34.17      1.09      8.64      Open
 17-16              -34.45      1.10      8.77      Open
 17-200             -34.71      1.10      8.89      Open
 15-18              -35.41      1.13      9.23      Open
 18-19              -10.18      0.32      0.92      Open
 19-20              -10.49      0.33      0.97      Open
 22-20              -10.84      0.34      1.03      Open
 18-21              -25.36      0.81      4.97      Open
 21-22              -25.36      0.81      4.97      Open
 22-23              -36.42      1.16      9.72      Open
 23-24              -10.22      0.33      0.92      Open
 24-25              -10.48      0.33      0.97      Open
 26-25              -10.72      0.34      1.01      Open
 27-26               26.32      0.84      5.33      Open
 23-27              -26.32      0.84      5.33      Open
 26-RD1             -37.16      1.18     10.09      Open
 RD1-100            -37.16      2.10     48.87      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD + FF NODE 14):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    124.24     39.09      0.00
  2(HYD)                0.28    123.79     38.45      0.00
  3(HYD)                0.31    123.46     37.96      0.00
  4(HYD)                0.26    122.84     37.10      0.00
  5                     0.11    122.75     36.94      0.00
  6(HYD)                0.18    123.63     37.39      0.00
  7                     0.07    124.20     37.61      0.00
  8                     0.18    122.79     36.86      0.00
  9(HYD)                0.15    123.27     37.38      0.00
  10                    0.11    124.30     37.96      0.00
  11(HYD)               0.11    122.40     36.29      0.00
  12(HYD)               0.18    121.48     35.41      0.00
  13                    0.11    121.04     35.14      0.00
  14(HYD)             233.31    117.21     31.46      0.00
  15                    0.15    121.59     36.06      0.00
  16(HYD)               0.28    121.89     36.43      0.00
  17(HYD)               0.26    124.09     38.99      0.00
  18                    0.13    122.33     36.87      0.00
  19(HYD)               0.31    122.42     36.81      0.00
  20(HYD)               0.35    122.59     36.72      0.00
  21(HYD)               0.00    122.59     36.95      0.00
  22                    0.22    122.74     37.04      0.00
  23                    0.13    123.28     37.66      0.00
  24(HYD)               0.26    123.37     37.66      0.00
  25(HYD)               0.24    123.55     37.72      0.00
  26                    0.11    123.67     38.12      0.00
  27(HYD)               0.00    123.50     38.01      0.00
  RD-1                  0.00    124.02     38.71      0.00
  28                  -52.83    125.50      0.00      0.00 Reservoir
  29                  -60.98    124.50      0.00      0.00 Reservoir
  30                  -33.21    124.40      0.00      0.00 Reservoir
  31                  -44.94    124.40      0.00      0.00 Reservoir
  32                  -46.04    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 (MD + FF NODE 14):
 ------------------------------------------------------------------
 Link                 Flow  VelocityUnit Headloss    Status
 ID                    LPS       m/s      m/km
 ------------------------------------------------------------------
 1-300               33.21      1.06      8.19      Open
 1-2                 33.01      1.05      8.10      Open
 2-3                 32.73      1.04      7.98      Open
 3-4                 32.42      1.03      7.84      Open
 4-5                 32.16      1.02      7.72      Open
 6-5                -44.69      1.42     14.20      Open
 7-6                -44.87      1.43     14.30      Open
 7-400              -44.94      1.43     14.34      Open
 5-8                -10.08      0.32      0.90      Open
 9-8                -45.78      1.46     14.85      Open
 10-9               -45.93      1.46     14.94      Open
 10-500             -46.04      1.47     15.00      Open
 8-11                35.51      1.13      9.28      Open
 11-12               35.40      1.13      9.22      Open
 12-13               35.22      1.12      9.14      Open
 5-13               -86.82      2.76     48.58      Open
 14-13              121.94      3.88     91.12      Open
 15-14             -111.37      3.55     77.03      Open
 16-15              -60.44      1.92     24.83      Open
 17-16              -60.72      1.93     25.05      Open
 17-200             -60.98      1.94     25.25      Open
 15-18              -51.08      1.63     18.19      Open
 18-19              -14.78      0.47      1.83      Open
 19-20              -15.09      0.48      1.90      Open
 22-20              -15.44      0.49      1.98      Open
 18-21              -36.43      1.16      9.73      Open
 21-22              -36.43      1.16      9.73      Open
 22-23              -52.09      1.66     18.86      Open
 23-24              -14.69      0.47      1.81      Open
 24-25              -14.95      0.48      1.87      Open
 26-25              -15.19      0.48      1.92      Open
 27-26               37.53      1.19     10.28      Open
 23-27              -37.53      1.19     10.28      Open
 26-RD1             -52.83      1.68     19.36      Open
 RD1-100            -52.83      2.99     93.78      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD + FF NODE 16):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    124.34     39.19      0.00
  2(HYD)                0.28    124.16     38.82      0.00
  3(HYD)                0.31    124.04     38.54      0.00
  4(HYD)                0.26    123.81     38.07      0.00
  5                     0.11    123.78     37.97      0.00
  6(HYD)                0.18    124.11     37.87      0.00
  7                     0.07    124.32     37.73      0.00
  8                     0.18    123.79     37.86      0.00
  9(HYD)                0.15    123.99     38.10      0.00
  10                    0.11    124.42     38.08      0.00
  11(HYD)               0.11    123.64     37.53      0.00
  12(HYD)               0.18    123.28     37.21      0.00
  13                    0.11    123.11     37.21      0.00
  14(HYD)               0.31    121.63     35.88      0.00
  15                    0.15    119.65     34.12      0.00
  16(HYD)             233.28    118.29     32.83      0.00
  17(HYD)               0.26    123.52     38.42      0.00
  18                    0.13    120.76     35.30      0.00
  19(HYD)               0.31    120.89     35.28      0.00
  20(HYD)               0.35    121.15     35.28      0.00
  21(HYD)               0.00    121.16     35.52      0.00
  22                    0.22    121.38     35.68      0.00
  23                    0.13    122.19     36.57      0.00
  24(HYD)               0.26    122.32     36.61      0.00
  25(HYD)               0.24    122.59     36.76      0.00
  26                    0.11    122.77     37.22      0.00
  27(HYD)               0.00    122.51     37.02      0.00
  RD-1                  0.00    123.29     37.98      0.00
  28                  -65.55    125.50      0.00      0.00 Reservoir
  29                  -97.26    124.50      0.00      0.00 Reservoir
  30                  -19.88    124.40      0.00      0.00 Reservoir
  31                  -26.68    124.40      0.00      0.00 Reservoir
  32                  -28.63    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 (MD + FF NODE 16):
  ----------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ----------------------------------------------------------------
  1-300               19.88      0.63      3.17      Open
  1-2                 19.68      0.63      3.11      Open
  2-3                 19.40      0.62      3.03      Open
  3-4                 19.09      0.61      2.94      Open
  4-5                 18.83      0.60      2.86      Open
  6-5                -26.43      0.84      5.37      Open
  7-6                -26.61      0.85      5.44      Open
  7-400              -26.68      0.85      5.46      Open
  5-8                 -6.82      0.22      0.44      Open
  9-8                -28.37      0.90      6.12      Open
  10-9               -28.52      0.91      6.18      Open
  10-500             -28.63      0.91      6.22      Open
  8-11                21.37      0.68      3.62      Open
  11-12               21.26      0.68      3.59      Open
  12-13               21.08      0.67      3.53      Open
  5-13               -51.98      1.65     18.78      Open
  14-13               72.94      2.32     35.18      Open
  15-14               72.63      2.31     34.90      Open
  16-15              136.28      4.34    111.96      Open
  17-16              -97.00      3.09     59.64      Open
  17-200             -97.26      3.10     59.93      Open
  15-18              -63.80      2.03     27.45      Open
  18-19              -18.52      0.59      2.78      Open
  19-20              -18.83      0.60      2.86      Open
  22-20              -19.18      0.61      2.96      Open
  18-21              -45.42      1.45     14.63      Open
  21-22              -45.42      1.45     14.63      Open
  22-23              -64.81      2.06     28.26      Open
  23-24              -18.32      0.58      2.72      Open
  24-25              -18.58      0.59      2.79      Open
  26-25              -18.82      0.60      2.86      Open
  27-26               46.62      1.48     15.36      Open
  23-27              -46.62      1.48     15.36      Open
  26-RD1             -65.55      2.09     28.86      Open
  RD1-100            -65.55      3.71    139.83      Open
```

```
 ******************************************************************************
 *                              E P A N E T                                   *
 *                      Hydraulic and Water Quality                           *
 *                      Analysis for Pipe Networks                            *
 *                            Version 2.2                                     *
 ******************************************************************************
Node Results (MD + FF NODE 17):
 ------------------------------------------------------------------------------
 Node                Demand      Head  Pressure   Quality
 ID                     LPS         m         m
 ------------------------------------------------------------------------------
 1                      0.20    124.39     39.24      0.00
 2(HYD)                 0.28    124.37     39.03      0.00
 3(HYD)                 0.31    124.36     38.86      0.00
 4(HYD)                 0.26    124.34     38.60      0.00
 5                      0.11    124.33     38.52      0.00
 6(HYD)                 0.18    124.37     38.13      0.00
 7                      0.07    124.39     37.80      0.00
 8                      0.18    124.34     38.41      0.00
 9(HYD)                 0.15    124.39     38.50      0.00
 10                     0.11    124.48     38.14      0.00
 11(HYD)                0.11    124.32     38.21      0.00
 12(HYD)                0.18    124.27     38.20      0.00
 13                     0.11    124.24     38.34      0.00
 14(HYD)                0.31    124.03     38.28      0.00
 15                     0.15    123.76     38.23      0.00
 16(HYD)                0.28    123.49     38.03      0.00
 17(HYD)              233.26    121.54     36.44      0.00
 18                     0.13    124.08     38.62      0.00
 19(HYD)                0.31    124.12     38.51      0.00
 20(HYD)                0.35    124.20     38.33      0.00
 21(HYD)                0.00    124.20     38.56      0.00
 22                     0.22    124.26     38.56      0.00
 23                     0.13    124.50     38.88      0.00
 24(HYD)                0.26    124.54     38.83      0.00
 25(HYD)                0.24    124.62     38.79      0.00
 26                     0.11    124.68     39.13      0.00
 27(HYD)                0.00    124.60     39.11      0.00
 RD-1                   0.00    124.83     39.52      0.00
 28                   -34.31    125.50      0.00      0.00 Reservoir
 29                  -176.30    124.50      0.00      0.00 Reservoir
 30                    -6.35    124.40      0.00      0.00 Reservoir
 31                    -8.16    124.40      0.00      0.00 Reservoir
 32                   -12.88    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 (MD + FF NODE 17):
  ----------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ----------------------------------------------------------------
  1-300                6.35      0.20      0.38      Open
  1-2                  6.15      0.20      0.36      Open
  2-3                  5.87      0.19      0.33      Open
  3-4                  5.56      0.18      0.30      Open
  4-5                  5.30      0.17      0.27      Open
  6-5                 -7.91      0.25      0.57      Open
  7-6                 -8.09      0.26      0.60      Open
  7-400               -8.16      0.26      0.61      Open
  5-8                 -4.76      0.15      0.22      Open
  9-8                -12.62      0.40      1.37      Open
  10-9               -12.77      0.41      1.40      Open
  10-500             -12.88      0.41      1.42      Open
  8-11                 7.68      0.24      0.54      Open
  11-12                7.57      0.24      0.53      Open
  12-13                7.39      0.24      0.51      Open
  5-13               -17.86      0.57      2.60      Open
  14-13               25.14      0.80      4.89      Open
  15-14               24.83      0.79      4.78      Open
  16-15               57.24      1.82     22.45      Open
  17-16               56.96      1.81     22.25      Open
  17-200            -176.30      5.61    180.36      Open
  15-18              -32.56      1.04      7.90      Open
  18-19               -9.34      0.30      0.78      Open
  19-20               -9.65      0.31      0.83      Open
  22-20              -10.00      0.32      0.89      Open
  18-21              -23.35      0.74      4.27      Open
  21-22              -23.35      0.74      4.27      Open
  22-23              -33.57      1.07      8.36      Open
  23-24               -9.41      0.30      0.79      Open
  24-25               -9.67      0.31      0.83      Open
  26-25               -9.91      0.32      0.87      Open
  27-26               24.29      0.77      4.59      Open
  23-27              -24.29      0.77      4.59      Open
  26-RD1             -34.31      1.09      8.70      Open
  RD1-100            -34.31      1.94     42.16      Open
```

```
 ******************************************************************************
 *                              E P A N E T                                   *
 *                     Hydraulic and Water Quality                            *
 *                     Analysis for Pipe Networks                             *
 *                           Version 2.2                                      *
 ******************************************************************************
Node Results (MD + FF NODE 19):
 ------------------------------------------------------------------------------
 Node                Demand      Head  Pressure   Quality
 ID                     LPS         m         m
 ------------------------------------------------------------------------------
 1                     0.20    124.35     39.20      0.00
 2(HYD)                0.28    124.21     38.87      0.00
 3(HYD)                0.31    124.12     38.62      0.00
 4(HYD)                0.26    123.94     38.20      0.00
 5                     0.11    123.91     38.10      0.00
 6(HYD)                0.18    124.17     37.93      0.00
 7                     0.07    124.34     37.75      0.00
 8                     0.18    123.92     37.99      0.00
 9(HYD)                0.15    124.09     38.20      0.00
 10                    0.11    124.43     38.09      0.00
 11(HYD)               0.11    123.81     37.70      0.00
 12(HYD)               0.18    123.52     37.45      0.00
 13                    0.11    123.39     37.49      0.00
 14(HYD)               0.31    122.22     36.47      0.00
 15                    0.15    120.65     35.12      0.00
 16(HYD)               0.28    121.05     35.59      0.00
 17(HYD)               0.26    123.95     38.85      0.00
 18                    0.13    116.24     30.78      0.00
 19(HYD)             233.31    109.52     23.91      0.00
 20(HYD)               0.35    113.24     27.37      0.00
 21(HYD)               0.00    116.33     30.69      0.00
 22                    0.22    116.38     30.68      0.00
 23                    0.13    118.18     32.56      0.00
 24(HYD)               0.26    118.47     32.76      0.00
 25(HYD)               0.24    119.07     33.24      0.00
 26                    0.11    119.46     33.91      0.00
 27(HYD)               0.00    118.89     33.40      0.00
 RD-1                  0.00    120.62     35.31      0.00
 28                 -100.56    125.50      0.00      0.00 Reservoir
 29                  -70.93    124.50      0.00      0.00 Reservoir
 30                  -17.49    124.40      0.00      0.00 Reservoir
 31                  -23.41    124.40      0.00      0.00 Reservoir
 32                  -25.61    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 (MD + FF NODE 19):
  ----------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ----------------------------------------------------------------
  1-300               17.49      0.56      2.50      Open
  1-2                 17.29      0.55      2.45      Open
  2-3                 17.01      0.54      2.37      Open
  3-4                 16.70      0.53      2.29      Open
  4-5                 16.44      0.52      2.23      Open
  6-5                -23.16      0.74      4.20      Open
  7-6                -23.34      0.74      4.26      Open
  7-400              -23.41      0.75      4.29      Open
  5-8                 -6.30      0.20      0.38      Open
  9-8                -25.35      0.81      4.97      Open
  10-9               -25.50      0.81      5.02      Open
  10-500             -25.61      0.82      5.06      Open
  8-11                18.87      0.60      2.87      Open
  11-12               18.76      0.60      2.84      Open
  12-13               18.58      0.59      2.79      Open
  5-13               -45.80      1.46     14.86      Open
  14-13               64.26      2.05     27.82      Open
  15-14               63.95      2.04     27.57      Open
  16-15              -70.39      2.24     32.93      Open
  17-16              -70.67      2.25     33.17      Open
  17-200             -70.93      2.26     33.40      Open
  15-18              134.19      4.27    108.79      Open
  18-19              154.33      4.91    140.94      Open
  19-20              -78.98      2.51     40.77      Open
  22-20              -79.33      2.53     41.10      Open
  18-21              -20.27      0.65      3.28      Open
  21-22              -20.27      0.65      3.28      Open
  22-23              -99.82      3.18     62.89      Open
  23-24              -28.30      0.90      6.09      Open
  24-25              -28.56      0.91      6.20      Open
  26-25              -28.80      0.92      6.29      Open
  27-26               71.65      2.28     34.04      Open
  23-27              -71.65      2.28     34.04      Open
  26-RD1            -100.56      3.20     63.76      Open
  RD1-100           -100.56      5.69    308.88      Open
```

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

Node Results (MD + FF NODE 20):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.20	124.35	39.20	0.00	
2(HYD)	0.28	124.22	38.88	0.00	
3(HYD)	0.31	124.12	38.62	0.00	
4(HYD)	0.26	123.95	38.21	0.00	
5	0.11	123.92	38.11	0.00	
6(HYD)	0.18	124.18	37.94	0.00	
7	0.07	124.34	37.75	0.00	
8	0.18	123.94	38.01	0.00	
9(HYD)	0.15	124.10	38.21	0.00	
10	0.11	124.44	38.10	0.00	
11(HYD)	0.11	123.82	37.71	0.00	
12(HYD)	0.18	123.54	37.47	0.00	
13	0.11	123.41	37.51	0.00	
14(HYD)	0.31	122.27	36.52	0.00	
15	0.15	120.74	35.21	0.00	
16(HYD)	0.28	121.13	35.67	0.00	
17(HYD)	0.26	123.96	38.86	0.00	
18	0.13	116.43	30.97	0.00	
19(HYD)	0.31	113.45	27.84	0.00	
20(HYD)	233.35	107.78	21.91	0.00	
21(HYD)	0.00	116.21	30.57	0.00	
22	0.22	116.09	30.39	0.00	
23	0.13	117.95	32.33	0.00	
24(HYD)	0.26	118.25	32.54	0.00	
25(HYD)	0.24	118.87	33.04	0.00	
26	0.11	119.27	33.72	0.00	
27(HYD)	0.00	118.69	33.20	0.00	
RD-1	0.00	120.47	35.16	0.00	
28	-102.26	125.50	0.00	0.00	Reservoir
29	-70.04	124.50	0.00	0.00	Reservoir
30	-17.27	124.40	0.00	0.00	Reservoir
31	-23.10	124.40	0.00	0.00	Reservoir
32	-25.32	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 (MD + FF NODE 20):
 ------------------------------------------------------------------------------
 Link                  Flow  VelocityUnit Headloss    Status
 ID                     LPS       m/s      m/km
 ------------------------------------------------------------------------------
 1-300                17.27      0.55      2.44      Open
 1-2                  17.07      0.54      2.39      Open
 2-3                  16.79      0.53      2.32      Open
 3-4                  16.48      0.52      2.24      Open
 4-5                  16.22      0.52      2.17      Open
 6-5                 -22.85      0.73      4.10      Open
 7-6                 -23.03      0.73      4.16      Open
 7-400               -23.10      0.74      4.18      Open
 5-8                  -6.25      0.20      0.37      Open
 9-8                 -25.06      0.80      4.86      Open
 10-9                -25.21      0.80      4.92      Open
 10-500              -25.32      0.81      4.96      Open
 8-11                 18.63      0.59      2.81      Open
 11-12                18.52      0.59      2.78      Open
 12-13                18.34      0.58      2.73      Open
 5-13                -45.21      1.44     14.51      Open
 14-13                63.44      2.02     27.17      Open
 15-14                63.13      2.01     26.92      Open
 16-15               -69.50      2.21     32.17      Open
 17-16               -69.78      2.22     32.41      Open
 17-200              -70.04      2.23     32.63      Open
 15-18               132.49      4.22    106.25      Open
 18-19                99.47      3.17     62.49      Open
 19-20                99.16      3.16     62.13      Open
 22-20              -134.19      4.27    108.79      Open
 18-21                32.89      1.05      8.05      Open
 21-22                32.89      1.05      8.05      Open
 22-23              -101.52      3.23     64.90      Open
 23-24               -28.78      0.92      6.29      Open
 24-25               -29.04      0.92      6.39      Open
 26-25               -29.28      0.93      6.49      Open
 27-26                72.87      2.32     35.11      Open
 23-27               -72.87      2.32     35.11      Open
 26-RD1              -102.26      3.26     65.77      Open
 RD1-100             -102.26      5.79    318.63      Open
```

```
 ******************************************************************
 *                            E P A N E T                         *
 *                     Hydraulic and Water Quality                *
 *                     Analysis for Pipe Networks                 *
 *                          Version 2.2                           *
 ******************************************************************
Node Results (MD + FF NODE 21):
 ----------------------------------------------------------------
 Node                Demand      Head  Pressure   Quality
 ID                     LPS         m         m
 ----------------------------------------------------------------
 1                     0.20    124.35     39.20      0.00
 2(HYD)                0.28    124.22     38.88      0.00
 3(HYD)                0.31    124.13     38.63      0.00
 4(HYD)                0.26    123.96     38.22      0.00
 5                     0.11    123.93     38.12      0.00
 6(HYD)                0.18    124.18     37.94      0.00
 7                     0.07    124.34     37.75      0.00
 8                     0.18    123.95     38.02      0.00
 9(HYD)                0.15    124.10     38.21      0.00
 10                    0.11    124.44     38.10      0.00
 11(HYD)               0.11    123.83     37.72      0.00
 12(HYD)               0.18    123.56     37.49      0.00
 13                    0.11    123.43     37.53      0.00
 14(HYD)               0.31    122.31     36.56      0.00
 15                    0.15    120.80     35.27      0.00
 16(HYD)               0.28    121.18     35.72      0.00
 17(HYD)               0.26    123.97     38.87      0.00
 18                    0.13    116.58     31.12      0.00
 19(HYD)               0.31    116.41     30.80      0.00
 20(HYD)               0.35    116.12     30.25      0.00
 21(HYD)             233.00    114.49     28.85      0.00
 22                    0.22    115.87     30.17      0.00
 23                    0.13    117.77     32.15      0.00
 24(HYD)               0.26    118.08     32.37      0.00
 25(HYD)               0.24    118.71     32.88      0.00
 26                    0.11    119.12     33.57      0.00
 27(HYD)               0.00    118.53     33.04      0.00
 RD-1                  0.00    120.35     35.04      0.00
 28                 -103.54    125.50      0.00      0.00 Reservoir
 29                  -69.38    124.50      0.00      0.00 Reservoir
 30                  -17.10    124.40      0.00      0.00 Reservoir
 31                  -22.87    124.40      0.00      0.00 Reservoir
 32                  -25.11    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 ( MD + FF NODE 21):
  ------------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ------------------------------------------------------------------
  1-300               17.10      0.54      2.40      Open
  1-2                 16.90      0.54      2.34      Open
  2-3                 16.62      0.53      2.27      Open
  3-4                 16.31      0.52      2.19      Open
  4-5                 16.05      0.51      2.13      Open
  6-5                -22.62      0.72      4.02      Open
  7-6                -22.80      0.73      4.08      Open
  7-400              -22.87      0.73      4.11      Open
  5-8                 -6.22      0.20      0.37      Open
  9-8                -24.85      0.79      4.79      Open
  10-9               -25.00      0.80      4.84      Open
  10-500             -25.11      0.80      4.88      Open
  8-11                18.45      0.59      2.76      Open
  11-12               18.34      0.58      2.73      Open
  12-13               18.16      0.58      2.68      Open
  5-13               -44.78      1.43     14.25      Open
  14-13               62.83      2.00     26.68      Open
  15-14               62.52      1.99     26.44      Open
  16-15              -68.84      2.19     31.60      Open
  17-16              -69.12      2.20     31.84      Open
  17-200             -69.38      2.21     32.06      Open
  15-18              131.21      4.18    104.36      Open
  18-19               20.56      0.65      3.37      Open
  19-20               20.25      0.64      3.28      Open
  22-20               19.90      0.63      3.17      Open
  18-21              110.52      3.52     75.94      Open
  21-22             -122.48      3.90     91.87      Open
  22-23             -102.80      3.27     66.42      Open
  23-24              -29.15      0.93      6.43      Open
  24-25              -29.41      0.94      6.54      Open
  26-25              -29.65      0.94      6.64      Open
  27-26               73.78      2.35     35.93      Open
  23-27              -73.78      2.35     35.93      Open
  26-RD1            -103.54      3.30     67.30      Open
  RD1-100           -103.54      5.86    326.04      Open
```

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

Node Results (MD + FF NODE 24):

Node ID	Demand LPS	Head m	Pressure m	Quality	
1	0.20	124.37	39.22	0.00	
2(HYD)	0.28	124.28	38.94	0.00	
3(HYD)	0.31	124.22	38.72	0.00	
4(HYD)	0.26	124.10	38.36	0.00	
5	0.11	124.09	38.28	0.00	
6(HYD)	0.18	124.25	38.01	0.00	
7	0.07	124.36	37.77	0.00	
8	0.18	124.10	38.17	0.00	
9(HYD)	0.15	124.21	38.32	0.00	
10	0.11	124.45	38.11	0.00	
11(HYD)	0.11	124.02	37.91	0.00	
12(HYD)	0.18	123.83	37.76	0.00	
13	0.11	123.75	37.85	0.00	
14(HYD)	0.31	122.98	37.23	0.00	
15	0.15	121.96	36.43	0.00	
16(HYD)	0.28	122.22	36.76	0.00	
17(HYD)	0.26	124.14	39.04	0.00	
18	0.13	119.08	33.62	0.00	
19(HYD)	0.31	118.72	33.11	0.00	
20(HYD)	0.35	118.06	32.19	0.00	
21(HYD)	0.00	118.06	32.42	0.00	
22	0.22	117.51	31.81	0.00	
23	0.13	115.51	29.89	0.00	
24(HYD)	233.26	109.02	23.31	0.00	
25(HYD)	0.24	113.29	27.46	0.00	
26	0.11	116.05	30.50	0.00	
27(HYD)	0.00	115.81	30.32	0.00	
RD-1	0.00	117.87	32.56	0.00	
28	-128.04	125.50	0.00	0.00	Reservoir
29	-56.68	124.50	0.00	0.00	Reservoir
30	-13.82	124.40	0.00	0.00	Reservoir
31	-18.38	124.40	0.00	0.00	Reservoir
32	-21.08	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 (MD + FF NODE 24):

Link ID	Flow LPS	Velocity m/s	Unit Headloss m/km	Status
1-300	13.82	0.44	1.62	Open
1-2	13.62	0.43	1.57	Open
2-3	13.34	0.42	1.51	Open
3-4	13.03	0.41	1.45	Open
4-5	12.77	0.41	1.40	Open
6-5	-18.13	0.58	2.67	Open
7-6	-18.31	0.58	2.72	Open
7-400	-18.38	0.59	2.74	Open
5-8	-5.58	0.18	0.30	Open
9-8	-20.82	0.66	3.45	Open
10-9	-20.97	0.67	3.50	Open
10-500	-21.08	0.67	3.53	Open
8-11	15.06	0.48	1.89	Open
11-12	14.95	0.48	1.87	Open
12-13	14.77	0.47	1.83	Open
5-13	-36.37	1.16	9.70	Open
14-13	51.03	1.62	18.15	Open
15-14	50.72	1.61	17.95	Open
16-15	-56.14	1.79	21.66	Open
17-16	-56.42	1.80	21.86	Open
17-200	-56.68	1.80	22.05	Open
15-18	106.71	3.40	71.17	Open
18-19	31.56	1.00	7.45	Open
19-20	31.25	0.99	7.32	Open
22-20	30.90	0.98	7.17	Open
18-21	75.02	2.39	37.06	Open
21-22	75.02	2.39	37.06	Open
22-23	105.70	3.36	69.92	Open
23-24	150.66	4.80	134.80	Open
24-25	-82.60	2.63	44.29	Open
26-25	-82.84	2.64	44.53	Open
27-26	45.09	1.44	14.43	Open
23-27	-45.09	1.44	14.43	Open
26-RD1	-128.04	4.08	99.74	Open
RD1-100	-128.04	7.25	483.17	Open

```
 ******************************************************************************
 *                              E P A N E T                                   *
 *                      Hydraulic and Water Quality                           *
 *                      Analysis for Pipe Networks                            *
 *                            Version 2.2                                     *
 ******************************************************************************
Node Results (MD + FF NODE25):
 ------------------------------------------------------------------------------
 Node                Demand      Head  Pressure   Quality
 ID                     LPS         m         m
 ------------------------------------------------------------------------------
 1                     0.20    124.37     39.22      0.00
 2(HYD)                0.28    124.29     38.95      0.00
 3(HYD)                0.31    124.23     38.73      0.00
 4(HYD)                0.26    124.12     38.38      0.00
 5                     0.11    124.10     38.29      0.00
 6(HYD)                0.18    124.26     38.02      0.00
 7                     0.07    124.36     37.77      0.00
 8                     0.18    124.11     38.18      0.00
 9(HYD)                0.15    124.22     38.33      0.00
 10                    0.11    124.46     38.12      0.00
 11(HYD)               0.11    124.04     37.93      0.00
 12(HYD)               0.18    123.86     37.79      0.00
 13                    0.11    123.77     37.87      0.00
 14(HYD)               0.31    123.03     37.28      0.00
 15                    0.15    122.05     36.52      0.00
 16(HYD)               0.28    122.30     36.84      0.00
 17(HYD)               0.26    124.15     39.05      0.00
 18                    0.13    119.27     33.81      0.00
 19(HYD)               0.31    118.92     33.31      0.00
 20(HYD)               0.35    118.28     32.41      0.00
 21(HYD)               0.00    118.29     32.65      0.00
 22                    0.22    117.75     32.05      0.00
 23                    0.13    115.82     30.20      0.00
 24(HYD)               0.26    113.28     27.57      0.00
 25(HYD)             233.24    108.22     22.39      0.00
 26                    0.11    115.77     30.22      0.00
 27(HYD)               0.00    115.79     30.30      0.00
 RD-1                  0.00    117.64     32.33      0.00
 28                 -130.08    125.50      0.00      0.00 Reservoir
 29                  -55.62    124.50      0.00      0.00 Reservoir
 30                  -13.54    124.40      0.00      0.00 Reservoir
 31                  -18.01    124.40      0.00      0.00 Reservoir
 32                  -20.75    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 (MD + FF NODE 25):
  ----------------------------------------------------------------------
  Link                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ----------------------------------------------------------------------
  1-300               13.54      0.43      1.56      Open
  1-2                 13.34      0.42      1.51      Open
  2-3                 13.06      0.42      1.46      Open
  3-4                 12.75      0.41      1.39      Open
  4-5                 12.49      0.40      1.34      Open
  6-5                -17.76      0.57      2.57      Open
  7-6                -17.94      0.57      2.62      Open
  7-400              -18.01      0.57      2.64      Open
  5-8                 -5.53      0.18      0.30      Open
  9-8                -20.49      0.65      3.35      Open
  10-9               -20.64      0.66      3.40      Open
  10-500             -20.75      0.66      3.43      Open
  8-11                14.78      0.47      1.83      Open
  11-12               14.67      0.47      1.80      Open
  12-13               14.49      0.46      1.76      Open
  5-13               -35.67      1.14      9.35      Open
  14-13               50.05      1.59     17.51      Open
  15-14               49.74      1.58     17.31      Open
  16-15              -55.08      1.75     20.91      Open
  17-16              -55.36      1.76     21.11      Open
  17-200             -55.62      1.77     21.29      Open
  15-18              104.67      3.33     68.67      Open
  18-19               30.96      0.99      7.19      Open
  19-20               30.65      0.98      7.06      Open
  22-20               30.30      0.96      6.91      Open
  18-21               73.58      2.34     35.75      Open
  21-22               73.58      2.34     35.75      Open
  22-23              103.66      3.30     67.45      Open
  23-24               90.80      2.89     52.77      Open
  24-25               90.54      2.88     52.49      Open
  26-25             -142.70      4.54    121.92      Open
  27-26              -12.73      0.41      1.39      Open
  23-27               12.73      0.41      1.39      Open
  26-RD1            -130.08      4.14    102.70      Open
  RD1-100           -130.08      7.36    497.51      Open
```

```
  ******************************************************************
  *                            E P A N E T                         *
  *                     Hydraulic and Water Quality                *
  *                     Analysis for Pipe Networks                 *
  *                          Version 2.2                           *
  ******************************************************************
Node Results (MD + FF NODE 27):
  ----------------------------------------------------------------
  Node                Demand      Head  Pressure   Quality
  ID                     LPS         m         m
  ----------------------------------------------------------------
  1                     0.20    124.37     39.22      0.00
  2(HYD)                0.28    124.28     38.94      0.00
  3(HYD)                0.31    124.22     38.72      0.00
  4(HYD)                0.26    124.11     38.37      0.00
  5                     0.11    124.10     38.29      0.00
  6(HYD)                0.18    124.26     38.02      0.00
  7                     0.07    124.36     37.77      0.00
  8                     0.18    124.11     38.18      0.00
  9(HYD)                0.15    124.22     38.33      0.00
  10                    0.11    124.45     38.11      0.00
  11(HYD)               0.11    124.03     37.92      0.00
  12(HYD)               0.18    123.85     37.78      0.00
  13                    0.11    123.77     37.87      0.00
  14(HYD)               0.31    123.03     37.28      0.00
  15                    0.15    122.03     36.50      0.00
  16(HYD)               0.28    122.29     36.83      0.00
  17(HYD)               0.26    124.15     39.05      0.00
  18                    0.13    119.24     33.78      0.00
  19(HYD)               0.31    118.89     33.28      0.00
  20(HYD)               0.35    118.24     32.37      0.00
  21(HYD)               0.00    118.25     32.61      0.00
  22                    0.22    117.71     32.01      0.00
  23                    0.13    115.77     30.15      0.00
  24(HYD)               0.26    115.78     30.07      0.00
  25(HYD)               0.24    115.80     29.97      0.00
  26                    0.11    115.82     30.27      0.00
  27(HYD)             233.00    114.24     28.75      0.00
  RD-1                  0.00    117.68     32.37      0.00
  28                 -129.75    125.50      0.00      0.00 Reservoir
  29                  -55.79    124.50      0.00      0.00 Reservoir
  30                  -13.59    124.40      0.00      0.00 Reservoir
  31                  -18.07    124.40      0.00      0.00 Reservoir
  32                  -20.80    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 (MD + FF NODE 27):
 ------------------------------------------------------------------
 Link                 Flow  VelocityUnit Headloss    Status
 ID                    LPS       m/s      m/km
 ------------------------------------------------------------------
 1-300               13.59      0.43      1.57      Open
 1-2                 13.39      0.43      1.52      Open
 2-3                 13.11      0.42      1.46      Open
 3-4                 12.80      0.41      1.40      Open
 4-5                 12.54      0.40      1.35      Open
 6-5                -17.82      0.57      2.59      Open
 7-6                -18.00      0.57      2.63      Open
 7-400              -18.07      0.58      2.65      Open
 5-8                 -5.54      0.18      0.30      Open
 9-8                -20.54      0.65      3.37      Open
 10-9               -20.69      0.66      3.41      Open
 10-500             -20.80      0.66      3.45      Open
 8-11                14.82      0.47      1.84      Open
 11-12               14.71      0.47      1.81      Open
 12-13               14.53      0.46      1.77      Open
 5-13               -35.79      1.14      9.41      Open
 14-13               50.21      1.60     17.62      Open
 15-14               49.90      1.59     17.42      Open
 16-15              -55.25      1.76     21.03      Open
 17-16              -55.53      1.77     21.23      Open
 17-200             -55.79      1.78     21.41      Open
 15-18              105.00      3.34     69.07      Open
 18-19               31.06      0.99      7.24      Open
 19-20               30.75      0.98      7.10      Open
 22-20               30.40      0.97      6.95      Open
 18-21               73.82      2.35     35.96      Open
 21-22               73.82      2.35     35.96      Open
 22-23              103.99      3.31     67.85      Open
 23-24               -4.36      0.14      0.19      Open
 24-25               -4.62      0.15      0.21      Open
 26-25               -4.86      0.15      0.23      Open
 27-26              124.77      3.97     95.08      Open
 23-27              108.23      3.44     73.05      Open
 26-RD1            -129.75      4.13    102.22      Open
 RD1-100           -129.75      7.34    495.17      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                      0.43    124.39     39.24      0.00
  2(HYD)                 0.63    124.37     39.03      0.00
  3(HYD)                 0.67    124.35     38.85      0.00
  4(HYD)                 0.58    124.33     38.59      0.00
  5                      0.24    124.33     38.52      0.00
  6(HYD)                 0.39    124.31     38.07      0.00
  7                      0.14    124.30     37.71      0.00
  8                      0.39    124.32     38.39      0.00
  9(HYD)                 0.34    124.32     38.43      0.00
  10                     0.24    124.30     37.96      0.00
  11(HYD)                0.24    124.33     38.22      0.00
  12(HYD)                0.39    124.33     38.26      0.00
  13                     0.24    124.34     38.44      0.00
  14(HYD)                0.67    124.35     38.60      0.00
  15                     0.34    124.39     38.86      0.00
  16(HYD)                0.63    124.39     38.93      0.00
  17(HYD)                0.58    124.40     39.30      0.00
  18                     0.29    124.40     38.94      0.00
  19(HYD)                0.67    124.40     38.79      0.00
  20(HYD)                0.77    124.40     38.53      0.00
  21(HYD)                0.00    124.40     38.76      0.00
  22                     0.48    124.40     38.70      0.00
  23                     0.29    124.42     38.80      0.00
  24(HYD)                0.58    124.42     38.71      0.00
  25(HYD)                0.53    124.43     38.60      0.00
  26                     0.24    124.43     38.88      0.00
  27(HYD)                0.00    124.43     38.94      0.00
  RD-1                   0.00    124.44     39.13      0.00
  28                    -8.99    124.50      0.00      0.00 Reservoir
  29                    -4.05    124.40      0.00      0.00 Reservoir
  30                    -7.06    124.40      0.00      0.00 Reservoir
  31                     4.75    124.30      0.00      0.00 Reservoir
  32                     4.36    124.30      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                 Flow  VelocityUnit Headloss    Status
  ID                    LPS       m/s      m/km
  ------------------------------------------------------------------
  1-300                7.06      0.22      0.47      Open
  1-2                  6.63      0.21      0.41      Open
  2-3                  6.00      0.19      0.34      Open
  3-4                  5.33      0.17      0.28      Open
  4-5                  4.75      0.15      0.22      Open
  6-5                  5.28      0.17      0.27      Open
  7-6                  4.89      0.16      0.24      Open
  7-400                4.75      0.15      0.22      Open
  5-8                  3.38      0.11      0.12      Open
  9-8                  4.94      0.16      0.24      Open
  10-9                 4.60      0.15      0.21      Open
  10-500               4.36      0.14      0.19      Open
  8-11                -1.95      0.06      0.04      Open
  11-12               -2.19      0.07      0.05      Open
  12-13               -2.58      0.08      0.07      Open
  5-13                 4.15      0.13      0.17      Open
  14-13               -6.97      0.22      0.45      Open
  15-14               -7.64      0.24      0.54      Open
  16-15               -2.84      0.09      0.09      Open
  17-16               -3.47      0.11      0.13      Open
  17-200              -4.05      0.13      0.17      Open
  15-18               -5.14      0.16      0.26      Open
  18-19               -0.98      0.03      0.01      Open
  19-20               -1.65      0.05      0.03      Open
  22-20               -2.42      0.08      0.06      Open
  18-21               -4.44      0.14      0.20      Open
  21-22               -4.44      0.14      0.20      Open
  22-23               -7.35      0.23      0.50      Open
  23-24               -1.72      0.05      0.03      Open
  24-25               -2.30      0.07      0.06      Open
  26-25               -2.83      0.09      0.09      Open
  27-26                5.91      0.19      0.34      Open
  23-27               -5.91      0.19      0.34      Open
  26-RD1              -8.99      0.29      0.73      Open
  RD1-100             -8.99      0.51      3.53      Open
```

Appendix C
Sanitary Servicing

SANITARY SEWER DESIGN SHEET

Novatech Project #: 122040
Project Name: Conroy Walkey
Date Prepared: 9/7/2022
Date Revised: 10/24/2022
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)																			
110	107	8	0.022	0.022	3.70	0.07	0.26	0.12	0.12	0.04	0.30	53.3	250 PVC	0.254	0.013	0.65	50.0	0.99	0.6%
109	108	4	0.011	0.011	3.73	0.04	0.13	0.07	0.07	0.02	0.15	30.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.3%
108	107	10	0.027	0.038	3.67	0.12	0.45	0.18	0.25	0.08	0.53	78.3	250 PVC	0.254	0.013	0.30	34.0	0.67	1.6%
107	104	4	0.011	0.070	3.63	0.23	0.82	0.07	0.44	0.15	0.97	37.0	250 PVC	0.254	0.013	0.30	34.0	0.67	2.9%
106	105	4	0.011	0.011	3.73	0.04	0.13	0.07	0.07	0.02	0.15	30.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.3%
105	104	10	0.027	0.038	3.67	0.12	0.45	0.18	0.25	0.08	0.53	78.1	250 PVC	0.254	0.013	0.30	34.0	0.67	1.6%
104	103	16	0.043	0.151	3.55	0.49	1.74	0.30	0.99	0.33	2.07	67.1	250 PVC	0.254	0.013	0.30	34.0	0.67	6.1%
103	102	6	0.016	0.167	3.54	0.54	1.92	0.15	1.14	0.38	2.30	31.7	250 PVC	0.254	0.013	0.30	34.0	0.67	6.8%
102	101	26	0.070	0.238	3.50	0.77	2.69	0.48	1.62	0.53	3.23	92.1	250 PVC	0.254	0.013	0.30	34.0	0.67	9.5%
101	100	0	0.000	0.238	3.50	0.77	2.69	0.01	1.63	0.54	3.23	13.3	250 PVC	0.254	0.013	0.30	34.0	0.67	9.5%
East Connection (St. Laurent Bouldevard)																			
207	206	5	0.014	0.014	3.72	0.04	0.16	0.08	0.08	0.03	0.19	30.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.4%
206	205	7	0.019	0.032	3.68	0.11	0.39	0.14	0.22	0.07	0.46	61.2	250 PVC	0.254	0.013	0.30	34.0	0.67	1.4%
205	204	17	0.046	0.078	3.62	0.25	0.92	0.25	0.47	0.16	1.07	72.5	250 PVC	0.254	0.013	0.30	34.0	0.67	3.2%
204	203	6	0.016	0.095	3.60	0.31	1.10	0.11	0.58	0.19	1.29	29.9	250 PVC	0.254	0.013	0.30	34.0	0.67	3.8%
220	219	4	0.011	0.011	3.73	0.04	0.13	0.08	0.08	0.03	0.16	29.1	250 PVC	0.254	0.013	0.65	50.0	0.99	0.3%
219	218	6	0.016	0.027	3.69	0.09	0.32	0.11	0.19	0.06	0.39	41.4	250 PVC	0.254	0.013	0.30	34.0	0.67	1.1%
218	217	1	0.003	0.030	3.68	0.10	0.35	0.03	0.22	0.07	0.43	16.1	250 PVC	0.254	0.013	0.30	34.0	0.67	1.3%
217	214	0	0.000	0.030	3.68	0.10	0.35	0.02	0.24	0.08	0.43	31.0	250 PVC	0.254	0.013	0.30	34.0	0.67	1.3%
216	215	10	0.027	0.027	3.69	0.09	0.32	0.13	0.13	0.04	0.37	30.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.7%
215	214	13	0.035	0.062	3.64	0.20	0.73	0.18	0.31	0.10	0.83	55.2	250 PVC	0.254	0.013	0.30	34.0	0.67	2.5%
214	211	0	0.000	0.092	3.60	0.30	1.07	0.02	0.57	0.19	1.26	34.7	250 PVC	0.254	0.013	0.30	34.0	0.67	3.7%
213	212	10	0.027	0.027	3.69	0.09	0.32	0.13	0.13	0.04	0.37	30.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.7%
212	211	13	0.035	0.062	3.64	0.20	0.73	0.18	0.31	0.10	0.83	53.9	250 PVC	0.254	0.013	0.30	34.0	0.67	2.5%
211	208	0	0.000	0.154	3.55	0.50	1.77	0.02	0.90	0.30	2.07	35.7	250 PVC	0.254	0.013	0.30	34.0	0.67	6.1%
210	209	9	0.024	0.024	3.69	0.08	0.29	0.11	0.11	0.04	0.33	30.0	250 PVC	0.254	0.013	0.65	50.0	0.99	0.7%
209	208	14	0.038	0.062	3.64	0.20	0.73	0.19	0.30	0.10	0.83	55.0	250 PVC	0.254	0.013	0.30	34.0	0.67	2.4%
208	203	0	0.000	0.216	3.51	0.70	2.46	0.02	1.22	0.40	2.86	41.4	250 PVC	0.254	0.013	0.30	34.0	0.67	8.4%
203	202	8	0.022	0.332	3.45	1.08	3.71	0.16	1.96	0.65	4.36	33.0	250 PVC	0.254	0.013	0.30	34.0	0.67	12.8%
202	201	17	0.046	0.378	3.43	1.23	4.20	0.32	2.28	0.75	4.95	61.5	250 PVC	0.254	0.013	0.30	34.0	0.67	14.6%
201	200	0	0.000	0.378	3.43	1.23	4.20	0.01	2.29	0.76	4.95	12.0	250 PVC	0.254	0.013	0.30	34.0	0.67	14.6%
TOTAL		228	0.616	0.616				3.92											

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

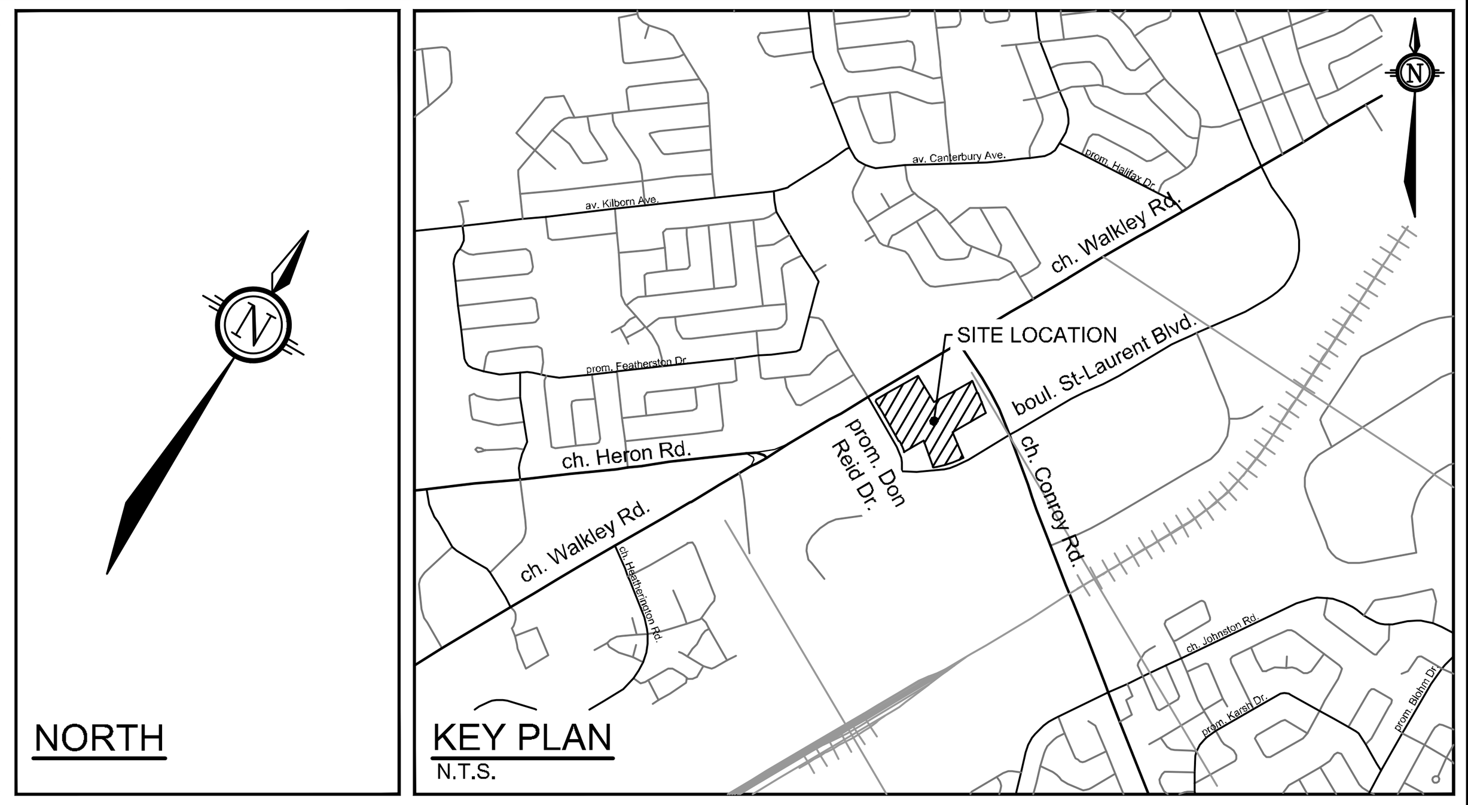
SANITARY SEWER DESIGN SHEET

Project Name: Conroy Walkey
Date Prepared: 9/7/2022
Date Revised: 10/24/2022
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



LEGEND

- PROPERTY LINE
- CURB C/W CONTINUOUS SUBDRAIN PER CITY DETAIL R1
- DEPRESSED CURB
- PROPOSED TWSI
- 101 PROPOSED SANITARY MANHOLE
- PROPOSED SANITARY SEWER AND FLOW DIRECTION
- SANITARY DRAINAGE AREA BOUNDARY
- AREA — AREA IN HECTARES; 110-108 — MANHOLE TO MANHOLE; 24 51 — POPULATION EQUIVALENT
- SAN MH — EXISTING SANITARY MANHOLE & SEWER

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
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

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
SANITARY DRAINAGE PLAN

PROJECT No. 122040
REV #1
DRAWING No. 122040-SAN

PLANA1.DWG - 841mmx594mm

M:\2022\122040\CAD\Civil\122040-SAN.dwg, SAN, Oct 24, 2022 - 3:18pm, cferguson

Appendix D
Storm Servicing

FOUNDATION DRAIN DESIGN SHEET

Novatech Project #: 122040
Project Name: 2510 St. Laurent BLVD
Date Prepared: 10/27/2022
Date Revised: 10/28/2022
Input By: Curtis Ferguson, E.I.T.
Reviewed By: Anthony Mestwarp, P.Eng
Drawing Reference: 122040-FDP

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

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION		DEMAND			DESIGN CAPACITY							
FROM MH	TO MH	RESIDENTIAL FLOW		EXTRANEOUS FLOW	PROPOSED SEWER PIPE SIZING / DESIGN							
		Townhomes	Cumulative Townhomes	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)												
409	406	9	9	4.05	60.7	250 PVC	0.254	0.013	0.30	34.0	0.67	11.9%
408	407	14	14	6.30	93.4	250 PVC	0.254	0.013	0.30	34.0	0.67	18.5%
406	404	3	26	11.70	35.8	250 PVC	0.254	0.013	0.30	34.0	0.67	34.4%
405	404	14	14	6.30	111.6	250 PVC	0.254	0.013	0.30	34.0	0.67	18.5%
404	403	16	56	25.20	59.1	250 PVC	0.254	0.013	0.30	34.0	0.67	74.2%
403	402	3	59	26.55	17.4	250 PVC	0.254	0.013	0.30	34.0	0.67	78.1%
402	401	11	70	31.50	50.7	300 PVC	0.305	0.013	0.30	55.3	0.76	57.0%
401	400	18	88	39.60	64.7	300 PVC	0.305	0.013	0.30	55.3	0.76	71.7%
400	301	0	88	39.60	2.1	300 PVC	0.305	0.013	0.30	55.3	0.76	71.7%
East Connection (St. Laurent Boulevard)												
605	604	12	12	5.40	98.7	250 PVC	0.254	0.013	0.30	34.0	0.67	15.9%
604	603	17	29	13.05	66.9	250 PVC	0.254	0.013	0.30	34.0	0.67	38.4%
603	602	7	36	16.20	36.4	250 PVC	0.254	0.013	0.30	34.0	0.67	47.7%
614	613	9	9	4.05	64.3	250 PVC	0.254	0.013	0.30	34.0	0.67	11.9%
613	612	2	11	4.95	24.7	250 PVC	0.254	0.013	0.30	34.0	0.67	14.6%
612	610	0	11	4.95	34.3	250 PVC	0.254	0.013	0.30	34.0	0.67	14.6%
611	610	23	23	10.35	88.2	250 PVC	0.254	0.013	0.30	34.0	0.67	30.5%
610	608	0	34	15.30	42.7	250 PVC	0.254	0.013	0.30	34.0	0.67	45.0%
609	608	23	23	10.35	90.5	250 PVC	0.254	0.013	0.30	34.0	0.67	30.5%
608	606	0	57	25.65	27.8	250 PVC	0.254	0.013	0.30	34.0	0.67	75.5%
607	606	23	23	10.35	90.0	250 PVC	0.254	0.013	0.30	34.0	0.67	30.5%
606	602	0	80	36.00	42.4	300 PVC	0.305	0.013	0.30	55.3	0.76	65.2%
602	601	8	124	55.80	31.6	375 PVC	0.381	0.013	0.30	100.2	0.88	55.7%
601	600	16	140	63.00	58.2	375 PVC	0.381	0.013	0.30	100.2	0.88	62.9%
600	501	0	140	63.00	2.1	375 PVC	0.381	0.013	0.30	100.2	0.88	62.9%
TOTAL		228										

Design Parameters:
1. Flow Per Unit 0.45 L/s

LEGEND

- PROPERTY LINE
- EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- FOUNDATION DRAIN DRAINAGE AREA
- MANHOLE TO MANHOLE # OF UNITS (602-603 / 5)
- PROPOSED STORM SEWER AND MANHOLE
- PROPOSED STORMWATER MANAGEMENT PIPE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED BOX MANHOLE
- PROPOSED CATCHBASIN BOX MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED LANDSCAPE DRAIN
- PROPOSED INLET CONTROL DEVICE

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
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

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ISSUED FOR REVIEW
ISSUED FOR REVIEW

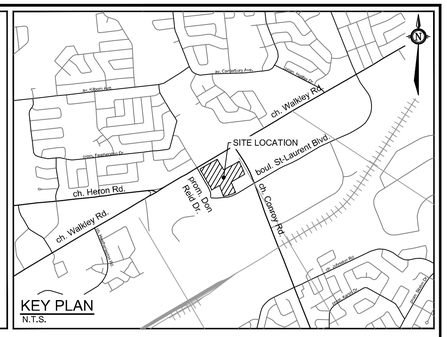
NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

DRAWING NAME
FOUNDATION DRAINAGE PLAN

PROJECT No. 122040
REV REV #1
DRAWING No. 122040-FDP

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:
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K1S 4N7.

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No.	REVISION	DATE	BY
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

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ISSUED FOR REVIEW
ISSUED FOR REVIEW

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

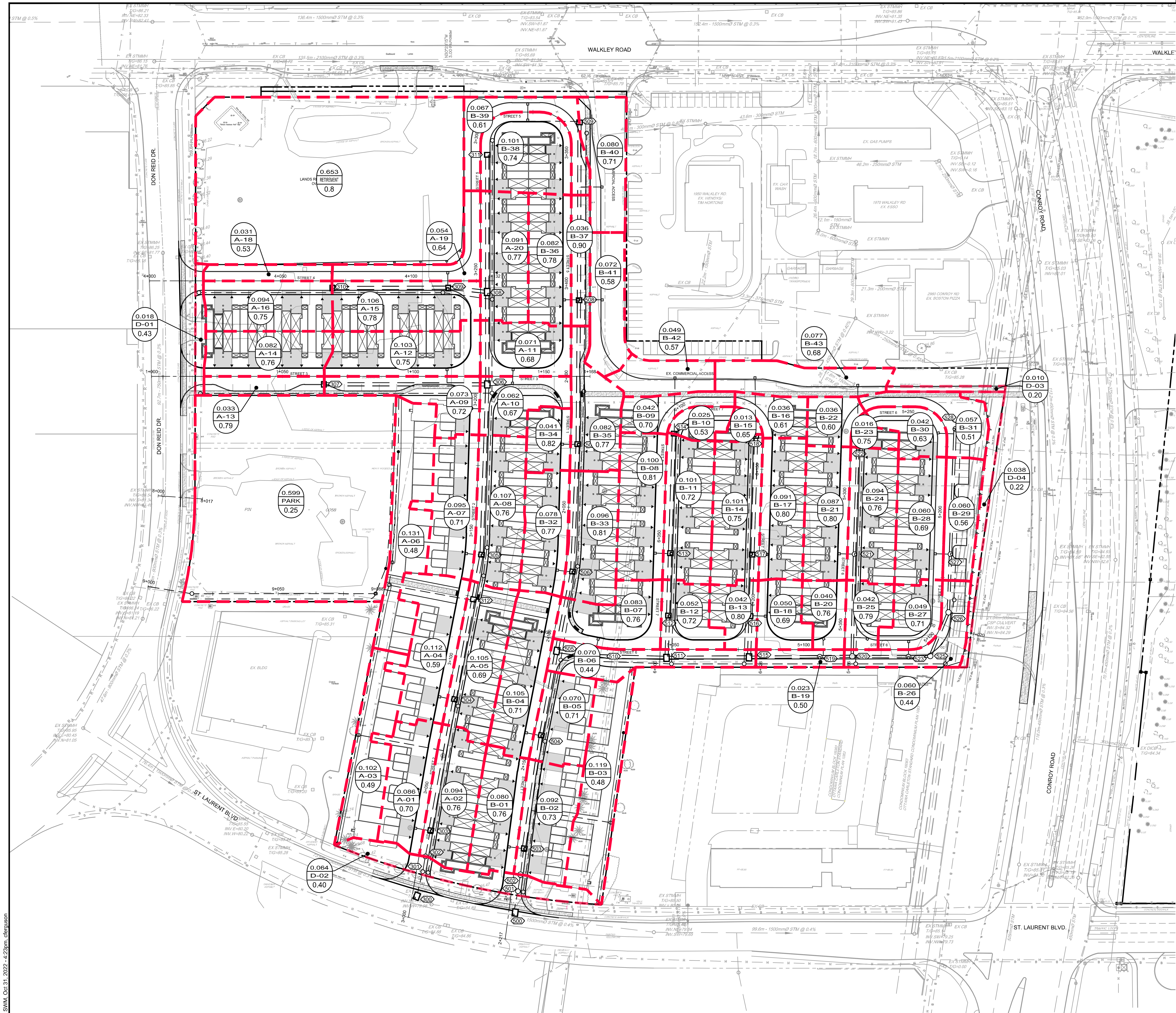
LOCATION
CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

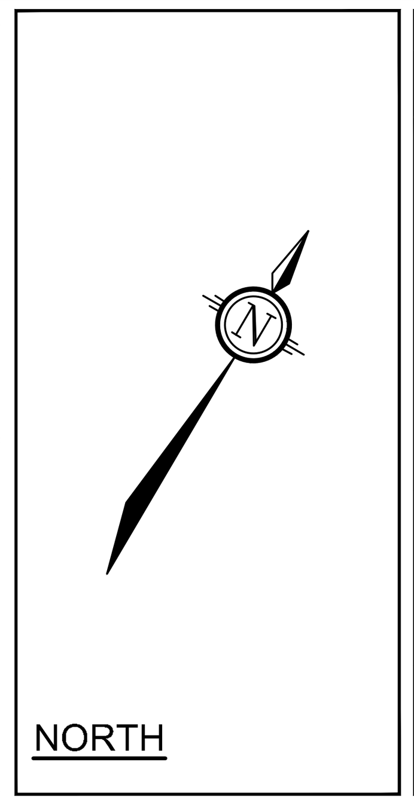
DRAWING NAME
EXISTING STORMWATER MANAGEMENT PLAN

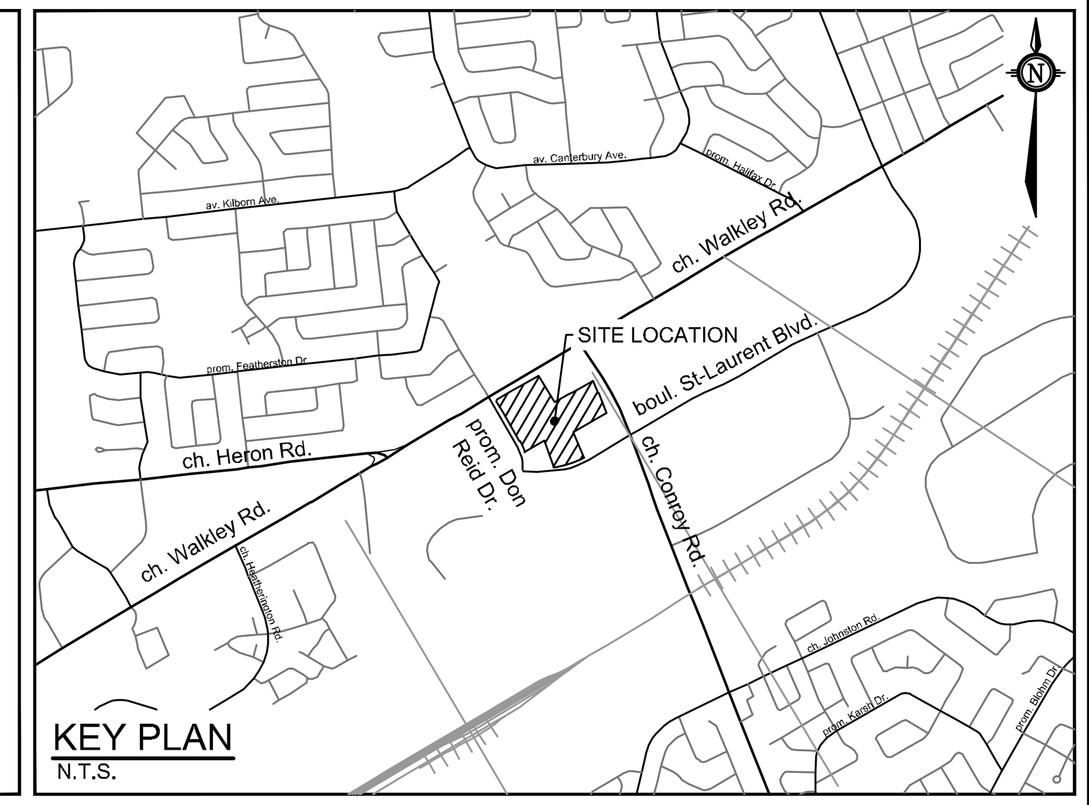
PROJECT No. 122040
REV REV #1
DRAWING No. 122040-EXSWM

M:\2022\122040\CAD\Civil\122040-EXSWM.dwg, EXSWM, Nov 01, 2022 - 11:18am, cferguson

PLAN1:DWG - cferguson







LEGEND

- PROPERTY LINE
- EXISTING STORM MANHOLE & SEWER
- EXISTING CATCHBASIN
- 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 STORMWATER MANAGEMENT PIPE
- PROPOSED CATCHBASIN MANHOLE
- PROPOSED BOX MANHOLE
- PROPOSED CATCHBASIN BOX MANHOLE
- PROPOSED CATCHBASIN
- PROPOSED LANDSCAPE DRAIN
- PROPOSED INLET CONTROL DEVICE

M:\2022\122040\CAD\Civil\122040-SWM.dwg, SWM, Oct 31, 2022 - 4:23pm, cferguson

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.

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No.	REVISION	DATE	BY
1.	ISSUED IN SUPPORT OF DEVELOPMENT APPLICATIONS	NOV 01/22	GJM

SCALE 1:750

DESIGN	ARM
CHECKED	GJM
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LOCATION
CITY OF OTTAWA
2510 St. LAURENT BOULEVARD

DRAWING NAME
STORMWATER MANAGEMENT PLAN

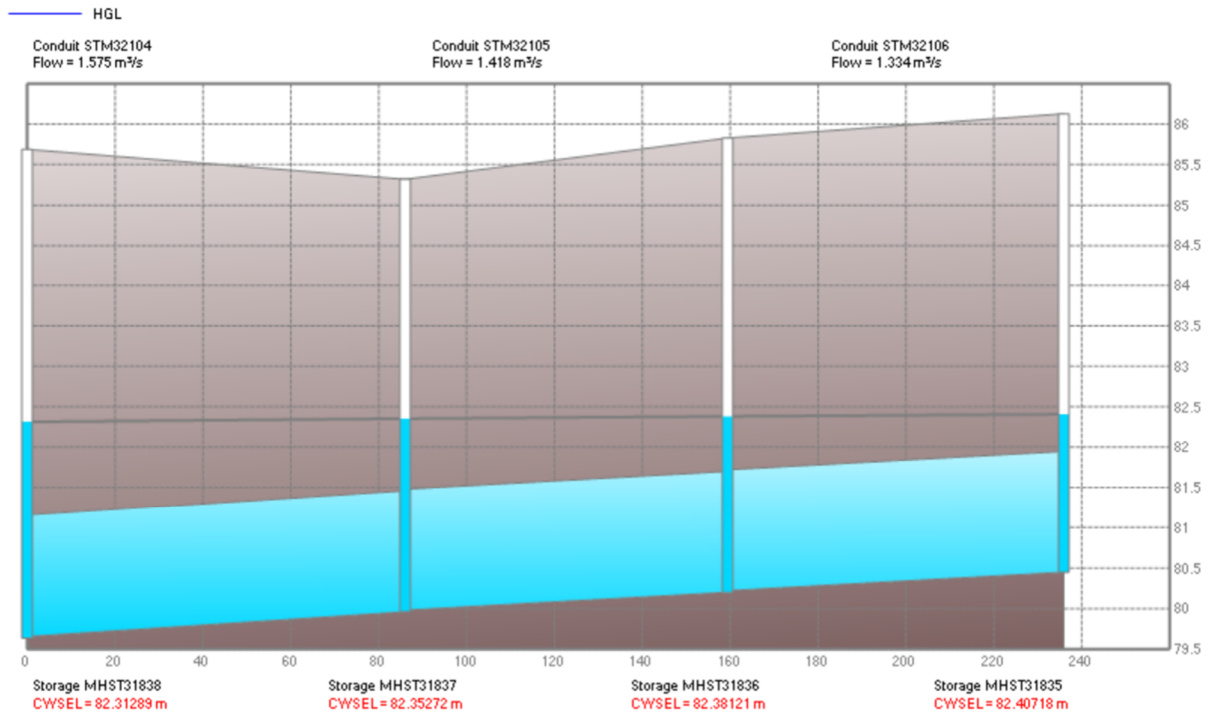
PROJECT No. 122040
REV: REV #1
DRAWING No. 122040-SWM

PLANA1.DWG - 841mmx594mm

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: 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

Subcatchments Parameters

Post-Development

Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	Zero Imperv (%)	Runoff Coeff.
A-01	0.086	22	39	0.6	71.4	50	0.70
A-02	0.094	24	39	0.6	80.0	50	0.76
A-03	0.102	15	67	0.6	41.4	50	0.49
A-04	0.112	24	47	0.6	55.7	50	0.59
A-05	0.105	23	45	0.6	70.0	50	0.69
A-06	0.131	15	89	0.6	40.0	50	0.48
A-07	0.095	21	45	0.6	72.9	50	0.71
A-08	0.107	19	55	0.6	80.0	50	0.76
A-09	0.073	13	55	0.6	74.3	50	0.72
A-10	0.062	23	27	0.6	67.1	50	0.67
A-11	0.071	20	35	0.6	68.6	50	0.68
A-12	0.101	21	47	0.6	78.6	50	0.75
A-13	0.033	8	41	0.6	84.3	50	0.79
A-14	0.082	20	42	0.6	80.0	50	0.76
A-15	0.108	21	50	0.6	82.9	50	0.78
A-16	0.094	20	47	0.6	78.6	50	0.75
A-18	0.031	7	47	0.6	47.1	50	0.53
A-19	0.054	7	73	0.6	62.9	50	0.64
A-20	0.091	20	45	0.6	81.4	50	0.77
B-01	0.08	18	45	0.6	80.0	50	0.76
B-02	0.092	20	45	0.6	75.7	50	0.73
B-03	0.119	16	75	0.6	40.0	50	0.48
B-04	0.105	16	65	0.6	72.9	50	0.71
B-05	0.07	27	26	0.6	72.9	50	0.71
B-06	0.07	9	75	0.6	34.3	50	0.44
B-07	0.083	21	40	0.6	80.0	50	0.76
B-08	0.1	18	55	0.6	87.1	50	0.81
B-09	0.042	10	41	0.6	71.4	50	0.70
B-10	0.025	12	22	0.6	47.1	50	0.53
B-11	0.101	18	55	0.6	74.3	50	0.72
B-12	0.052	21	25	0.6	74.3	50	0.72
B-13	0.042	17	25	0.6	85.7	50	0.80
B-14	0.101	18	55	0.6	78.6	50	0.75
B-15	0.013	10	13	0.6	64.3	50	0.65
B-16	0.036	15	24	0.6	58.6	50	0.61
B-17	0.091	17	55	0.6	85.7	50	0.80
B-18	0.05	20	25	0.6	70.0	50	0.69
B-19	0.023	8	30	0.6	42.9	50	0.50
B-20	0.04	16	25	0.6	80.0	50	0.76
B-21	0.087	16	55	0.6	85.7	50	0.80
B-22	0.036	15	24	0.6	57.1	50	0.60

Post-Development

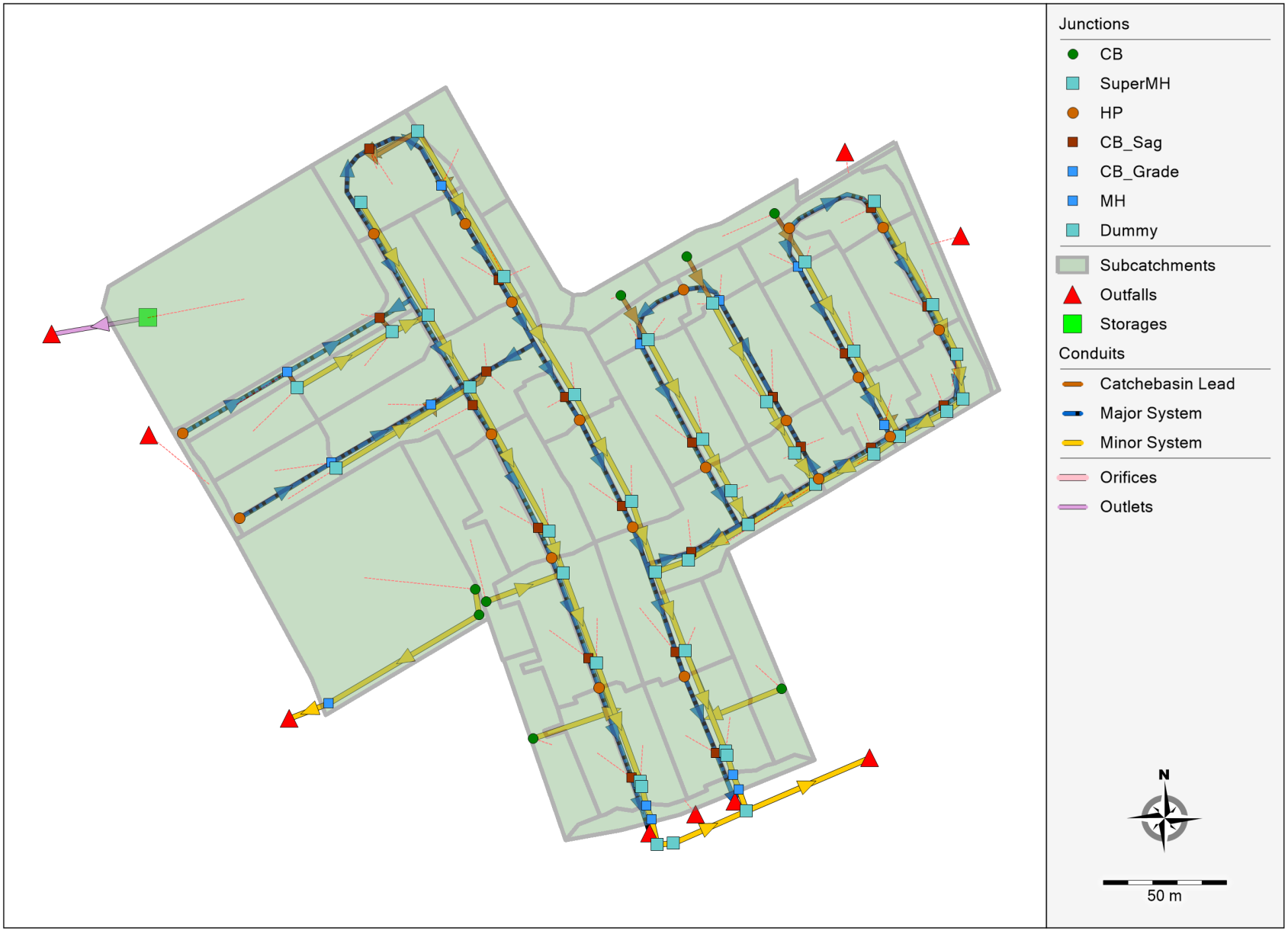
Name	Area (ha)	Width (m)	Flow Length (m)	Slope (%)	Imperv. (%)	Zero Imperv (%)	Runoff Coeff.
B-23	0.016	11	14	0.6	78.6	50	0.75
B-24	0.094	17	55	0.6	80.0	50	0.76
B-25	0.042	17	25	0.6	84.3	50	0.79
B-26	0.06	9	65	0.6	34.3	50	0.44
B-27	0.049	20	25	0.6	72.9	50	0.71
B-28	0.06	11	55	0.6	70.0	50	0.69
B-29	0.06	11	55	0.6	51.4	50	0.56
B-30	0.042	14	30	0.6	61.4	50	0.63
B-31	0.057	13	43	0.6	44.3	50	0.51
B-32	0.078	14	55	0.6	81.4	50	0.77
B-33	0.096	17	55	0.6	87.1	50	0.81
B-34	0.041	16	25	0.6	88.6	50	0.82
B-35	0.082	17	48	0.6	81.4	50	0.77
B-36	0.082	18	45	0.6	82.9	50	0.78
B-37	0.036	8	46	0.6	100.0	50	0.90
B-38	0.101	39	26	0.6	77.1	50	0.74
B-39	0.067	15	46	0.6	58.6	50	0.61
B-40	0.08	16	50	0.6	72.9	50	0.71
B-41	0.072	16	45	0.6	54.3	50	0.58
B-42	0.049	14	35	0.6	52.9	50	0.57
B-43	0.077	14	55	0.6	68.6	50	0.68
D-01	0.018	6	32	0.6	32.9	50	0.43
D-02	0.064	11	57	0.6	28.6	50	0.40
D-03	0.01	2	45	0.6	0.0	50	0.20
D-04	0.038	8	47	1	2.9	50	0.22
Park	0.599	86	70	1.1	7.1	0	0.25
Retirement_1	0.653	69	94	1	85.7	50	0.80

ARM Subcatchments

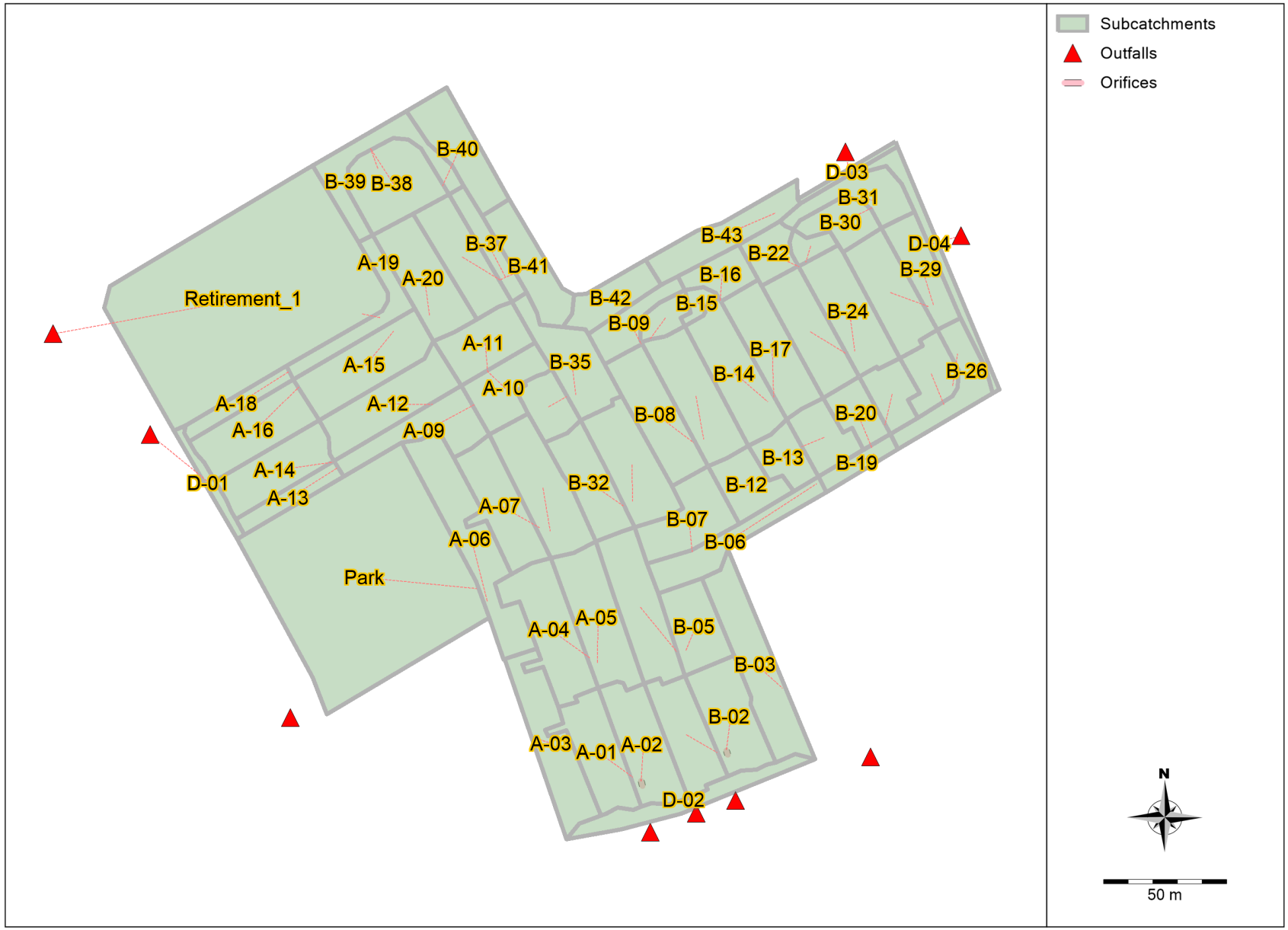
Pre-Development

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

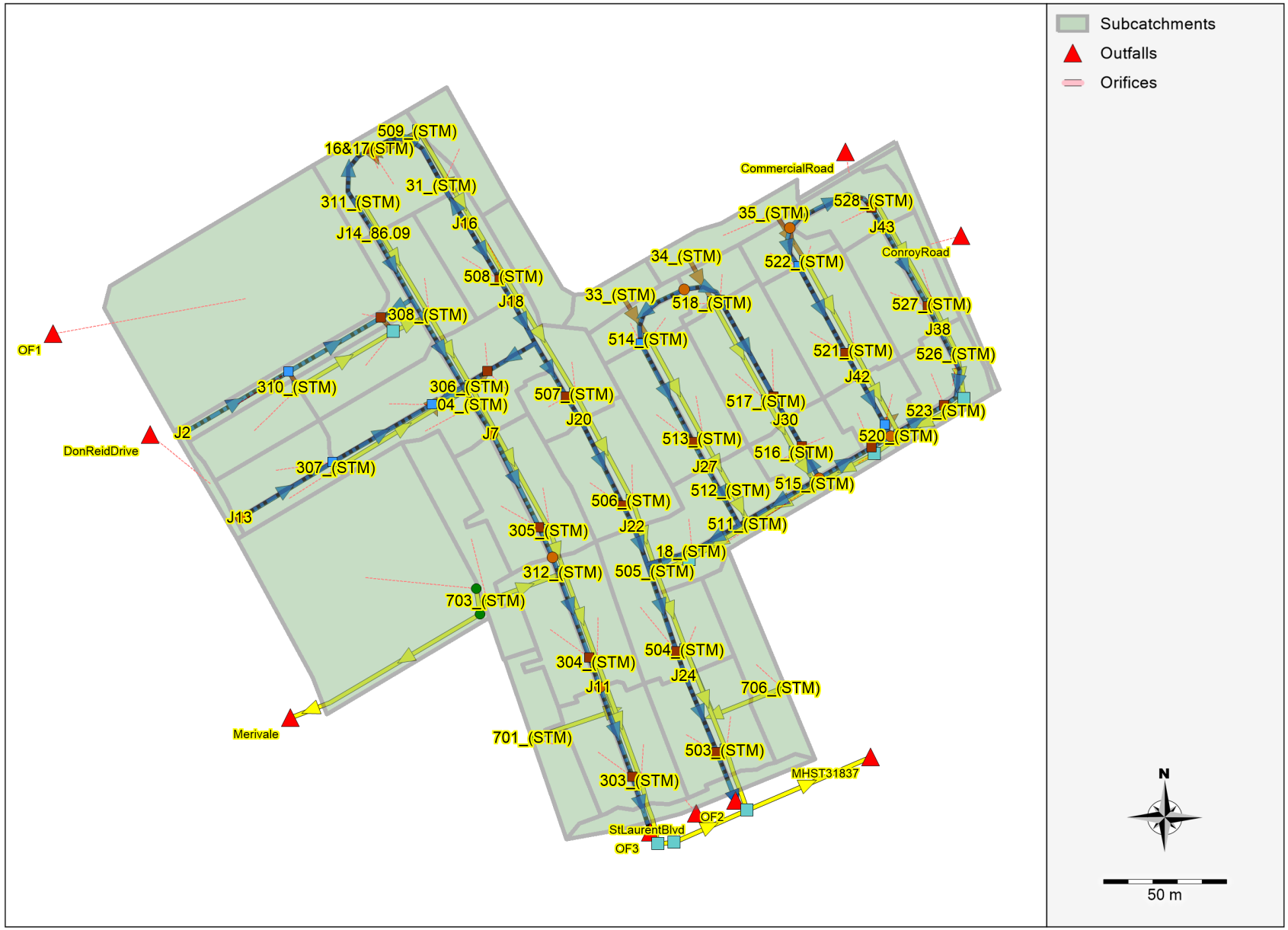
Overall Schematics



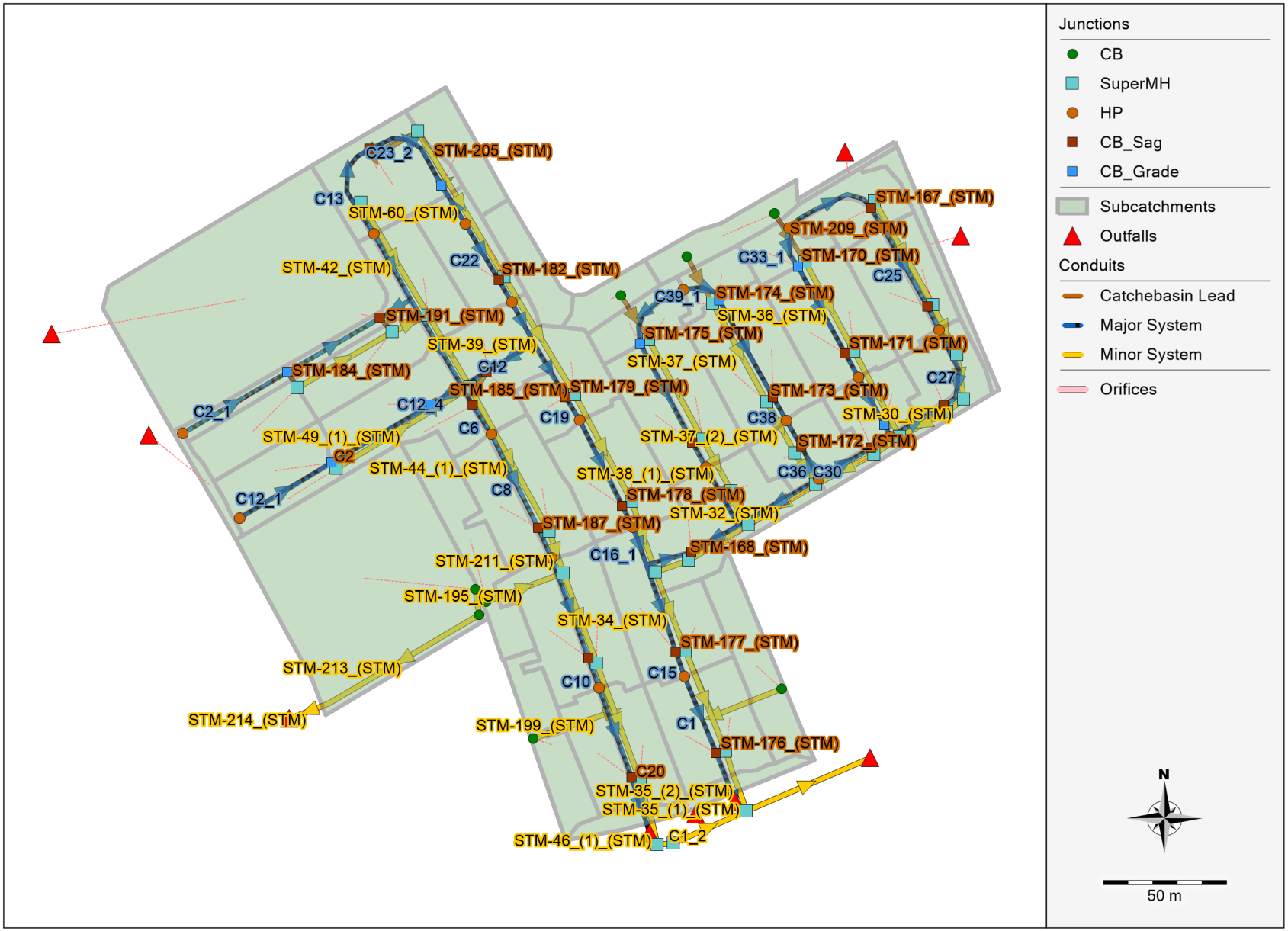
Subcatchments



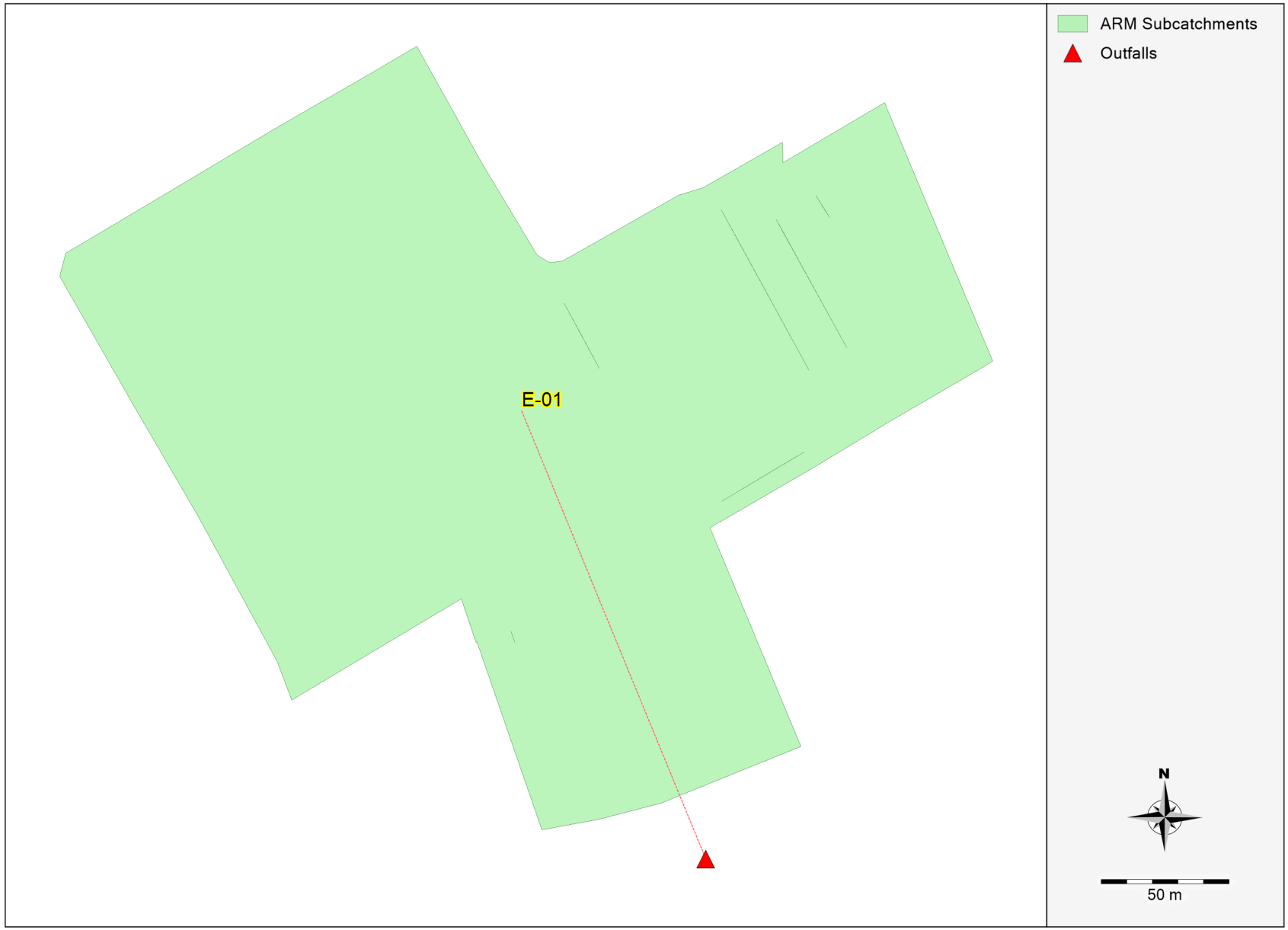
Junctions and Outfalls



Conduits


C23_2
STM-205_(STM)
C13
STM-60_(STM)
STM-42_(STM)
C22
STM-182_(STM)
STM-191_(STM)
STM-39_(STM)
C12
STM-184_(STM)
STM-185_(STM)
STM-179_(STM)
C2_1
C12_4
C19
C6
STM-49_(1)_(STM)
C2
STM-44_(1)_(STM)
C8
C12_1
STM-187_(STM)
STM-211_(STM)
C16_1
STM-195_(STM)
STM-34_(STM)
STM-213_(STM)
C10
C15
STM-214_(STM)
STM-199_(STM)
C1
STM-176_(STM)
C20
STM-35_(2)_(STM)
STM-35_(1)_(STM)
STM-46_(1)_(STM)
C1_2
STM-167_(STM)
STM-209_(STM)
C33_1
STM-170_(STM)
C25
C39_1
STM-174_(STM)
STM-36_(STM)
STM-175_(STM)
STM-171_(STM)
STM-37_(STM)
C27
STM-173_(STM)
C38
STM-30_(STM)
STM-37_(2)_(STM)
STM-172_(STM)
C36
C30
STM-38_(1)_(STM)
STM-178_(STM)
STM-32_(STM)
STM-168_(STM)
Junctions
CB
SuperMH
HP
CB_Sag
CB_Grade
Subcatchments
Outfalls
Conduits
Catchebasin Lead
Major System
Minor System
Orifices
N
50 m

Pre-Development Model



Post-Development Model Output

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

  Walkley-Conroy
  Created By Vahid Mehdipour
  October 18, 2022

  WARNING 03: negative offset ignored for Link C16_1
  WARNING 02: maximum depth increased for Node 01_(STM)
  WARNING 02: maximum depth increased for Node 05&06_(STM)
  WARNING 02: maximum depth increased for Node 07_(STM)
  WARNING 02: maximum depth increased for Node 09_(STM)
  WARNING 02: maximum depth increased for Node 11_(STM)
  WARNING 02: maximum depth increased for Node 14_(STM)
  WARNING 02: maximum depth increased for Node 16&17(STM)
  WARNING 02: maximum depth increased for Node 18_(STM)
  WARNING 02: maximum depth increased for Node 20_(STM)
  WARNING 02: maximum depth increased for Node 21_(STM)
  WARNING 02: maximum depth increased for Node 22_(STM)
  WARNING 02: maximum depth increased for Node 23_(STM)
  WARNING 02: maximum depth increased for Node 24_(STM)
  WARNING 02: maximum depth increased for Node 25_(STM)
  WARNING 02: maximum depth increased for Node 27_(STM)
  WARNING 02: maximum depth increased for Node 28_(STM)
  WARNING 02: maximum depth increased for Node 303_(STM)
  WARNING 02: maximum depth increased for Node 503_(STM)
  WARNING 02: maximum depth increased for Node J4
  WARNING 02: maximum depth increased for Node J5
  WARNING 02: maximum depth increased for Node J7

  *************
  Element Count
  *************
  Number of rain gages ...... 1
  Number of subcatchments ... 68
  Number of nodes ........... 118
  Number of links ........... 147
  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                        0.09     22.10     71.43    0.6000 RG
01_(STM)
  A-02                        0.09     23.85     80.00    0.6000 RG
303_(STM)
```

A-03	0.10	15.12	41.43	0.6000 RG
701_(STM)				
A-04	0.11	24.07	55.71	0.6000 RG
02_(STM)				
A-05	0.10	23.32	70.00	0.6000 RG
304_(STM)				
A-06	0.13	14.78	40.00	0.6000 RG
703_(STM)				
A-07	0.10	21.00	72.86	0.6000 RG
03_(STM)				
A-08	0.11	19.45	80.00	0.6000 RG
305_(STM)				
A-09	0.07	13.32	74.29	0.6000 RG
04_(STM)				
A-10	0.06	22.74	67.14	0.6000 RG
05&06_(STM)				
A-11	0.07	20.29	68.57	0.6000 RG
05&06_(STM)				
A-12	0.10	21.26	78.57	0.6000 RG
07_(STM)				
A-13	0.03	8.03	84.29	0.6000 RG
307_(STM)				
A-14	0.08	19.65	80.00	0.6000 RG
08_(STM)				
A-15	0.11	21.50	82.86	0.6000 RG
309_(STM)				
A-16	0.09	20.10	78.57	0.6000 RG
310_(STM)				
A-18	0.03	6.62	47.14	0.6000 RG
10_(STM)				
A-19	0.05	7.39	62.86	0.6000 RG
09_(STM)				
A-20	0.09	20.22	81.43	0.6000 RG
308_(STM)				
B-01	0.08	17.78	80.00	0.6000 RG
11_(STM)				
B-02	0.09	20.44	75.71	0.6000 RG
503_(STM)				
B-03	0.12	15.87	40.00	0.6000 RG
706_(STM)				
B-04	0.10	16.15	72.86	0.6000 RG
12_(STM)				
B-05	0.07	26.93	72.86	0.6000 RG
504_(STM)				
B-06	0.07	9.33	34.29	0.6000 RG
515_(STM)				
B-07	0.08	20.75	80.00	0.6000 RG
18_(STM)				
B-08	0.10	18.18	87.14	0.6000 RG
19_(STM)				
B-09	0.04	10.20	71.43	0.6000 RG
20_(STM)				
B-10	0.03	11.62	47.14	0.6000 RG
514_(STM)				
B-11	0.10	18.36	74.29	0.6000 RG
513_(STM)				
B-12	0.05	20.80	74.29	0.6000 RG
512_(STM)				
B-13	0.04	16.80	85.71	0.6000 RG
516_(STM)				
B-14	0.10	18.36	78.57	0.6000 RG
517_(STM)				

B-15	0.01	9.77	64.29	0.6000	RG
518_(STM)					
B-16	0.04	14.93	58.57	0.6000	RG
23_(STM)					
B-17	0.09	16.55	85.71	0.6000	RG
22_(STM)					
B-18	0.05	20.00	70.00	0.6000	RG
21_(STM)					
B-19	0.02	7.67	42.86	0.6000	RG
519_(STM)					
B-20	0.04	16.00	80.00	0.6000	RG
24_(STM)					
B-21	0.09	15.82	85.71	0.6000	RG
26_(STM)					
B-22	0.04	14.98	57.14	0.6000	RG
27_(STM)					
B-23	0.02	11.38	78.57	0.6000	RG
522_(STM)					
B-24	0.09	17.09	80.00	0.6000	RG
521_(STM)					
B-25	0.04	16.80	84.29	0.6000	RG
25_(STM)					
B-26	0.06	9.23	34.29	0.6000	RG
526_(STM)					
B-27	0.05	19.60	72.86	0.6000	RG
28_(STM)					
B-28	0.06	10.91	70.00	0.6000	RG
29_(STM)					
B-29	0.06	10.91	51.43	0.6000	RG
527_(STM)					
B-30	0.04	13.86	61.43	0.6000	RG
30_(STM)					
B-31	0.06	13.33	44.29	0.6000	RG
528_(STM)					
B-32	0.08	14.18	81.43	0.6000	RG
13_(STM)					
B-33	0.10	17.45	87.14	0.6000	RG
506_(STM)					
B-34	0.04	16.40	88.57	0.6000	RG
14_(STM)					
B-35	0.08	17.06	81.43	0.6000	RG
507_(STM)					
B-36	0.08	18.22	82.86	0.6000	RG
15&32_(STM)					
B-37	0.04	7.87	100.00	0.6000	RG
508_(STM)					
B-38	0.10	38.85	77.14	0.6000	RG
16&17(STM)					
B-39	0.07	14.64	58.57	0.6000	RG
16&17(STM)					
B-40	0.08	16.00	72.86	0.6000	RG
31_(STM)					
B-41	0.07	16.00	54.29	0.6000	RG
15&32_(STM)					
B-42	0.05	14.00	52.86	0.6000	RG
33_(STM)					
B-43	0.08	14.00	68.57	0.6000	RG
35_(STM)					
D-01	0.02	5.63	32.86	0.6000	RG
DonReidDrive					
D-02	0.06	11.13	28.57	0.6000	RG
StLaurentBlvd					

D-03	0.01	2.22	0.00	0.6000	RG
CommercialRoad					
D-04	0.04	8.09	2.86	1.0000	RG
ConroyRoad					
Park	0.60	85.57	7.14	1.1000	RG
803_(STM)					
Retirement_1	0.65	69.22	85.71	1.0000	RG
SU1					

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Node Summary
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Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
01_(STM)	JUNCTION	83.88	1.66	0.0	
02_(STM)	JUNCTION	84.07	1.30	0.0	
03_(STM)	JUNCTION	84.28	1.61	0.0	
04_(STM)	JUNCTION	84.50	1.30	0.0	
05&06_(STM)	JUNCTION	84.30	1.41	0.0	
07_(STM)	JUNCTION	84.97	0.88	0.0	
08_(STM)	JUNCTION	84.97	1.33	0.0	
09_(STM)	JUNCTION	84.53	1.29	0.0	
10_(STM)	JUNCTION	84.81	1.26	0.0	
11_(STM)	JUNCTION	83.90	1.66	0.0	
12_(STM)	JUNCTION	84.06	1.30	0.0	
13_(STM)	JUNCTION	84.32	1.30	0.0	
14_(STM)	JUNCTION	84.49	1.30	0.0	
15&32_(STM)	JUNCTION	84.43	1.57	0.0	
16&17(STM)	JUNCTION	84.55	1.43	0.0	
18_(STM)	JUNCTION	84.10	1.30	0.0	
19_(STM)	JUNCTION	84.29	1.31	0.0	
20_(STM)	JUNCTION	84.57	1.31	0.0	
21_(STM)	JUNCTION	84.32	1.31	0.0	
22_(STM)	JUNCTION	84.38	1.31	0.0	
23_(STM)	JUNCTION	84.65	1.28	0.0	
24_(STM)	JUNCTION	84.30	1.35	0.0	
25_(STM)	JUNCTION	84.25	1.47	0.0	
26_(STM)	JUNCTION	84.38	1.30	0.0	
27_(STM)	JUNCTION	84.67	1.29	0.0	
28_(STM)	JUNCTION	84.25	1.27	0.0	
29_(STM)	JUNCTION	84.40	1.31	0.0	
30_(STM)	JUNCTION	84.56	1.31	0.0	
300_(STM)	JUNCTION	79.70	5.32	0.0	
301_(STM)	JUNCTION	80.70	4.37	0.0	
302_(STM)	JUNCTION	82.51	2.67	0.0	
303_(STM)	JUNCTION	82.84	2.65	0.0	
304_(STM)	JUNCTION	82.70	2.56	0.0	
305_(STM)	JUNCTION	82.89	2.59	0.0	
306_(STM)	JUNCTION	83.09	2.67	0.0	
307_(STM)	JUNCTION	83.36	2.81	0.0	
308_(STM)	JUNCTION	83.23	2.61	0.0	
309_(STM)	JUNCTION	83.62	2.10	0.0	
31_(STM)	JUNCTION	84.45	1.71	0.0	
310_(STM)	JUNCTION	83.48	2.53	0.0	
311_(STM)	JUNCTION	83.50	2.56	0.0	
312_(STM)	JUNCTION	83.13	2.38	0.0	
33_(STM)	JUNCTION	84.10	1.30	0.0	
34_(STM)	JUNCTION	84.08	1.30	0.0	
35_(STM)	JUNCTION	84.05	1.30	0.0	
500_(STM)	JUNCTION	79.54	5.50	0.0	
501_(STM)	JUNCTION	80.54	4.55	0.0	

502_(STM)	JUNCTION	82.37	2.82	0.0
503_(STM)	JUNCTION	82.71	2.80	0.0
504_(STM)	JUNCTION	82.55	2.71	0.0
505_(STM)	JUNCTION	82.66	2.82	0.0
506_(STM)	JUNCTION	82.76	2.76	0.0
507_(STM)	JUNCTION	82.92	2.77	0.0
508_(STM)	JUNCTION	83.10	2.81	0.0
509_(STM)	JUNCTION	83.75	2.23	0.0
510_(STM)	JUNCTION	83.06	2.24	0.0
511_(STM)	JUNCTION	82.85	2.66	0.0
512_(STM)	JUNCTION	83.26	2.17	0.0
513_(STM)	JUNCTION	83.33	2.16	0.0
514_(STM)	JUNCTION	83.22	2.56	0.0
515_(STM)	JUNCTION	82.95	2.76	0.0
516_(STM)	JUNCTION	83.36	2.17	0.0
517_(STM)	JUNCTION	83.44	2.14	0.0
518_(STM)	JUNCTION	83.29	2.57	0.0
519_(STM)	JUNCTION	83.34	2.21	0.0
520_(STM)	JUNCTION	83.09	2.52	0.0
521_(STM)	JUNCTION	83.57	2.01	0.0
522_(STM)	JUNCTION	83.40	2.46	0.0
523_(STM)	JUNCTION	83.47	1.96	0.0
525_(STM)	JUNCTION	83.21	2.31	0.0
526_(STM)	JUNCTION	83.31	2.30	0.0
527_(STM)	JUNCTION	83.71	1.89	0.0
528_(STM)	JUNCTION	83.66	2.10	0.0
701_(STM)	JUNCTION	83.64	1.69	0.0
703_(STM)	JUNCTION	83.90	1.45	0.0
706_(STM)	JUNCTION	83.50	1.61	0.0
801_(STM)	JUNCTION	81.94	4.32	0.0
802_(STM)	JUNCTION	84.11	1.38	0.0
803_(STM)	JUNCTION	84.45	1.00	0.0
dummy1	JUNCTION	82.84	2.24	0.0
dummy2	JUNCTION	82.71	2.39	0.0
EXSTMMH	JUNCTION	79.96	5.06	0.0
J1	JUNCTION	85.77	0.15	0.0
J11	JUNCTION	85.28	0.15	0.0
J13	JUNCTION	86.51	0.15	0.0
J14_86.09	JUNCTION	86.09	0.15	0.0
J16	JUNCTION	86.09	0.15	0.0
J18	JUNCTION	85.91	0.15	0.0
J2	JUNCTION	86.28	0.15	0.0
J20	JUNCTION	85.70	0.15	0.0
J22	JUNCTION	85.53	0.15	0.0
J24	JUNCTION	85.27	0.15	0.0
J27	JUNCTION	85.51	0.15	0.0
J28	JUNCTION	85.91	0.15	0.0
J3	JUNCTION	85.73	0.15	0.0
J30	JUNCTION	85.60	0.15	0.0
J32	JUNCTION	85.64	0.15	0.0
J34	JUNCTION	85.39	0.15	0.0
J36	JUNCTION	85.56	0.15	0.0
J38	JUNCTION	85.62	0.15	0.0
J4	JUNCTION	85.83	0.30	0.0
J40	JUNCTION	85.93	0.15	0.0
J42	JUNCTION	85.59	0.15	0.0
J43	JUNCTION	85.78	0.15	0.0
J44	JUNCTION	85.41	0.15	0.0
J5	JUNCTION	85.85	0.30	0.0
J7	JUNCTION	85.71	0.30	0.0
J9	JUNCTION	85.50	0.15	0.0
CommercialRoad	OUTFALL	0.00	0.00	0.0
ConroyRoad	OUTFALL	0.00	0.00	0.0

DonReidDrive	OUTFALL	0.00	0.00	0.0
Merivale	OUTFALL	0.00	82.14	0.0
MHST31837	OUTFALL	79.64	1.51	0.0
OF1	OUTFALL	0.00	0.00	0.0
OF2	OUTFALL	85.19	0.15	0.0
OF3	OUTFALL	85.02	0.15	0.0
StLaurentBlvd	OUTFALL	0.00	0.00	0.0
SU1	STORAGE	0.00	3.00	0.0

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Link Summary
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Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	J24	11_(STM)	CONDUIT	33.5	0.6266	0.0160
C1_1	300_(STM)	EXSTMMH	CONDUIT	6.9	0.2882	0.0130
C1_2	EXSTMMH	500_(STM)	CONDUIT	30.6	0.4575	0.0130
C10	J11	02_(STM)	CONDUIT	12.5	0.4784	0.0160
C11	J11	01_(STM)	CONDUIT	38.7	0.5691	0.0160
C12	J1	05&06_(STM)	CONDUIT	22.2	0.9625	0.0160
C12_1	J13	08_(STM)	CONDUIT	43.3	0.8285	0.0160
C12_3	08_(STM)	07_(STM)	CONDUIT	46.2	0.9757	0.0160
C12_4	J3	07_(STM)	CONDUIT	14.5	0.2067	0.0160
C13	J14_86.09	16&17(STM)	CONDUIT	41.6	0.6252	0.0160
C14	J14_86.09	J4	CONDUIT	30.4	0.3613	0.0160
C15	J24	12_(STM)	CONDUIT	10.3	0.5802	0.0160
C16	J40	30_(STM)	CONDUIT	39.0	0.5391	0.0160
C16_1	J22	J34	CONDUIT	16.2	0.8759	0.0160
C16_2	J34	12_(STM)	CONDUIT	37.1	0.4801	0.0160
C17	J22	13_(STM)	CONDUIT	9.4	0.6374	0.0160
C18	J20	13_(STM)	CONDUIT	38.8	0.5922	0.0160
C19	J20	14_(STM)	CONDUIT	10.8	0.5545	0.0160
C2	08_(STM)	307_(STM)	CONDUIT	6.0	1.0001	0.0130
C2_1	J2	10_(STM)	CONDUIT	57.0	0.6316	0.0160
C2_2	10_(STM)	09_(STM)	CONDUIT	43.3	0.5778	0.0160
C20	01_(STM)	303_(STM)	CONDUIT	3.7	1.3395	0.0130
C20_1	J18	J1	CONDUIT	19.1	0.7114	0.0160

C20_2	J1	14_(STM)	CONDUIT	24.8	0.5395
0.0160					
C21	J18	15&32_(STM)	CONDUIT	10.2	0.5891
0.0160					
C22	J16	15&32_(STM)	CONDUIT	26.5	0.9061
0.0160					
C23	303_(STM)	01_(STM)	CONDUIT	3.0	-1.6669
0.0160					
C23_1	J16	31_(STM)	CONDUIT	18.0	0.4397
0.0160					
C23_2	31_(STM)	16&17(STM)	CONDUIT	40.2	0.4501
0.0160					
C24	J43	30_(STM)	CONDUIT	9.1	0.6563
0.0160					
C25	J43	29_(STM)	CONDUIT	36.5	0.6026
0.0160					
C26	J38	29_(STM)	CONDUIT	10.5	0.5695
0.0160					
C27	J38	28_(STM)	CONDUIT	35.1	0.7120
0.0160					
C28	J36	28_(STM)	CONDUIT	24.8	0.7650
0.0160					
C29	J36	24_(STM)	CONDUIT	8.9	0.6714
0.0160					
C3	J4	09_(STM)	CONDUIT	14.3	1.1151
0.0160					
C30	J32	24_(STM)	CONDUIT	24.5	0.5706
0.0160					
C31	J27	J44	CONDUIT	27.1	0.3696
0.0160					
C31_1	J32	J44	CONDUIT	37.5	0.6134
0.0160					
C31_2	J44	18_(STM)	CONDUIT	21.7	0.7384
0.0160					
C32	J34	18_(STM)	CONDUIT	18.8	0.7350
0.0160					
C33	11_(STM)	OF2	CONDUIT	21.0	-0.6200
0.0160					
C33_1	J40	27_(STM)	CONDUIT	17.1	0.7038
0.0160					
C33_2	27_(STM)	26_(STM)	CONDUIT	39.8	0.7036
0.0160					
C34	J42	26_(STM)	CONDUIT	10.9	0.5493
0.0160					
C35	01_(STM)	OF3	CONDUIT	23.4	0.1707
0.0160					
C35_1	J42	25_(STM)	CONDUIT	21.9	0.0957
0.0160					
C35_2	25_(STM)	J36	CONDUIT	5.3	0.1711
0.0160					
C36	J32	21_(STM)	CONDUIT	14.5	1.1026
0.0160					
C37	J30	21_(STM)	CONDUIT	12.3	0.9726
0.0160					
C38	J30	22_(STM)	CONDUIT	10.6	0.5636
0.0160					
C39	503_(STM)	11_(STM)	CONDUIT	3.0	-1.6669
0.0160					
C39_1	J28	23_(STM)	CONDUIT	17.0	0.7471
0.0160					
C39_2	23_(STM)	22_(STM)	CONDUIT	44.6	0.5444
0.0160					

C4	J4	J5	CONDUIT	7.0	-2.4269
0.0160					
C40_1	J28	20_(STM)	CONDUIT	31.9	0.5606
0.0160					
C40_2	20_(STM)	19_(STM)	CONDUIT	44.9	0.6257
0.0160					
C41	J27	19_(STM)	CONDUIT	11.2	0.5370
0.0160					
C5	J3	05&06_(STM)	CONDUIT	11.5	1.4764
0.0160					
C5_1	J5	J3	CONDUIT	33.8	0.3548
0.0160					
C5_2	J3	04_(STM)	CONDUIT	8.6	0.9273
0.0160					
C6	04_(STM)	J7	CONDUIT	13.7	-1.5370
0.0160					
C7	J9	03_(STM)	CONDUIT	13.3	-1.8047
0.0160					
C8	J7	03_(STM)	CONDUIT	42.3	-0.0709
0.0160					
C9	J9	02_(STM)	CONDUIT	43.1	0.6497
0.0160					
STM-167_(STM)	30_(STM)	528_(STM)	CONDUIT	4.4	1.4242
0.0130					
STM-168_(STM)	18_(STM)	510_(STM)	CONDUIT	3.4	2.0574
0.0130					
STM-169_(STM)	29_(STM)	527_(STM)	CONDUIT	2.2	2.8426
0.0130					
STM-170_(STM)	27_(STM)	522_(STM)	CONDUIT	3.5	1.9834
0.0130					
STM-171_(STM)	26_(STM)	521_(STM)	CONDUIT	3.8	1.8463
0.0130					
STM-172_(STM)	21_(STM)	516_(STM)	CONDUIT	3.6	1.4378
0.0130					
STM-173_(STM)	22_(STM)	517_(STM)	CONDUIT	3.2	1.6632
0.0130					
STM-174_(STM)	23_(STM)	518_(STM)	CONDUIT	5.0	1.0401
0.0130					
STM-175_(STM)	20_(STM)	514_(STM)	CONDUIT	3.9	1.3438
0.0130					
STM-176_(STM)	11_(STM)	503_(STM)	CONDUIT	3.8	0.5281
0.0130					
STM-177_(STM)	12_(STM)	504_(STM)	CONDUIT	3.7	1.4425
0.0130					
STM-178_(STM)	13_(STM)	506_(STM)	CONDUIT	4.2	1.2731
0.0130					
STM-179_(STM)	14_(STM)	507_(STM)	CONDUIT	3.9	1.3756
0.0130					
STM-180_(STM)	05&06_(STM)	306_(STM)	CONDUIT	9.1	0.6586
0.0130					
STM-181_(STM)	05&06_(STM)	306_(STM)	CONDUIT	9.6	0.9298
0.0130					
STM-182_(STM)	15&32_(STM)	508_(STM)	CONDUIT	5.0	-4.4043
0.0130					
STM-184_(STM)	10_(STM)	310_(STM)	CONDUIT	6.0	0.9000
0.0130					
STM-185_(STM)	07_(STM)	306_(STM)	CONDUIT	19.1	0.3134
0.0130					
STM-186_(STM)	04_(STM)	306_(STM)	CONDUIT	11.5	0.4357
0.0130					
STM-187_(STM)	03_(STM)	305_(STM)	CONDUIT	5.5	1.2833
0.0130					

STM-188_(STM)	02_(STM)	304_(STM)	CONDUIT	3.7	1.8826
0.0130					
STM-191_(STM)	09_(STM)	309_(STM)	CONDUIT	7.5	0.6933
0.0130					
STM-192_(STM)	25_(STM)	521_(STM)	CONDUIT	35.0	0.1428
0.0130					
STM-193_(STM)	24_(STM)	519_(STM)	CONDUIT	2.9	2.3368
0.0130					
STM-194_(STM)	19_(STM)	513_(STM)	CONDUIT	4.5	1.1665
0.0130					
STM-195_(STM)	703_(STM)	312_(STM)	CONDUIT	33.3	0.4990
0.0130					
STM-199_(STM)	701_(STM)	304_(STM)	CONDUIT	54.4	0.3033
0.0130					
STM-203_(STM)	706_(STM)	504_(STM)	CONDUIT	58.6	0.2609
0.0130					
STM-205_(STM)	31_(STM)	509_(STM)	CONDUIT	26.4	0.3028
0.0130					
STM-206_(STM)	15&32_(STM)	508_(STM)	CONDUIT	5.0	1.7002
0.0130					
STM-207_(STM)	34_(STM)	518_(STM)	CONDUIT	21.8	0.9977
0.0130					
STM-208_(STM)	33_(STM)	514_(STM)	CONDUIT	20.9	1.0002
0.0130					
STM-209_(STM)	35_(STM)	522_(STM)	CONDUIT	23.3	1.0018
0.0130					
STM-211_(STM)	305_(STM)	312_(STM)	CONDUIT	17.4	0.2993
0.0130					
STM-212_(STM)	803_(STM)	802_(STM)	CONDUIT	10.4	0.9999
0.0130					
STM-213_(STM)	802_(STM)	801_(STM)	CONDUIT	70.3	0.4996
0.0130					
STM-214_(STM)	801_(STM)	Merivale	CONDUIT	17.0	1.0021
0.0130					
STM-28_(1)_(STM)	527_(STM)	526_(STM)	CONDUIT	22.3	0.3009
0.0130					
STM-28_(STM)	528_(STM)	527_(STM)	CONDUIT	47.9	0.4994
0.0130					
STM-29_(STM)	526_(STM)	525_(STM)	CONDUIT	18.1	0.2984
0.0130					
STM-30_(1)_(STM)	523_(STM)	520_(STM)	CONDUIT	21.5	0.3016
0.0130					
STM-30_(STM)	525_(STM)	523_(STM)	CONDUIT	8.3	0.2999
0.0130					
STM-31_(1)_(STM)	519_(STM)	515_(STM)	CONDUIT	27.0	0.2891
0.0130					
STM-31_(STM)	520_(STM)	519_(STM)	CONDUIT	12.4	0.3133
0.0130					
STM-32_(STM)	515_(STM)	511_(STM)	CONDUIT	31.6	0.3011
0.0130					
STM-33_(1)_(STM)	510_(STM)	505_(STM)	CONDUIT	14.3	0.3004
0.0130					
STM-33_(STM)	511_(STM)	510_(STM)	CONDUIT	27.8	0.2981
0.0130					
STM-34_(STM)	505_(STM)	504_(STM)	CONDUIT	32.5	0.3041
0.0130					
STM-35_(1)_(STM)	501_(STM)	500_(STM)	CONDUIT	7.2	0.3056
0.0130					
STM-35_(2)_(STM)	502_(STM)	501_(STM)	CONDUIT	6.4	0.2969
0.0130					
STM-35_(3)_(STM)_2	dummy2	502_(STM)	CONDUIT	10.4	
0.2981	0.0130				

```
  STM-35_(STM)      504_(STM)         503_(STM)         CONDUIT           43.7    0.2995
0.0130
  STM-36_(1)_(STM) 521_(STM)         520_(STM)         CONDUIT           39.1    0.2995
0.0130
  STM-36_(STM)      522_(STM)         521_(STM)         CONDUIT           40.9    0.3008
0.0130
  STM-37_(1)_(STM) 516_(STM)         515_(STM)         CONDUIT           15.6    0.3021
0.0130
  STM-37_(2)_(STM) 517_(STM)         516_(STM)         CONDUIT           23.5    0.3019
0.0130
  STM-37_(STM)      518_(STM)         517_(STM)         CONDUIT           45.4    0.2996
0.0130
  STM-38_(1)_(1)_(STM) 512_(STM)         511_(STM)         CONDUIT           16.4
0.2991    0.0130
  STM-38_(1)_(STM) 513_(STM)         512_(STM)         CONDUIT           23.9    0.3058
0.0130
  STM-38_(STM)      514_(STM)         513_(STM)         CONDUIT           45.7    0.2996
0.0130
  STM-39_(STM)      508_(STM)         507_(STM)         CONDUIT           55.2    0.3009
0.0130
  STM-40_(STM)      507_(STM)         506_(STM)         CONDUIT           48.5    0.3010
0.0130
  STM-41_(STM)      506_(STM)         505_(STM)         CONDUIT           31.1    0.2987
0.0130
  STM-42_(STM)      311_(STM)         308_(STM)         CONDUIT           52.4    0.4997
0.0130
  STM-43_(STM)      308_(STM)         306_(STM)         CONDUIT           35.3    0.3001
0.0130
  STM-44_(1)_(STM) 306_(STM)         305_(STM)         CONDUIT           65.1    0.2995
0.0130
  STM-45_(1)_(STM) 312_(STM)         304_(STM)         CONDUIT           38.7    0.3078
0.0130
  STM-46            304_(STM)         303_(STM)         CONDUIT           50.9    0.2947
0.0130
  STM-46_(1)_(STM) 301_(STM)         300_(STM)         CONDUIT            9.6    0.3008
0.0130
  STM-46_(2)_(STM) 302_(STM)         301_(STM)         CONDUIT            5.9    0.3062
0.0130
  STM-46_(3)_(STM)_2 dummy1            302_(STM)         CONDUIT           10.8
0.2870    0.0130
  STM-49_(1)_(STM) 307_(STM)         306_(STM)         CONDUIT           62.9    0.2971
0.0130
  STM-50_(1)_(STM) 309_(STM)         308_(STM)         CONDUIT           14.8    0.2974
0.0130
  STM-50_(STM)      310_(STM)         309_(STM)         CONDUIT           44.5    0.3011
0.0130
  STM-52_(STM)      500_(STM)         MHST31837         CONDUIT           54.1    0.3603
0.0130
  STM-60_(STM)      509_(STM)         508_(STM)         CONDUIT           68.2    0.4969
0.0130
  STM-73_(STM)      28_(STM)          523_(STM)         CONDUIT            2.6    2.7311
0.0130
  STM-98_(STM)      16&17(STM)        509_(STM)         CONDUIT           22.1   -0.2719
0.0130
  STM-99_(STM)      16&17(STM)        509_(STM)         CONDUIT           24.2    0.7977
0.0130
  ICD-303           303_(STM)         dummy1            ORIFICE
  ICD-503           503_(STM)         dummy2            ORIFICE
  OL3               SU1               OF1               OUTLET


  **********
  Cross Section Summary
```

****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow
C1	9m_ROW	0.15	0.72	0.08	9.00	1	645.14
C1_1	CIRCULAR	1.50	1.77	0.38	1.50	1	3795.00
C1_2	CIRCULAR	1.50	1.77	0.38	1.50	1	4781.69
C10	9m_ROW	0.15	0.72	0.08	9.00	1	563.72
C11	9m_ROW	0.15	0.72	0.08	9.00	1	614.86
C12	9m_ROW	0.15	0.72	0.08	9.00	1	799.61
C12_1	9m_ROW	0.15	0.72	0.08	9.00	1	741.85
C12_3	9m_ROW	0.15	0.72	0.08	9.00	1	805.06
C12_4	9m_ROW	0.15	0.72	0.08	9.00	1	370.58
C13	9m_ROW	0.15	0.72	0.08	9.00	1	644.42
C14	9m_ROW	0.15	0.72	0.08	9.00	1	489.87
C15	9m_ROW	0.15	0.72	0.08	9.00	1	620.79
C16	9m_ROW	0.15	0.72	0.08	9.00	1	598.44
C16_1	9m_ROW	0.15	0.72	0.08	9.00	1	762.79
C16_2	9m_ROW	0.15	0.72	0.08	9.00	1	564.72
C17	9m_ROW	0.15	0.72	0.08	9.00	1	650.67
C18	9m_ROW	0.15	0.72	0.08	9.00	1	627.21
C19	9m_ROW	0.15	0.72	0.08	9.00	1	606.92
C2	CIRCULAR	1.00	0.79	0.25	1.00	1	2397.78
C2_1	9m_ROW	0.15	0.72	0.08	9.00	1	647.72
C2_2	9m_ROW	0.15	0.72	0.08	9.00	1	619.51
C20	CIRCULAR	0.20	0.03	0.05	0.20	1	37.96
C20_1	9m_ROW	0.15	0.72	0.08	9.00	1	687.40
C20_2	9m_ROW	0.15	0.72	0.08	9.00	1	598.65
C21	9m_ROW	0.15	0.72	0.08	9.00	1	625.53
C22	9m_ROW	0.15	0.72	0.08	9.00	1	775.80
C23	RECT_OPEN	0.35	1.05	0.28	3.00	1	3659.11
C23_1	9m_ROW	0.15	0.72	0.08	9.00	1	540.42

C23_2	9m_ROW	0.15	0.72	0.08	9.00	1
546.79						
C24	9m_ROW	0.15	0.72	0.08	9.00	1
660.24						
C25	9m_ROW	0.15	0.72	0.08	9.00	1
632.68						
C26	9m_ROW	0.15	0.72	0.08	9.00	1
615.08						
C27	9m_ROW	0.15	0.72	0.08	9.00	1
687.74						
C28	9m_ROW	0.15	0.72	0.08	9.00	1
712.86						
C29	9m_ROW	0.15	0.72	0.08	9.00	1
667.81						
C3	9m_ROW	0.15	0.72	0.08	9.00	1
860.63						
C30	9m_ROW	0.15	0.72	0.08	9.00	1
615.65						
C31	9m_ROW	0.15	0.72	0.08	9.00	1
495.49						
C31_1	9m_ROW	0.15	0.72	0.08	9.00	1
638.35						
C31_2	9m_ROW	0.15	0.72	0.08	9.00	1
700.37						
C32	9m_ROW	0.15	0.72	0.08	9.00	1
698.74						
C33	9m_ROW	0.15	0.72	0.08	9.00	1
641.73						
C33_1	9m_ROW	0.15	0.72	0.08	9.00	1
683.74						
C33_2	9m_ROW	0.15	0.72	0.08	9.00	1
683.64						
C34	9m_ROW	0.15	0.72	0.08	9.00	1
604.03						
C35	9m_ROW	0.15	0.72	0.08	9.00	1
336.75						
C35_1	9m_ROW	0.15	0.72	0.08	9.00	1
252.18						
C35_2	9m_ROW	0.15	0.72	0.08	9.00	1
337.10						
C36	9m_ROW	0.15	0.72	0.08	9.00	1
855.81						
C37	9m_ROW	0.15	0.72	0.08	9.00	1
803.77						
C38	9m_ROW	0.15	0.72	0.08	9.00	1
611.86						
C39	RECT_OPEN	0.35	1.05	0.28	3.00	1
3659.11						
C39_1	9m_ROW	0.15	0.72	0.08	9.00	1
704.45						
C39_2	9m_ROW	0.15	0.72	0.08	9.00	1
601.38						
C4	9m_ROW	0.15	0.72	0.08	9.00	1
1269.67						
C40_1	9m_ROW	0.15	0.72	0.08	9.00	1
610.24						
C40_2	9m_ROW	0.15	0.72	0.08	9.00	1
644.68						
C41	9m_ROW	0.15	0.72	0.08	9.00	1
597.23						
C5	9m_ROW	0.15	0.72	0.08	9.00	1
990.30						

C5_1	9m_ROW	0.15	0.72	0.08	9.00	1
485.45						
C5_2	9m_ROW	0.15	0.72	0.08	9.00	1
784.82						
C6	9m_ROW	0.15	0.72	0.08	9.00	1
1010.41						
C7	9m_ROW	0.15	0.72	0.08	9.00	1
1094.88						
C8	9m_ROW	0.15	0.72	0.08	9.00	1
216.98						
C9	9m_ROW	0.15	0.72	0.08	9.00	1
656.94						
STM-167_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
39.14						
STM-168_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
47.05						
STM-169_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
55.30						
STM-170_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
46.19						
STM-171_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
44.57						
STM-172_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
39.33						
STM-173_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
42.30						
STM-174_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
33.45						
STM-175_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
38.02						
STM-176_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
23.84						
STM-177_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
39.39						
STM-178_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
37.01						
STM-179_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
38.47						
STM-180_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
26.62						
STM-181_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
31.63						
STM-182_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
68.84						
STM-184_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
31.12						
STM-185_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
18.36						
STM-186_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
21.65						
STM-187_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
37.16						
STM-188_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
45.00						
STM-191_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
27.31						
STM-192_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
12.39						
STM-193_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
50.14						
STM-194_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
35.43						

STM-195_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	42.01
STM-199_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	32.75
STM-203_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	30.38
STM-205_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	18.05
STM-206_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	42.77
STM-207_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.76
STM-208_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.80
STM-209_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1	32.83
STM-211_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2132.93
STM-212_(STM)	CIRCULAR	0.25	0.05	0.06	0.25	1	59.47
STM-213_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	123.93
STM-214_(STM)	CIRCULAR	0.38	0.11	0.09	0.38	1	175.52
STM-28_(1)_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	993.11
STM-28_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	1279.34
STM-29_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	988.92
STM-30_(1)_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	994.31
STM-30_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	991.45
STM-31_(1)_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	973.38
STM-31_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	1013.28
STM-32_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2139.33
STM-33_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2137.00
STM-33_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2128.71
STM-34_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2150.27
STM-35_(1)_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	237.74
STM-35_(2)_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1	234.34
STM-35_(3)_(STM)_2	CIRCULAR	0.53	0.22	0.13	0.53	1	234.81
STM-35_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2133.72
STM-36_(1)_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	990.77
STM-36_(STM)	CIRCULAR	0.90	0.64	0.23	0.90	1	992.91
STM-37_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2143.00
STM-37_(2)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1	2142.34

STM-37_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2134.25						
STM-38_(1)_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2132.25						
STM-38_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2156.23						
STM-38_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2134.19						
STM-39_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2138.64						
STM-40_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2139.02						
STM-41_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2130.99						
STM-42_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2756.16						
STM-43_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2135.90						
STM-44_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2133.82						
STM-45_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2163.27						
STM-46	CIRCULAR	1.20	1.13	0.30	1.20	1
2116.47						
STM-46_(1)_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1
235.90						
STM-46_(2)_(STM)	CIRCULAR	0.53	0.22	0.13	0.53	1
237.98						
STM-46_(3)_(STM)_2	CIRCULAR	0.53	0.22	0.13	0.53	1
230.42						
STM-49_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2125.09						
STM-50_(1)_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2126.27						
STM-50_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2139.34						
STM-52_(STM)	CIRCULAR	1.50	1.77	0.38	1.50	1
4243.07						
STM-60_(STM)	CIRCULAR	1.20	1.13	0.30	1.20	1
2748.38						
STM-73_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
54.21						
STM-98_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
17.10						
STM-99_(STM)	CIRCULAR	0.20	0.03	0.05	0.20	1
29.30						

****
Transect Summary
****

Transect 9m_ROW
Area:

0.0004	0.0016	0.0036	0.0064	0.0100
0.0145	0.0197	0.0257	0.0325	0.0402
0.0486	0.0579	0.0679	0.0788	0.0904
0.1029	0.1161	0.1302	0.1450	0.1607
0.1772	0.1945	0.2125	0.2314	0.2511
0.2716	0.2929	0.3150	0.3379	0.3616
0.3861	0.4114	0.4375	0.4645	0.4922
0.5207	0.5500	0.5802	0.6111	0.6429

```
            0.6754     0.7088     0.7429     0.7779     0.8136
            0.8502     0.8875     0.9250     0.9625     1.0000
Hrad:
            0.0188     0.0376     0.0564     0.0752     0.0940
            0.1127     0.1315     0.1503     0.1691     0.1879
            0.2067     0.2255     0.2443     0.2631     0.2819
            0.3006     0.3194     0.3382     0.3570     0.3758
            0.3946     0.4134     0.4322     0.4510     0.4698
            0.4886     0.5073     0.5261     0.5449     0.5637
            0.5825     0.6013     0.6201     0.6389     0.6577
            0.6765     0.6952     0.7140     0.7328     0.7516
            0.7704     0.7892     0.8080     0.8268     0.8456
            0.8644     0.8892     0.9262     0.9631     1.0000
Width:
            0.0214     0.0429     0.0643     0.0857     0.1071
            0.1286     0.1500     0.1714     0.1929     0.2143
            0.2357     0.2571     0.2786     0.3000     0.3214
            0.3429     0.3643     0.3857     0.4071     0.4286
            0.4500     0.4714     0.4929     0.5143     0.5357
            0.5571     0.5786     0.6000     0.6214     0.6429
            0.6643     0.6857     0.7071     0.7286     0.7500
            0.7714     0.7929     0.8143     0.8357     0.8571
            0.8786     0.9000     0.9214     0.9429     0.9643
            0.9857     1.0000     1.0000     1.0000     1.0000


************************************************************
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 ........... YES
  Ponding Allowed ........ NO
  Water Quality .......... NO
Infiltration Method ...... HORTON
Flow Routing Method ...... DYNWAVE
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
Wet Time Step ............ 00:01:00
Dry Time Step ............ 00:01:00
Routing Time Step ........ 5.00 sec
Variable Time Step ....... YES
Maximum Trials ........... 8
Number of Threads ........ 4
Head Tolerance ........... 0.001500 m

**************************        Volume         Depth
Runoff Quantity Continuity     hectare-m            mm
**************************     ---------       -------
```

Initial LID Storage	0.003	0.512
Total Precipitation	0.442	76.002
Evaporation Loss	0.000	0.000
Infiltration Loss	0.092	15.816
Surface Runoff	0.350	60.232
Final Storage	0.003	0.512
Continuity Error (%)	-0.060	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.350	3.501
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.002	0.017
External Outflow	0.352	3.523
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.017	0.166
Final Stored Volume	0.017	0.166
Continuity Error (%)	-0.129	

Time-Step Critical Elements

Link STM-169_(STM) (28.35%)
Link STM-35_(2)_(STM) (9.47%)
Link STM-73_(STM) (1.76%)
Link STM-193_(STM) (1.16%)

Highest Flow Instability Indexes

Link C1_1 (77)
Link STM-46_(1)_(STM) (74)
Link STM-35_(1)_(STM) (74)
Link C1_2 (54)
Link STM-52_(STM) (25)

Routing Time Step Summary

Minimum Time Step	:	0.50 sec
Average Time Step	:	3.53 sec
Maximum Time Step	:	5.00 sec
Percent in Steady State	:	0.00
Average Iterations per Step	:	2.40
Percent Not Converging	:	0.58
Time Step Frequencies	:	
5.000 - 3.155 sec	:	58.86 %
3.155 - 1.991 sec	:	6.74 %
1.991 - 1.256 sec	:	20.72 %
1.256 - 0.792 sec	:	9.11 %
0.792 - 0.500 sec	:	4.58 %

Subcatchment Runoff Summary
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Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff mm	Total Runoff 10^6 ltr	Peak Runoff LPS	Runoff Coeff
A-01	76.00	0.00	0.00	11.99	54.33	9.73	64.06	0.06	38.36	0.843
A-02	76.00	0.00	0.00	8.29	60.85	6.92	67.77	0.06	44.17	0.892
A-03	76.00	0.00	0.00	26.83	31.51	17.70	49.21	0.05	29.59	0.647
A-04	76.00	0.00	0.00	19.22	42.38	14.44	56.82	0.06	42.36	0.748
A-05	76.00	0.00	0.00	12.71	53.24	10.11	63.35	0.07	45.65	0.833
A-06	76.00	0.00	0.00	28.35	30.42	17.26	47.68	0.06	34.89	0.627
A-07	76.00	0.00	0.00	11.44	55.41	9.20	64.61	0.06	42.21	0.850
A-08	76.00	0.00	0.00	8.39	60.84	6.82	67.66	0.07	49.20	0.890
A-09	76.00	0.00	0.00	10.91	56.50	8.64	65.13	0.05	32.20	0.857
A-10	76.00	0.00	0.00	13.68	51.08	11.31	62.39	0.04	27.81	0.821
A-11	76.00	0.00	0.00	13.19	52.16	10.71	62.87	0.04	31.35	0.827
A-12	76.00	0.00	0.00	8.96	59.76	7.33	67.09	0.07	46.51	0.883
A-13	76.00	0.00	0.00	6.47	64.11	5.48	69.58	0.02	15.80	0.916
A-14	76.00	0.00	0.00	8.30	60.85	6.91	67.75	0.06	38.40	0.891
A-15	76.00	0.00	0.00	7.13	63.01	5.91	68.93	0.07	50.84	0.907
A-16	76.00	0.00	0.00	8.96	59.76	7.34	67.10	0.06	43.33	0.883
A-18	76.00	0.00	0.00	23.25	35.86	16.93	52.80	0.02	10.59	0.695
A-19	76.00	0.00	0.00	16.45	47.80	11.78	59.58	0.03	20.60	0.784
A-20	76.00	0.00	0.00	7.71	61.93	6.41	68.34	0.06	42.77	0.899
B-01	76.00	0.00	0.00	8.33	60.84	6.88	67.73	0.05	37.29	0.891
B-02	76.00	0.00	0.00	10.19	57.59	8.28	65.87	0.06	41.74	0.867
B-03	76.00	0.00	0.00	27.84	30.42	17.76	48.19	0.06	32.91	0.634
B-04	76.00	0.00	0.00	11.67	55.41	8.97	64.38	0.07	44.96	0.847
B-05	76.00	0.00	0.00	11.21	55.43	9.43	64.86	0.05	32.52	0.853
B-06	76.00	0.00	0.00	30.79	26.08	19.16	45.24	0.03	17.47	0.595

B-07			76.00	0.00	0.00	8.29	60.85	
6.92	67.77	0.06	38.97	0.892				
B-08			76.00	0.00	0.00	5.31	66.27	
4.47	70.74	0.07	47.88	0.931				
B-09			76.00	0.00	0.00	12.02	54.33	
9.70	64.03	0.03	18.63	0.843				
B-10			76.00	0.00	0.00	22.21	35.88	
17.98	53.86	0.01	10.05	0.709				
B-11			76.00	0.00	0.00	10.92	56.50	
8.64	65.13	0.07	44.54	0.857				
B-12			76.00	0.00	0.00	10.59	56.51	
8.97	65.48	0.03	24.38	0.862				
B-13			76.00	0.00	0.00	5.81	65.20	
5.06	70.26	0.03	20.46	0.924				
B-14			76.00	0.00	0.00	9.02	59.75	
7.28	67.03	0.07	45.99	0.882				
B-15			76.00	0.00	0.00	14.61	48.92	
12.56	61.49	0.01	6.08	0.809				
B-16			76.00	0.00	0.00	17.31	44.56	
14.19	58.76	0.02	15.48	0.773				
B-17			76.00	0.00	0.00	5.92	65.18	
4.95	70.13	0.06	43.27	0.923				
B-18			76.00	0.00	0.00	12.41	53.26	
10.40	63.66	0.03	22.96	0.838				
B-19			76.00	0.00	0.00	24.52	32.61	
18.93	51.54	0.01	8.27	0.678				
B-20			76.00	0.00	0.00	8.19	60.86	
7.02	67.88	0.03	19.18	0.893				
B-21			76.00	0.00	0.00	5.92	65.18	
4.95	70.13	0.06	41.37	0.923				
B-22			76.00	0.00	0.00	17.93	43.48	
14.66	58.14	0.02	15.33	0.765				
B-23			76.00	0.00	0.00	8.70	59.79	
7.61	67.40	0.01	7.75	0.887				
B-24			76.00	0.00	0.00	8.39	60.84	
6.82	67.66	0.06	43.22	0.890				
B-25			76.00	0.00	0.00	6.41	64.12	
5.55	69.67	0.03	20.39	0.917				
B-26			76.00	0.00	0.00	30.33	26.08	
19.62	45.70	0.03	15.57	0.601				
B-27			76.00	0.00	0.00	11.20	55.43	
9.45	64.87	0.03	22.82	0.854				
B-28			76.00	0.00	0.00	12.84	53.24	
9.97	63.20	0.04	25.52	0.832				
B-29			76.00	0.00	0.00	21.49	39.12	
15.43	54.55	0.03	20.94	0.718				
B-30			76.00	0.00	0.00	16.23	46.73	
13.10	59.84	0.03	17.89	0.787				
B-31			76.00	0.00	0.00	24.43	33.69	
17.92	51.61	0.03	19.17	0.679				
B-32			76.00	0.00	0.00	7.77	61.93	
6.35	68.28	0.05	36.20	0.898				
B-33			76.00	0.00	0.00	5.31	66.27	
4.47	70.74	0.07	45.96	0.931				
B-34			76.00	0.00	0.00	4.64	67.38	
4.06	71.44	0.03	20.08	0.940				
B-35			76.00	0.00	0.00	7.73	61.93	
6.39	68.32	0.06	38.39	0.899				
B-36			76.00	0.00	0.00	7.10	63.02	
5.94	68.96	0.06	38.83	0.907				
B-37			76.00	0.00	0.00	0.00	76.05	
0.00	76.05	0.03	17.77	1.001				

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  B-38                    76.00       0.00       0.00       9.40      58.69
7.99      66.67        0.07    47.83   0.877
  B-39                    76.00       0.00       0.00      17.89      44.55
13.61      58.16        0.04    26.19   0.765
  B-40                    76.00       0.00       0.00      11.50      55.41
9.14      64.55        0.05    35.20   0.849
  B-41                    76.00       0.00       0.00      19.84      41.29
14.91      56.21        0.04    26.97   0.740
  B-42                    76.00       0.00       0.00      20.18      40.21
15.66      55.87        0.03    18.93   0.735
  B-43                    76.00       0.00       0.00      13.49      52.15
10.40      62.56        0.05    32.33   0.823
  D-01                    76.00       0.00       0.00      33.30      25.00
42.76      42.76        0.01     5.37   0.563
  D-02                    76.00       0.00       0.00      36.17      21.74
39.87      39.87        0.03    12.39   0.525
  D-03                    76.00       0.00       0.00      46.41       0.00
29.61      29.61        0.00     1.31   0.390
  D-04                    76.00       0.00       0.00      44.43       2.17
31.59      31.59        0.01     6.19   0.416
  Park                    76.00       0.00       0.00      43.39       5.44
27.20      32.64        0.20    90.11   0.429
  Retirement_1            76.00       0.00       0.00       5.98      65.18
4.88      70.06        0.46   305.03   0.922
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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
01_(STM)	JUNCTION	0.08	0.74	84.62	0 01:42	0.74
02_(STM)	JUNCTION	0.06	0.56	84.63	0 01:42	0.56
03_(STM)	JUNCTION	0.04	0.37	84.65	0 01:30	0.37
04_(STM)	JUNCTION	0.03	0.34	84.84	0 01:30	0.34
05&06_(STM)	JUNCTION	0.04	0.33	84.63	0 01:30	0.33
07_(STM)	JUNCTION	0.05	0.70	85.67	0 01:30	0.69
08_(STM)	JUNCTION	0.01	0.09	85.06	0 01:30	0.09
09_(STM)	JUNCTION	0.02	0.18	84.71	0 01:30	0.18
10_(STM)	JUNCTION	0.01	0.11	84.92	0 01:30	0.11
11_(STM)	JUNCTION	0.08	0.64	84.54	0 01:43	0.64
12_(STM)	JUNCTION	0.06	0.49	84.55	0 01:43	0.49
13_(STM)	JUNCTION	0.03	0.31	84.63	0 01:30	0.31
14_(STM)	JUNCTION	0.02	0.16	84.65	0 01:30	0.16
15&32_(STM)	JUNCTION	0.04	0.44	84.87	0 01:30	0.44
16&17(STM)	JUNCTION	0.04	0.53	85.08	0 01:30	0.53
18_(STM)	JUNCTION	0.05	0.44	84.54	0 01:43	0.44
19_(STM)	JUNCTION	0.04	0.45	84.74	0 01:30	0.45
20_(STM)	JUNCTION	0.02	0.15	84.72	0 01:30	0.15
21_(STM)	JUNCTION	0.02	0.22	84.54	0 01:44	0.22
22_(STM)	JUNCTION	0.03	0.37	84.75	0 01:30	0.37
23_(STM)	JUNCTION	0.01	0.14	84.79	0 01:30	0.14
24_(STM)	JUNCTION	0.02	0.24	84.54	0 01:44	0.24
25_(STM)	JUNCTION	0.09	0.34	84.59	0 01:30	0.34
26_(STM)	JUNCTION	0.03	0.34	84.72	0 01:30	0.34
27_(STM)	JUNCTION	0.01	0.12	84.79	0 01:30	0.12
28_(STM)	JUNCTION	0.03	0.30	84.55	0 01:43	0.30
29_(STM)	JUNCTION	0.02	0.17	84.57	0 01:30	0.17
30_(STM)	JUNCTION	0.01	0.14	84.70	0 01:30	0.14

300_(STM)	JUNCTION	2.65	2.67	82.37	0	06:07	2.67
301_(STM)	JUNCTION	1.66	1.71	82.42	0	01:43	1.71
302_(STM)	JUNCTION	0.39	0.62	83.12	0	01:43	0.62
303_(STM)	JUNCTION	0.33	1.78	84.62	0	01:42	1.78
304_(STM)	JUNCTION	0.58	1.91	84.61	0	01:42	1.91
305_(STM)	JUNCTION	0.53	1.71	84.60	0	01:42	1.70
306_(STM)	JUNCTION	0.48	1.50	84.60	0	01:42	1.50
307_(STM)	JUNCTION	0.42	1.24	84.59	0	01:44	1.24
308_(STM)	JUNCTION	0.45	1.37	84.60	0	01:43	1.37
309_(STM)	JUNCTION	0.13	0.98	84.60	0	01:43	0.97
31_(STM)	JUNCTION	0.04	0.50	84.95	0	01:30	0.50
310_(STM)	JUNCTION	0.40	1.11	84.60	0	01:45	1.11
311_(STM)	JUNCTION	0.39	1.09	84.60	0	01:43	1.09
312_(STM)	JUNCTION	0.24	1.47	84.60	0	01:42	1.47
33_(STM)	JUNCTION	0.32	0.45	84.55	0	01:44	0.45
34_(STM)	JUNCTION	0.31	0.47	84.55	0	01:44	0.47
35_(STM)	JUNCTION	0.32	0.52	84.57	0	01:43	0.50
500_(STM)	JUNCTION	2.81	2.82	82.36	0	06:45	2.82
501_(STM)	JUNCTION	1.84	1.98	82.52	0	01:43	1.98
502_(STM)	JUNCTION	0.42	0.72	83.09	0	01:43	0.72
503_(STM)	JUNCTION	0.37	1.83	84.53	0	01:43	1.82
504_(STM)	JUNCTION	0.61	1.98	84.53	0	01:43	1.98
505_(STM)	JUNCTION	0.59	1.87	84.53	0	01:43	1.87
506_(STM)	JUNCTION	0.55	1.77	84.53	0	01:44	1.77
507_(STM)	JUNCTION	0.51	1.62	84.54	0	01:44	1.62
508_(STM)	JUNCTION	0.47	1.44	84.54	0	01:45	1.44
509_(STM)	JUNCTION	0.10	0.79	84.54	0	01:45	0.78
510_(STM)	JUNCTION	0.26	1.47	84.53	0	01:43	1.47
511_(STM)	JUNCTION	0.53	1.68	84.54	0	01:44	1.68
512_(STM)	JUNCTION	0.20	1.28	84.54	0	01:44	1.28
513_(STM)	JUNCTION	0.18	1.21	84.54	0	01:44	1.21
514_(STM)	JUNCTION	0.44	1.32	84.54	0	01:44	1.32
515_(STM)	JUNCTION	0.51	1.58	84.54	0	01:44	1.58
516_(STM)	JUNCTION	0.18	1.18	84.54	0	01:44	1.18
517_(STM)	JUNCTION	0.16	1.10	84.54	0	01:44	1.09
518_(STM)	JUNCTION	0.42	1.26	84.54	0	01:44	1.25
519_(STM)	JUNCTION	0.19	1.20	84.54	0	01:43	1.20
520_(STM)	JUNCTION	0.48	1.45	84.54	0	01:43	1.45
521_(STM)	JUNCTION	0.14	0.98	84.54	0	01:43	0.97
522_(STM)	JUNCTION	0.40	1.15	84.55	0	01:43	1.13
523_(STM)	JUNCTION	0.15	1.08	84.54	0	01:42	1.08
525_(STM)	JUNCTION	0.44	1.34	84.55	0	01:42	1.34
526_(STM)	JUNCTION	0.42	1.23	84.55	0	01:42	1.23
527_(STM)	JUNCTION	0.10	0.84	84.55	0	01:43	0.84
528_(STM)	JUNCTION	0.36	0.89	84.55	0	01:43	0.87
701_(STM)	JUNCTION	0.33	1.72	85.36	0	01:28	0.99
703_(STM)	JUNCTION	0.33	1.06	84.96	0	01:34	0.72
706_(STM)	JUNCTION	0.34	1.82	85.32	0	01:27	1.06
801_(STM)	JUNCTION	0.03	0.20	82.14	0	01:30	0.20
802_(STM)	JUNCTION	0.03	0.24	84.34	0	01:30	0.24
803_(STM)	JUNCTION	0.04	0.45	84.90	0	01:30	0.45
dummy1	JUNCTION	0.09	0.35	83.19	0	01:43	0.35
dummy2	JUNCTION	0.13	0.48	83.19	0	01:43	0.48
EXSTMMH	JUNCTION	2.39	2.41	82.37	0	06:40	2.41
J1	JUNCTION	0.00	0.00	85.77	0	00:00	0.00
J11	JUNCTION	0.00	0.00	85.28	0	00:00	0.00
J13	JUNCTION	0.00	0.00	86.51	0	00:00	0.00
J14_86.09	JUNCTION	0.00	0.00	86.09	0	00:00	0.00
J16	JUNCTION	0.00	0.00	86.09	0	00:00	0.00
J18	JUNCTION	0.00	0.00	85.91	0	00:00	0.00
J2	JUNCTION	0.00	0.00	86.28	0	00:00	0.00
J20	JUNCTION	0.00	0.00	85.70	0	00:00	0.00
J22	JUNCTION	0.00	0.00	85.53	0	00:00	0.00

J24	JUNCTION	0.00	0.00	85.27	0	00:00	0.00
J27	JUNCTION	0.00	0.00	85.51	0	00:00	0.00
J28	JUNCTION	0.00	0.00	85.91	0	00:00	0.00
J3	JUNCTION	0.00	0.00	85.73	0	00:00	0.00
J30	JUNCTION	0.00	0.00	85.60	0	00:00	0.00
J32	JUNCTION	0.00	0.00	85.64	0	00:00	0.00
J34	JUNCTION	0.00	0.00	85.39	0	00:00	0.00
J36	JUNCTION	0.00	0.00	85.56	0	00:00	0.00
J38	JUNCTION	0.00	0.00	85.62	0	00:00	0.00
J4	JUNCTION	0.00	0.00	85.83	0	00:00	0.00
J40	JUNCTION	0.00	0.00	85.93	0	00:00	0.00
J42	JUNCTION	0.00	0.00	85.59	0	00:00	0.00
J43	JUNCTION	0.00	0.00	85.78	0	00:00	0.00
J44	JUNCTION	0.00	0.00	85.41	0	00:00	0.00
J5	JUNCTION	0.00	0.00	85.85	0	00:00	0.00
J7	JUNCTION	0.00	0.00	85.71	0	00:00	0.00
J9	JUNCTION	0.00	0.00	85.50	0	00:00	0.00
CommercialRoad	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
ConroyRoad	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
DonReidDrive	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
Merivale	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
MHST31837	OUTFALL	2.71	2.71	82.35	0	00:00	2.71
OF1	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
OF2	OUTFALL	0.00	0.00	85.19	0	00:00	0.00
OF3	OUTFALL	0.00	0.00	85.02	0	00:00	0.00
StLaurentBlvd	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU1	STORAGE	0.20	1.57	1.57	0	01:44	1.57

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Node Inflow Summary
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Node	Type	Maximum Lateral Inflow LPS	Maximum Total Inflow LPS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 ltr	Total Inflow 10^6 ltr	Flow Balance Error Percent
01_(STM)	JUNCTION	38.36	38.36	0 01:30	0.0551	0.0551	-0.000
02_(STM)	JUNCTION	42.36	42.36	0 01:30	0.0636	0.0636	0.003
03_(STM)	JUNCTION	42.21	42.21	0 01:30	0.0614	0.0614	0.001
04_(STM)	JUNCTION	32.20	32.20	0 01:30	0.0475	0.0475	0.138
05&06_(STM)	JUNCTION	59.16	59.16	0 01:30	0.0833	0.0833	0.166
07_(STM)	JUNCTION	46.51	46.51	0 01:30	0.0678	0.0678	0.012
08_(STM)	JUNCTION	38.40	38.40	0 01:30	0.0556	0.0556	-0.005
09_(STM)	JUNCTION	20.60	20.60	0 01:30	0.0322	0.0322	0.030
10_(STM)	JUNCTION	10.59	10.59	0 01:30	0.0164	0.0164	-0.001

11_(STM)	JUNCTION	37.29	37.29	0	01:30	0.0542	0.0542	-0.004
12_(STM)	JUNCTION	44.96	44.96	0	01:30	0.0676	0.0676	0.001
13_(STM)	JUNCTION	36.20	36.20	0	01:30	0.0533	0.0533	-0.001
14_(STM)	JUNCTION	20.08	20.08	0	01:30	0.0293	0.0293	-0.000
15&32_(STM)	JUNCTION	65.80	65.80	0	01:30	0.097	0.097	0.023
16&17(STM)	JUNCTION	74.02	74.02	0	01:30	0.106	0.106	0.177
18_(STM)	JUNCTION	38.97	38.97	0	01:30	0.0562	0.0562	0.000
19_(STM)	JUNCTION	47.88	47.88	0	01:30	0.0707	0.0707	-0.000
20_(STM)	JUNCTION	18.63	18.63	0	01:30	0.0269	0.0269	-0.001
21_(STM)	JUNCTION	22.96	22.96	0	01:30	0.0318	0.0318	-0.002
22_(STM)	JUNCTION	43.27	43.27	0	01:30	0.0638	0.0638	-0.001
23_(STM)	JUNCTION	15.48	15.48	0	01:30	0.0211	0.0211	-0.001
24_(STM)	JUNCTION	19.18	19.18	0	01:30	0.0272	0.0272	-0.003
25_(STM)	JUNCTION	20.39	20.39	0	01:30	0.0293	0.0293	0.980
26_(STM)	JUNCTION	41.37	41.37	0	01:30	0.061	0.061	-0.001
27_(STM)	JUNCTION	15.33	15.33	0	01:30	0.0209	0.0209	-0.001
28_(STM)	JUNCTION	22.82	22.82	0	01:30	0.0318	0.0318	-0.002
29_(STM)	JUNCTION	25.52	25.52	0	01:30	0.0379	0.0379	-0.001
30_(STM)	JUNCTION	17.89	17.89	0	01:30	0.0251	0.0251	-0.001
300_(STM)	JUNCTION	0.00	159.75	0	01:43	0	1.07	0.014
301_(STM)	JUNCTION	0.00	159.61	0	01:43	0	1.04	0.022
302_(STM)	JUNCTION	0.00	159.58	0	01:43	0	1.02	-0.014
303_(STM)	JUNCTION	44.17	203.31	0	01:34	0.0637	1.02	-0.007
304_(STM)	JUNCTION	45.65	215.48	0	01:23	0.0665	0.905	-0.140
305_(STM)	JUNCTION	49.20	271.75	0	01:23	0.0724	0.678	-0.064
306_(STM)	JUNCTION	0.00	287.12	0	01:24	0	0.584	-0.074
307_(STM)	JUNCTION	15.80	125.69	0	01:29	0.023	0.0924	-0.061
308_(STM)	JUNCTION	42.77	215.27	0	01:30	0.0622	0.306	0.145
309_(STM)	JUNCTION	50.84	128.50	0	01:29	0.0744	0.194	0.514
31_(STM)	JUNCTION	35.20	35.20	0	01:30	0.0516	0.0516	0.379
310_(STM)	JUNCTION	43.33	66.31	0	01:30	0.0631	0.0843	-0.181

311_(STM)	JUNCTION	0.00	64.79	0	01:30	0	0.0243
-3.815							
312_(STM)	JUNCTION	0.00	200.62	0	01:23	0	0.729
-0.128							
33_(STM)	JUNCTION	18.93	18.93	0	01:30	0.0274	0.0274
0.317							
34_(STM)	JUNCTION	0.00	3.29	0	01:38	0	0.000544
-3.635							
35_(STM)	JUNCTION	32.33	32.33	0	01:30	0.0482	0.0482
0.376							
500_(STM)	JUNCTION	0.00	420.40	0	01:44	0	2.85
-0.107							
501_(STM)	JUNCTION	0.00	261.64	0	01:43	0	1.79
0.027							
502_(STM)	JUNCTION	0.00	261.63	0	01:43	0	1.78
-0.001							
503_(STM)	JUNCTION	41.74	281.14	0	01:35	0.0606	1.78
-0.005							
504_(STM)	JUNCTION	32.52	261.77	0	01:35	0.0454	1.66
-0.073							
505_(STM)	JUNCTION	0.00	244.18	0	01:23	0	1.5
-0.034							
506_(STM)	JUNCTION	45.96	178.43	0	01:27	0.0679	0.493
0.018							
507_(STM)	JUNCTION	38.39	177.98	0	01:27	0.056	0.371
-0.098							
508_(STM)	JUNCTION	17.77	177.39	0	01:27	0.0274	0.285
0.104							
509_(STM)	JUNCTION	0.00	107.64	0	01:30	0	0.159
-0.562							
510_(STM)	JUNCTION	0.00	232.44	0	01:23	0	1.01
0.045							
511_(STM)	JUNCTION	0.00	267.33	0	01:23	0	0.958
-0.002							
512_(STM)	JUNCTION	24.38	162.86	0	01:29	0.034	0.246
0.042							
513_(STM)	JUNCTION	44.54	148.82	0	01:29	0.0658	0.214
-0.112							
514_(STM)	JUNCTION	10.05	99.47	0	01:30	0.0135	0.0746
0.008							
515_(STM)	JUNCTION	17.47	273.92	0	01:24	0.0317	0.715
-0.012							
516_(STM)	JUNCTION	20.46	105.38	0	01:23	0.0295	0.228
0.041							
517_(STM)	JUNCTION	45.99	105.33	0	01:31	0.0677	0.177
0.001							
518_(STM)	JUNCTION	6.08	67.18	0	01:32	0.00799	0.0422
-0.038							
519_(STM)	JUNCTION	8.27	206.34	0	01:24	0.0119	0.457
-0.033							
520_(STM)	JUNCTION	0.00	209.56	0	01:25	0	0.421
-0.220							
521_(STM)	JUNCTION	43.22	144.17	0	01:26	0.0636	0.234
0.393							
522_(STM)	JUNCTION	7.75	55.09	0	01:30	0.0108	0.0802
-0.346							
523_(STM)	JUNCTION	0.00	89.39	0	01:25	0	0.193
-0.046							
525_(STM)	JUNCTION	0.00	77.43	0	01:25	0	0.159
-0.305							
526_(STM)	JUNCTION	15.57	83.63	0	01:26	0.0274	0.156
0.328							

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  527_(STM)             JUNCTION     20.94    81.51     0  01:29       0.0327
0.133       0.230
  528_(STM)             JUNCTION     19.17    61.38     0  01:33       0.0294
0.0602      -0.342
  701_(STM)             JUNCTION     29.59    29.59     0  01:30       0.0502
0.0502       1.717
  703_(STM)             JUNCTION     34.89    34.89     0  01:30       0.0625
0.0625       0.961
  706_(STM)             JUNCTION     32.91    32.91     0  01:30       0.0573
0.0573       1.826
  801_(STM)             JUNCTION      0.00    85.22     0  01:30            0
0.196       -0.000
  802_(STM)             JUNCTION      0.00    90.14     0  01:30            0
0.196       -0.004
  803_(STM)             JUNCTION     90.11    90.11     0  01:30        0.196
0.196       -0.001
  dummy1                JUNCTION      0.00   159.57     0  01:42            0
1.02        0.000
  dummy2                JUNCTION      0.00   261.63     0  01:43            0
1.78        0.000
  EXSTMMH               JUNCTION      0.00   159.84     0  01:43            0
1.07       -0.023
  J1                    JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J11                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J13                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J14_86.09             JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J16                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J18                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J2                    JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J20                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J22                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J24                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J27                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J28                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J3                    JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J30                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J32                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J34                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J36                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J38                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J4                    JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
  J40                   JUNCTION      0.00     0.00     0  00:00            0
0        0.000 ltr
```

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  J42                 JUNCTION      0.00     0.00     0  00:00           0
0       0.000 ltr
  J43                 JUNCTION      0.00     0.00     0  00:00           0
0       0.000 ltr
  J44                 JUNCTION      0.00     0.00     0  00:00           0
0       0.000 ltr
  J5                  JUNCTION      0.00     0.00     0  00:00           0
0       0.000 ltr
  J7                  JUNCTION      0.00     0.00     0  00:00           0
0       0.000 ltr
  J9                  JUNCTION      0.00     0.00     0  00:00           0
0       0.000 ltr
  CommercialRoad      OUTFALL       1.31     1.31     0  01:30     0.00296
0.00296       0.000
  ConroyRoad          OUTFALL       6.19     6.19     0  01:30       0.012
0.012       0.000
  DonReidDrive        OUTFALL       5.37     5.37     0  01:30      0.0077
0.0077       0.000
  Merivale            OUTFALL       0.00    85.29     0  01:30           0
0.196       0.000
  MHST31837           OUTFALL       0.00   420.42     0  01:44           0
2.84       0.000
  OF1                 OUTFALL       0.00    65.70     0  01:20           0
0.458       0.000
  OF2                 OUTFALL       0.00     0.00     0  00:00           0
0       0.000 ltr
  OF3                 OUTFALL       0.00     0.00     0  00:00           0
0       0.000 ltr
  StLaurentBlvd       OUTFALL      12.39    12.39     0  01:31      0.0255
0.0255       0.000
  SU1                 STORAGE     305.03   305.03     0  01:30       0.457
0.457      -0.014


  **********************
  Node Surcharge Summary
  **********************

  Surcharging occurs when water rises above the top of the highest conduit.
  -------------------------------------------------------------------------
                                        Max. Height   Min. Depth
                                  Hours Above Crown    Below Rim
  Node                 Type      Surcharged         Meters       Meters
  -------------------------------------------------------------------------
  300_(STM)            JUNCTION       24.00          0.871        2.653
  304_(STM)            JUNCTION        0.74          0.398        0.658
  305_(STM)            JUNCTION        0.45          0.190        0.882
  312_(STM)            JUNCTION        0.56          0.261        0.912
  35_(STM)             JUNCTION        0.04          0.022        0.778
  500_(STM)            JUNCTION       24.00          1.016        2.677
  504_(STM)            JUNCTION        0.68          0.327        0.724
  505_(STM)            JUNCTION        0.67          0.313        0.948
  506_(STM)            JUNCTION        0.24          0.069        0.983
  510_(STM)            JUNCTION        0.59          0.264        0.765
  511_(STM)            JUNCTION        0.35          0.127        0.974
  512_(STM)            JUNCTION        0.26          0.081        0.894
  515_(STM)            JUNCTION        0.15          0.026        1.182
  519_(STM)            JUNCTION        0.30          0.105        1.006
  520_(STM)            JUNCTION        0.46          0.189        1.071
  521_(STM)            JUNCTION        0.15          0.035        1.033
  523_(STM)            JUNCTION        0.41          0.164        0.876
  525_(STM)            JUNCTION        0.26          0.086        0.965
  526_(STM)            JUNCTION        0.02          0.008        1.065
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701_(STM)	JUNCTION	0.88	1.234	0.000
703_(STM)	JUNCTION	0.44	0.525	0.395
706_(STM)	JUNCTION	1.05	1.336	0.000
803_(STM)	JUNCTION	0.29	0.204	0.546
EXSTMMH	JUNCTION	24.00	0.890	2.650

****
Node Flooding Summary
****

No nodes were flooded.

****
Storage Volume Summary
****

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
SU1	0.020	7	0	0	0.157	52	0 01:44	65.70

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
CommercialRoad	21.32	0.59	1.31	0.003
ConroyRoad	22.04	2.37	6.19	0.012
DonReidDrive	23.01	1.52	5.37	0.008
Merivale	41.60	19.50	85.29	0.196
MHST31837	86.60	107.42	420.42	2.838
OF1	50.62	30.92	65.70	0.458
OF2	0.00	0.00	0.00	0.000
OF3	0.00	0.00	0.00	0.000
StLaurentBlvd	26.23	4.15	12.39	0.026
System	30.16	166.46	571.41	3.539

****
Link Flow Summary
****

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	0.00
C1_1	CONDUIT	159.84	0	01:43	0.09	0.04	1.00
C1_2	CONDUIT	159.93	0	01:43	0.09	0.03	1.00
C10	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C11	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C12	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C12_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C12_3	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C12_4	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C13	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C14	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C15	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C16	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C16_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C16_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C17	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C18	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C19	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C2	CONDUIT	38.38	0	01:30	1.14	0.02	0.09
C2_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C2_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C20	CONDUIT	38.22	0	01:30	1.38	1.01	1.00
C20_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C20_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C21	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C22	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C23	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C23_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C23_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C24	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C25	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C26	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C27	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C28	CHANNEL	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	0.00
C30	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C31	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C31_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C31_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C32	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C33	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C33_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C33_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C34	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C35	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C35_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C35_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C36	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C37	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C38	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C39	CONDUIT	0.00	0	00:00	0.00	0.00	0.00
C39_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C39_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C4	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C40_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C40_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C41	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C5	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C5_1	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C5_2	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C6	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C7	CHANNEL	0.00	0	00:00	0.00	0.00	0.00

C8	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
C9	CHANNEL	0.00	0	00:00	0.00	0.00	0.00
STM-167_(STM)	CONDUIT	17.84	0	01:30	0.95	0.46	0.58
STM-168_(STM)	CONDUIT	38.88	0	01:30	1.37	0.83	1.00
STM-169_(STM)	CONDUIT	25.47	0	01:30	1.14	0.46	0.89
STM-170_(STM)	CONDUIT	15.30	0	01:30	0.99	0.33	0.49
STM-171_(STM)	CONDUIT	41.28	0	01:30	1.41	0.93	0.94
STM-172_(STM)	CONDUIT	22.91	0	01:30	0.94	0.58	1.00
STM-173_(STM)	CONDUIT	43.18	0	01:30	1.41	1.02	0.94
STM-174_(STM)	CONDUIT	15.44	0	01:30	0.82	0.46	0.58
STM-175_(STM)	CONDUIT	18.59	0	01:30	0.91	0.49	0.62
STM-176_(STM)	CONDUIT	36.97	0	01:29	1.23	1.55	1.00
STM-177_(STM)	CONDUIT	44.77	0	01:30	1.46	1.14	1.00
STM-178_(STM)	CONDUIT	36.11	0	01:30	1.21	0.98	1.00
STM-179_(STM)	CONDUIT	20.08	0	01:30	0.93	0.52	0.65
STM-180_(STM)	CONDUIT	23.20	0	01:30	0.83	0.87	0.97
STM-181_(STM)	CONDUIT	35.77	0	01:30	1.20	1.13	1.00
STM-182_(STM)	CONDUIT	16.62	0	01:30	0.75	0.24	0.67
STM-184_(STM)	CONDUIT	10.55	0	01:30	0.74	0.34	0.47
STM-185_(STM)	CONDUIT	46.08	0	01:30	1.50	2.51	0.95
STM-186_(STM)	CONDUIT	32.06	0	01:30	1.09	1.48	0.89
STM-187_(STM)	CONDUIT	42.04	0	01:30	1.38	1.13	1.00
STM-188_(STM)	CONDUIT	42.02	0	01:30	1.41	0.93	1.00
STM-191_(STM)	CONDUIT	20.52	0	01:30	0.79	0.75	0.77
STM-192_(STM)	CONDUIT	20.23	0	01:30	0.75	1.63	1.00
STM-193_(STM)	CONDUIT	19.16	0	01:30	1.06	0.38	1.00
STM-194_(STM)	CONDUIT	47.76	0	01:30	1.55	1.35	1.00
STM-195_(STM)	CONDUIT	34.87	0	01:30	0.89	0.83	1.00
STM-199_(STM)	CONDUIT	29.58	0	01:30	0.72	0.90	1.00
STM-203_(STM)	CONDUIT	32.90	0	01:30	0.69	1.08	1.00
STM-205_(STM)	CONDUIT	34.54	0	01:30	1.16	1.91	0.90
STM-206_(STM)	CONDUIT	49.05	0	01:30	1.59	1.15	0.96
STM-207_(STM)	CONDUIT	3.29	0	01:38	0.15	0.10	0.93
STM-208_(STM)	CONDUIT	18.79	0	01:30	1.05	0.57	0.88
STM-209_(STM)	CONDUIT	32.08	0	01:30	1.17	0.98	1.00
STM-211_(STM)	CONDUIT	177.43	0	01:23	0.87	0.08	1.00
STM-212_(STM)	CONDUIT	90.14	0	01:30	1.86	1.52	0.96
STM-213_(STM)	CONDUIT	85.22	0	01:30	1.23	0.69	0.60
STM-214_(STM)	CONDUIT	85.29	0	01:30	1.49	0.49	0.51
STM-28_(1)_(STM)	CONDUIT	70.59	0	01:26	0.74	0.07	0.97
STM-28_(STM)	CONDUIT	49.15	0	01:34	0.55	0.04	0.78
STM-29_(STM)	CONDUIT	77.43	0	01:25	0.77	0.08	1.00
STM-30_(1)_(STM)	CONDUIT	79.44	0	01:25	0.52	0.08	1.00
STM-30_(STM)	CONDUIT	68.78	0	01:25	0.60	0.07	1.00
STM-31_(1)_(STM)	CONDUIT	185.39	0	01:24	0.80	0.19	1.00
STM-31_(STM)	CONDUIT	182.59	0	01:24	0.89	0.18	1.00
STM-32_(STM)	CONDUIT	225.74	0	01:24	0.74	0.11	1.00
STM-33_(1)_(STM)	CONDUIT	189.24	0	01:23	0.77	0.09	1.00
STM-33_(STM)	CONDUIT	201.04	0	01:23	0.73	0.09	1.00
STM-34_(STM)	CONDUIT	224.86	0	01:53	0.73	0.10	1.00
STM-35_(1)_(STM)	CONDUIT	261.66	0	01:43	1.21	1.10	1.00
STM-35_(2)_(STM)	CONDUIT	261.64	0	01:43	1.54	1.12	0.73
STM-35_(3)_(STM)_2	CONDUIT	261.63	0	01:43	1.33	1.11	0.86
STM-35_(STM)	CONDUIT	254.58	0	01:35	0.43	0.12	1.00
STM-36_(1)_(STM)	CONDUIT	134.11	0	01:25	0.84	0.14	1.00
STM-36_(STM)	CONDUIT	47.92	0	01:35	0.47	0.05	0.97
STM-37_(1)_(STM)	CONDUIT	88.74	0	01:23	0.62	0.04	0.99
STM-37_(2)_(STM)	CONDUIT	69.14	0	01:23	0.58	0.03	0.94
STM-37_(STM)	CONDUIT	56.26	0	01:32	0.27	0.03	0.85
STM-38_(1)_(1)_(STM)	CONDUIT	159.06	0	01:29	0.49	0.07	1.00
STM-38_(1)_(STM)	CONDUIT	138.64	0	01:29	0.57	0.06	1.00
STM-38_(STM)	CONDUIT	59.38	0	01:30	0.56	0.03	0.91
STM-39_(STM)	CONDUIT	123.13	0	01:23	0.72	0.06	0.98

STM-40_(STM)	CONDUIT	99.38	0	01:27	0.66	0.05	1.00
STM-41_(STM)	CONDUIT	112.65	0	01:32	0.50	0.05	1.00
STM-42_(STM)	CONDUIT	64.79	0	01:30	0.21	0.02	0.77
STM-43_(STM)	CONDUIT	181.33	0	01:30	0.78	0.08	0.93
STM-44_(1)_(STM)	CONDUIT	200.31	0	01:23	0.78	0.09	1.00
STM-45_(1)_(STM)	CONDUIT	133.55	0	01:42	0.67	0.06	1.00
STM-46	CONDUIT	175.43	0	01:34	0.35	0.08	1.00
STM-46_(1)_(STM)	CONDUIT	159.75	0	01:43	0.74	0.68	1.00
STM-46_(2)_(STM)	CONDUIT	159.61	0	01:43	1.29	0.67	0.56
STM-46_(3)_(STM)_2	CONDUIT	159.58	0	01:43	1.11	0.69	0.63
STM-49_(1)_(STM)	CONDUIT	71.72	0	01:29	0.57	0.03	0.86
STM-50_(1)_(STM)	CONDUIT	106.58	0	01:25	0.83	0.05	0.83
STM-50_(STM)	CONDUIT	65.16	0	01:31	0.50	0.03	0.73
STM-52_(STM)	CONDUIT	420.42	0	01:44	0.24	0.10	1.00
STM-60_(STM)	CONDUIT	98.54	0	01:27	0.85	0.04	0.80
STM-73_(STM)	CONDUIT	22.80	0	01:30	1.13	0.42	1.00
STM-98_(STM)	CONDUIT	31.70	0	01:30	1.08	1.85	0.88
STM-99_(STM)	CONDUIT	41.40	0	01:30	1.36	1.41	0.93
ICD-303	ORIFICE	159.57	0	01:42			1.00
ICD-503	ORIFICE	261.63	0	01:43			1.00
OL3	DUMMY	65.70	0	01:20			

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Flow Classification Summary
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	Adjusted	---------- Fraction of Time in Flow Class ----------								
Conduit	/Actual Length	Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C1_1	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C1_2	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
C10	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C11	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12_3	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C12_4	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C13	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C14	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C15	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C16	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C16_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C17	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C18	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C19	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C2_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20	1.00	0.00	0.00	0.00	0.16	0.00	0.00	0.84	0.00	0.00
C20_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C20_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C21	1.00	1.00	0.00	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
C23_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C23_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

C24	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C25	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C26	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C27	1.00	1.00	0.00	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	1.00	0.00	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	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C31_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C32	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C33_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C34	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C35	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C35_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C35_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C36	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C37	1.00	1.00	0.00	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
C39_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C39_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C40_1	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C40_2	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C41	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C5_1	1.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5_2	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
C6	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C7	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C8	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C9	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
STM-167_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-168_(STM)	1.00	0.00	0.00	0.00	0.12	0.00	0.00	0.87	0.00	0.00
STM-169_(STM)	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.00	0.00
STM-170_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-171_(STM)	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.93	0.00	0.00
STM-172_(STM)	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.00	0.00
STM-173_(STM)	1.00	0.00	0.00	0.00	0.06	0.00	0.00	0.94	0.00	0.00
STM-174_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-175_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-176_(STM)	1.00	0.00	0.00	0.00	0.15	0.00	0.00	0.85	0.00	0.00
STM-177_(STM)	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.00	0.00
STM-178_(STM)	1.00	0.00	0.00	0.00	0.07	0.00	0.00	0.93	0.00	0.00
STM-179_(STM)	1.00	0.00	0.00	0.00	0.03	0.00	0.00	0.96	0.00	0.00
STM-180_(STM)	1.00	0.88	0.01	0.00	0.07	0.00	0.00	0.04	0.92	0.00
STM-181_(STM)	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
STM-182_(STM)	1.00	0.00	0.96	0.00	0.00	0.00	0.04	0.00	0.00	0.00
STM-184_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-185_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-186_(STM)	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.00	0.00
STM-187_(STM)	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
STM-188_(STM)	1.00	0.00	0.00	0.00	0.14	0.00	0.00	0.86	0.00	0.00
STM-191_(STM)	1.00	0.00	0.00	0.00	0.04	0.00	0.00	0.96	0.00	0.00
STM-192_(STM)	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.00	0.00
STM-193_(STM)	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.91	0.00	0.00
STM-194_(STM)	1.00	0.00	0.00	0.00	0.08	0.00	0.00	0.92	0.00	0.00
STM-195_(STM)	1.00	0.00	0.00	0.00	0.13	0.00	0.00	0.87	0.01	0.00
STM-199_(STM)	1.00	0.00	0.00	0.00	0.18	0.00	0.00	0.82	0.01	0.00

STM-203_(STM)	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.80	0.01	0.00
STM-205_(STM)	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.00	0.00
STM-206_(STM)	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.00	0.00
STM-207_(STM)	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.02	0.00
STM-208_(STM)	1.00	0.00	0.00	0.00	0.09	0.00	0.00	0.90	0.01	0.00
STM-209_(STM)	1.00	0.00	0.00	0.00	0.11	0.00	0.00	0.89	0.01	0.00
STM-211_(STM)	1.00	0.00	0.00	0.00	0.41	0.00	0.00	0.58	0.00	0.00
STM-212_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-213_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-214_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-28_(1)_(STM)	1.00	0.00	0.00	0.00	0.22	0.00	0.00	0.78	0.00	0.00
STM-28_(STM)	1.00	0.00	0.00	0.00	0.41	0.00	0.00	0.59	0.08	0.00
STM-29_(STM)	1.00	0.00	0.00	0.00	0.21	0.00	0.00	0.79	0.00	0.00
STM-30_(1)_(STM)	1.00	0.00	0.00	0.00	0.43	0.00	0.00	0.57	0.09	0.00
STM-30_(STM)	1.00	0.00	0.00	0.00	0.25	0.12	0.00	0.64	0.00	0.00
STM-31_(1)_(STM)	1.00	0.00	0.00	0.00	0.48	0.00	0.00	0.52	0.02	0.00
STM-31_(STM)	1.00	0.00	0.00	0.00	0.33	0.02	0.00	0.65	0.00	0.00
STM-32_(STM)	1.00	0.00	0.00	0.00	0.45	0.00	0.00	0.55	0.00	0.00
STM-33_(1)_(STM)	1.00	0.00	0.00	0.00	0.26	0.00	0.00	0.74	0.00	0.00
STM-33_(STM)	1.00	0.00	0.00	0.00	0.48	0.00	0.00	0.52	0.03	0.00
STM-34_(STM)	1.00	0.00	0.00	0.00	0.48	0.00	0.00	0.52	0.00	0.00
STM-35_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-35_(2)_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-35_(3)_(STM)_2	1.00	0.00	0.00	0.00	0.43	0.02	0.00	0.54	0.00	0.00
STM-35_(STM)	1.00	0.00	0.00	0.00	0.47	0.00	0.00	0.53	0.08	0.00
STM-36_(1)_(STM)	1.00	0.00	0.00	0.00	0.22	0.00	0.00	0.78	0.01	0.00
STM-36_(STM)	1.00	0.00	0.00	0.00	0.43	0.00	0.00	0.57	0.11	0.00
STM-37_(1)_(STM)	1.00	0.00	0.00	0.00	0.26	0.00	0.00	0.74	0.00	0.00
STM-37_(2)_(STM)	1.00	0.00	0.00	0.00	0.43	0.00	0.00	0.57	0.01	0.00
STM-37_(STM)	1.00	0.00	0.00	0.00	0.43	0.00	0.00	0.57	0.13	0.00
STM-38_(1)_(1)_(STM)	1.00	0.00	0.00	0.00	0.27	0.00	0.00	0.73	0.00	0.00
STM-38_(1)_(STM)	1.00	0.00	0.05	0.00	0.95	0.00	0.00	0.00	0.92	0.00
STM-38_(STM)	1.00	0.00	0.00	0.00	0.24	0.00	0.00	0.76	0.01	0.00
STM-39_(STM)	1.00	0.00	0.00	0.00	0.42	0.00	0.00	0.58	0.01	0.00
STM-40_(STM)	1.00	0.00	0.00	0.00	0.45	0.00	0.00	0.55	0.01	0.00
STM-41_(STM)	1.00	0.00	0.00	0.00	0.46	0.00	0.00	0.54	0.11	0.00
STM-42_(STM)	1.00	0.58	0.21	0.00	0.22	0.00	0.00	0.00	0.89	0.00
STM-43_(STM)	1.00	0.00	0.00	0.00	0.39	0.01	0.00	0.60	0.01	0.00
STM-44_(1)_(STM)	1.00	0.00	0.00	0.00	0.46	0.00	0.00	0.54	0.02	0.00
STM-45_(1)_(STM)	1.00	0.00	0.00	0.00	0.44	0.00	0.00	0.56	0.01	0.00
STM-46	1.00	0.00	0.00	0.00	0.47	0.00	0.00	0.53	0.10	0.00
STM-46_(1)_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-46_(2)_(STM)	1.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
STM-46_(3)_(STM)_2	1.00	0.00	0.00	0.00	0.62	0.00	0.00	0.38	0.07	0.00
STM-49_(1)_(STM)	1.00	0.00	0.00	0.00	0.24	0.00	0.00	0.76	0.01	0.00
STM-50_(1)_(STM)	1.00	0.00	0.00	0.00	0.20	0.00	0.00	0.80	0.00	0.00
STM-50_(STM)	1.00	0.00	0.00	0.00	0.36	0.03	0.00	0.61	0.02	0.00
STM-52_(STM)	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00
STM-60_(STM)	1.00	0.00	0.00	0.00	0.42	0.00	0.00	0.58	0.10	0.00
STM-73_(STM)	1.00	0.00	0.00	0.00	0.10	0.00	0.00	0.90	0.00	0.00
STM-98_(STM)	1.00	0.00	0.84	0.00	0.00	0.00	0.16	0.00	0.00	0.00
STM-99_(STM)	1.00	0.00	0.00	0.00	0.05	0.00	0.00	0.95	0.01	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

C1_1	24.00	24.00	24.00	0.01	0.24
C1_2	24.00	24.00	24.00	0.01	0.01
C20	0.94	0.94	1.00	0.01	0.01
STM-168_(STM)	0.56	0.70	0.65	0.01	0.01
STM-169_(STM)	0.01	0.01	0.02	0.01	0.01
STM-171_(STM)	0.01	0.15	0.15	0.01	0.01
STM-172_(STM)	0.11	0.11	0.24	0.01	0.01
STM-173_(STM)	0.01	0.17	0.08	0.03	0.01
STM-176_(STM)	0.85	0.98	0.87	0.15	0.14
STM-177_(STM)	0.62	0.77	0.68	0.08	0.05
STM-178_(STM)	0.12	0.27	0.24	0.01	0.01
STM-180_(STM)	0.01	0.02	0.16	0.01	0.01
STM-181_(STM)	0.31	0.49	0.45	0.11	0.01
STM-182_(STM)	0.01	0.01	22.64	0.01	0.01
STM-185_(STM)	0.01	0.23	0.01	0.24	0.01
STM-186_(STM)	0.01	0.16	0.01	0.15	0.01
STM-187_(STM)	0.35	0.52	0.45	0.08	0.01
STM-188_(STM)	0.68	0.81	0.76	0.01	0.03
STM-192_(STM)	0.19	0.33	0.27	0.16	0.01
STM-193_(STM)	0.18	0.18	0.30	0.01	0.01
STM-194_(STM)	0.23	0.41	0.30	0.13	0.01
STM-195_(STM)	0.44	0.44	0.67	0.01	0.01
STM-199_(STM)	0.88	0.88	1.10	0.01	0.01
STM-203_(STM)	1.05	1.05	1.27	0.04	0.05
STM-205_(STM)	0.01	0.19	0.01	0.19	0.01
STM-206_(STM)	0.01	0.23	0.01	0.11	0.01
STM-207_(STM)	0.01	0.01	0.43	0.01	0.01
STM-208_(STM)	0.01	0.01	0.38	0.01	0.01
STM-209_(STM)	0.04	0.04	0.51	0.01	0.01
STM-211_(STM)	0.47	0.47	0.56	0.01	0.01
STM-212_(STM)	0.01	0.29	0.01	0.30	0.01
STM-28_(1)_(STM)	0.01	0.01	0.02	0.01	0.01
STM-29_(STM)	0.13	0.13	0.26	0.01	0.01
STM-30_(1)_(STM)	0.43	0.43	0.55	0.01	0.01
STM-30_(STM)	0.36	0.36	0.41	0.01	0.01
STM-31_(1)_(STM)	0.64	0.64	0.76	0.01	0.01
STM-31_(STM)	0.56	0.56	0.62	0.01	0.01
STM-32_(STM)	0.27	0.27	0.44	0.01	0.01
STM-33_(1)_(STM)	0.60	0.60	0.67	0.01	0.01
STM-33_(STM)	0.45	0.45	0.59	0.01	0.01
STM-34_(STM)	0.76	0.76	0.91	0.01	0.01
STM-35_(1)_(STM)	24.00	24.00	24.00	0.59	2.15
STM-35_(2)_(STM)	0.01	0.01	0.01	0.64	0.01
STM-35_(3)_(STM)_2	0.01	0.01	0.01	0.63	0.01
STM-35_(STM)	0.92	0.92	1.13	0.01	0.01
STM-36_(1)_(STM)	0.25	0.25	0.46	0.01	0.01
STM-36_(STM)	0.01	0.01	0.23	0.01	0.01
STM-37_(1)_(STM)	0.01	0.01	0.15	0.01	0.01
STM-38_(1)_(1)_(STM)	0.26	0.26	0.35	0.01	0.01
STM-38_(1)_(STM)	0.04	0.04	0.26	0.01	0.01
STM-39_(STM)	0.01	0.01	0.30	0.01	0.01
STM-40_(STM)	0.34	0.34	0.58	0.01	0.01
STM-41_(STM)	0.60	0.60	0.74	0.01	0.01
STM-44_(1)_(STM)	0.01	0.01	0.46	0.01	0.01
STM-45_(1)_(STM)	0.58	0.58	0.74	0.01	0.01
STM-46	0.76	0.76	0.98	0.01	0.01
STM-46_(1)_(STM)	24.00	24.00	24.00	0.01	1.39
STM-52_(STM)	24.00	24.00	24.00	0.01	0.01
STM-73_(STM)	0.28	0.28	0.41	0.01	0.01
STM-98_(STM)	0.01	0.01	0.20	0.15	0.01
STM-99_(STM)	0.01	0.20	0.01	0.17	0.01

```
Analysis begun on:  Tue Nov  1 14:19:23 2022
Analysis ended on:  Tue Nov  1 14:19:26 2022
Total elapsed time: 00:00:03
```

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
```

Max Flow, Velocity and Depth of Major System During Stress Test

NOVATECH
Engineers, Planners & Landscape Architects

Chicago 4hr - 100year + 20%

Conduit Name	Inlet Node	Outlet Node	Max. Flow (L/s)	Max. Velocity (m/s)	Max. Depth/Full*	Depth×Velocity (m2/s)
C3	J4	09_(STM)	0.00	0.00	0.00	0.00
C4	J4	J5	0.00	0.00	0.00	0.00
C6	04_(STM)	J7	0.00	0.00	0.00	0.00
C7	J9	03_(STM)	0.00	0.00	0.00	0.00
C8	J7	03_(STM)	0.00	0.00	0.00	0.00
C9	J9	02_(STM)	0.00	0.00	0.34	0.00
C10	J11	02_(STM)	18.31	0.15	0.45	0.01
C11	J11	01_(STM)	13.09	0.10	0.45	0.01
C13	J14_86.09	16&17(STM)	0.00	0.00	0.00	0.00
C14	J14_86.09	J4	0.00	0.00	0.00	0.00
C1	J24	11_(STM)	28.71	0.11	0.66	0.01
C15	J24	12_(STM)	30.85	0.18	0.54	0.01
C17	J22	13_(STM)	0.00	0.00	0.00	0.00
C18	J20	13_(STM)	0.00	0.00	0.00	0.00
C19	J20	14_(STM)	0.00	0.00	0.00	0.00
C21	J18	15&32_(STM)	0.00	0.00	0.00	0.00
C22	J16	15&32_(STM)	0.00	0.00	0.00	0.00
C16_1	J22	J34	0.00	0.00	0.00	0.00
C16_2	J34	12_(STM)	0.00	0.00	0.38	0.00
C16	J40	30_(STM)	0.00	0.00	0.00	0.00
C24	J43	30_(STM)	0.00	0.00	0.00	0.00
C25	J43	29_(STM)	0.00	0.00	0.00	0.00
C26	J38	29_(STM)	0.00	0.00	0.00	0.00
C27	J38	28_(STM)	0.00	0.00	0.09	0.00
C28	J36	28_(STM)	0.00	0.00	0.09	0.00
C29	J36	24_(STM)	0.00	0.00	0.00	0.00
C30	J32	24_(STM)	0.00	0.00	0.00	0.00
C32	J34	18_(STM)	0.00	0.00	0.44	0.00
C34	J42	26_(STM)	0.00	0.00	0.00	0.00
C36	J32	21_(STM)	0.00	0.00	0.00	0.00
C37	J30	21_(STM)	0.00	0.00	0.00	0.00

Max Flow, Velocity and Depth of Major System During Stress Test

Conduit Name	Inlet Node	Outlet Node	Max. Flow (L/s)	Max. Velocity (m/s)	Max. Depth/Full*	Depth×Velocity (m2/s)
C38	J30	22_(STM)	0.00	0.00	0.00	0.00
C41	J27	19_(STM)	0.00	0.00	0.00	0.00
C31_1	J32	J44	0.00	0.00	0.00	0.00
C31_2	J44	18_(STM)	0.00	0.00	0.44	0.00
C31	J27	J44	0.00	0.00	0.00	0.00
C2_1	J2	10_(STM)	0.00	0.00	0.00	0.00
C2_2	10_(STM)	09_(STM)	0.00	0.00	0.00	0.00
C12_1	J13	08_(STM)	0.00	0.00	0.00	0.00
C12_3	08_(STM)	07_(STM)	0.00	0.00	0.15	0.00
C12_4	J3	07_(STM)	1.71	0.07	0.18	0.00
C33_1	J40	27_(STM)	0.00	0.00	0.00	0.00
C33_2	27_(STM)	26_(STM)	0.00	0.00	0.00	0.00
C40_1	J28	20_(STM)	0.00	0.00	0.00	0.00
C40_2	20_(STM)	19_(STM)	0.00	0.00	0.00	0.00
C39_1	J28	23_(STM)	0.00	0.00	0.00	0.00
C39_2	23_(STM)	22_(STM)	0.00	0.00	0.00	0.00
C35_1	J42	25_(STM)	0.00	0.00	0.00	0.00
C35_2	25_(STM)	J36	0.00	0.00	0.00	0.00
C20_1	J18	J1	0.00	0.00	0.00	0.00
C20_2	J1	14_(STM)	0.00	0.00	0.00	0.00
C5_1	J5	J3	0.00	0.00	0.03	0.00
C5_2	J3	04_(STM)	0.44	0.18	0.06	0.00
C5	J3	05&06_(STM)	0.62	0.21	0.06	0.00
C12	J1	05&06_(STM)	0.00	0.00	0.00	0.00
C23_1	J16	31_(STM)	0.00	0.00	0.00	0.00
C23_2	31_(STM)	16&17(STM)	0.00	0.00	0.00	0.00
C33	11_(STM)	OF2	62.55	0.18	0.70	0.02
C35	01_(STM)	OF3	91.97	0.40	0.56	0.03
Maximum				**0.40**	**0.70**	**0.03**

* Overland Flow Depth is 0.15m Throughout the Site

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 302

Engineer: NOVATECH
Contact: Vahid Mehdipour
Report Date: 27-Oct-22

Area	1.68	ha	**Rainfall Station #**	215	
Weighted C	0.68		**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	7.0	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	17.6	93.8	7.2
3.0	5.9%	51.7%	9.6	9.6	21.1	92.8	5.5
3.5	4.4%	56.1%	11.2	11.2	24.6	91.8	4.0
4.0	4.7%	60.7%	12.8	12.8	28.2	90.8	4.2
4.5	3.3%	64.0%	14.4	14.4	31.7	89.8	3.0
5.0	3.0%	67.1%	15.9	15.9	35.2	88.8	2.7
6.0	5.4%	72.4%	19.1	19.1	42.2	86.8	4.7
7.0	4.4%	76.8%	22.3	22.3	49.3	84.7	3.7
8.0	3.5%	80.3%	25.5	25.5	56.3	82.7	2.9
9.0	2.8%	83.2%	28.7	28.7	63.3	80.7	2.3
10.0	2.2%	85.3%	31.9	31.9	70.4	78.7	1.7
15.0	7.0%	92.3%	47.8	45.3	100.0	66.5	4.6
20.0	4.5%	96.9%	63.8	45.3	100.0	49.9	2.3
25.0	1.4%	98.3%	79.7	45.3	100.0	39.9	0.6
30.0	0.7%	99.0%	95.7	45.3	100.0	33.2	0.2
35.0	0.5%	99.5%	111.6	45.3	100.0	28.5	0.1
40.0	0.5%	100.0%	127.6	45.3	100.0	24.9	0.1
45.0	0.0%	100.0%	143.5	45.3	100.0	22.2	0.0
50.0	0.0%	100.0%	159.5	45.3	100.0	19.9	0.0
							86.6

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 80.1%

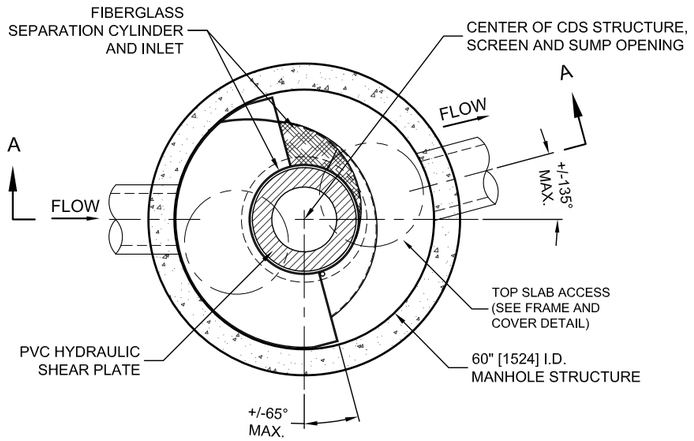
Predicted Annual Rainfall Treated = 96.7%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON

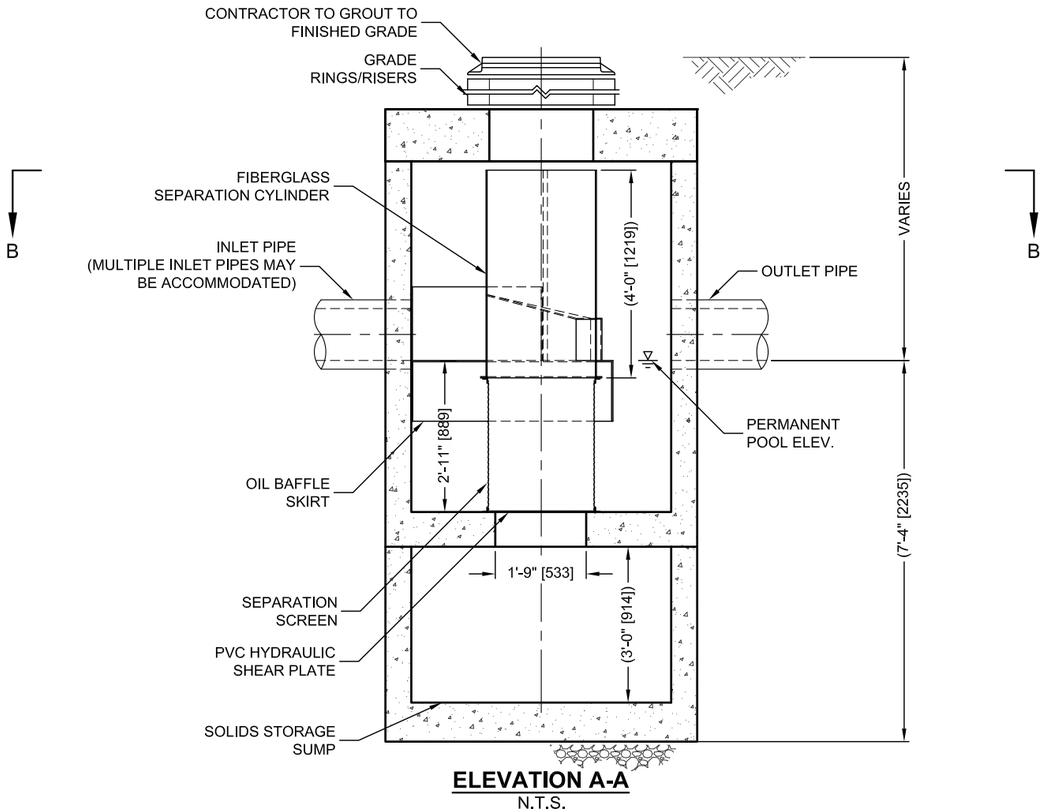
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

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.



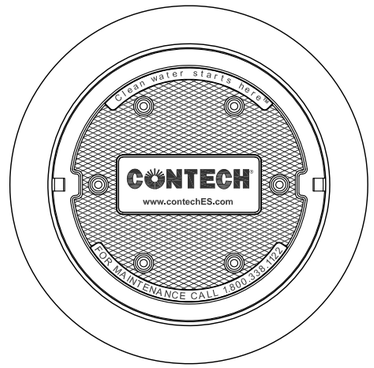
ELEVATION A-A
N.T.S.

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING U.S. PATENTS: 5,788,849; 6,641,720; 6,511,600; 6,581,783; RELATED FOREIGN PATENTS, OR OTHER PATENTS PENDING.

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



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.
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 502

Engineer: NOVATECH
Contact: Vahid Mehdipour
Report Date: 27-Oct-22

Area	2.80	ha	**Rainfall Station #**	215	
Weighted C	0.70		**Particle Size Distribution**	FINE	
CDS Model	3030		**CDS Treatment Capacity**	85	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%	2.7	2.7	3.2	97.9	9.0
1.0	10.6%	19.8%	5.4	5.4	6.4	97.0	10.3
1.5	9.9%	29.7%	8.1	8.1	9.6	96.1	9.5
2.0	8.4%	38.1%	10.8	10.8	12.8	95.2	8.0
2.5	7.7%	45.8%	13.6	13.6	16.0	94.3	7.2
3.0	5.9%	51.7%	16.3	16.3	19.2	93.4	5.5
3.5	4.4%	56.1%	19.0	19.0	22.3	92.5	4.0
4.0	4.7%	60.7%	21.7	21.7	25.5	91.5	4.3
4.5	3.3%	64.0%	24.4	24.4	28.7	90.6	3.0
5.0	3.0%	67.1%	27.1	27.1	31.9	89.7	2.7
6.0	5.4%	72.4%	32.5	32.5	38.3	87.9	4.7
7.0	4.4%	76.8%	38.0	38.0	44.7	86.0	3.7
8.0	3.5%	80.3%	43.4	43.4	51.1	84.2	3.0
9.0	2.8%	83.2%	48.8	48.8	57.5	82.4	2.3
10.0	2.2%	85.3%	54.2	54.2	63.8	80.6	1.8
15.0	7.0%	92.3%	81.4	81.4	95.8	71.4	5.0
20.0	4.5%	96.9%	108.5	85.0	100.0	55.0	2.5
25.0	1.4%	98.3%	135.6	85.0	100.0	44.0	0.6
30.0	0.7%	99.0%	162.7	85.0	100.0	36.7	0.2
35.0	0.5%	99.5%	189.8	85.0	100.0	31.4	0.1
40.0	0.5%	100.0%	216.9	85.0	100.0	27.5	0.1
45.0	0.0%	100.0%	244.1	85.0	100.0	24.4	0.0
50.0	0.0%	100.0%	271.2	85.0	100.0	22.0	0.0
							87.8

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.3%

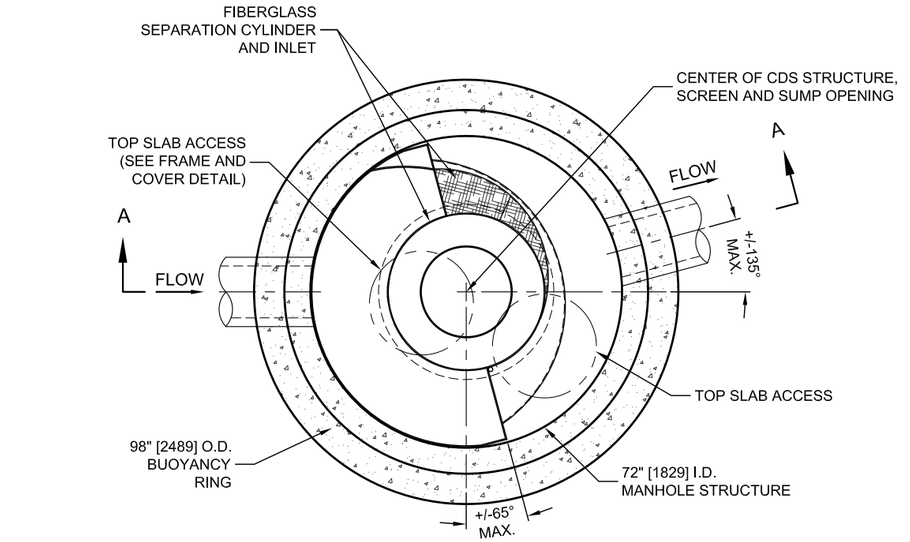
Predicted Annual Rainfall Treated = 97.6%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON

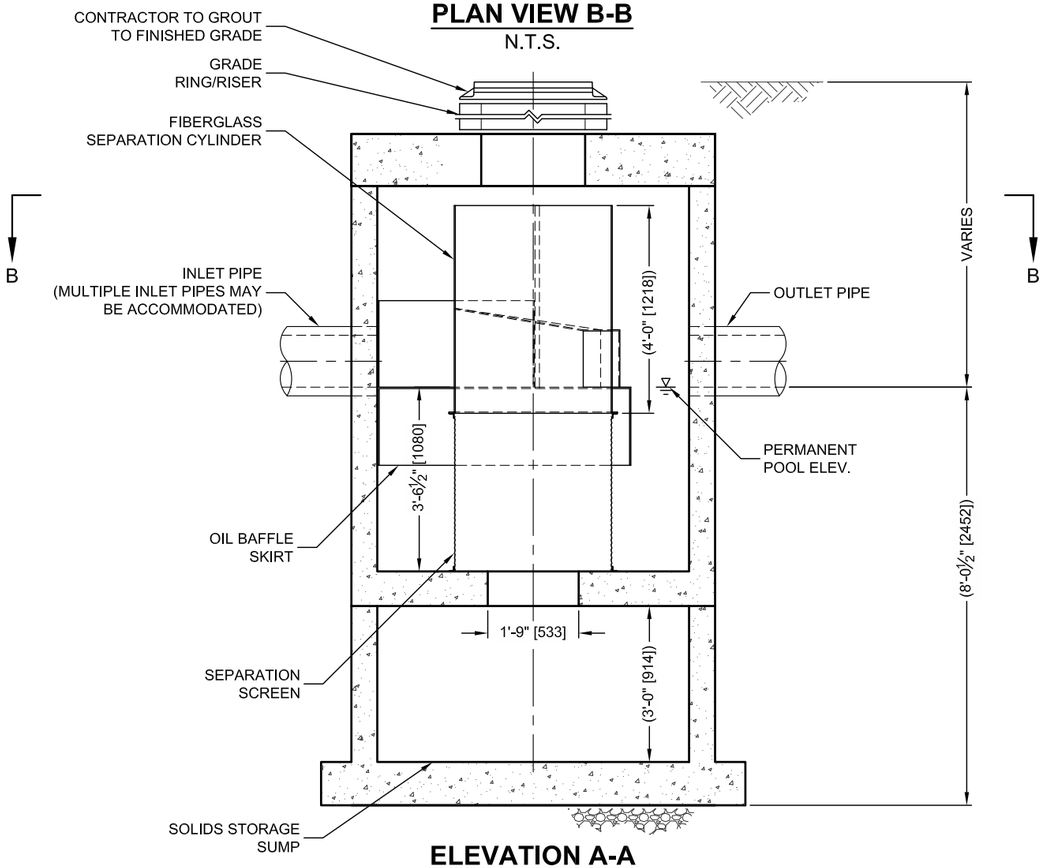
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.

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.



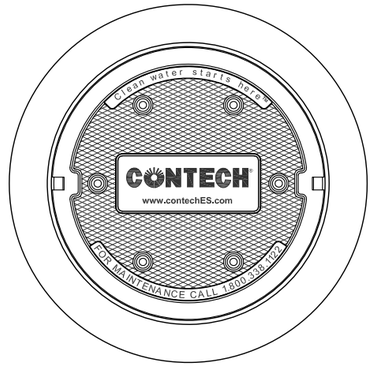
ELEVATION A-A
N.T.S.

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

CDS PMSU3030-6-C DESIGN NOTES

THE STANDARD CDS PMSU3030-6-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.
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
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CDS PMSU3030-6-C INLINE CDS STANDARD DETAIL