LeBreton Flats Plan of Subdivision

Functional Servicing Study

Stantec

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1 Introduction

Stantec Consulting Ltd. has been retained by the National Capital Commission (NCC) to prepare a Functional Servicing Study for the LeBreton Flats Plan of Subdivision in support of a Draft Plan of Subdivision application. The subdivision lands are currently zoned Parks and Open Space (O1), General Mixed-Use Zone (GM7), and Residential Fifth Density Zone (R5), and is bordered by Wellington Street and the Kichi Zibi Mikan Parkway to the north, the O-Train Trillium Line rail corridor and Trillium Pathway to the west, Albert Street to the south, and Booth Street to the east. The subdivision lands are shown in blue in **Figure 1.1** below. Other lands owned by the NCC subject to the LeBreton Flats Master Concept Plan are identified in green. These lands fall outside of the plan of subdivision and development of the parcels will be approved in the future through Site Plan Control.

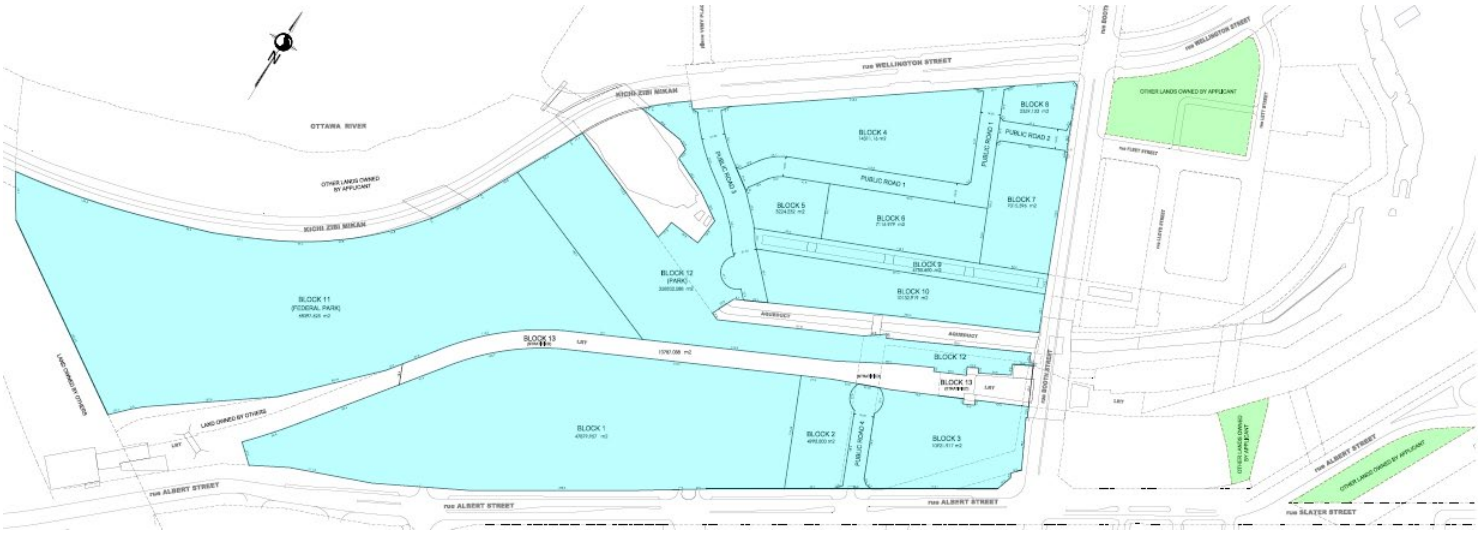


Figure 1.1: LeBreton Flats Subdivision Lands

The 21.5 ha subdivision development comprises of a total of 13 blocks, with public roadways and private lanes. The subdivision will include a block for an NCC park, a block for a municipal park and a block over the covered aqueduct. The Confederation Line rail corridor and the open aqueduct bisect the subdivision lands. The draft plan of subdivision has been prepared by Stantec Geomatics Ltd. dated July 15, 2026, and density tables are included **Appendix A.1**.

The intent of this report is to build on the servicing principals outlined in the earlier master servicing studies to develop a servicing strategy specific to the subject site. The report will establish criteria for future detailed design of the subdivision in accordance with the associated background studies, City of Ottawa Design Guidelines, and all other relevant regulations.

1.1 Master Plan Context

In 1962, pursuing the modernist vision set out in the 1950 Gréber Plan, the federal government expropriated lands and cleared much of LeBreton Flats. The plan was to use the site as a federal office

campus, but it was never fully realized. In subsequent years, efforts were undertaken to determine a suitable future for this important site.

In 1989, the NCC, the former Regional Municipality of Ottawa-Carleton (RMOC), and the City of Ottawa launched a joint planning process. The issues that were addressed and recommendations that were endorsed by all three parties included:

- the Transitway alignment;
- the condition of the heritage aqueduct and related bridge crossings;
- the reinforcement of the street grid;
- environmental assessment processes; and
- the sanitary sewer servicing capacity.

This process led to a land agreement that consolidated land ownership under the NCC and created the 1997 LeBreton Flats Master Plan. It analyzed and developed policies for density, land uses, urban design, servicing, roads, and the environment. The master plan was approved by Official Plan amendment in 1997, adopted following the Ontario Municipal Board decision in 1999, and zoning was updated by the City of Ottawa in 2000. The 1997 Plan still forms much of the policy basis that applies to the site today.

In 2002, the NCC hired Dessau-Soprin to complete a Master Servicing Study for LeBreton Flats and the Master Serving Plan (LeBreton Flats Infrastructure and Remediation Project: Master Servicing Report, 2004) was submitted and approved under the Municipal Class EA Process. The Site Development Plan from the 2004 Master Servicing Report is included in **Figure 1.2**.

Based on that 2004 Master Servicing Study, in 2005 the NCC and the City entered into a servicing agreement to construct a new sanitary pumping station at LeBreton Flats. Pursuant to the agreement, the NCC undertook the environmental assessment in accordance with the Canadian Environmental Assessment Act and financed the design and construction of the facility, while the City obtained the provincial requirements. In 2008, the NCC built the LeBreton Flats Sanitary Pumping Station to accommodate the anticipated servicing requirements for the full build-out of LeBreton Flats. The NCC then transferred ownership of the pumping station to the City for operation and maintenance.

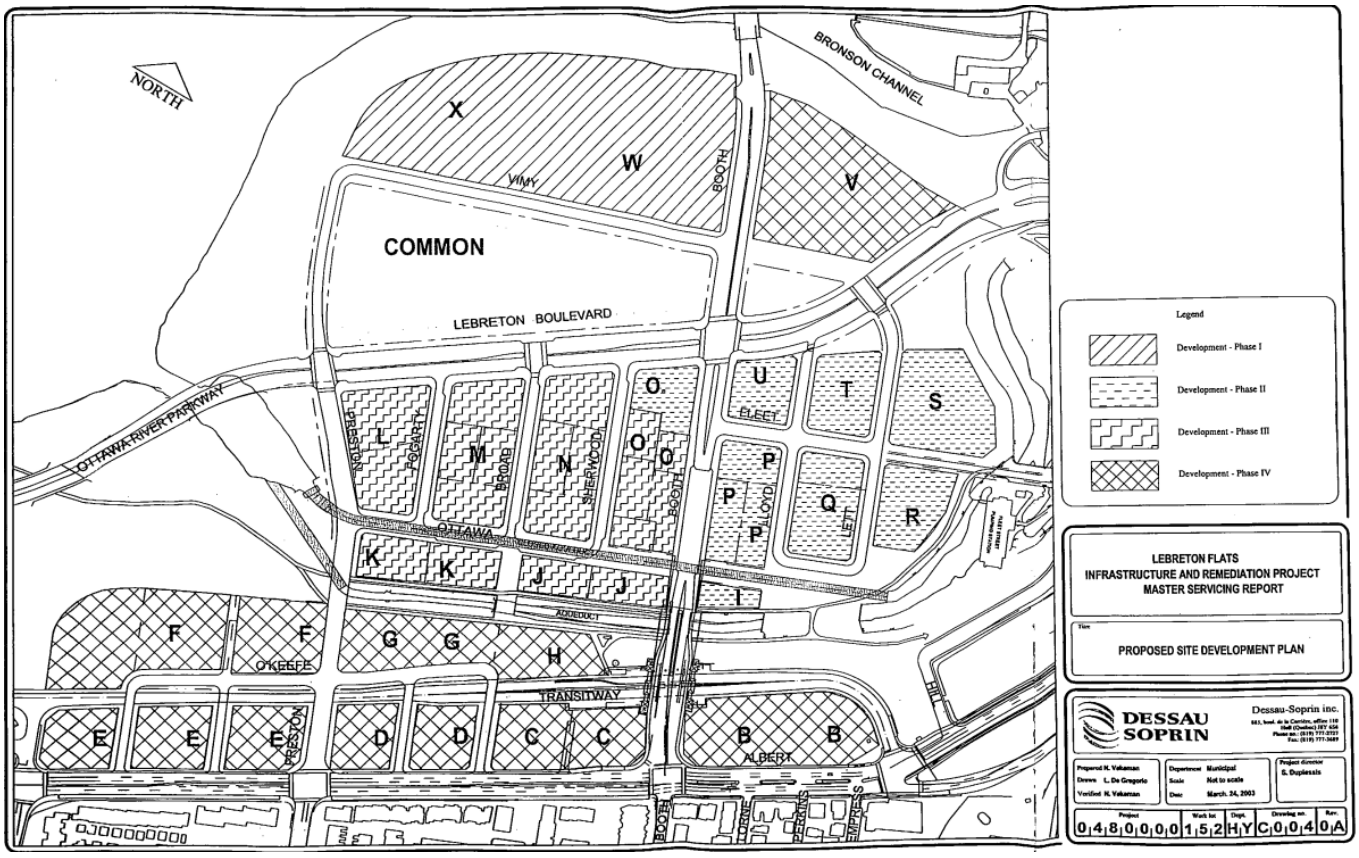


Figure 1.2: Proposed Site Development Plan (Appendix D, LeBreton Flats Infrastructure and Remediation Project: Master Servicing Report, Dessau-Soprin, 2004)

In 2014, motivated to enhance the attractiveness of the Capital and bring civic life back to LeBreton Flats, the NCC launched a competitive process seeking a development proposal for the entire site. With the cancellation of that process in 2019, the NCC chose to lead a new approach that would establish a comprehensive vision for LeBreton Flats, re-establishing the area as a Capital destination and a vibrant community. That new vision finds its expression in the 2021 LeBreton Flats Master Concept Plan (MCP), which serves as the guiding document for the draft plan of subdivision.

Supporting development of the LeBreton Flats MCP, the Master Servicing Report: Renewed Master Concept Plan & Development Strategy by CIMA+ was completed in 2021. The report is based on the 2004 Dessau-Soprin report and incorporates minor updates to reflect updated site conditions and the updated vision and plan for LeBreton Flats. While the CIMA+ report was not formally approved by the City of Ottawa, City staff reviewed the report and contributed to its development in support of the Master Concept planning process. See figure below of the block layout used in the master servicing report (CIMA+, 2021).

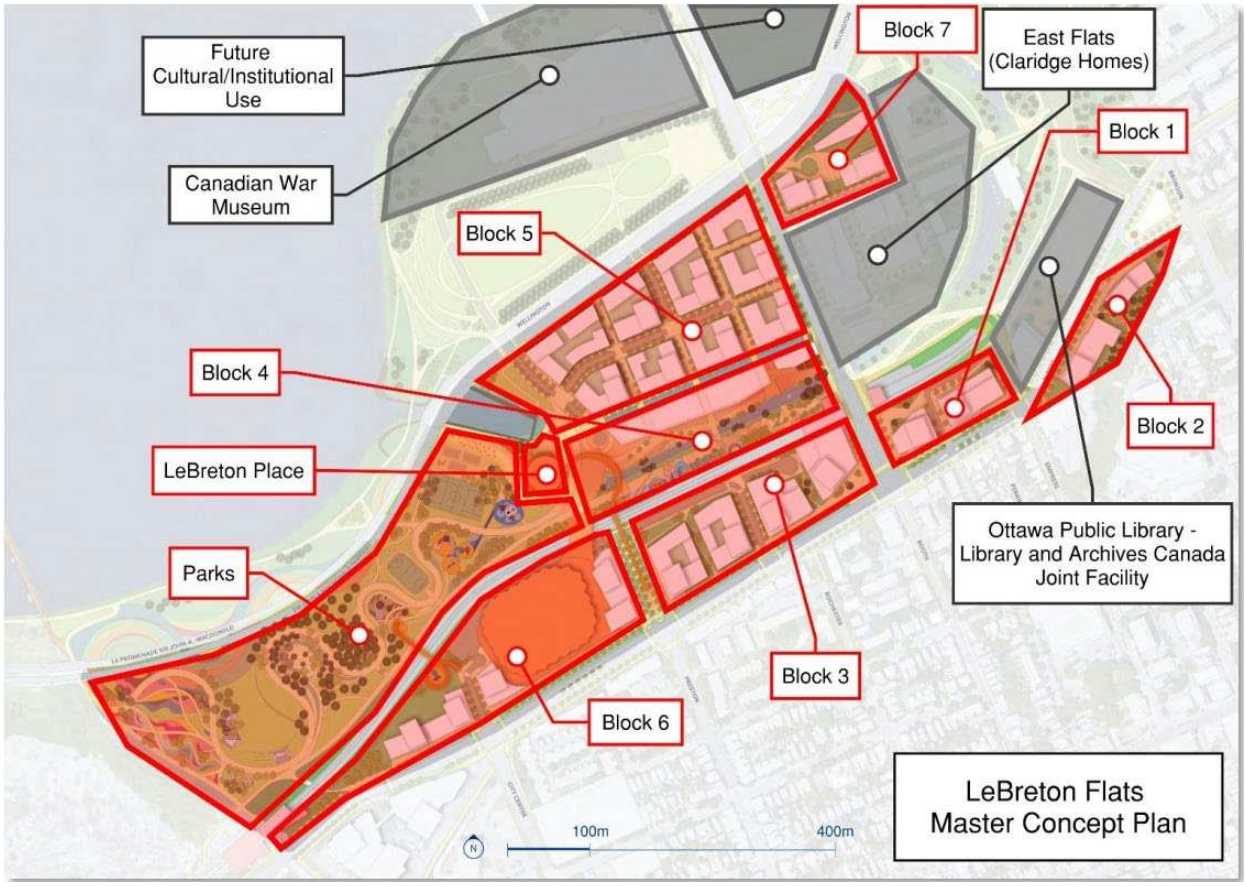


Figure 1.3: Master Servicing Plan Block Layout of LeBreton Flats Master Concept Plan (Master Servicing Report: Renewed Master Concept Plan & Development Strategy, CIMA+, 2021)

As required under the West Downtown Core Secondary Plan, the master servicing study is to be updated for the LeBreton Flats MCP area prior to development as outlined by Policy 7 under Section 10.2 from the Pimisi and LeBreton Flats District chapter:

> *The City shall require an updated master servicing study for the district, prior to development of lands within the LeBreton Flats Master Concept Plan area, west of Booth Street.*

The intent of this report is to fulfill this policy condition by preparing a Functional Servicing Study for the subdivision lands west of Booth Street, maintaining the overall intent of the 2004 Dessau-Soprin report while building on the servicing principles outlined in the LeBreton Flats Master Servicing Report (CIMA+, 2021) to develop a servicing strategy specific to the subject site to support the draft plan of subdivision.

This report demonstrates that the municipal servicing can support the proposed development, establishes the functional design for future detailed design of the subdivision and the design criteria for the detailed design of the subdivision development blocks subject to future Site Plan Control approval.

The overall development plan for LeBreton Flats has evolved from the 1997 LeBreton Flats Master Plan to reflect the current vision and address the impacts of the Confederation Line. The West Downtown Core Secondary Plan was developed based on the current MCP for LeBreton Flats and this update to the Master Servicing Study addresses the land uses, road network, and densities established in the master plans while meeting current design criteria.

2 References

The following documents were referenced in the preparation of this report:

- *City of Ottawa Sewer Design Guidelines*, City of Ottawa, 4th Edition, December 2025.
- *City of Ottawa Design Guidelines – Water Distribution*, Infrastructure Services Department, City of Ottawa, Second Edition, December 2025.
- *LeBreton Flats Master Concept Plan,* NCC, 2021
- *LeBreton Flats Infrastructure and Remediation Project, Master Servicing Report,* Dessau Soprin, February 2004
- *LeBreton Flats Redevelopment Infrastructure Needs Study, Ainley Group, January 2002*
- *LeBreton Flats Master Servicing Report Amendment (Draft), Parsons, June 2019*
- *Building LeBreton Master Servicing Report – Renewed Master Concept Plan & Development Strategy*, CIMA+, March 2021
- *Geotechnical Desktop Review: The LeBreton Flats Plan of Subdivision*, Stantec Consulting Ltd., June 2, 2026.
- *Draft Phase One Environmental Site Assessment, LeBreton Flats,* Stantec Consulting Ltd., February 2024.
- *LeBreton Flats Hydrogeological Memo,* Stantec Consulting Ltd., June 18, 2026.
- *LeBreton Flats Master Concept Plan,* National Capital *Commission, 2021*
- *Cave Creek Collector Realignment (Preliminary Design Drawings),* Robinson Consultants, April, 2026.
- *Albert/Queen/Slater Renewal (Construction Drawings),* Parsons, June 20, 2022.
- *Albert Street Reconstruction (Drawings),* Robinson Consultants, August 28, 2014.
- *Low Pressure Transmission Main Replacement Program – Lemieux Island WPP to Fleet Street (As-built Drawing)*, Stantec Consulting Ltd., March 2007.
- *Confederation Line Guideway Design – Segment 1 (As-built Drawings),* RTGE Joint Venture / MMM Group, July 22, 2019.
- *The Canada Central Railway Bridge – General Arrangement (Record Drawing),* Stantec Consulting Ltd. / Morrison Hershfield, November 12, 2001.
- *Impact of Additional Flows from the Palladium Auto Park on the Canadian Tire Centre Sanitary Sewer System*, J.L. Richards & Associates Ltd., December 19, 2013
- *National Capital Commission Stormwater Management Manual*

3 Water Servicing

3.1 Background

The proposed development is located within Pressure Zone 1W of the City of Ottawa's water distribution system. The development will be serviced with proposed connections to existing watermains along the boundaries of the development. These include the 406 mm diameter PVC watermains in Albert Street and Booth Street, and the 305 mm diameter PVC watermain in Wellington Street. A 1676 mm concrete backbone watermain is located within the open aqueduct and a 1220 mm diameter backbone watermain is located within Albert Street. These are critical components of the City of Ottawa water infrastructure that are not to be impacted as part of the subdivision development.

3.2 Design Criteria

3.2.1 Water Demand and Allowable Pressure

The domestic water demand and allowable water pressure are assessed using the City of Ottawa Water Distribution Guidelines (2025) and the LeBreton Flats MSS (CIMA+, 2021).

Residential Population Density	
Apartment	1.8 persons / unit
Townhouse	2.7 persons / unit
Residential Apartment Demand	
Average Daily (AVDY)	280 L/cap/day
Maximum Daily (MXDY)	2.5 × AVDY
Peak Hour (PKHR)	2.2 × MXDY
Commercial Demand	
Average Daily (AVDY)	28,000 L/ha/day
Maximum Daily (MXDY)	1.5 × AVDY
Peak Hour (PKHR)	1.8 × MXDY
Parks and Hotel Demand	
Park Equivalent Population	185.3 persons/ha
Park Picnic and Flush Toilet	20 L/person/day
Hotel Bedspace	2 bedspace/room
Allowable Water Pressure	

AVDY Flow	345 kPa (50 psi) to 552 kPa (80 psi)
PKHR Flow Minimum	276 kPa (40 psi)
MXDY + Fire Flow	140 kPa (20 psi)
Maximum Allowable for Occupied Area	552 kPa (80 psi)

3.3 Functional Water Servicing Design

3.3.1 Water Distribution Layout

The functional layout of the municipal water distribution system ensures the servicing of all development blocks based on the NCC Master Concept Plan, planned densities and applicable design criteria. The functional layout of the water distribution system in shown on **Drawing WTR-1**.

Watermains within the new public roads will be fed through connections to the existing watermains within Albert Street, Booth Street and Wellington Street. Watermain stubs were installed with the construction of the 305 mm watermain in Wellington Street and the 406 mm watermain in Albert Street in anticipation of future connections for the servicing of the LeBreton Flats Subdivision. It is assumed that these stubs will be used as connection points for the municipal servicing where possible and will be confirmed through the detailed design phase.

The water distribution layout ensures that development blocks can be designed with redundant supply through secondary connections to the proposed distribution system. It is noted that Block 10 has frontage on the southern portion of Public Road 3 where the watermain is not looped. Block 10 can be provided with redundancy by a connection to Public Road 1 either through the Public Road 3 or an adjacent development block. The detailed design of each block will form part of future site plan development applications.

The NCC federal park does not have frontage on a public watermain, as such, a private water service will be required to cross the Block 12 park to service the NCC park. Size and alignment of the services will be established as part of the future detailed design of the parks.

The watermains have been sized to meet City of Ottawa design criteria for pressure and flow for both domestic and fire flow demands.

3.3.2 Domestic Water Demands

Preliminary water demands were estimated based on the assumed development densities and gross parcel areas established by the NCC in accordance with the West Downtown Core Secondary Plan. The density table is included in **Appendix A.1.**

It has been confirmed that a future arena complex will be located on Block 1 in addition to other commercial, residential and office uses. To estimate the water demands for the arena, we were provided actual water usage data by the Capital Sports and Entertainment Group who manage the Canadian Tire Centre. They specifically provided a sample of water bills and a summary of charges from October 2023 to

October 2024. These are included in **Appendix A.2.** The Canadian Tire Centre has a capacity of 18,500 seats. As such, the data has been adjusted based on the proposed seating capacity of 17,500 seats to obtain the average day demand. The maximum day demand is provided by applying the commercial peaking factor of 1.5 to the average day demand.

The peak hour demand at for the arena was established based on the sanitary design flow of 46 L/s assumed for the former Corel Centre (20,500 seats) per the Additional Flow Assessment Memo (J.L. Richards, 2013) (**Appendix A.2**) and adjusted based on the proposed seating capacity of 17,500 seats. The estimated demands are shown in **Table 3.1** and detailed in **Appendix B.1**.

Table 3.1: Water Demands

Demand Type	Area (ha)	Total Units	Seats	Population	AVDY (L/s)	MXDY (L/s)	PKHR (L/s)
Residential	-	4,608	-	8,546	27.7	69.2	152.3
Commercial	5.6	-	-	-	1.8	2.7	4.9
Arena	-		17,500		0.4	0.6	39.3
Hotel	-	294	-	-	1.5	2.3	4.1
Parks	9.3	-	-	-	0.5	0.8	1.4
Total	**14.9**	**4,902**	**17,500**	**8,546**	**32.0**	**75.6**	**202.0**

3.3.3 Fire Flow Demands

At the draft plan level, no details pertaining to the building footprints for each block are available. Therefore, a fire flow demand of 200 L/s (12,000 L/min) was assumed based on the Simple Method for a typical family dwelling in a subdivision summarized in Table 8 of the 2020 FUS, in which the 200 L/s is the worst-case scenario. This conservative estimate, which is applied to all blocks, exceeds the fire flow demands of non-combustible and sprinklered buildings that are anticipated for the development. Further details of the fire flow demands will be provided once the building construction and floor area details are made available at the detailed design stage for each site plan block.

3.3.4 Boundary Conditions

The estimated domestic water and fire flow demands were used to define the supply required for the proposed development from the existing watermains. **Table 3.2** summarizes the boundary conditions received from the City of Ottawa on June 24, 2024. A copy of the boundary condition correspondence and the accompanying schematic received from the City of Ottawa is included in **Appendix B.2**.

Table 3.2: Boundary Conditions

Street	Wellington			Booth	Albert			
Connection	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Min. HGL (m)	107.4	107.4	107.4	107.5	107.6	107.6	107.6	107.6
Max. HGL (m)	115.2	115.2	115.2	115.2	115.1	115.0	115.0	114.9
MXDY + FF (200 L/s) (m)	105.0	106.5	107.1	108.4	110.1	109.9	110.0	110.0

3.4 Hydraulic Assessment

3.4.1 Level of Service

A preliminary watermain network was compiled and modeled on PCSWMM to verify adequacy of watermain pressures to service the subdivision, based on the provided boundary conditions from the City. Through the City of Ottawa Design Guidelines, the normal demand conditions (average day, maximum day and peak hour) should be in the preferred range of 350 kPa to 480 kPa (50 psi to 70 psi) and no less than 275 kPa (40 psi) at the ground elevation on the streets (i.e., at hydrant level).

As per the Ontario Building Code (OBC) & Guide for Plumbing, if pressures greater than 550 kPa (80 psi) are anticipated, pressure relief measures are required. The maximum pressure at any point in the distribution system in unoccupied areas shall not exceed 689 kPa (100 psi). Under emergency fire flow conditions, the minimum pressure objective in the distribution system is 138 kPa (20 psi).

Hazen-Williams coefficients (“C-Factors”) are applied to the simulated watermains in accordance with the City of Ottawa’s Water Distribution Design Guidelines and as shown in **Table 3.3**.

Table 3.3: Proposed Watermain C-Factors

Pipe Diameter (mm)	C-Factor
150	100
200 to 250	110
300 to 600	120
> 600	130

Results of the preliminary watermain hydraulic analysis is available in **Appendix B.3**.

3.4.2 Average Day Demand (AVDY)

The hydraulic modeling results indicate that under the average day demand, the pressure in the proposed watermain ranges from 550 kPa to 583 kPa (79.7 psi to 84.6 psi). Pressure at some nodes exceed the serviceable limit of 276 kPa to 550 kPa (40 psi to 80 psi) as specified in the City of Ottawa Design Guidelines - Water Distribution, indicating that pressure reducing valves may be required for the development. Results are shown in **Figure 3.1**. Requirements for pressure-reducing measures will be confirmed by the mechanical or civil engineering consultant at the future detailed design phase for the residential and park development blocks.

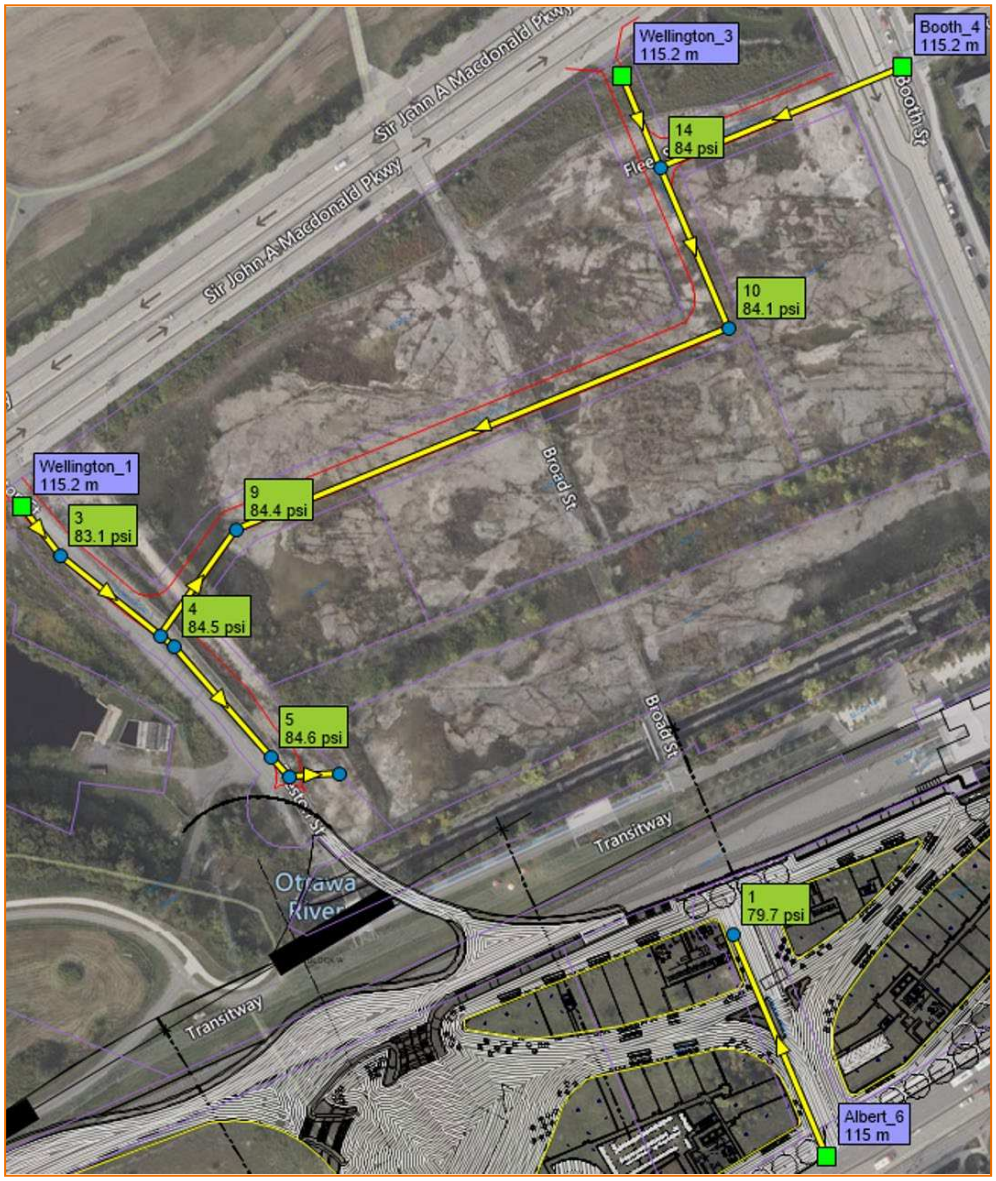


Figure 3.1: AVDY Pressure Results

3.4.1 Peak Hour Demand (PKHR)

The hydraulic modeling results indicate that under the peak hour demands, the pressure in the proposed watermain ranges from 408 kPa to 502 kPa (59.2 psi to 72.8 psi). These pressures are within the serviceable limit of 276 kPa to 552 kPa (40 psi to 80 psi) as specified in the City of Ottawa Design Guidelines – Water Distribution. Results are shown in **Figure 3.2**.

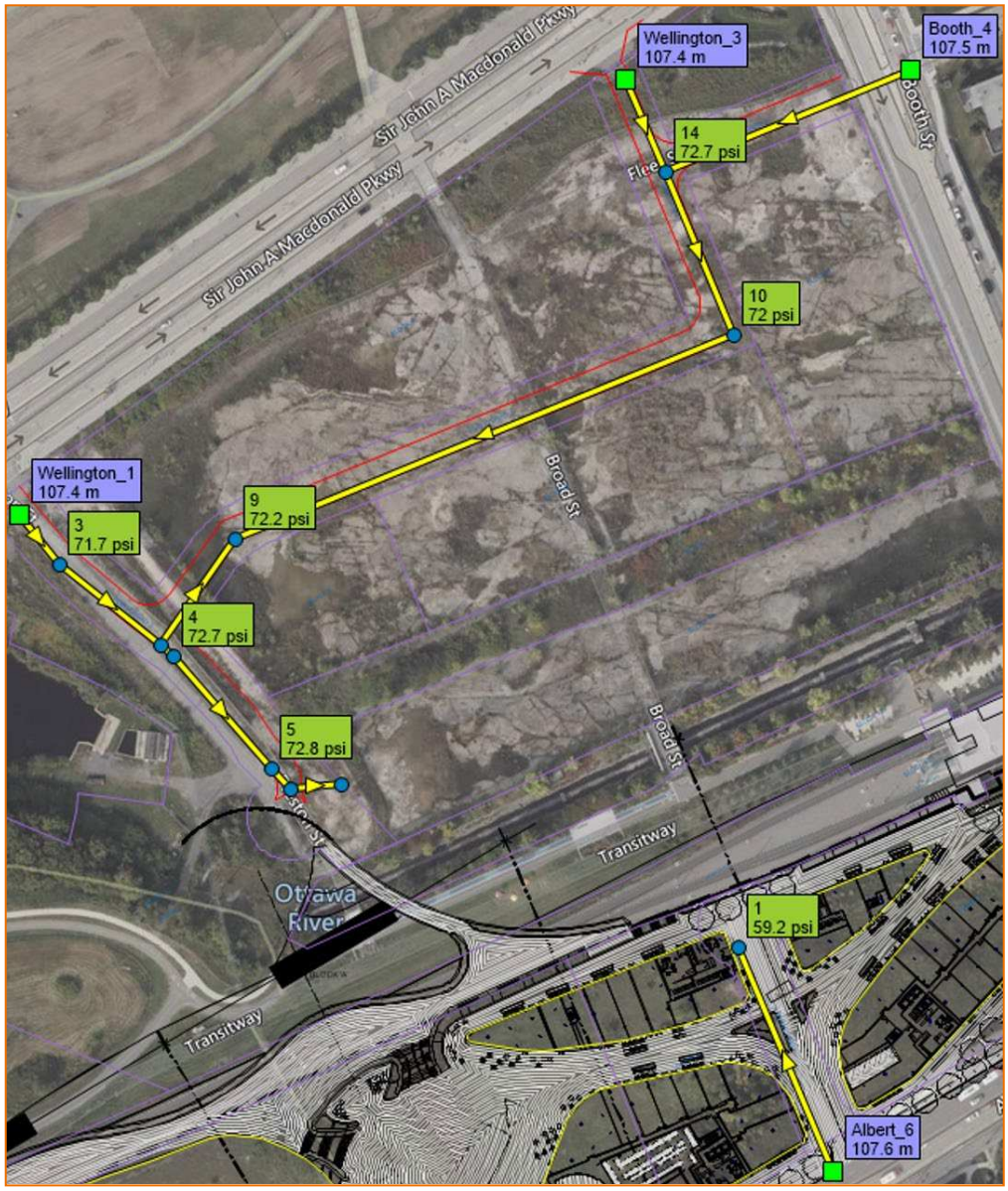


Figure 3.2: PKHR Pressure Results

3.4.2 Maximum Day Demand + Fire Flow (MXDY+FF)

The hydraulic modeling was also used to assess the maximum day and fire flow demands while maintaining a residual pressure of 138 kPa (20 psi), per the City of Ottawa Design Guidelines – Water Distribution. The modeling is conducted using a steady-state maximum day demand scenario along with the automated fire flow simulation feature of PCSWMM. The fire flow demand is set to 200 L/s as per the demands noted in **Section 3.2.3**.

Figure 3.3 illustrates that the proposed networks can deliver flows exceeding 200 L/s while maintaining the required residual pressure of 138 kPa (20 psi).



Figure 3.3: Fire Flow Results – Residual Pressure and Available Fire Flows

3.5 Conclusion

The proposed watermain alignment and sizing can achieve the required level of service within the LeBreton Flats subdivision. Based on the hydraulic analysis, the following conclusions were made:

- The proposed water distribution system is recommended to include a network of 200 mm diameter watermains within the public roads, with connections to the existing municipal system.
- During peak hour conditions, the proposed system is capable of operating above the minimum required pressure of 275 kPa (40 psi).
- Pressure reducing valves may be required in some areas of the development. Requirements for pressure-reducing measures will be confirmed by the mechanical and civil engineering professionals at the future detailed design phase for the residential and park development blocks.
- Under fire flow conditions, the proposed networks can provide sufficient fire flows (200 L/s and above) while maintaining a residual pressure of 138 kPa (20 psi) in the LeBreton Flats development.

Watermain sizing and hydrant placement will be confirmed as part of the detailed design of subdivision.

4 Wastewater Servicing

4.1 Background

The LeBreton Flats subdivision lands are located within the central core of the City of Ottawa immediately adjacent to the Ottawa River. Public wastewater infrastructure is available to service the subdivision lands. The 1050 mm diameter Cave Creek Collector (CCC) sanitary sewer, crosses the southern portion of the development land (Block 1, Block 2 and Public Road 4). Design is underway for the realignment of the CCC. The CCC is intended to be relocated to the Albert Street ROW (by others) prior to the development of the impacted subdivision blocks. 250 mm diameter and 300 mm diameter sanitary sewers on Wellington Street, and a 375 mm diameter sanitary sewer on Booth Street also front the subdivision lands. These sewers direct wastewater to the LeBreton Flats Pumping Station (LFPS) via Fleet Street. The LFPS was designed to service the full buildout of LeBreton Flats subdivision north of the closed aqueduct, including the existing Claridge development and the Canadian War Museum. A flow allotment was also assigned for potential future development of Victoria Island. The design and construction of the LFPS was funded by the NCC.

4.2 Wastewater Generation and Servicing Design

The following criteria have been used to calculate the estimated wastewater flow rates and to determine the size and location of the sanitary sewers. Design criteria are in accordance with the City of Ottawa Sewer Design Guidelines, the Ministry of Environment Conservation and Parks (MECP) Design Guidelines for Sewage Works, and the 2013 JL Richards technical study for the Canadian Tire Centre wastewater system. Park design criteria are consistent with previous background studies.

- Minimum velocity = 0.6 m/s (0.8 m/s for upstream sections)
- Maximum velocity = 3.0 m/s
- Manning roughness coefficient for all smooth wall pipes = 0.013
- Minimum size of sanitary sewers inside the greenbelt = 250 mm
- Minimum grade of 250 mm sanitary sewer = 0.24% (0.65% where less than 10 contributing residential units)
- Residential average wastewater generation = 280 L/person/day
- Commercial average wastewater generation = 28,000 L/gross floor ha/day
- Hotel average wastewater generation = 225 L/bedspace/day
- Picnic space and flushing toilets average wastewater generation = 20 L/persons/day
- Residential Peaking Factor = based on Harmon Equation; maximum of 4.0, minimum of 2.0

- Commercial and Hotel Peaking Factor = 1.5
- Park Contingency Factor = 25 %
- Harmon correction factor = 0.8
- Infiltration allowance = 0.33 L/s/ha
- Minimum cover for sewers = 2.5 m
- Population density for apartment units = 1.8 persons/unit
- Population density for townhome units = 2.7 persons/unit
- Bedspace per hotel unit = 2 bedspaces/hotel unit
- Population density for park areas = 183.5 persons/ha
- Arena sanitary design flows (based on 20,500 seats) = 46 L/s*

* Sanitary design flow of 46 L/s based on the former Corel Centre (20,500 seats) Additional Flow Assessment Memo (J.L. Richards, 2013) (**Appendix A.2**) to be adjusted for proposed seating capacity of 17,500 seats.

4.3 Functional Sanitary Servicing Design

4.3.1 Functional Layout

The functional layout of the municipal sanitary collection system ensures the servicing of all development blocks based on the NCC Master Concept Plan, planned densities and applicable design criteria.

The functional servicing layout and drainage area plan for the LeBreton Flats Plan of Subdivision is detailed on **Drawing SAN-1**. The LeBreton Flats development will be serviced by two separate networks of sanitary sewers. Wastewater from the subdivision lands north of the covered aqueduct will outlet to the 375 mm diameter sanitary sewer in Booth Street, which directs flow to the LFPS via Fleet Street. Wastewater from the subdivision lands south of the covered aqueduct will outlet to the Cave Creek Collector (CCC). In **Figure 4.1**, lands serviced by the LFPS are green and those serviced by the CCC are shown in pink.

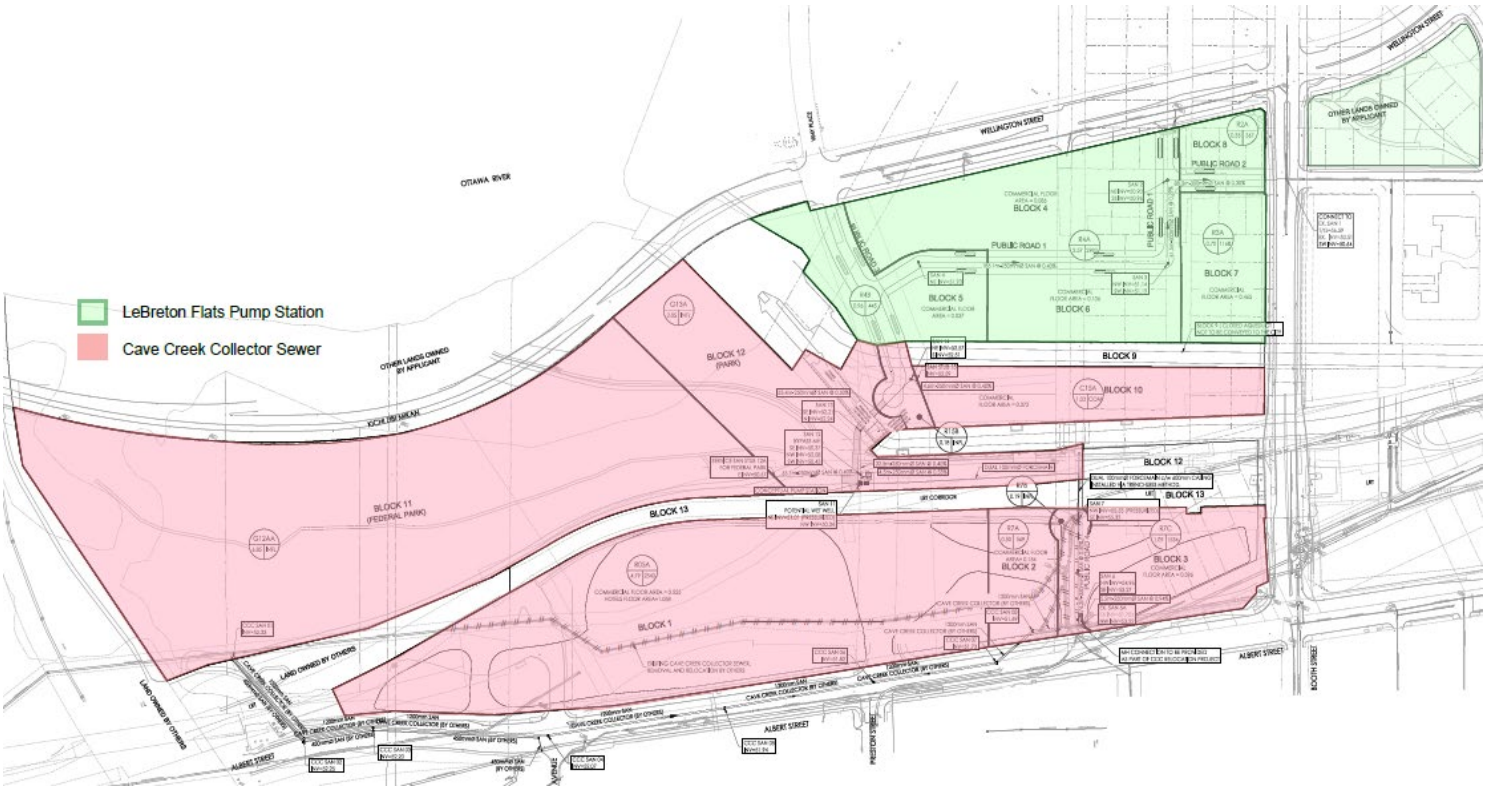


Figure 4.1: Sanitary Drainage Outlets

A network of sanitary sewers will service the subdivision lands with connections to the existing municipal sewers within Booth Street and Albert Street consistent with earlier master servicing studies. New municipal sewers will be located within the public roadways to provide a wastewater outlet for each of the development blocks and park blocks.

4.3.2 LeBreton Flats Pump Station Capacity Allocation

Lands within the LeBreton Flats subdivision north of the covered aqueduct fall within the drainage area for the LFPS. As outlined in the Amended Certificate Approval issued by the Ministry of Environment, Number 8494-84GSRF (**Appendix C.3**), the station is approved for a rated firm capacity of 100 L/s. Although the capacity of 100 L/s is specified on the Certificate of Approval, correspondence from the City of Ottawa indicates that the station can service a higher flow rate. Should development within the LFPS drainage area expand beyond that currently proposed and require a higher servicing capacity from the LFPS, the capacity of the station should be validated through further analysis and approval from the Ministry of Environment Conservation and Parks will be required. Correspondence with the City of Ottawa related to the capacity of the station is included in **Appendix C.5.**

In 2004, Dessau Soprin prepared the LeBreton Flats Infrastructure and Remediation Project Master Servicing Report and assigned conceptual flow rates to the LeBreton Flats area which includes the subdivision land. Total flows assigned to the subdivision area in the MSS were based on densities and

gross floor area assumed in the 2002 Ainley Group LeBreton Flats Redevelopment Infrastructure Needs Study. Relevant excerpts from both reports are appended for reference (see **Appendix A.2**).

A sewer design sheet has been prepared distributing flows from the MSS to the subdivision and external lands to reflect the current development configuration. The design sheet is included in **Appendix C.4.** Total flows assumed for lands within the LFPS drainage area are summarized in the **Table 4.1**. One small adjustment has been made to the MSS flow allocation to reflect the completed development of the Canadian War Museum site. Flow for the museum has been adjusted based on current design criteria to more accurately represent estimated actual flows from the site. The entire parcel area has been used to estimate the flow and this assumption remains conservative.

Table 4.1: Flow Allocations per Dessau Soprin MSS

Subdivision/External Development Land*	MSS Flow Allocation
BLOCK 4-8 (LMNO)	27.9
BLOCK 10 (JK)	5.8
N of Fleet & E of Booth (UT)	6.0
Victoria Island	20.0
Future Cultural/Institutional (V)	2.2
Canadian War Museum (XW)**	3.4
CLARIDGE PHASES 1-5 (PQRS)	20.6
N of Aqueduct & E of Booth (I)	0.3
Allocation Total	**86.2**
Remaining LFPS Capacity (LFPS Firm Capacity = 100 L/s)	**13.8**

* Letter Drainage Area IDs per MSS Dwg C002 based on Ainley Infrastructure Needs Assessment

** Actual Flow for Canadian War Museum Adjusted using Current Design Criteria

Given that the LFPS has a firm capacity of 100 L/s, there is an additional 13.8 L/s of capacity over and above that allocated as part of the MSS. This flow can be allocated based on density, percentage of overall flow allocation, by area, or another distribution. Based on our review of the options, it is recommended that the remaining capacity be allocated based on the percentage of undeveloped area within the LFPS drainage area. This appears to be the most equitable way to allocate the balance of the design flows. **Table 4.2** presents the proportionate undeveloped area east and west of Booth Street to be serviced by the LFPS and assigns the balance of the remaining capacity accordingly.

Table 4.2: Recommended Distribution for the Balance of Available LFPS Capacity

Undeveloped Areas to LFPS	Area (Ha)	Percentage Undeveloped Area	Flow Allocation
LeBreton Flats Subdivision (lands west of Booth)	3.0	51%	7.0
Lands External to Subdivision (lands east of Booth)*	2.9	49%	6.8

*Undeveloped lands include parcels UT, V, I and a portion of PQRS (Claridge Phases 1-5) as identified in the Dessau Soprin MSS, see **Appendix A.2**.

Combining the flow allocated to the subdivision lands in **Table 4.1** with the distribution in **Table 4.2**, the total flow allocation to the subdivision is 40.7 L/s.

It should be noted that actual wastewater flows are typically significantly lower than design flows. Should there be questions about available capacity as the area develops, monitored flows should be reviewed to assess actual capacity.

4.3.3 Cave Creek Collector Capacity

Through pre-application consultation, the City of Ottawa advised that there are no capacity restrictions to be considered for those portions of the development that will be serviced by the Cave Creek Collector sewer.

4.3.4 Functional Design Flow

Functional design flows were estimated based on the assumed development densities and gross parcel areas established by the NCC in accordance with the West Downtown Core Secondary Plan. The density table is included in **Appendix A.1**.

A sanitary pumping station will be required to service the sanitary sewers receiving flows from Block 10 (commercial/office) and park blocks 11 and 12 due to their relative elevations to the CCC and the need for transmission infrastructure to cross the open aqueduct and rail corridor. City of Ottawa Wastewater Operations have advised that the sanitary pump station will require back up power, dual forcemains and vehicular access. Wastewater Operations have also specified that the infrastructure crossing the rail line is required to be sleeved. The functional location and layout of the proposed pumping station (Option 1 per section 4.3.2) is included on **Drawing SAN-1**. Peak design flow to the station is calculated to be 5.2 L/s as detailed in the sanitary design sheet included in **Appendix C.1.**

The proposed design peak flows for the subdivision to each outlet are outlined in **Table 4.3** and detailed in **Appendix C.1**. As shown in **Table 4.4**, the design peak flows fall within the available capacity of both the CCC and the LFPS.

Table 4.3: Estimated Total Wastewater Peak Flow for Draft Plan of Subdivision (lands west of Booth)

Outlet	Blocks	Residential			Hotel	Park	Arena	Commercial			Infiltration Flow (L/s)	Total Peak Flow (L/s)
		Population	Peak Factor	Peak Flow (L/s)	Peak Flow (L/s)	Peak Flow (L/s)	Peak Flow (L/s)	Area (ha)	Peak Factor	Peak Flow (L/s)		
LFPS	4, 5, 6, 7, 8	4,104	2.86	38.0	0.7	-	-	0.66	1.5	0.2	1.4	40.4
CCC	1, 2, 3, 10, 11, 12	4,442	-	43.8	1.6	0.5	39.3	12.82	1.5	6.2	5.6	96.9
Total Estimated Wastewater Peak Flow (L/s):												**137.3**

Table 4.4: Comparison of Design Flow with Capacity Allocation

Outlet	Blocks	Sanitary Peak Flows for Draft Plan of Subdivision (L/s)	Capacity Allocation
LFPS	4, 5, 6, 7, 8	40.4	40.7
CCC	1, 2, 3, 10, 11, 12	96.9	No Limit Restriction Identified by the City of Ottawa

4.3.5 Local Sanitary Pump Station

The existing infrastructure crossing the site and the relative elevations of the land and existing sewer outlets constrain the servicing of the lands between the covered aqueduct and the Confederation Line rail corridor. A small sanitary pumping station is required as part of the sanitary servicing infrastructure to service Block 10, the City park block, and the NCC federal park block.

Options for the pump station siting were evaluated based on the station requirements and constraints. A technical memo and schematics examining the options has been included in **Appendix C.2.** The memo includes the functional layout of both options. A version of Option 1 is depicted on the Functional Sanitary Sewer System layout, **Drawing SAN-1** and is the recommended option based on the review of pros and cons identified.

The wet well will receive wastewater flow from the two parks and Block 10 by gravity where sewage will be pumped across the rail corridor. The forcemains will outlet to SAN 7 within Public Road 4 where sewage will flow by gravity to the CCC. The detailed design of the pump station will form part of the detailed design of the subdivision.

4.4 Conclusion

The proposed sanitary sewer alignment and sizing can achieve the required level of service for the LeBreton Flats subdivision development.

The capacity of the receiving wastewater systems can accommodate design flows based on proposed densities.

A small sanitary pump station will be required to service the blocks that do not have a gravity outlet to the municipal collection system, Blocks 10, 11 and 12.

The detailed design of the sanitary collection system and components will be established as part of the detailed design of subdivision.

5 Stormwater Management and Stormwater Servicing

5.1 Background

The objective of this stormwater management plan is to determine the measures necessary to control the quantity and quality of stormwater released from the proposed development to the design criteria established in earlier Master Servicing Studies and subsequent pre-consultation with City of Ottawa staff.

5.2 Stormwater Management (SWM) Design Criteria

The Stormwater Management (SWM) criteria are established by combining current design practices outlined by the City of Ottawa Sewer Design Guidelines (SDG) (December 2025), as amended, the National Capital Commission Stormwater Management Manual, consultation with City of Ottawa staff, and review of the LeBreton Flats MSS (LFMSS) and other background studies. The following summarizes the criteria, with the source of each criterion indicated in brackets:

General

- Use of the dual drainage principle (City of Ottawa SDG)
- Wherever feasible and practical, site-level measures should be used to reduce and control the volume and rate of runoff (City of Ottawa SDG)
- Assess impact of 100-year event outlined in the City of Ottawa Sewer Design Guidelines on the major and minor drainage systems (City of Ottawa SDG)

Storm Sewer and Water Quantity Control

- The minor system will be designed to convey the 5-year post event, and quantity control will be required for the individual blocks up to and including the 100-year event (LFMSS, CIMA+ 2021)
- Discharge from the blocks and ROWs should be controlled to the 5-year storm event with C=0.70 (City of Ottawa pre-consultation).
- Discharge from park blocks to existing sewer outfalls to the Ottawa River / Open Aqueduct to be controlled to pre-development levels for equivalent storm events.
- Tc should be not less than 10 minutes (City of Ottawa SDG).

Surface Storage and Overland Flow

- Building openings to be a minimum of 0.30 m above the 100-year water level (City of Ottawa SDG)

- Maximum depth of flow under either static or dynamic conditions shall be less than 0.35 m for local streets (City of Ottawa SDG)
- Provide adequate emergency overflow conveyance off-site with a minimum vertical clearance of 0.15 m between the spill elevation and the ground elevation at the building envelope in the proximity of the flow route or ponding area (City of Ottawa SDG)

Water Quality

- An Enhanced level of quality control of 80% removal of Total Suspended Solids (TSS) has been requested for all stormwater outlets, and corresponding to requirements for the City of Ottawa's CLI-ECA (City of Ottawa pre-consultation)

Water Balance

- Control recharge to meet pre-development conditions on the site as defined by local site study, or to the 90th percentile storm event (roughly a 26mm rainfall event) as noted in Appendix A of the City of Ottawa's CLI-ECA (MECP)

5.3 Functional Stormwater Management Design

The LeBreton Flats development is to be designed using the "dual drainage" principle, whereby the minor (pipe) system is designed to convey the peak rate of runoff from the 5-year design storm and runoff from larger events is conveyed by both minor (pipe) and major (overland) channels, such as roadways and walkways, safely off site without impacting proposed or existing downstream properties.

In keeping with the 5-year inlet restriction criterion, inlet control devices (ICDs) or orifice plates will be specified during the detailed design stage for the individual blocks and street catchbasins to limit the inflow to the minor system. Restricted inlet rates to the sewers are necessary to prevent the hydraulic grade line (HGL) from surcharging storm sewers into basements and other underground infrastructure during major storms.

The Modified Rational Method has been employed to assess the rate and volume of runoff anticipated during post-development rainfall events. Based on the draft plan and preliminary Grading Plan, drainage area boundaries have been defined. Runoff coefficient values were then assigned to each drainage area based on a conservative estimate of built-form imperviousness. Runoff coefficients for each area are assigned based on City of Ottawa SDG and accepted practices. Full details can be found in **Appendix D.1**, while **Drawing STM-1** illustrates the conceptual post-development drainage conditions.

The major system flows generated from larger events (beyond the 100-year storm), for lands north of the Confederation Line, will be safely conveyed to the open aqueduct as per existing conditions by engineered (overland) channels such as roadways, ditches, and walkways. Under historical conditions, the open aqueduct served as the major system outlet for the subdivision lands south of the Confederation Line as well as approximately 21 ha of land south of Albert Street (see Major Overland Flow section below). Construction of the Confederation Line has effectively blocked existing overland flow path to the open

aqueduct, with no option for overland conveyance identified in the stormwater management report for the Confederation Line guideway.

The minor system from the proposed subdivision will be conveyed and modelled up to the point of discharge to four storm sewer outlets which include the open aqueduct, the 525 mm diameter storm sewer in Albert Street and two connections to the 2100 mm diameter storm trunk sewer at Albert Street and at Fleet Street.

5.3.1 Pre-Development Drainage Conditions

The existing drainage conditions for the site have been determined by evaluating available topographic mapping to delineate the existing flow patterns and subdrainage areas, with the study area split into subcatchments based on existing surface inlets. The runoff coefficients for the existing subdrainage areas have been determined based on the relative imperviousness of the respective areas. A network of existing culverts and catch basins direct the drainage from most areas to either the open aqueduct, the Confederation Line ditch line, and the Ottawa River. Existing areas to be retained as NCC or City of Ottawa park land largely drain to existing catch basin and culvert infrastructure to the Ottawa River or open aqueduct. The pre-development subdrainage areas are shown on **Drawing EX STM-1**.

An external area to the south measuring approximately 21 ha as identified by City of Ottawa personnel historically contributed overland flow to the open aqueduct as identified in previous background studies. This emergency overland flow route currently enters LeBreton Flats Subdivision lands via a low point at the intersection of Albert and Preston Streets, with grading indicating a potential for major system flows to overtop the centerline of Albert Street allowing major system runoff to enter the proposed subdivision with no ability to cross the Confederation Line.

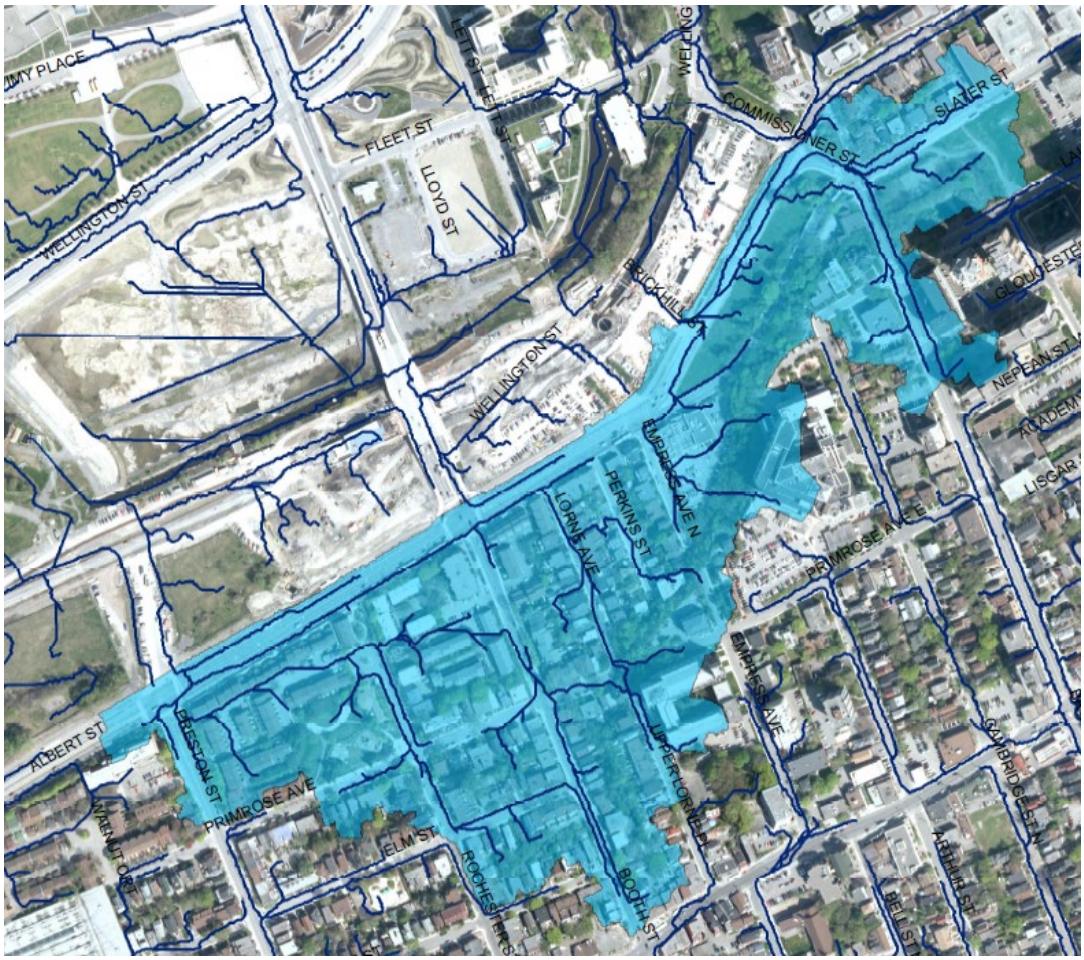


Figure 5.1: External Stormwater Drainage Area Crossing Albert Street (LeBreton Flats Master Servicing Report Amendment, Parsons, June 2019)

The target release rate for the site was calculated using the rational method, a time of concentration of 10 minutes, and the City of Ottawa IDF curves. The rational method equation is as follows:

- Q = 2.78 CiA
- Where:
    a. Q = peak flow rate, L/s
    b. A = drainage area, ha
    c. I = rainfall intensity, mm/hr (per Ottawa IDF curves)
    d. C = site runoff coefficient

The release rates are summarized in **Table 5.1**. The post-development peak flows for the study area for the 5-year and the 100-year event must be restricted to be less than or equal to the 5-year pre-development with a C of 0.7.

Table 5.1: Target Release Rate

Design Storm	Target Flow Rate (L/s)
5-Year	4408

5.3.2 Post-Development Drainage Conditions

The post-development drainage patterns for the site were established based on the draft plan and shown on **Drawing STM-1**, where the subdrainage areas have been delineated based on their drainage outlet, storage treatment, and design criteria. The subdrainage areas have been grouped into the following categories as shown in **Table 5.2**.

Table 5.2: Summary of Post-Development Subdrainage Areas

Category	Applicable Blocks	Subdrainage Areas	Total Area (ha)	Outlet
Block Areas – Tributary to Fleet Street	Blocks 4 to 8	C3A, C4A, C5A, C5C, C6B	2.88	Fleet Street 2100 mm diameter storm sewer
ROWs – Tributary to Fleet Street	Public Roads 1 to 3,	C6A, C6D, C3B	0.97	Fleet Street 2100 mm diameter storm sewer
Block Areas – Tributary to Albert Street	Blocks 1 to 3	BLOCK 1, C13A, C13B	6.38	Albert Street 525 mm and 2100 mm diameter storm sewers
ROWs – Tributary to Albert Street	Public Road 4	C12C	0.19	Albert Street 525 mm and 2100 mm diameter storm sewers

Category	Applicable Blocks	Subdrainage Areas	Total Area (ha)	Outlet
Block Area – Tributary to the Open Aqueduct	Blocks 9 and 10	C7A, C7B, C7C	1.63	Open Aqueduct
City Park	Block 12	PARK-1, PARK-2	2.48	Open Aqueduct / Nepean Bay / Ottawa River
NCC Lands, Closed Aqueduct Block	Block 9 11	NCC-1	6.85	Ottawa River / Open Aqueduct

The post-development subdrainage areas and runoff coefficients are summarized in **Appendix D.1**.

5.3.2.1 Quantity Control

The LeBreton Flats development will lead to a significant increase in the site's overall runoff coefficient, as the site is presently vacant and predominantly pervious area. In addition, the C coefficient values have been increased by 25 % for the post-development 100-year storm event based on MTO Drainage Manual recommendations and City of Ottawa Sewer Design Guidelines. Quantity control measures are required on this site to meet the restrictive stormwater release criteria.

To assess the post-development runoff, a runoff coefficient of C=0.85 was assigned to all the development blocks, save for the parks (C=0.40) and the covered aqueduct (Block 9, C=0.20), while C=0.70 was assigned to the public roads and private lane ROWs.

Detailed design for each block is expected to progress through individual Site Plan Control (SPC) processes. To demonstrate the serviceability of the subdivision, the Block areas and ROWs have been treated as a single consolidated area with a combined runoff coefficient, overall storage requirements, and a single outflow rate that satisfies the 5-year pre-development release rate. To demonstrate the serviceability of each individual Block, the stormwater management design calculations also provide the required release rates at the Block level.

Although the block proximity to the Ottawa River would not suggest a requirement for quantity control, stormwater runoff from the park blocks is anticipated to be controlled to the pre-development release rate for all storm events up to the 100-year storm event to ensure adequate sizing of existing downstream storm sewer infrastructure. The amount of storage required will depend on the detailed design of the parks and the amount of impervious area proposed at the site plan stage.

It is anticipated that surface storage with inlet control devices (ICDs) in catch basins be provided in the public roadway and private lane ROWs, while onsite storage methods (i.e. controlled rooftop storage, cisterns, underground tanks, oversized pipes, or a combination thereof with restricted release) will be

provided onsite within the blocks to meet the target discharge. Further details of the stormwater storages for each block and the surface storages within the ROWs will be provided at the detailed plan of subdivision and individual block site plan control stages for the development.

The storage requirements for the site were determined using the Modified Rational Method (MRM). The detailed MRM analysis have been provided in **Appendix D.1**. The 100-year storage requirements per outlet are summarized in **Table 5.3**, where:

- Qactual is the 100-year rainfall runoff rate generated from the Block area as determined by the Rational Method Calculation at tc = 10 min
- Vstored is the volume of storage required.
- Park block storage has been omitted from the tables below, and is directly dependent on the level of impervious area to be assessed at the site plan stage. Sufficient on-site storage is required to retain runoff to ensure peak discharge does not exceed pre-development levels.

Table 5.3: 100-Year Storage Requirements for Block Areas and ROWs

Outlet	Area Type	Area	C	C	Qactual	Qcontrol	Vstored
		(ha)	(5-yr)	(100-yr)	(L/s)	(L/s)	(m^3)
Fleet Street	Blocks	3.41	0.85	1.00	1692	691	601
	ROWs	0.97	0.70	0.88	422	197	135
Albert Street	Blocks	6.39	0.85	1.00	3171	1295	1126
	ROWs	0.19	0.70	0.88	83	39	27
Open Aqueduct	Blocks	1.50	0.71	0.88	657	303	212
	ROW	0.13	0.70	0.88	56	26	18

5.3.2.2 Quality Control

On-site quality control measures are expected for the proposed development per pre-consultation with the City of Ottawa. An enhanced level of protection (80% removal of total suspended solids) was identified for the site before discharging to the storm sewer outlet. The use of LIDs may be limited for the development based on elevated bedrock as well as historic land use for a portion of the development as a landfill. As such, quality control measures will largely be limited to oil/grit separators, surface filtration measures, and filtration manufactured treatment devices (MTDs). The MECP has recently advised that OGS units should be sized for quality control based on revised particle size distributions which largely limit OGS units to providing 50-55% removal of total suspended solids. As such, filtration bioswales are proposed within the boulevards of the streets to collect and treat surface runoff from the ROWs before discharge into the municipal storm sewers. Surface filtration LIDs are expected to provide capture and control of at minimum runoff resultant from the 25mm storm event per design hierarchy noted within the City of Ottawa's CLI-ECA.

Quality control requirements and measures for each block will be established at site plan control for each individual block and is expected to meet the enhanced level of protection required. The quality control unit

for the outlet into the open aqueduct will be incorporated into the stormwater design by others at the detailed design phase.

The Hydrogeological Review (Stantec, 2026) recommended using low impact development (LID) systems designed to promote sediment filtration, evapotranspiration, and/or capture stormwater from the parks and direct it toward a stormwater sewer that conveys the water away from any proposed buildings. Furthermore, the LeBreton Flats Master Servicing Report (CIMA+, 2021) also identified bio-swales and/or rain gardens as the preferred LID measures for park blocks.

5.4 Functional Storm Servicing

A functional storm servicing design featuring conceptual sewer alignments, emergency overland flows, and storm drainage areas is provided in **Drawing STM-1**. Preliminary storage requirements and supporting calculations are provided in **Appendix D.1**. The sewers are to be designed in conformance with all City of Ottawa and MECP Guidelines, policies, and design parameters.

The proposed roadways will have urban cross sections complete with curb, gutter, and catch basins to inlet to the minor storm system. Design of the storm sewer (including catch basin design and locations) are to be determined at the detailed design phase when a dynamic model will be developed to evaluate the post-development conditions and sewer hydraulic design. At present, the functional sewer design is free of conflicts with other services (SAN and WTR) and has adequate cover for frost protection.

The buildings in each development block are anticipated to be serviced by storm service laterals, which will accommodate the controlled release of rooftop runoff, building foundation drain flow, and release of stormwater runoff from building area drains or stormwater storage cistern(s). It is assumed that sump pits and pumps will be required to accommodate the foundation drains and the possible stormwater storage cistern(s) at the basement (underground) parking levels.

The mechanical consultant or plumbing contractor will ultimately be responsible to confirm the building service lateral sizing; sump pump requirements and designs; and ensure conformance to building code requirements. Building service sizing and sump pump requirements will be confirmed at the detailed design phase.

5.5 Major System Flow – Lands South of Confederation Line

During pre-application consultation discussions, the City of Ottawa identified that the Confederation Rail Line is situated in the overland flow path of runoff from an area of approximately 21 hectares external to the subdivision, south of Albert Street. Infrastructure for conveyance of the external drainage has not been accommodated with works to date including the construction of the Confederation Line. The City of Ottawa initially directed the NCC to design an emergency overland flow outlet as part of the plan of subdivision to safely convey the external stormwater drainage across the rail line to the open aqueduct.

As the construction of the Confederation Line has cut off the ability to provide an overland flow path for the municipal overland drainage for the lands south of Albert, it is ultimately the responsibility of the City of Ottawa to provide for conveyance of the overland flows. Further to more recent discussions, the City of

Ottawa advised that they will be undertaking detailed modeling of the external flows and will establish a major system drainage solution to accommodate these flows as well as the emergency overland flow from the subdivision lands south of the Confederation Line Rail Corridor. It is intended that the drainage solution will be integrated as part of the Albert Street Reconstruction works. Correspondence with the City of Ottawa is included in **Appendix D.4.**

To support the functional design for the LeBreton Flats Plan of Subdivision, the stormwater management design includes capture of major system spillage at Albert Street via a bank of surface catch basins or a high-flow trench drain, directed to an extension of the Albert Street storm sewer. This will prevent surface runoff from being directed through private development lands. The inlet is proposed to be sited to permit capture of flows that exceed the allowable flow depth within Albert Street, to be assessed at detailed design. The Albert Street sewer progresses northwards along Booth Street and discharges to the tailrace downstream of the open and closed aqueducts. Flows from the subdivision lands to the Albert Street sewer in this manner are only anticipated for extreme storm events (100yr and above). See **Drawing PP-STM** for conceptual major system capture sewer details. Validation of the major system drainage solution including review of conveyance capacity of the Albert Street sewer will be verified by the City of Ottawa. As noted in the correspondence in **Appendix D.4**, the drainage solution is intended to be implemented as part of the Albert Street Reconstruction works.

To satisfy the City of Ottawa's initial request to model the external flows for sizing of a major system outlet, we undertook a high-level modeling exercise to quantify the external flows. Using available 2K mapping topography, the catchment area for the external drainage was delineated, and an overall runoff coefficient of 0.70 was applied based on prevailing imperviousness of existing areas.

A PCSWMM model for the major system within the catchment area was developed in consideration of the typical 18m ROW cross section for all streets with the exception of Preston and the south side of Albert Street which were developed based on existing photogrammetry. Subcatchments within the area are generally sloped from southeast to northwest to the intersection of Albert/Preston Street. Given the relatively high average longitudinal slope of the roadways, it was conservatively assumed that no additional storage would be available within ponded areas beyond that already determined for the given road cross sections. Subcatchment slopes were conservatively set at 3% on average, and subcatchment widths defined as subcatchment area x 225 per recommendations of the SDG for lumped drainage areas.

Each street intersection or major incoming driveway was modeled with a storage node in the PCSWMM model without surface storage to permit routing of the major system from street to street. At each storage node, runoff was removed from the model using catch basin capture curves for inlets on continuous grade as noted in the SDG, and for capacity of surface grates within sags from Design Charge 4.19 in the MTO Drainage Manual. Catch basin counts for each area were estimated based on direct take-offs from available City of Ottawa GIS mapping (GeoOttawa). It is assumed that the minor system in this area does not surcharge to surface during major storm events, and that the area is not equipped with inlet control devices given the overall existing sewer age.

The 100yr 3hr Chicago storm and 100yr 3hr +20% climate change storm was then run on the resulting model to verify at a high level whether considerable major system flows could be expected to discharge

over the centerline of Albert Street at the Preston intersection. Results of the model are noted in **Table 5.4** below, and PCSWMM model input and output files are included in **Appendix D.3**.

Table 5.4: Major System Spillage at Albert/Preston

Design Storm	Major System Spillage (L/s)
100-Year	372
100-Year + 20%	983

5.6 Conclusion

The proposed storm sewer alignment and sizing will provide the required level of service for the LeBreton Flats subdivision development and meet quantity and quality control requirements.

- On site storage within the blocks and ROWs are proposed to limit inflow from the subdivision into the existing storm sewers on Albert and Fleet Streets to the 5-year storm event based on City of Ottawa IDF curves and to a maximum runoff coefficient of 0.70.
- Major overland flow is directed to City managed rights-of-way.
- A major system overland capture point located within Albert Street is proposed to manage spillage from Albert Street and approximately 21 ha of external contributing area during the climate change (100yr +20%) storm event. Captured flows are to be directed to the Albert Street storm sewer. The final drainage solution will be established by the City of Ottawa and completed as part of the Albert Street Reconstruction project.
- Quality control is proposed to be provided by bioswales within the boulevards for urban rights-of-way, with additional on-site quality control required for site plan blocks.
- Quality control for the proposed park blocks is anticipated to be provided by on-site surface filtration through the use of bioswales, enhanced grass swales, or other infiltration measures.

6 Site Grading

The site measures approximately 21.5 ha in area and is mostly vacant, save for the two aqueducts and the existing multi-use pathways (MUPs). Per Appendix D of the LFMSS (CIMA+, March 2021) and topographic survey data, the existing terrain generally slopes from the edges of the site towards the open aqueduct and Broad Street, with portions of the NCC and City Park blocks draining to the Ottawa River.

A functional grading plan (see **Drawing GP-1**) is provided to support the stormwater management review presented in **Section 5**. The functional grading scheme verifies stormwater management calculations and allows for major system flow routes to progress along public ROWs as per City design criteria, and ultimately to the open aqueduct as per existing conditions. It provides preliminary high-point to high-point elevations in critical areas to demonstrate the proposed overall drainage patterns. The plan ties-in to existing elevations at the rail corridor and adjacent right of ways and no drainage is proposed to be directed to the adjacent private properties.

7 Utilities

Overhead (OH) hydro-wires run east-west along Albert Street and north-south along Preston Street, and significant hydro underground plant exists along Albert and Booth Street. Limited hydro plant exists along the northern boulevard of the Kichi Zibi Mikan and Wellington Street.

Within the subdivision boundaries, Hydro Ottawa duct runs along the southern limit of Block 2. Overhead electrical lines extend across the subdivision lands from the underground duct at Albert Street at Preston Street and extend to underground duct north of the covered aqueduct. A 100mm hydro duct extends from the covered aqueduct at the Inlet from the Ottawa River to Booth Street.

The detailed design of utility services will be further investigated as part of the composite utility planning process as part of the detailed design of subdivision. Existing utilities within the site boundaries may require relocation where they are not being incorporated into the detailed design.

Enbridge gas plant exists within the rights-of-way in the vicinity of the proposed site. Gas servicing is anticipated to be via the existing 300 mm diameter medium pressure system that runs along Preston and Albert Streets and via the existing 150mm line within Booth Street north of Fleet Street. The site is expected to be serviced through connections to these existing services.

Bell utilities exist near the development along Albert, Booth, and the Parkway. It is anticipated that the future development will be serviced by Bell fibre optic cables which will be extended through the subdivision.

The exact size, location, and routing of utilities is to be finalized during detailed design. Detailed design of the required utility services will be completed by the respective utility companies. Any relocation and protection of existing utilities in conflict with the proposed development will be coordinated with the individual utility providers.

8 Municipal Rights-of-Way

The widths of the proposed municipal roadways for the plan of subdivision were established to ensure that all right-of-way (ROW) infrastructure including municipal servicing, utility servicing, sidewalks, trees, streetlights and vehicular travel lanes can be accommodated while maintaining minimum offsets to adjacent infrastructure. ROW infrastructure is to include LID bioswales for filtration of surface runoff to meet quality control requirements per the intent of the City of Ottawa's CLI-ECA. The City standard ROW sections developed for greenfield development are not suitable for use in the urban core and do not meet the intent of the MCP.

Functional sections have been included on the Details Sheet, **Drawing DS-1** to demonstrate that the proposed ROW widths are adequate to support the required infrastructure. Alternative ROW sections will be established for the subdivision development as part of the detailed design.

9 Approvals

The City of Ottawa will review and approve the functional design report to support the Draft Plan of Subdivision application for the development and issue conditions to be satisfied prior to early servicing and/or registration of the subdivision. Assessment of the proposed works within the subdivision (watermains, storm and sanitary sewers, local roads, and installation of LIDs) under the draft plan of subdivision would satisfy the requirements under Schedule B Municipal Class Environmental Assessment (EA) projects. Further EA requirements for individual works (such as the required sewage collection system and pump station to service the anticipated park blocks) would be exempt from further EA process through Municipal Class EA for works required as a condition of approval of a draft plan of subdivision under the Planning Act.

At the detailed design stage, an MECP Environmental Compliance Approval (ECA) will be required for the proposed public storm and sanitary sewage and stormwater management works and anticipated to be processed under the City of Ottawa's current CLI-ECAs for wastewater and stormwater management works. Approval for the new sewage pump station is expected to require approval through direct submission to the MECP, however this will be confirmed based on the final detailed design, and potentially via the Consolidated Linear Infrastructure (CLI) ECA process.

At the subdivision construction phase, registration on the Environmental Activity Registry (EASR) or a Permit to Take Water (PTTW) may be required depending on the volume of water expected during construction of deep servicing trenches. Expected permitting requirements can be provided by the geotechnical engineer at the detailed design phase.

10 Erosion and Sediment Control During Construction

To protect downstream water quality and prevent sediment build-up in catch basins and storm sewers, erosion and sediment control measures must be implemented during construction. The following recommendations will be included in the contract documents and communicated to the Contractor.

2. Implement best management practices to provide appropriate protection of the existing and proposed drainage system and the receiving water course(s).
3. Limit the extent of the exposed soils at any given time.
4. Re-vegetate exposed areas as soon as possible.
5. Minimize the area to be cleared and grubbed.
6. Protect exposed slopes with geotextiles, geogrid, or synthetic mulches.
7. Install silt barriers/fencing around the perimeter of the site to prevent the migration of sediment offsite.
8. Install track out control mats (mud mats) at the entrance/egress as shown in **Drawing EC-1** to prevent migration of sediment into the public ROW.
9. Provide sediment traps and basins during dewatering works.
10. Install sediment traps (such as SiltSack® by Terrafix) between catch basins and frames.
11. Schedule the construction works at times which avoid flooding due to seasonal rains.

The Contractor will also be required to complete inspections and guarantee the proper performance of their erosion and sediment control measures at least after every rainfall. The inspections are to include:

- Verification that water is not flowing under silt barriers.
- Cleaning and changing the sediment traps placed on catch basins.

Refer to **Drawing EC-1** in for the proposed location of silt fences, sediment traps, and other erosion control measures.

11 Geotechnical and Environmental Considerations

A Geotechnical Desktop Review (Stantec, June 2, 2026), Phase One Environmental Site Assessment (Stantec, August 2, 2024), and Hydrogeological Memo (Stantec, June 18, 2026) were prepared for the proposed development to support the draft plan of subdivision application. These reports form part of the submission package for the Planning Act approval.

11.1 Geotechnical Investigation

Subsurface soil conditions within the subject area were determined through field investigations from February 1992 through to June 2018. In total the site has been divided into 4 portions (North, South, West, and East) based on subsurface conditions. The soil stratigraphy for the North, South, and West portions of site are summarized as follows:

- West Portion of Site: The proposed parklands north of the Confederation Line rail corridor sits on the former Nepean Bay landfill and consists of a layer of silty sand and gravel fill, complete with various amounts of debris, including wood, brick, and plastic, with a thickness of up to 19 m. Bedrock was encountered at 3.7 m to 15.4 m depth. South of the rail corridor, the fill layer is generally 1.5 m to 4.9 m thick, and bedrock was encountered at 5.6 m to 11.0 m depth.
- North Portion of Site: Bedrock was encountered at ground surface at some borehole locations. Elsewhere, bedrock was encountered at 2.7 m to 4.8 m depth. At the multi-use pathway where Preston Street formerly extended to the Ottawa River Parkway, the bedrock is overlain by a silty sand fill and gravel. Silty sand with gravel and cobbles fill material is the cover material for the buried aqueduct.
- South Portion of Site: The fill material comprises of loose to compact silty sand and containing gravel, cobbles, boulders, and construction debris, such as brick, wood, slag, and ashes. A silty clay and clayey silt deposit was encountered under the fill layer between the former Preston Street extension and the former Broad Street right of way. Bedrock was encountered at 3.5 m to 9.2 m depth.

Groundwater levels were measured at depths between 1.1 m to 9.8 m, though seasonal variations in the water table should be expected and would need to be monitored continuously at key locations where underground infrastructures are proposed. It is expected that construction may occur below the existing groundwater table and therefore a permit to take water may be required. No grade raise restrictions were identified for the site.

11.2 Environmental Site Assessment

A Phase One Environmental Site Assessment (ESA) was conducted to determine if Areas of Potential Environmental Concern (APECs) exists on the proposed site due to current and/or past Potential Contaminating Areas (PCAs) on the proposed site or nearby properties within 250 m of the perimeter of the site boundary.

The Phase One ESA determined the presence of APECs on the proposed site potentially impacting soil and groundwater quality, on account of the past industrial, commercial, and mixed-use residential usage of the site before the site was cleared out in the 1960s. Specifically, the proposed parks at the western end of the site north of the Confederation Line rail corridor sits in areas identified as PCAs due to it being a former landfill, with the potential contaminants the result from importation of fill material of unknown quality and the use for waste disposal and management. As such, a Phase Two ESA will be required to assess the issues before a Record of Site Condition can be submitted for the site.

11.3 Hydrogeological Review

A hydrogeological review was conducted to evaluate the hydrogeologic conditions on the site and potential for Low Impact Development (LID) infrastructure/techniques to be implemented at the site and the potential dewatering requirements.

The ability to infiltration stormwater within the development will be limited by space constraints and the shallow depth of bedrock. Capture and infiltration of groundwater is not recommended in the vicinity of building foundations due to the risk of short circuiting. Further, there is risk that infiltration systems may transport contaminants from the subsurface.

LID systems designed to promote sediment filtration, evapotranspiration, and/or capture stormwater and direct it toward a stormwater sewer that conveys the water away from buildings are recommended. Bio-swales, rain gardens, and green roofs were also identified as the preferred LID measures for the site.

12 Conclusions and Recommendations

12.1 Potable Water Servicing

The proposed watermain network and pipe sizing will achieve the required level of service in the proposed development:

- During peak hour (PKHR) conditions, the proposed watermain network is expected to operate above the minimum pressure objective of 276 kPa (40 psi);
- The proposed system will provide sufficient fire flow while maintaining a residual pressure of 138kPa (20 psi) in all areas.

12.2 Wastewater Servicing

The LeBreton Flats subdivision will be serviced by a network of gravity sewers which will direct wastewater flows to two different outlets. The area north of the covered aqueduct contributing to the 375 mm diameter storm sewer in Fleet Street, and ultimately to the LeBreton Flats Pumping Station. The balance of the subdivision will be serviced by the 1200 mm diameter Cave Creek Collector which runs along Albert Street.

A small pump station will be required to service the two park blocks and Block 10.

The preferred cover requirement of 2.5 m for the sanitary sewer system has been satisfied in all locations, and requirements for slope and velocities have been met within the local internal sewers. The downstream sewers have been adequately sized to receive peak sanitary discharge from the proposed subdivision.

12.3 Stormwater Management

The proposed stormwater management plan follows the goals specified in the background reports and the 2025 City of Ottawa Sewer Guidelines:

- On site storage within the blocks and ROWs are proposed to limit inflow from the subdivision into the existing storm sewers on Albert and Fleet Streets to the 5-year storm event based on City of Ottawa IDF curves and to a maximum runoff coefficient of 0.70;
- Major overland flow is directed to City managed rights-of-way;
- A high-capacity storm inlet located south of the subdivision within the Albert Street ROW is proposed to manage spillage from Albert Street and approximately 21 ha of external contributing area during the climate change (100yr +20%) storm event. Captured flows are to be directed to the Albert Street trunk storm sewer. City of Ottawa and NCC to establish responsibilities for funding and construction. Final drainage solution to be designed and constructed by the City of Ottawa.

- Quality control is proposed to be provided by bioswales within the boulevards for urban rights-of-way, with additional on-site quality control required for site plan blocks north of the aqueduct, and for the hotel arena parcel.
- Quality control for the proposed park blocks is anticipated to be provided by on-site surface filtration through the use of bioswales, enhanced grass swales, or other infiltration measures.

12.4 Utilities

Utility infrastructure is available on the surrounding municipal roadways and will be extended to service the subdivision. Designs will be prepared by each of the respective utilities at the detailed design stage.

12.5 Municipal Right's of Way

Alternative ROW cross sections will be used for this urban development to meet the intent of the MCP. Municipal ROW widths proposed are sufficient to accommodate all infrastructure needs. The alternative ROW sections will be established at detailed design.

12.6 Grading

The functional grading scheme has been developed to allow for an emergency overland flow outlet to downstream rights-of-way as per City standards, and ultimately to the open aqueduct as per existing conditions.

12.7 Approvals/Permits

At the detailed design stage, an MECP Environmental Compliance Approval (ECA) will be required for the proposed public storm sewage and stormwater management works. Approval for the new sewage pump station is expected to require approval through direct submission to the MECP, however this will be confirmed based on the final detailed design. The ECA for storm and sanitary sewer works is anticipated to be required through the CLI ECA process. The public consultation for the plan of subdivision under the *Planning Act* will fulfill requirements established in the Schedule B Municipal Class Environmental Assessment (EA).

At the subdivision construction phase, registration on the Environmental Activity Registry (EASR) or A Permit to Take Water (PTTW) may be required depending on the volume of water. Expected permitting requirements can be provided by the geotechnical engineer at the detailed design phase.

Appendix A Background

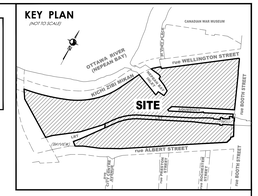
A.1 Draft Plan and Densities

May 28, 2026

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED _____ 20____
THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS _____ DAY OF _____ 20____.

ANDREW MCCREIGHT, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW-CENTRAL
PLANNING, DEVELOPMENT AND BUILDING SERVICES
DEPARTMENT, CITY OF OTTAWA

KEY PLAN
(NOT TO SCALE)



DRAFT PLAN OF SUBDIVISION OF

PART OF LOTS 38, 39 AND 40
CONCESSION A (OTTAWA FRONT)
PART OF THE BED OF THE OTTAWA RIVER
IN FRONT OF LOT 38 & LOT 39
CONCESSION A (OTTAWA FRONT)
PART OF DUCK ISLAND
IN FRONT OF LOT 38,
CONCESSION A (OTTAWA FRONT)
PART OF PRESTON STREET
(CLOSED BY BY-LAW OC1899021)
(GEOGRAPHIC TOWNSHIP OF NEPEAN)
PART OF BLOCKS A, B & C
PART OF MILL STREET
(CLOSED BY BY-LAW CR588682)
PART ENGINE HOUSE AREA
REGISTERED PLAN 60
LOTS 1 & 2 AND PART OF LOTS 3, 4 & 5
IN BLOCK E
PART OF LOTS 1, 2 & 3
IN BLOCK F
LOTS 2 TO 12 (BOTH INCLUSIVE)
IN BLOCK G
LOTS 2, 4, 6, 8, 10 & 11 AND PART OF LOTS 3, 5, 7, 9 & 12
IN BLOCK H
PART OF LOTS 23, 24, 25 & 26
IN BLOCK M
PART OF LOTS 3, 4 & 5
IN BLOCK R
LOT 4 AND PART OF LOTS 1, 2 & 3
IN BLOCK S
LOTS 1 & 4 AND PART OF LOTS 2 & 3
IN BLOCK T
PART OF THE LANE AT REAR OF BLOCK S
(CLOSED BY BY-LAW LT1243121)
THE LANE AT REAR OF BLOCK T
(CLOSED BY BY-LAW LT1243121)
PART OF BROAD STREET
(CLOSED BY BY-LAW LT1243121)
PART OF BROAD STREET
(CLOSED BY BY-LAW LT1243121)
PART OF FLEET STREET
(FORMERLY QUEEN STREET)
(CLOSED BY BY-LAW LT1243127)
PART OF OTTAWA STREET
(CLOSED BY BY-LAW LT1243127)
PART OF SHERWOOD STREET
(CLOSED BY BY-LAW LT1243127)
PART OF SHERWOOD STREET
(CLOSED BY BY-LAWS CR280019)
PART OF WELLINGTON STREET
(CLOSED BY BY-LAW LT1243128)
PART OF WELLINGTON STREET
(CLOSED BY BY-LAWS LT1243128 & OC1457912)
REGISTERED PLAN 2
LOTS A, B, C & D
REGISTERED PLAN 31129
CITY OF OTTAWA

SCALE 1:1000
20 0 10 20 30 40 METRES

METRIC CONVERSION
DISTANCES AND COORDINATES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

STRATA NOTE:

THIS PLAN IS STRATIFIED TO SHOW NCC AIR RIGHTS ON BLOCK 12.

ADDITIONAL INFORMATION REQUIRED UNDER SECTION 51 OF THE PLANNING ACT.

(A)-AS SHOWN ON DRAFT PLAN
(B)-AS SHOWN ON DRAFT PLAN
(C)-AS SHOWN ON DRAFT AND KEY PLANS
(D)-
(E)-AS SHOWN ON DRAFT PLAN
(F)-AS SHOWN ON DRAFT PLAN
(G)-AS SHOWN ON DRAFT PLAN
(H)-
(I)-
(J)-AS SHOWN ON DRAFT PLAN
(K)-
(L)-AS SHOWN ON DRAFT PLAN

LAND USE

NUMBER OF RESIDENTIAL BLOCKS: 2
NUMBER OF COMMERCIAL OR MIXED-USE BLOCKS: 7
NUMBER OF PUBLIC ROADS: 4
NUMBER OF PARKS: 2

AREA OF DEVELOPMENT BLOCKS 1-10 =	11.273 Ha
AREA OF PARK BLOCKS 11 & 12=	9.421 Ha
AREA OF STRATIFIED BLOCK 13 =	1.079 Ha
AREA OF PUBLIC ROADS =	1.294 Ha
TOTAL AREA OF SUBDIVISION =	23.067 Ha

OWNER'S CERTIFICATE
I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE — I HAVE THE AUTHORITY TO BIND THE CORPORATION

OWNER'S CERTIFICATE
I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE — I HAVE THE AUTHORITY TO BIND THE CORPORATION

SURVEYOR'S CERTIFICATE
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE — FRANCIS LAU
ONTARIO LAND SURVEYOR

Stantec
Stantec Geomatics Ltd.
CANADA LAND SURVEYORS
ONTARIO LAND SURVEYORS
1331 Clyde Avenue, Suite 300
Ottawa, Ontario, K2C 3G4
TEL: 613.722.4420
stantec.com

DRAWN: ME | CHECKED: * | DATE: May 28, 2026 | PROJECT NO.: 160401780-112

SUBDIVISION: PROPOSED LAND USES AND DENSITIES

MCP Block	MCP Block Area (m2)	Subdivision Block	Subdivision Block Area	Land Use	Floor Area (m2)	Dwelling Units Apartment	Dwelling Units Townhouse	Population	Number of Buildings	Building Storeys
A1-5	34,604	1	47,880	Residential	111,881	1,300	-	2,340		
				Commercial	5,560					
				Office (/ loft)	4,736					
				Hotel	10,579					
				Event Centre	78,781					
				Total Floor Area	**211,537**				4	27,30,38,43
A6	4,428	2	4,996	Residential	24,849	316	-	569		
				Commercial	1,543					
				Office (/ loft)	2,095					
				Hotel	-					
				Total Floor Area	**28,487**				2	6,30
A7-8	8,875	3	10,922	Residential	65,147	852	-	1,534		
				Commercial	3,955					
				Office (/ loft)	4,848					
				Hotel	-					
				Total Floor Area	**73,950**				3	6,33,43
F1-3	12,683	4	14,311	Residential	59,262	351	206	1,188		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**59,262**				3	12,20,20
F8	3,086	5	3,224	Residential	22,067	221	-	398		
				Commercial	884					
				Office (/ loft)	-					
				Hotel	4,896					
				Total Floor Area	**27,847**				1	20
F9-10	7,337	6	7,117	Residential	53,705	504	28	983		
				Commercial	1,060					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**54,765**				2	20,30
F11-12	8,137	7	7,015	Residential	64,941	649	-	1,168		
				Commercial	4,652					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**69,593**				2	30,40
F4	2,706	8	2,359	Residential	18,899	135	46	367		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**18,899**				1	20
Buried Aqueduct	Undefined	9	4,756	Residential	-	-	-	-		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**-**				-	-
AD2-5	7,340	10	10,133	Residential	-	-	-	-		
				Commercial	3,717					
				Office (/ loft)	22,950					
				Hotel	-					
				Total Floor Area	**26,667**				1	5
Park (federal)	Undefined	11	68,398	Residential	-	-	-	-		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**-**				-	-
Park (city)	Undefined	12	25,832	Residential	-	-	-	-		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**-**				-	-

TOTALS (Blocks 1-19)			
Res. Units (apt. / towns / total)	4,328	280	4,608
Res. Pop. (apt. / towns / total)	7,790	756	8,546
Res. Floor Area (m2)			420,751
Comm. Floor Area (m2)			21,371
Office (/ loft) Floor Area (m2)			34,629
Hotel Floor Area (m2)			15,475
Event Centre Area (m2)			78,781
Total Floor Area (m2)			571,007
MCP Block Area (m2)			89,195
Subdivision Block Area (m2)			217,730

Population	person/DU
Apartment pop.	1.8
Townhouse pop.	2.7

CONVERSION TABLE - Former DP to New DP

New Draft Plan			Former Draft Plan		
Block	Road	New land	Blocks	Road	Lane
1	-	-	1,2,3	6, part of 4 (65%)	6
2	-	-	4	Part of 4 (10%)	-
3	-	YES	5,6	-	7
4	-	-	7,8,9	2	1
5	-	-	12	-	2
6	-	-	13,14	-	3,4
7	-	-	11,15	-	5
8	-	-	10	-	-
9	-	-	16	-	-
10	-	-	17, Part of 19 (5%)	-	-
11	-	-	18	-	-
12	-	-	Part of 19 (92%)	-	-
13	-	-	20	-	-
-	1	-	-	1	-
-	2	-	-	3	-
-	3	-	Part of 19 (3%)	5	-
-	4	-	-	Part of 4 (25%)	-

LRT

LRT (strata)	Undefined	13	10,787	Residential	-	-	-	-			
				Commercial	-						
				Office (/ loft)	-						
				Hotel	-						
				Total Floor Area	**-**				-	-	

MCP BLOCKS EXCLUDED FROM SUBDIVISON BUT RELEVANT FOR SERVICING AND TRANSPO

MCP Block	MCP Block Area (m2)	Subdivision Block	Subdivision Block Area	Land Use	Floor Area (m2)	Dwelling Units Apartment	Dwelling Units Townhouse	Population	Number of Buildings	Building Storeys
A9	4,357	NA	NA	Residential	22,824	228	-	410		
				Commercial	960					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**23,784**				1	25
A10	4,357	NA	NA	Residential	24,356	244	-	439		
				Commercial	1,368					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**25,724**				1	25
A10B	2,930	NA	NA	Residential	20,775	208	-	374		
				Commercial	521					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**21,295**				1	25
A11	4,575	NA	NA	Residential	31,410	314	-	565		
				Commercial	1,046					
				Office (/ loft)	-					
				Hotel	-					
				High School	1,645					
				Total Floor Area	**34,100**				1	20
A12	3,349	NA	NA	Residential	19,499	195	-	351		
				Commercial	600					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**20,098**				1	20
F5	3,312	NA	NA	Residential	19,125	191	-	344		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**19,125**				1	20
F6	2,777	NA	NA	Residential	18,395	184	-	331		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**18,395**				-	-
F7	2,173	NA	NA	Residential	5,518	55	-	99		
				Commercial	-					
				Office (/ loft)	-					
				Hotel	-					
				Total Floor Area	**5,518**				1	20

TOTALS (Blocks 1-19 + excluded NCC land)			
Res. Units (apt. / towns / total)	5,947	280	6,227
Res. Pop. (apt. / towns / total)	10,705	756	11,461
Res. Floor Area (m2)			582,651
Comm. Floor Area (m2)			25,865
Office (/ loft) Floor Area (m2)			34,629
Hotel Floor Area (m2)			15,475
Event Centre Area (m2)			78,781
High School Floor Area (m2)			1,645
Total Floor Area (m2)			739,047
MCP Block Area (m2)			117,024
Subdivision Block Area + Excluded MCP land			245,559

A.2 Background Report Excerpts

R-0813

11934.A

Commission de la Capitale nationale

Canada

LeBreton Flats Infrastructure and Remediation Project

Project N°: SC436



Master Servicing Report

Final Report (5th Revision)

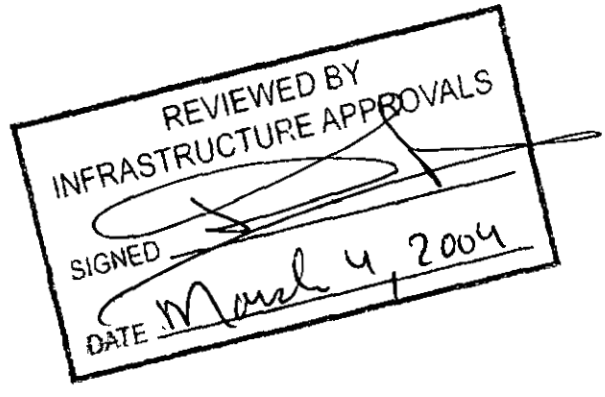
O/File: 480000-100-Hy-07

DESSAU SOPRIN

LeBreton Flats Infrastructure and Remediation Project

Master Servicing Report

FINAL REPORT (5th Revision)



February 2004

Y/Ref.: SC-436
O/Ref.: 480000-100-Hy-07

DESSAU SOPRIN

SANITARY SEWER DESIGN SHEET - PRELIMARY

Dessau-Soprin inc.

February 6, 2004
SC-436

CLIENT: National Capital Commission
PROJECT: Le Breton Flats Infrastructure and Remediation Project
DESIGNED: Nicolas Vekeman, Dominique Deveau

Location				Description										Flows					Proposed sewer data**				
Street	From mh	To mh	Sub-catchment	Detail	Individual		Accumulative		Peak factor (M)	Individual		Accumulative		Q_{res} (l/s)	Q_{extran} (l/s)	Q_{office} (l/s)	Q_{retail} (l/s)	Q_{total} (l/s)	Diameter (mm)	Slope (%)	Length (m)	$Q_{cap.}$ (l/s)	Velocity (m/s)
					Pop. (persons)	Area (ha)	Pop. (persons)	Area (ha)		Office (m^2)	Retail (m^2)	Office (m^2)	Retail (m^2)										
Booth	5	8	13 & 14	X,W,V				5.32		64000		64000		0.0	1.5	5.6	0.0	7.0	250	0.45	90	39.9	0.81
Forgarty	26	11	30	K	202	0.49	202	0.49	4.15		400		400	3.4	0.1	0.0	0.0	3.6	250	0.45	60	39.9	0.81
Forgarty	11	11a	15	1/2L & 1/2M	480	0.63	682	1.12	3.90				400	10.8	0.3	0.0	0.0	11.1	250	0.45	60	39.9	0.81
Forgarty	11a	10					682	1.12	3.90				400	10.8	0.3	0.0	0.0	11.1	250	0.45	75	39.9	0.81
LeBreton	9	10	16	1/2L	252	0.28	252	0.28	4.11					4.2	0.1	0.0	0.0	4.3	250	0.45	90	39.9	0.81
LeBreton	10	12	17	1/4M	114	0.18	1048	1.58	3.79				400	16.1	0.4	0.0	0.0	16.6	250	0.45	80	39.9	0.81
Broad	27	13	31	1/2J	101	0.22	101	0.22	4.24		200		200	1.7	0.1	0.0	0.0	1.8	250	0.45	75	39.9	0.81
Broad	13	13a	18	1/4M & 1/2N	376	0.59	477	0.81	3.98				200	7.7	0.2	0.0	0.0	7.9	250	0.45	75	39.9	0.81
Broad	13a	12					477	0.81	3.98				200	7.7	0.2	0.0	0.0	7.9	250	0.45	80	39.9	0.81
LeBreton	12	14	19	1/4N	131	0.21	1656	2.6	3.65				600	24.5	0.7	0.0	0.1	25.3	300	0.4	75	61.2	0.87
Sherwood	28	15	32	1/2J	101	0.22	101	0.22	4.24		200		200	1.7	0.1	0.0	0.0	1.8	250	0.45	75	39.9	0.81
Sherwood	15	15a	20	O2 & 1/4N	332	0.56	433	0.78	4.01				200	7.0	0.2	0.0	0.0	7.3	250	0.45	80	39.9	0.81
Sherwood	15a	14					433	0.78	4.01				200	7.0	0.2	0.0	0.0	7.3	250	0.45	90	39.9	0.81
LeBreton	14	8	21	O		0.27	2089	3.65	3.57	19000	1000	19000	1800	30.2	1.0	1.6	0.2	33.0	300	0.4	85	61.2	0.87
Booth	8	16	22	U		0.4	2089	9.37	3.57	25200	1400	108200	3200	30.2	2.6	9.4	0.3	42.5	375	0.3	75	96.0	0.87
Booth	17	16	23	P3 & O3		0.7		0.7		34525	3305	34525	3305	0.0	0.2	3.0	0.3	3.5	250	0.45	115	39.9	0.81
Fleet	16	18	24	1/2P	104	0.09	2193	10.16	3.55		100	142725	6605	31.6	2.8	12.4	0.6	47.4	375	0.45	75	117.6	1.06
Lloyd	24	20	33	I	21	0.1	21	0.1	4.38		100		100	0.4	0.0	0.0	0.0	0.4	250	0.45	105	39.9	0.81
Lloyd	20	18	27	1/2P & 1/2Q	330	0.33	351	0.43	4.05		100		200	5.8	0.1	0.0	0.0	5.9	250	0.45	105	39.9	0.81

SANITARY SEWER DESIGN SHEET - PRELIMARY

Dessau-Soprin inc.

February 6, 2004
SC-436

CLIENT: National Capital Commission
PROJECT: Le Breton Flats Infrastructure and Remediation Project
DESIGNED: Nicolas Vekeman, Dominique Deveau

Location				Description											Flows					Proposed sewer data**				
Street	From mh	To mh	Sub-catchment	Detail	Individual		Accumulative		Peak	Individual		Accumulative			Q_{res}	Q_{extran}	Q_{office}	Q_{retail}	Q_{total}	Diameter	Slope	Length	$Q_{cap.}$	Velocity
					Pop. (persons)	Area (ha)	Pop. (persons)	Area (ha)	factor (M)	Office (m^2)	Retail (m^2)	Office (m^2)	Retail (m^2)		(l/s)	(l/s)	(l/s)	(l/s)	(l/s)	(mm)	(%)	(m)	(l/s)	(m/s)
Fleet	18	22	26	1/4Q	114	0.12	2658	10.71	3.49			142725	6805		37.5	3.0	12.4	0.6	53.5	375	0.45	80	117.6	1.06
Lett	21	22	25	S & T	420	1.18	420	1.18	4.01	37800	2100	37800	2100		6.8	0.3	3.3	0.2	10.6	250	0.45	90	39.9	0.81
Lett	23	22	28	R & 1/4Q	415	0.43	415	0.43	4.01						6.7	0.1	0.0	0.0	6.9	250	0.45	110	39.9	0.81
Fleet	22	PS					3493	12.32	3.39			180525	8905		47.9	3.4	15.7	0.8	**67.8***	375	0.45	80	117.6	1.06

Drawing Reference: 480000 (100) HY0001 and HYC002

Notes:
Stacked and Townhouses 3.0 ppu
Low or Med-Rise 2.1 ppu
High-Rise 2.1 ppu

N-Value : 0,013

* **Add 20 l/s to include future development of Victoria Island.**

** **Pipes were designed to meet future Victoria Island needs.**

Design flow rates (Q) :

- Residential (res) : 350 l/pers/d
- Extraneous (extran) : 0,28 l/s/ha
- Office (office) : 5 l/d/m^2
- Retail (retail) : 5 l/d/m^2

Peaking Factor :

Res.: $M = 1 + K \times \left(\frac{14}{4 + P^{1/2}} \right)$

P = population in 1000's

K = 1

Office : 1,5
Retail : 1,5

NORTH

BRONSON CHANNEL

X

W

V

COMMON

VIMY

BOOTH

WELLINGTON
(LEBRETON BOULEVARD)

OTTAWA RIVER PARKWAY

PRESTON

FOGARTY

BROAD

ANISHINABEG
(SHERWOOD)

O'DONOHUE
(OTTAWA)

CROSSED AQUEDUCT

LLOYD

FLEET

FLEET STREET
PARLIAMENT STATION

AQUEDUCT

THOMAS AHERN
(O'KEEFE)

TRANSITWAY

ALBERT

LORNE

PERKINS

EMPRESS

250ø	Proposed sanitary sewer
G	Block identification
15	Node number
5 / 0.92ha	Subcatchment number / Land area in hectares
	Subcatchment areas

LEBRETON FLATS
INFRASTRUCTURE AND REMEDIATION PROJECT
MASTER SERVICING REPORT

Titre

SANITARY SUBCATCHMENT
AREA PLAN

DESSAU SOPRIN

Dessau-Soprin inc.
885, boul. de la Carrière, office 110
Hull (Quebec) J8Y 6S6
Phone no.: (819) 777-2727
Fax: (819) 777-3689

Prepared N. Vekaman	Department Municipal	Project director S. Duplessis
Drawn L. De Gregorio	Scale Not to scale	
Verified D. Devaau	Date May 02, 2003	

Project	Work lot	Dept.	Drawing no.	Rev.
048000	100	HY	C0020	B

File: \\Dc_rtherrien\DATA\Projets\048\4800000\Vr\0 DAO\Conceptual Design Plan\Dao 100\048000100HYC002.dwg

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

Ainley Graham & Associates Limited
2724 Fenton Road, Gloucester, Ontario K1T 3T7
Tel: (613) 822-1052 • Fax: (613) 822-1573
E-mail: ottawa@ainleygroup.com

January 8, 2001

File No. 21010.1

National Capital Commission
40 Elgin Street
Suite 202
Ottawa, Ontario
K1P 1C7

Attn: **Mr. Robert Walters, MCIP, RPP**
Senior Planner
Property Development & Planning

Ref: **LeBreton Flats Redevelopment**
Infrastructure Needs Study

Dear Sir:

Ainley Group is please to submit three (3) copies of the final report, incorporating review agency comments, entitled "Lebreton Flats Redevelopment Infrastructure Needs Study (Updated 2001)" (January 2002). Should you have any further questions please do not hesitate to contact us.

Yours very truly,

AINLEY GRAHAM & ASSOCIATES LTD.,

Fairouz Wahab, P. Eng.
Project Engineer

Encl.
FW/fw

Cc. Ronald Jack, P. Eng. - Delcan Corporation
John van Gaal, P. Eng. - Stantec Consulting

J:\21000\21010\report\RW080102.let.wpd

TABLE 1-1

LEBRETON FLATS DEVELOPMENT DENSITIES

OPTION 1 (EXCLUDING BLOCKS W3 AND X3 AS PART OF PHASE I)

Ainley CONSULTING ENGINEERS PLANNERS

Block	Area (ha)	Residential			Residential Population				Office (m^2)	Retail (m^2)
		Stacked Townhouse (units)	Low or Mid-Rise (units)	High-Rise (units)	S-TH 3.0 (ppu)	L/M-R 2.1 (ppu)	H-R 2.1 (ppu)	Total		
PHASE I										
O	0.27	-	-	-	-	-	-	0	19,000	1,000
U-T	0.94	-	-	-	-	-	-	0	63,000	3,500
Sub-Total	**1.21**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**82,000**	**4,500**
PHASE II										
P	0.19	34	50	-	102	105	-	207	-	200
Q-R	0.77	10	345	-	30	725	-	755	-	-
S	0.64	-	-	200	-	-	420	420	-	-
Sub-Total	**1.60**	**44**	**395**	**200**	**132**	**830**	**420**	**1382**	**0**	**200**
PHASE III										
J2	0.22	-	48	-	-	101	-	101	-	200
K2	0.24	-	48		-	101	-	101	-	200
L2	0.56	-	160	80	-	336	168	504	-	-
M2	0.70	40	80	80	120	168	168	456	-	-
N2	0.82	40	112	80	120	235	168	523	-	-
O2	0.35	32	50	-	96	105	-	201	-	-
Sub-Total	**2.89**	**112**	**498**	**240**	**336**	**1046**	**504**	**1886**	**0**	**400**
PHASE IV										
B3	1.09	-	-	-	-	-	-	0	25,000	418
C3	0.58	-	-	-	-	-	-	0	16,200	800
D3	0.45	-	90	80	-	189	168	357	-	800
E3	1.07	-	90	200	-	189	420	609	-	1,200
F3	1.05	-	280	-	-	588	-	588	-	-
G3	0.77	13	128	-	39	269	-	308	-	-
H3	0.73	8	64	-	24	134	-	158	-	-
I3	0.10	-	10	-	-	21	-	21	-	100
J3	0.22	-	48	-	-	101	-	101	-	200
K3	0.25	-	48	-	-	101	-	101	-	200
O3	0.32	-	-	-	-	-	-	0	24,000	1,200
P3	0.38	-	-	-	-	-	-	0	10,525	2,105
V3	1.66	-	-	-	-	-	-	0	11,798	-
W3	2.16	-	-	-	-	-	-	0	21,563	-
X3	1.49	-	-	-	-	-	-	0	22,813	-
Sub-Total	**12.32**	**21**	**758**	**280**	**63**	**1,592**	**588**	**2,243**	**131,899**	**7,023**
TOTAL	**18.02**	**177**	**1,651**	**720**	**531**	**3,467**	**1,512**	**5,510**	**213,899**	**12,123**

NOTES: Land areas, Residential units, Office & Retail areas provided by NCC (March 26, 2001)
Residential Persons per Unit (ppu) from Update Report (1993)

From:	Montgomery, Paul
To:	O"Connell, Erin; Smadella, Karin
Cc:	Mottalib, Abdul; Thiffault, Dustin
Subject:	Re: Lebreton Flats Draft Plan of Subdivision - Engineering Discussion
Date:	Tuesday, November 14, 2023 7:55:22 PM
Attachments:	image001.gif image002.png

Hello Karen; all is well and I hope the same for you and yours.

Below is what information I have regarding water elevations, in and around the two Fleet Street aqueducts:

The **open aqueduct** is largely connected, together with the **covered aqueduct**, with and at the forebay of the Fleet Street Pumping Station. With little usual flow through the **open aqueduct**, I would guess that its usual water elevation would be fairly level along its length and would follow the usual operating level of the forebay; currently between 51.82m and 52.03m (per Record Drawings: ISB05-3013, Sheet 1, Delcan). Peak and surge operating levels, in the forebay, can be higher and sometimes spill over the forebay's stoplog weir. I don't have a precise elevation of this weir but, from previous visual observations, I would roughly estimate its current crest elevation to be ~52.2m.

The hydraulic grade line along the length of the **covered aqueduct** is much steeper and will, of course, vary with flow rate. Usual and optimal flow rates through the **covered aqueduct** were estimated to be between 25 to 35m3/s (Fleet Street Pumping Station Hydraulic Capacity Study, October 1998, Delcan).

For the **open aqueduct**, Water Production has no records of upstream water elevations, estimated or observed, for or during storm events. It is worth noting that there is a small diameter (~200mm?) pipe connection, at the upper end of the **open aqueduct**, which flows water from the river and from just above the headworks facility, to maintain some flow through. This small pipe connection, along with any other seepage, piped or overland flows entering into the **open aqueduct**, would steepen its operating hydraulic grade line somewhat but, to what degree, I cannot precisely say.

For the **covered aqueduct**, data taken from personal survey notes on April 30, 2019, recorded the peak river water elevation, just upstream of the Headworks flow control gates, at 53.7m. I then estimated an additional river level increase of ~0.5m would begin to bypass at/around the Headworks facility and down into the lower Lebreton Flats area. From the same Delcan study noted above, the usual river water elevation, just above Headworks, was noted as 52.8m (as controlled by the Chaudiere Ring Dam). Much of the then observed headloss, through the **covered aqueduct**, was attributed to the Headworks trash racks and gatehouse structure.

Lastly, I do recall finished grades, adjacent to the **open aqueduct** and by the Pimisi Station, being quite close the usual operating level of the forebay. I did not keep copies of those early station drawings but Erin should know where they can be found.

I hope you find this information helpful!

Paul

From:	Montgomery, Paul
To:	Smadella, Karin
Cc:	Moroz, Peter; Tousignant, Eric; Duquette, Vincent; Fawzi, Mohammed
Subject:	RE: Open Aqueduct Configuration - Upstream end.
Date:	Monday, March 25, 2024 8:56:41 PM
Attachments:	~WRD2863.jpg image001.png SN 015120 STRUCTURAL EVALUATION FINAL REPORT MARCH 2015.pdf B01512001-01 .pdf

Hi Karin,

Unfortunately, I am fairly certain that the City has very little detailed record information on this former rail bridge. I recall a concerted effort made by several staff to locate any such details, in advance of the construction of the temporary Preston Street Extension but, to my knowledge, very little was found. I have attached what I could find through the City's Geoinformation site, about this immediate area, for your reference. Much of the structure is on NCC property so I can only speculate who might now own this structure. From the attached 2014 report's photos, it would also appear that the LPTM has been routed under a portion of the southerly end of the former (and now heritage) 1870 railway bridge (SN015120). This 2014 report mentions an earlier 2006 condition report but I could not find a copy of it on the Geoinformation site. If the City's structures folks have more detail, perhaps try reaching out to Jack Zhao?

As you may already know, the original open aqueduct extended through to Nepean Bay and had its own headworks structure (i.e. separate from the current headworks structure). Historical photos and the attached report appear to confirm that this open aqueduct was, at one time, entirely routed underneath this former rail bridge. I have checked and no detailed records, about this abandoned section of open aqueduct or former headworks structure, are here at Lemieux or on the same geoinformation site. As such, precisely how and how much of this aqueduct section was filled in, I cannot say, but I would guess that any original rock cut, for this aqueduct section, was simply filled in, from the then shore and back towards this former rail bridge. The attached MH report suggests likewise and notes that only a southerly ~10m section of the arch structure still acts as a bridge, with the rest underlain by some manner of fill material.

The dashed line, as highlighted in red below, shows a rather ***approximate*** location of the pipe, as I understand it, but I would suggest that its terminus lies somewhere underneath the old rail bridge and not beyond. Again, like much of this area, details on this pipe are few. I can confirm that the pipe exists and it is valved off, from time to time, coincident with the draining of the aqueducts. I would guess that the pipe was installed along and with the filling in of the upstream section of the old aqueduct. Again, I have no details of the pipe's depth but there is a valve box inside our fenced headworks compound, like those used for watermains, which we can operate.

The attached drawing, by Stantec, details some circa 2001 rehabilitation work completed on the bridge. This was the only drawing I found, for this particular structure, so I hope this, and the above information will be helpful.

Take care,

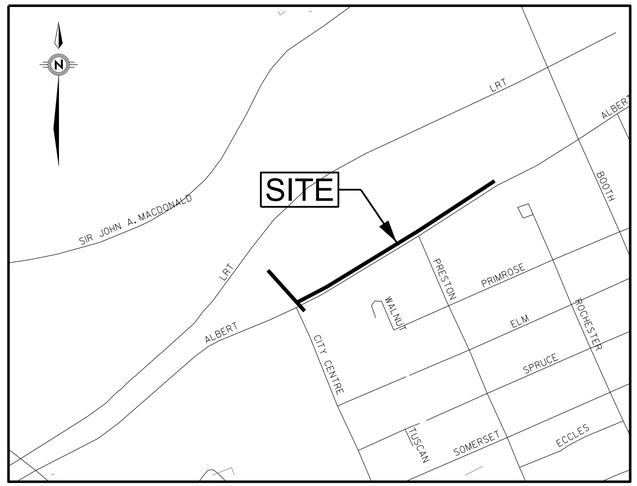
Paul

M. Paul Montgomery, P.Eng.
Plant Manager, Water Production East
Infrastructure and Water Services Department, City of Ottawa
1 Onigam Street, Ottawa, Ontario, K1Y 2C4
tel / tél: (613) 580-2424, ext / poste: 23302
cell: (613) 223-0907
e-mail / courriel: Paul.Montgomery@ottawa.ca

From: Smadella, Karin <Karin.Smadella@stantec.com>

INFRASTRUCTURE SERVICES

C. DUCLOS, P.ENG.
DIRECTOR
INFRASTRUCTURE SERVICES



Robinson Consultants

CAVE CREEK COLLECTOR REALIGNMENT

CONTRACT NO. CP000511

ISSUED FOR FINAL PRELIMINARY DESIGN
JAN. 23, 2024

SYMBOLS

	EXISTING	PROPOSED	REMOVALS
Structure Adjustment			ADJ DENOTES ADJUSTMENT ONLY
Self Leveling Frame & Cover		(SL)	
Clay Seal		CS	
San. Sewer & Manhole	MHSAN 250mm SANITARY SEWER	PROP.250mmØ SAN	MHSAN LIMIT OF REMOVAL
Comb. Sewer & Manhole	MHSAN 250mm SANITARY SEWER (COMBINED)	PROP.250mmØ COMB	MHSAN LIMIT OF REMOVAL
Storm Sewer & Manhole	MHST 450mm STORM SEWER	PROP.450mmØ STM	MHST LIMIT OF REMOVAL
Single Curb Inlet Catch Basin	CICB	CICB#	CICB
Single Catch Basin	CB	CB#	CB
Ditch Inlet Catch Basin	DICB	DICB#	DICB
Double Curb Inlet Catch Basin	DCICB	DCICB#	DCICB
Double Catch Basin	DCB	DCB#	DCB
Subdrain (with direction of flow)			
Water Main	400mm WATERMAIN	PROP. 406mmØ WM	400mm WATERMAIN
Hydrant & Valve Box	VB 2012	V&VB FH	VB 2012
Valve & Valve Box	VB	V&VB	VB
Valve & Valve Chamber	VC	V&VC	VC
Valves (Water services only)	WV WK	SP	WV WK
Sanitary Service Lateral		SA	
Storm Service Lateral		ST	
Water Lateral & Stand Pipe		SP	
Gas Main & Valve	GV 100mm GAS		
Property Line			
Concrete Curb			
Depressed Curb		DC	
Ditch	EX. DITCH		
Fence & Gate	CHAIN LINK FENCE GATE		
Guide Rail	CABLE GUARD RAIL		
Retaining Wall	CONC RWALL		
Trees (Dripline & Trunk Dia. / Small Tree)	20		20
Hedge / Brush Area			
Concrete Sidewalk / Median	CONCRETE		
Asphalt Sidewalk / Pathway	ASPHALT		
Asphalt Laneways & Entrances	ASPHALT		
Asphalt (Full Depth)			
Asphalt (Partial Depth)			
Gravel Laneways & Entrances	GRAVEL		
Paving Stones	PSTONE		
TWSI			
Bell Utility Pole & Anchor	WP BP		WP BP
Bell Manhole	MHU BELL		MHU BELL
Bell Box / Pedestal	BELL Box		BELL Box
Hydro Utility Pole & Anchor	WP HP		WP HP
Hydro Manhole	MHU HYDRO		MHU HYDRO
Hydro Transformer / Pedestal	HYDRO TRANS		HYDRO TRANS
Light Standard	LS		LS
Traffic Manhole	MHU TRAFFIC		MHU TRAFFIC
Traffic Handhole	THH		THH
Traffic Control Box	TRAFFIC CONTROL		TRAFFIC CONTROL
Traffic Mast Arm Foundation	TL		TL
Metal Pole	MP		MP
Wood Pole	WP		WP

REFERENCE POINTS

BM ELEV.	BENCH MARK
CM	CONCRETE MONUMENT
	ROCK BAR
IP	IRON TUBE OR PIPE
IB	IRON BAR
PK	PK NAIL
ISCM 2-	2ND ORDER INTEGRATED SURVEY CONTROL MONUMENT
ISCM 3-	3RD ORDER INTEGRATED SURVEY CONTROL MONUMENT
	CUT CROSS
V	CUT VEE
RIB	ROUND IRON BAR
Ø	REINFORCING BAR
SIB	STANDARD IRON BAR
SSIB	SHORT STANDARD IRON BAR

MISCELLANEOUS

CUT
ROADWAY — GRADING
FILL

BUILDINGS

MW4 MONITORING WELL (PLAN VIEW)
BH4 BOREHOLE (PLAN VIEW)
AG4 AUGER HOLE (PLAN VIEW)
HV4 HYDROVAC HOLE (PLAN VIEW)

SUPPLEMENTAL

Topsoil & Sod
Rip Rap

DWG.	DESCRIPTION
000	COVER SHEET
I1	LEGEND, INDEX, AND NOTES
P01	PLAN & PROFILE - STA. 1+000 TO 1+150
P02	PLAN & PROFILE - STA. 2+000 TO 2+150
P03	PLAN & PROFILE - STA. 2+150 TO 2+300
P04	PLAN & PROFILE - STA. 2+300 TO 2+450

CAVE CREEK
COLLECTOR REALIGNMENT

LEGEND, INDEX, AND NOTES

C. Duclos, P.Eng.
Director
Infrastructure Services

J. Trudel, P.Eng.
Senior Engineer
Infrastructure Services

Robinson Consultants

Ottawa

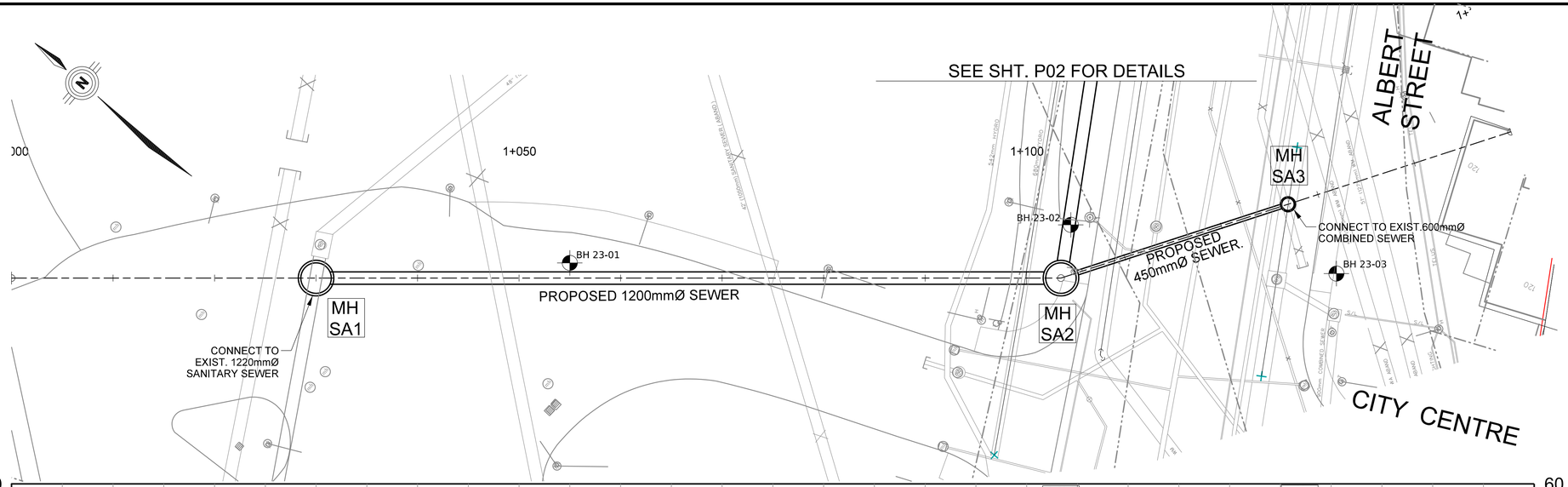
Contract No. CP-000511 | Dwg. No. I1
Sheet - of -
Asset No. ---
Asset Group ---
Des. I.M. | Chk'd. D.S.
Dwn. I.M. | Chk'd. D.S.
Utility Circ. No. ---- | Index No. ----
Const. Inspector ----
Scale: HORIZONTAL 0m - - - 0m
VERTICAL

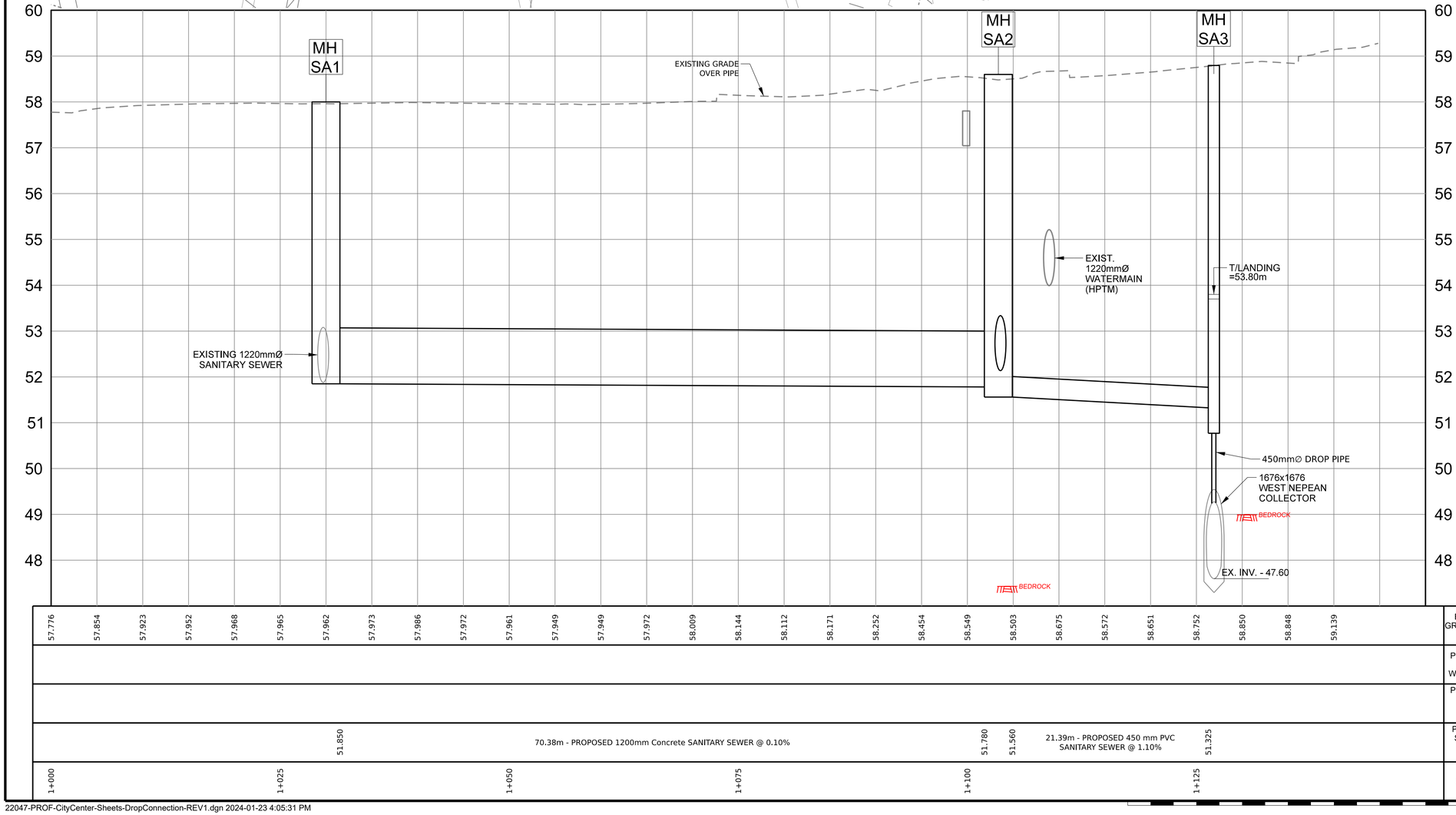
NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	D.S.	24/11/23
2	ISSUED FOR FINAL PRELIMINARY DESIGN	D.S.	23/01/24

NOT FOR CONSTRUCTION





EXISTING GRADE OVER PIPE	57.776	57.854	57.923	57.952	57.968	57.965	57.962	57.973	57.986	57.972	57.961	57.949	57.949	57.972	58.009	58.144	58.112	58.171	58.252	58.454	58.549	58.503	58.675	58.572	58.651	58.752	58.850	58.848	59.139			
PROPOSED TOP OF WATERMAIN																																
PROPOSED STORM SEWER INVERT																																
PROPOSED SANITARY SEWER INVERT							51.850															51.780	51.560				51.325					
STATION	1+000			1+025			1+050				1+075										1+100						1+125					

70.38m - PROPOSED 1200mm Concrete SANITARY SEWER @ 0.10%

21.39m - PROPOSED 450 mm PVC SANITARY SEWER @ 1.10%

CAVE CREEK
COLLECTOR REALIGNMENT

PLAN & PROFILE
STA. 1+000 TO STA. 1+150

C. Duclos, P.Eng.
Director
Infrastructure Services

J. Trudel, P.Eng.
Senior Engineer
Infrastructure Services

Robinson Consultants

Ottawa

Contract No. CP-000511 | Dwg. No. P01

Sheet _ of _

Asset No. ---------

Asset Group ---

Des.	Chk'd.
I.M.	D.S.
Dwn.	Chk'd.
I.M.	D.S.

Utility Circ. No. _____ | Index No. _____

Const. Inspector _____

Scale:
HORIZONTAL
0m 5 10
0m 1 2
VERTICAL

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned, The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	D.S.	24/11/23
2	ISSUED FOR FINAL PRELIMINARY DESIGN	D.S.	23/01/24

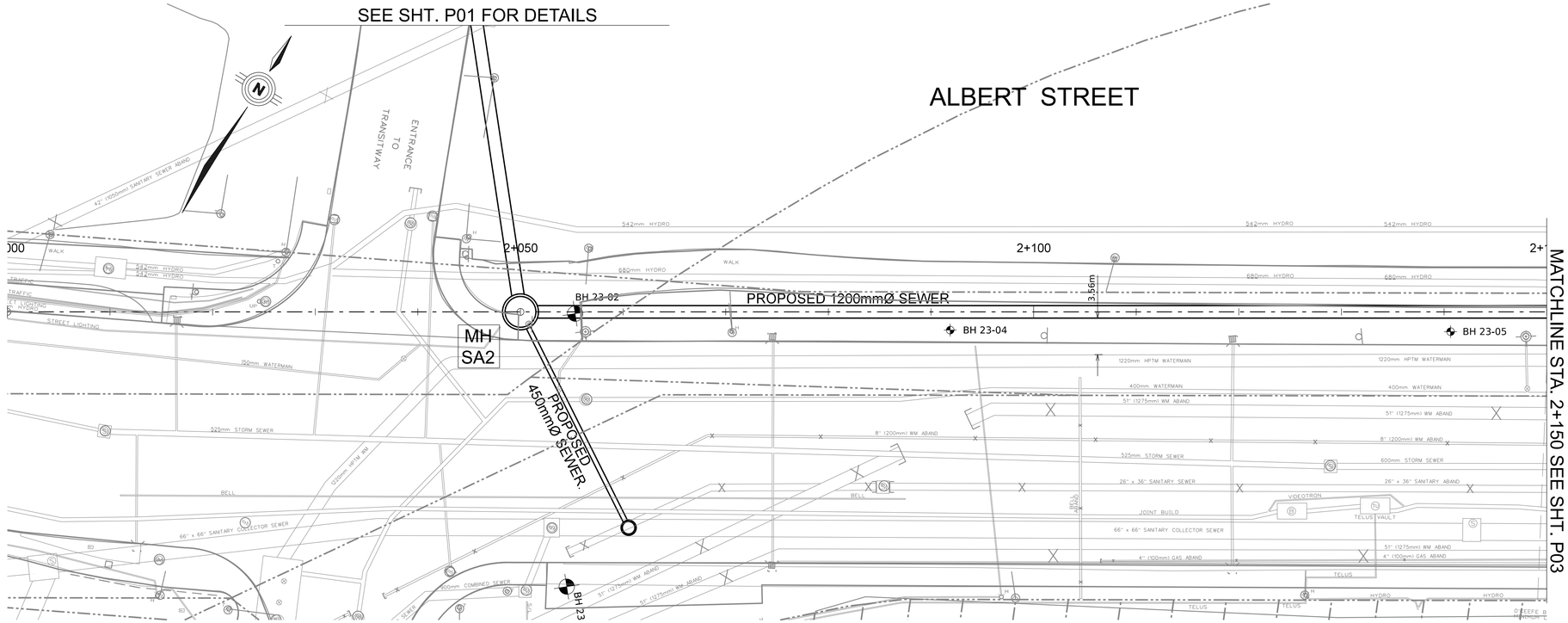
NOT FOR CONSTRUCTION

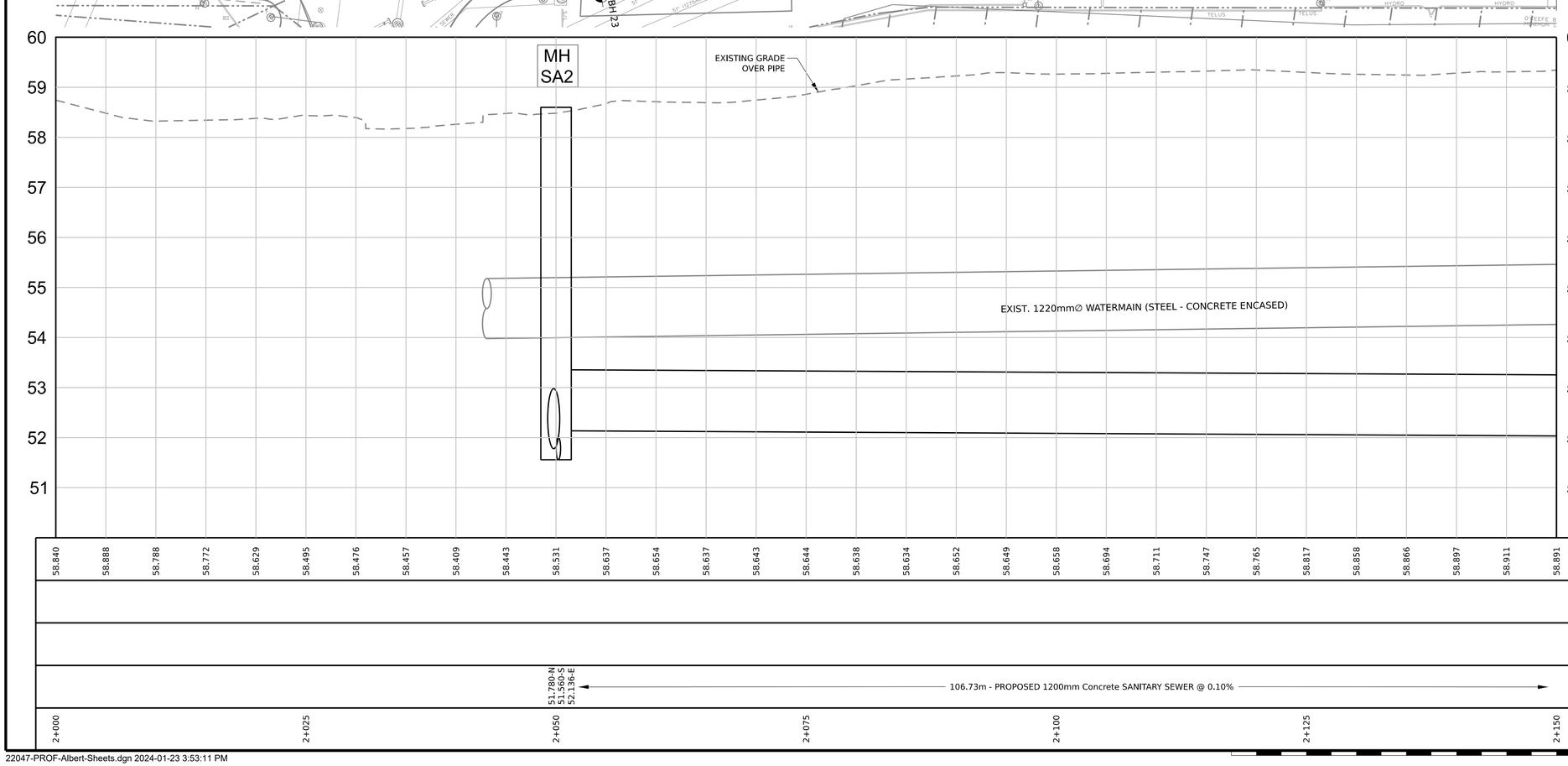
SANITARY SEWER MH DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert
			Structure	Cover	Grate	Low Inv.	
MHSA1	1+030.00	0.00	701.014	S24	58.00	51.85	6.15
MHSA2	1+103.38	0.00	701.014	S24	58.60	51.56	7.04
MHSA3	1+126.90	0.00	701.010	S24 / SL	58.80	50.73	8.08

SL DENOTES SELF LEVELLING COVER

NOTE:
CITY OF OTTAWA IS IN CONSULTATION WITH HYDRO OTTAWA REGARDING THE IMPACTED HYDRO UNDERGROUND INFRASTRUCTURE





58.840	58.888	58.788	58.772	58.629	58.495	58.476	58.457	58.409	58.443	58.531	58.637	58.654	58.637	58.643	58.644	58.638	58.634	58.652	58.649	58.658	58.694	58.711	58.747	58.765	58.817	58.858	58.866	58.897	58.911	58.891	EXISTING GRADE OVER PIPE
																															PROPOSED TOP OF WATERMAIN
																															PROPOSED STORM SEWER INVERT
										51.780-N 51.560-S 52.136-E	← 106.73m - PROPOSED 1200mm Concrete SANITARY SEWER @ 0.10% →																				PROPOSED SANITARY SEWER INVERT
2+000							2+025			2+050					2+075						2+100					2+125					2+150	STATION

CAVE CREEK
COLLECTOR REALIGNMENT

PLAN & PROFILE
STA 2+000 TO STA 2+150

C. Duclos, P.Eng.	J. Trudel, P.Eng.
Director *Infrastructure Services*	*Senior Engineer* *Infrastructure Services*

Robinson Consultants

Ottawa

Contract No.	Dwg. No.
CP-000511	P02

Sheet _ of _

Asset No. ---------

Asset Group ---

Des.	Chk'd.
I.M.	D.S.
Dwn.	Chk'd.
I.M.	D.S.
Utility Circ. No.	Index No.
_____	_____

Const. Inspector .....

Scale: HORIZONTAL
0m 5 10
0m 1 2
VERTICAL

NOTE: The locatlon of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned, The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage,

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	D.S.	24/11/23
2	ISSUED FOR FINAL PRELIMINARY DESIGN	D.S.	23/01/24

NOT FOR CONSTRUCTION

SANITARY SEWER MH DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert
			Structure	Cover	Grate	Low Inv.	
MHSA2	2+050.00	0.00	SEE DWG. P01 FOR DETAILS				
SL DENOTES SELF LEVELLING COVER							

NOTE:
CITY OF OTTAWA IS IN CONSULTATION WITH HYDRO OTTAWA REGARDING THE IMPACTED HYDRO UNDERGROUND INFRASTRUCTURE

CAVE CREEK COLLECTOR REALIGNMENT

PLAN & PROFILE STA 2+150 TO STA 2+300

C. Duclos, P.Eng. — Director, Infrastructure Services

J. Trudel, P.Eng. — Senior Engineer, Infrastructure Services

Robinson Consultants

Ottawa

Contract No.	Dwg. No.
CP-000511	P03

Sheet _ of _

Asset No. ---------

Asset Group ---

Des.	Chk'd.
I.M.	D.S.
Dwn.	Chk'd.
I.M.	D.S.
Utility Circ. No.	Index No.
-----	------

Const. Inspector .....

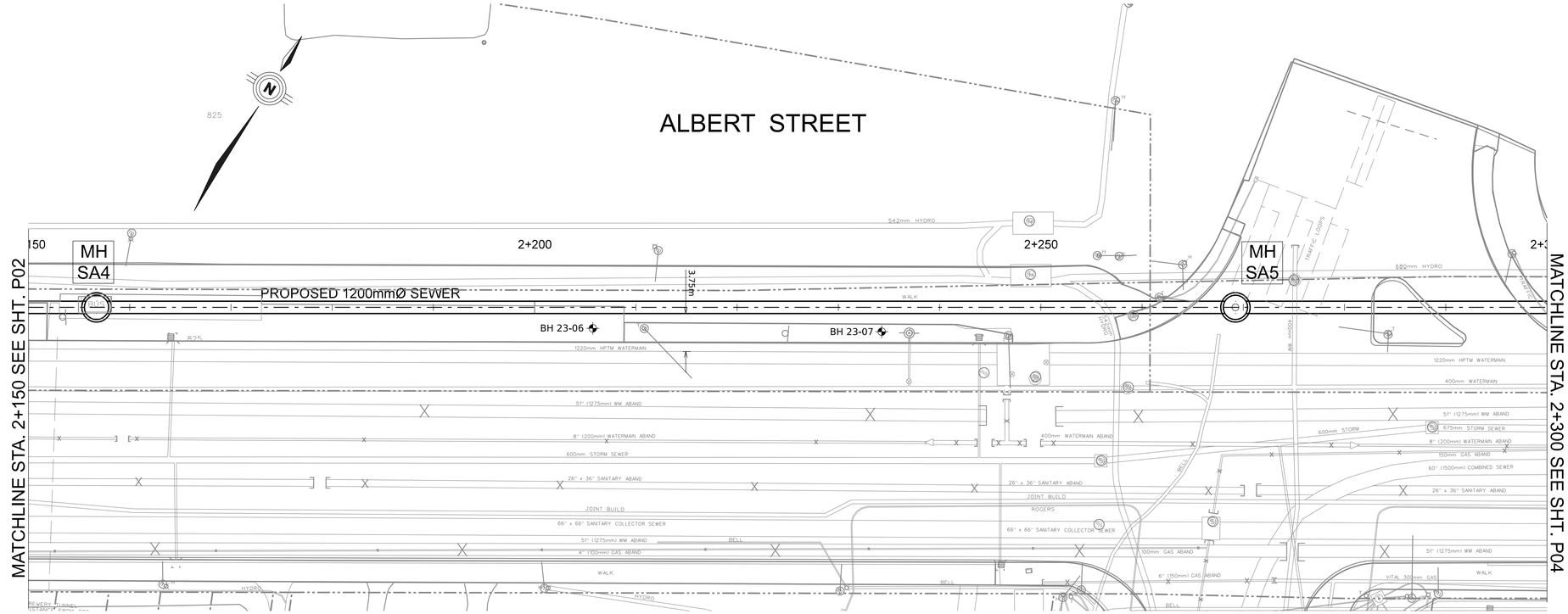
Scale: HORIZONTAL 0m 5 10 / 0m 1 2 VERTICAL

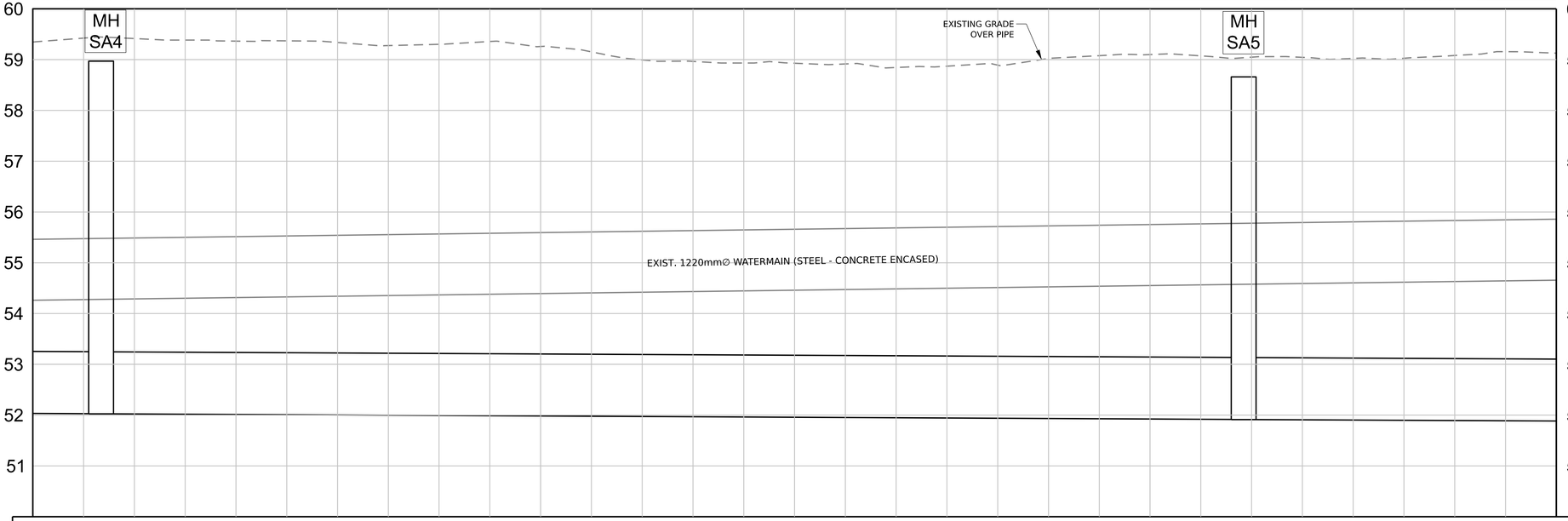
NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned, The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage,

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	D.S.	24/11/23
2	ISSUED FOR FINAL PRELIMINARY DESIGN	D.S.	23/01/24

NOT FOR CONSTRUCTION





EXISTING GRADE OVER PIPE	58.943	58.978	59.000	59.015	59.030	59.049	59.063	59.082	59.115	59.126	59.129	59.161	59.149	59.164	59.162	59.118	59.096	59.093	59.107	58.997	59.044	58.813	58.674	58.693	58.665	58.658	58.635	58.601	58.512	58.647
PROPOSED TOP OF WATERMAIN																														
PROPOSED STORM SEWER INVERT																														
PROPOSED SANITARY SEWER INVERT	52.029-W	52.026-E	112.50m - PROPOSED 1200mm Concrete SANITARY SEWER @ 0.10%																					51.916-W	51.913-E	112.50 - PROPOSED 1200mm Concrete SANITARY SEWER @ 0.10%						
STATION		2+175			2+200				2+225								2+250									2+275					2+300

SANITARY SEWER MH DATA

No.	Station	Offset (m)	Type		Elevations		Grate to
			Structure	Cover	Grate	Low Inv.	
MHSA4	2+156.73	0.00	701.013	S24	58.97	52.03	6.94
MHSA5	2+269.22	0.00	701.013	S24 / SL	58.66	51.91	6.75

SL DENOTES SELF LEVELLING COVER

NOTE:
CITY OF OTTAWA IS IN CONSULTATION WITH HYDRO OTTAWA REGARDING THE IMPACTED HYDRO UNDERGROUND INFRASTRUCTURE

CAVE CREEK COLLECTOR REALIGNMENT

PLAN & PROFILE STA 2+300 TO STA 2+450

C. Duclos, P.Eng. — Director, Infrastructure Services

J. Trudel, P.Eng. — Senior Engineer, Infrastructure Services

Robinson Consultants

Ottawa

Contract No.	Dwg. No.
CP-000511	P04

Sheet _ of _

Asset No. ---------

Asset Group ---

Des.	Chk'd.
I.M.	D.S.
Dwn.	Chk'd.
I.M.	D.S.

Utility Circ. No. _____ Index No. _____

Const. Inspector .....

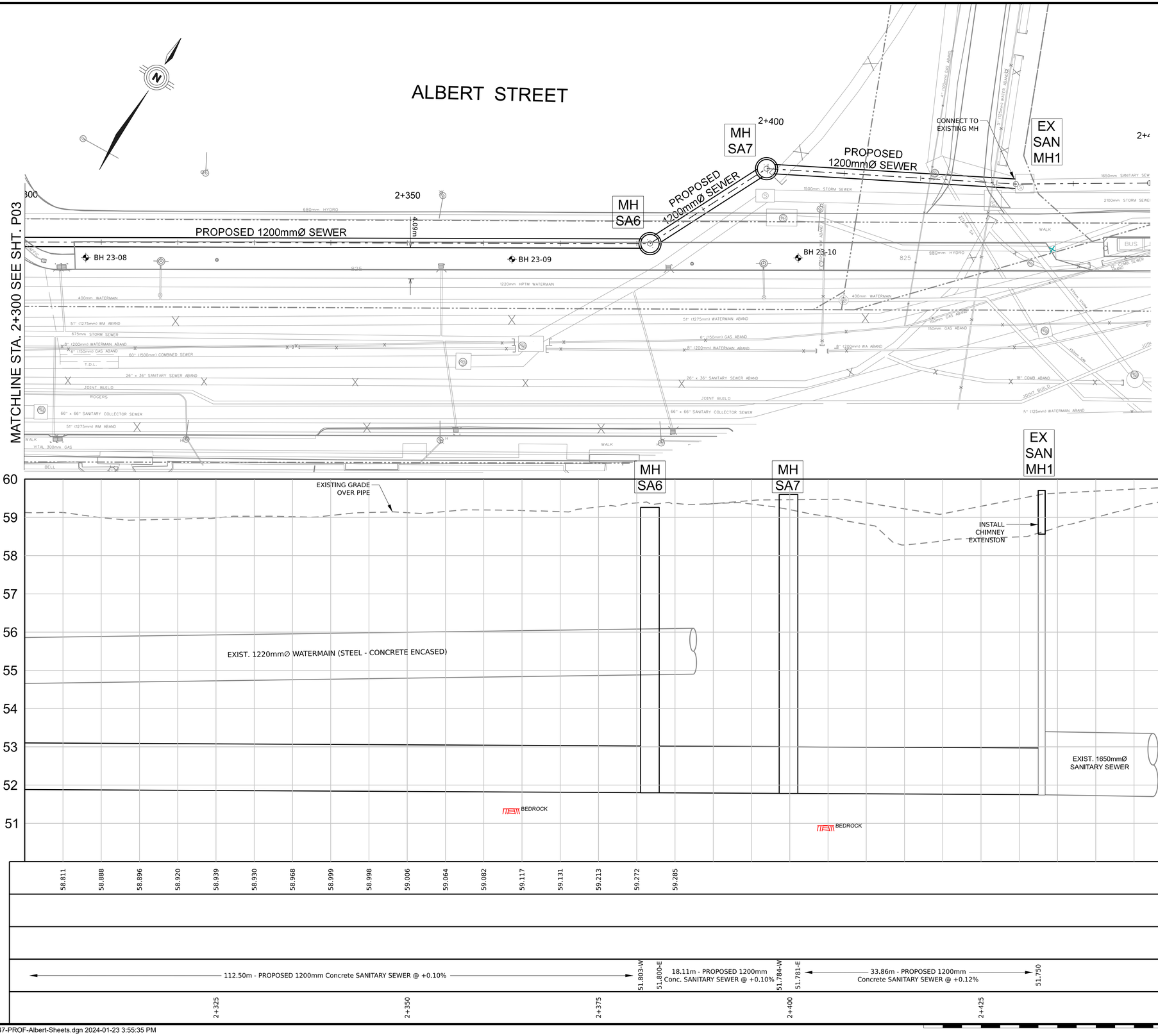
Scale: HORIZONTAL 0m 5 10 / 0m 1 2 VERTICAL

NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned, The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage,

REVISIONS

No.	Description	By	Date (dd/mm/yy)
1	ISSUED FOR PRELIMINARY DESIGN CIRCULATION	D.S.	24/11/23
2	ISSUED FOR FINAL PRELIMINARY DESIGN	D.S.	23/01/24

NOT FOR CONSTRUCTION



SANITARY SEWER MH DATA

No.	Station	Offset (m)	Type		Elevations		Grate to Invert
			Structure	Cover	Grate	Low Inv.	
MHSA6	2+381.02	0.00	701.013	S24	59.26	51.80	7.46
MHSA7	2+399.84	0.00	701.013	S24	59.60	51.78	7.82

SL DENOTES SELF LEVELLING COVER

NOTE:
CITY OF OTTAWA IS IN CONSULTATION WITH HYDRO OTTAWA REGARDING THE IMPACTED HYDRO UNDERGROUND INFRASTRUCTURE

mmddyy DGN_FILE_NAME

Record Drawing

These drawings have been prepared based on information provided by others. Stantec Consulting Ltd. has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result.

Stantec

NO.	REVISIONS	BY	DATE
1.	ISSUED FOR TENDER	B.B.	2004-11-19
2.	ISSUED FOR CONSTRUCTION	B.B.	2005-03-11
3	AS RECORDED	JvW	2007-03

NOTE:
The location of the utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned.
The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage

LOW PRESSURE TRANSMISSION MAIN
REPLACEMENT PROGRAM
LEMIEUX ISLAND W.P.P. TO FLEET STREET PUMPING STATION

PROPOSED 1676MM WATERMAIN PLAN & PROFILE STATIONS 5+043 TO 5+140

Ottawa

CONTRACT NO. ISB04-3023

DWG. NO. 3023-P1

SHEET 11 OF 25

M.J. WILLMETS	R. G. HEWITT, P.ENG.	W.R. NEWELL, P.ENG.
Project Manager	Director Infrastructure Services	Manager Construction Services West

Dwn: C.V. Chkd: B.B. Des: B.B. Chkd: J.D.K.

Date: 2005-03-11
Scale: Horizontal 0m 2.5 5 10
0m 0.5 1 2
Vertical

NOTES:

1- RESTORE DISTURBED AREAS. CULVERTS. SIDEWALK. DECORATIVE LANDSCAPING (FLOWER GARDEN). PAVEMENT TO ORIGINAL CONDITION UNLESS INDICATED OTHERWISE ON THE DRAWING. IN ACCORDANCE WITH THE REQUIREMENTS OF THE CITY OF OTTAWA.

2- ENDS OF PIPE AT THE LIMIT OF CONTRACT TO BE MARKED BEFORE BACK FILLING. TIE-IN TO THE EXISTING FEATURES FOR FUTURE LOCATING.

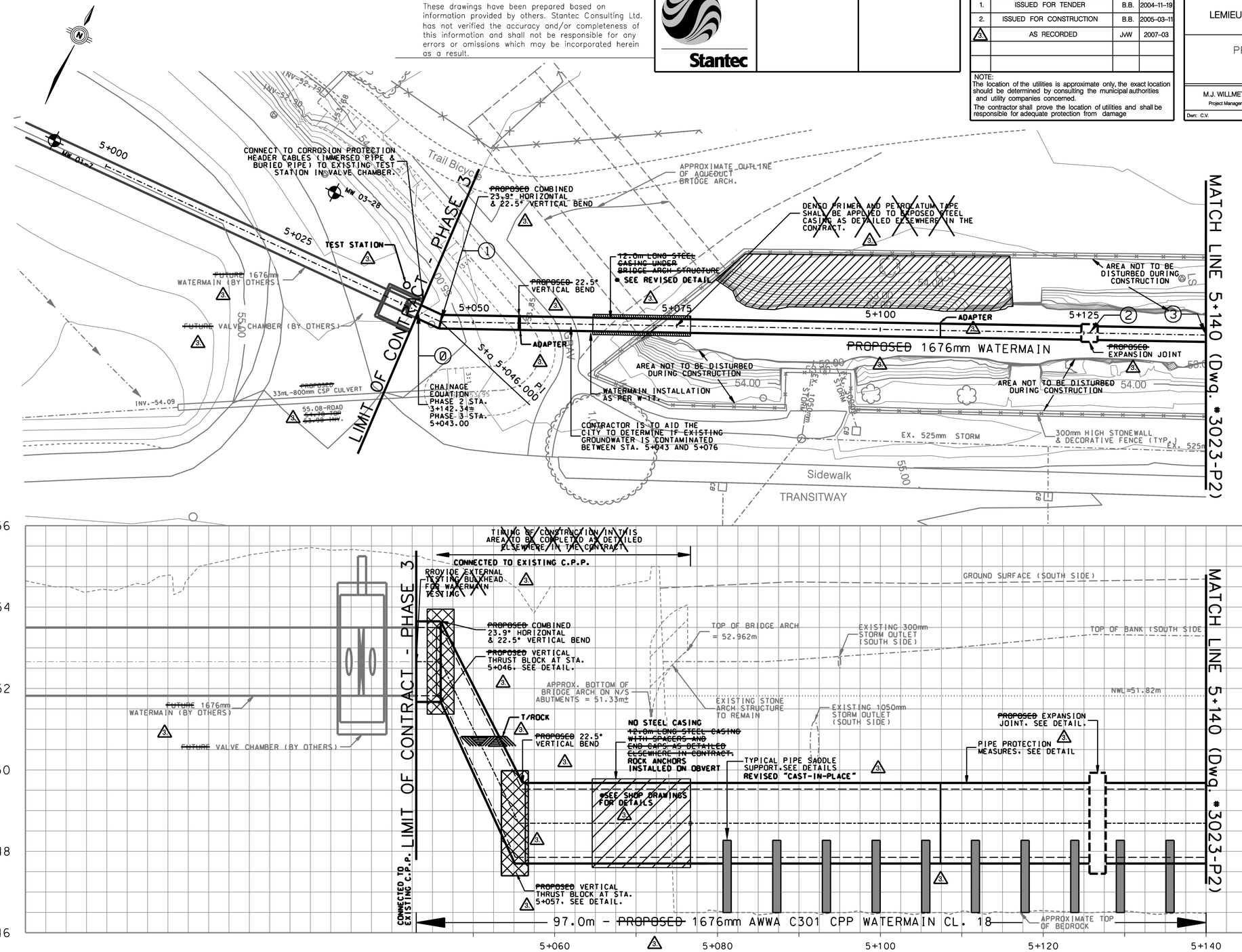
3- SITE SECURITY FENCING SHALL BE INSTALLED ALONG THE LIMITS OF CONSTRUCTION BEFORE CONSTRUCTION WORK STARTS AND SHALL REMAIN IN PLACE UNTIL REINSTATEMENT IS COMPLETED. EXCEPT WHERE OTHERWISE NOTED.

4- PRESERVE AND PROTECT HYDRO POLES.

5- MAINTAIN EXISTING PEDESTRIAN MOVEMENTS AT ALL TIMES DURING CONSTRUCTION. PROVIDE INFORMATION SIGNAGE. DIRECTIONAL SIGNAGE AND BARRICADES TO DIRECT PEDESTRIANS AROUND THE CONSTRUCTION ACTIVITY AREA.

6- PIPE SADDLE SUPPORT LOCATIONS AND SPACING ARE FOR ILLUSTRATION PURPOSES ONLY. PIPE SADDLE SUPPORTS ARE TO BE SPACED SO THAT EACH PIPE SECTION IS SUPPORTED BY AT LEAST ONE (1) SADDLE (MAXIMUM SPACING TO BE NO GREATER THAN 6.1m FROM CENTER TO CENTER). A PIPE SADDLE SUPPORT TO BE LOCATED NO GREATER THAN 1.0m FROM EACH SIDE OF THE CENTERLINE OF THE EXPANSION JOINTS. THE SADDLE SUPPORT ADJACENT TO EXPANSION JOINTS TO BE EMBEDDED 1.0m INTO SOUND BEDROCK AS DETAILED. THE MIDDLE PIPE SUPPORT BETWEEN EXPANSION JOINTS AND TUNNEL SECTION OR PIPE BLOCK ANCHORS OR THRUST ANCHORS SHALL BE EMBEDDED 1.0m INTO SOUND BEDROCK. AS DETAILED.

AREA CAN BE USED AS AN OPTIONAL ACCESS INTO THE AQUEDUCT DURING CONSTRUCTION. AREA TO BE REINSTATED TO ORIGINAL CONDITION UPON COMPLETION OF PROJECT. EXISTING ROCK FACE NOT TO BE DISTURBED.



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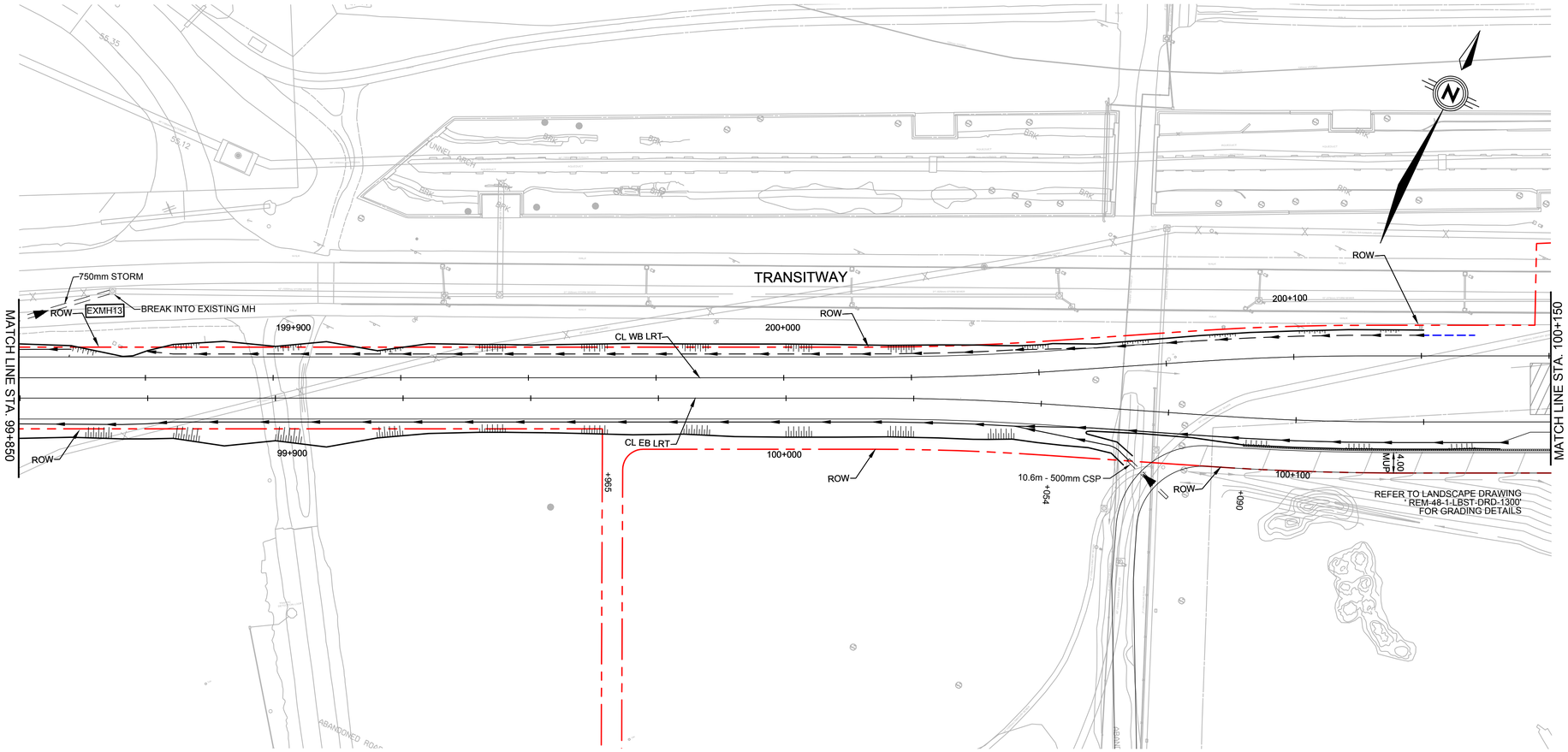
TITLEBLOCK: 790mm x 534mm RTGE JV 2013



CULVERT DATA

	STATION	OFFSET (m)	ELEVATIONS (m)
INVERT 1	100+067.77	9.79RT	54.701
INVERT 2	100+075.87	16.70RT	54.742

OFFSETS ARE FROM CENTER LINE OF EB LRT

Confederation Line
Ligne de la Confédération

Ottawa

GUIDEWAY DESIGN - SEGMENT 1
GRADING AND DRAINAGE

CONTRACT No.
OILC-11-00-P006

DESIGNED	CHECKED
-	-
DRAWN	SEALED
KUSUM	-

DRAWING NUMBER
REM-20-1-0000-DRD-2716

PRIMARY SEAL

Refer to Rev 3 for the originally sealed version

DESIGN/BUILDER
OLRT CONSTRUCTORS CONSTRUCTEURS

ENGINEERING JV
RTGE Joint Venture

SECONDARY SEAL (IF REQUIRED)

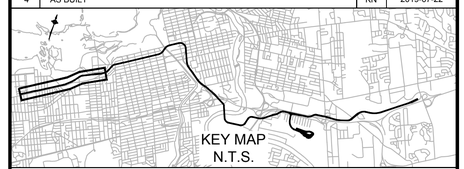
DESIGN FIRM
MMM GROUP

SCALE
HORIZONTAL 1:500 FULL SIZE
1:1000 HALF SIZE
0 5 10 20 40

ASSET No.
-

ASSET GROUP
-

REV	DESCRIPTION	BY	DATE
0	SIN-0518: ISSUED FOR CONSTRUCTION	RC	2016-01-15
1	SIN-0649: ISSUED FOR CONSTRUCTION	RC	2016-04-12
2	SIN-1396: ISSUED FOR CONSTRUCTION	RC	2017-08-31
3	SIN-1506: ISSUED FOR CONSTRUCTION	RC	2017-11-22
4	AS BUILT	KN	2019-07-22



NO PART OF THIS DOCUMENT MAY BE REPRODUCED, PUBLISHED, CONVERTED, OR STORED IN ANY DATA RETRIEVAL SYSTEM, OR TRANSMITTED IN ANY FORM BY ANY MEANS (ELECTRONIC, MECHANICAL, PHOTOCOPYING, RECORDING, OR OTHERWISE) WITHOUT THE PRIOR WRITTEN PERMISSION OF THE RTGE JOINT VENTURE.

This As-Built Document has been prepared based upon information furnished by OLRT Constructors.

LAYOUT INFORMATION BASED ON 3 DEGREE
MTM ZONE 9 NAD 83 (OLRT) COORDINATE SYSTEM
COMBINED SCALE FACTOR 0.999946

GENERAL NOTES:

A. THE LOCATION OF EXISTING UTILITIES ARE APPROXIMATE AND SHOULD BE VERIFIED BY THE CONTRACTOR IN THE FIELD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADEQUATE PROTECTION FROM DAMAGE.

B. REFER TO 'STRAY CURRENT REPORT' FOR ADDITIONAL CORROSION CONTROL SYSTEMS, INCLUDING THE LOCATION AND TYPICAL ARRANGEMENT, MEASURING POINTS, AND STRAY CURRENT MONITORING SYSTEMS. CORROSION CONTROL MEASURES SHALL BE PROVIDED FOR BURIED PIPES AND PIPES SUBJECT TO DIRECT CURRENT (DC) STRAY CURRENTS.

C. MATERIAL SUBSTITUTIONS MAY BE CONSIDERED AT THE DISCRETION OF THE OLRTC REPRESENTATIVE. SUBSTITUTIONS SHALL NOT BE MADE WITHOUT THE PRIOR APPROVAL OF THE OLRTC REPRESENTATIVE. THE APPROVAL OR REJECTION OF A PROPOSED SUBSTITUTION WILL BE MADE AT THE DISCRETION OF THE OLRTC REPRESENTATIVE.

D. CONNECTION POINTS TO EXISTING UTILITIES TO BE VERIFIED BY VISUAL EXPOSURE AND SURVEY AS REQUIRED.

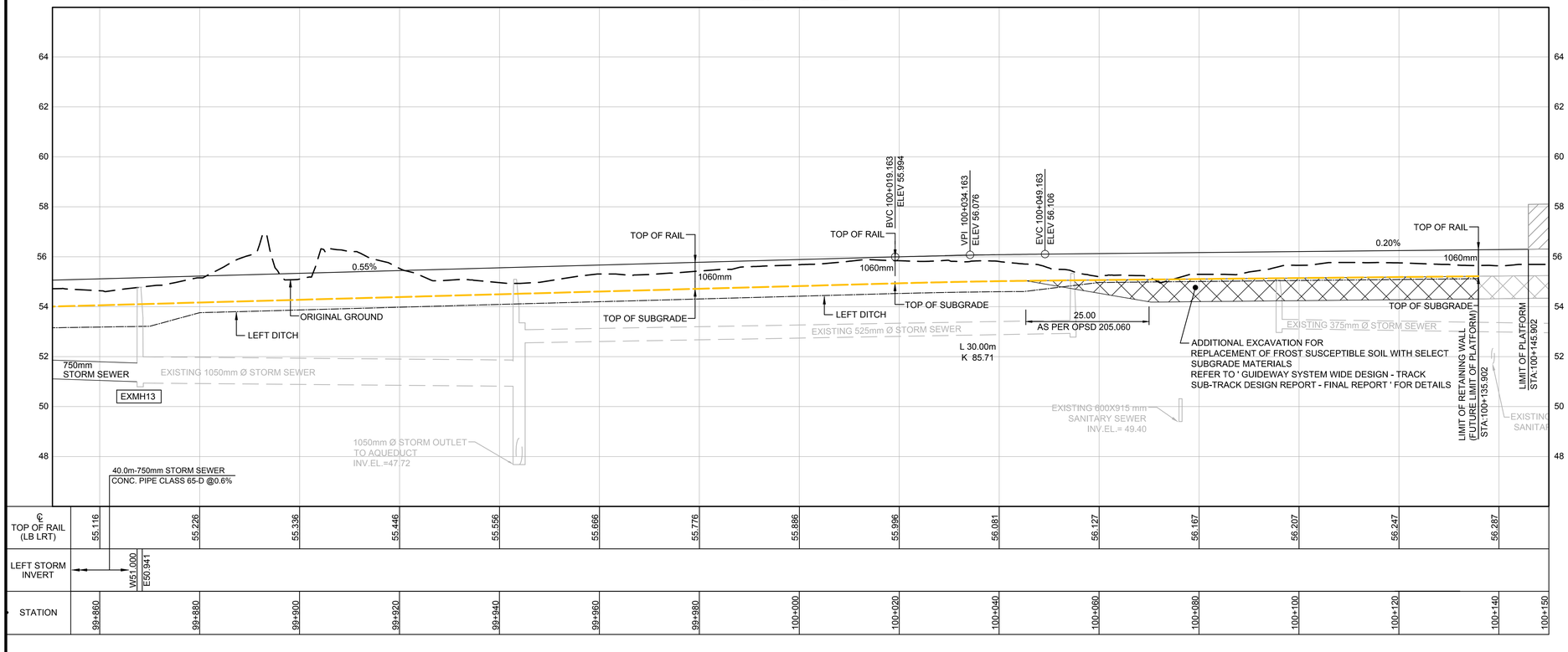
E. ROW BASED ON PROPERTY REQUEST PLANS (PRP) PROVIDED BY THE CITY.

F. REFER TO OLRTC'S ENVIRONMENTAL MANAGEMENT PLAN(LATEST REVISION) FOR EROSION AND SEDIMENT CONTROL, TREE PROTECTION AND OTHER ENVIRONMENTAL REQUIREMENTS FOR CONFEDERATION LINE.

2019-Jul-22 11:13:28 AM O:\Drawings\WIP As-Built\SUB-03\22 Guideway - Civil - Segment 1\Submitted\20190722\CAD\REM-20-1-0000-DRD-2704-2719_4_GRADING AND DRAINAGE.dwg

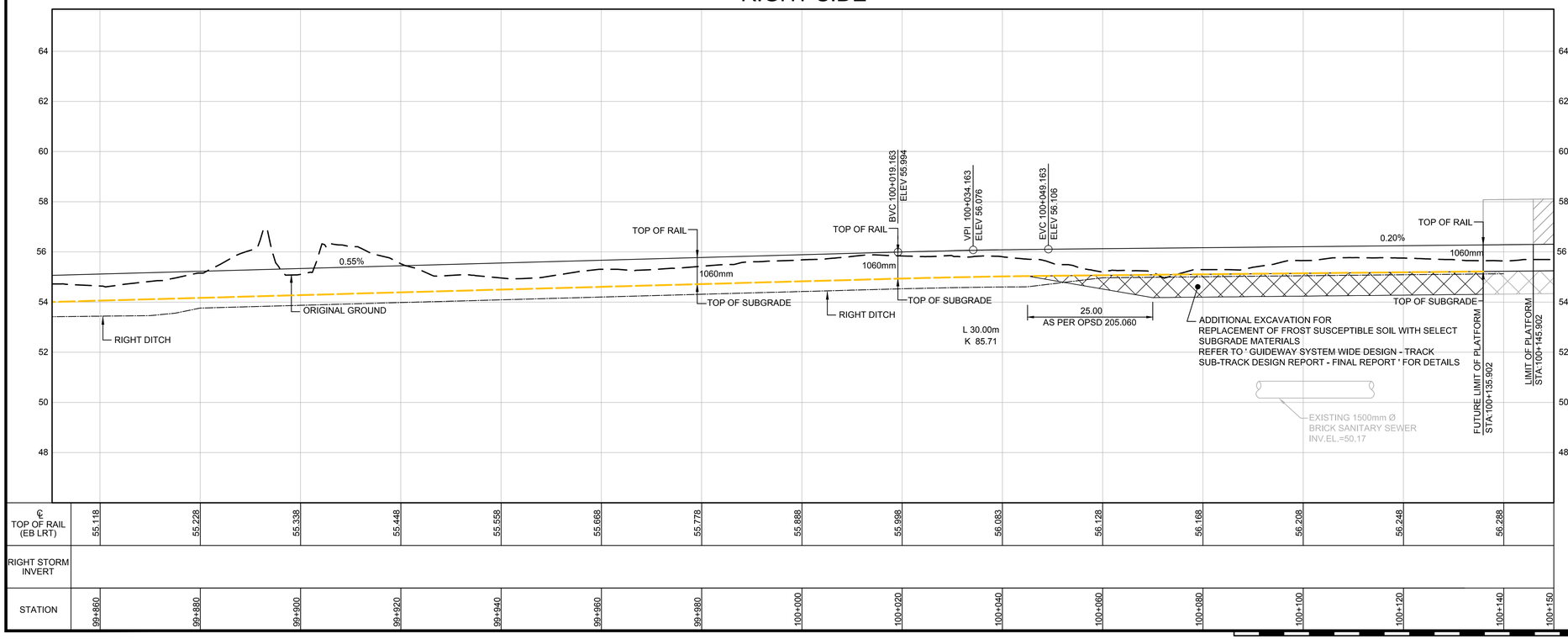
TITLEBLOCK: 790mm x 534mm RTGE JV 2013

LEFT SIDE



TOP OF RAIL (LB LRT)	55.116		55.226		55.336		55.446		55.556		55.666		55.776		55.886		55.996		56.081		56.127		56.167		56.207		56.247		56.287
LEFT STORM INVERT		W51.000 E50.941																										
STATION	99+860		99+880		99+900		99+920		99+940		99+960		99+980		100+000		100+020		100+040		100+060		100+080		100+100		100+120		100+140	100+150

RIGHT SIDE



TOP OF RAIL (EB LRT)	55.118		55.228		55.338		55.448		55.558		55.668		55.778		55.888		55.998		56.083		56.128		56.168		56.208		56.248		56.288
RIGHT STORM INVERT																												
STATION	99+860		99+880		99+900		99+920		99+940		99+960		99+980		100+000		100+020		100+040		100+060		100+080		100+100		100+120		100+140	100+150

Confederation Line
Ligne de la Confédération

Ottawa

GUIDEWAY DESIGN - SEGMENT 1
GRADING AND DRAINAGE

CONTRACT No.
OILC-11-00-P006

DESIGNED	CHECKED
-	-
DRAWN	SEALED
KUSUM	-

DRAWING NUMBER
REM-20-1-0000-DRD-2717

PRIMARY SEAL

Refer to Rev 4 for the originally sealed version

DESIGN/BUILDER
OLRT CONSTRUCTORS CONSTRUCTEURS

ENGINEERING JV
RTGE Joint Venture

SECONDARY SEAL (IF REQUIRED)

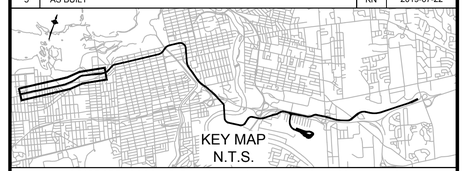
DESIGN FIRM
MMM GROUP

SCALE
HORIZONTAL 1:500 FULL SIZE / 1:1000 HALF SIZE
0 5 10 20 40
0 1 2 4 8
VERTICAL 1:100 FULL SIZE / 1:200 HALF SIZE

ASSET No.
-

ASSET GROUP
-

REV	DESCRIPTION	BY	DATE
1	SIN-0649: ISSUED FOR CONSTRUCTION	RC	2016-04-12
2	SIN-0824: ISSUED FOR CONSTRUCTION	RC	2016-06-23
3	SIN-1396: ISSUED FOR CONSTRUCTION	RC	2017-08-31
4	SIN-1506: ISSUED FOR CONSTRUCTION	RC	2017-11-22
5	AS BUILT	KN	2019-07-22



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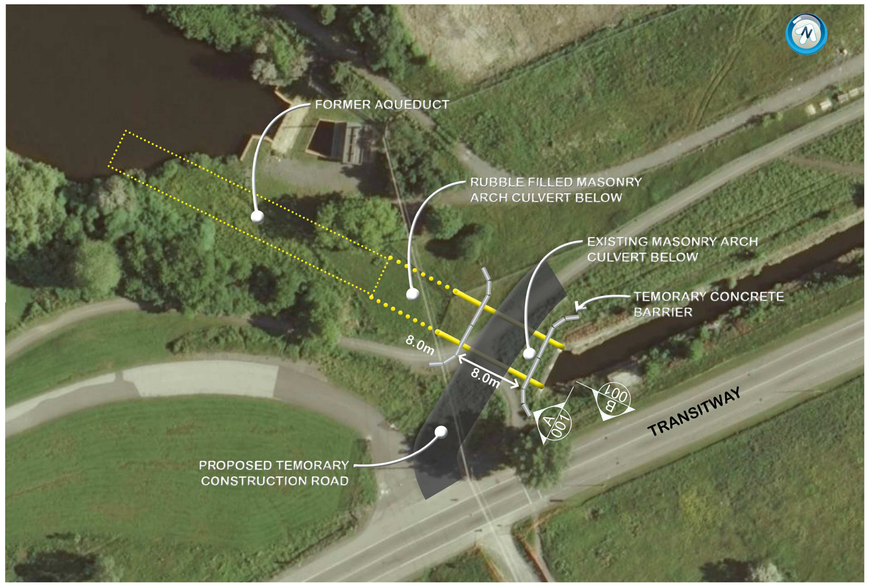
This As-Built Document has been prepared based upon information furnished by OLRT Constructors.

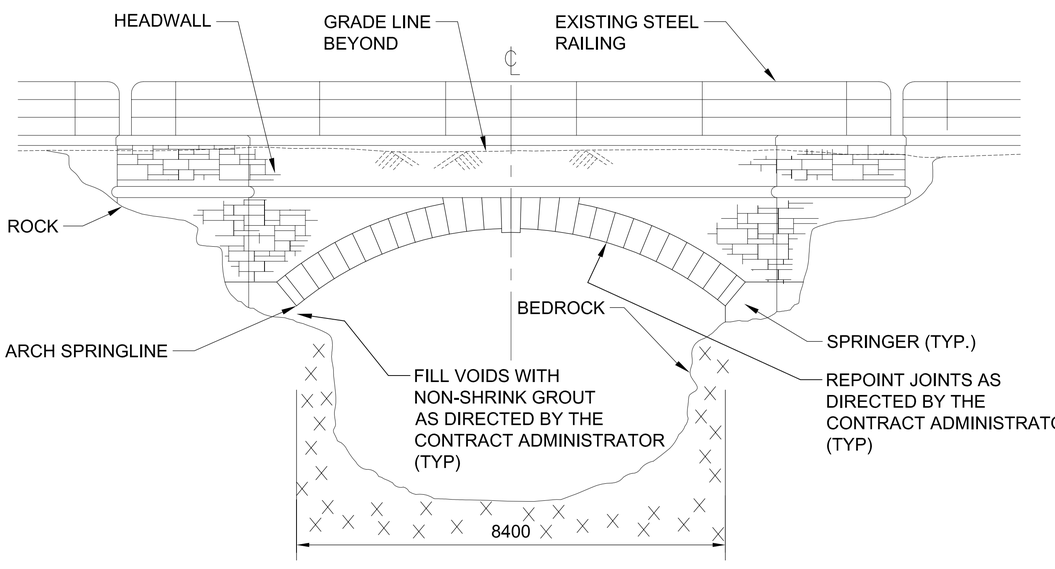
LAYOUT INFORMATION BASED ON 3 DEGREE
MTM ZONE 9 NAD 83 (OLRT) COORDINATE SYSTEM
COMBINED SCALE FACTOR 0.999946

2019-Jul-22 11:13:28 AM O:\Drawings\WIP As-Built\SUB-03\22 Guideway - Civil - Segment 1\Submitted\20190722\CAD\REM-20-1-0000-DRD-2704-2719_4_GRADING AND DRAINAGE.dwg

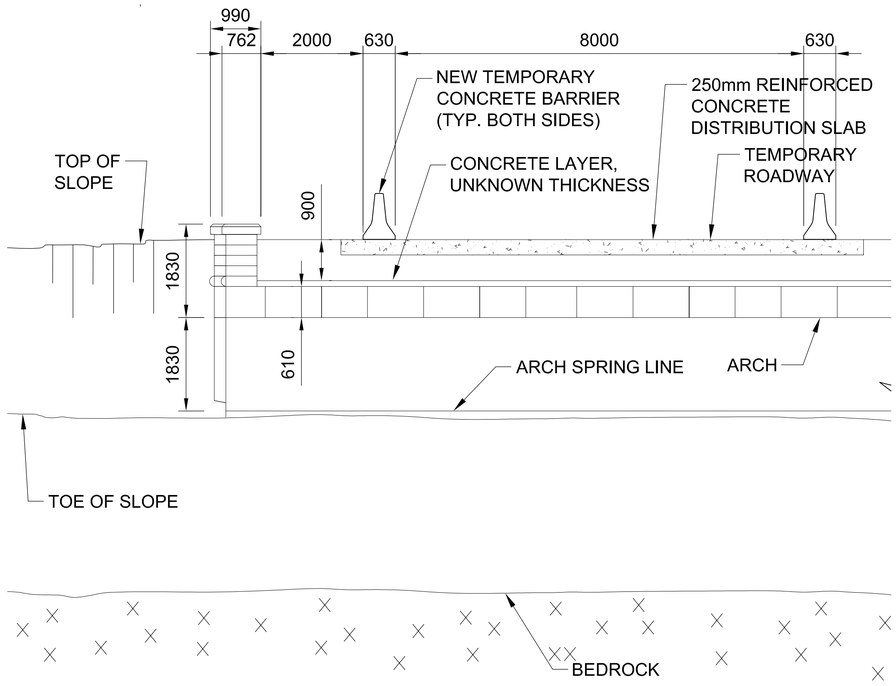
DRAWING FRAME: 790mm x 534mm City of Ottawa 2008



PLAN
1:60



ELEVATION A 001
1:60



SECTION B 001
1:60

CANADIAN CENTRAL RAILWAY BRIDGE
(SN015120)

GENERAL ARRANGEMENT

MORRISON HERSHFIELD

Ottawa

Contract No. ISD14-7114 | Dwg. No.

Sheet of

Asset No.

Asset Group

Des.	Chk'd.
HL	JBE
Dwn.	Chk'd.
GK	HL

Utility Circ. No. | Index No.

Const. Inspector

Scale: AS NOTED

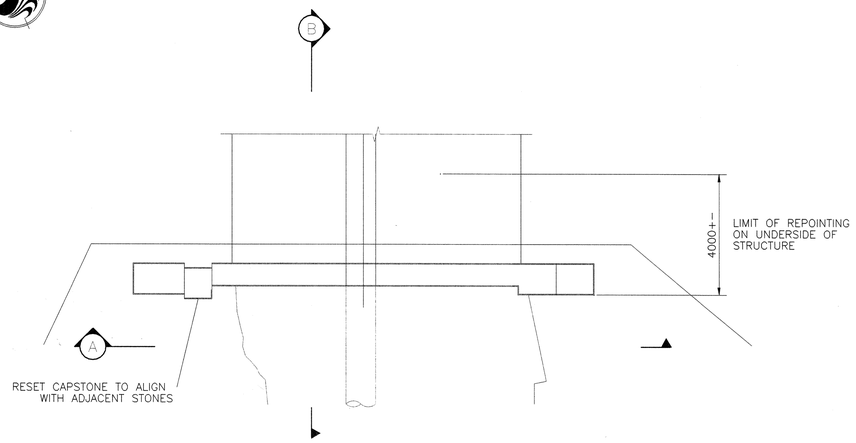
NOTE: The location of utilities is approximate only, the exact location should be determined by consulting the municipal authorities and utility companies concerned. The contractor shall prove the location of utilities and shall be responsible for adequate protection from damage.

REVISIONS

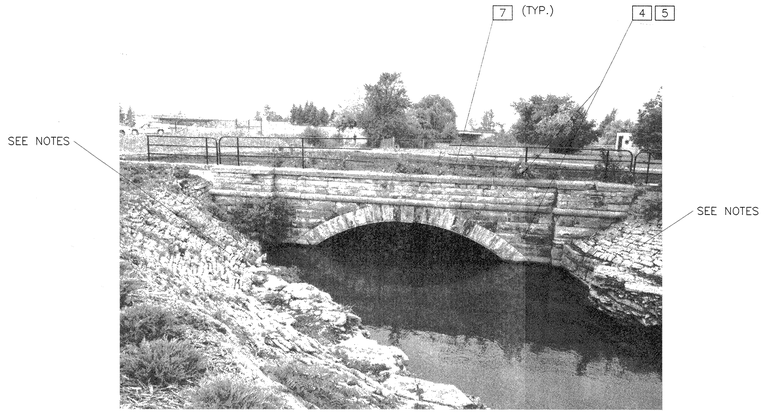
No.	Description	By	Date (dd/mm/yy)

NOTES:

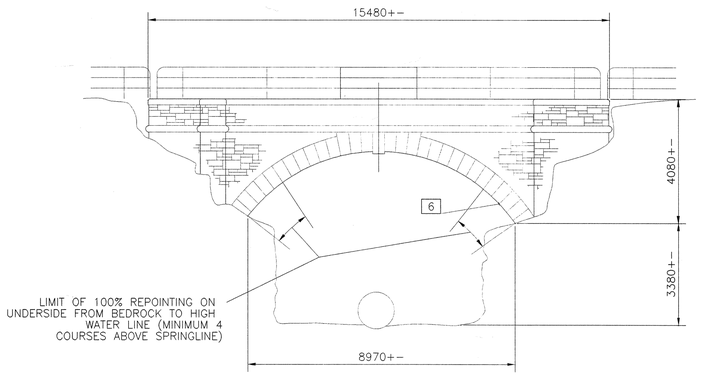
1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER APPLICABLE CONTRACT DRAWINGS. INFORMATION SHOWN ON THIS DRAWING HAS BEEN EXTRACTED FROM xxxx AND SUPPLEMENTED BY FIELD INVESTIGATIONS.



PLAN
1:100



WEST ELEVATION
EXISTING



(A) WEST ELEVATION
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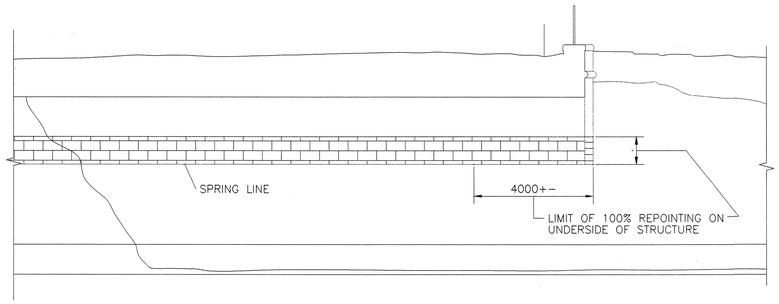


(B) SECTION
1:100

Stantec

No.	REVISION	BY	DATE
1	RECORD SET	P.C.M.	12 NOV 01

Ottawa-Carleton

THE CANADA CENTRAL RAILWAY BRIDGE

GENERAL ARRANGEMENT

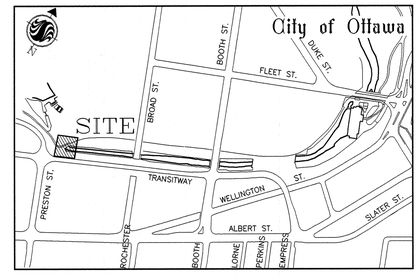
J. MILLER, P.ENG. — Director of Engineering

V.K. SAHNI, P.ENG. — Manager Structural Branch

DWG. No. B-051201-001
Sheet of
CONTRACT No. ETL00-7000
Des. S.T.R. Chk. D.A.H.
Dwn. Chk. J.M.
Date: 10 MAR 00
Scale: 1:100

SCOPE of WORK:

1. INSTALL FENCING, BARRICADES, ETC. AS REQUIRED TO PREVENT PUBLIC ACCESS TO THE WORK SITE.
2. DO NOT BLOCK EXISTING PATH. CONFINE ACCESS ACROSS PATH TO ONE LOCATION, APPROXIMATELY 4.0m WIDE.
3. PROVIDE ACCESS SCAFFOLDING, FALSE WORK AND DEMOLITION CATCHMENT SYSTEM.
4. REPLACE DETERIORATED STONE IN SPANDREL WALL AS DIRECTED BY THE ENGINEER.
5. CHIP AND REPOINT MASONRY JOINTS (100%) ON EXTERIOR.
6. CHIP AND REPOINT ARCH BARREL UNDERSIDE AT WATERLINE (100% OF AREA). CHIP AND REPOINT REMAINDER OF ARCH SOFFIT ONLY AS DIRECTED BY THE CONTRACT ADMINISTRATOR.
7. SEAL SKYWARD FACING JOINTS.
8. REINSTATE LANDSCAPING.



GENERAL NOTES:

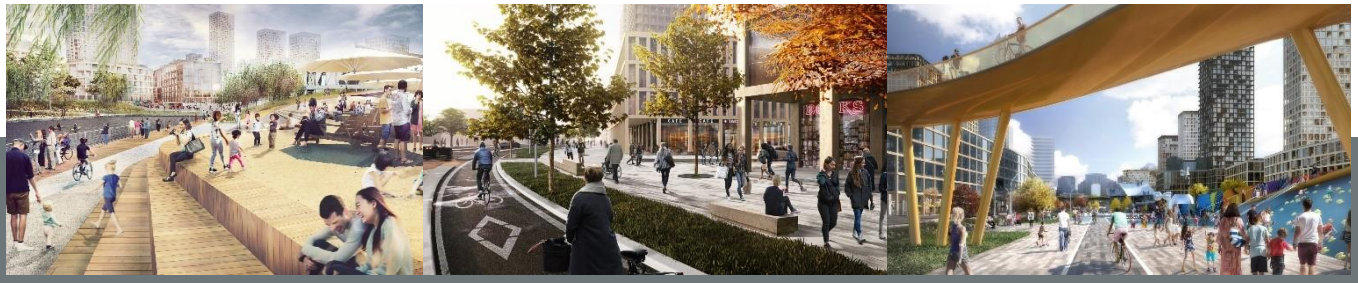
- THE CANADA CENTRAL RAILWAY BRIDGE IS A DESIGNATED HISTORIC STRUCTURE. ALL MASONRY RESTORATION IS TO PRESERVE THE HERITAGE APPEARANCE.
- THE AREA IN AND AROUND THE BRIDGE MAY CONTAIN VALUABLE AND SENSITIVE ARCHAEOLOGICAL RESOURCES. RESTRICT WORK TO DESIGNATED AREAS AND NOTIFY CONTRACT ADMINISTRATOR UPON DISCOVERY OF RELICS, ETC.
- ACCESS, WORK AND STORAGE AREAS SHALL BE LIMITED TO THOSE AREAS SHOWN ON THE DRAWINGS.
- DO ALL MASONRY RESTORATION WORK TO CAN3-A371-M94, EXCEPT AS MODIFIED BY THESE DRAWINGS AND THE CONTRACT SPECIFICATIONS.
- WHERE STONEWORK IS REMOVED, STABILIZE AND PROVIDE PROTECTION TO EXPOSED MASONRY REMAINING. PROVIDE TEMPORARY SHORING AND BRACING AS REQUIRED.
- UNLESS OTHERWISE NOTED, NO STONES ARE TO BE REPAIRED OR REPLACED WITHOUT PRIOR INSPECTION AND APPROVAL OF THE CONTRACT ADMINISTRATOR.
- NO CLEANING OF THE STONEWORK IS TO BE CARRIED OUT (UNLESS NOTED OTHERWISE) EXCEPT FOR THAT REQUIRED TO RESTORE PRECONTRACT APPEARANCE AS A RESULT OF SPILLAGE OF MORTAR, CONCRETE, GROUT, ETC.
- DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE. ELEVATIONS AND STATIONS ARE IN METERS.
- THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, ELEVATIONS AND DETAILS OF EXISTING FEATURES BEFORE PROCEEDING WITH THE WORK. ANY DISCREPANCIES SHALL BE PROMPTLY REPORTED TO THE CONTRACT ADMINISTRATOR.
- FIELD MEASURE TO ENSURE PROPER FIT.
- THE AQUADUCT WILL BE DRAINED FOR A PERIOD OF 4 WEEKS BEGINNING SEPTEMBER 18th TO PERMIT WORK TO BE COMPLETED ON THE ARCH BARREL UNDERSIDES. CATCHMENT SYSTEMS MUST BE IN PLACE TO PREVENT ANY REMOVALS OR OTHER MATERIALS FROM BLOCKING OR FALLING INTO THE AQUADUCT. COMPLY WITH THE ENVIRONMENT OPERATIONAL CONSTRAINTS OUTLINED IN THE CONTRACT SPECIFICATIONS.
- MAINTAIN WORK SITE IN A NEAT AND ORDERLY MANNER AT ALL TIMES AND REINSTATE ALL DISRUPTED AREAS TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR.
- DESIGN CRITERIA AND LOADING TO OHBDC 1991 3RD EDITION FOR PEDESTRIAN BRIDGES.
- THE NCC HAS RECENTLY COMPLETED RESTORATION WORKS OF THE AQUADUCT AREA ADJACENT TO THIS STRUCTURE INCLUDING THE RAILING OVER THE STRUCTURE. THESE WORKS ARE NOT TO BE DISTURBED BY THE WORK OF THIS CONTRACT AND ANY DAMAGE SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR.

01512001

Building LeBreton

Master Servicing Report

Renewed Master Concept Plan & Development Strategy



CIMA+ file number: A000958

March 5th, 2021

CIMA+

WAR MUSEUM

BLOCK 7

BLOCK 5

BLOCK 4

PARK AREA

LEBRETON PLACE

LEBRETON PLACE

BLOCK 6

POTENTIAL SITE FOR MAJOR AMENITY

BLOCK 3

PIMISI STATION

BLOCK 1

BLOCK 2

NEW CENTRAL LIBRARY

5A

CONNECTION 5A
BLOCK 4, 5 & PARK AREA
PRIMARY CONNECTION
CONNECT TO EXISTING STUB

5B

CONNECTION 5B
BLOCK 4, 5 & PARK AREA SECONDARY CONNECTION
CONNECT TO EXISTING NETWORK

7A

7B

7C

CONNECTION 7A,7B,7C
BLOCK 7 CONNECTIONS
CONNECT TO EXISTING
305mm WATERMAIN.

2A

2B

CONNECTION 2A, 2B
BLOCK 2 CONNECTIONS
CONNECT TO EXISTING
406mm WATERMAIN.

1A

1B

CONNECTION 1A, 1B
BLOCK 1 CONNECTIONS
CONNECT TO EXISTING
406mm WATERMAIN.

6A

CONNECTION 6A
BLOCK 6 PRIMARY CONNECTION
CONNECT TO EXISTING STUB.

3A

CONNECTION 3A
BLOCK 3 PRIMARY CONNECTION
CONNECT TO EXISTING STUB.

6B ALT

CONNECTION 6B
BLOCK 6 SECONDARY CONNECTION
CONNECT TO EXISTING STUB.

3B

CONNECTION 3B
BLOCK 3 SECONDARY CONNECTION
CONNECT TO EXISTING STUB.

NO.	Date	Description	By
2	20/04/03	PRELIMINARY DRAFT REPORT REV-2	-
1	20/03/13	PRELIMINARY DRAFT REPORT	-

CIMA+

CIVIL

CLIENT_NAME

LE BRETON MASTER CONCEPT

WATERMAIN SERVICING

DRAWN:	S.C. POGGIOLI
SCALE:	1:1000
CHECKED:	J.LAUVE
DATE:	2020/02/07
APPROVED:	C.L.LEBEL
APPROVED:	C.L.LEBEL
PROJECT No:	A000958
DRAWING No:	1
SHEET No:	1 of 1

PRINT DATE: 2020/02/07 | PAPER SIZE: ARCH full bleed D (36.00 x 48.00 inches)
PATH: Z:\Cima+\Shop\Projects\A000958\Civil\Design\Drawings\Plan\Key Plans\Watermain_Connections.dgn | LAYOUT: Servicing_Watermain

WAR MUSEUM

BLOCK 7

BLOCK 5E
FFE = 56.530

BLOCK 5C
FFE = 56.760

BLOCK 5B
FFE = 57.260

BLOCK 5A
FFE = 57.800

BLOCK 5D
FFE = 56.450
FFE = 56.315

FFE = 56.230
FFE = 56.185
FFE = 56.165

PARK AREA

LEBRETON PLACE

BLOCK 4
FFE = 56.000
FFE = 56.000
FFE = 56.000

NEW CENTRAL LIBRARY
FFE = 65.860

PUMP STATION
INV. 48.82

PIMISI STATION

BLOCK 1
FFE = 63.160
FFE = 62.890
FFE = 63.120

BLOCK 2
FFE = 63.220

BLOCK 3A
FFE = 59.800

BLOCK 3B
FFE = 61.400
FFE = 61.400

BLOCK 6B
POTENTIAL SITE FOR MAJOR AMENITY
FFE = 60.300
FFE = 60.300

CAVE CREEK COLLECTOR RELOCATION

BLOCK 6A
FFE = 63.000
FFE = 60.300

CONNECT TO FLEET STREET SANITARY SEWER
INV. 50.67

1	2013/12	PRELIMINARY DRAFT REPORT	-	
No.	Date	Description	By	

CIMA+

CIVIL

NCC / O2

LE BRETON MASTER CONCEPT

SANITARY SERVICING

S.C POGGIOLI

J.SAUVÉ

C.L.LEBEL

C.L.LEBEL

A000956

1 of 1

1:1000

2020/02/07

1

TITLEBLOCK 36x48 HORZ ENG 3.0

WAR MUSEUM

BLOCK 5A

BLOCK 5B

BLOCK 5E

BLOCK 7

BLOCK 5C

BLOCK 5D

BLOCK 4A

LEBRETON PLACE

PARK AREA

BLOCK 4B

PIMISI STATION

NEW CENTRAL LIBRARY

BLOCK 1

BLOCK 2

BLOCK 6B

POTENTIAL SITE FOR MAJOR AMENITY

BLOCK 3B

BLOCK 3A

BLOCK 6A

OIL GRIT SEPERATOR

230m ~ BIO-SWALE AS PER CITY OF OTTAWA DETAIL L20

BOX CULVERT 51.6m

2	20/04/03	PRELIMINARY DRAFT REPORT REV-2	-
1	20/03/13	PRELIMINARY DRAFT REPORT	-
No.	Date	Description	By

STAMPS:

DESIGNED BY:

APPROVED BY:

ENGINEER: CIMA+

DISCIPLINE: CIVIL

CLIENT: NCC / O2

PROJECT NAME: LE BRETON MASTER CONCEPT

SHEET TITLE: STORM SERVICING

DRAFTED: S.C.POGGIOLI

DESIGNED: J.SAUVÉ

APPROVED: C.L.LEBEL

PROJECT No: A000958

SHEET No: 1 of 1

SCALE: 1:1000

DATE: 2020/02/07

APPROVED:

DRAWING No: 1

PRINT DATE: 2020/04/03 / PAPER SIZE: ARCH full bleed E (36.00 x 48.00 inches)
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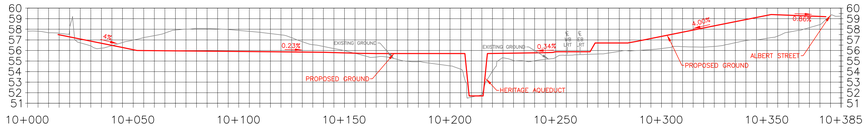
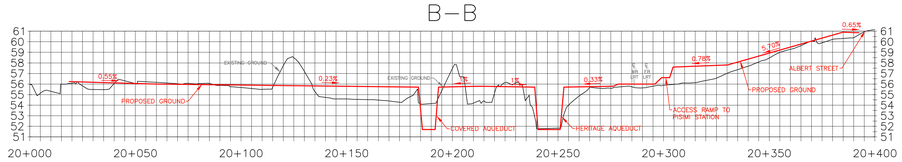
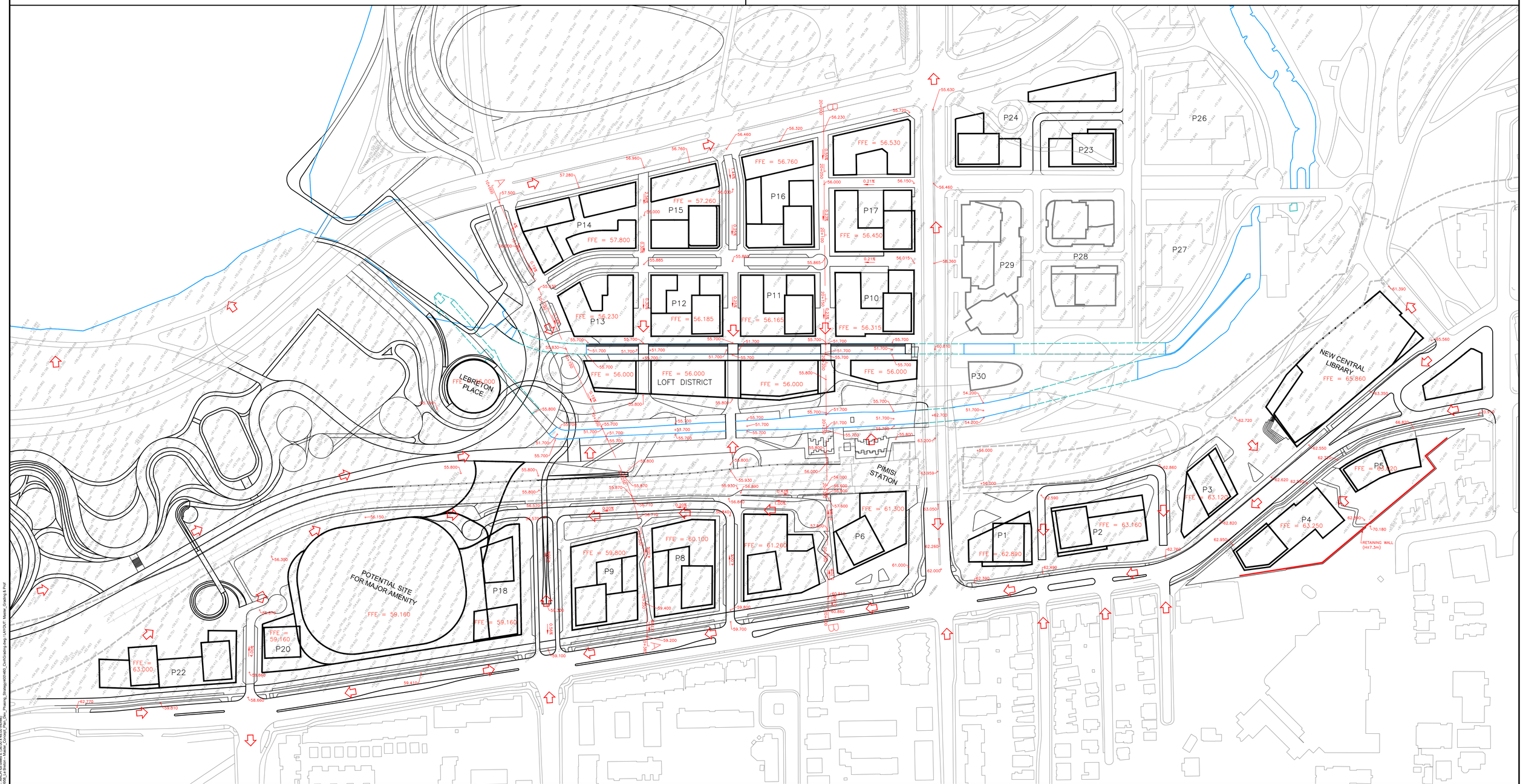
TITLEBLOCK 36x48 HORZ ENG 3.0

A–A



B–B





3	20/04/03	PRELIMINARY GRADING REV-2	-
2	20/03/20	PRELIMINARY GRADING	-
1	20/03/13	PRELIMINARY GRADING	-
No.	Date	Description	By

STAMPS:

DESIGNED BY

APPROVED BY

ENGINEER: CIMA+

DISCIPLINE: CIVIL

CLIENT: NCC / O2

PROJECT NAME: LE BRETON MASTER CONCEPT

SHEET TITLE: GRADING - MASTER PLAN

DRAFTER: S.C POGGIOLI

DESIGNER: J.SAUVÉ

APPROVER: C.L LEBEL

PROJECT No.: A000958

SHEET No.: 1 of 3

SCALE: 1:1000

DATE: 2020/02/07

APPROVER: C.L LEBEL

DRAWING No.: 1

PRINT DATE: 2020/04/03 / PAPER SIZE: ARCH full bleed E (48.00 x 36.00 Inches)
PATH: Z:\Cima-C1\CIVIL Projects\A000958_Le Breton – Master_Concept_Plan_Dev_Phasing_Strategy\a000958_CivilDrawing.dwg / LAYOUT: Master_Grading & Prof

J.L. Richards
& Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

TECHNICAL MEMORANDUM

TO:	Jean-Yves Laberge Palladium Auto Park Ltd.	DATE:	December 19, 2013
		JOB NO.:	25798
FROM:	Philip Reeve, P.Eng.	CC:	
RE:	Impact of Additional Flows from the Palladium Auto Park on the Canadian Tire Centre Sanitary Sewer System		

Theoretical sanitary sewage flow rates for the Canadian Tire Centre (CTC) lands were calculated and summarized in the "Report on Servicing for the Ottawa Senators Palladium NHL Arena Development (revised January 21, 1992 to concur with OMB Decision)", by J.L. Richards & Associates Limited. The design flows are as follows:

Corel Centre	46.0 L/s
Arena Retail (future)	4.0
Hotel (future)	7.2
Site Retail (future)	5.85
Site Infiltration	2.8
	65.85 L/s

The theoretical estimation of sewage flows shown above then formed the basis for the design of the sanitary sewage collection system to service the proposed development of the Palladium lands. The design of the sewage collection system did not include allowances from any other upstream areas in accordance with the OMB Decision that recommended that all services for CTC be sized only to accommodate flows from the Palladium lands. The theoretical estimated total peak flow given in the JLR Report was 65.85 L/s; the estimated total average flow was 16.16 L/s. It was recognized, however, that peak sewage flows from the area, as a result of major sports events, will not, in general, occur simultaneously with commercial and industrial hours of sewage use.

Flow Monitoring Programs

CTC undertook a flow monitoring program to compare actual sanitary sewage generation rates with the theoretical estimates. Flows generated at various events were monitored by JLR at the opening of the facility in January of 1996, and again during the period of December, 1997 to February, 1998. In general, the peak flow experienced in the system is measured during the intermissions of sold out hockey games. On January 24, 1998, a peak flow rate of 34.9 L/s was measured in the 375 mm diameter outlet sewer during the second intermission of a hockey game with an attendance of 18,300. On January 29, 1998, a peak flow of 33.5 L/s was monitored during a sold out game against the New York Rangers.

Palladium Auto Park Development

In August 1998, J.L. Richards & Associates Limited produced a study that concluded that connection to the water and sewer systems servicing CTC was the preferred servicing alternative for the 40 ha Palladium Auto Park, located on Huntmar Road, adjacent to CTC. A report entitled "Sanitary Sewer Servicing for Palladium Auto Park" (JLR, June, 2002) documented the estimated peak theoretical flow from the Auto Park site to be 11.98 L/s. The Report concluded that there was sufficient capacity in the CTC sanitary sewer system to accommodate the Auto Park flows even under the worst case (coincident peak) scenario. The 1996 and 1997/1998 flow monitoring results were key components of the analysis that supported the Report's conclusions.

Construction of the internal sanitary sewage collection system at the Palladium Auto Park was completed in December, 2003 and was connected to the municipal sewer on Cyclone Taylor Boulevard. Development of the Auto Park lands continues to this day.

Palladium Campus Development

The Palladium Campus Development is located in the southeast corner of the CTC site. It currently consists of 3 office buildings.

The theoretical flow for this development is calculated using formulae for commercial flows given in the City of Ottawa's Design Guidelines:

Site Area	=	5.51 ha
Commercial Flow Rate	=	50,000 L/ha/d
Infiltration Allowance	=	0.28 L/s/ha
Peaking Factor	=	1.5
Total Peak Theoretical Flow	=	6.33 L/s

Existing Sewage Collection System

The "As-Built" Drawings from the CTC development are attached to this Technical Memorandum. The mechanical site plan of the arena is also attached, showing the four (4) sanitary connections to the collection system. A hand drawn sketch of the schematic layout of the building sanitary services is also attached. Of note is the invert of the piping leaving the building (98.00), as well as the fact that the sanitary flows from the Club Level and above leave the building by gravity.

Assessment of Existing Collection System

A design spreadsheet showing all of the theoretical and actual flows, as well as the As-Built inverts (and resulting capacities) of the site services is also attached. Flows from the arena are based on the peak monitored flow of 35 L/s, factored up by (20,500/18,500) to account for the seating capacity expansion carried out by CTC in 2004. This flow is then split evenly amongst the 4 connections from the building. The future "arena retail", "site retail" and hotel are also added (at the theoretical rates) at the approximate location where they are anticipated, in accordance with the "Roads and Blocks" plan, also attached.

The design spreadsheet shows that there is spare capacity in the wastewater collection system to accommodate additional flow. The flow constraint appears to be the inverted siphon, that has a capacity of 83 L/s. Based on the very conservative assumption that all of the uses (the Auto Park, the CTC and the Palladium Campus) generate peak wastewater flows at exactly the same time, and accounting for the peak flows from the as yet undeveloped parcels around CTC, approximately 5.8 L/s of additional flow can be accommodated in the siphon before it reaches its theoretical design capacity.

Adding 5.8 L/s to the collection system and maximizing the capacity of the siphon will not cause surcharge in any of the site services. Even if the water level in the sewer is at the obvert, there would still be an available freeboard of about 2.5 m from the invert of the lateral (98.00) as it leaves the building.

2013 Flow Monitoring Program – Palladium Auto Park

The August 29, 2013 memo by MMM Group summarizes the results of a flow monitoring program undertaken in July/August, 2013, and provides monitored flow parameters for the current Auto Park development. The monitored flow parameters are extended to the remaining lots to estimate a new projected sanitary flow from the Auto Park. The proposed hotel use on Lot 14 is also added, to give a new total peak sanitary flow projection of 18.58 L/s. This is (18.58-11.98) 6.6 L/s higher than the original flow projection. Therefore, based on the 2013 flow monitoring, it is projected that an additional 6.6 L/s could be generated from the Auto Park at full build-out which, or course, will not happen for many years.

Summary

An additional 5.8 L/s can be added to the CTC wastewater collection system before the theoretical design capacity of the siphon is reached. This additional flow will not result in any surcharge in the upstream collection system, and will not present a risk of basement flooding in the CTC. This additional flow allocation assumes an unlikely and highly conservative occurrence of coincident peaks from all connected users. The additional flow projection for the Auto Park lands, based on the 2013 flow monitoring, is 6.6 L/s at full build-out. This will exceed the siphon capacity by 0.8 L/s.

Recommendation

Based on the analysis given above, the City could consider allowing the zoning amendment prepared for Lot 14 to proceed, because:

- coincident peaks for the Auto Park, CTC and the Palladium campus are highly unlikely to occur. During an afternoon game on a weekend or holiday, it is conceivable that flows from the Auto Park will be above base flow levels at the same time as the peak flow from the CTC is occurring. It is highly unlikely, though, that flows from the Palladium campus office development will be high on a weekend or holiday afternoon. An additional 2.1 L/s of additional capacity can be added to the system if it is assumed that the CTC and the Auto Park peak at the same time, but the Palladium campus lands do not. This will more than compensate for the 0.8 L/s deficiency in the siphon capacity.
- the Auto Park is actively trying to find the inflow source identified in the 2013 flow monitoring report and is committed to disconnecting it once it is located. Once this inflow source is disconnected, the actual flows from the Auto Park will be very much consistent with the theoretical estimates.
- an additional 0.8 L/s in the siphon will not cause any significant operational concern, and will not result in any upstream surcharge in the sewers. The site sewers are about 2.5 m deeper then the invert of the sanitary laterals as they leave the CTC.
- the "site retail" flow generation projection was developed using the Guidelines of the former City of Kanata; namely, 0.39 L/s/ha and a peaking factor of 3. Using today's City of Ottawa flow generation standards, the peak flow from this 5 ha block would be 3.75 L/s, or 2.1 L/s less than the currently approved 5.85 L/s for this future block.

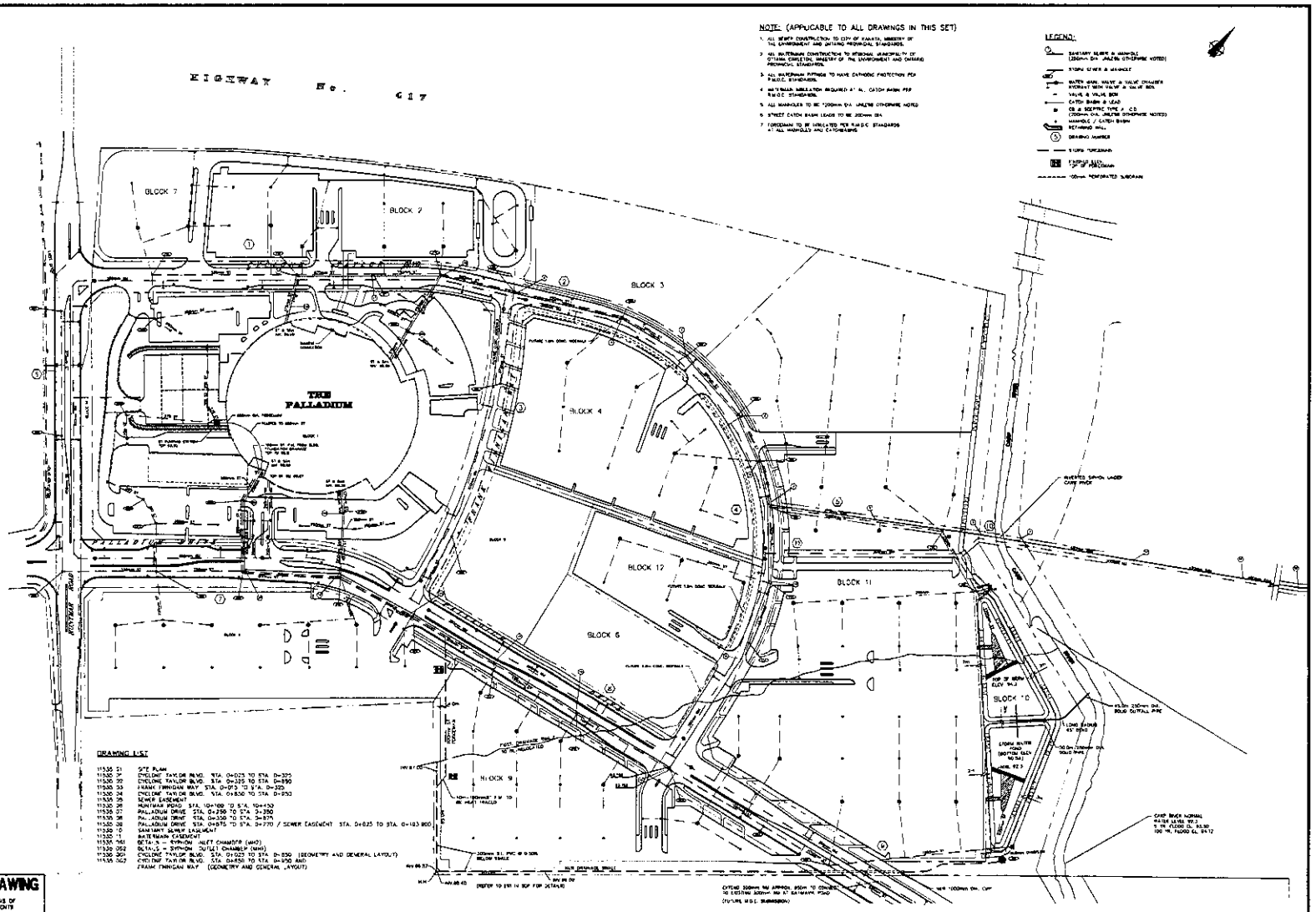
There appears to be sufficient redundancy and conservatism in the peak theoretical flow generation calculations, therefore, to allow for a modest increase to the flow allocation for the Palladium Auto Park lands.

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED

Philip Reeve, P.Eng.

PR:jd
Attach.



NO.	DATE	REVISIONS	BY
15	95/12/08	AS CONSTRUCTED INFO ADDED	D.G.S.
14	95/06/05	REV. ST. SEWER LOCATION - HUNTMAR	D.G.S.
13	95/03/03	GEN REVISIONS (HOTEL RELOCATED)	D.G.S.
12	95/01/05	WM TO NEW HYDRANT - HUNTMAR RD. REVISED SUBDIVS. & PALLADIUM	D.G.S.
11	94/11/04	CYCLONE/PALLADIUM INTERSECT REV	D.G.S.

NO.	DATE	REVISIONS	BY
10	94/10/04	PALLADIUM S/E REVISED	D.G.S.
9	94/09/04	ISSUED FOR CONSTRUCTION	D.G.S.
8	94/07/04	PALLADIUM DRIVE WIDENED	D.G.S.
7	94/03/04	REVISED PLAN R.M.O.C.	D.G.S.
6	94/03/04	REVISED PLAN CITY OF KANATA	D.G.S.

SCALES
1:1500

J.L. Richards & Associates Limited
Consulting Engineers, Architects & Planners
OTTAWA, KINGSTON, SUDBURY, CANADA

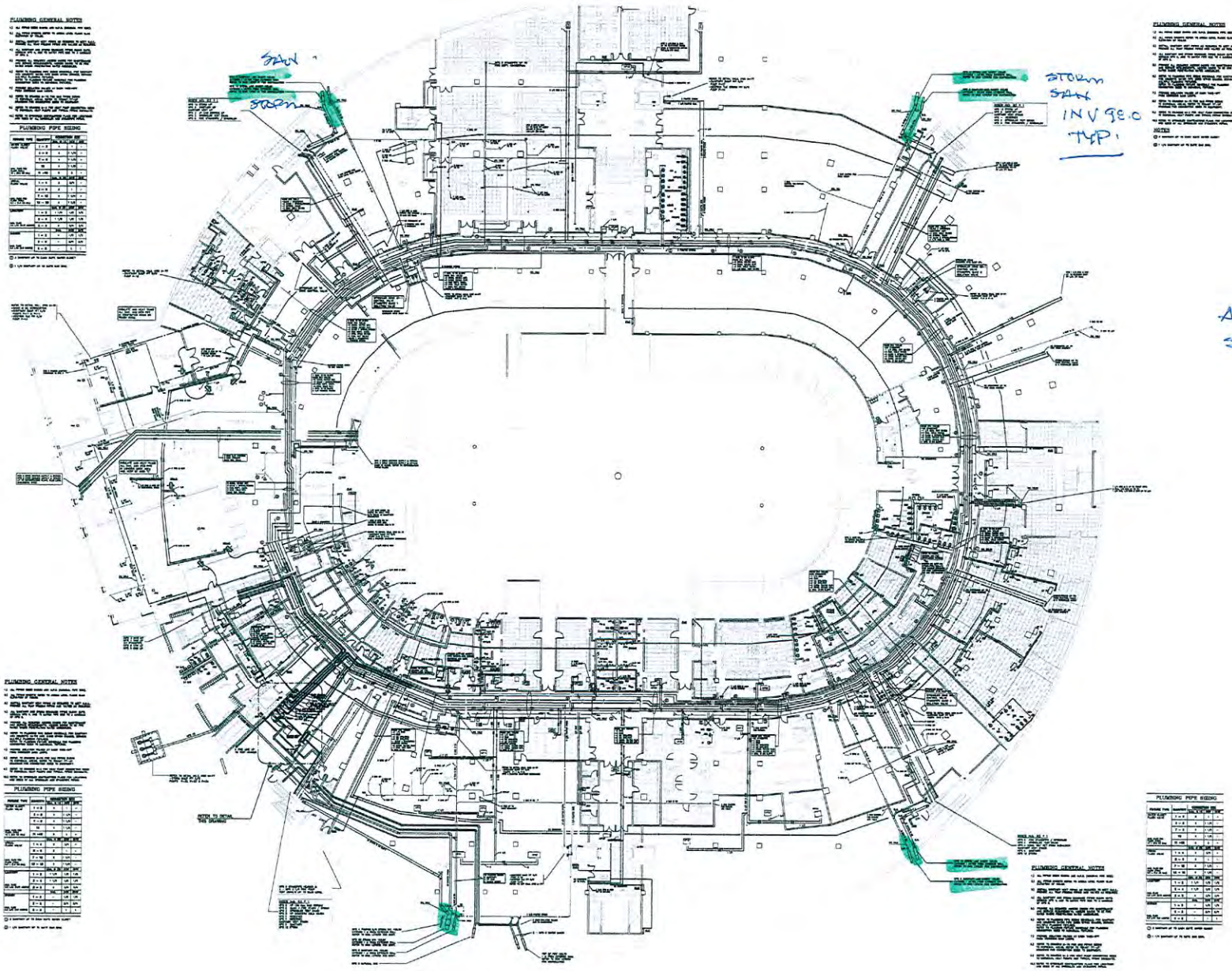
DESIGN W.Z.
CHECKED D.B.S.
DRAWN M.M.L.
CHECKED
APPROVED

CITY OF KANATA
DEPARTMENT OF ENGINEERING AND PUBLIC WORKS

PALLADIUM CORPORATION
THE PALLADIUM
SITE PLAN

PROJECT 11535-15
CONT. No.
DATED AUGUST 1994
DWG. No. 11535 S1

D:\11535\115358\95/08/22\10:04


SAN
STORM
STORM
SAN
INV 98.0
TYP.
All GRAVITY
STORM/SAN

JOB NO. 12725M 11535 C.

PROJECT GTC (PALLADIUM)

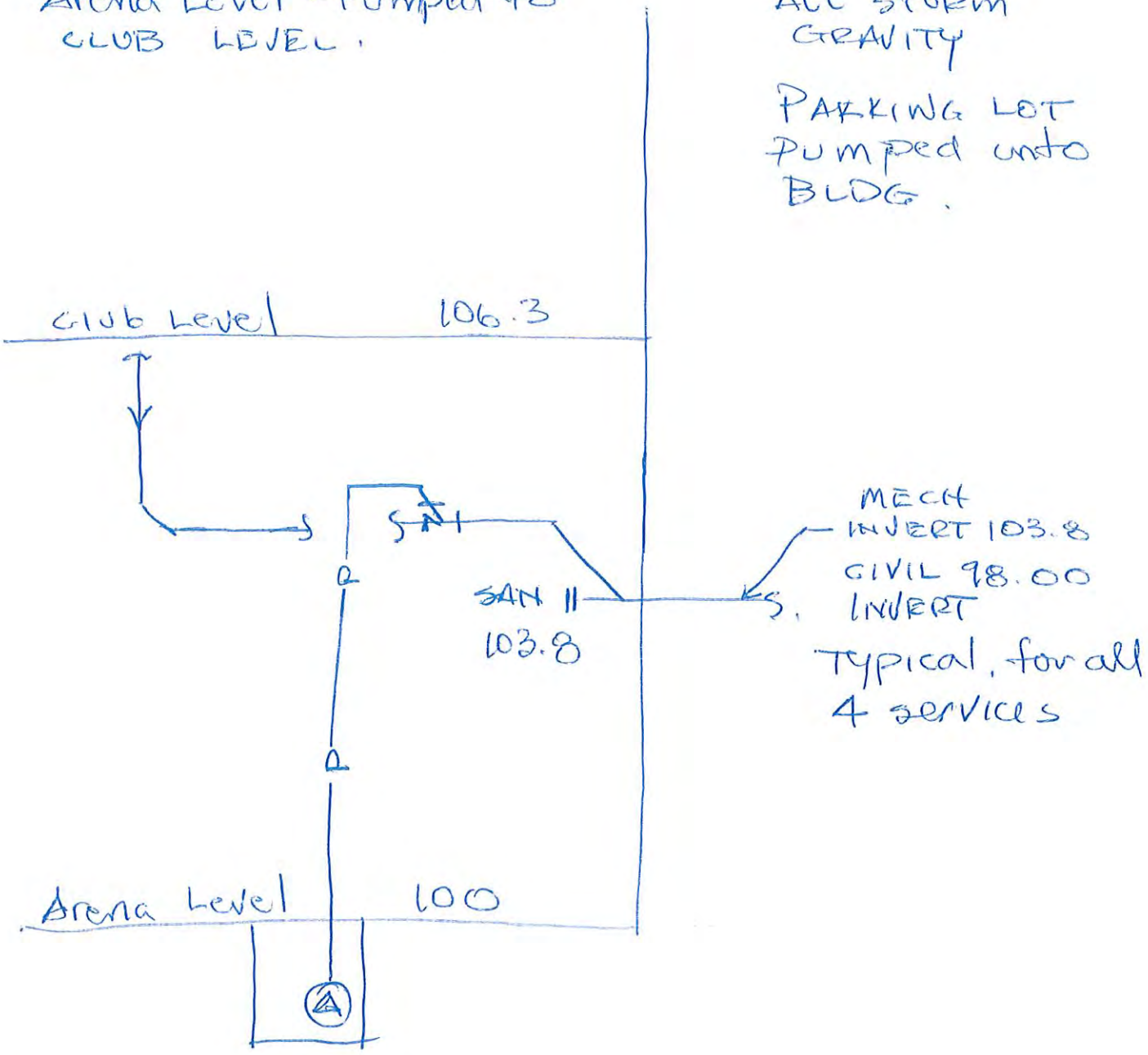
BY SP DATE DEC 12/13

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Arena Level - Pumped to CLUB LEVEL.

ALL STORM GRAVITY

PARKING LOT Pumped unto BLDG.



SHEET ____ OF ____

Printed: 12/20/2013 at 10:46 AM

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

CANADIAN TIRE CENTRE SANITARY SEWER SYSTEM

SANITARY SEWER DESIGN SHEET

Prepared by: V.A.
Checked by: J.B.

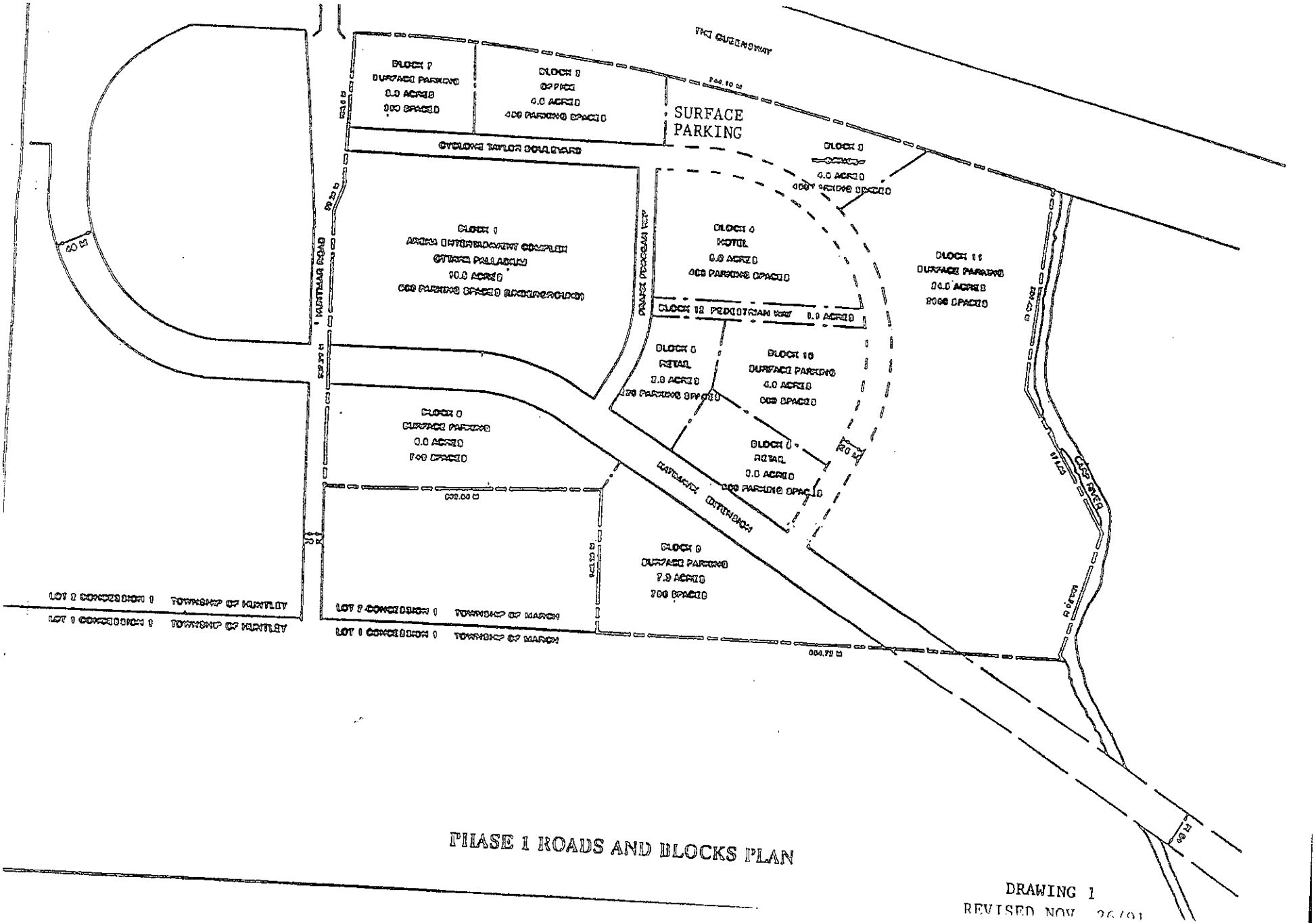
DESIGN PARAMETERS

I	= 0.140	L/s/ha	Original Corel Centre Design
I	= 0.280	L/s/ha	Palladium Office Campus
q (com)	= 50.000	L/ha/day	

STREET	M.H. #		NON-RESIDENTIAL AREA (Corel) (ha)	AREA (Other) (ha)	CUMM. AREA (Corel) (ha)	CUMM. AREA (Autop.) (ha)	Peaking Factor	AVE. BLDG. FLOW (L/s)	PK. BLDG. FLOW (L/s)	CUMM. BUILDING FLOW (L/s)	INFIL. FLOW (L/s)	PEAK FLOW (L/s)	SEWER DATA FROM AS-BUILT INFORMATION DIA. (mm)	SLOPE (%)	CAPAC. (L/s)	VEL. (m/s)	LENGTH (m)	RESIDUAL CAP. (L/s)	UPSTREAM Obvert	UPSTREAM Invert	DOWNSTREAM Obvert	DOWNSTREAM Invert	COMMENTS
	FROM	TO																					
PALLADIUM AUTOPARK	Future	12	0	18.00	0.00	18.00	3.00	2.31	6.94	6.94	5.04	11.98											
CYCLONE TAYLOR	12	11	2.32	0.00	2.32	18.00		N/A	*10.75*	17.69	5.36	23.06	250	0.84	56.95	1.12	61.10	33.89	**96.589**	96.335	96.074	95.820	as-built length missing, **
	11	10	0.93	0.00	3.25	18.00		0.00	0.00	17.69	5.50	23.19	250	0.61	48.43	0.96	57.10	25.24	96.046	95.792	95.698	95.444	as-built length missing
	10	9	1.10	0.00	4.35	18.00		N/A	*10.75*	28.44	5.65	34.09	250	0.51	44.34	0.88	63.80	10.25	**95.520**	95.266	95.194	94.940	as-built, **
	9	8	1.80	0.00	6.15	18.00		0.00	0.00	28.44	5.90	34.35	250	0.60	48.22	0.95	90.70	13.87	94.646	94.392	94.098	93.844	as-built
	8	7	2.08	0.00	8.23	18.00		0.00	0.00	28.44	6.19	34.64	250	0.60	48.01	0.95	61.10	13.37	94.037	93.783	93.671	93.417	as-built
	Hotel								*7.20*														
	7	6	0.43	0.00	8.66	18.00		0.00	0.00	35.64	6.25	41.90	250	0.60	47.90	0.95	64.40	6.00	93.621	93.367	93.237	92.983	as-built
	6	5	0.28	0.00	8.94	18.00		0.00	0.00	35.64	6.29	41.94	250	0.62	48.71	0.96	42.50	6.77	93.206	92.952	92.944	92.690	as-built
	5	4	0.26	0.00	9.20	18.00		0.00	0.00	35.64	6.33	41.97	250	0.85	57.27	1.13	35.90	15.30	92.915	92.661	92.609	92.355	as-built
PALLADIUM DRIVE	20	19	3.51	0.00	3.51	0.00		N/A	*10.75*	10.75	0.49	11.24	250	0.53	45.03	0.89	78.20	33.79	96.256	96.002	95.844	95.590	as-built, **
	19	18	1.12	0.00	4.63	0.00		N/A	*10.75*	21.50	0.65	22.15	250	0.48	42.95	0.85	67.60	20.80	95.786	95.532	95.462	95.208	as-built, **
	18	17	1.50	0.00	6.13	0.00		0.00	0.00	21.50	0.86	22.36	250	0.49	43.31	0.85	79.80	20.95	95.380	95.126	94.991	94.737	as-built
	Retail								5.85														
	17	16	0.76	0.00	6.89	0.00		0.00	0.00	27.35	0.96	28.31	250	0.50	43.94	0.87	81.70	15.63	94.948	94.694	94.538	94.284	as-built
	16	15	0.58	0.00	7.47	0.00		0.00	0.00	27.35	1.05	28.40	250	0.48	42.98	0.85	90.00	14.58	94.473	94.219	94.041	93.787	as-built
CYCLONE TAYLOR	15	14	0.86	0.00	8.33	0.00		0.00	0.00	27.35	1.17	28.52	250	0.50	43.96	0.87	109.30	15.45	93.954	93.700	93.405	93.151	as-built
	14	13	0.53	0.00	8.86	0.00		0.00	0.00	27.35	1.24	28.59	250	0.50	44.02	0.87	68.30	15.43	93.354	93.100	93.010	92.756	as-built
	13	4	0.42	0.00	9.28	0.00		0.00	0.00	27.35	1.30	28.65	250	0.60	48.25	0.95	64.30	19.60	92.990	92.736	92.601	92.347	as-built
EASEMENT	4	3	0.48	0.00	18.96	18.00		0.00	0.00	62.99	7.69	70.69	375	0.20	80.83	0.71	89.60	10.14	92.678	92.297	92.503	92.122	as-built
	3	2	0.69	5.51	19.65	23.51	1.50	3.19	4.78	67.78	9.33	77.11	375	0.26	92.95	0.82	81.70	15.84	92.420	92.039	**92.209**	**91.828**	as-built, Palladium Office Campus flow
	2	1	0.35	0.00	20.00	23.51		0.00	0.00	67.78	9.38	77.16	SIPHON (Capacity = 83 L/s)										
EASEMENT	1	1a	0.58	0.00	20.58	23.51		0.00	0.00	67.78	9.46	77.24	450	0.25	147.36	0.90	99.80	70.12	91.684	91.430	91.439	91.185	as-built
	1a	1b	0.62	0.00	21.20	23.51		0.00	0.00	67.78	9.55	77.33	450	0.10	96.05	0.59	93.00	18.72	91.424	91.170	91.327	91.073	as-built
	1b	1c	0.45	0.00	21.65	23.51		0.00	0.00	67.78	9.61	77.39	450	0.12	103.77	0.63	69.00	26.38	91.324	91.070	91.240	90.986	as-built

** Corel Centre flows are already peaked (8.735 L/s x 4 = 34.94 L/s)

Notes:
1. 1 L/s was added to each of the four (4) peak bld flows from the arena to account for the future Arena Retail flows (4 L/s)



PHASE 1 ROADS AND BLOCKS PLAN

DRAWING 1
REVISED NOV 26/01

Meter Read Date	Meter #	Read Status	Current Read	Days	Usage	Bill Date	Bill Number	Due Date	Current Bill
2024-10-31	70314066C	Unbilled Usage	68329	31	1616				
2024-09-30	70314066C	Actual Read	66713	30	722	2024-10-09	36588138	2024-10-28	$6,869.99
2024-08-31	70314066C	Actual Read	65991	30	370	2024-09-09	36436667	2024-09-27	$5,335.27
2024-08-01	70314066C	Actual Read	65621	30	828	2024-08-09	36303885	2024-08-29	$7,332.15
2024-07-02	70314066C	Actual Read	64793	30	394	2024-07-10	36154897	2024-07-29	$5,439.91
2024-06-02	70314066C	Actual Read	64399	30	458	2024-06-07	36013317	2024-06-27	$5,718.95
2024-05-03	70314066C	Actual Read	63941	30	1190	2024-05-08	35854775	2024-05-29	$8,910.47
2024-04-03	70314066C	Actual Read	62751	30	1582	2024-04-10	35724836	2024-04-29	$10,207.43
2024-03-04	70314066C	Actual Read	61169	30	1584	2024-03-08	35577541	2024-03-28	$10,185.61
2024-02-03	70314066C	Actual Read	59585	30	1769	2024-02-07	35447963	2024-02-26	$10,973.71
2024-01-04	70314066C	Actual Read	57816	30	1385	2024-01-09	35301046	2024-01-26	$9,337.87
2023-12-05	70314066C	Actual Read	56431	30	1471	2023-12-08	35171457	2023-12-28	$9,704.23
2023-11-05	70314066C	Actual Read	54960	30	1812	2023-11-08	35024796	2023-11-27	$11,156.89

Water Utility Bill

Customer no. - Account no.
0072968 - 01324754
Bill date: Aug 9, 2024
Bill number: 36303885

Service address: 1000 PALLADIUM DR

Bill period:
Jul 3, 2024 to Aug 1, 2024

Activity since last bill

Last bill	$5,439.91
Payment	$-5,439.91
Balance forward	$0.00

New charges summary

Fixed charges	$3,825.98
Usage charges	$3,506.17
Total new charges	$7,332.15
Amount due	**$7,332.15**
Due date	**Aug 29, 2024**

Interest will be charged at rate of 0.0417% per day on the outstanding balance after the due date, every 15 days thereafter and before each bill. (Effective Annual Rate 16.13%)

My Service Ottawa

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- Sign up for paperless billing
- Manage your usage
- Make a payment
- Update your language preference

Pour recevoir votre facture en français, visitez Mon ServiceOttawa ou contactez les Services des recettes.

WBIL

CAPITAL SPORTS PROPERTIES INC
1000 PALLADIUM DR
OTTAWA ON K2V 1A4

Customer no. - Account no.
0072968 - 01324754

Service address:	1000 PALLADIUM DR
Amount due:	**$7,332.15**
Due date:	**Aug 29, 2024**
Amount paid	

Rate period	Service period		Days	Meter reading		Read type	Usage (m^3)	Tier 1	Tier 2	Tier 3	Tier 4
	From	To		From	To						
1	Jul 3, 2024	Aug 1, 2024	30	64793	65621	Actual	828	6	19	155	648
Total			**30**				**828**	**6**	**19**	**155**	**648**

How we calculated your new charges

Fixed charges

Fire supply [30 days x $14.421]	**$432.63**
Water service charge [30 days x $17.850]	**$535.49**
Wastewater service charge [30 days x $16.599]	**$497.98**
Stormwater - non res - E [30 days x 1 unit x $1.275]	**$38.26**
Stormwater - non res - I [30 days x 3 units x $4.757]	**$428.10**
Stormwater - non res - Q [30 days x 1 unit x $63.117]	**$1,893.52**
Total	**$3,825.98**

Usage charges

	Usage (m^3)	Combined rate	
Tier 1 (0-6 m³)	6	$1.78	**$10.68**
Tier 2 (7-25 m³)	19	$3.54	**$67.26**
Tier 3 (26-180 m³)	155	$3.89	**$602.95**
Tier 4 (>180 m³)	648	$4.36	**$2,825.28**
Total	**828**		**$3,506.17**

Total new charges **$7,332.15**

Payment options

- Financial institutions - online, by telephone, or in person
- Online by debit or credit - visit MyService.Ottawa.ca
- Pre-authorized debit (PAD) plan - visit MyService.Ottawa.ca
- City of Ottawa client service centre
- Cheque by mail - include bill stub and customer-account number on cheque

  Cheque payments
  City of Ottawa, Revenue Services
  PO Box 4648 Station A
  Toronto ON M5W 0E8

To receive an accessible format (electronic, large print, or braille), please contact Revenue Services.

Explanation of charges

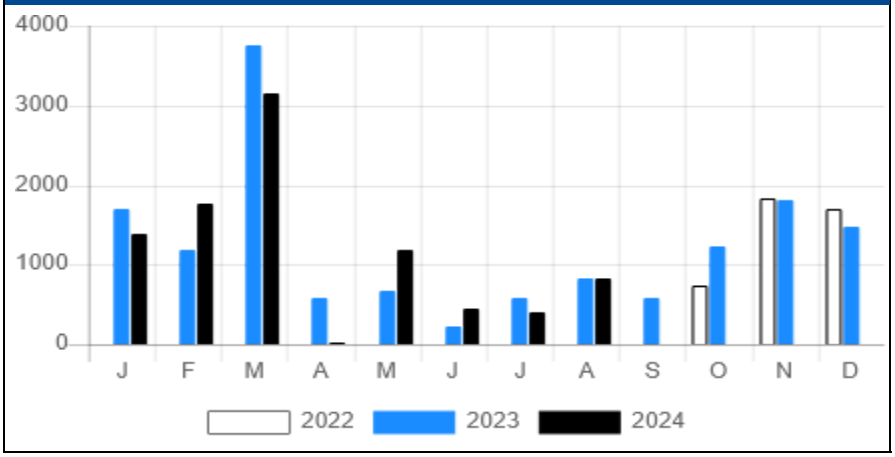
Fixed charges, help provide funding for infrastructure maintenance costs. The annual fixed charges are based on your meter size except for the stormwater fixed charge, which is based on your property type as defined by MPAC. Annual charges are pro-rated by day and included on each bill.
Usage charges, represent costs of water production and wastewater treatment. You are allotted 4 tiers of Usage rates every 30 days.
Additional charges, are administrative and services fees. For a full listing of fees, please visit Ottawa.ca/waterbill.

Contact revenue services
Tel: 613-580-2444 | TTY: 613-580-2401
Fax: 613-580-2457

Water Utility Bill

Customer no. - Account no.
0072968 - 01324754
Bill date: Aug 9, 2024
Bill number: 36303885

Usage history



Fixed service charges	(Per year)
Fire supply	$5,263.63
Water	$6,515.07
Wastewater	$6,058.74

Usage rates	(Per m^3)		
	Water	**Wastewater**	**Combined**
Tier 1	$0.92	$0.86	$1.78
Tier 2	$1.83	$1.71	$3.54
Tier 3	$2.01	$1.88	$3.89
Tier 4	$2.24	$2.12	$4.36

Stormwater - non res - E	(Per year)
Stormwater - non res	$465.45
Assessment	$300,000-$1,000,000
Unit(s)	1

Stormwater - non res - I	(Per year)
Stormwater - non res	$1,736.15
Assessment	$1,000,000-$5,000,000
Unit(s)	3

Stormwater - non res - Q	(Per year)
Stormwater - non res	$23,037.80
Assessment	$20,000,000-$50,000,000
Unit(s)	1

About your property	
Service type	Connected
Service area	Urban
Meter size	150mm

Water Utility Bill

Customer no. - Account no.
0072968 - 01324754
Bill date: Sep 9, 2024
Bill number: 36436667

Service address: 1000 PALLADIUM DR

Bill period:
Aug 2, 2024 to Aug 31, 2024

Activity since last bill

Last bill	$7,332.15
Payment	$-7,332.15
Balance forward	$0.00

New charges summary

Fixed charges	$3,825.98
Usage charges	$1,509.29
Total new charges	$5,335.27
Amount due	**$5,335.27**
Due date	**Sep 27, 2024**

Interest will be charged at rate of 0.0417% per day on the outstanding balance after the due date, every 15 days thereafter and before each bill. (Effective Annual Rate 16.13%)

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- Manage your usage
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- Update your language preference

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WBIL

CAPITAL SPORTS PROPERTIES INC
1000 PALLADIUM DR
OTTAWA ON K2V 1A4

Customer no. - Account no.
0072968 - 01324754

Service address:	1000 PALLADIUM DR
Amount due:	**$5,335.27**
Due date:	**Sep 27, 2024**
Amount paid	

Rate period	Service period		Days	Meter reading		Read type	Usage (m^3)	Tier 1	Tier 2	Tier 3	Tier 4
	From	To		From	To						
1	Aug 2, 2024	Aug 31, 2024	30	65621	65991	Actual	370	6	19	155	190
Total			**30**				**370**	**6**	**19**	**155**	**190**

How we calculated your new charges

Fixed charges

Fire supply [30 days x $14.421]	**$432.63**
Water service charge [30 days x $17.850]	**$535.49**
Wastewater service charge [30 days x $16.599]	**$497.98**
Stormwater - non res - E [30 days x 1 unit x $1.275]	**$38.26**
Stormwater - non res - I [30 days x 3 units x $4.757]	**$428.10**
Stormwater - non res - Q [30 days x 1 unit x $63.117]	**$1,893.52**
Total	**$3,825.98**

Usage charges

	Usage (m^3)	Combined rate	
Tier 1 (0-6 m³)	6	$1.78	**$10.68**
Tier 2 (7-25 m³)	19	$3.54	**$67.26**
Tier 3 (26-180 m³)	155	$3.89	**$602.95**
Tier 4 (>180 m³)	190	$4.36	**$828.40**
Total	**370**		**$1,509.29**

Total new charges **$5,335.27**

Payment options

- Financial institutions - online, by telephone, or in person
- Online by debit or credit - visit MyService.Ottawa.ca
- Pre-authorized debit (PAD) plan - visit MyService.Ottawa.ca
- City of Ottawa client service centre
- Cheque by mail - include bill stub and customer-account number on cheque

  Cheque payments
  City of Ottawa, Revenue Services
  PO Box 4648 Station A
  Toronto ON M5W 0E8

To receive an accessible format (electronic, large print, or braille), please contact Revenue Services.

Explanation of charges

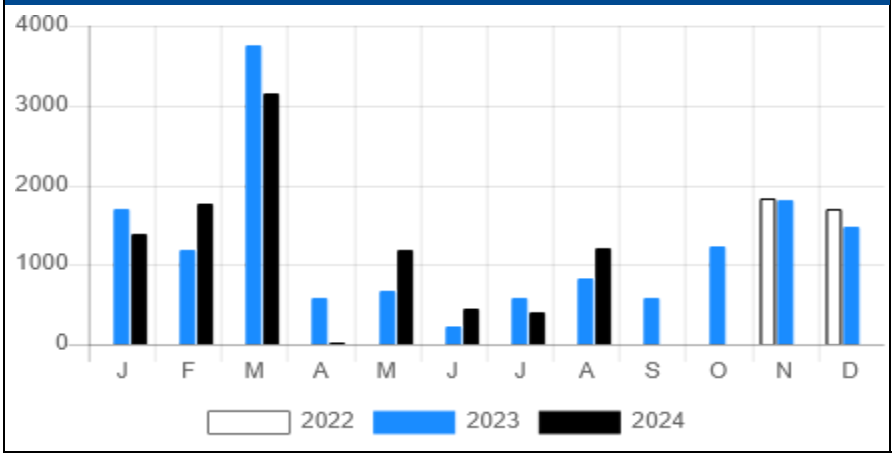
Fixed charges, help provide funding for infrastructure maintenance costs. The annual fixed charges are based on your meter size except for the stormwater fixed charge, which is based on your property type as defined by MPAC. Annual charges are pro-rated by day and included on each bill.
Usage charges, represent costs of water production and wastewater treatment. You are allotted 4 tiers of Usage rates every 30 days.
Additional charges, are administrative and services fees. For a full listing of fees, please visit Ottawa.ca/waterbill.

Contact revenue services
Tel: 613-580-2444 | TTY: 613-580-2401
Fax: 613-580-2457

Water Utility Bill

Customer no. - Account no.
0072968 - 01324754
Bill date: Sep 9, 2024
Bill number: 36436667

Usage history



Fixed service charges	(Per year)
Fire supply	$5,263.63
Water	$6,515.07
Wastewater	$6,058.74

Usage rates (Per m^3)	Water	Wastewater	Combined
Tier 1	$0.92	$0.86	$1.78
Tier 2	$1.83	$1.71	$3.54
Tier 3	$2.01	$1.88	$3.89
Tier 4	$2.24	$2.12	$4.36

Stormwater - non res - E	(Per year)
Stormwater - non res	$465.45
Assessment	$300,000-$1,000,000
Unit(s)	1

Stormwater - non res - I	(Per year)
Stormwater - non res	$1,736.15
Assessment	$1,000,000-$5,000,000
Unit(s)	3

Stormwater - non res - Q	(Per year)
Stormwater - non res	$23,037.80
Assessment	$20,000,000-$50,000,000
Unit(s)	1

About your property	
Service type	Connected
Service area	Urban
Meter size	150mm

Water Utility Bill

Customer no. - Account no.
0072968 - 01324754
Bill date: Oct 9, 2024
Bill number: 36588138

Service address: 1000 PALLADIUM DR

Bill period:
Sep 1, 2024 to Sep 30, 2024

Activity since last bill

Last bill	$5,335.27
Payment	$-5,335.27
Balance forward	$0.00

New charges summary

Fixed charges	$3,825.98
Usage charges	$3,044.01
Total new charges	$6,869.99
Amount due	**$6,869.99**
Due date	**Oct 28, 2024**

Interest will be charged at rate of 0.0417% per day on the outstanding balance after the due date, every 15 days thereafter and before each bill. (Effective Annual Rate 16.13%)

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WBIL

CAPITAL SPORTS PROPERTIES INC
1000 PALLADIUM DR
OTTAWA ON K2V 1A4

Customer no. - Account no.
0072968 - 01324754

Service address:	1000 PALLADIUM DR
Amount due:	**$6,869.99**
Due date:	**Oct 28, 2024**
Amount paid	

Rate period	Service period		Days	Meter reading		Read type	Usage (m^3)	Tier 1	Tier 2	Tier 3	Tier 4
	From	To		From	To						
1	Sep 1, 2024	Sep 30, 2024	30	65991	66713	Actual	722	6	19	155	542
Total			**30**				**722**	**6**	**19**	**155**	**542**

How we calculated your new charges

Fixed charges

Fire supply [30 days x $14.421]	**$432.63**
Water service charge [30 days x $17.850]	**$535.49**
Wastewater service charge [30 days x $16.599]	**$497.98**
Stormwater - non res - E [30 days x 1 unit x $1.275]	**$38.26**
Stormwater - non res - I [30 days x 3 units x $4.757]	**$428.10**
Stormwater - non res - Q [30 days x 1 unit x $63.117]	**$1,893.52**
Total	**$3,825.98**

Usage charges

	Usage (m^3)	Combined rate	
Tier 1 (0-6 m^3)	6	$1.78	**$10.68**
Tier 2 (7-25 m^3)	19	$3.54	**$67.26**
Tier 3 (26-180 m^3)	155	$3.89	**$602.95**
Tier 4 (>180 m^3)	542	$4.36	**$2,363.12**
Total	**722**		**$3,044.01**

Total new charges **$6,869.99**

Payment options

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- Pre-authorized debit (PAD) plan - visit MyService.Ottawa.ca
- City of Ottawa client service centre
- Cheque by mail - include bill stub and customer-account number on cheque

  Cheque payments
  City of Ottawa, Revenue Services
  PO Box 4648 Station A
  Toronto ON M5W 0E8

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Explanation of charges

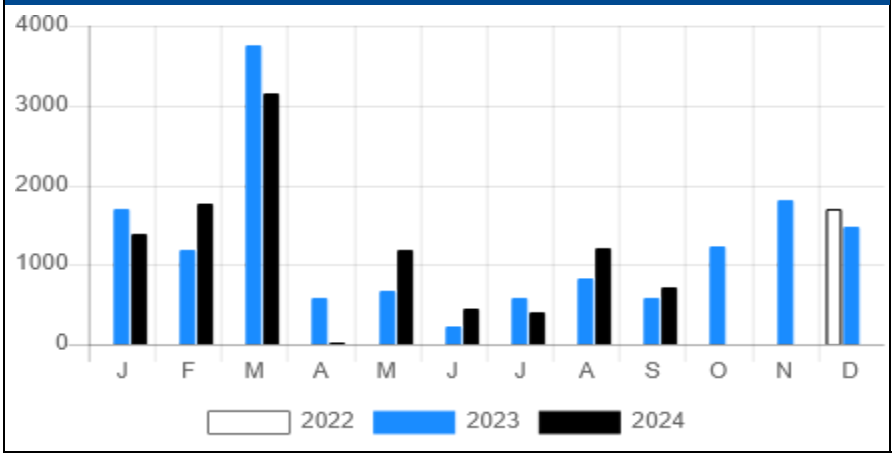
Fixed charges, help provide funding for infrastructure maintenance costs. The annual fixed charges are based on your meter size except for the stormwater fixed charge, which is based on your property type as defined by MPAC. Annual charges are pro-rated by day and included on each bill.
Usage charges, represent costs of water production and wastewater treatment. You are allotted 4 tiers of Usage rates every 30 days.
Additional charges, are administrative and services fees. For a full listing of fees, please visit Ottawa.ca/waterbill.

Contact revenue services
Tel: 613-580-2444 | TTY: 613-580-2401
Fax: 613-580-2457

Water Utility Bill

Customer no. - Account no.
0072968 - 01324754
Bill date: Oct 9, 2024
Bill number: 36588138

Usage history



Fixed service charges	(Per year)
Fire supply	$5,263.63
Water	$6,515.07
Wastewater	$6,058.74

Usage rates	(Per m^3)		
	Water	**Wastewater**	**Combined**
Tier 1	$0.92	$0.86	$1.78
Tier 2	$1.83	$1.71	$3.54
Tier 3	$2.01	$1.88	$3.89
Tier 4	$2.24	$2.12	$4.36

Stormwater - non res - E	(Per year)
Stormwater - non res	$465.45
Assessment	$300,000-$1,000,000
Unit(s)	1

Stormwater - non res - I	(Per year)
Stormwater - non res	$1,736.15
Assessment	$1,000,000-$5,000,000
Unit(s)	3

Stormwater - non res - Q	(Per year)
Stormwater - non res	$23,037.80
Assessment	$20,000,000-$50,000,000
Unit(s)	1

About your property	
Service type	Connected
Service area	Urban
Meter size	150mm

Appendix B Water Servicing

B.1 Domestic Water Demands

LeBreton Flats, Ottawa, ON - Domestic Water Demand Estimates

Draft Plan of Subdivision, Stantec Geomatics, May 28, 2026 & associated densities

Project No. 160401780 Designed by: MW

Date 2026-06-18 Checked by:

Revision: 02 City File No. D07-16-24-0026

Population densities per Table 4.1 City of Ottawa Water Design Guidelines:		
Apartment	1.8	ppu
Townhome	2.7	ppu
Demand conversion factors per Table 4.2 of the City of Ottawa Water Design Guidelines:		
Residential	280	L/cap/day
Hotel	225	L/bedspace/d
Commercial and Institutional	28000	L/gross ha/day

Block ID	Commercial / Institutional (m^2)	No. of Units	Seats	Population	Avg Day Demand		Max Day Demand [1 2]		Peak Hour Demand [1 2]	
					(L/min)	(L/s)	(L/min)	(L/s)	(L/min)	(L/s)
Block 1										
Apartment		1300		2340	455.0	7.58	1137.5	18.96	2502.5	41.71
Hotel[3]		201			62.8	1.05	94.2	1.57	169.6	2.83
Commercial	5560			0	10.8	0.18	16.2	0.27	29.2	0.49
Office	4736			0	9.2	0.15	13.8	0.23	24.9	0.41
Arena[6]			17500		24.8	0.41	37.1	0.62	2356.1	39.27
Block 1 Subtotal	10296	1501		2340	562.6	9.38	1298.9	21.65	5082.2	84.70
Block 2										
Apartment		316		569	110.6	1.84	276.5	4.61	608.3	10.14
Commercial	1543			0	3.0	0.05	4.5	0.08	8.1	0.14
Office	2095			0	4.1	0.07	6.1	0.10	11.0	0.18
Block 2 Subtotal	3638	316		569	117.7	1.96	287.1	4.79	627.4	10.46
Block 3										
Apartment		852		1534	298.2	4.97	745.5	12.43	1640.1	27.34
Commercial	3955			0	7.7	0.13	11.5	0.19	20.8	0.35
Office	4848			0	9.4	0.16	14.1	0.24	25.5	0.42
Block 3 Subtotal	8803	852		1534	315.3	5.26	771.2	12.85	1686.3	28.11
Block 4										
Apartment		351		632	122.9	2.05	307.1	5.12	675.7	11.26
Townhome		206		556	108.2	1.80	270.4	4.51	594.8	9.91
Block 4 Subtotal		557		1188	231.0	3.85	577.5	9.63	1270.5	21.18
Block 5										
Apartment		221		398	77.4	1.29	193.4	3.22	425.4	7.09
Hotel[3 4]		93			29.1	0.48	43.6	0.73	78.5	1.31
Commercial	884			0	1.7	0.03	2.6	0.04	4.6	0.08
Block 5 Subtotal	884	314		398	108.1	1.80	239.6	3.99	508.6	8.48
Block 6										
Apartment		504		907	176.4	2.94	441.0	7.35	970.2	16.17
Townhome		28		76	14.7	0.25	36.8	0.61	80.9	1.35
Commercial	1060			0	2.1	0.03	3.1	0.05	5.6	0.09
Block 6 Subtotal	1060	532		983	193.2	3.22	480.8	8.01	1056.6	17.61
Block 7										
Apartment		649		1168	227.2	3.79	567.9	9.46	1249.3	20.82
Commercial	4652			0	9.0	0.15	13.6	0.23	24.4	0.41
Block 7 Subtotal	4652	649		1168	236.2	3.94	581.4	9.69	1273.7	21.23
Block 8										
Apartment		135		243	47.3	0.79	118.1	1.97	259.9	4.33
Townhome		46		124	24.2	0.40	60.4	1.01	132.8	2.21
Block 8 Subtotal	0	181		367	71.4	1.19	178.5	2.98	392.7	6.55
Block 10										
Commercial	3717			0	7.2	0.12	10.8	0.18	19.5	0.33
Office	22950			0	44.6	0.74	66.9	1.12	120.5	2.01
Block 10 Subtotal	26667	0		0	51.9	0.86	77.8	1.30	140.0	2.33
Block 11										
Park[5]	68398			1268	22.0	0.37	33.0	0.55	59.4	0.99
Block 11 Subtotal	68398	0		1268	22.0	0.37	33.0	0.55	59.4	0.99
Block 12										
Park[5]	24756			459	8.0	0.13	11.9	0.20	21.5	0.36

Block 12 Subtotal	24756	0		459	8.0	0.13	11.9	0.20	21.5	0.36
Residential Subtotal		*4608*		*8546*	*1661.8*	*27.70*	*4154.5*	*69.24*	*9139.9*	*152.33*
Hotel Subtotal		*294*			*91.9*	*1.53*	*137.8*	*2.30*	*248.1*	*4.13*
Commercial Subtotal	*56000*				*108.9*	*1.81*	*163.3*	*2.72*	*294.0*	*4.90*
Park Subtotal [5]	*93154*			*1726*	*30.0*	*0.50*	*45.0*	*0.75*	*80.9*	*1.35*
Arena Subtotal			*17500*		*24.8*	*0.41*	*37.1*	*0.62*	*2356.1*	*39.27*
Total Site :	**149154**	**4902**	**17500**	**10273**	**1917.3**	**31.95**	**4537.7**	**75.63**	**12119.0**	**201.98**

Notes:

1 The City of Ottawa water demand criteria used to estimate peak demand rates for residential areas are as follows:
maximum day demand rate = 2.5 × average day demand rate
peak hour demand rate = 2.2 × maximum day demand rate

2 Water demand criteria used to estimate peak demand rates for commercial areas, hotels, and parks are as follows:
maximum daily demand rate = 1.5 × average day demand rate
peak hour demand rate = 1.8 × maximum day demand rate

3 Hotel bedspace assumed to be 2 bedspace/room per LeBreton Flats MSS (CIMA+ 2021)

4 Block 5 hotel unit counts estimated based on density of hotel room/gross floor area (201 rooms/10579 m^2) established in Block 1 in density table.

5 Park area equivalent population estimated based on 185.3 persons/ha density; 20 L/p/d water demand based on park picnic and flush toilet demand from City Sewer Design Guidelines

6 Water demands for the arena are based as follows:
Average day demand rate - based on average daily water usage of the Canadian Tire Centre from November 2023 to October 2024 and 18500 seats
Maximum daily demand rate = 1.5 × average day demand rate
Peak hour demand rate based on sanitary design flow of 46 L/s assumed for the former Corel Centre (20,500 seats) in the 2013 JLR Technical memo

B.2 Boundary Conditions

From: Fawzi, Mohammed
To: Smadella, Karin
Cc: Duquette, Vincent; Moroz, Peter; Mottalib, Abdul; Thiffault, Dustin; Wu, Michael; binitha.chakraburtty@ncc-ccn.ca
Subject: RE: LeBreton Flats Boundary Conditions Request
Date: Monday, June 24, 2024 12:33:05 PM
Attachments: ~WRD2598.jpg
image004.png
image005.png
image006.png
image007.png
LeBreton Flats June 2024.pdf

Hi Karin,

The following are boundary conditions, HGL, for hydraulic analysis at LeBreton Flats (zone 1W) assumed to be connected to via 8 Connections to the 305mm watermain on Wellington Avenue, 406mm on Booth Street and 406mm on Albert Street (see attached PDF for location).

-

Notes:

1. Analysis has been completed by classifying the demands into three groups:
   North Block: Blocks 7 to 19
   South Block: Blocks 1 to 5
   South Individual Block: Block 6
2. Private main looping has been assumed for North Blocks.
3. *For Connections 1,2,3,4 and 8: The maximum pressure is estimated to be more than 80 psi. A pressure check at completion of construction is recommended to determine if pressure control is required.*

	Connection 1	**Connection 2**	**Connection 3**	**Connection 4**	**Connection 5**	**Connection 6**	**Connection 7**	**Connection 8**
Minimum HGL (m)	107.4	107.4	107.4	107.5	107.6	107.6	107.6	107.6
Maximum HGL (m)	115.2	115.2	115.2	115.2	115.1	115.0	115.0	114.9
MaxDay + FireFlow (200 L/s)	105.0	106.5	107.1	108.4	110.1	109.9	110.0	110.0

-

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

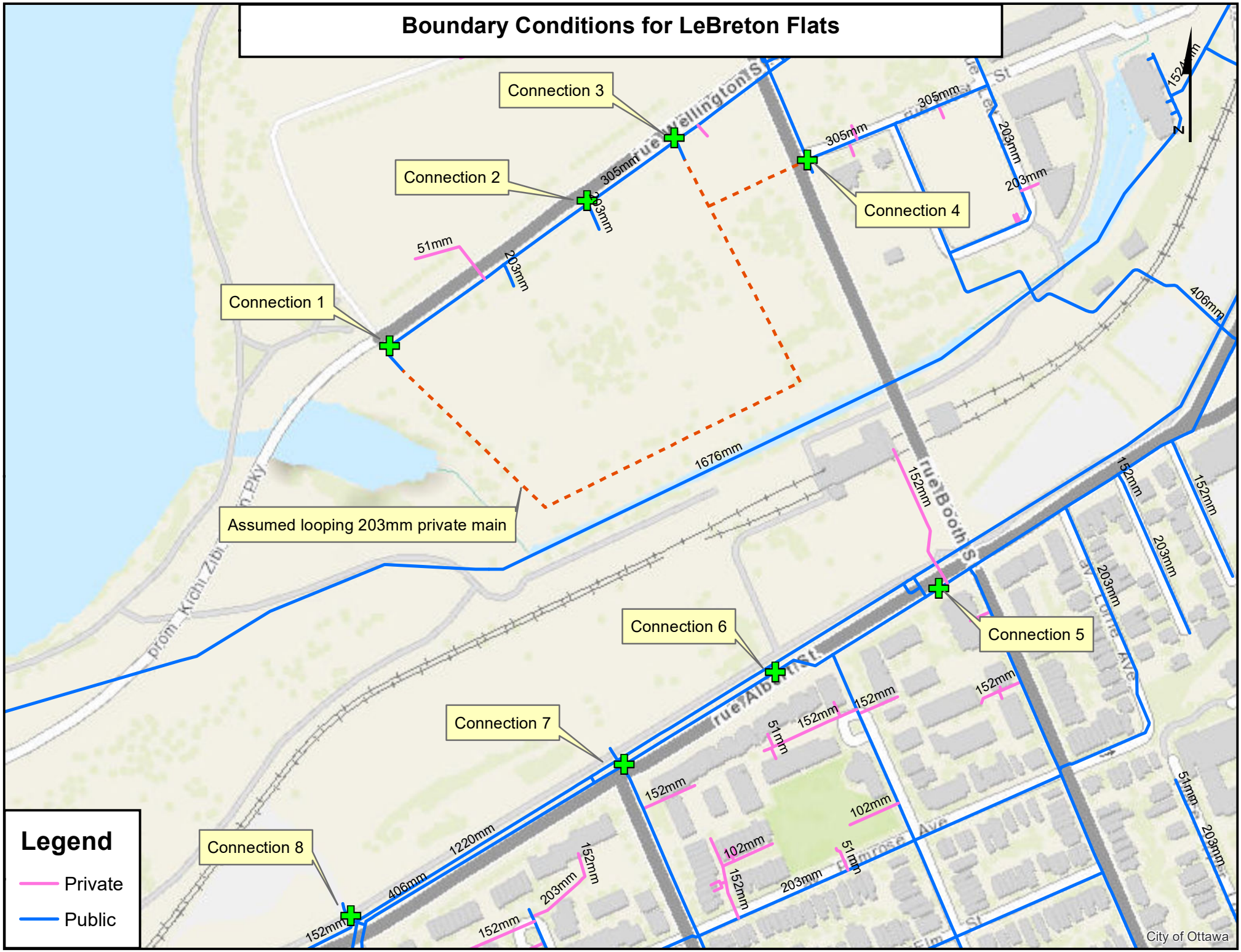
Disclaimer: The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation 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.

Best Regards,

Mohammed Fawzi, P.Eng.

Project Manager, Infrastructure - Gestionnaire de projet, Projets d'infrastructure

Development Review All Wards (DRAW) | Direction de l'examen des projets d'aménagement - Tous les quartiers (EPATQ)
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement
110 Laurier Avenue West | 110 Avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 20120, Mohammed.Fawzi@ottawa.ca


Boundary Conditions for LeBreton Flats
Connection 1
Connection 2
Connection 3
Connection 4
Connection 5
Connection 6
Connection 7
Connection 8
Assumed looping 203mm private main
1676mm
305mm
203mm
51mm
406mm
1220mm
152mm
102mm
Legend
Private
Public
N
City of Ottawa

B.3 Preliminary Hydraulic Analysis

Junction Results - Basic Day

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)2	Pressure (kPa)
1	16.59	58.77	114.83	56.05	79.70	549.54
3	0.00	56.78	115.19	58.41	83.06	572.65
14	1.19	56.09	115.19	59.10	84.04	579.45
10	7.16	56.01	115.16	59.16	84.12	579.98
9	5.65	55.82	115.16	59.34	84.38	581.80
8	0.00	55.76	115.17	59.41	84.48	582.49
4	0.00	55.75	115.17	59.43	84.51	582.65
7	0.86	55.71	115.17	59.46	84.55	582.93
5	0.50	55.68	115.17	59.49	84.60	583.28
6	0.00	55.67	115.17	59.50	84.61	583.35

Link Results - Basic Day

ID	FROM	TO	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1000	1	Albert_6	84.95	204.00	110.00	-16.59	0.51
1001	3	Wellington_1	22.13	204.00	110.00	-6.72	0.21
1003	5	4	51.82	204.00	110.00	-1.36	0.04
1004	6	5	9.48	204.00	110.00	-0.86	0.03
1005	7	6	17.65	204.00	110.00	-0.86	0.03
1006	9	8	45.42	204.00	110.00	-5.36	0.16
1007	10	9	187.28	204.00	110.00	0.29	0.01
1002_1	4	8	4.72	204.00	110.00	-1.36	0.04
1008_1	Wellington_3	14	33.87	204.00	110.00	5.46	0.17
1010	14	Booth_4	92.72	204.00	110.00	-3.17	0.10
1008_2	14	10	61.78	204.00	110.00	7.45	0.23
1002_2	8	3	46.24	204.00	110.00	-6.72	0.21

Junction Results - Peak Hour

ID	Demand (L/s)	Elevation (m)	Head (m)	Pressure (m)	Pressure (psi)2	Pressure (kPa)
1	123.27	58.77	100.43	41.66	59.23	408.40
3	0.00	56.78	107.24	50.45	71.74	494.66
10	38.84	56.01	106.62	50.62	71.97	496.25
9	29.65	55.82	106.62	50.80	72.24	498.06
8	0.00	55.76	106.89	51.13	72.71	501.31
4	0.00	55.75	106.89	51.15	72.73	501.45
14	6.55	56.09	107.24	51.15	72.74	501.50
7	2.33	55.71	106.88	51.17	72.76	501.68
5	1.35	55.68	106.89	51.21	72.81	502.03
6	0.00	55.67	106.89	51.21	72.82	502.10

Link Results - Peak Hour

ID	FROM	TO	Length (m)	Diameter (mm)	Roughness	Flow (L/s)	Velocity (m/s)
1000	1	Albert_6	84.95	204.00	110.00	-123.27	3.77
1001	3	Wellington_1	22.13	204.00	110.00	-33.17	1.02
1003	5	4	51.82	204.00	110.00	-3.68	0.11
1004	6	5	9.48	204.00	110.00	-2.33	0.07
1005	7	6	17.65	204.00	110.00	-2.33	0.07
1006	9	8	45.42	204.00	110.00	-29.49	0.90
1007	10	9	187.28	204.00	110.00	0.16	0.01
1002_1	4	8	4.72	204.00	110.00	-3.68	0.11
1008_1	Wellington_3	14	33.87	204.00	110.00	25.95	0.79
1010	14	Booth_4	92.72	204.00	110.00	-19.59	0.60
1008_2	14	10	61.78	204.00	110.00	39.00	1.19
1002_2	8	3	46.24	204.00	110.00	-33.17	1.02

Fire Flow Results - Max Day + 200 L/s

ID	Static Demand (L/s)	Static Pressure (m)	Static Pressure (psi)	Static Pressure (kPa)	Static Head (m)	Fire Flow Demand (L/s)	Residual Pressure (m)	Residual Pressure (psi)	Available Flow (L/s)	Available Pressure (psi)
1	39.29	50.26	71.47	492.80	109.04	200.00	26.63	37.87	260.0	20
3	0.00	48.25	68.61	473.03	105.03	200.00	44.95	63.92	713.2	20
4	0.00	49.35	70.17	483.80	105.09	200.00	40.52	57.62	429.3	20
5	0.75	49.41	70.26	484.42	105.09	200.00	29.66	42.18	275.1	20
6	0.00	49.42	70.27	484.49	105.09	200.00	27.68	39.36	261.0	20
7	1.30	49.37	70.21	484.07	105.09	200.00	23.95	34.05	239.3	20
8	0.00	49.33	70.15	483.64	105.09	200.00	41.50	59.01	459.1	20
9	13.62	49.35	70.17	483.83	105.17	200.00	38.78	55.15	391.7	20
10	17.70	50.24	71.43	492.51	106.24	200.00	41.20	58.59	441.5	20
14	2.98	51.01	72.53	500.11	107.10	200.00	48.20	68.53	890.6	20

Appendix C Sanitary Servicing

C.1 Sanitary Sewer Design Sheet

Stantec

SUBDIVISION:
LeBreton Flats
Draft Plan of Subdivision

DATE: 2026-08-13
REVISION: 2
DESIGNED BY: JP
CHECKED BY: MW

FILE NUMBER: 160401780

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	280	l/p/day	MINIMUM VELOCITY	0.60	m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	28,000	l/ha/day	MAXIMUM VELOCITY	3.00	m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000	l/ha/day	MANNINGS n	0.013	
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000	l/ha/day	BEDDING CLASS	B	
PERSONS / SINGLE	3.4	INSTITUTIONAL	28,000	l/ha/day	MINIMUM COVER	2.50	m
PERSONS / TOWNHOME	2.7	INFILTRATION	0.33	l/s/Ha	HARMON CORRECTION FACTOR	0.8	
PERSONS / APARTMENT	1.8	HOTEL	225	l/bedspace/day	BEDSPACE/HOTEL UNIT	2.00	

| | | | | | | |

C.2 Proposed Preliminary Pump Station Design Memo

Stantec

Memo

To:	Peter Moroz, P.Eng.	From:	Gregory Chochlinski, P. Eng. Stantec, Ottawa
Project/File:	160401780	Date:	July 23, 2024

Reference: LeBreton Flats Subdivision Sewage PS – Functional Design

INTRODUCTION

Further to your request we prepared a Functional Design and location options for the proposed Sewage PS at LeBreton Flats. We understand that this Memo will be reviewed by the stakeholders and one of the two options will be selected to advance to the preliminary design.

We understand that the proposed PS would receive a peak flow of about 3.6 L/s but we propose a pumping rate of about 7.0 L/s through 100 mm diameter forcemain to maintain self-cleaning velocity of 0.90 m/s. Twin forcemains are proposed for redundancy, as per the City guidelines. After construction and commissioning the PS will be taken over and operated by the City of Ottawa.

Two location options are presented and evaluated in this Memo:

Option 1: PS location close to LRT corridor (south of the arch bridge)

Option 2: PS location north of the arch bridge

In both cases the twin discharge forcemains would need to be installed under the existing LRT tracks using trenchless construction method.

Refer to the **Attachment** for the proposed plan and profile drawings for two options.

PS DESIGN COMPONENTS

The proposed PS will be a wet well type with two submersible pumps, one duty, one standby, with the following components:

- Prefabricated Fiberglass wet well, 2.4 m diameter (minimum size acceptable to the City)
- Inlet sewer 250 mm dia. with an isolation valve and trash basket
- Two submersible sewage pumps capable of pumping about 7.0 L/s
- Twin forcemains, 100 mm dia. each (HDPE/PVC, SS inside the swabbing chamber)
- Bypass MH (upstream of the wet well) to allow bypassing the wet well during inspections/repairs or emergency situations
- Swabbing/Bypass Chamber d/s of the wet well
- Precast concrete control building with HVAC, for process, electrical and SCADA equipment
- Permanent power supply
- Soft starters for well pumps
- Standby Power: Generator (diesel or natural gas)

- SCADA control and communication

The Swabbing/Bypass Chamber downstream of the wet well will have the following components:

- Swab launcher at each of the two 100 mm forcemains (FMs)
- 75 mm Bypass Connections with isolation valves at each of the two FMs
- Flowmeters at each of the two FMs
- Isolation valves at entry and exist within the chamber
- Drain valves and sump pit (gravity drain back to the well could be an option)

The PS facility with be equipped with the following:

- Security fence, 2.4 m tall with a sliding access gate 4.0 m wide.
- Asphalt access road and parking (2 spots) with a turning point
- Granular or asphalt walkways to the control building and generator
- Protective bollards
- Yard hydrant and flow metering chamber (if connection to the City water supply system is possible). Or water trucks will be used when occasional cleanup of the wet well is required.

TRENCHLESS CROSSING OF LRT CORRIDOR

The proposed 100 mm dia. twin FMs will cross the existing LRT corridor using trenchless construction method. More detailed geotechnical evaluation is required to determine the most suitable trenchless method, installation depth, allowable vibration and settlement limits etc.

At this point it appears that a 600 mm dia. casing installed by pipe ramming might be a suitable option. The pipe material for two 100 mm FMs crossing the LRT inside the casing are anticipated to be HDPE. The casing would be grouted or filled with blown-in sand after the installation of FMs.

REVIEW OF PROPOSED LOCATION OPTIONS

In both options part of the arch of the existing old bridge would need to be removed to allow installation of pipes. The first 10 m of the arch bridge will remain intact as it is considered a heritage structure. The remaining portion of the arch bridge (about 20 m) is already abandoned, buried and filled with stone under the arch. The proposed open cut will remove a section of the abandoned arch for installation of the FMs/sewer/access road.

In both options the proposed new pipes will cross above the existing 1,650 mm dia. watermain, this will greatly reduce the risk of any damage to the watermain.

The pros and cons of two options are presented below:

Description	Option 1: PS near the LRT	Option 2: PS north of arch bridge
PS Layout	Simpler	More complicated
Lot size requirement	Approx. 14.0 x 23.0 m	Approx. 20.0 x 20.0 m (irreg.)

Reference: LeBreton Flats Subdivision PS – Functional Design

Pipe alignment	Simple, straight, FM easier to swab. Only one pipe (gravity sewer) crossing the arch bridge. Swabbing connection might not be needed as the short FM could be cleaned with water jets from the MH side, if ever needed.	Longer, more bends for FM, more difficult to swab. Three pipes crossing the arch bridge.
Access Road	Longer access road needed, wider cut at arch bridge needed	Short road, no road over the arch bridge
Water Supply and YH for cleaning	Longer water line needed (water truck could be more economical for occasional cleaning of wet well)	Shorter line, from the new development
Trenchless crossing of LRT	Same	Same
Power Supply	Likely from Street 5, to be designed as part of the plan of subdivision.	Likely from Street 5, to be designed as part of the plan of subdivision
Property/easement acquisition issues	On the NCC property to be conveyed to the City of Ottawa for City park.	On the NCC property to be conveyed to the City of Ottawa for City park

Please let us know if you have any comments or questions. We look forward to discussing this Memo with all interested parties and stakeholders.

Regards,

STANTEC CONSULTING LTD.



Gregory Chochlinski P.Eng., M.Eng.
Senior Associate
Mobile: 613-290-2322
gregory.chochlinski@stantec.com
stantec.com

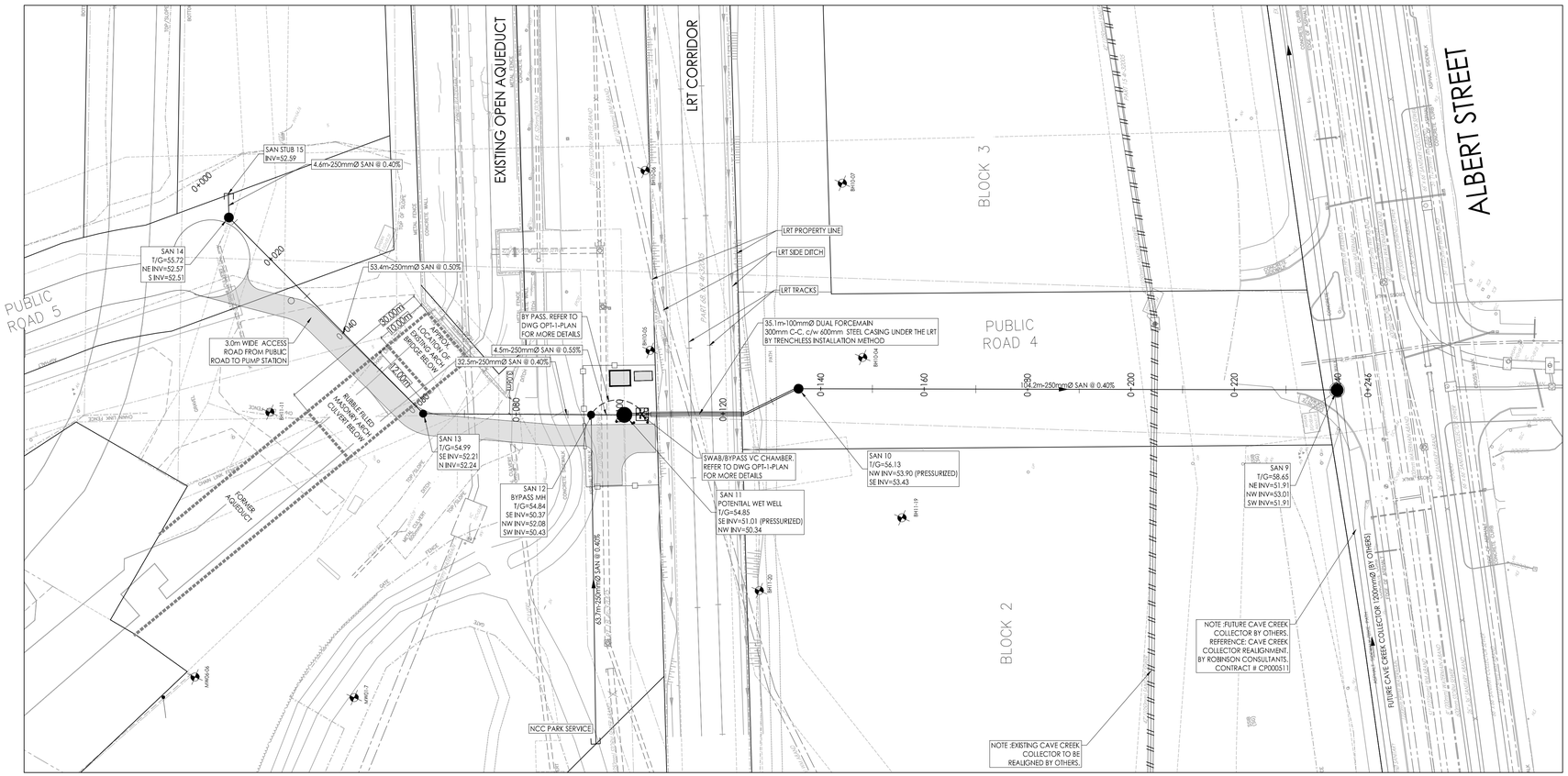
Attachments:
1. Functional Design Drawings – Plan and Profile – Option 1 and 2

July 23, 2024
Peter Moroz, P.Eng.

Reference: **LeBreton Flats Subdivision PS – Functional Design**

Attachment 1

Functional Design Drawings



1:500 0 5 15 25m

Notes

1. APPROXIMATE DEPTH OF BEDROCK RETRIEVED FROM GEOTECHNICAL REPORT BY STANTEC CONSULTING, TITLED GEOTECHNICAL DESKTOP REVIEW, LEBRETON FLATS PLAN OF SUBDIVISION, OTTAWA, ONTARIO. PREPARED FOR NATIONAL CAPITAL COMMISSION. DATED MAY 7, 2024
2. LRT DESIGN LAYOUT RETRIEVED FROM: MMM GROUP. DRAWING # REM-20-1-0000-DRD-2714, DATED: 2019-07-22
3. TOPOGRAPHIC SURVEY RETRIEVED FROM: STANTEC GEOMATICS LTD. PROJECT # 160401780-112, DATED AUGUST 31,2023
4. DRAFT PLAN RETRIEVED FROM: STANTEC GEOMATICS LTD. PROJECT # 160401780-112. DATED MARCH 12,2024

PROFILE SCALE
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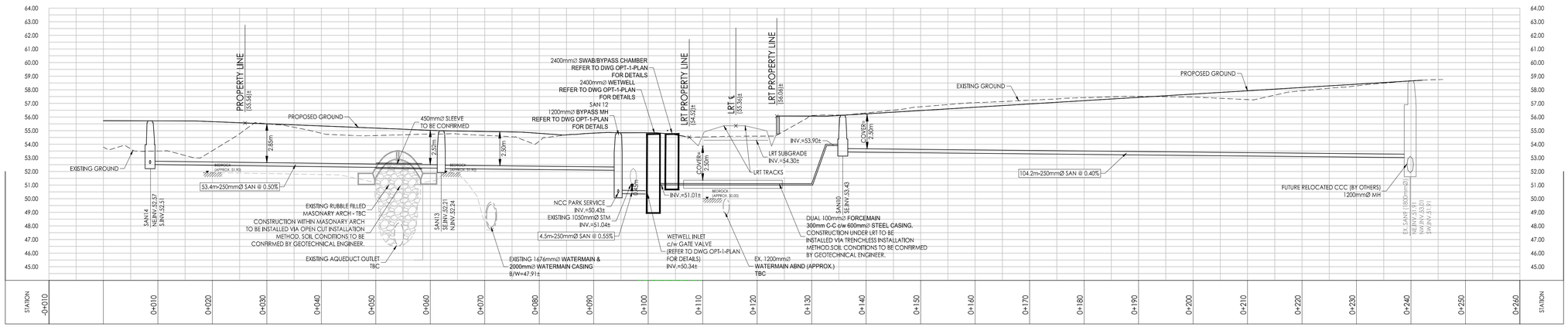
V=1:160



Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

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Legend

- PROPOSED PUMP STATION
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN

1	DRAFT PLAN APPROVAL 1ST SUBMISSION	JP	KS	24.07.19
Revision		By	Appd.	YY.MM.DD

File Name: 160401780-PSR.dwg	JP	DT	JP	24.06.10
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Client/Project

NCC (NATIONAL CAPITAL COMMISSION)
40 Elgin Street, Suite 202
OTTAWA, ON, K1P 1C7

LEBRETON FLATS DRAFT PLAN OF SUBDIVISION

Title

SANITARY PUMP STATION
OPTION 1

Project No.	Scale	
160401780		
Drawing No.	Sheet	Revision
OPT-1	1 of 3	1

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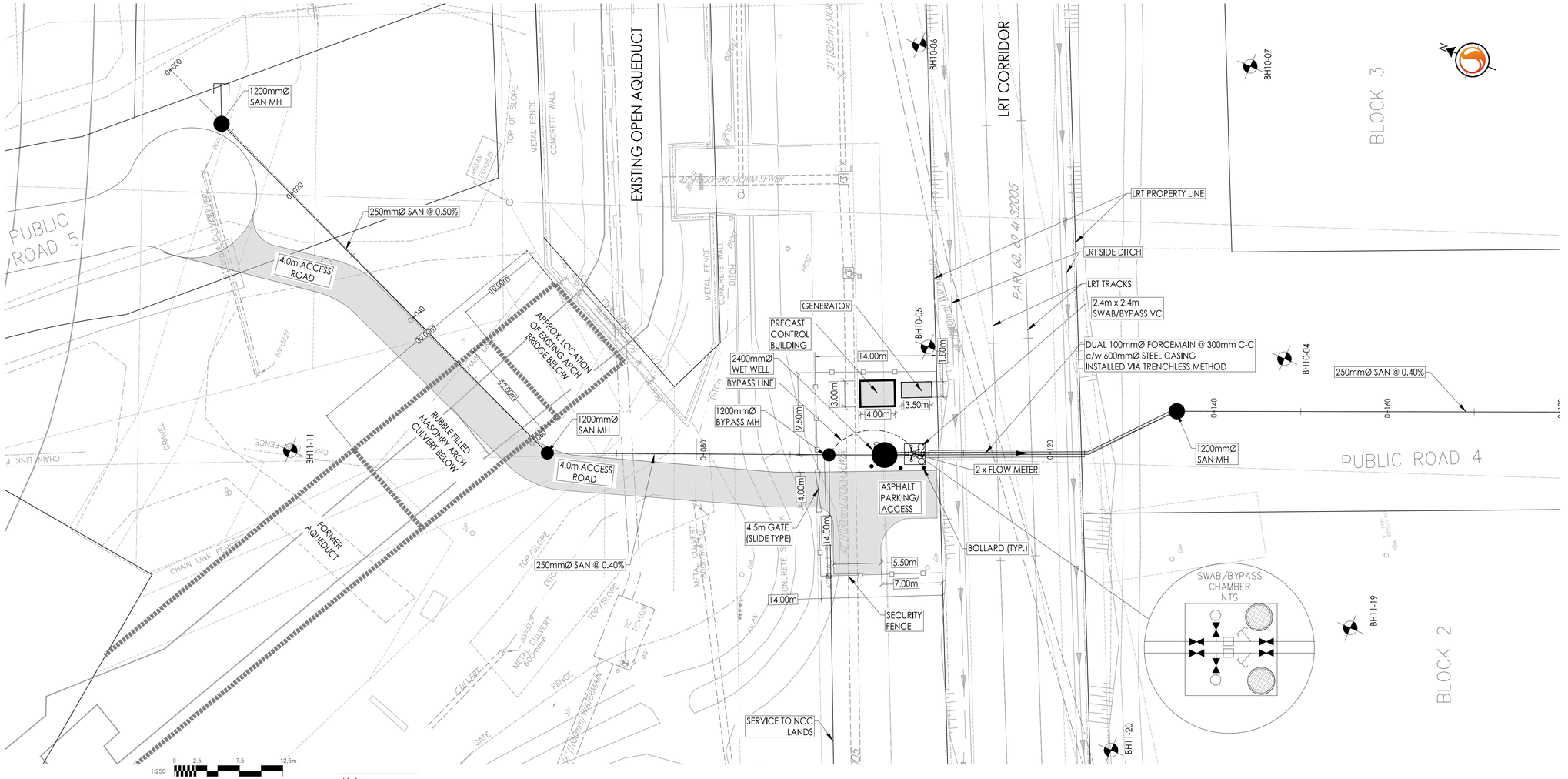
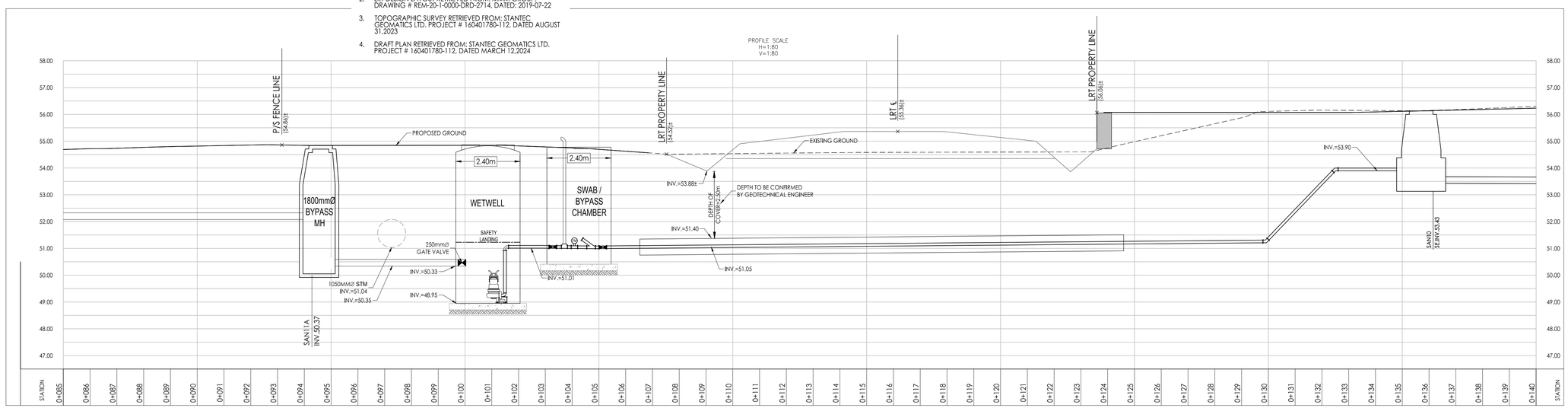
2024/07/22 2:43:34 PM by Rodrigo Jupiter

ORIGINAL SHEET - ARCH D



Notes

1. APPROXIMATE DEPTH OF BEDROCK RETRIEVED FROM GEOTECHNICAL REPORT BY STANTEC CONSULTING, TITLED GEOTECHNICAL DESKTOP REVIEW, LEBRETON FLATS PLAN OF SUBDIVISION, OTTAWA, ONTARIO. PREPARED FOR NATIONAL CAPITAL COMMISSION, DATED MAY 7, 2024
2. LRT DESIGN LAYOUT RETRIEVED FROM: MMM GROUP DRAWING # REM-20-1-0000-DRD-2714, DATED: 2019-07-22
3. TOPOGRAPHIC SURVEY RETRIEVED FROM: STANTEC GEOMATICS LTD. PROJECT # 160401780-112, DATED AUGUST 31,2023
4. DRAFT PLAN RETRIEVED FROM: STANTEC GEOMATICS LTD. PROJECT # 160401780-112, DATED MARCH 12,2024



Stantec

Stantec Consulting Ltd.
400 - 1331 Clyde Avenue
Ottawa ON
Tel. 613.722.4420
www.stantec.com

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Legend

- CONCEPTUAL PUMP STATION
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- EXISTING STORM SEWER
- EXISTING WATERMAIN

Notes

1	DRAFT PLAN APPROVAL 1ST SUBMISSION	JP	KS	24.07.19
	Revision	By	Appd.	YY.MM.DD
File Name: 160401780-FSR.dwg		JP	DT	JP	24.06.10
		Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

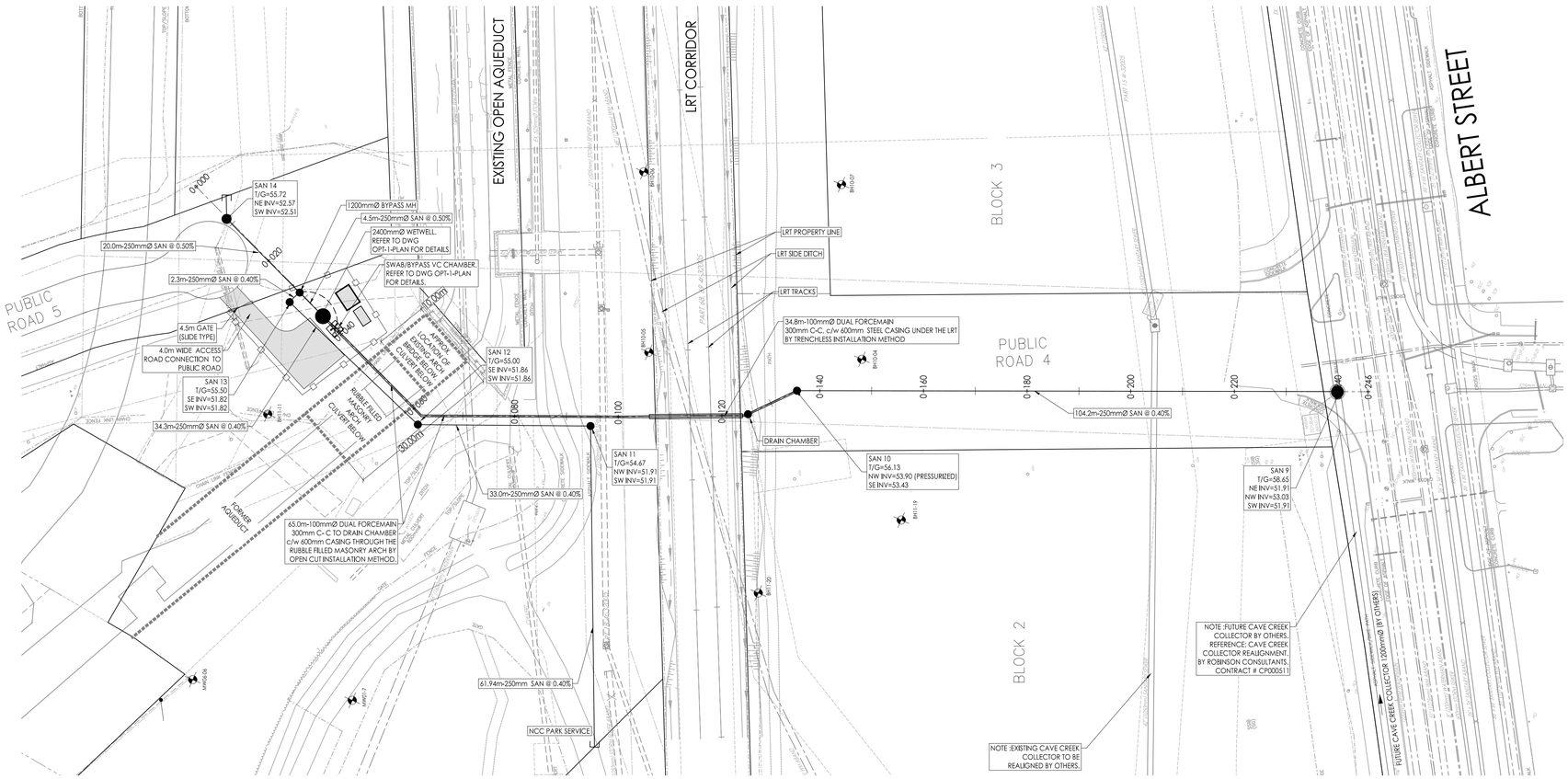
Client/Project
NCC (NATIONAL CAPITAL COMMISSION)
40 Elgin Street, Suite 202
OTTAWA, ON, K1P 1C7
LEBRETON FLATS DRAFT PLAN OF SUBDIVISION

Title
SANITARY PUMP STATION
OPTION 1-PLAN

Project No.	Scale	
160401780		
Drawing No.	Sheet	Revision
OPT-1P	2 of 3	1

W:\Civil\160401780\Design_CIVIL\drawings\Draft_Plan\160401780-FSR.dwg
2024/07/26, 4:53:19 PM, Philip Julien

ORIGINAL SHEET - ARCH D



1:500 0 5 15 25m

Notes

1. APPROXIMATE DEPTH OF BEDROCK RETRIEVED FROM GEOTECHNICAL REPORT BY STANTEC CONSULTING, TITLED GEOTECHNICAL DESKTOP REVIEW, LEBRETON FLATS PLAN OF SUBDIVISION, OTTAWA, ONTARIO, PREPARED FOR NATIONAL CAPITAL COMMISSION, DATED MAY 7, 2024
2. LRT DESIGN LAYOUT RETRIEVED FROM: MMM GROUP, DRAWING # REM-20-1-0000-DRD-2714, DATED: 2019-07-22
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4. DRAFT PLAN RETRIEVED FROM: STANTEC GEOMATICS LTD. PROJECT # 160401780-112, DATED MARCH 12,2024

PROFILE SCALE
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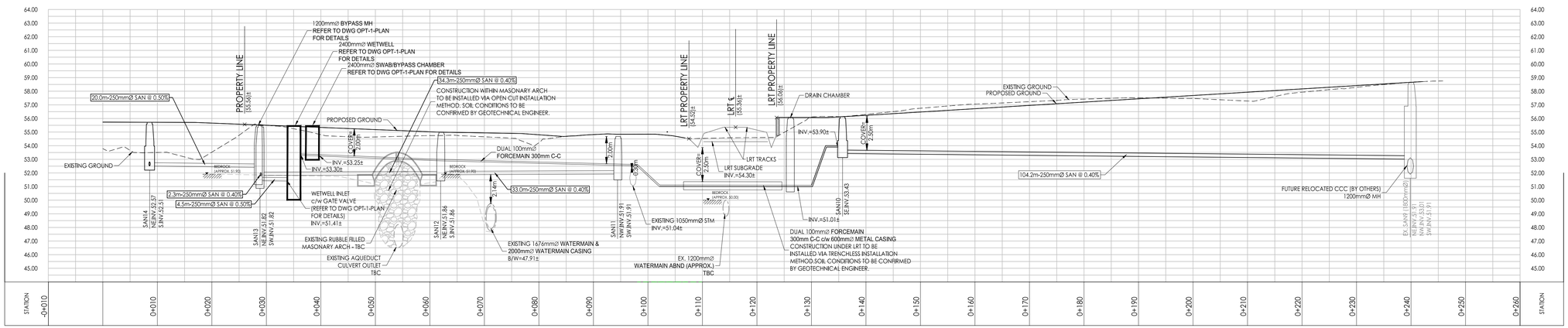
V=1:160



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Legend

- CONCEPTUAL PUMP STATION
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
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Notes

1	DRAFT PLAN APPROVAL 1ST SUBMISSION	JP	KS	24.07.19
Revision		By	Appd.	YY.MM.DD

File Name: 160401780-FSR.dwg	JP	DT	JP	24.06.10
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Client/Project

NCC (NATIONAL CAPITAL COMMISSION)
40 Elgin Street, Suite 202
OTTAWA, ON, K1P 1C7

LEBRETON FLATS DRAFT PLAN OF SUBDIVISION

Title

SANITARY PUMP STATION
OPTION 2

Project No.	Scale	
160401780		
Drawing No.	Sheet	Revision
OPT-2	3 of 3	1

W:\active\160401780\design\1_CIVIL\drawing\Draft_Plan\160401780-FSR.dwg
2024/07/02 2:38:19 PM by Tsang, Jaime

ORIGINAL SHEET - ARCH D

C.3 LeBreton Flats Pump Station Certificate of Approval

163000648 / 30
(APPROVALS)

Ontario

Ministry of the Environment
Ministère de l'Environnement

AMENDED CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 8494-84GSRF
Issue Date: April 15, 2010

City of Ottawa
100 Constellation Crescent, 6th Floor
Ottawa, Ontario
K2G 6J8

Site Location: 10 Fleet Street
10 Fleet Street North East of Fleet Street Pumping Station, East of Tailrace Canal
Ottawa City

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

Inlet Gravity Sanitary Sewer

An existing 375mm diameter inlet gravity concrete sanitary sewer services the Lebreton Flats Development. Flow normally will pass through the Lebreton Flats Sanitary Pumping Station (LFPS) and the LFPS will only pump when levels in the receiving Interceptor Outfall Sewer (IOS) rise to a set level of 47.70m.

Sewage Pump Station

A sanitary sewage pump station with a rated firm capacity of 100 L/s to be constructed to serve the Lebreton Flats development, comprising of an in-ground cast-in-place flow through wet well located at the east end of Fleet Street just to the northeast of the Fleet Street Pumping Station (FSPS) at the corner of Fleet and the former Wellington Streets consisting of the following:

- A pre-cast maintenance hole (MH2) located immediately upstream of the flow through wetwell, equipped with 300mm diameter overflow to the FSPS tailrace. An emergency overflow float alarm at the wetwell will indicate if the overflow is in use.
- Sewage inflow to the wetwell is directed through a drop bowl.
- A cast-in-place flow through wetwell equipped with two (2) 11.2kW submersible pumps (one duty and one standby) of the non-clog type, each pump is capable of pumping up to 100 L/s at 6 m TDH, complete with soft starters, two (2) multitrodes for liquid level measurement and pump control (one duty / one backup). The wetwell is isolated by a 400x400mm stainless steel sluice gate and actuator which is controlled by a multitrode located in the downstream maintenance hole (MH1).

- The wetwell is equipped with one (1) stainless steel vent, complete with bird screen.
- The six (6) meter ductile iron forcemain pumps sewage into the adjacent maintenance hole (MH1) which is equipped with vent to release air during high flow events in order to pressurize MH1 pump into the receiving IOS.
- An 80kW diesel engine generator set for standby power during emergencies to be located within the existing adjacent FSPS, including a 1250L capacity fuel storage facility to be located within a spill containment area.
- The controls located in the FSPS building will have electrical and control equipment, including a new Supervisory Control and Data Acquisition (SCADA) system.

All in accordance with the following submitted documents:

1. Request for Amendment of Certificate of Approval #9608-7L6RZV submitted under covering letter dated February 8, 2010 by Ziad Ghadban, P. Eng., Manager, Design and Construction, Municipal East Branch, and all supporting documentation and information, including revised design drawings #13973-PS104, #13973-PS105 and #13973-PS301 prepared by Stantec Consulting Ltd.
2. Application for Approval of Municipal and Private Sewage Works submitted under covering letter dated September 9, 2008 by James Ricker, P.Eng., Project Engineer, Environmental Infrastructure, Stantec Consulting Ltd., Consulting Engineers;
3. Design brief outlining description of proposed works prepared by Stantec Consulting Ltd., Consulting Engineer;
4. Geotechnical report entitled "Geotechnical Investigation for a Proposed Wet Well Chamber, Fleet Street Pumping Station, Ottawa, Ontario" prepared by Jacques Whitford;
5. Final plans entitled "Fleet Street Pumping Station Electrical Upgrade and Construction of the Lebreton Flats Sanitary Pumping Station" prepared by Stantec Consulting Ltd., Consulting Engineers;
6. Final specifications entitled "Fleet Street Pumping Station Electrical Upgrade and Construction of the Lebreton Flats Sanitary Pumping Station" prepared by Stantec Consulting Ltd., Consulting Engineers;
7. MOE Appendix H (Modified) – Sewage Pump Station Design - Table 1 and 2;
8. MOE Appendix I – Information Required for Pump Station Applications; and
9. Notice of Study Completion.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "*Act* " means the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended;

2. "*Certificate* " means this entire certificate of approval document, issued in accordance with Section 53 of the *Act* , and includes any schedules;

3. "*Director* " means any *Ministry* employee appointed by the Minister pursuant to section 5 of the *Act* ;

4. "*District Manager* " means the District Manager of the MOE, Ottawa District Office of the Ministry;

5. "*Ministry* " means the Ontario Ministry of the Environment;

6. "*Owner* " means City of Ottawa and includes its successors and assignees;

7. "*Regional Director* " means the Regional Director of the MOE, Ottawa Region of the Ministry;

8. "*Substantial Completion* " has the same meaning as *"substantial performance* " in the Construction Lien Act; and

9. "*Works* " means the sewage works described in the *Owner* 's application, this *Certificate* and in the supporting documentation referred to herein, to the extent approved by this *Certificate* .

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. GENERAL PROVISIONS

1.1 The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Certificate* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

1.2 Except as otherwise provided by these Conditions, the *Owner* shall design, build, install, operate and maintain the *Works* in accordance with the description given in this *Certificate* , the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this *Certificate* .

1.3 Where there is a conflict between a provision of any submitted document referred to in this *Certificate* and the Conditions of this *Certificate* , the Conditions in this *Certificate* shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

1.4 Where there is a conflict between the listed submitted documents, and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

1.5 The requirements of this *Certificate* are severable. If any requirement of this *Certificate* , or the application of any requirement of this *Certificate* to any circumstance, is held invalid or unenforceable, the application of such requirement to other circumstances and the remainder of this *Certificate* shall not be affected thereby.

2. EXPIRY OF APPROVAL

2.1 The approval issued by this *Certificate* will cease to apply to those parts of the *Works* which have not been constructed within five (5) years of the date of this *Certificate* .

3. UPON THE SUBSTANTIAL COMPLETION OF THE WORKS

3.1 Upon the *Substantial Completion* of the *Works* , the Owner shall prepare a statement, certified by a Professional Engineer, that the works are constructed in accordance with this *Certificate* , and upon request, shall make the written statement available for inspection by Ministry personnel.

3.2 Within one year of the *Substantial Completion* of the *Works* , a set of as-built drawings showing the works "as constructed" shall be prepared. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be retained at the *Works* for the operational life of the *Works* .

4. OPERATION AND MAINTENANCE

4.1 The *Owner* shall exercise due diligence in ensuring that, at all times, the *Works* and the related equipment and appurtenances used to achieve compliance with this *Certificate* are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate operator staffing and training, including training in all procedures and other requirements of this *Certificate* and the *Act* and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the *Works* .

4.2 The *Owner* shall prepare an operations manual within six (6) months of *Substantial Completion* of the *Works* , that includes, but not necessarily limited to, the following information:

(a) operating procedures for routine operation of the *Works* ;

(b) inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

(c) repair and maintenance programs, including the frequency of repair and maintenance for the *Works* ;

(d) procedures for the inspection and calibration of monitoring equipment;

(e) a spill prevention control and countermeasures plan, consisting of contingency plans and procedures for dealing with equipment breakdowns, potential spills and any other abnormal situations, including notification of the *District Manager* ; and

(f) procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

4.3 The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works* . Upon request, the *Owner* shall make the manual available to *Ministry* staff.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition 1 is imposed to ensure that the *Works* are built and operated in the manner in which they were described for review and upon which approval was granted. This condition is also included to emphasize the precedence of Conditions in the *Certificate* and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review. The condition also advises the *Owners* their responsibility to notify any person they authorized to carry out work pursuant to this *Certificate* the existence of this *Certificate* .

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Works* are constructed in accordance with the approval and that record drawings of the *Works* "as constructed" are maintained for future references.

4. Condition 4 is included to require that the *Works* be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the *Owner* and made available to the *Ministry* . Such a manual is an integral part of the operation of the *Works* . Its compilation and use should assist the *Owner* in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for *Ministry* staff when reviewing the *Owner'* s operation of the *Works* .

This Certificate of Approval revokes and replaces Certificate(s) of Approval No. 9608-7L6RZV issued on November 10, 2008.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, 15th Floor
Toronto, Ontario
M5G 1E5

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 15th day of April, 2010

THIS CERTIFICATE WAS MAILED
ON April 21, 2010
pc
(Signed)

Zafar Bhatti

Zafar Bhatti, P.Eng.
Director
Section 53, *Ontario Water Resources Act*

OF/

c: District Manager, MOE Ottawa
James Ricker, P. Eng., Stantec Consulting Ltd. ✓

C.4 Sanitary Flow Allocation – Dessau Soprin MSS

Stantec

SUBDIVISION: **LeBreton Flats**

DATE:
REVISION: 1
DESIGNED BY:
CHECKED BY: -

SANITARY SEWER DESIGN SHEET
(City of Ottawa)

Sanitary Flow Allocation - Data from Dessau Soprin MSS

FILE NUMBER: 160401780

DESIGN PARAMETERS

MAX PEAK FACTOR (RES.)=	4.0	AVG. DAILY FLOW / PERSON	350 l/p/day	MINIMUM VELOCITY	0.60 m/s
MIN PEAK FACTOR (RES.)=	2.0	COMMERCIAL	50,000 l/ha/day	MAXIMUM VELOCITY	3.00 m/s
PEAKING FACTOR (INDUSTRIAL):	2.4	INDUSTRIAL (HEAVY)	55,000 l/ha/day	MANNINGS n	0.013
PEAKING FACTOR (ICI >20%):	1.5	INDUSTRIAL (LIGHT)	35,000 l/ha/day	BEDDING CLASS	B
PERSONS / SINGLE	3.0	INSTITUTIONAL	50,000 l/ha/day	MINIMUM COVER	2.50 m
PERSONS / TOWNHOME	3.0	INFILTRATION	0.28 l/s/Ha	HARMON CORRECTION FACT(	1.0
PERSONS / APARTMENT	2.1	HOTEL	225.00 l/bed-space/day		

LOCATION			RESIDENTIAL AREA AND POPULATION							COMMERCIAL		INDUSTRIAL (L)		INDUSTRIAL (H)		INSTITUTIONAL		HOTEL		C+I+I	INFILTRATION			TOTAL	PIPE							
AREA ID NUMBER*	FROM M.H.	TO M.H.	AREA	UNITS SINGLE	TOWN	APT	POP.	CUMULATIVE AREA	POP.	PEAK*** FLOW	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	AREA	ACCU. AREA	PEAK FLOW	TOTAL AREA	ACCU. AREA	INFILT. FLOW	FLOW	LENGTH	DIA	MATERIAL	CLASS	SLOPE	CAP. (FULL)	CAP. V PEAK FLOW	VEL. (FULL)
			(ha)					(ha)		(l/s)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)			(%)	(l/s)	(%)	(m/s)
BLOCKS 4-8 (LMNO)	LFPS		3.020		112	642	1684	3.020	1684	23.1	0.22	0.22	0.00	0.00	0.00	0.00	4.30	4.30	0.00	0.00	3.9	3.02	3.02	0.8	27.9								
BLOCK 10 (JK)	LFPS (now to CCC)		0.930			192	403	0.930	403	5.5	0.08	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.93	0.93	0.3	5.8								
N of Fleet & E of Booth (UT)	LFPS		0.940					0.940			0.35	0.35	0.00	0.00	0.00	0.00	6.30	6.30	0.00	0.00	5.8	0.94	0.94	0.3	6.0								
Victoria Island	LFPS																								20.0								
Future Cultural/Institutional (V)**	LFPS		1.660					1.660			0.00	0.00	0.00	0.00	0.00	0.00	1.96	1.96	0.00	0.00	1.7	1.66	1.66	0.5	2.2								
Canadian War Museum (XW)**	LFPS		3.660					3.660			0.00	0.00	0.00	0.00	0.00	0.00	4.44	4.44	0.00	0.00	3.9	3.66	3.66	1.0	4.9								
CLARIDGE PHASES 1-5 (PQRS)	LFPS		1.980		44	595	1382	1.980	1382	19.0	0.23	0.23	0.00	0.00	0.00	0.00	1.05	1.05	0.00	0.00	1.1	1.98	1.98	0.6	20.6								
N of Aqueduct & E of Booth (I) CLAF	LFPS		0.100			10	21	0.100	21	0.3	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.10	0.10	0.0	0.3								
LFPS TOTAL							**3490**		**3490**	**47.9**	**0.89**	**0.89**		**0.00**		**0.00**	**18.05**	**18.05**		**0.00**	**16.4**	**12.29**	**12.29**	**3.4**	**87.8**								

* Letter Drainage Area IDs per Ainley Infrastructure Needs Assessment Drawing 1-3 and Table 1-2 - Referenced in Dessau Soprin MSS

** Dessau Soprin MSS assigned 64,000m2 to VXW. In site statistics (Ainley table 1-2), 44,376 assigned to XW. As such the difference has been assigned to V (Future Cultural/Institutional) to match total in DS report which is more conservative than Ainley values.

*** Peak residential flows from MSS assigned based on proportionate population

C.5 LeBreton Flats Pump Station Capacity Correspondence

From: Cooke, Ryan
Sent: Wednesday, August 22, 2018 3:02 PM
To: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Subject: Fleet St PS - SAN37601

Hi Eric,

To evaluate the maximum flow through SAN37601 before flooding or triggering the overflow, I replaced the inflows upstream of MHSA61763 with a constant inflow ranging from 100 – 150 L/s in the City-wide sanitary model (1:100 year – scaled Hurricane Frances). SAN37601 was updated from 300 mm to 275 mm to reflect the reduced diameter due to slip lining.

The maximum flow through SAN37601 before triggering the overflow is approximately 140 L/s – please see the attached profile.

Ryan

'

This e-mail originates from the City of Ottawa e-mail system. Any distribution, use or copying of this e-mail or the information it contains by other than the intended recipient(s) is unauthorized. Thank you.

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'

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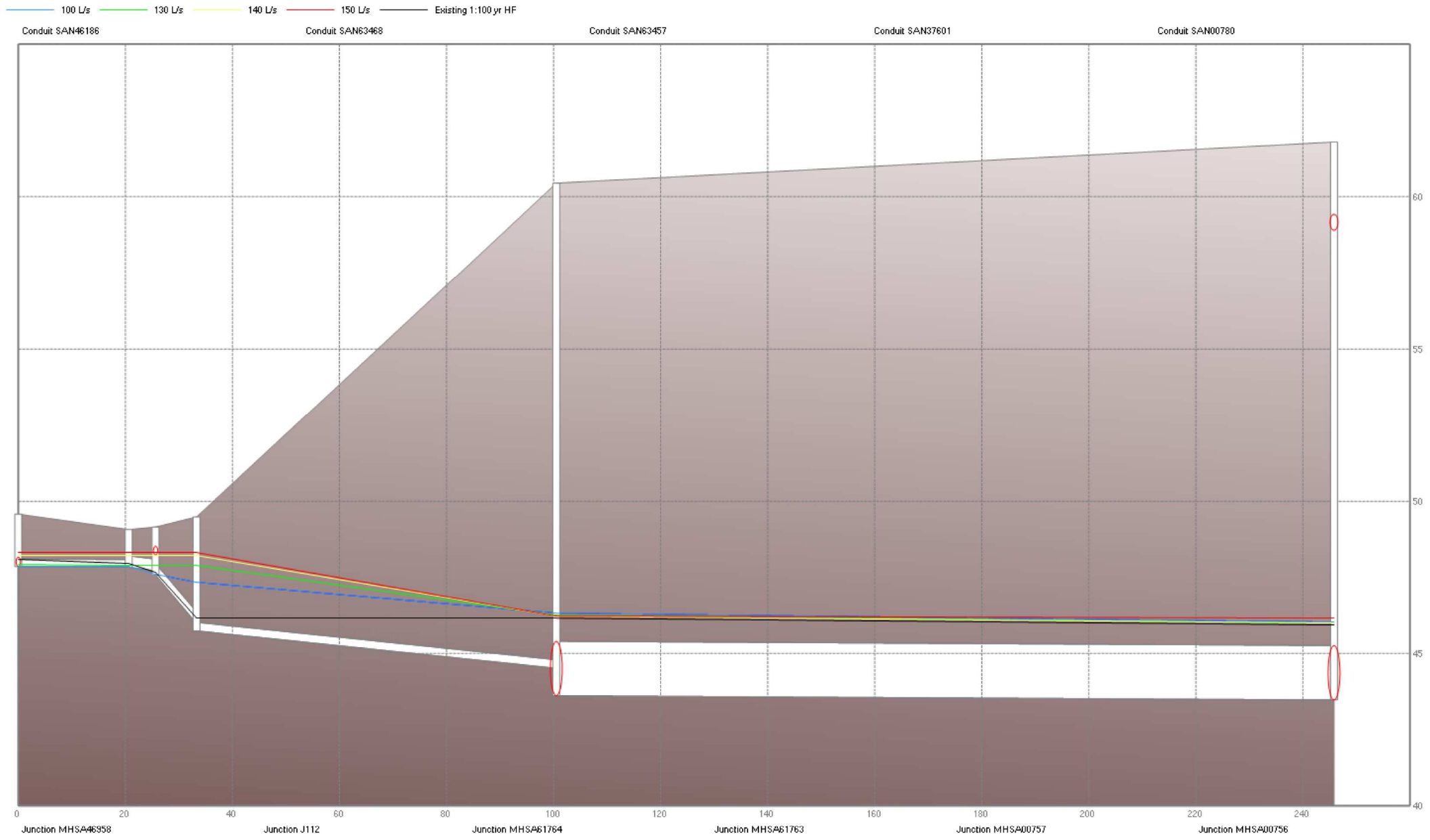
100 L/s
130 L/s
140 L/s
150 L/s
Existing 1:100 yr HF
Conduit SAN46186
Conduit SAN63468
Conduit SAN63457
Conduit SAN37601
Conduit SAN00780
60
55
50
45
40
0
20
40
60
80
100
120
140
160
180
200
220
240
Junction MHSA46958
Junction J112
Junction MHSA61764
Junction MHSA61763
Junction MHSA00757
Junction MHSA00756

Mitchelson, Sarah

From: Paradis, Kelly
Sent: Monday, October 22, 2018 1:41 PM
To: Mitchelson, Sarah
Subject: FW: Fleet St PS - SAN37601
Attachments: HGL_SAN37601.png

Use this for the pumping station

Kelly Paradis, P.Eng, PMP
Senior Project Manager
1223 Michael St. North, Suite 100, Ottawa, ON K1J 7T2
kelly.paradis@parsons.com - +1 613.691.1587 cell - +1 613.355.7941

PARSONS - Envision More
www.parsons.com | LinkedIn [linkedin.com] | Twitter [twitter.com] | Facebook [facebook.com]



From: Tousignant, Eric <Eric.Tousignant@ottawa.ca>
Sent: Thursday, August 23, 2018 1:12 PM
To: Paradis, Kelly <Kelly.Paradis@parsons.com>
Cc: James, Douglas <Douglas.James@ottawa.ca>; O'Connell, Erin <Erin.O'Connell@Ottawa.ca>
Subject: FW: Fleet St PS - SAN37601

Hi Kelly

We did an internal analysis of the gravity pipe downstream of the Fleet Street Sanitary pumping station and our results don't agree with the assessment that Stantec did for the NCC, which shows that the pipe only has approximately 100 L/s capacity. We did not review their analysis so I cannot explain why they go that result. In our analysis, we used the latest PCSWMM 100-year model of the large Ottawa Interceptor sewer and added the station's outlet pipe to it using the latest slip lining information. As noted below, the station's 130 L/s capacity would not be problematic (Overflow to the storm system would occur at 140 L/s during the 100 year event). We suspect that our results are different from Stantec's since we are using the most up-to-date model that may have a lower boundary condition in the Interceptor Sewer. We are therefore confident that the station still can still convey the original 130 L/s design flow.

Eric

Eric Tousignant, P.Eng.
Senior Water Resources Engineer
Infrastructure Services
613-580-2424 ext 25129

Appendix D Stormwater Management

D.1 Modified Rational Method Calculations

Stormwater Management Calculations

File No: **160401780**
Project: **LeBreton Flats**
Date: **21-Jul-26**

SWM Approach:
Post-development to 5-yr Storm C=0.7, Tc=10min

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Controlled - Tributary to Aqueduct	BLOCKS 9 & 10 (C7A, C7C)	Hard	1.084		0.9	0.976		
		Soft	0.412		0.2	0.082		
		Subtotal		1.50			1.058	0.707
Controlled - Tributary to Fleet	BLOCK 8 (C3A)	Hard	0.222		0.9	0.200		
		Soft	0.017		0.2	0.003		
		Subtotal		0.24			0.203	0.850
Controlled - Tributary to Fleet	BLOCK 7 (C4A)	Hard	0.654		0.9	0.589		
		Soft	0.050		0.2	0.010		
		Subtotal		0.70			0.599	0.850
Controlled - Tributary to Fleet	BLOCK 6 (C5C)	Hard	0.662		0.9	0.596		
		Soft	0.051		0.2	0.010		
		Subtotal		0.71			0.606	0.850
Controlled - Tributary to Fleet	BLOCK 5 (C6B)	Hard	0.299		0.9	0.270		
		Soft	0.023		0.2	0.005		
		Subtotal		0.32			0.274	0.850
Controlled - Tributary to Fleet	BLOCK 4 (C5A)	Hard	1.328		0.9	1.195		
		Soft	0.102		0.2	0.020		
		Subtotal		1.43			1.215	0.850
Controlled - Tributary to Albert	BLOCK 3 (C13B)	Hard	1.015		0.9	0.914		
		Soft	0.078		0.2	0.016		
		Subtotal		1.09			0.929	0.850
Controlled - Tributary to Albert	BLOCK 2 (C13A)	Hard	0.465		0.9	0.418		
		Soft	0.036		0.2	0.007		
		Subtotal		0.50			0.425	0.850
Controlled - Tributary to Albert	BLOCK 1	Hard	4.452		0.9	4.007		
		Soft	0.342		0.2	0.068		
		Subtotal		4.79			4.075	0.850
Total				**11.29**			**9.386**	
Overall Runoff Coefficient= C:								**0.83**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**11.294 ha**
Total Tributary Area to Outlet	**11.294 ha**
Total Uncontrolled Areas (Non-Tributary)	**0.000 ha**
Total Site	**11.294 ha**

Stormwater Management Calculations

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

5 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	998.071
b =	6.053
c =	0.814

t (min)	I (mm/hr)
10	104.2
20	70.3
30	53.9
40	44.2
50	37.7
60	32.9
70	29.4
80	26.6
90	24.3
100	22.4
110	20.8
120	19.5

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: 3 9 & 10 (C7A, C7C) — Controlled - Tributary to Aqueduct
Area (ha): 1.50
C: 0.71

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	306.6	303.4	3.2	**1.9**
20	70.3	206.7	206.7	0.0	0.0
30	53.9	158.7	158.7	0.0	0.0
40	44.2	130.0	130.0	0.0	0.0
50	37.7	110.8	110.8	0.0	0.0
60	32.9	96.9	96.9	0.0	0.0
70	29.4	86.4	86.4	0.0	0.0
80	26.6	78.2	78.2	0.0	0.0
90	24.3	71.5	71.5	0.0	0.0
100	22.4	65.9	65.9	0.0	0.0
110	20.8	61.3	61.3	0.0	0.0
120	19.5	57.3	57.3	0.0	0.0

Storage: Block 10 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
1.50	0.70	10.0	104.2	303.4

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
1.9	212.0	OK	210.1

Subdrainage Area: OCK 8 (C3A) — Controlled - Tributary to Fleet
Area (ha): 0.24
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	58.9	48.5	10.4	**6.2**
20	70.3	39.7	39.7	0.0	0.0
30	53.9	30.5	30.5	0.0	0.0
40	44.2	25.0	25.0	0.0	0.0
50	37.7	21.3	21.3	0.0	0.0
60	32.9	18.6	18.6	0.0	0.0
70	29.4	16.6	16.6	0.0	0.0
80	26.6	15.0	15.0	0.0	0.0
90	24.3	13.7	13.7	0.0	0.0
100	22.4	12.7	12.7	0.0	0.0
110	20.8	11.8	11.8	0.0	0.0
120	19.5	11.0	11.0	0.0	0.0

Storage: Block 8 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.24	0.70	10.0	104.2	48.5

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
6.2	43.0	OK	36.8

Subdrainage Area: OCK 7 (C4A) — Controlled - Tributary to Fleet
Area (ha): 0.70
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	173.5	142.9	30.6	**18.4**
20	70.3	117.0	117.0	0.0	0.0
30	53.9	89.8	89.8	0.0	0.0
40	44.2	73.6	73.6	0.0	0.0
50	37.7	62.7	62.7	0.0	0.0
60	32.9	54.8	54.8	0.0	0.0
70	29.4	48.9	48.9	0.0	0.0
80	26.6	44.2	44.2	0.0	0.0
90	24.3	40.4	40.4	0.0	0.0
100	22.4	37.3	37.3	0.0	0.0
110	20.8	34.7	34.7	0.0	0.0
120	19.5	32.4	32.4	0.0	0.0

Storage: Block 7 Onsite

Design Discharge				
Area	C	tc	I (5-yr)	Release

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.6
20	120.0
30	91.9
40	75.1
50	64.0
60	55.9
70	49.8
80	45.0
90	41.1
100	37.9
110	35.2
120	32.9

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: 3 9 & 10 (C7A, C7C) — Controlled - Tributary to Aqueduct
Area (ha): 1.50
C: 0.88

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	656.7	303.4	353.3	**212.0**
20	120.0	441.2	303.4	137.8	165.3
30	91.9	337.9	303.4	34.5	62.0
40	75.1	276.4	276.4	0.0	0.0
50	64.0	235.2	235.2	0.0	0.0
60	55.9	205.6	205.6	0.0	0.0
70	49.8	183.1	183.1	0.0	0.0
80	45.0	165.5	165.5	0.0	0.0
90	41.1	151.2	151.2	0.0	0.0
100	37.9	139.4	139.4	0.0	0.0
110	35.2	129.5	129.5	0.0	0.0
120	32.9	121.0	121.0	0.0	0.0

Storage: Block 10 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
1.50	0.70	10.0	104.2	303.4

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
212.0	212.0	OK	0.0

Subdrainage Area: OCK 8 (C3A) — Controlled - Tributary to Fleet
Area (ha): 0.24
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	118.7	48.5	70.2	**42.1**
20	120.0	79.7	48.5	31.2	37.5
30	91.9	61.1	48.5	12.6	22.6
40	75.1	49.9	48.5	1.5	3.5
50	64.0	42.5	42.5	0.0	0.0
60	55.9	37.1	37.1	0.0	0.0
70	49.8	33.1	33.1	0.0	0.0
80	45.0	29.9	29.9	0.0	0.0
90	41.1	27.3	27.3	0.0	0.0
100	37.9	25.2	25.2	0.0	0.0
110	35.2	23.4	23.4	0.0	0.0
120	32.9	21.9	21.9	0.0	0.0

Storage: Block 8 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.24	0.70	10.0	104.2	48.5

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
42.1	43.0	OK	0.9

Subdrainage Area: OCK 7 (C4A) — Controlled - Tributary to Fleet
Area (ha): 0.70
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	349.8	142.9	206.9	**124.1**
20	120.0	235.0	142.9	92.1	110.5
30	91.9	179.9	142.9	37.1	66.8
40	75.1	147.2	142.9	4.3	10.4
50	64.0	125.3	125.3	0.0	0.0
60	55.9	109.5	109.5	0.0	0.0
70	49.8	97.5	97.5	0.0	0.0
80	45.0	88.1	88.1	0.0	0.0
90	41.1	80.5	80.5	0.0	0.0
100	37.9	74.2	74.2	0.0	0.0
110	35.2	69.0	69.0	0.0	0.0
120	32.9	64.4	64.4	0.0	0.0

Storage: Block 7 Onsite

Design Discharge				
Area	C	tc	I (5-yr)	Release

Stormwater Management Calculations

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

(ha)		(min)	(mm/hr)	(L/s)
0.70	0.70	10.0	104.2	142.9

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
18.4	125.0	OK	106.6

Subdrainage Area: ..OCK 6 (C5C) — Controlled - Tributary to Fleet
Area (ha): 0.71
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	175.5	144.5	31.0	**18.6**
20	70.3	118.3	118.3	0.0	0.0
30	53.9	90.8	90.8	0.0	0.0
40	44.2	74.4	74.4	0.0	0.0
50	37.7	63.4	63.4	0.0	0.0
60	32.9	55.5	55.5	0.0	0.0
70	29.4	49.5	49.5	0.0	0.0
80	26.6	44.7	44.7	0.0	0.0
90	24.3	40.9	40.9	0.0	0.0
100	22.4	37.7	37.7	0.0	0.0
110	20.8	35.1	35.1	0.0	0.0
120	19.5	32.8	32.8	0.0	0.0

Storage: Block 6 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.71	0.70	10.0	104.2	144.5

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
18.6	126.0	OK	107.4

Subdrainage Area: ..OCK 5 (C6B) — Controlled - Tributary to Fleet
Area (ha): 0.32
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	79.4	65.4	14.0	**8.4**
20	70.3	53.5	53.5	0.0	0.0
30	53.9	41.1	41.1	0.0	0.0
40	44.2	33.7	33.7	0.0	0.0
50	37.7	28.7	28.7	0.0	0.0
60	32.9	25.1	25.1	0.0	0.0
70	29.4	22.4	22.4	0.0	0.0
80	26.6	20.2	20.2	0.0	0.0
90	24.3	18.5	18.5	0.0	0.0
100	22.4	17.1	17.1	0.0	0.0
110	20.8	15.9	15.9	0.0	0.0
120	19.5	14.8	14.8	0.0	0.0

Storage: Block 5 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.32	0.70	10.0	104.2	65.4

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
8.4	57.0	OK	48.6

Subdrainage Area: ..OCK 4 (C5A) — Controlled - Tributary to Fleet
Area (ha): 1.43
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	352.0	289.9	62.1	**37.3**
20	70.3	237.4	237.4	0.0	0.0
30	53.9	182.2	182.2	0.0	0.0
40	44.2	149.3	149.3	0.0	0.0
50	37.7	127.2	127.2	0.0	0.0
60	32.9	111.3	111.3	0.0	0.0
70	29.4	99.2	99.2	0.0	0.0
80	26.6	89.7	89.7	0.0	0.0
90	24.3	82.1	82.1	0.0	0.0
100	22.4	75.7	75.7	0.0	0.0
110	20.8	70.4	70.4	0.0	0.0
120	19.5	65.8	65.8	0.0	0.0

Storage: Block 4 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
1.43	0.70	10.0	104.2	289.9

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
37.3	252.0	OK	214.7

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

(ha)		(min)	(mm/hr)	(L/s)
0.70	0.70	10.0	104.2	142.9

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
124.1	125.0	OK	0.9

Subdrainage Area: ..OCK 6 (C5C) — Controlled - Tributary to Fleet
Area (ha): 0.71
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	353.9	144.5	209.3	**125.6**
20	120.0	237.7	144.5	93.2	111.8
30	91.9	182.1	144.5	37.5	67.5
40	75.1	148.9	144.5	4.4	10.5
50	64.0	126.8	126.8	0.0	0.0
60	55.9	110.8	110.8	0.0	0.0
70	49.8	98.7	98.7	0.0	0.0
80	45.0	89.2	89.2	0.0	0.0
90	41.1	81.5	81.5	0.0	0.0
100	37.9	75.1	75.1	0.0	0.0
110	35.2	69.8	69.8	0.0	0.0
120	32.9	65.2	65.2	0.0	0.0

Storage: Block 6 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.71	0.70	10.0	104.2	144.5

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
125.6	126.0	OK	0.4

Subdrainage Area: ..OCK 5 (C6B) — Controlled - Tributary to Fleet
Area (ha): 0.32
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	160.1	65.4	94.7	**56.8**
20	120.0	107.5	65.4	42.2	50.6
30	91.9	82.4	65.4	17.0	30.6
40	75.1	67.4	65.4	2.0	4.8
50	64.0	57.3	57.3	0.0	0.0
60	55.9	50.1	50.1	0.0	0.0
70	49.8	44.6	44.6	0.0	0.0
80	45.0	40.3	40.3	0.0	0.0
90	41.1	36.9	36.9	0.0	0.0
100	37.9	34.0	34.0	0.0	0.0
110	35.2	31.6	31.6	0.0	0.0
120	32.9	29.5	29.5	0.0	0.0

Storage: Block 5 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.32	0.70	10.0	104.2	65.4

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
56.8	57.0	OK	0.2

Subdrainage Area: ..OCK 4 (C5A) — Controlled - Tributary to Fleet
Area (ha): 1.43
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	709.8	289.9	419.9	**251.9**
20	120.0	476.8	289.9	186.9	224.3
30	91.9	365.2	289.9	75.3	135.5
40	75.1	298.7	289.9	8.8	21.1
50	64.0	254.2	254.2	0.0	0.0
60	55.9	222.2	222.2	0.0	0.0
70	49.8	197.9	197.9	0.0	0.0
80	45.0	178.8	178.8	0.0	0.0
90	41.1	163.4	163.4	0.0	0.0
100	37.9	150.7	150.7	0.0	0.0
110	35.2	139.9	139.9	0.0	0.0
120	32.9	130.8	130.8	0.0	0.0

Storage: Block 4 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
1.43	0.70	10.0	104.2	289.9

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
251.9	252.0	OK	0.1

Stormwater Management Calculations

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

Subdrainage Area: OCK 3 (C13B) — Controlled - Tributary to Albert
Area (ha): 1.09
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	269.2	221.7	47.5	**28.5**
20	70.3	181.5	181.5	0.0	0.0
30	53.9	139.3	139.3	0.0	0.0
40	44.2	114.2	114.2	0.0	0.0
50	37.7	97.3	97.3	0.0	0.0
60	32.9	85.1	85.1	0.0	0.0
70	29.4	75.9	75.9	0.0	0.0
80	26.6	68.6	68.6	0.0	0.0
90	24.3	62.8	62.8	0.0	0.0
100	22.4	57.9	57.9	0.0	0.0
110	20.8	53.8	53.8	0.0	0.0
120	19.5	50.3	50.3	0.0	0.0

Storage: Block 3 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
1.09	0.70	10.0	104.2	221.7

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
28.5	193.0	OK	164.5

Subdrainage Area: OCK 2 (C13A) — Controlled - Tributary to Albert
Area (ha): 0.50
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	123.2	101.4	21.7	**13.0**
20	70.3	83.1	83.1	0.0	0.0
30	53.9	63.8	63.8	0.0	0.0
40	44.2	52.2	52.2	0.0	0.0
50	37.7	44.5	44.5	0.0	0.0
60	32.9	38.9	38.9	0.0	0.0
70	29.4	34.7	34.7	0.0	0.0
80	26.6	31.4	31.4	0.0	0.0
90	24.3	28.7	28.7	0.0	0.0
100	22.4	26.5	26.5	0.0	0.0
110	20.8	24.6	24.6	0.0	0.0
120	19.5	23.0	23.0	0.0	0.0

Storage: Block 2 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.50	0.70	10.0	104.2	101.4

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
13.0	89.0	OK	76.0

Subdrainage Area: BLOCK 1 — Controlled - Tributary to Albert
Area (ha): 4.79
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	1180.5	972.2	208.3	**125.0**
20	70.3	795.9	795.9	0.0	0.0
30	53.9	611.0	611.0	0.0	0.0
40	44.2	500.6	500.6	0.0	0.0
50	37.7	426.6	426.6	0.0	0.0
60	32.9	373.2	373.2	0.0	0.0
70	29.4	332.8	332.8	0.0	0.0
80	26.6	300.9	300.9	0.0	0.0
90	24.3	275.2	275.2	0.0	0.0
100	22.4	253.9	253.9	0.0	0.0
110	20.8	235.9	235.9	0.0	0.0
120	19.5	220.6	220.6	0.0	0.0

Storage: Block 1 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
4.79	0.70	10.0	104.2	972.2

Onsite Storage			
5-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
125.0	845.0	OK	720.0

SUMMARY TO OUTLET

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

Subdrainage Area: OCK 3 (C13B) — Controlled - Tributary to Albert
Area (ha): 1.09
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	542.8	221.7	321.1	**192.6**
20	120.0	364.6	221.7	142.9	171.5
30	91.9	279.2	221.7	57.6	103.6
40	75.1	228.4	221.7	6.7	16.1
50	64.0	194.4	194.4	0.0	0.0
60	55.9	169.9	169.9	0.0	0.0
70	49.8	151.3	151.3	0.0	0.0
80	45.0	136.8	136.8	0.0	0.0
90	41.1	125.0	125.0	0.0	0.0
100	37.9	115.2	115.2	0.0	0.0
110	35.2	107.0	107.0	0.0	0.0
120	32.9	100.0	100.0	0.0	0.0

Storage: Block 3 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
1.09	0.70	10.0	104.2	221.7

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
192.6	193.0	OK	0.4

Subdrainage Area: OCK 2 (C13A) — Controlled - Tributary to Albert
Area (ha): 0.50
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	248.4	101.4	146.9	**88.1**
20	120.0	166.8	101.4	65.4	78.5
30	91.9	127.8	101.4	26.3	47.4
40	75.1	104.5	101.4	3.1	7.4
50	64.0	89.0	89.0	0.0	0.0
60	55.9	77.7	77.7	0.0	0.0
70	49.8	69.3	69.3	0.0	0.0
80	45.0	62.6	62.6	0.0	0.0
90	41.1	57.2	57.2	0.0	0.0
100	37.9	52.7	52.7	0.0	0.0
110	35.2	49.0	49.0	0.0	0.0
120	32.9	45.8	45.8	0.0	0.0

Storage: Block 2 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
0.50	0.70	10.0	104.2	101.4

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
88.1	89.0	OK	0.9

Subdrainage Area: BLOCK 1 — Controlled - Tributary to Albert
Area (ha): 4.79
C: 1.00

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	2380.0	972.2	1407.9	**844.7**
20	120.0	1598.8	972.2	626.7	752.0
30	91.9	1224.5	972.2	252.4	454.3
40	75.1	1001.6	972.2	29.5	70.7
50	64.0	852.5	852.5	0.0	0.0
60	55.9	745.0	745.0	0.0	0.0
70	49.8	663.7	663.7	0.0	0.0
80	45.0	599.7	599.7	0.0	0.0
90	41.1	548.0	548.0	0.0	0.0
100	37.9	505.2	505.2	0.0	0.0
110	35.2	469.2	469.2	0.0	0.0
120	32.9	438.5	438.5	0.0	0.0

Storage: Block 1 Onsite

Design Discharge				
Area (ha)	C	tc (min)	I (5-yr) (mm/hr)	Release (L/s)
4.79	0.70	10.0	104.2	972.2

Onsite Storage			
100-year Vreq (m^3)	Vminimum (m^3)	Volume Check	Vexcess (m^3)
844.7	845.0	OK	0.3

SUMMARY TO OUTLET

Stormwater Management Calculations

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

			Vrequired	Vavailable*		
Tributary Area	11.294	ha				
Total 5yr Flow to Sewer	2,290	L/s	257	1,942	m^3	Ok
Non-Tributary Area	0.000	ha				
Total 5yr Flow Uncontrolled	0	L/s				
Total Area	11.294	ha				
Total 5yr Flow	2,290	L/s				

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

			Vrequired	Vavailable*		
Tributary Area	11.294	ha				
Total 100yr Flow to Sewer	2,290	L/s	1,938	1,942	m^3	Ok
Non-Tributary Area	0.000	ha				
Total 100yr Flow Uncontrolled	0	L/s				
Total Area	11.294	ha				
Total 100yr Flow	2,290	L/s				

File No: **160401780**
Project: **LeBreton Flats - Block Sites**
Date: **21-Jul-2026**

Created By: MW
Checked By: DT
Revision: 2

100-YEAR SUMMARY OF BLOCK (SITE) STORAGE

SWM Approach: Post-development to 5-year with C=0.70 and tc = 10 min

100-year IDF
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.6
20	120.0
30	91.9
40	75.1
50	64.0
60	55.9
70	49.8
80	45.0
90	41.1
100	37.9
110	35.2
120	32.9

All Mixed-Use Blocks (Site) Post-Development Conditions:

Tributary	(ha)
Fleet	3.41
Albert	6.39
Aqueduct	1.50
Total Area:	**11.29**
Overall C:	1.00

Target	(L/s)
To Fleet	691
To Albert	1295
To Aqueduct	303
Total Target	**2290**

t_c (min)	Runoff Rate (L/s)	Maximum Allowable Discharge (L/s)	Required Storage Volume (m^3)	Required Storage Rate (m^3/ha)
10	5606	2290	1990	176
20	3766	2290	1771	157
30	2884	2290	1070	95
40	2359	2290	167	15
50	2008	2290	0	0
60	1755	2290	0	0

BLOCK ID	Area (ha)	C (5-yr)	C (100-yr)	Runoff Rate (L/s)	Maximum Allowable Discharge (L/s)	Required Storage Volume (m^3)
BLOCK 1	4.79	0.85	1.00	2380	972	845
BLOCK 2	0.50	0.85	1.00	248	101	88
BLOCK 3	1.09	0.85	1.00	543	222	193
BLOCK 4	1.43	0.85	1.00	710	290	252
BLOCK 5	0.32	0.85	1.00	160	65	57
BLOCK 6	0.71	0.85	1.00	354	145	126
BLOCK 7	0.70	0.85	1.00	350	143	124
BLOCK 8	0.24	0.85	1.00	119	48	42
BLOCK 10	1.50	0.71	0.88	657	303	212

Stormwater Management Calculations

File No: **160401780**
Project: **LeBreton Flats**
Date: **21-Jul-26**

SWM Approach:
Post-development to Pre-development flows

Post-Development Site Conditions:

Overall Runoff Coefficient for Site and Sub-Catchment Areas

Runoff Coefficient Table

Catchment Type	Sub-catchment Area ID / Description		Area (ha) "A"		Runoff Coefficient "C"	"A x C"		Overall Runoff Coefficient
Uncontrolled - Non-Tributary	NCC-1	Hard	1.958		0.9	1.762		
		Soft	4.895		0.2	0.979		
		Subtotal		6.85			2.741	0.40
Controlled - Tributary Open A	C7B	Hard	0.092		0.9	0.083		
		Soft	0.037		0.2	0.007		
		Subtotal		0.13			0.090	0.70
Controlled - Tributary Open A	PARK-1, PARK-2	Hard	0.657		0.9	0.592		
		Soft	1.643		0.2	0.329		
		Subtotal		2.30			0.920	0.40
Controlled - Tributary Open A	C7A, C7C	Hard	1.084		0.9	0.976		
		Soft	0.412		0.2	0.082		
		Subtotal		1.50			1.058	0.71
Controlled - Tributary Albert	C12C	Hard	0.137		0.9	0.123		
		Soft	0.055		0.2	0.011		
		Subtotal		0.19			0.134	0.70
Controlled - Tributary Albert	BLOCK 1, C13A, C13B	Hard	5.932		0.9	5.339		
		Soft	0.456		0.2	0.091		
		Subtotal		6.39			5.430	0.85
Controlled - Tributary Fleet	C3B, C5B, C6A	Hard	0.694		0.9	0.625		
		Soft	0.278		0.2	0.056		
		Subtotal		0.97			0.680	0.70
Controlled - Tributary Fleet	C3A, C4A, C5A, C5C, C6B	Hard	3.165		0.9	2.849		
		Soft	0.243		0.2	0.049		
		Subtotal		3.41			2.898	0.85
Total				**21.74**			**13.952**	
Overall Runoff Coefficient= C:								**0.64**

Total Roof Areas	**0.000 ha**
Total Tributary Surface Areas (Controlled and Uncontrolled)	**14.886 ha**
Total Tributary Area to Outlet	**14.886 ha**
Total Uncontrolled Areas (Non-Tributary)	**6.852 ha**
Total Site	**21.739 ha**

Stormwater Management Calculations

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

5 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	998.071
b =	6.053
c =	0.814

t (min)	I (mm/hr)
10	104.2
20	70.3
30	53.9
40	44.2
50	37.7
60	32.9
70	29.4
80	26.6
90	24.3
100	22.4
110	20.8
120	19.5

5 YEAR Predevelopment Target Release from Portion of Site

Subdrainage Area: Predevelopment Tributary Area to Outlet
Area (ha): 21.74
C: 0.70

Typical Time of Concentration

tc (min)	I (5 yr) (mm/hr)	Qtarget (L/s)
10	104.2	**4407.7**

5 YEAR Modified Rational Method for Entire Site

Subdrainage Area: NCC-1 — Uncontrolled - Non-Tributary
Area (ha): 6.85
C: 0.40

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	793.9	793.9		
20	70.3	535.3	535.3		
30	53.9	410.9	410.9		
40	44.2	336.7	336.7		
50	37.7	286.9	286.9		
60	32.9	251.0	251.0		
70	29.4	223.8	223.8		
80	26.6	202.4	202.4		
90	24.3	185.1	185.1		
100	22.4	170.7	170.7		
110	20.8	158.7	158.7		
120	19.5	148.3	148.3		

Subdrainage Area: C7B — Controlled - Tributary Open A
Area (ha): 0.13
C: 0.70

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	26.1	26.1		
20	70.3	17.6	17.6		
30	53.9	13.5	13.5		
40	44.2	11.1	11.1		
50	37.7	9.4	9.4		
60	32.9	8.2	8.2		
70	29.4	7.3	7.3		
80	26.6	6.6	6.6		
90	24.3	6.1	6.1		
100	22.4	5.6	5.6		
110	20.8	5.2	5.2		
120	19.5	4.9	4.9		

Subdrainage Area: RK-1, PARK-2 — Controlled - Tributary Open A
Area (ha): 2.30
C: 0.40

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	266.5	266.5		
20	70.3	179.7	179.7		
30	53.9	137.9	137.9		
40	44.2	113.0	113.0		
50	37.7	96.3	96.3		
60	32.9	84.3	84.3		
70	29.4	75.1	75.1		
80	26.6	67.9	67.9		
90	24.3	62.1	62.1		
100	22.4	57.3	57.3		
110	20.8	53.3	53.3		
120	19.5	49.8	49.8		

Subdrainage Area: C7A, C7C — Controlled - Tributary Open A
Area (ha): 1.50
C: 0.71

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	306.6	303.4	3.2	**1.9**
20	70.3	206.7	206.7	0.0	0.0
30	53.9	158.7	158.7	0.0	0.0
40	44.2	130.0	130.0	0.0	0.0
50	37.7	110.8	110.8	0.0	0.0
60	32.9	96.9	96.9	0.0	0.0
70	29.4	86.4	86.4	0.0	0.0
80	26.6	78.2	78.2	0.0	0.0
90	24.3	71.5	71.5	0.0	0.0
100	22.4	65.9	65.9	0.0	0.0
110	20.8	61.3	61.3	0.0	0.0
120	19.5	57.3	57.3	0.0	0.0

Subdrainage Area: C12C — Controlled - Tributary Albert
Area (ha): 0.19
C: 0.70

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	38.8	38.8		
20	70.3	26.2	26.2		
30	53.9	20.1	20.1		
40	44.2	16.5	16.5		
50	37.7	14.0	14.0		
60	32.9	12.3	12.3		
70	29.4	10.9	10.9		
80	26.6	9.9	9.9		
90	24.3	9.1	9.1		
100	22.4	8.4	8.4		
110	20.8	7.8	7.8		
120	19.5	7.3	7.3		

Subdrainage Area: BLOCK 1, C13A, C13B — Controlled - Tributary Albert
Area (ha): 6.39
C: 0.85
Qcontrol 1295.31 L/s

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	1572.9	1295.3	277.6	**166.5**
20	70.3	1060.5	1060.5	0.0	0.0
30	53.9	814.1	814.1	0.0	0.0
40	44.2	667.0	667.0	0.0	0.0
50	37.7	568.4	568.4	0.0	0.0
60	32.9	497.3	497.3	0.0	0.0
70	29.4	443.4	443.4	0.0	0.0
80	26.6	401.0	401.0	0.0	0.0

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

100 yr Intensity
City of Ottawa

$I = a/(t + b)^c$

a =	1735.688
b =	6.014
c =	0.820

t (min)	I (mm/hr)
10	178.6
20	120.0
30	91.9
40	75.1
50	64.0
60	55.9
70	49.8
80	45.0
90	41.1
100	37.9
110	35.2
120	32.9

100 YEAR Predevelopment Target Release from Portion of Site

100 YEAR Modified Rational Method for Entire Site

Subdrainage Area: NCC-1 — Uncontrolled - Non-Tributary
Area (ha): 6.85
C: 0.50

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	1700.7	1700.7		
20	120.0	1142.5	1142.5		
30	91.9	875.0	875.0		
40	75.1	715.7	715.7		
50	64.0	609.1	609.1		
60	55.9	532.4	532.4		
70	49.8	474.2	474.2		
80	45.0	428.5	428.5		
90	41.1	391.6	391.6		
100	37.9	361.0	361.0		
110	35.2	335.3	335.3		
120	32.9	313.3	313.3		

Subdrainage Area: C7B — Controlled - Tributary Open A
Area (ha): 0.13
C: 0.88

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	55.8	26.1	29.8	**17.9**
20	120.0	37.5	26.1	11.4	13.7
30	91.9	28.7	26.1	2.7	4.8
40	75.1	23.5	23.5	0.0	0.0
50	64.0	20.0	20.0	0.0	0.0
60	55.9	17.5	17.5	0.0	0.0
70	49.8	15.6	15.6	0.0	0.0
80	45.0	14.1	14.1	0.0	0.0
90	41.1	12.9	12.9	0.0	0.0
100	37.9	11.9	11.9	0.0	0.0
110	35.2	11.0	11.0	0.0	0.0
120	32.9	10.3	10.3	0.0	0.0

Subdrainage Area: RK-1, PARK-2 — Controlled - Tributary Open A
Area (ha): 2.30
C: 0.50

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	571.0	571.0		
20	120.0	383.5	383.5		
30	91.9	293.8	293.8		
40	75.1	240.3	240.3		
50	64.0	204.5	204.5		
60	55.9	178.7	178.7		
70	49.8	159.2	159.2		
80	45.0	143.9	143.9		
90	41.1	131.5	131.5		
100	37.9	121.2	121.2		
110	35.2	112.6	112.6		
120	32.9	105.2	105.2		

Subdrainage Area: C7A, C7C — Controlled - Tributary Open A
Area (ha): 1.50
C: 0.88
Qcontrol 303.43 L/s

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	656.7	303.4	353.3	**212.0**
20	120.0	441.2	303.4	137.8	165.3
30	91.9	337.9	303.4	34.5	62.0
40	75.1	276.4	276.4	0.0	0.0
50	64.0	235.2	235.2	0.0	0.0
60	55.9	205.6	205.6	0.0	0.0
70	49.8	183.1	183.1	0.0	0.0
80	45.0	165.5	165.5	0.0	0.0
90	41.1	151.2	151.2	0.0	0.0
100	37.9	139.4	139.4	0.0	0.0
110	35.2	129.5	129.5	0.0	0.0
120	32.9	121.0	121.0	0.0	0.0

Subdrainage Area: C12C — Controlled - Tributary Albert
Area (ha): 0.19
C: 0.88

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	83.2	38.8	44.4	**26.6**
20	120.0	55.9	38.8	17.0	20.5
30	91.9	42.8	38.8	4.0	7.1
40	75.1	35.0	35.0	0.0	0.0
50	64.0	29.8	29.8	0.0	0.0
60	55.9	26.0	26.0	0.0	0.0
70	49.8	23.2	23.2	0.0	0.0
80	45.0	21.0	21.0	0.0	0.0
90	41.1	19.2	19.2	0.0	0.0
100	37.9	17.7	17.7	0.0	0.0
110	35.2	16.4	16.4	0.0	0.0
120	32.9	15.3	15.3	0.0	0.0

Subdrainage Area: BLOCK 1, C13A, C13B — Controlled - Tributary Albert
Area (ha): 6.39
C: 1.00
Qcontrol 1295.31 L/s

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	3171.2	1295.3	1875.9	**1125.5**
20	120.0	2130.3	1295.3	835.0	1002.0
30	91.9	1631.6	1295.3	336.2	605.2
40	75.1	1334.6	1295.3	39.3	94.2
50	64.0	1135.8	1135.8	0.0	0.0
60	55.9	992.7	992.7	0.0	0.0
70	49.8	884.3	884.3	0.0	0.0
80	45.0	799.0	799.0	0.0	0.0

Stormwater Management Calculations

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

90	24.3	366.7	366.7	0.0	0.0
100	22.4	338.3	338.3	0.0	0.0
110	20.8	314.3	314.3	0.0	0.0
120	19.5	293.9	293.9	0.0	0.0

Summary of 5-Year Block Storage

Block	Area (ha)	C (5-yr)	Qactual (L/s)	Qcontrol (L/s)	Qstored (L/s)	Vstored (m^3)
1	4.79	0.85	1180.5	972.2	208.3	125.0
2	0.50	0.85	123.2	101.4	21.7	13.0
3	1.09	0.85	269.2	221.7	47.5	28.5

Subdrainage Area: C3B, C5B, C6A — Controlled - Tributary Fleet
Area (ha): 0.97
C: 0.70

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	197.1	197.1		
20	70.3	132.9	132.9		
30	53.9	102.0	102.0		
40	44.2	83.6	83.6		
50	37.7	71.2	71.2		
60	32.9	62.3	62.3		
70	29.4	55.6	55.6		
80	26.6	50.2	50.2		
90	24.3	45.9	45.9		
100	22.4	42.4	42.4		
110	20.8	39.4	39.4		
120	19.5	36.8	36.8		

Subdrainage Area: 4A, C5A, C5C, C6B — Controlled - Tributary Fleet
Area (ha): 3.41
C: 0.85

tc (min)	I (5 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	104.2	839.3	691.2	148.1	**88.9**
20	70.3	565.9	565.9	0.0	0.0
30	53.9	434.4	434.4	0.0	0.0
40	44.2	355.9	355.9	0.0	0.0
50	37.7	303.3	303.3	0.0	0.0
60	32.9	265.4	265.4	0.0	0.0
70	29.4	236.6	236.6	0.0	0.0
80	26.6	214.0	214.0	0.0	0.0
90	24.3	195.7	195.7	0.0	0.0
100	22.4	180.5	180.5	0.0	0.0
110	20.8	167.7	167.7	0.0	0.0
120	19.5	156.8	156.8	0.0	0.0

Summary of 5-Year Block Storage

Block	Area (ha)	C (5-yr)	Qactual (L/s)	Qcontrol (L/s)	Qstored (L/s)	Vstored (m^3)
4	1.43	0.85	352.0	289.9	62.1	37.3
5	0.32	0.85	79.4	65.4	14.0	8.4
6	0.71	0.85	175.5	144.5	31.0	18.6
7	0.70	0.85	173.5	142.9	30.6	18.4
8	0.24	0.85	58.9	48.5	10.4	6.2

SUMMARY TO OUTLET

			Vrequired	Vavailable*	
Fleet Street Tributary Area	4.381	ha			
Total 5yr Flow to Fleet Street Sewer	888	L/s	0	0 m^3	Ok
Albert Street Tributary Area	6.580	ha			
Total 5yr Flow to Albert Street Sewer	1,334	L/s			
Open Aquaduct Tributary Area	3.925	ha			
Total 5yr Flow to Open Aqueduct	596	L/s			
Non-Tributary Area	6.981	ha			
Total 5yr Flow Uncontrolled	794	L/s			
Total Area	21.867	ha			
Total 5yr Flow	3,612	L/s			
Target	4,408	L/s			

Project #160401780, LeBreton Flats
Modified Rational Method Calculations for Storage

90	41.1	730.1	730.1	0.0	0.0
100	37.9	673.1	673.1	0.0	0.0
110	35.2	625.2	625.2	0.0	0.0
120	32.9	584.2	584.2	0.0	0.0

Summary of 100-Year Block Storage

Block	Area (ha)	C (100-yr)	Qactual (L/s)	Qcontrol (L/s)	Qstored (L/s)	Vstored (m^3)
1	4.79	1.00	2380.0	972.2	1407.9	844.7
2	0.50	1.00	248.4	101.4	146.9	88.1
3	1.09	1.00	542.8	221.7	321.1	192.6

Subdrainage Area: C3B, C5B, C6A — Controlled - Tributary Fleet
Area (ha): 0.97
C: 0.88

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	422.1	197.1	225.1	**135.0**
20	120.0	283.6	197.1	86.5	103.8
30	91.9	217.2	197.1	20.1	36.2
40	75.1	177.7	177.7	0.0	0.0
50	64.0	151.2	151.2	0.0	0.0
60	55.9	132.1	132.1	0.0	0.0
70	49.8	117.7	117.7	0.0	0.0
80	45.0	106.4	106.4	0.0	0.0
90	41.1	97.2	97.2	0.0	0.0
100	37.9	89.6	89.6	0.0	0.0
110	35.2	83.2	83.2	0.0	0.0
120	32.9	77.8	77.8	0.0	0.0

Subdrainage Area: 4A, C5A, C5C, C6B — Controlled - Tributary Fleet
Area (ha): 3.41
C: 1.00 — Qcontrol 691.20 L/s

tc (min)	I (100 yr) (mm/hr)	Qactual (L/s)	Qrelease (L/s)	Qstored (L/s)	Vstored (m^3)
10	178.6	1692.2	691.2	1001.0	**600.6**
20	120.0	1136.8	691.2	445.6	534.7
30	91.9	870.6	691.2	179.4	323.0
40	75.1	712.1	691.2	20.9	50.3
50	64.0	606.1	606.1	0.0	0.0
60	55.9	529.7	529.7	0.0	0.0
70	49.8	471.8	471.8	0.0	0.0
80	45.0	426.4	426.4	0.0	0.0
90	41.1	389.6	389.6	0.0	0.0
100	37.9	359.2	359.2	0.0	0.0
110	35.2	333.6	333.6	0.0	0.0
120	32.9	311.7	311.7	0.0	0.0

Summary of 100-Year Block Storage

Block	Area (ha)	C (100-yr)	Qactual (L/s)	Qcontrol (L/s)	Qstored (L/s)	Vstored (m^3)
4	1.43	1.00	709.8	289.9	419.9	251.9
5	0.32	1.00	160.1	65.4	94.7	56.8
6	0.71	1.00	353.9	144.5	209.3	125.6
7	0.70	1.00	349.8	142.9	206.9	124.1
8	0.24	1.00	118.7	48.5	70.2	42.1

SUMMARY TO OUTLET

			Vrequired	Vavailable*	
Fleet Street Tributary Area	4.381	ha			
Total 100yr Flow to Fleet Street Sewer	888	L/s	0	0 m^3	Ok
Albert Street Tributary Area	6.580	ha			
Total 100yr Flow to Albert Street Sewer	1,334	L/s			
Open Aquaduct Tributary Area	3.925	ha			
Total 100yr Flow to Open Aqueduct	900	L/s			
Non-Tributary Area	6.981	ha			
Total 100yr Flow Uncontrolled	1,701	L/s			
Total Area	21.867	ha			
Total 100yr Flow	4,824	L/s			
Target	4,408	L/s			

D.2 Storm Sewer Design Sheet

Stantec

LeBreton Flats		STORM SEWER DESIGN SHEET (City of Ottawa)
DATE:	2026-09-18	
REVISION:	1	
DESIGNED BY:	JP	FILE NUMBER: 160401780
CHECKED BY:	MW	

DESIGN PARAMETERS

$I = a / (t+b)^c$ (As per City of Ottawa Guidelines, 2012)

	1:2 yr	1:5 yr	1:10 yr	1:100 yr				
a =	732.951	998.071	1174.184	1735.688	MANNING'S n =	0.013	BEDDING CLASS =	B
b =	6.199	6.053	6.014	6.014	MINIMUM COVER:	2.00	m	
c =	0.810	0.814	0.816	0.820	TIME OF ENTRY	10	min	

LOCATION			DRAINAGE AREA																						PIPE SELECTION									
AREA ID NUMBER	FROM M.H.	TO M.H.	AREA (2-YEAR) (ha)	AREA (5-YEAR) (ha)	AREA (10-YEAR) (ha)	AREA (100-YEAR) (ha)	AREA (ROOF) (ha)	C (2-YEAR) (-)	C (5-YEAR) (-)	C (10-YEAR) (-)	C (100-YEAR) (-)	A x C (2-YEAR) (ha)	ACCUM. AxC (2YR) (ha)	A x C (5-YEAR) (ha)	ACCUM. AxC (5YR) (ha)	A x C (10-YEAR) (ha)	ACCUM. AxC (10YR) (ha)	A x C (100-YEAR) (ha)	ACCUM. AxC (100YR) (ha)	T of C (min)	$I_{2\text{-YEAR}}$ (mm/h)	$I_{5\text{-YEAR}}$ (mm/h)	$I_{10\text{-YEAR}}$ (mm/h)	$I_{100\text{-YEAR}}$ (mm/h)	$Q_{CONTROL}$ (L/s)	ACCUM. $Q_{CONTROL}$ (L/s)	Q_{ACT} (CIA/360) (L/s)	LENGTH (m)	PIPE WIDTH OR DIAMETE (mm)	PIPE HEIGHT (mm)	PIPE SHAPE (-)	MATERIAL (-)	CLASS (-)	SLOPE %	Q_{CAP} (FULL) (L/s)	% FULL (-)	VEL. (FULL) (m/s)
C13C, C13B, C13A	13	12	0.00	1.79	0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.000	0.000	1.489	1.489	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	430.9	55.2	600	600	CIRCULAR	CONCRETE	-	0.50	452.9	**95.13%**	1.55
	12	11A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	1.489	0.000	0.000	0.000	0.000	10.57	74.68	101.27	118.70	173.50	0.0	0.0	418.8	5.9	600	600	CIRCULAR	CONCRETE	-	0.86	594.5	**70.44%**	2.04
																				10.62									600	600							
BLOCK 1/C16A	16	96	0.00	4.79	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.000	0.000	4.075	4.075	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	1179.5	59.0	1500	1500	CIRCULAR	CONCRETE	-	0.15	2815.9	**41.89%**	1.54
Existing Albert Inflow*	96	15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	4.075	0.000	0.000	0.000	0.000	10.78	73.92	100.23	117.47	171.70	2815.9	2815.9	3950.6	13.9	2100	2100	CIRCULAR	CONCRETE	-	0.10	5733.4	**68.90%**	1.60
	15	11A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	4.075	0.000	0.000	0.000	0.000	10.94	73.39	99.49	116.61	170.43	0.0	2815.9	3942.2	29.7	2100	2100	CIRCULAR	CONCRETE	-	0.10	5747.5	**68.59%**	1.61
																				11.26									2100	2100							
C7C, C7B, C7A	7	7A	0.00	1.63	0.00	0.00	0.00	0.00	0.71	0.00	0.00	0.000	0.000	1.148	1.148	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	332.4	15.5	675	675	CIRCULAR	CONCRETE	-	0.30	480.3	**69.20%**	1.30
																				10.21									675	675							
C6A, C6D, C6B	6	5	0.00	1.18	0.00	0.00	0.00	0.00	0.74	0.00	0.00	0.000	0.000	0.875	0.875	0.000	0.000	0.000	0.000	10.00	76.81	104.19	122.14	178.56	0.0	0.0	253.2	42.1	600	600	CIRCULAR	CONCRETE	-	0.71	540.0	**46.88%**	1.85
C5A, C5C	5	4	0.00	2.14	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.000	0.000	1.821	2.696	0.000	0.000	0.000	0.000	10.45	75.11	101.87	119.40	174.53	0.0	0.0	762.9	184.0	975	975	CIRCULAR	CONCRETE	-	0.15	908.3	**84.00%**	1.18
C4A	4	3	0.00	0.70	0.00	0.00	0.00	0.00	0.85	0.00	0.00	0.000	0.000	0.599	3.295	0.000	0.000	0.000	0.000	13.05	66.79	90.43	105.94	154.77	0.0	0.0	827.8	62.1	1050	1050	CIRCULAR	CONCRETE	-	0.15	1116.4	**74.15%**	1.25
C3B, C3A	3	2	0.00	0.35	0.00	0.00	0.00	0.00	0.80	0.00	0.00	0.000	0.000	0.283	3.578	0.000	0.000	0.000	0.000	13.91	64.46	87.24	102.19	149.26	0.0	0.0	867.1	73.8	1050	1050	CIRCULAR	CONCRETE	-	0.15	1090.6	**79.51%**	1.22
	2	2A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	3.578	0.000	0.000	0.000	0.000	14.94	61.92	83.76	98.10	143.25	0.0	0.0	832.5	21.4	1050	1050	CIRCULAR	CONCRETE	-	0.15	1103.3	**75.45%**	1.23
	2A	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	3.578	0.000	0.000	0.000	0.000	15.23	61.22	82.81	96.97	141.60	0.0	0.0	823.0	76.1	1050	1050	CIRCULAR	CONCRETE	-	0.15	1103.3	**74.59%**	1.23
	1	1A	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.000	0.000	3.578	0.000	0.000	0.000	0.000	16.30	58.85	79.57	93.16	136.01	0.0	0.0	790.8	12.1	1050	1050	CIRCULAR	CONCRETE	-	0.10	896.0	**88.27%**	1.00
																				16.50									1050	1050							

*Existing Albert Street inflow set based on full flow capacity of existing incoming 1500mm trunk sewer. Sewers along Albert sized to accommodate potential inflow of 1cms via high-capacity surface inlet during events beyond the 100-year storm.

D.3 Conceptual Major System PCSWMM Model Input/Output Files

```
[TITLE]
;;Project Title/Notes

[OPTIONS]
;;Option             Value
FLOW_UNITS           LPS
INFILTRATION         HORTON
FLOW_ROUTING         DYNWAVE
LINK_OFFSETS         ELEVATION
MIN_SLOPE            0
ALLOW_PONDING        YES
SKIP_STEADY_STATE    NO

START_DATE           07/17/2024
START_TIME           00:00:00
REPORT_START_DATE    07/17/2024
REPORT_START_TIME    00:00:00
END_DATE             07/17/2024
END_TIME             06:00:00
SWEEP_START          01/01
SWEEP_END            12/31
DRY_DAYS             0
REPORT_STEP          00:01:00
WET_STEP             00:01:00
DRY_STEP             00:01:00
ROUTING_STEP         1
RULE_STEP            00:00:00

INERTIAL_DAMPING     PARTIAL
NORMAL_FLOW_LIMITED  BOTH
FORCE_MAIN_EQUATION  H-W
VARIABLE_STEP        0
LENGTHENING_STEP     0
MIN_SURFAREA         0
MAX_TRIALS           8
HEAD_TOLERANCE       0.0015
SYS_FLOW_TOL         5
LAT_FLOW_TOL         5
```

POST-DEVELOPMENT MODEL

```
MINIMUM_STEP         0.5
THREADS              8

[EVAPORATION]
;;Data Source    Parameters
;;-------------- ----------------
CONSTANT         0.0
DRY_ONLY         NO

[RAINGAGES]
;;Name           Format    Interval SCF      Source
;;-------------- --------- -------- -------- ----------
RG1              INTENSITY 0:10     1.0      TIMESERIES 03H120C

[SUBCATCHMENTS]
;;Name           Rain Gage        Outlet           Area     %Imperv  Width    %Slope   CurbLen  SnowPack

;;-------------- ---------------- ---------------- -------- -------- -------- -------- --------
----------------
;0.7
33               RG1              SPR-BOO          0.769436 71.43    173.123  3        0

;0.7
34               RG1              ELM-BOO          0.784973 71.43    176.619  3        0

;0.7
37               RG1              BOO-LP1          0.699023 71.43    157.28   3        0

;0.7
38               RG1              ELM-ROC          0.788085 71.43    177.319  3        0

;0.7
39               RG1              PRI-LOR          1.208135 71.43    271.83   3        0

;0.7
40               RG1              ALB-PRI          0.227745 71.43    51.243   3        0

;0.7
```

```
41              RG1             ALB-LOR         0.196647 71.43    44.246   3        0

;0.7
42              RG1             PRI             0.677902 71.43    152.528  3        0

;0.7
43              RG1             PRI-EMP         0.379017 71.43    85.279   3        0

;0.7
44              RG1             LOR             0.781348 71.43    175.803  3        0

;0.7
45              RG1             ALB-ROC         0.684771 71.43    154.073  3        0

;0.7
46              RG1             ALB-BOO         0.436649 71.43    98.246   3        0

;0.7
47              RG1             ALB-PRE         0.76698  71.43    172.57   3        0

;0.7
48              RG1             ROC-LP1         1.407692 71.43    316.731  3        0

;0.7
49              RG1             BOO-LP2         0.62678  71.43    141.026  3        0

;0.7
50              RG1             PRI-BOO         0.735359 71.43    165.456  3        0

;0.7
51              RG1             PRE             0.556116 71.43    125.126  3        0

;0.7
52              RG1             ELM-PRI         1.137188 71.43    255.867  3        0


[SUBAREAS]
;;Subcatchment   N-Imperv   N-Perv     S-Imperv   S-Perv     PctZero    RouteTo    PctRouted
```



```
;;-------------- ---------- ---------- ---------- ---------- ---------- ---------- ----------
33              0.013      0.25       1.57       4.67       0          OUTLET
34              0.013      0.25       1.57       4.67       0          OUTLET
37              0.013      0.25       1.57       4.67       0          OUTLET
38              0.013      0.25       1.57       4.67       0          OUTLET
39              0.013      0.25       1.57       4.67       0          OUTLET
40              0.013      0.25       1.57       4.67       0          OUTLET
41              0.013      0.25       1.57       4.67       0          OUTLET
42              0.013      0.25       1.57       4.67       0          OUTLET
43              0.013      0.25       1.57       4.67       0          OUTLET
44              0.013      0.25       1.57       4.67       0          OUTLET
45              0.013      0.25       1.57       4.67       0          OUTLET
46              0.013      0.25       1.57       4.67       0          OUTLET
47              0.013      0.25       1.57       4.67       0          OUTLET
48              0.013      0.25       1.57       4.67       0          OUTLET
49              0.013      0.25       1.57       4.67       0          OUTLET
50              0.013      0.25       1.57       4.67       0          OUTLET
51              0.013      0.25       1.57       4.67       0          OUTLET
52              0.013      0.25       1.57       4.67       0          OUTLET

[INFILTRATION]
;;Subcatchment   Param1     Param2     Param3     Param4     Param5
;;-------------- ---------- ---------- ---------- ---------- ----------
33              76.2       13.2       4.14       7          0
34              76.2       13.2       4.14       7          0
37              76.2       13.2       4.14       7          0
38              76.2       13.2       4.14       7          0
39              76.2       13.2       4.14       7          0
40              76.2       13.2       4.14       7          0
41              76.2       13.2       4.14       7          0
42              76.2       13.2       4.14       7          0
43              76.2       13.2       4.14       7          0
44              76.2       13.2       4.14       7          0
45              76.2       13.2       4.14       7          0
46              76.2       13.2       4.14       7          0
47              76.2       13.2       4.14       7          0
48              76.2       13.2       4.14       7          0
49              76.2       13.2       4.14       7          0
```

```
50              76.2       13.2       4.14       7          0
51              76.2       13.2       4.14       7          0
52              76.2       13.2       4.14       7          0

[OUTFALLS]
;;Name           Elevation  Type       Stage Data       Gated    Route To
;;-------------- ---------- ---------- ---------------- -------- ----------------
ALB-OF          0          FREE                        NO
OF1             0          FREE                        NO
OF2             0          FREE                        NO
OF3             0          FREE                        NO
OF4             0          FREE                        NO
OF5             0          FREE                        NO
OF6             0          FREE                        NO
OF7             0          FREE                        NO
SU1             0          FREE                        NO
SU10            0          FREE                        NO
SU11            0          FREE                        NO
SU12            0          FREE                        NO
SU13            0          FREE                        NO
SU14            0          FREE                        NO
SU15            0          FREE                        NO
SU16            0          FREE                        NO
SU17            0          FREE                        NO
SU2             0          FREE                        NO
SU3             0          FREE                        NO
SU4             0          FREE                        NO
SU5             0          FREE                        NO
SU6             0          FREE                        NO
SU7             0          FREE                        NO
SU8             0          FREE                        NO
SU9             0          FREE                        NO

[STORAGE]
;;Name           Elev.    MaxDepth   InitDepth  Shape       Curve Name/Params            SurDepth Fevap
Psi      Ksat     IMD
;;-------------- -------- ---------- ---------- ----------- ---------------------------- -------- --------
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```



```
ALB-BOO         61.78    0.4        0          FUNCTIONAL  0         0         0         0         0
ALB-LOR         62.33    0.4        0          FUNCTIONAL  0         0         0         0         0
ALB-PRE         58.95    0.4        0          FUNCTIONAL  0         0         0         0         0
ALB-PRI         62.47    0.4        0          FUNCTIONAL  0         0         0         0         0
ALB-ROC         60.67    0.4        0          FUNCTIONAL  0         0         0         0         0
BOO-LP1         62.23    0.4        0          FUNCTIONAL  0         0         0         0         0
BOO-LP2         62.25    0.4        0          FUNCTIONAL  0         0         0         0         0
ELM-BOO         64.98    0.4        0          FUNCTIONAL  0         0         0         0         0
ELM-PRI         62.36    0.4        0          FUNCTIONAL  0         0         0         0         0
ELM-ROC         63.04    0.4        0          FUNCTIONAL  0         0         0         0         0
LOR             76.87    0.4        0          FUNCTIONAL  0         0         0         0         0
PRE             61.31    0.4        0          FUNCTIONAL  0         0         0         0         0
PRI             62.87    0.4        0          FUNCTIONAL  0         0         0         0         0
PRI-BOO         62.37    0.4        0          FUNCTIONAL  0         0         0         0         0
PRI-EMP         80.19    0.4        0          FUNCTIONAL  0         0         0         0         0
PRI-LOR         72       0.4        0          FUNCTIONAL  0         0         0         0         0
ROC-LP1         61.36    0.4        0          FUNCTIONAL  0         0         0         0         0
SPR-BOO         71.56    0.4        0          FUNCTIONAL  0         0         0         0         0

[CONDUITS]
;;Name           From Node        To Node          Length     Roughness  InOffset   OutOffset  InitFlow
MaxFlow
;;-------------- ---------------- ---------------- ---------- ---------- ---------- ---------- ----------
----------
C1              SPR-BOO          ELM-BOO          81.637     0.013      71.56      64.98      0          0

C10             PRE              ALB-PRE          120.656    0.013      61.31      59.03      0          0

C11             PRI-BOO          BOO-LP1          71.962     0.013      62.37      62.23      0          0

C12             BOO-LP1          BOO-LP2          41.708     0.013      62.23      62.25      0          0

C13             BOO-LP2          ALB-BOO          59.074     0.013      62.25      61.88      0          0

C14             ELM-PRI          ROC-LP1          91.928     0.013      62.36      61.36      0          0

C15             ROC-LP1          ALB-ROC          65.3       0.013      61.36      60.77      0          0
```

```
C16              ALB-BOO          ALB-ROC          123.296    0.013      61.78      60.67      0          0

C17              ALB-ROC          ALB-PRE          192.513    0.013      60.67      58.95      0          0

C2               ELM-BOO          PRI-BOO          79.055     0.013      64.98      62.37      0          0

C3               LOR              PRI-LOR          68.101     0.013      76.87      72         0          0

C4               PRI-LOR          ALB-LOR          185.838    0.013      72         62.43      0          0

C5               PRI-EMP          PRI-LOR          96.195     0.013      80.19      72         0          0

C6               PRI              ALB-PRI          91.889     0.013      62.87      62.57      0          0

C7               ALB-PRI          ALB-LOR          48.944     0.013      62.47      62.33      0          0

C8               ALB-LOR          ALB-BOO          77.391     0.013      62.33      61.78      0          0

C9               ELM-ROC          ELM-PRI          80.486     0.013      63.04      62.36      0          0


[WEIRS]
;;Name           From Node        To Node          Type         CrestHt    Qcoeff     Gated    EndCon
EndCoeff   Surcharge  RoadWidth  RoadSurf   Coeff. Curve
;;-------------- ---------------- ---------------- ------------ ---------- ---------- -------- --------
---------- ---------- ---------- ---------- ----------------
W1               ALB-PRE          ALB-OF           TRANSVERSE   59.18      1.67       NO       0        0
       YES

[OUTLETS]
;;Name           From Node        To Node          Offset     Type             QTable/Qcoeff    Qexpon
Gated
;;-------------- ---------------- ---------------- ---------- ---------------- ---------------- ----------
--------
OL1              ALB-PRE          SU17             58.95      TABULAR/HEAD     10CB_S0.03
NO
OL10             PRI-LOR          OF2              72         TABULAR/HEAD     10CB_S0.03
NO
```

POST-DEVELOPMENT MODEL

```
OL11             PRI-EMP          SU15             80.19      TABULAR/HEAD     1CB_S0.03
NO
OL12             PRI              SU14             62.87      TABULAR/HEAD     8CB_S0.03
NO
OL13             ALB-PRI          SU13             62.47      TABULAR/HEAD     4CB_S0.03
NO
OL14             ALB-LOR          SU12             62.33      TABULAR/HEAD     4CB_S0.03
NO
OL15             ALB-BOO          SU10             61.78      TABULAR/HEAD     4CB_S0.03
NO
OL16             BOO-LP2          SU9              62.25      TABULAR/HEAD     3CB_SAG
NO
OL17             BOO-LP1          SU8              62.23      TABULAR/HEAD     3CB_SAG
NO
OL18             PRI-BOO          OF3              62.37      TABULAR/HEAD     3CB_S0.03
NO
OL19             PRI-LOR          OF1              72         TABULAR/HEAD     6CB_S0.03
NO
OL2              PRE              SU1              61.31      TABULAR/HEAD     1CB_S0.03
NO
OL20             PRI-BOO          SU7              62.37      TABULAR/HEAD     10CB_S0.03
NO
OL21             ELM-BOO          SU5              64.98      TABULAR/HEAD     10CB_S0.03
NO
OL22             ELM-PRI          SU3              62.36      TABULAR/HEAD     10CB_S0.03
NO
OL23             PRE              OF7              61.31      TABULAR/HEAD     10CB_S0.03
NO
OL24             ROC-LP1          SU2              61.36      TABULAR/HEAD     2CB_SAG
NO
OL3              ALB-ROC          SU11             60.67      TABULAR/HEAD     10CB_S0.03
NO
OL4              ROC-LP1          OF6              61.36      TABULAR/HEAD     10CB_S0.03
NO
OL5              ELM-PRI          OF5              62.36      TABULAR/HEAD     4CB_S0.03
NO
OL6              ELM-ROC          SU4              63.04      TABULAR/HEAD     6CB_S0.03
NO
```

```
OL7              ELM-BOO          OF4              64.98      TABULAR/HEAD     3CB_S0.03
NO
OL8              SPR-BOO          SU6              71.56      TABULAR/HEAD     9CB_S0.03
NO
OL9              LOR              SU16             76.87      TABULAR/HEAD     2CB_S0.03
NO

[XSECTIONS]
;;Link            Shape        Geom1            Geom2      Geom3      Geom4      Barrels    Culvert
;;--------------- ------------ ---------------- ---------- ---------- ---------- ---------- ----------
C1               IRREGULAR    18m
C10              IRREGULAR    20m_Preston
C11              IRREGULAR    18m
C12              IRREGULAR    18m
C13              IRREGULAR    18m
C14              IRREGULAR    18m
C15              IRREGULAR    18m
C16              IRREGULAR    15.5m_Albert_OS
C17              IRREGULAR    15.5m_Albert_OS
C2               IRREGULAR    18m
C3               IRREGULAR    18m
C4               IRREGULAR    18m
C5               IRREGULAR    18m
C6               IRREGULAR    18m
C7               IRREGULAR    15.5m_Albert_OS
C8               IRREGULAR    15.5m_Albert_OS
C9               IRREGULAR    18m
W1               RECT_OPEN    0.2              10         0          0

[TRANSECTS]
;;Transect Data in HEC-2 format
;
NC 0.013    0.013    0.013
X1 15.5m_Albert_OS   4        0.0      11.5     0.0      0.0      0.0      0.0      0.0
GR 0.23     0        0        11.5     0.15     11.5     0.23     15
;
NC 0.2      0.2      0.013
X1 18m               7        4.25     13.75    0.0      0.0      0.0      0.0      0.0
```



```
GR 0.35     0        0.15     4.25     0        4.25     0.13     9        0        13.75
GR 0.15     13.75    0.35     18
;
NC 0.013    0.013    0.013
X1 20m_Preston       7        2.5      17.5     0.0      0.0      0.0      0.0      0.0
GR 0.2      0        0.15     2.5      0        2.5      0.15     10       0        17.5
GR 0.15     17.5     0.2      20

[LOSSES]
;;Link            Kentry     Kexit      Kavg       Flap Gate  Seepage
;;--------------- ---------- ---------- ---------- ---------- ----------

[CURVES]
;;Name            Type       X-Value    Y-Value
;;--------------- ---------- ---------- ----------
10CB_S0.03       Rating     0          0
10CB_S0.03                  0.01       5
10CB_S0.03                  0.02       17
10CB_S0.03                  0.03       57
10CB_S0.03                  0.04       110
10CB_S0.03                  0.05       146
10CB_S0.03                  0.06       179
10CB_S0.03                  0.07       216
10CB_S0.03                  0.08       256
10CB_S0.03                  0.09       298
10CB_S0.03                  0.1        335
10CB_S0.03                  0.11       380
10CB_S0.03                  0.12       390
10CB_S0.03                  0.4        390

1CB_S0.03        Rating     0          0
1CB_S0.03                   0.01       0.5
1CB_S0.03                   0.02       1.7
1CB_S0.03                   0.03       5.7
1CB_S0.03                   0.04       11
1CB_S0.03                   0.05       14.6
1CB_S0.03                   0.06       17.9
1CB_S0.03                   0.07       21.6
```

1CB_S0.03		0.08	25.6
1CB_S0.03		0.09	29.8
1CB_S0.03		0.1	33.5
1CB_S0.03		0.11	38
1CB_S0.03		0.12	39
1CB_S0.03		0.4	39
1CB_SAG	Rating	0	0
1CB_SAG		0.01	1
1CB_SAG		0.02	2
1CB_SAG		0.03	4
1CB_SAG		0.04	7
1CB_SAG		0.05	11
1CB_SAG		0.06	16
1CB_SAG		0.07	20
1CB_SAG		0.08	36
1CB_SAG		0.09	48
1CB_SAG		0.1	61
1CB_SAG		0.11	73
1CB_SAG		0.12	86
1CB_SAG		0.13	99
1CB_SAG		0.14	109
1CB_SAG		0.15	120
1CB_SAG		0.16	129
1CB_SAG		0.17	136
1CB_SAG		0.18	145
1CB_SAG		0.19	150
1CB_SAG		0.2	156
1CB_SAG		0.21	161
1CB_SAG		0.22	167
1CB_SAG		0.23	172
1CB_SAG		0.24	176
1CB_SAG		0.25	181
1CB_SAG		0.26	186
1CB_SAG		0.27	189
1CB_SAG		0.28	194
1CB_SAG		0.29	199
1CB_SAG		0.3	202

POST-DEVELOPMENT MODEL

2CB_S0.03	Rating	0	0
2CB_S0.03		0.01	1
2CB_S0.03		0.02	3.4
2CB_S0.03		0.03	11.4
2CB_S0.03		0.04	22
2CB_S0.03		0.05	29.2
2CB_S0.03		0.06	35.8
2CB_S0.03		0.07	43.2
2CB_S0.03		0.08	51.2
2CB_S0.03		0.09	59.6
2CB_S0.03		0.1	67
2CB_S0.03		0.11	76
2CB_S0.03		0.12	78
2CB_S0.03		0.4	78
2CB_SAG	Rating	0	0
2CB_SAG		0.01	2
2CB_SAG		0.02	4
2CB_SAG		0.03	8
2CB_SAG		0.04	14
2CB_SAG		0.05	22
2CB_SAG		0.06	32
2CB_SAG		0.07	40
2CB_SAG		0.08	72
2CB_SAG		0.09	96
2CB_SAG		0.1	122
2CB_SAG		0.11	146
2CB_SAG		0.12	172
2CB_SAG		0.13	198
2CB_SAG		0.14	218
2CB_SAG		0.15	240
2CB_SAG		0.16	258
2CB_SAG		0.17	272
2CB_SAG		0.18	290
2CB_SAG		0.19	300
2CB_SAG		0.2	312
2CB_SAG		0.21	322

2CB_SAG		0.22	334
2CB_SAG		0.23	344
2CB_SAG		0.24	352
2CB_SAG		0.25	362
2CB_SAG		0.26	372
2CB_SAG		0.27	378
2CB_SAG		0.28	388
2CB_SAG		0.29	398
2CB_SAG		0.3	404
3CB_S0.03	Rating	0	0
3CB_S0.03		0.01	1.5
3CB_S0.03		0.02	5.1
3CB_S0.03		0.03	17.1
3CB_S0.03		0.04	33
3CB_S0.03		0.05	43.8
3CB_S0.03		0.06	53.7
3CB_S0.03		0.07	64.8
3CB_S0.03		0.08	76.8
3CB_S0.03		0.09	89.4
3CB_S0.03		0.1	100.5
3CB_S0.03		0.11	114
3CB_S0.03		0.12	117
3CB_S0.03		0.4	117
3CB_SAG	Rating	0	0
3CB_SAG		0.01	3
3CB_SAG		0.02	6
3CB_SAG		0.03	12
3CB_SAG		0.04	21
3CB_SAG		0.05	33
3CB_SAG		0.06	48
3CB_SAG		0.07	60
3CB_SAG		0.08	108
3CB_SAG		0.09	144
3CB_SAG		0.1	183
3CB_SAG		0.11	219
3CB_SAG		0.12	258

3CB_SAG		0.13	297
3CB_SAG		0.14	327
3CB_SAG		0.15	360
3CB_SAG		0.16	387
3CB_SAG		0.17	408
3CB_SAG		0.18	435
3CB_SAG		0.19	450
3CB_SAG		0.2	468
3CB_SAG		0.21	483
3CB_SAG		0.22	501
3CB_SAG		0.23	516
3CB_SAG		0.24	528
3CB_SAG		0.25	543
3CB_SAG		0.26	558
3CB_SAG		0.27	567
3CB_SAG		0.28	582
3CB_SAG		0.29	597
3CB_SAG		0.3	606
4CB_S0.03	Rating	0	0
4CB_S0.03		0.01	2
4CB_S0.03		0.02	6.8
4CB_S0.03		0.03	22.8
4CB_S0.03		0.04	44
4CB_S0.03		0.05	58.4
4CB_S0.03		0.06	71.6
4CB_S0.03		0.07	86.4
4CB_S0.03		0.08	102.4
4CB_S0.03		0.09	119.2
4CB_S0.03		0.1	134
4CB_S0.03		0.11	152
4CB_S0.03		0.12	156
4CB_S0.03		0.4	156
5CB_S0.03	Rating	0	0
5CB_S0.03		0.01	2.5
5CB_S0.03		0.02	8.5
5CB_S0.03		0.03	28.5

```
5CB_S0.03                   0.04       55
5CB_S0.03                   0.05       73
5CB_S0.03                   0.06       89.5
5CB_S0.03                   0.07       108
5CB_S0.03                   0.08       128
5CB_S0.03                   0.09       149
5CB_S0.03                   0.1        167.5
5CB_S0.03                   0.11       190
5CB_S0.03                   0.12       195
5CB_S0.03                   0.4        195

6CB_S0.03        Rating     0          0
6CB_S0.03                   0.01       3
6CB_S0.03                   0.02       10.2
6CB_S0.03                   0.03       34.2
6CB_S0.03                   0.04       66
6CB_S0.03                   0.05       87.6
6CB_S0.03                   0.06       107.4
6CB_S0.03                   0.07       129.6
6CB_S0.03                   0.08       153.6
6CB_S0.03                   0.09       178.8
6CB_S0.03                   0.1        201
6CB_S0.03                   0.11       228
6CB_S0.03                   0.12       234
6CB_S0.03                   0.4        234

7CB_S0.03        Rating     0          0
7CB_S0.03                   0.01       3.5
7CB_S0.03                   0.02       11.9
7CB_S0.03                   0.03       39.9
7CB_S0.03                   0.04       77
7CB_S0.03                   0.05       102.2
7CB_S0.03                   0.06       125.3
7CB_S0.03                   0.07       151.2
7CB_S0.03                   0.08       179.2
7CB_S0.03                   0.09       208.6
7CB_S0.03                   0.1        234.5
7CB_S0.03                   0.11       266
```

POST-DEVELOPMENT MODEL

```
7CB_S0.03                   0.12       273
7CB_S0.03                   0.4        273

8CB_S0.03        Rating     0          0
8CB_S0.03                   0.01       4
8CB_S0.03                   0.02       13.6
8CB_S0.03                   0.03       45.6
8CB_S0.03                   0.04       88
8CB_S0.03                   0.05       116.8
8CB_S0.03                   0.06       143.2
8CB_S0.03                   0.07       172.8
8CB_S0.03                   0.08       204.8
8CB_S0.03                   0.09       238.4
8CB_S0.03                   0.1        268
8CB_S0.03                   0.11       304
8CB_S0.03                   0.12       312
8CB_S0.03                   0.4        312

9CB_S0.03        Rating     0          0
9CB_S0.03                   0.01       4.5
9CB_S0.03                   0.02       15.3
9CB_S0.03                   0.03       51.3
9CB_S0.03                   0.04       99
9CB_S0.03                   0.05       131.4
9CB_S0.03                   0.06       161.1
9CB_S0.03                   0.07       194.4
9CB_S0.03                   0.08       230.4
9CB_S0.03                   0.09       268.2
9CB_S0.03                   0.1        301.5
9CB_S0.03                   0.11       342
9CB_S0.03                   0.12       351
9CB_S0.03                   0.4        351

[TIMESERIES]
;;Name           Date       Time       Value
;;-------------- ---------- ---------- ----------
03H100C                     0:00       0
03H100C                     0:10       6.05
```

03H100C	0:20	7.54
03H100C	0:30	10.16
03H100C	0:40	15.97
03H100C	0:50	40.65
03H100C	1:00	178.56
03H100C	1:10	54.05
03H100C	1:20	27.32
03H100C	1:30	18.24
03H100C	1:40	13.74
03H100C	1:50	11.06
03H100C	2:00	9.29
03H100C	2:10	8.02
03H100C	2:20	7.08
03H100C	2:30	6.35
03H100C	2:40	5.76
03H100C	2:50	5.28
03H100C	3:00	4.88
03H120C	0:00	0
03H120C	0:10	7.26
03H120C	0:20	9.048
03H120C	0:30	12.192
03H120C	0:40	19.164
03H120C	0:50	48.78
03H120C	1:00	214.272
03H120C	1:10	64.86
03H120C	1:20	32.784
03H120C	1:30	21.888
03H120C	1:40	16.488
03H120C	1:50	13.272
03H120C	2:00	11.148
03H120C	2:10	9.624
03H120C	2:20	8.496
03H120C	2:30	7.62
03H120C	2:40	6.912
03H120C	2:50	6.336
03H120C	3:00	5.856

POST-DEVELOPMENT MODEL

```
[REPORT]
;;Reporting Options
INPUT      YES
CONTROLS   NO
SUBCATCHMENTS ALL
NODES ALL
LINKS ALL

[TAGS]

[MAP]
DIMENSIONS       366080.2087      5030220.22155    366695.2693      5030739.82745
UNITS            Meters

[COORDINATES]
;;Node           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
ALB-OF           366143.745         5030491.113
OF1              366561.224         5030486.487
OF2              366561.962         5030485.749
OF3              366487.932         5030457.828
OF4              366521.881         5030385.55
OF5              366379.435         5030410.818
OF6              366346.034         5030492.952
OF7              366197.772         5030338.959
SU1              366196.986         5030339.745
SU10             366423.129         5030613.526
SU11             366317.45          5030549.462
SU12             366489.932         5030653.498
SU13             366534.832         5030681.424
SU14             366570.424         5030600.933
SU15             366652.01          5030522.084
SU16             366589.041         5030422.427
SU17             366152.634         5030447.615
SU2              366345.376         5030493.61
SU3              366378.777         5030411.476
SU4              366408.893         5030335.912
SU5              366521.143         5030386.288
```

```
SU6              366554.544         5030311.272
SU7              366487.194         5030458.566
SU8              366459.816         5030525.917
SU9              366443.389         5030564.793
ALB-BOO          366429.516         5030630.229
ALB-LOR          366495.464         5030670.72
ALB-PRE          366161.116         5030463.904
ALB-PRI          366537.409         5030695.935
ALB-ROC          366323.562         5030567.191
BOO-LP1          366468.067         5030537.126
BOO-LP2          366451.58          5030575.434
ELM-BOO          366528.923         5030398.925
ELM-PRI          366386.601         5030423.171
ELM-ROC          366418.363         5030349.222
LOR              366595.842         5030437.476
PRE              366210.835         5030353.976
PRI              366575.96          5030612.53
PRI-BOO          366497.404         5030471.42
PRI-EMP          366657.702         5030537.068
PRI-LOR          366568.929         5030500.03
ROC-LP1          366349.02          5030507.061
SPR-BOO          366561.898         5030324.249

[VERTICES]
;;Link           X-Coord            Y-Coord
;;-------------- ------------------ ------------------
OL19             366561.087         5030495.555
OL20             366486.731         5030467.56
OL21             366519.9           5030396.484
OL22             366377.233         5030420.154
OL23             366209.658         5030342.429
OL24             366340.592         5030502.152

[POLYGONS]
;;Subcatchment   X-Coord            Y-Coord
;;-------------- ------------------ ------------------
33               366619.39          5030289.71
33               366592.332         5030253.03
```

POST-DEVELOPMENT MODEL

```
33               366592.332         5030253.03
33               366552.97          5030243.84
33               366552.97          5030243.84
33               366527.372         5030297.603
33               366527.372         5030297.603
33               366544.282         5030311.094
33               366544.282         5030311.094
33               366537.925         5030336.48
33               366537.925         5030336.48
33               366541.376         5030359.772
33               366541.376         5030359.772
33               366581.91          5030377.77
33               366581.91          5030377.77
33               366619.39          5030289.71
34               366467.569         5030415.215
34               366548.303         5030449.668
34               366548.303         5030449.668
34               366548.485         5030449.745
34               366548.485         5030449.745
34               366581.91          5030377.77
34               366581.91          5030377.77
34               366541.376         5030359.772
34               366541.376         5030359.772
34               366537.925         5030336.48
34               366537.925         5030336.48
34               366516.325         5030327.358
34               366516.325         5030327.358
34               366512.08          5030329.18
34               366512.08          5030329.18
34               366508.26          5030333.8
34               366508.26          5030333.8
34               366503.303         5030331.783
34               366503.303         5030331.783
34               366467.569         5030415.215
37               366473.55          5030550.784
37               366503.256         5030564.221
37               366503.256         5030564.221
37               366523.663         5030511.484
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37	366523.663	5030511.484
37	366475.109	5030502.782
37	366475.109	5030502.782
37	366418.8	5030478.49
37	366418.8	5030478.49
37	366409.03	5030482.37
37	366409.03	5030482.37
37	366408.26	5030482.17
37	366408.26	5030482.17
37	366401.53	5030479.211
37	366401.53	5030479.211
37	366395.54	5030498.39
37	366395.54	5030498.39
37	366385.68	5030511.057
37	366385.68	5030511.057
37	366378.272	5030523.863
37	366378.272	5030523.863
37	366392.307	5030530.098
37	366392.307	5030530.098
37	366452.237	5030556.15
37	366452.237	5030556.15
37	366473.55	5030550.784
38	366397.9	5030385.485
38	366467.569	5030415.215
38	366467.569	5030415.215
38	366503.303	5030331.783
38	366503.303	5030331.783
38	366494.117	5030328.046
38	366494.117	5030328.046
38	366500.756	5030313.631
38	366500.756	5030313.631
38	366490.04	5030303.83
38	366490.04	5030303.83
38	366454.418	5030288.218
38	366454.418	5030288.218
38	366450.874	5030289.664
38	366450.874	5030289.664
38	366415.316	5030342.551

POST-DEVELOPMENT MODEL

38	366415.316	5030342.551
38	366397.9	5030385.485
39	366548.485	5030449.745
39	366548.303	5030449.668
39	366548.303	5030449.668
39	366531.64	5030490.871
39	366531.64	5030490.871
39	366523.663	5030511.484
39	366523.663	5030511.484
39	366503.256	5030564.221
39	366503.256	5030564.221
39	366481.219	5030621.173
39	366481.219	5030621.173
39	366502.985	5030642.015
39	366502.985	5030642.015
39	366531.021	5030654.341
39	366531.021	5030654.341
39	366539.111	5030632.511
39	366539.111	5030632.511
39	366563.37	5030585.01
39	366563.37	5030585.01
39	366573.07	5030551.98
39	366573.07	5030551.98
39	366589.47	5030530.98
39	366589.47	5030530.98
39	366617.51	5030534.77
39	366617.51	5030534.77
39	366626.497	5030514.457
39	366626.497	5030514.457
39	366583.83	5030495.579
39	366583.83	5030495.579
39	366574.4	5030463.87
39	366574.4	5030463.87
39	366548.485	5030449.745
40	366515.191	5030686.248
40	366562.582	5030716.209
40	366562.582	5030716.209
40	366566.792	5030706.813

40	366566.792	5030706.813
40	366576.585	5030690.905
40	366576.585	5030690.905
40	366582.947	5030674.588
40	366582.947	5030674.588
40	366531.021	5030654.341
40	366531.021	5030654.341
40	366522.11	5030675.305
40	366522.11	5030675.305
40	366515.191	5030686.248
41	366466.27	5030655.32
41	366515.191	5030686.248
41	366515.191	5030686.248
41	366522.11	5030675.305
41	366522.11	5030675.305
41	366531.021	5030654.341
41	366531.021	5030654.341
41	366502.985	5030642.015
41	366502.985	5030642.015
41	366481.219	5030621.173
41	366481.219	5030621.173
41	366471.07	5030647.4
41	366471.07	5030647.4
41	366466.27	5030655.32
42	366531.021	5030654.341
42	366582.947	5030674.588
42	366582.947	5030674.588
42	366596.751	5030639.188
42	366596.751	5030639.188
42	366617.63	5030596.572
42	366617.63	5030596.572
42	366619.259	5030561.197
42	366619.259	5030561.197
42	366589.47	5030530.98
42	366589.47	5030530.98
42	366573.07	5030551.98
42	366573.07	5030551.98
42	366563.37	5030585.01

POST-DEVELOPMENT MODEL

42	366563.37	5030585.01
42	366539.111	5030632.511
42	366539.111	5030632.511
42	366531.021	5030654.341
43	366629.51	5030483.795
43	366627.384	5030512.453
43	366627.384	5030512.453
43	366626.497	5030514.457
43	366626.497	5030514.457
43	366617.51	5030534.77
43	366617.51	5030534.77
43	366589.47	5030530.98
43	366589.47	5030530.98
43	366619.259	5030561.197
43	366619.259	5030561.197
43	366617.63	5030596.572
43	366617.63	5030596.572
43	366620.419	5030596.721
43	366620.419	5030596.721
43	366639.85	5030595.64
43	366639.85	5030595.64
43	366652.84	5030596.3
43	366652.84	5030596.3
43	366656.016	5030582.215
43	366656.016	5030582.215
43	366667.312	5030555.751
43	366667.312	5030555.751
43	366661.449	5030546.897
43	366661.449	5030546.897
43	366653.74	5030529.165
43	366653.74	5030529.165
43	366629.51	5030483.795
44	366581.91	5030377.77
44	366548.485	5030449.745
44	366548.485	5030449.745
44	366574.4	5030463.87
44	366574.4	5030463.87
44	366583.83	5030495.579

44	366583.83	5030495.579
44	366626.497	5030514.457
44	366626.497	5030514.457
44	366627.384	5030512.453
44	366627.384	5030512.453
44	366629.51	5030483.795
44	366629.51	5030483.795
44	366653.97	5030470.53
44	366653.97	5030470.53
44	366663.764	5030454.432
44	366663.764	5030454.432
44	366615.153	5030433.885
44	366615.153	5030433.885
44	366632.08	5030396.264
44	366632.08	5030396.264
44	366581.91	5030377.77
45	366301.091	5030575.904
45	366350.63	5030599.04
45	366350.63	5030599.04
45	366357.918	5030587.259
45	366357.918	5030587.259
45	366357.58	5030568.31
45	366357.58	5030568.31
45	366360.287	5030562.069
45	366360.287	5030562.069
45	366361.77	5030544.67
45	366361.77	5030544.67
45	366333.939	5030522.615
45	366333.939	5030522.615
45	366268.163	5030488.683
45	366268.163	5030488.683
45	366259.789	5030504.914
45	366259.789	5030504.914
45	366260.266	5030513.543
45	366260.266	5030513.543
45	366244.367	5030541.042
45	366244.367	5030541.042
45	366267.964	5030555.544

POST-DEVELOPMENT MODEL

45	366267.964	5030555.544
45	366291.967	5030570.296
45	366291.967	5030570.296
45	366301.091	5030575.904
46	366357.918	5030587.259
46	366440.91	5030639.287
46	366440.91	5030639.287
46	366466.27	5030655.32
46	366466.27	5030655.32
46	366471.07	5030647.4
46	366471.07	5030647.4
46	366481.219	5030621.173
46	366481.219	5030621.173
46	366472.49	5030616.02
46	366472.49	5030616.02
46	366447.398	5030604.888
46	366447.398	5030604.888
46	366431.26	5030587.84
46	366431.26	5030587.84
46	366413.62	5030580.29
46	366413.62	5030580.29
46	366387.985	5030574.085
46	366387.985	5030574.085
46	366360.287	5030562.069
46	366360.287	5030562.069
46	366357.58	5030568.31
46	366357.58	5030568.31
46	366357.918	5030587.259
47	366150.516	5030439.185
47	366144.31	5030436.46
47	366144.31	5030436.46
47	366125.161	5030426.264
47	366125.161	5030426.264
47	366108.166	5030455.608
47	366108.166	5030455.608
47	366140.746	5030476.592
47	366140.746	5030476.592
47	366166.263	5030493.026

47	366166.263	5030493.026
47	366166.791	5030493.366
47	366166.791	5030493.366
47	366213.887	5030522.31
47	366213.887	5030522.31
47	366225.944	5030529.72
47	366225.944	5030529.72
47	366244.367	5030541.042
47	366244.367	5030541.042
47	366260.266	5030513.543
47	366260.266	5030513.543
47	366259.789	5030504.914
47	366259.789	5030504.914
47	366268.163	5030488.683
47	366268.163	5030488.683
47	366212.111	5030459.768
47	366212.111	5030459.768
47	366212.097	5030459.803
47	366212.097	5030459.803
47	366212.111	5030459.768
47	366212.111	5030459.768
47	366182.194	5030444.334
47	366182.194	5030444.334
47	366150.516	5030439.185
48	366285.83	5030399.63
48	366247.248	5030383.591
48	366247.248	5030383.591
48	366234.603	5030403.004
48	366234.603	5030403.004
48	366212.111	5030459.768
48	366212.111	5030459.768
48	366268.163	5030488.683
48	366268.163	5030488.683
48	366333.939	5030522.615
48	366333.939	5030522.615
48	366361.77	5030544.67
48	366361.77	5030544.67
48	366370.863	5030536.669

POST-DEVELOPMENT MODEL

48	366370.863	5030536.669
48	366378.272	5030523.863
48	366378.272	5030523.863
48	366385.68	5030511.057
48	366385.68	5030511.057
48	366395.54	5030498.39
48	366395.54	5030498.39
48	366401.53	5030479.211
48	366401.53	5030479.211
48	366389.087	5030472.996
48	366389.087	5030472.996
48	366351.34	5030449.657
48	366351.34	5030449.657
48	366307.543	5030424.064
48	366307.543	5030424.064
48	366285.83	5030399.63
49	366503.256	5030564.221
49	366473.55	5030550.784
49	366473.55	5030550.784
49	366452.237	5030556.15
49	366452.237	5030556.15
49	366392.307	5030530.098
49	366392.307	5030530.098
49	366378.272	5030523.863
49	366378.272	5030523.863
49	366370.863	5030536.669
49	366370.863	5030536.669
49	366361.77	5030544.67
49	366361.77	5030544.67
49	366360.287	5030562.069
49	366360.287	5030562.069
49	366387.985	5030574.085
49	366387.985	5030574.085
49	366413.62	5030580.29
49	366413.62	5030580.29
49	366431.26	5030587.84
49	366431.26	5030587.84
49	366447.398	5030604.888

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49              366447.398        5030604.888
49              366472.49         5030616.02
49              366472.49         5030616.02
49              366481.219        5030621.173
49              366481.219        5030621.173
49              366503.256        5030564.221
50              366548.303        5030449.668
50              366467.569        5030415.215
50              366467.569        5030415.215
50              366454.19         5030445.56
50              366454.19         5030445.56
50              366432.29         5030449.492
50              366432.29         5030449.492
50              366418.8          5030478.49
50              366418.8          5030478.49
50              366475.109        5030502.782
50              366475.109        5030502.782
50              366523.663        5030511.484
50              366523.663        5030511.484
50              366531.64         5030490.871
50              366531.64         5030490.871
50              366548.303        5030449.668
51              366247.248        5030383.591
51              366246.32         5030366.3
51              366246.32         5030366.3
51              366223.36         5030355.55
51              366223.36         5030355.55
51              366200.48         5030354.42
51              366200.48         5030354.42
51              366182.086        5030395.395
51              366182.086        5030395.395
51              366174.41         5030392.2
51              366174.41         5030392.2
51              366166.84         5030409.15
51              366166.84         5030409.15
51              366150.516        5030439.185
51              366150.516        5030439.185
51              366182.194        5030444.334
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POST-DEVELOPMENT MODEL

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51              366182.194        5030444.334
51              366212.111        5030459.768
51              366212.111        5030459.768
51              366234.603        5030403.004
51              366234.603        5030403.004
51              366247.248        5030383.591
52              366467.569        5030415.215
52              366397.9          5030385.485
52              366380.24         5030393.48
52              366339.15         5030374.4
52              366304.45         5030352.87
52              366296.88         5030370.78
52              366285.83         5030399.63
52              366307.543        5030424.064
52              366351.34         5030449.657
52              366389.087        5030472.996
52              366401.53         5030479.211
52              366408.26         5030482.17
52              366409.03         5030482.37
52              366418.8          5030478.49
52              366432.29         5030449.492
52              366454.19         5030445.56
52              366467.569        5030415.215

;;Storage Node   X-Coord           Y-Coord
;;--------------- ----------------- ------------------

[SYMBOLS]
;;Gage           X-Coord           Y-Coord
;;--------------- ----------------- ------------------
```

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

****
Element Count
****
Number of rain gages 1
Number of subcatchments ... 18
Number of nodes 43
Number of links 42
Number of pollutants 0
Number of land uses 0

****
Raingage Summary
****

Name	Data Source	Data Type	Recording Interval
RG1	03H120C	INTENSITY	10 min.

****
Subcatchment Summary
****

Name	Area	Width	%Imperv	%Slope	Rain Gage	Outlet
33	0.77	173.12	71.43	3.0000	RG1	SPR-BOO
34	0.78	176.62	71.43	3.0000	RG1	ELM-BOO
37	0.70	157.28	71.43	3.0000	RG1	BOO-LP1
38	0.79	177.32	71.43	3.0000	RG1	ELM-ROC
39	1.21	271.83	71.43	3.0000	RG1	PRI-LOR
40	0.23	51.24	71.43	3.0000	RG1	ALB-PRI
41	0.20	44.25	71.43	3.0000	RG1	ALB-LOR
42	0.68	152.53	71.43	3.0000	RG1	PRI
43	0.38	85.28	71.43	3.0000	RG1	

PRI-EMP					
44	0.78	175.80	71.43	3.0000	RG1
LOR					
45	0.68	154.07	71.43	3.0000	RG1
ALB-ROC					
46	0.44	98.25	71.43	3.0000	RG1
ALB-BOO					
47	0.77	172.57	71.43	3.0000	RG1
ALB-PRE					
48	1.41	316.73	71.43	3.0000	RG1
ROC-LP1					
49	0.63	141.03	71.43	3.0000	RG1
BOO-LP2					
50	0.74	165.46	71.43	3.0000	RG1
PRI-BOO					
51	0.56	125.13	71.43	3.0000	RG1
PRE					
52	1.14	255.87	71.43	3.0000	RG1
ELM-PRI					

****
Node Summary
****

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
ALB-OF	OUTFALL	0.00	0.00	0.0	
OF1	OUTFALL	0.00	0.00	0.0	
OF2	OUTFALL	0.00	0.00	0.0	
OF3	OUTFALL	0.00	0.00	0.0	
OF4	OUTFALL	0.00	0.00	0.0	
OF5	OUTFALL	0.00	0.00	0.0	
OF6	OUTFALL	0.00	0.00	0.0	
OF7	OUTFALL	0.00	0.00	0.0	
SU1	OUTFALL	0.00	0.00	0.0	
SU10	OUTFALL	0.00	0.00	0.0	
SU11	OUTFALL	0.00	0.00	0.0	
SU12	OUTFALL	0.00	0.00	0.0	
SU13	OUTFALL	0.00	0.00	0.0	
SU14	OUTFALL	0.00	0.00	0.0	
SU15	OUTFALL	0.00	0.00	0.0	
SU16	OUTFALL	0.00	0.00	0.0	
SU17	OUTFALL	0.00	0.00	0.0	
SU2	OUTFALL	0.00	0.00	0.0	
SU3	OUTFALL	0.00	0.00	0.0	
SU4	OUTFALL	0.00	0.00	0.0	
SU5	OUTFALL	0.00	0.00	0.0	
SU6	OUTFALL	0.00	0.00	0.0	
SU7	OUTFALL	0.00	0.00	0.0	

SU8	OUTFALL	0.00	0.00	0.0
SU9	OUTFALL	0.00	0.00	0.0
ALB-BOO	STORAGE	61.78	0.40	0.0
ALB-LOR	STORAGE	62.33	0.40	0.0
ALB-PRE	STORAGE	58.95	0.40	0.0
ALB-PRI	STORAGE	62.47	0.40	0.0
ALB-ROC	STORAGE	60.67	0.40	0.0
BOO-LP1	STORAGE	62.23	0.40	0.0
BOO-LP2	STORAGE	62.25	0.40	0.0
ELM-BOO	STORAGE	64.98	0.40	0.0
ELM-PRI	STORAGE	62.36	0.40	0.0
ELM-ROC	STORAGE	63.04	0.40	0.0
LOR	STORAGE	76.87	0.40	0.0
PRE	STORAGE	61.31	0.40	0.0
PRI	STORAGE	62.87	0.40	0.0
PRI-BOO	STORAGE	62.37	0.40	0.0
PRI-EMP	STORAGE	80.19	0.40	0.0
PRI-LOR	STORAGE	72.00	0.40	0.0
ROC-LP1	STORAGE	61.36	0.40	0.0
SPR-BOO	STORAGE	71.56	0.40	0.0

****
Link Summary
****

Name	From Node	To Node	Type	Length	%Slope	Roughness
C1	SPR-BOO	ELM-BOO	CONDUIT	81.6	8.0864	0.0130
C10	PRE	ALB-PRE	CONDUIT	120.7	1.8900	0.0130
C11	PRI-BOO	BOO-LP1	CONDUIT	72.0	0.1945	0.0130
C12	BOO-LP1	BOO-LP2	CONDUIT	41.7	-0.0480	0.0130
C13	BOO-LP2	ALB-BOO	CONDUIT	59.1	0.6263	0.0130
C14	ELM-PRI	ROC-LP1	CONDUIT	91.9	1.0879	0.0130
C15	ROC-LP1	ALB-ROC	CONDUIT	65.3	0.9036	0.0130
C16	ALB-BOO	ALB-ROC	CONDUIT	123.3	0.9003	0.0130
C17	ALB-ROC	ALB-PRE	CONDUIT	192.5	0.8935	0.0130
C2	ELM-BOO	PRI-BOO	CONDUIT	79.1	3.3033	0.0130

C3	LOR	PRI-LOR	CONDUIT	68.1	7.1695 0.0130
C4	PRI-LOR	ALB-LOR	CONDUIT	185.8	5.1565 0.0130
C5	PRI-EMP	PRI-LOR	CONDUIT	96.2	8.5450 0.0130
C6	PRI	ALB-PRI	CONDUIT	91.9	0.3265 0.0130
C7	ALB-PRI	ALB-LOR	CONDUIT	48.9	0.2860 0.0130
C8	ALB-LOR	ALB-BOO	CONDUIT	77.4	0.7107 0.0130
C9	ELM-ROC	ELM-PRI	CONDUIT	80.5	0.8449 0.0130
W1	ALB-PRE	ALB-OF	WEIR		
OL1	ALB-PRE	SU17	OUTLET		
OL10	PRI-LOR	OF2	OUTLET		
OL11	PRI-EMP	SU15	OUTLET		
OL12	PRI	SU14	OUTLET		
OL13	ALB-PRI	SU13	OUTLET		
OL14	ALB-LOR	SU12	OUTLET		
OL15	ALB-BOO	SU10	OUTLET		
OL16	BOO-LP2	SU9	OUTLET		
OL17	BOO-LP1	SU8	OUTLET		
OL18	PRI-BOO	OF3	OUTLET		
OL19	PRI-LOR	OF1	OUTLET		
OL2	PRE	SU1	OUTLET		
OL20	PRI-BOO	SU7	OUTLET		
OL21	ELM-BOO	SU5	OUTLET		
OL22	ELM-PRI	SU3	OUTLET		
OL23	PRE	OF7	OUTLET		
OL24	ROC-LP1	SU2	OUTLET		
OL3	ALB-ROC	SU11	OUTLET		
OL4	ROC-LP1	OF6	OUTLET		
OL5	ELM-PRI	OF5	OUTLET		
OL6	ELM-ROC	SU4	OUTLET		
OL7	ELM-BOO	OF4	OUTLET		
OL8	SPR-BOO	SU6	OUTLET		
OL9	LOR	SU16	OUTLET		

****
Cross Section Summary
****

Conduit	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels	Full Flow

```
----
  C1              18m                 0.35     3.56     0.19    18.00        1
25310.06
  C10             20m_Preston         0.20     2.00     0.10    20.00        1
4499.28
  C11             18m                 0.35     3.56     0.19    18.00        1
3925.81
  C12             18m                 0.35     3.56     0.19    18.00        1
1949.04
  C13             18m                 0.35     3.56     0.19    18.00        1
7044.06
  C14             18m                 0.35     3.56     0.19    18.00        1
9283.36
  C15             18m                 0.35     3.56     0.19    18.00        1
8460.47
  C16             15.5m_Albert_OS     0.23     1.46     0.10    15.00        1
2240.10
  C17             15.5m_Albert_OS     0.23     1.46     0.10    15.00        1
2231.59
  C2              18m                 0.35     3.56     0.19    18.00        1
16176.70
  C3              18m                 0.35     3.56     0.19    18.00        1
23832.00
  C4              18m                 0.35     3.56     0.19    18.00        1
20211.25
  C5              18m                 0.35     3.56     0.19    18.00        1
26017.86
  C6              18m                 0.35     3.56     0.19    18.00        1
5085.65
  C7              15.5m_Albert_OS     0.23     1.46     0.10    15.00        1
1262.66
  C8              15.5m_Albert_OS     0.23     1.46     0.10    15.00        1
1990.28
  C9              18m                 0.35     3.56     0.19    18.00        1
8181.22


  ***************
  Transect Summary
  ***************

  Transect 15.5m_Albert_OS
  Area:
             0.0004     0.0014     0.0033     0.0058     0.0090
             0.0130     0.0177     0.0231     0.0293     0.0362
             0.0438     0.0521     0.0611     0.0709     0.0814
             0.0926     0.1045     0.1172     0.1306     0.1447
             0.1595     0.1751     0.1913     0.2083     0.2261
             0.2445     0.2637     0.2836     0.3042     0.3255
             0.3476     0.3704     0.3939     0.4187     0.4449
```

0.4724 0.5013 0.5315 0.5631 0.5960
0.6303 0.6660 0.7030 0.7413 0.7811
0.8221 0.8646 0.9084 0.9535 1.0000

Hrad:

0.0234 0.0467 0.0701 0.0934 0.1168
0.1402 0.1635 0.1869 0.2102 0.2336
0.2569 0.2803 0.3037 0.3270 0.3504
0.3737 0.3971 0.4205 0.4438 0.4672
0.4905 0.5139 0.5373 0.5606 0.5840
0.6073 0.6307 0.6540 0.6774 0.7008
0.7241 0.7475 0.7633 0.7690 0.7764
0.7854 0.7958 0.8073 0.8198 0.8332
0.8474 0.8623 0.8779 0.8940 0.9107
0.9278 0.9453 0.9632 0.9814 1.0000

Width:

0.0153 0.0307 0.0460 0.0613 0.0767
0.0920 0.1073 0.1227 0.1380 0.1533
0.1687 0.1840 0.1993 0.2147 0.2300
0.2453 0.2607 0.2760 0.2913 0.3067
0.3220 0.3373 0.3527 0.3680 0.3833
0.3987 0.4140 0.4293 0.4447 0.4600
0.4753 0.4907 0.5113 0.5400 0.5688
0.5975 0.6263 0.6550 0.6838 0.7125
0.7413 0.7700 0.7988 0.8275 0.8563
0.8850 0.9138 0.9425 0.9713 1.0000

Transect 18m

Area:

0.0005 0.0020 0.0045 0.0081 0.0126
0.0181 0.0247 0.0322 0.0408 0.0503
0.0609 0.0725 0.0851 0.0986 0.1132
0.1288 0.1454 0.1631 0.1816 0.2003
0.2190 0.2378 0.2571 0.2770 0.2975
0.3186 0.3402 0.3625 0.3853 0.4087
0.4327 0.4573 0.4825 0.5082 0.5346
0.5615 0.5890 0.6171 0.6458 0.6751
0.7049 0.7354 0.7664 0.7980 0.8302
0.8630 0.8964 0.9303 0.9649 1.0000

Hrad:

0.0183 0.0366 0.0549 0.0731 0.0914
0.1097 0.1280 0.1463 0.1646 0.1829
0.2012 0.2194 0.2377 0.2560 0.2743
0.2926 0.3109 0.3292 0.3551 0.3911
0.4270 0.4628 0.4975 0.5304 0.5618
0.5917 0.6201 0.6471 0.6727 0.6971
0.7203 0.7424 0.7633 0.7833 0.8023
0.8203 0.8375 0.8539 0.8695 0.8844
0.8986 0.9121 0.9249 0.9372 0.9489
0.9601 0.9708 0.9810 0.9907 1.0000

Width:

0.0284 0.0568 0.0853 0.1137 0.1421
0.1705 0.1989 0.2274 0.2558 0.2842
0.3126 0.3410 0.3694 0.3979 0.4263
0.4547 0.4831 0.5115 0.5278 0.5278
0.5278 0.5372 0.5537 0.5703 0.5868
0.6033 0.6199 0.6364 0.6529 0.6694
0.6860 0.7025 0.7190 0.7356 0.7521
0.7686 0.7851 0.8017 0.8182 0.8347
0.8512 0.8678 0.8843 0.9008 0.9174
0.9339 0.9504 0.9669 0.9835 1.0000

Transect 20m_Preston
Area:
0.0004 0.0016 0.0036 0.0064 0.0100
0.0144 0.0196 0.0256 0.0324 0.0400
0.0484 0.0576 0.0676 0.0784 0.0900
0.1024 0.1156 0.1296 0.1444 0.1600
0.1764 0.1936 0.2116 0.2304 0.2500
0.2704 0.2916 0.3136 0.3364 0.3600
0.3844 0.4096 0.4356 0.4624 0.4900
0.5184 0.5476 0.5776 0.6084 0.6400
0.6724 0.7056 0.7396 0.7744 0.8100
0.8464 0.8836 0.9216 0.9604 1.0000
Hrad:
0.0199 0.0398 0.0597 0.0796 0.0995
0.1194 0.1393 0.1592 0.1791 0.1990
0.2189 0.2388 0.2587 0.2786 0.2985
0.3184 0.3383 0.3582 0.3781 0.3980
0.4179 0.4378 0.4577 0.4776 0.4975
0.5175 0.5374 0.5573 0.5772 0.5971
0.6170 0.6369 0.6568 0.6767 0.6966
0.7165 0.7364 0.7565 0.7768 0.7971
0.8173 0.8376 0.8579 0.8782 0.8985
0.9188 0.9391 0.9594 0.9797 1.0000
Width:
0.0200 0.0400 0.0600 0.0800 0.1000
0.1200 0.1400 0.1600 0.1800 0.2000
0.2200 0.2400 0.2600 0.2800 0.3000
0.3200 0.3400 0.3600 0.3800 0.4000
0.4200 0.4400 0.4600 0.4800 0.5000
0.5200 0.5400 0.5600 0.5800 0.6000
0.6200 0.6400 0.6600 0.6800 0.7000
0.7200 0.7400 0.7600 0.7800 0.8000
0.8200 0.8400 0.8600 0.8800 0.9000
0.9200 0.9400 0.9600 0.9800 1.0000

****
Analysis Options
****

```
Flow Units ..... LPS
Process Models:
  Rainfall/Runoff ..... YES
  RDII ..... NO
  Snowmelt ..... NO
  Groundwater ..... NO
  Flow Routing ..... YES
  Ponding Allowed ..... YES
  Water Quality ..... NO
Infiltration Method ..... HORTON
Flow Routing Method ..... DYNWAVE
Surcharge Method ..... EXTRAN
Starting Date ..... 07/17/2024 00:00:00
Ending Date ..... 07/17/2024 06:00:00
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 ..... 1.00 sec
Variable Time Step ..... NO
Maximum Trials ..... 8
Number of Threads ..... 8
Head Tolerance ..... 0.001500 m
```

Runoff Quantity Continuity	Volume hectare-m	Depth mm
Total Precipitation	1.106	86.000
Evaporation Loss	0.000	0.000
Infiltration Loss	0.173	13.470
Surface Runoff	0.920	71.504
Final Storage	0.014	1.126
Continuity Error (%)	-0.116	

Flow Routing Continuity	Volume hectare-m	Volume 10^6 ltr
Dry Weather Inflow	0.000	0.000
Wet Weather Inflow	0.920	9.198
Groundwater Inflow	0.000	0.000
RDII Inflow	0.000	0.000
External Inflow	0.000	0.000
External Outflow	0.916	9.162
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 (%) 0.399

****
Highest Continuity Errors
****
Node ALB-PRE (3.51%)
Node ALB-ROC (-1.21%)

****
Highest Flow Instability Indexes
****
All links are stable.

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

****
Routing Time Step Summary
****
Minimum Time Step : 1.00 sec
Average Time Step : 1.00 sec
Maximum Time Step : 1.00 sec
% of Time in Steady State : 0.00
Average Iterations per Step : 2.00
% of Steps Not Converging : 0.00

****
Subcatchment Runoff Summary
****

Subcatchment	Total Precip mm	Total Runon mm	Total Evap mm	Total Infil mm	Imperv Runoff mm	Perv Runoff mm	Total Runoff 10^6 ltr	Total Peak Runoff LPS	Runoff Coeff
33	86.00	0.00	0.00	13.47	60.38				

```
11.12      71.50        0.55   429.09   0.831
  34                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.56   437.76   0.831
  37                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.50   389.83   0.831
  38                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.56   439.49   0.831
  39                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.86   673.74   0.831
  40                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.16   127.01   0.831
  41                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.14   109.66   0.831
  42                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.48   378.05   0.831
  43                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.27   211.37   0.831
  44                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.56   435.74   0.831
  45                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.49   381.88   0.831
  46                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.31   243.51   0.831
  47                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.55   427.72   0.831
  48                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        1.01   785.03   0.831
  49                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.45   349.54   0.831
  50                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.53   410.09   0.831
  51                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.40   310.13   0.831
  52                      86.00       0.00       0.00      13.47      60.38
11.12      71.50        0.81   634.18   0.831


  ******************
  Node Depth Summary
  ******************

  ------------------------------------------------------------------------------
                                  Average  Maximum  Maximum  Time of Max    Reported
                                    Depth    Depth      HGL   Occurrence   Max Depth
  Node                 Type       Meters   Meters   Meters  days hr:min      Meters
  ------------------------------------------------------------------------------
  ALB-OF               OUTFALL      0.00     0.00     0.00     0  00:00        0.00
  OF1                  OUTFALL      0.00     0.00     0.00     0  00:00        0.00
  OF2                  OUTFALL      0.00     0.00     0.00     0  00:00        0.00
  OF3                  OUTFALL      0.00     0.00     0.00     0  00:00        0.00
```

OF4	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
OF5	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
OF6	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
OF7	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU1	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU10	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU11	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU12	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU13	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU14	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU15	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU16	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU17	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU2	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU3	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU4	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU5	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU6	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU7	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU8	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
SU9	OUTFALL	0.00	0.00	0.00	0	00:00	0.00
ALB-BOO	STORAGE	0.02	0.18	61.96	0	01:10	0.18
ALB-LOR	STORAGE	0.02	0.17	62.50	0	01:10	0.17
ALB-PRE	STORAGE	0.03	0.38	59.33	0	01:13	0.38
ALB-PRI	STORAGE	0.01	0.10	62.57	0	01:10	0.10
ALB-ROC	STORAGE	0.02	0.21	60.88	0	01:10	0.21
BOO-LP1	STORAGE	0.02	0.16	62.39	0	01:10	0.16
BOO-LP2	STORAGE	0.02	0.11	62.36	0	01:10	0.11
ELM-BOO	STORAGE	0.01	0.08	65.06	0	01:10	0.08
ELM-PRI	STORAGE	0.01	0.10	62.46	0	01:10	0.10
ELM-ROC	STORAGE	0.01	0.09	63.13	0	01:10	0.09
LOR	STORAGE	0.01	0.07	76.94	0	01:10	0.07
PRE	STORAGE	0.01	0.05	61.36	0	01:10	0.05
PRI	STORAGE	0.01	0.09	62.96	0	01:10	0.09
PRI-BOO	STORAGE	0.01	0.12	62.49	0	01:10	0.12
PRI-EMP	STORAGE	0.01	0.05	80.24	0	01:10	0.05
PRI-LOR	STORAGE	0.01	0.09	72.09	0	01:10	0.09
ROC-LP1	STORAGE	0.02	0.12	61.48	0	01:10	0.12
SPR-BOO	STORAGE	0.01	0.06	71.62	0	01:10	0.06

****
Node Inflow Summary
****

		Maximum	Maximum			Lateral	
Total	Flow						

Node	Type	Lateral Inflow LPS	Total Inflow LPS	Time of Max Occurrence days hr:min	Inflow Volume 10^6 ltr	Inflow Volume 10^6 ltr	Balance Error Percent
ALB-OF	OUTFALL	0.00	983.37	0 01:13	0	0.542	0.000
OF1	OUTFALL	0.00	189.10	0 01:10	0	0.343	0.000
OF2	OUTFALL	0.00	315.17	0 01:10	0	0.571	0.000
OF3	OUTFALL	0.00	116.23	0 01:10	0	0.158	0.000
OF4	OUTFALL	0.00	76.34	0 01:10	0	0.121	0.000
OF5	OUTFALL	0.00	136.64	0 01:10	0	0.212	0.000
OF6	OUTFALL	0.00	390.00	0 01:08	0	0.692	0.000
OF7	OUTFALL	0.00	157.38	0 01:10	0	0.241	0.000
SU1	OUTFALL	0.00	15.74	0 01:10	0	0.0241	0.000
SU10	OUTFALL	0.00	156.00	0 01:03	0	0.378	0.000
SU11	OUTFALL	0.00	390.00	0 01:04	0	0.793	0.000
SU12	OUTFALL	0.00	156.00	0 01:03	0	0.343	0.000
SU13	OUTFALL	0.00	132.04	0 01:10	0	0.182	0.000
SU14	OUTFALL	0.00	230.16	0 01:10	0	0.373	0.000
SU15	OUTFALL	0.00	15.37	0 01:10	0	0.0284	0.000
SU16	OUTFALL	0.00	43.45	0 01:10	0	0.0932	0.000
SU17	OUTFALL	0.00	390.00	0 01:03	0	1.06	0.000
SU2	OUTFALL	0.00	176.99	0 01:10	0	0.171	0.000
SU3	OUTFALL	0.00	341.61	0 01:10	0	0.529	0.000
SU4	OUTFALL	0.00	178.45	0 01:10	0	0.326	0.000
SU5	OUTFALL	0.00	254.46	0 01:10	0		

0.405	0.000							
SU6		OUTFALL	0.00	159.88	0	01:10	0	
0.271	0.000							
SU7		OUTFALL	0.00	387.42	0	01:10	0	
0.526	0.000							
SU8		OUTFALL	0.00	395.00	0	01:10	0	
0.542	0.000							
SU9		OUTFALL	0.00	205.36	0	01:10	0	
0.238	0.000							
ALB-BOO		STORAGE	243.51	1383.15	0	01:10	0.312	
1.19	-0.147							
ALB-LOR		STORAGE	109.66	973.51	0	01:10	0.141	
0.892	-0.069							
ALB-PRE		STORAGE	427.72	2117.22	0	01:10	0.548	
1.66	3.643							
ALB-PRI		STORAGE	127.01	267.16	0	01:10	0.163	
0.275	-0.187							
ALB-ROC		STORAGE	381.88	2146.20	0	01:10	0.49	
1.75	-1.198							
BOO-LP1		STORAGE	389.83	641.79	0	01:10	0.5	
0.664	0.105							
BOO-LP2		STORAGE	349.54	567.92	0	01:10	0.448	
0.57	-0.026							
ELM-BOO		STORAGE	437.76	705.78	0	01:10	0.561	
0.841	-0.047							
ELM-PRI		STORAGE	634.18	892.55	0	01:10	0.813	
1.05	-0.005							
ELM-ROC		STORAGE	439.49	439.49	0	01:10	0.564	
0.564	-0.053							
LOR		STORAGE	435.74	435.74	0	01:10	0.559	
0.559	-0.076							
PRE		STORAGE	310.13	310.13	0	01:10	0.398	
0.398	-0.511							
PRI		STORAGE	378.05	378.05	0	01:10	0.485	
0.485	-0.038							
PRI-BOO		STORAGE	410.09	780.30	0	01:10	0.526	
0.841	-0.016							
PRI-EMP		STORAGE	211.37	211.37	0	01:10	0.271	
0.271	-0.128							
PRI-LOR		STORAGE	673.74	1259.92	0	01:10	0.864	
1.57	0.040							
ROC-LP1		STORAGE	785.03	1190.39	0	01:10	1.01	
1.32	0.407							
SPR-BOO		STORAGE	429.09	429.09	0	01:10	0.55	
0.55	-0.029							

****
Node Surcharge Summary
****

No nodes were surcharged.

****
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
ALB-BOO	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	1336.68
ALB-LOR	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	956.33
ALB-PRE	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	1373.37
ALB-PRI	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	264.71
ALB-ROC	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	2002.33
BOO-LP1	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	615.49
BOO-LP2	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	551.81
ELM-BOO	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	701.17
ELM-PRI	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	883.83
ELM-ROC	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	436.88
LOR	0.000	0.0	0.0	0.0	0.000	0.0	0 00:00	434.66
PRE	0.000	0.0	0.0	0.0	0.000	0.0	0	

```
00:00     306.18
  PRI                    0.000    0.0    0.0    0.0       0.000    0.0       0
00:00     370.55
  PRI-BOO                0.000    0.0    0.0    0.0       0.000    0.0       0
00:00     756.65
  PRI-EMP                0.000    0.0    0.0    0.0       0.000    0.0       0
00:00     210.39
  PRI-LOR                0.000    0.0    0.0    0.0       0.000    0.0       0
00:00    1236.88
  ROC-LP1                0.000    0.0    0.0    0.0       0.000    0.0       0
00:00    1168.57
  SPR-BOO                0.000    0.0    0.0    0.0       0.000    0.0       0
00:00     427.93
```

****
Outfall Loading Summary
****

Outfall Node	Flow Freq Pcnt	Avg Flow LPS	Max Flow LPS	Total Volume 10^6 ltr
ALB-OF	5.69	440.90	983.37	0.542
OF1	64.43	24.62	189.10	0.343
OF2	68.90	38.37	315.17	0.571
OF3	57.48	12.71	116.23	0.158
OF4	57.85	9.71	76.34	0.121
OF5	61.48	15.93	136.64	0.212
OF6	71.42	44.86	390.00	0.692
OF7	64.95	17.15	157.38	0.241
SU1	52.32	2.13	15.74	0.024
SU10	63.86	27.43	156.00	0.378
SU11	67.53	54.34	390.00	0.793
SU12	58.35	27.21	156.00	0.343
SU13	59.06	14.30	132.04	0.182
SU14	67.63	25.54	230.16	0.373
SU15	64.55	2.03	15.37	0.028
SU16	69.19	6.23	43.45	0.093
SU17	68.49	71.50	390.00	1.058
SU2	63.09	12.54	176.99	0.171
SU3	69.12	35.43	341.61	0.529
SU4	68.83	21.95	178.45	0.326
SU5	66.36	28.24	254.46	0.405
SU6	68.52	18.29	159.88	0.271
SU7	65.77	37.03	387.42	0.526
SU8	67.81	37.03	395.00	0.542
SU9	66.99	16.45	205.36	0.238

System 62.39 1041.90 5610.57 9.162

****
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	268.05	0	01:10	1.51	0.01	0.20
C10	CHANNEL	133.06	0	01:10	0.82	0.03	0.63
C11	CHANNEL	253.01	0	01:10	0.35	0.06	0.40
C12	CHANNEL	220.55	0	01:10	0.33	0.11	0.39
C13	CHANNEL	346.64	0	01:10	0.84	0.05	0.30
C14	CHANNEL	405.58	0	01:10	0.89	0.04	0.32
C15	CHANNEL	601.73	0	01:10	1.11	0.07	0.35
C16	CHANNEL	1180.68	0	01:10	1.26	0.53	0.85
C17	CHANNEL	1612.33	0	01:10	1.25	0.72	0.95
C2	CHANNEL	370.37	0	01:10	1.15	0.02	0.28
C3	CHANNEL	391.21	0	01:10	1.89	0.02	0.24
C4	CHANNEL	732.63	0	01:10	2.24	0.04	0.27
C5	CHANNEL	195.02	0	01:10	1.19	0.01	0.21
C6	CHANNEL	140.46	0	01:10	0.56	0.03	0.24
C7	CHANNEL	132.66	0	01:10	0.30	0.11	0.57
C8	CHANNEL	800.33	0	01:10	1.05	0.40	0.76
C9	CHANNEL	258.43	0	01:10	0.77	0.03	0.27
W1	WEIR	983.37	0	01:13			0.76
OL1	DUMMY	390.00	0	01:03			
OL10	DUMMY	315.17	0	01:10			
OL11	DUMMY	15.37	0	01:10			
OL12	DUMMY	230.16	0	01:10			
OL13	DUMMY	132.04	0	01:10			
OL14	DUMMY	156.00	0	01:03			
OL15	DUMMY	156.00	0	01:03			
OL16	DUMMY	205.36	0	01:10			
OL17	DUMMY	395.00	0	01:10			
OL18	DUMMY	116.23	0	01:10			
OL19	DUMMY	189.10	0	01:10			
OL2	DUMMY	15.74	0	01:10			
OL20	DUMMY	387.42	0	01:10			
OL21	DUMMY	254.46	0	01:10			
OL22	DUMMY	341.61	0	01:10			
OL23	DUMMY	157.38	0	01:10			
OL24	DUMMY	176.99	0	01:10			
OL3	DUMMY	390.00	0	01:04			
OL4	DUMMY	390.00	0	01:08			
OL5	DUMMY	136.64	0	01:10			

OL6	DUMMY	178.45	0	01:10
OL7	DUMMY	76.34	0	01:10
OL8	DUMMY	159.88	0	01:10
OL9	DUMMY	43.45	0	01:10

****
Flow Classification Summary
****

Conduit	Adjusted /Actual Length	Fraction of Time in Flow Class: Dry	Up Dry	Down Dry	Sub Crit	Sup Crit	Up Crit	Down Crit	Norm Ltd	Inlet Ctrl
C1	1.00	0.09	0.03	0.00	0.34	0.54	0.00	0.00	0.47	0.00
C10	1.00	0.12	0.00	0.00	0.09	0.00	0.00	0.79	0.09	0.00
C11	1.00	0.08	0.09	0.00	0.83	0.00	0.00	0.00	0.94	0.00
C12	1.00	0.07	0.02	0.00	0.91	0.00	0.00	0.00	0.68	0.00
C13	1.00	0.09	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00
C14	1.00	0.07	0.07	0.00	0.59	0.27	0.00	0.00	0.93	0.00
C15	1.00	0.08	0.00	0.00	0.00	0.01	0.00	0.91	0.01	0.00
C16	1.00	0.08	0.02	0.00	0.36	0.54	0.00	0.00	0.04	0.00
C17	1.00	0.09	0.07	0.00	0.40	0.44	0.00	0.00	0.88	0.00
C2	1.00	0.12	0.04	0.00	0.31	0.53	0.00	0.00	0.46	0.00
C3	1.00	0.06	0.00	0.00	0.33	0.60	0.00	0.00	0.78	0.00
C4	1.00	0.13	0.00	0.00	0.00	0.00	0.00	0.87	0.00	0.00
C5	1.00	0.06	0.00	0.00	0.33	0.61	0.00	0.00	0.48	0.00
C6	1.00	0.09	0.00	0.00	0.00	0.00	0.00	0.91	0.00	0.00

```
  C7                     1.00   0.12  0.05  0.00  0.83  0.00  0.00  0.00  0.92
0.00
  C8                     1.00   0.08  0.10  0.00  0.78  0.04  0.00  0.00  0.87
0.00
  C9                     1.00   0.07  0.01  0.00  0.36  0.56  0.00  0.00  0.04
0.00


  *************************
  Conduit Surcharge Summary
  *************************

  ------------------------------------------------------------------------------
                                                          Hours        Hours
                        --------- Hours Full --------   Above Full   Capacity
  Conduit               Both Ends  Upstream  Dnstream   Normal Flow   Limited
  ------------------------------------------------------------------------------
  C10                        0.01      0.01      0.23      0.01         0.01
  C17                        0.01      0.01      0.34      0.01         0.01


  Analysis begun on:  Fri Jul 19 10:00:24 2024
  Analysis ended on:  Fri Jul 19 10:00:25 2024
  Total elapsed time: 00:00:01
```

D.4 Major System Emergency Outlet Correspondence

Wu, Michael

From: Duquette, Vincent <Vincent.Duquette@ottawa.ca>
Sent: August 14, 2026 15:35
To: Smadella, Karin
Cc: Moroz, Peter; Mottalib, Abdul; Abdulkarim, Yasser; simone.bourke; Jhamb, Nishant; hariombina@gmail.com; Crookes, Adam; O'Connell, Erin; Munteanu, Adrian; Laura.Mueller; Gaboury, Jude; Thiffault, Dustin
Subject: RE: LeBreton Flats - Emergency Overland Flow Preston Area - Coordination with Plan of Subdivision and Albert Street/CCC Works

Hi Karin,

Thank you for your patience while we addressed this internally.

At our meeting in early July, we discussed minor and major stormflows from the Lebreton Flats subdivision lands, as well as the 21 ha external major overland flows entering the site at the intersection of Albert St. and Preston St.

While the City previously requested that your team model this external area, we acknowledge your position that evaluating these offsite flows rests with the City. Following internal review, the City has retained a consultant to model the external catchment area and quantify the overland flows directed toward the subdivision. This study will also recommend a major system drainage solution, with the intention of integrating it into the ongoing Albert St. reconstruction project design.

Because the capacity of the Albert St. storm sewer and its downstream segments to the Tailrace outlet depends on these results, we cannot confirm capacity for the Lebreton Flats parcels until the study is complete. The modeling is expected to take 5 to 6 weeks, after which we anticipate being able to confirm available capacity.

In the meantime, we are happy to continue advancing discussions on the other engineering aspects of the subdivision.

Please let us know if you have any questions.

Best Regards,

Vincent Duquette, P.Eng
Project Manager, Infrastructure Approvals | Gestionnaire de projet, Projets d'infrastructure
Development Review – All Ward | Direction de l'examen des projets d'aménagement - Tous les quartiers
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Duquette, Vincent
Sent: Wednesday, July 29, 2026 10:39 PM
To: 'Smadella, Karin' <Karin.Smadella@stantec.com>
Cc: Moroz, Peter <peter.moroz@stantec.com>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Abdulkarim, Yasser

<yasser.abdulkarim@ottawa.ca>; Bourke, Simone <simone.bourke@ottawa.ca>; Jhamb, Nishant <nishant.jhamb@ottawa.ca>; hariombina@gmail.com; Crookes, Adam <adam.crookes@ncc-ccn.ca>; O'Connell, Erin <Erin.OConnell@ottawa.ca>; Munteanu, Adrian <Adrian.Munteanu@ottawa.ca>; Mueller, Laura <laura.mueller@ncc-ccn.ca>; Gaboury, Jude <jude.gaboury@ncc-ccn.ca>; Thiffault, Dustin <dustin.thiffault@stantec.com>
Subject: RE: LeBreton Flats - Emergency Overland Flow Preston Area - Coordination with Plan of Subdivision and Albert Street/CCC Works

Hi Karin,

I wanted to provide an update since we met two weeks ago. We have had several meetings discussing the external major drainage that currently drains to Albert St., and we are currently exploring options to internally investigate this item. We hope to provide you with formal response on this by the end of next week.

Thank you for your patience on this item.

Best Regards,

Vincent Duquette, P.Eng
Project Manager, Infrastructure Approvals | Gestionnaire de projet, Projets d'infrastructure
Development Review – All Ward | Direction de l'examen des projets d'aménagement - Tous les quartiers
Planning, Development and Building Services Department (PDBS)| Direction générale des services de la planification, de l'aménagement et du bâtiment (DGSPAB)
City of Ottawa | Ville d'Ottawa
110 Laurier Avenue West | 110 avenue Laurier Ouest
Ottawa, ON K1P 1J1
613.580.2424 ext./poste 14048, vincent.duquette@ottawa.ca

From: Smadella, Karin <Karin.Smadella@stantec.com>
Sent: Monday, July 13, 2026 4:45 PM
To: Duquette, Vincent <Vincent.Duquette@ottawa.ca>; Gaboury, Jude <jude.gaboury@ncc-ccn.ca>; Thiffault, Dustin <dustin.thiffault@stantec.com>; Munteanu, Adrian <Adrian.Munteanu@ottawa.ca>; Mueller, Laura <laura.mueller@ncc-ccn.ca>
Cc: Moroz, Peter <peter.moroz@stantec.com>; Mottalib, Abdul <Abdul.Mottalib@ottawa.ca>; Abdulkarim, Yasser <yasser.abdulkarim@ottawa.ca>; Bourke, Simone <simone.bourke@ottawa.ca>; Jhamb, Nishant <nishant.jhamb@ottawa.ca>; hariombina@gmail.com; Crookes, Adam <adam.crookes@ncc-ccn.ca>
Subject: RE: LeBreton Flats - Emergency Overland Flow Preston Area - Coordination with Plan of Subdivision and Albert Street/CCC Works

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Hi All – Further to our call this afternoon, I have attached a figure outlining two conceptual options for collection of the emergency overland at Albert Street. The baseplan includes the proposed realignment of the CCC and other adjacent infrastructure.

Thank you,

Karin

Karin Smadella, P.Eng.
Principal, Operations Leader

Stantec

-----Original Appointment-----
From: Smadella, Karin
Sent: Tuesday, July 7, 2026 10:11 AM
To: Smadella, Karin; Duquette, Vincent; Gaboury, Jude; Thiffault, Dustin; Munteanu, Adrian; Mueller, Laura
Cc: Moroz, Peter; Mottalib, Abdul; Abdulkarim, Yasser; Bourke, Simone; Jhamb, Nishant; hariombina@gmail.com; adam.crookes@ncc-ccn.ca
Subject: LeBreton Flats - Emergency Overland Flow Preston Area - Coordination with Plan of Subdivision and Albert Street/CCC Works
When: Monday, July 13, 2026 2:00 PM-2:45 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Microsoft Teams Meeting

Vincent – Please forward to Jon Pach if appropriate.

Thanks,

Karin

Microsoft Teams meeting

Join:

https://teams.microsoft.com/meet/222184554130381?p=8Gbk5Yhzzc7sxoj2fX

Meeting ID: 222 184 554 130 381

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